An Examination of Adolescent Engagement in Risky Behaviours:

Assessing Predictors and Intervening in Schools

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June 6, 2016

A thesis submitted to McGill University in partial fulfillment of the requirements of the degree of

Doctor of Philosophy in School/Applied Child Psychology

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Abstract

Adolescents may engage in risky behaviours as an attempt to manage negative affect and stress during a difficult developmental period, yet using such a maladaptive coping strategy comes at a cost. Given the important potential negative long-term consequences of engaging in risky behaviours, the high prevalence in adolescence, and the clinical implications, there is a need to delineate reliable vulnerability factors, as well as designing and implementing intervention programs. This dissertation is comprised of three manuscripts that collectively contribute to the literature by documenting: (1) personal and environmental factors associated with adolescent risky behaviour engagement; (2) the relationship between different executive function skills and adolescent broad-based engagement in risky behaviours; and (3) the effectiveness of an in-school intervention for adolescents designed to target emotional regulation skills related to risky behaviours. The current research examines adolescents' engagement in risky behaviours in an attempt to identify predictive factors and reduce such engagement through intervention. The three manuscripts are unique as they are the first exploratory examinations of general personal and environmental factors and various executive function skills in relation to broad-based engagement in risky behaviours. Further, the third manuscript is the first attempt to design, implement, and examine the potential benefits for reducing risky behaviours by intervening on a known vulnerability factor. The first manuscript reports on 160 adolescents (46% male and 54% female) between the ages of 12 and 18 (M = 15.17; SD = 1.22) and examined whether personal (i.e., intrapersonal, temperament, symptoms, and coping) and environmental (i.e., interpersonal and negative life events) factors are associated with risky behaviour engagement. Results of the first study indicate that personal factors account for a greater proportion of the variance in risky behaviour engagement as compared to environmental factors. However, while a number of

personal factors (i.e., impulsiveness, low anxious symptoms, and poor self-concept clarity) predict adolescent engagement in risky behaviours, the strongest single predictor of risky behaviours is negative life events (i.e., an environmental factor). Furthermore, age-related comparisons indicate that older male adolescents are most likely to engage in risky behaviours. The second manuscript examined broad-based engagement in risky behaviours and the predictive power of different measures of executive function skills among 102 adolescents (48% male and 52% female) between the ages of 12 and 19 (M = 15.07, SD = 1.53). Results indicated that adolescents who exhibited low overall scores on observer-reported executive function were more likely than adolescents who exhibited high levels of executive function to engage in risky behaviours. However, there was no relationship between the performance-based measure of adolescent executive function and risky behaviours. The third manuscript included 41 adolescents (71% male and 29% female) between the ages of 12 and 17 (M = 14.2, SD = 1.4), and examined the efficacy of a pilot program (i.e., Cognitive Emotion Regulation Training Intended for Youth) to improve cognitive emotion regulation, and reduce subsequent engagement in risky behaviours. Participants made significant gains with regard to using adaptive cognitive emotion regulation strategies (e.g., positive reappraisal and refocusing on planning), yet no benefits were found for reducing maladaptive cognitive emotion regulation strategies or risky behaviours. Taken together, findings from these three studies provide insight into vulnerability factors and intervention for adolescent risky behaviour engagement. Also discussed are the implications of this research for school psychologists who work with adolescents who engage in such maladaptive behavioural patterns.

Keywords: risky behaviours, executive function, cognitive emotion regulation, intervention

Résumé

Les adolescents peuvent adopter des comportements à risque afin de gérer la mauvaise humeur et le stress durant une période de développement difficile, toutefois, cette stratégie mal adaptée peut se retourner contre eux. Étant donné les conséquences potentielles néfastes à long-terme du recours à des comportements à risque, leur fréquence élevée durant l'adolescence, les implications cliniques, il importe de tracer des facteurs de vulnérabilité fiables ainsi que de concevoir et de mettre en place des programmes d'intervention. Cette thèse comporte trois manuscrits qui ensembles, contribuent aux travaux existants en documentant 1) les facteurs personnels et environnementaux associés à prendre part à des comportements à risque durant l'adolescence ; 2) la relation entre différentes fonctions exécutives et les comportements à risque ; et 3) l'efficacité d'une intervention en milieu scolaire conçu pour cibler les stratégies de régulation émotionnelle liés à des comportements à risque. La présente recherche étudie les comportements à risque des adolescents dans le but de déterminer des facteurs prédictifs et, le cas échéant, réduire le recours à de tels comportements par le biais d'intervention. Les trois manuscrits sont uniques puisqu'ils sont les premiers à examiner les facteurs personnels et environnementaux ainsi que les fonctions exécutives en relation à l'adoption globale de comportements à risque. De plus, le troisième manuscrit est la première tentative de concevoir, implanter et d'examiner les bénéfices potentiels de réduction des comportements à risque en intervenant sur un facteur de vulnérabilité connu. Le premier manuscrit fait le compte-rendu sur 160 adolescents (46% de males et 54% de femelles) entre 12 et 18 ans (M=15.17; SD=1.22) et a étudié si les facteurs personnels (i.e. intra personnel, tempérament, symptômes et adaptation) et environnementaux (interpersonnel et évènements de vie négatifs) sont associés au recours à des comportements à risque. Les résultats de la première étude indiquent que les facteurs personnels

comptent pour une plus grande proportion en comparaison aux facteurs environnementaux, en ce qui a trait à l'analyse de variance de recours aux comportements à risque. Toutefois, bien que plusieurs facteurs personnels (i.e. impulsivité, faibles symptômes anxieux, conscience d'une mauvaise image de soi) prédisent le recours aux comportements à risque, le facteur prédictif le plus important est l'évènement de vie négatif (i.e. un évènement environnemental). De plus, en tenant compte des comparaisons liées à l'âge, les adolescents mâles plus âgés sont plus enclins à recourir à des comportements à risque. Le deuxième manuscrit a examiné le recours à des comportements à risque de manière globale et le pouvoir prédictif des différents paramètres liés aux fonctions exécutives parmi 102 adolescents (48 % de male et 52 % de femelles) entre 12 et 19 ans (M= 15.07, SD=1.53). Les résultats indiquent que les adolescents ayant eu de faibles pointages globaux en ce qui a trait aux paramètres d'observation liés aux fonctions exécutives étaient plus enclins que les adolescents avant eu des plus hauts pointages à avoir recours à des comportements à risque. Toutefois, il n'y a pas de lien de cause à effet pour les paramètres de performance des fonctions exécutives chez les adolescents et les comportements à risque. Le troisième manuscrit a examiné l'efficacité d'un projet pilote (i.e. formation pour les jeunes sur la régulation cognitive des émotions) pour 41 adolescents entre 12 et 17 ans (M=14.2, SD=1.4) à améliorer la régulation cognitive des émotions et son effet sur la baisse subséquente du recours aux comportements à risque. Des gains importants ont été signalés pour les participants en ce qui a trait à l'usage d'émotion cognitive mieux adaptée (réévaluation positive et recentrage sur la planification) malgré qu'aucun bénéfice n'ait été noté en ce qui a trait à la réduction d'émotions cognitives mal adaptées ou des recours à des comportements à risque. Lorsque considérés ensembles, les résultats de ces trois études donnent un aperçu des facteurs de vulnérabilité et d'intervention concernant le recours par des adolescents à des comportements à risque. Les

implications de cette étude pour les psychologues scolaires devant intervenir auprès d'adolescents aux prises avec des comportements à risques, sont également discutées.

Mots-clés : comportements à risques, fonctions exécutives, régulation des émotions cognitives, intervention

Acknowledgments

I would like to take the opportunity to thank a few individuals, without whom the completion of this dissertation would not have been possible. First and foremost, a special thank you to my parents and brother who continue to provide me with a safe haven where I can fall down time and time again, and who allow me to lean on them when needed. I would also like to thank my friends for feigning interest in my extended student career, and always knowing never to ask "how's the thesis coming along?" In particular, thanks to Chris, Mike, Steve, and Rob for the eternal entertainment, the support when I needed it most, and most importantly, the laughs. Professionally, I am grateful to three special men. First, from the moment I met Dr. Armando Bertone during my first year of graduate school, I felt a special bond and relatedness that helped motivate and direct me to the 'light at the end of the tunnel.' Second, Dr. Steven R. Shaw and his impressive lab have provided me with an arena within which I was able to grow as a researcher, student, and clinician. Moreover, his kind and approachable demeanour, combined with his wealth of clinical experience, were exactly what I starved for as a graduate student. Finally, Dr. Randy P. Auerbach, possibly unknowingly at first, has served as my academic mentor for almost a decade, and I honestly know that I would not have been able to complete the journey without his witty edits, sassy remarks, and truly genius feedback and advice. I would also like to thank the administration and psychology department at Summit School for taking a chance on a doctoral student and entrusting him with the well-being of so many special children. It truly is a dream position, in a perfect environment, working with a wonderful clientele. Finally, to the love of my life, Celia Lombardi: you are the most beautiful and compassionate person I have ever met and you've supported me in all areas of my life. I look forward to doing the same for you and our '2.5' for many years.

Contribution of Authors

The three manuscripts presented in the dissertation were planned, conceptualized, written, and edited by me. For the first article, my co-author Dr. Steven R. Shaw provided editorial support, whereas Dr. Randy P. Auerbach provided editorial support and a dataset to examine the applicability of social cognitive theory for adolescent risky behaviour engagement. For the second and third articles, my co-author Dr. Steven R. Shaw provided feedback, editorial support, and advice throughout the study. My co-author Dr. Randy P. Auerbach provided editorial support for the second article. My co-author Marie-Michelle Boulanger assisted with the intervention implementation and editorial support for the third article. The data for the second and third articles were collected by me and by research assistants whom I trained and supervised.

Abstract	
Résumé	
Acknowledgments	7
Contribution of Authors	
Table of Contents	9
List of Tables	
List of Appendices	
Introduction	
Chapter I–Review of the Literature	
Chapter II– Manuscript I	
Abstract	39
Risky Behaviours in Adolescence	40
Personal Vulnerability Factors	
Intrapersonal	
Temperament	45
Symptoms	47
Coping	49
Environmental Vulnerability Factors	50
Interpersonal	50
Life Events	52
Goals of the Current Study	53
Method	53
Participants	53
Procedure	54
Measures	54
Statistical Analysis Overview	58
Results	59
Descriptive Data	59
Cumulative Predictive Power of Personal and Environmental Factors	59
The Influence of Personal Factors	60

Table of Contents

The Influence of Environmental Factors	60
Individual Predictors	61
Discussion	62
Personal versus Environmental Factors	62
Specific Predictors of Risky Behaviour Engagement	63
Limitations	67
Clinical Implications	68
References	71
Bridging Manuscripts	. 89
Chapter III – Manuscript II	. 90
Abstract	.91
Executive Function	. 92
Goals of the Current Study	.95
Method	.95
Participants	95
Procedure	96
Measures	. 96
Results	. 98
Descriptive Data	. 98
Association between Observer-Reported and Performance-Based ExecutiveFunction with	
Risky Behaviour Engagement	. 98
Observer-Reported Executive Function Skills on the Engagement in Risky Behaviours	. 99
Discussion 1	100
Limitations	102
Clinical Implications	103
References	106
Bridging Manuscripts	117
Chapter IV– Manuscript III	119
Abstract 1	120
Cognitive Emotion Regulation	123
Risky Behaviours	126

Current Study 12	27
Method 12	28
Participants12	28
Intervention 12	29
The Intervention Team	31
Procedure	31
Measures 13	31
Data Collection	33
Data Analysis	33
Results13	33
Cognitive Emotion Regulation13	34
Adaptive Cognitive Emotion Regulation 13	34
Maladaptive Cognitive Emotion Regulation13	35
Risky Behaviours 13	35
Discussion13	36
Limitations 13	36
Clinical Implications	37
Conclusion 13	38
References14	41
Chapter V– Conclusion 15	50
Bibliography	58

List of Tables

Manuscript I
Table 1. Means, Standard Deviations, and Correlations for Baseline Measures 87
Table 2. Predictors of Risky Behaviours
Manuscript II
Table 1. Means, Standard Deviations, and Correlations for Baseline Measures 113
Table 2. Clarifying the Relationship between Observer-Reported and Performance-Based
Executive Function with Adolescent Risky Behaviour Engagement114
Table 3. Examining the Association between the Indexes that Comprise Observer-Reported
Executive Function and Risky Behaviours115
Table 4. Assessing the Relationships between Specific Observer-Reported Executive Function
Skills and Risky Behaviours116
Manuscript III
Table 1. Mean Group Differences Between the Intervention and Control Groups' Performance on
Pretest Measures
Table 2. Risky Behavior Questionnaire and Cognitive Emotion Regulation Questionnaire Self-
Reported Means and Standard Deviations

List of Appendices

Appendix A. Consent for Executive Function Study (Manuscript II)	195
Appendix B. Assent for Executive Function Study (Manuscript II)	198
Appendix C. Consent fo Intervention Study (Manuscript III)	201
Appendix D. Assent for Intervention Study (Manuscript III)	204
Appendix E. Risky Behavior Questionnaire for Adolescents	207
Appendix F. Cognitive Emotion Regulation Questionnaire	210
Appendix G. Research Ethics Certificate (Manuscript I)	212
Appendix H. Research Ethics Certificate (Manuscripts II and III)	213

Introduction

The engagement in risky behaviours has emerged as an important area of research over the last decade. In particular, adolescence has been identified as the peak period for risk and vulnerability, as youth between the ages of 14 and 17 report engaging in a greater number and frequency of risky behaviours than younger and older individuals (Fergus, Zimmerman, & Caldwell, 2007; Hasin, Stinson, Ogburn, & Grant, 2007; Lahey et al., 2000). However, it is important to delineate between individuals who engage in such behaviours versus those who do not. In fact, most risky behaviours research (e.g., Pharo, Sim, Graham, Gross, & Hayne, 2011) focuses primarily on identifying vulnerability factors that reliably predict risky behaviour engagement:

Adolescence is a risky business. Despite outstanding physical health, the risk of injury or death during adolescence is 2–3 times that of childhood. The primary cause of this increase in morbidity and mortality is heightened risky behavior including drinking, driving, drug-taking, smoking, and unprotected sex. Why is it that some adolescents take big risks, while others do not? (p. 970)

Theoretical Framework

Jessor and Jessor's (1977) Problem Behavior Theory rationalizes the likelihood of an adolescent to engage in risky behaviours as a combination of their protective and risk/vulnerability factors, both of which incorporate individual (personal) and contextual (environmental) influences. If risky behaviours such as "delinquency, tobacco use, alcohol abuse, marijuana and other illicit drug use, and early sexual intercourse experience" (Jessor et al., 2003, p.330) are the result of the interaction between protective factors and vulnerability factors, then it is critical to study which role various factors may serve in relation to risky behaviours, and how important such factors are in relation to each other. Uncovering the direct effects of vulnerability factors, as well as the regulating influence of protective factors could result in a better understanding of an adolescent's exposure to risk and subsequent likelihood of risky behaviour engagement.

For most studies, researchers are typically best-served to "aim small" and attempt to address a specific research question. However, with respect to risky behaviours, the opposite is often true. That is, research has shown that adolescents tend to engage in clusters of risky behaviours (Allen, Leadbeater, & Aber, 1994; Auerbach, Abela, & Ho, 2007; Fergusson, Horwood, & Lynskey, 1994), and according to the Problem Behavior Theory (Jessor & Jessor, 1977), these co-occurring behaviours are best explained by a common cause (e.g., negative affect, stress). As such, a study targeting a specific or singular behaviour (e.g., marijuana use) would miss an adolescent who often uses marijuana, but who is currently using another illicit substance as per their propensity to engage in various risky behaviours interchangeably. As adolescents use an array of risky behaviors (Auerbach, Tsai, & Abela, 2010), the current research program focuses on broad-based versus singular engagement to best represent a given youth's pattern of engagement.

The purpose of the current program of study is to identify predictors of risky behaviours, as well as creating and assessing an in-school group intervention that aims to curb adolescent risky behaviour engagement. First, there is a lack of literature comparing and investigating the predictive power of personal and environmental factors. Furthermore, no research has compared the relationship between different measures of executive function and broad-based engagement in risky behaviours. Finally, there is a scarcity of research on intervention for risky behaviours. As such, the current program of research will not only have important clinical implications, but

will help the understanding of the relationship between numerous vulnerability factors and maladaptive behavioural patterns.

This research program includes three studies that explore: (a) personal and environmental factors associated with adolescent risky behaviour engagement, (b) the relationship between different executive function skills and adolescent broad-based engagement in risky behaviours, and (c) the effectiveness of an in-school intervention for adolescents designed to target emotional regulation skills related to risky behaviours. All of these studies are presented in separate manuscripts. However, each study represents a continuous progression in this field of research. Specifically, the first manuscript, "Applied Social Cognitive Theory: The Interplay between Personal and Environmental Factors in Predicting Adolescent Risky Behaviour," presented in Chapter II, examines the respective predictive effects of personal and environmental factors on adolescent engagement in risky behaviours. The second manuscript, "Clarifying the Relationship between Executive Function and Risky Behavior Engagement in Adolescents" (Claro, Auerbach, & Shaw, under review at Canadian Journal of School Psychology), described in Chapter III, assesses the relationship between different executive function skills and risky behaviours in adolescence. Finally, the third manuscript, "Targeting Vulnerabilities to Risky Behavior: An Intervention for Promoting Adaptive Emotion Regulation in Adolescents" (Claro, Boulanger, & Shaw, 2015), described in Chapter IV and published in Contemporary School Psychology, investigates the efficacy of a novel in-school intervention designed to increase adaptive and decrease maladaptive cognitive emotion regulation skills. Furthermore, potential collateral benefits related to risky behaviours were examined. Each manuscript contains its own introduction, methods, results, and discussion sections. Chapter I reviews the literature on proven and possible vulnerability factors, theories explaining adolescent use of risky behaviours, and

recent trends in risky behaviours research. Chapter V integrates and discusses the findings of the three manuscripts and their contributions to the fields of clinical, school, and developmental psychology.

Chapter I – Review of the Literature

As physical, cognitive, and affective changes emerge in adolescence (Buchanan et al., 1990; Dishion, Nelson, & Bullock, 2004; Rosenblum & Lewis, 2006; Steinberg, 2005), so do new and challenging problems that many individuals are unprepared to manage. As a result, adolescence may be a trying period of life (Avenevoli, Swendsen, He, Burstein, & Merikangas, 2015; Buchanan et al., 1990), particularly as the onset of risky behaviour engagement (e.g., smoking, anti-social behaviour, hazardous alcohol consumption and unprotected sexual intercourse) occurs (Auerbach, Tsai, & Abela, 2010b; DuRant, Smith, Kreiter, & Krowchuk, 1999). Moreover, these risky behaviours can co-occur with one another (Auerbach & Gardiner, 2012; Barrera, Biglan, Ary, & Li, 2001; Burke et al., 1997; van Nieuwenhuijzen et al., 2009), and are associated with "increased risk of poor educational attainment, future morbidity and premature mortality" (Biglan, 2004; as cited in Kipping, Campbell, MacArthur, Gunnell, & Hickman, 2012, p. i1).

Etiology of Adolescent Behaviours

Adolescence has long been regarded as a challenging developmental stage, and Granville Stanley Hall (1904) coined the term, storm and stress, to define this developmental period. Storm and stress consists of three key elements: conflict with parents, mood disruptions, and risky behaviour engagement. Hall (1904) argued that the problems associated with the key elements of the storm and stress view are universal and inevitable, and occur more frequently during adolescence. Modified versions of Hall's theory (1904) have surfaced (e.g., Arnett, 1999) and have confirmed that problem areas including conflict with parents (Gecas & Seff, 1990; Steinberg, 1987), mood disruptions (Larson & Richards, 1994; Petersen et al., 1993), and risky behaviour (Arnett, 1992; Moffitt, 1993) are more likely to occur during adolescence as compared to other developmental periods.

However, Hall's claim of universality has been challenged. For example, Margaret Mead's (1928) *Coming of Age in Samoa* was a study of Samoan culture, with a particular focus on determining whether adolescence manifests itself differently in diverse conditions. Specifically, Mead set out to investigate whether the numerous difficulties encountered by adolescents are simply a product of the developmental stage, or instead are caused by the society within which they belong. Primarily through her study of adolescent girls, Mead concluded that adolescent behaviour is a product of upbringing and culture (1928).

Whether adolescent behaviour is typical during the course of development, biologically mediated and universal (Hall, 1904), or context-specific and socially-acquired through cultural forces (Mead, 1928), adolescence is generally viewed as a difficult developmental stage (Buchanan et al., 1990; Buchanan & Holmbeck, 1998; Holmbeck & Hill, 1988; Offer, Ostrov, & Howard, 1981). A third possibility, put forth by Albert Bandura (1978), is the notion of triadic reciprocity, which posits that there are relationships and interactions between behaviours, the individual, and the environment. Put simply, Bandura argues that there are interactive effects between personal and environmental factors that shape an individual's behaviour.

Risky Behaviours. With respect to maladaptive behaviour, Richard and Shirley Jessor (1977) put forth a psychosocial model (i.e., Problem Behavior Theory [PBT]) in an attempt to explain risky behaviour engagement (e.g., unsafe sexual practices, aggressive and violent behaviours, rule-breaking, dangerous, destructive and illegal behaviours, self-injurious behaviours, alcohol and drug use). Specifically, PBT postulates that any behaviour that deviates from social, cultural, and legal norms and "elicit[s] some form of social control response whether

mild reproof, social rejection or incarceration" (Jessor, 1987, p.380), can be explained by the influence of three separate systems. First, the *personality system* consists of social cognitions, values, expectations, beliefs, and attitudes. Second, the *perceived environmental system* consists of family and peer expectations/influences. Third, the *behavior system* consists of "problem and conventional behavioral structures that work in opposition to one another" (Zamboanga, Carlo, & Raffaelli, 2004, p. 254). In other words, the third system's influence is related to an individual's assertion of independence from family, societal norms, and conventional behavioural structures (Jessor & Jessor, 1977).

Each of the three aforementioned systems of psychosocial influence that comprise the PBT are themselves composed of a multitude of variables that either increase (i.e., vulnerability factors) or decrease (i.e., protective factor) the likelihood of a problem behaviour (Donovan, Jessor, & Costa, 1991). Since the original publication (Jessor & Jessor, 1977), PBT has expanded to include research that tests the overabundance of factors that may strengthen the predictability of risky behaviours, as well as the generalizability and applicability of the model (e.g., Jessor, 2014; Vazsonyi et al., 2010; Zambroanga et al., 2004). In fact, PBT has expanded to include protective factors, as they are absent of risk, act opposite to vulnerability factors, and have an important effect on risky behaviours (Jessor, 1991). For example, Jessor, Bos, Vanderryn, Costa, and Turbin (1995) identified several protective factors (e.g., positive orientation to school, positive relationships with adults, health, attitudinal intolerance of deviance, and perception of social controls) for risky behaviors (alcohol and drug abuse, delinquency, and sexual precocity). Furthermore, Jessor's framework (1991) has developed into a multi-level model that not only includes risky behaviours, vulnerability and protective factors, but incorporates health/life-

compromising outcomes as well (e.g., illness, school failure, social isolation, depression, legal trouble).

Etiology of Risky Behaviours

Although adolescence is the period in life where the onset of many risky behaviours occur and peak (Arnett, 1992), it is important to note that for most, there is a natural decline in engagement in risky behaviours through the transition into adulthood (Bachman et al., 2002). However, for others there is no decline and their maladaptive behaviour during adolescence acts as a precursor to the development of lifelong problems (e.g., substance dependence), which in turn serve as vulnerability factors for comorbid psychopathologies (e.g., mood disorders; Colder, Campbell, Ruel, Richardson, & Flay, 2002; Hesselbrock & Hesselbrock, 2006). Therefore, it would follow that some adolescents present with certain vulnerability factors that cause them to continue their maladaptive behavioural patterns and develop serious problems into adulthood. On the other hand, other adolescents may engage in such behaviours during this period, but will not go on to develop lifelong problems. With regard to adolescent alcohol use, there are as many as four different drinking patterns that are the result of emotional and personality factors, all of which may have different prognoses for alcohol use in adulthood (Hesselbrock & Hesselbrock, 2006). More precisely, differential outcomes, such as increased emotional distress, risk taking, and other alcohol-related problems were related to certain drinking patterns, but not others (Colder et al., 2002).

Several risky behaviours co-occur more often in particular individuals. Clusters of risky behaviours are developed by late adolescence, especially in individuals from lower socioeconomic status families (Petridou et al., 1997). These findings suggest that adolescents who engage in risky behaviours often display a predictable pattern of maladaptive behaviours.

ADOLESCENTS AND RISKY BEHAVIOURS

Furthermore, adolescents who engage in one type of risky behaviour are more likely to employ other non-specific risky behaviours over time (Jessor et al., 2003). The likelihood of cooccurrence is strongest for risky behaviours that are serious problem behaviours (e.g., drug use, delinquency, alcohol use, and sexual precocity) (Jessor, 1991). For example, Jessor and Jessor (1977) found that 61% of high school marijuana users were sexually experienced, whereas only 18% of nonusers were. In sum, adolescents who engage in one form of risky behaviour are more likely to use other risky behaviours, and for some individuals, the additional behaviours they engage in can form clusters of predictable and repetitive patterns of behaviour.

The pathway to adolescent engagement in risky behaviours is equifinal. Specifically, research has implicated both personal (e.g., Auerbach, Abela, Zhu, & Yao, 2007b; Auerbach et al., 2010b; Windle, 1991; Yao et al. 2007) and environmental (e.g., Adrian, Zeman, Erdley, Lisa, & Sim, 2011; Brausch & Gutierrez, 2010; Reilly & Woo, 2004; Wallmyr & Welin, 2006; Youngblade, Curry, Novak, Vogel, & Shenkman, 2006) factors as important determinants of risky behaviour. The following represents a snapshot of known factors that contribute to the engagement in risky behaviours.

Vulnerability Factors. Determinants of behaviour are referred to as vulnerability factors if the predicted behaviours are maladaptive and result in negative outcomes for the individual (McAlister, Perry, & Parcel, 2008). Recurrent and prolonged engagement in risky behaviours has been linked with the development of more serious problems later in life (e.g., Chen, Kandel & Davies, 1997; Kipping et al., 2012). Therefore, risky behaviour engagement is determined by the presence of multiple vulnerability factors.

Vulnerability factors can be classified as personal (i.e., stemming from within the individual) or environmental (i.e., caused by an individual's setting). However, there is an

important distinction to be made amongst vulnerability factors. Specifically, personal factors are typically considered trait-based vulnerability factors, whereas environmental factors are characteristically state-based. The major discrepancy between the two is related to stability, whereby trait-based vulnerability factors are more likely to endure over time. Contrarily, state-based vulnerability factors are more likely to fluctuate over time (Auerbach, Claro, Abela, Zhu, & Yao, 2010).

The presence of a vulnerability factor, whether it is personal or environmental, increases the probability of engaging in risky behaviours; but it is the interaction of numerous vulnerability factors that may present the greatest risk. That is, individuals who present with one vulnerability factor may be at an increased likelihood to engage in risky behaviours, but the individuals who present with multiple vulnerability factors whose likelihood to engage in such behaviours experiences the greatest increase (Auerbach et al., 2010a). Vulnerability factors not only contribute unique risk, but also combine with one another to pose a combined effect on risky behaviours. Therefore, individuals with multiple vulnerability factors not only present with the unique risk of each factor, but also the combined risk, thereby increasing their likelihood to engage in risky behaviours.

Environmental Factors. Past research has found that adverse environmental factors are important predictors of adolescent engagement in risky behaviours (e.g., Youngblade et al., 2006). For example, home setting (Green et al., 2005), peer groups (Clark & Lohéac, 2006), media exposure (Anderson, Huston, Schmitt, Linebarger, & Wright, 2001), and school transitions (Blyth, Simmons, & Carlton-Ford, 1983) have all been shown to have an important predictive role in determining adolescent maladaptive behaviours.

Home Setting. Adolescents are impressionable and as a result, the environments they are exposed to during their adolescent years may shape them for their adult life (Wallmyr & Welin, 2006). In fact, an individual's home environment during childhood is a strong determinant of subsequent risky behaviour engagement (Bradley, Caldwell, & Rock, 1988). For example, exposure to abuse is a significant predictor of risky sexual behaviour, suicidal ideation, and violence (Green et al., 2005). Even a single exposure to interpersonal violence in adolescence predicts some risky behaviours (Green et al., 2005). Montemayor (1983) explains that all families have some instances of parent-adolescent conflict, but some families have parent-adolescent conflict most of the time. Therefore, adolescents with continued exposure to conflict in their immediate environments will be at a heightened vulnerability for risky behaviours.

Peer Groups. Adolescents view peers as more important and influential than family (e.g., Gonzales, Cauce, Friedman, & Mason, 1996; Wang, Fitzhugh, Westerfield, & Eddy, 1995). The shift from parental guidance to peer influences may have positive effects on socialization, but significant detrimental outcomes also emerge. Negative peer groups can have a strong influence on adolescent engagement in risky behaviours. For example, Allen, Porter, and McFarland (2006) demonstrated that susceptibility to peer influence predicted increased depressive symptoms, substance use, externalizing behaviours, and sexual activity. Other studies have found that peer effects have implications for alcohol use, criminal behaviour, and social violations (Clark & Lohéac, 2006; Horvath & Zuckerman, 1993). Moreover, adolescents become dependent on marijuana at a lower frequency and quantity of use than adults, therefore the presence of negative peer influences with regard to drug use will have more adverse effects for adolescents (Chen et al., 1997). Resistance to peer influences only begins to develop at age 14, and susceptibility to peer influence is particularly strong between the ages of 10 and 14 (Steinberg &

Monahan, 2007). These findings suggest that young adolescents may be vulnerable to the negative consequences of peer influence, and moreover, it highlights the critical need for early prevention and intervention.

Media Exposure. Another environmental factor that is an important determinant of adolescent behaviour is media (Anderson et al., 2001). The more exposure one has to such media forms as television and music, the more likely they are to engage in risky behaviours (Klein et al., 1993). Media effects are relevant even for children for whom alcohol consumption is not occurring. Austin and Knaus (2000) demonstrated that beliefs and desires related to alcohol developed by the third grade prime children for future decisions related to substance use. Furthermore, men who recall more alcohol advertisements at age 15 years drink larger quantities of beer at age 18 years (Connolly, Casswell, Zhang, & Silva, 1994).

School Transition. Adolescence is a time of change, and a particularly salient environmental transition occurs when moving from elementary school to high school. Such a transition can be stressful and may explain some of the increased maladaptive behaviours observed in early adolescence (Blyth et al., 1983). In fact, adjusting to school transitions is difficult for early adolescents, as decreases in self-esteem, grade point average, participation in extracurricular activities, and increases in perceived anonymity have all been observed (Blyth et al., 1983). However, Eccles and Midgley (1991) argue that the distinct behavioural patterns observed in adolescence are due to a transitional period that is not only defined by changes in the environment (e.g., school), but an interaction with changes within the individual as well. More precisely, not every adolescent engages in risky behaviours in response to stressful transitions and compromising environments, therefore individual factors must also act as important predictors. *Personal Factors.* Research has implicated personal factors as important determinants of risky behaviours (e.g., Auerbach et al., 2010b; Yao et al. 2007). For example, temperament (Windle, 1991), physical and mental health (Green et al., 2005), neuroticism (Auerbach, Abela, & Ringo Ho, 2007a), executive function (Magar, Phillips, & Hosie, 2008), and cognitive emotion regulation (Auerbach et al., 2010a) have all been strongly associated with adolescent risky behaviour engagement.

Temperament. Although a large quantity of environmental factors have a significant impact on adolescent behaviour, there also exists an important number of personal factors that help determine behaviour. For example, adolescents with difficult temperament factors (e.g., arrythmicity, inflexibility, high distractibility) were more likely to engage in delinquent activity and use substances such as cigarettes, alcohol, marijuana, and illicit drugs (i.e., cocaine, opiates, stimulants, barbiturates, hallucinogens, and inhalants) (Windle, 1991).

Physical and Mental Health. Another factor that affects rates of adolescent engagement in risky behaviour is physical and mental health (Pless, Cripps, Davies, & Wadsworth, 1989). That is, whether an individual presents with a psychological or physical disorder influences their use of risky behaviours. For example, major depression and posttraumatic stress disorder have been associated with many risky behaviours (Green et al., 2005). Such individuals may be using these behaviours (e.g., substance abuse and unsafe sexual practices) as a form of coping with their disorders, as these behaviours can provide temporary, short-term relief from their symptoms. In contrast, individuals with serious biological health concerns, such as cystic fibrosis, sickle cell disease, and insulin dependent diabetes mellitus all showed lower rates of risky behaviours than their peers (Britto et al., 1998; Frey, Guthrie, Loveland-Cherry, Park, & Foster, 1997). However, although individuals with health concerns seem to report lower rates of risky behaviours, they still take "more potentially damaging risks than might be expected" (Britto et al., 1998, p. 250). This phenomenon may be due to an increase in mortality salience (i.e., awareness of death) due to their diagnoses, which leads to a higher willingness to engage in risky behaviours, particularly in males (Hirschberger, Florian, Mikulincer, Goldenberg, & Pyszcynski, 2002). In fact, gender is also an important factor in adolescents, whereby males', but not females' risky behaviour engagement predicted subsequent higher levels of depressive symptoms (Auerbach et al., 2010b).

Neuroticism. Elevated levels of neuroticism are an important cognitive vulnerability factor for risky behaviour engagement. Costa and McCrae (1987, p. 301) define neuroticism as "the tendency to experience negative, distressing emotions." Individuals who present with high levels of neuroticism are more likely than others to experience depressive symptoms and are also more likely to report depressive symptoms as more distressing as compared to individuals with low levels of neuroticism (Robinson & Clore, 2002). Individuals who exhibited high levels of both neuroticism and emotional regulation deficits were more likely to report increased engagement in risky behaviours following increases in symptoms of either depression or anxiety (Auerbach et al., 2007a). Similarly, another study investigated neuroticism and cognitive emotion regulation and found that individuals who exhibited high levels of neuroticism and a tendency to use maladaptive cognitive emotional regulation strategies were more likely than individuals possessing one or neither of these vulnerability factors to report greater engagement in risky behaviours following increases in symptoms of depression (Auerbach et al., 2010a). Therefore, individuals who present with more than one vulnerability factor are at a greater risk to engage in risky behaviours, as in the proposed diathesis-stress model. That is, each vulnerability factor may increase the likelihood of using risky behaviours; however, it is the interaction

between the two that may confer the greatest risk. Such a phenomenon is referred to as a "double bind" (Auerbach et al., 2007a).

Executive function. Another cognitive factor that is related to the engagement in risky behaviours is executive function. Executive function, sometimes referred to as cognitive regulation, is a trait-based personal factor that can be defined as the cognitive skills related to the control of thoughts and goal-directed behaviour (Banfield, Wyland, Macrae, Münte, & Heatherton, 2004). Executive function is a blanket term for cognitive processes such as planning and organizing, working memory, inhibition, mental flexibility, initiation, and monitoring of actions. With regard to personal factors, it is not only possible to identify specific attributes that have a predictive role in relation to risky behaviours, but to also examine the underpinnings (i.e., executive function) of such attributes. Individuals with poor executive function endorse risky behaviours (e.g., joy riding, shoplifting), exaggerate the benefits of engaging in such behaviour, and have a higher incidence of excessive alcohol consumption (Magar et al., 2008). Another study found that deficits in executive function predicted substance use, risky behaviour, and aggression (Ready, Stierman, & Paulsen, 2001). Further, deficits in executive function (i.e., cognitive coping) have been linked to aggression and violence (Paschall & Fishbein, 2002), poor inhibition, impulsivity, and subsequent substance use (Nigg et al., 2006), including opiate use (Brand, Roth-Bauer, Driessen, & Markowitsch, 2008), and general risky behaviour engagement (Romer et al., 2012). Similarly, a meta-analysis found that deficits in executive function were related to significant antisocial behaviour (Morgan & Lilienfeld, 2000). Moreover, Pharo, Sim, Graham, Gross, and Hayne (2011) found that weaknesses in executive function, in conjunction with a risk-taking personality, are predictive of real-world problems and risky behaviour. The basic facets of executive function (e.g., working memory operations, behavioural inhibition, and

task- switching) may subserve successful self-regulation (Hofmann, Schmeichel, & Baddeley, 2012); particularly as individuals who lack proficient executive function skills are susceptible to maladaptive forms of coping. Further, into adolescence, executive function skills are not yet fully developed, and this underdevelopment may be "involved in the range and degree of risky behaviour commonly exhibited by teens" (Pharo et al., 2011, p.970).

As executive function is an umbrella term for a variety of skills, an important distinction centers on the different ways these skills are measured. Specifically, past research has relied heavily on self-report measures to assess executive function (e.g., Barkley &Fischer, 2011; Moffitt & Henry, 1989), and despite advantages to this approach (e.g., sensitive to subtle changes), the focus is not on observable behaviour. Slavney and Pauker (1981) suggest that emotions and behaviour have both subjective and objective components that are both experienced and expressed; however, although clinical intervention is informed by theory, it must depend primarily on what can be demonstrated empirically. Thus, what is observed in relation to executive function (i.e., through observer-reports and performance-based measures) is of particular clinical relevance. Deficits in executive function are associated with risky behaviours (Dawson & Guare, 2010; Magar et al., 2008; Ready et al., 2001), yet delineating the potential differential impact for broad-based risky behaviour engagement between observer-reported and performance-based executive function would address important empirical gaps in the literature.

Cognitive emotion regulation. Adolescent risky behaviour engagement has been associated with the trait-based personal factor cognitive emotion regulation (Auerbach et al., 2010a). Cognitive emotion regulation refers to the conscious cognitive processes that help regulate emotions after negative life events (Garnefski, Kraaij, & Spinhoven, 2001). Individuals who employ high levels of maladaptive cognitive emotion regulation strategies demonstrate increased alcohol consumption, as compared to individuals who endorse lower levels (Goldstein, 2001). A meta-analytic review of the relationship between emotion regulation strategies and four psychopathologies (anxiety, depression, eating, and substance-related disorders) found a large effect size for rumination and a small to medium effect size for reappraisal and acceptance (Aldao, Nolen-Hoeksema, & Schweizer, 2010). Greater use of rumination, a maladaptive cognitive emotion regulation strategy, is related to higher levels of depressive symptoms and risky behaviour (e.g., lying, stealing, truancy, destruction of property; Silk, Steinberg, & Sheffield-Morris, 2003). Conversely, effective emotion regulation skills are negatively associated with conduct problems (Walton & Flouri, 2010). In sum, individuals who lack adaptive emotion regulation strategies, or who endorse maladaptive strategies are more likely to engage in a variety of risky behaviours; some of which include, initiating experimental smoking (Novak & Clayton, 2001), alcohol and marijuana use (Nichols, Mahadeo, Bryant, & Botvin, 2008), hard drug use and increased number of sexual partners (Hessler & Katz, 2010).

Coping and intervention. Coping can be defined as a set of behavioural or cognitive strategies that are used to manage problematic events (Lazarus & Launier, 1978; Pearlin & Schooler, 1978). As previously discussed, many adolescents present with personal vulnerabilities, experience changes within themselves, and are often faced with negative environmental circumstances (e.g., parental divorce, family economic challenges) that place them at risk for a variety of difficulties (Weissberg & O'Brien, 2004). As a result, adolescents are faced with a variety of stressors and negative life events, in response to which effective coping is crucial.

Concurrent and prospective analyses have shown that stress, which often stems from a lack of coping, is related to substance use (e.g., Wills, 1986). However, there is a significant

distinction to be made between individuals who lack coping skills, versus those who employ maladaptive forms of coping. In particular, the use of maladaptive strategies may be a stronger determinant of adolescent risky behavior (Aldao et al., 2010). Repeated use of maladaptive strategies has negative consequences. Individuals who frequently use negative coping strategies (e.g., self-blame, other-blame, rumination, and catastrophizing) are more likely to report lower overall well-being (i.e., lower quality of life) and increased negative affect (i.e., depressive and anxious symptoms) across the lifespan (Garnefski, Koopman, Kraaij, & Cate, 2009; Garnefski & Kraaij, 2006, 2007; Garnefski, Rieffe, Jellesma, Terwogt, & Kraaij, 2007; Massey, Garnefski, & Gebhardt, 2009). With regard to the engagement in risky behaviors, maladaptive coping is associated with drug/alcohol addictions, physical injuries, medical complications, and incarcerations, among others (Auerbach, Richardt, Kertz, & Eberhart, 2012; Chen et al., 1997). Such negative consequences may exacerbate negative affect and lead to a transactional relationship between such symptoms and risky behaviors (Auerbach et al., 2010a). Ineffective coping is related to increased stress and anxiety (Billings & Moos, 1981; Collins, Baum, & Singer, 1983); thus, if an individual lacks specific and positive/adaptive strategies necessary to cope with and regulate the affect associated with stressors, they may seek out other forms of coping (e.g., risky behaviours).

Risky behaviour engagement as a form of coping. At-risk adolescents, many of which can be considered deviant identity individuals, who experience negative life events may engage in risky behaviors as a means to address, and potentially escape, their negative affect (Auerbach et al., 2010a). Additionally, the combination of adverse personal characteristics and unfavorable environmental conditions can result in elevated stress levels, which in conjunction with negative affect, may further increase the likelihood that adolescents engage in risky behaviours as a form of coping. However, individuals who use risky behaviors as a coping style have the potential of falling into an avoidance trap. In the short term, risky behaviors are negatively reinforced because of the temporary relief they provide, and thus, individuals may be apt to use such behaviors again in the future as a coping technique instead of addressing the issues that triggered the negative affect.

Using risky behaviours as a coping mechanism may be particularly appealing for individuals who lack alternative strategies. For example, there is evidence that adolescents who frequently use maladaptive cognitive emotion regulation strategies are more likely to engage in risky behaviours following the experience of depressive symptoms (Auerbach et al., 2010b). Similarly, Auerbach and colleagues (2007) found that adolescents who exhibited maladaptive cognitive coping strategies were more likely to engage in risky behaviours, perhaps as an alternative means to cope with stressful life events. This is consistent with affect regulation models that predict higher levels of cognitive coping will reduce the probability of maladaptive behaviours (Wills, 1986). Importantly, cognitive coping strategies manage the intake of emotionally arousing information (Thompson, 1991), and thus, individuals who lack these skills are more likely to seek out alternative forms of coping. Further, the aforementioned studies lend support to a theoretical diathesis-stress model for the engagement in risky behaviours. Specifically, certain individuals may present with a cognitive vulnerability that is activated in the presence of a stressor, which then results in increased engagement in risky behaviours that are used as a coping mechanism. Although adolescents may use broad-based risky behaviours to manage stress and negative affect, prolonged engagement in these behaviors renders youth susceptible to long-term negative consequences ranging from drug/alcohol dependence to incarceration (Auerbach et al., 2012; Chen et al., 1997).

Intervention. The dangerous implications related to engaging in risky behaviours highlights the need for intervention. However, it is important to avoid employing a "blame the victim" approach (Jessor, 1991). In fact, as the etiology of adolescent engagement in risky behaviours becomes better defined, it is clear that individuals alone cannot be held solely responsible for removing the risk in their lives (Jessor, 1991). Moreover, given the etiological framework for adolescent engagement in risky behaviour is clearly influenced by both personal and environmental factors, it is essential to identify realistic targets for intervention. Environmental vulnerability factors such as family economic challenges, parental divorce, media influence, and lack of mental health support increase the likelihood of adolescent engagement in risky behaviours (Weissberg & O'Brien, 2004); yet intervening on factors related to an individual's circumstance is often difficult. Rarely do clinicians or school psychologists have access or the authority to address and intervene on adolescent environments. However, programs should acknowledge the context within which the intervention takes place (Jessor, 1991). Particularly, if the participants in an intervention program come from adverse environments, it is worth understanding that these individuals not only present with increased risk factors, but protective factors are less likely to be available as well. A lack of protective factors (e.g., adaptive emotion regulation strategies) has been linked to a number of negative consequences ranging from increased depressive and anxious symptoms (Garnefski et al., 2007; Garnefski & Kraaij, 2006, 2007) to risky behaviours (Slee, Garnefski, Spinhoven, & Arensman, 2008). Therefore, intervention administrators should be aware that risky behaviours likely have different purposes for individuals in such adverse environments, versus those from more favourable settings. Accordingly, intervention programs may be more successful in targeting personal vulnerability factors.

One personal vulnerability factor that may allow for decreases in adolescent risky behaviour engagement following effective intervention is emotion regulation. In fact, emotion regulation is one of the most important developmental processes influencing an adolescent's experience of affect; including its quality, intensity, timing, and other dynamic features (Kesek, Zelazo, & Lewis, 2009). Unlike many areas of cognitive development that correlate with age, developmental changes in arousal, motivation, emotions, sensation seeking, risk taking, and reckless behaviors are linked to pubertal maturation (Steinberg, 2005). Consequently, adolescents' ability to control their emotions and level of emotional arousal matures during a specific developmental window, yet is subsequently related to success in many areas of life (Gumora & Arsenio, 2002). Adolescence is a critical developmental stage for the reorganization of many regulatory systems, during which they are faced with a variety of stressors and negative life events (Steinberg, 2005). As such, responding with appropriate regulatory processes will help individuals manage their emotions, which in turn reduces the likelihood of becoming overwhelmed during the experience of threatening or stressful events (Garnefski et al., 2001).

The clustering of risky behaviours is an important notion for intervention purposes as there is a significant difference between treating, intervening, and preventing behaviours as independent entities and as they arise (i.e., "problem of the week approach") versus treating the clusters as interrelated and forming what might be called a risky behaviour syndrome (Jessor, 1991). According to Jessor (1991), the risky behaviour syndrome approach, or dealing with broad based engagement in risky behaviours, is a more comprehensive approach that allows for a more complete intervention program. Some of the implications of such an approach center on the scope of the intervention; targeting widespread behaviours, as opposed to being limited in scope (i.e., targeting a single risky behaviour) is likely to be successful due to the complexity involved with the causal relationships between behaviours.

Jessor (1991) argues that intervention programs should simultaneously aim to reduce risk and promote protective factors. Therefore, dissuading the use of maladaptive emotion regulation strategies, while promoting adaptive strategies, could be a viable intervention approach. However, given the use of negative coping strategies (e.g., maladaptive cognitive emotion regulation or risky behaviours) provides immediate short-term relief, they can become negatively reinforced and may lead to an avoidance trap (Auerbach et al., 2010b). In other words, adolescents avoid dealing with their underlying problems and this may result in increased difficulty curtailing maladaptive coping mechanisms through intervention. Accordingly, including the promotion of protective factors within intervention programs may compensate for the difficulties associated with decreasing maladaptive coping, and ultimately, may reduce risky behavior engagement and their associated negative outcomes.

Principle Aim of Research Program

Although there are numerous studies identifying factors that contribute to risky behaviour engagement, much remains unknown. The findings from previous research have demonstrated that both environmental and personal vulnerability factors play a role in determining adolescent behaviour (e.g., Allen et al., 2006; Windle, 1991); however, it is difficult to delineate their respective effects because these factors often have conceptual, theoretical, and statistical (i.e., correlated) overlap. Similarly, other studies have linked executive function and risky behaviours (Magar et al., 2008), but have not compared different methods of measurement. Finally, numerous studies recognize that there is a lack of intervention programs that aim to decrease risky behaviour engagement by targeting specific vulnerability factors (e.g., Garnefski & Kraaij, 2007; Kraaij et al., 2003). The primary aim of this research program is to extend the literature on the etiology of adolescent risky behaviour engagement and narrow the scope for intervention. Specifically, the primary aim is to use a top down approach by first funneling many vulnerability factors into categories, followed by an analysis of the effects of partitioning a singular factor, and finally the potential benefits of intervening on a specific factor. To address this goal, the current program of research will present three studies investigating: (1) the differences in the strength of association between risky behaviours and personal versus environmental vulnerability factors; (2) the specific relationships between distinctive executive function skills and risky behaviours; and (3) the effectiveness of an intervention targeting a specific risky behaviour vulnerability factor. These manuscripts contribute to the fields of psychopathology, developmental, and school psychology by gaining a better understanding of the contributing factors related to adolescent broad-based engagement in risky behaviours and the potential benefits of in-school interventions.

Manuscript I investigates whether adolescent broad-based engagement in risky behaviours is more strongly associated with personal or environmental factors. Further, the study examined specific factors within these clusters to determine the most significant predictors of risky behaviours. The study offers insight into the application of Albert Bandura's (1986) social cognitive theory for adolescent risky behaviour engagement. Manuscript II investigates the relationship between different executive function skills and risky behaviours in adolescence. The study was especially important in terms of operationalizing youth vulnerability, particularly as this relates to understanding executive function deficits and different methods of measurement. These findings highlight the importance of obtaining teacher input when operationalizing youth vulnerability; particularly as this relates to understanding executive function deficits. Clinical implications for in-school intervention programs are discussed. Finally, Manuscript III
investigates the efficacy of a novel in-school intervention designed to increase adaptive and decrease maladaptive cognitive emotion regulation skills. Furthermore, potential secondary benefits related to risky behaviours were examined. This program of study provides insight not only into psychopathology and developmental psychology research, but also discusses implications for school psychology. Further, these three manuscripts are all interconnected. Manuscript I classifies vulnerability factors into personal and environmental categories, and aims to determine which grouping has a stronger association with adolescent broad-based risky behaviour engagement. Manuscript II builds on this top down approach by focusing on a specific personal vulnerability factor and assessing differences within the singular factor in relation to risky behaviours. Finally, Manuscript III explores the efficacy of a novel in-school intervention program that targets a specific skillset within a personal vulnerability factor and its potential beneficial effects for reducing subsequent risky behaviour engagement.

Chapter II – Manuscript I

Applied Social Cognitive Theory: The Interplay between Personal and Environmental Factors in Predicting Adolescent Risky Behaviour Anthony Claro¹, Randy P. Auerbach² and Steven R. Shaw¹ ¹Department of Educational and Counselling Psychology, McGill University ²Department of Psychiatry, Harvard Medical School; Center for Depression, Anxiety and Stress Research, McLean Hospital

Abstract

Albert Bandura's (1986) social cognitive theory suggests that the interplay among personal and environmental factors shape behaviours, and consequently, these factors may have a profound impact on risky behaviour engagement. In the current study, we examined whether personal (i.e., intrapersonal, temperament, symptoms, and coping) and environmental (i.e., interpersonal and negative life events) factors are associated with adolescent risky behaviour engagement. Results of hierarchical multiple regression analyses indicate that personal factors account for a greater proportion of the variance in risky behaviour engagement as compared to environmental factors. However, while a number of personal factors (i.e., impulsiveness, low anxious symptoms, and poor self-concept clarity) predict adolescent engagement in risky behaviours, the strongest single predictor of risky behaviours is negative life events (i.e., an environmental factor). Additionally, the interaction between two or more factors, regardless of domain, confers greater risk for risky behaviour engagement, and age-related comparisons also indicate that relative to younger males, older male adolescents report greater risky behaviour engagement. Overall, findings support Bandura's social cognitive theory (1986), as both personal and environmental factors interact to predict adolescent risky behaviour.

Keywords: Risky behaviours, personal factors, environmental factors, impulsiveness, anxiety, self-concept clarity, negative life events, adolescents

Applied Social Cognitive Theory: The Interplay between Environmental and Personal Factors in Predicting Adolescent Risky Behaviour

The social cognitive theory (Bandura, 1986) posits that personal and environmental factors are central determinants of behaviour, and Bandura (1986) describes the notion of reciprocal determinism whereby an individual's behaviour influences and is affected by personal factors and their environment. Bandura (1986) defines personal factors as the cognitive, affective, and biological events that happen within the person, and environmental factors are operationalized as the elements in the individual's surroundings that affect their behaviour. These personal and environmental determinants of behaviour can be referred to as vulnerability factors if the predicted behaviours are maladaptive and result in negative outcomes for the individual (McAlister, Perry, & Parcel, 2008).

Risky Behaviours in Adolescence

Given the profound changes across physical, cognitive, and affective domains, adolescence is a challenging period of development (Buchanan et al., 1990). As a result, risky behaviour engagement (e.g., unsafe sexual practices, alcohol and drug use), – which can be used as a form of coping (Auerbach, Claro, Abela, Chu, & Yao, 2010), – is most likely to occur during adolescence (Arnett, 1992; Auerbach, Tsai, & Abela, 2010; Moffitt, 1993). Prevalence studies have found that 65% of Canadian adolescents have engaged in at least one form of risky behaviour (Galambos & Tilton-Weaver, 1998), whereas 73% of American adolescents have had an alcoholic beverage, 46% have tried smoking, 39% have had unprotected sex, 18% have carried a weapon in a survey that assessed activities in the preceding 30 days, and 32% have been in a physical fight in the last year (Eaton et al., 2010). For most adolescents, risky behaviour engagement is a transient phenomenon that tends to decrease in frequency as individuals transition into adulthood (Bachman et al., 2002). However, for others, such behaviour is persistent and serves as a precursor to comorbid psychopathology and associated problems (Colder et al., 2002; Hesselbrock & Hesselbrock, 2006). Given the short- and long-term problems associated with risky behaviour engagement that extends into early- and lateadulthood, it is critical to identify factors that contribute to maladaptive behavioural patterns.

Adolescents tend to engage in multiple types of risky behaviours over time, and consequently, it is important to capture the breadth of these varied behaviours to understand the cumulative impact (Auerbach, Tsai, & Abela, 2010; Jessor, Turbin, Costa, Dong, Zhang, & Wang, 2003; Jessor, 1977; Jessor, 1991). Whereas some adolescents repeatedly use a specific cluster of behaviours over time (e.g., drug use and sexual precocity; Jessor & Jessor, 1977), others use a broad-based non-specific cluster of behaviours, which may vary given environmental availability, financial resources, and age (Auerbach, Abela, & Ho, 2007; Auerbach & Gardiner, 2012). Risky behaviour engagement may also serve a number of functions within the context of an adolescent's life. For example, whereas some adolescents may engage in risky behaviours as a form of coping with negative emotions, other adolescents' risky behaviour engagement may be triggered by familial and peer influences (Allen, Porter, & McFarland, 2006; Glassman, Weierich, Hooley, Deliberto, & Nock, 2007), media exposure (Klein, Brown, Dykers, Childers, Oliveri, & Porter, 1993), difficult temperament factors (Windle, 1991), and underlying personality predispositions (e.g., neuroticism - Auerbach et al., 2007a). Taken together, while there are many factors that potentiate risky behaviour engagement in youth, it remains unclear as to whether personal or environmental factors are more critical for predicting such maladaptive behaviour patterns.

Personal Vulnerability Factors

Individuals present with myriad personal factors (i.e., produced internally and stemming from the personality of the individual) that help determine how they feel, think, and behave. With regard to maladaptive behavioural patterns, the pathway to adolescent engagement in risky behaviours is equifinal. That is, research has implicated personal factors such as intrapersonal characteristics (e.g., impulsiveness; Yao et al. 2007), temperament (Windle, 1991), symptoms (e.g., depressive; Auerbach, Tsai, & Abela, 2010), and coping (e.g., maladaptive responses to stress; Auerbach et al., 2007b) as important determinants of risky behaviour. Considering personal factors and their inherent vulnerability to risky behaviours often endure over time (Auerbach et al., 2010), we aimed to examine a diverse array of factors that characterize adolescent development. Identifying high-risk adolescents will, ultimately, allow clinicians to better target prevention and intervention programs aimed at decreasing risky behavior engagement.

Intrapersonal. Intrapersonal factors are broadly defined as characteristics of the individual that promote resiliency and positive well-being. Research on adolescents suggests that self-esteem (Pyszczynski, Greenberg, Solomon, Arndt, & Schimel, 2004), self-concept (Arnett, 1992; Moffitt, 1993), perceived control (Beck, Steer, Beck, & Newman, 1993), and impulsiveness (Yao et al. 2007) are particularly important to improve our understanding of adolescent engagement in risky behaviours. Research suggests that individuals with greater intrapersonal resources (e.g., self-esteem) cope more effectively with adverse situations, and consequently, they become less susceptible to the consequences of negative affect and stress (Pyszczynski et al., 2004). However, these resources usually fall on a continuum and an individual who possesses too little or too much of a given intrapersonal characteristic may be

vulnerable to negative emotional states or maladaptive behavioural patterns. For example, selfesteem, an evaluation of an individual's own worth, is an underlying personality characteristic that is positively associated with adaptive outcomes (Pyszczynski et al., 2004). However, when adolescents engage in risky behaviours, it contributes to fluctuations (i.e., transient declines) in self-esteem (Auerbach & Gardiner, 2012).

Adolescence is a developmental period defined by change and identity formation. Adolescents become more autonomous (Dishion, Nelson, & Bullock, 2004), develop new social groups (Gonzales, Cauce, Friedman, & Mason, 1996), experience important environmental (Blyth, Simmons, & Carlton-Ford, 1983) and biological (Choudhury, Blakemore, & Charman, 2006) changes, and develop their own identities (Meeus, Iedema, Helsen, & Vollebergh, 1999). Self-concept clarity is involved in an individual's identity development, and it too is in flux during adolescence. Self-concept clarity refers to the extent to which an individual is confident with respect to their collection of beliefs about oneself (Campbell et al., 1996). Nevertheless, for youth who do not possess a coherent self-concept, it is associated with greater conflict with parents (Gecas & Seff, 1990; Steinberg, 1987), more pronounced mood disruptions (Larson & Richards, 1994; Petersen et al., 1993), and greater engagement in risky behaviours (Arnett, 1992; Moffitt, 1993). Individuals with a less coherent self-concept are likely to present with negative (i.e., insecure and avoidant) attachment styles (Armsden & Greenberg, 1987; Wu, 2009), which contribute to adverse relationships with peers (Bowlby, 1973; Sroufe & Fleeson, 1986). Moreover, adolescents who befriend deviant peer groups are at an increased risk for alcohol use, criminal behaviour, and social violations (Clark & Lohéac, 2006; Horvath & Zuckerman, 1993). Given the importance of self-concept within the context of an adolescent's life, we tested whether less coherent self-concept (i.e., low) contributes to greater risky behaviour engagement.

Due to the many changes that occur during adolescence, an individual may feel as if they are not in control of many facets of their life. In fact, perceived control, or an individual's belief in their ability to exert control over important outcomes in their life (Weisz, Southam-Gerow, & Sweeney, 1998) may be difficult to achieve for many adolescents. Further, adolescents who lack a sense of control over academic, social, and behavioural domains in their lives may feel helpless, which is strongly related to depression and suicidal ideation (Beck et al., 1993). In turn, engaging in risky behaviours may be a way of coping with and/or attenuating the negative affect associated with a lack of control. Alternatively, for individuals who report low levels of perceived control, risky behaviour use may offer a sense of control over one's body, environment, and mental state. Regardless of motivation, the current study will investigate whether there is a relationship between perceived control and risky behaviours. It is hypothesized that individuals who believe they have low control over facets of their life will be more likely to engage in risky behaviours, either as a form of coping with negative affect, or as a way of establishing a sense of control.

Similarly, individuals with high levels of impulsiveness are often described as lacking inhibitory control. Such individuals have difficulty restraining motor and verbal actions, as well as thought processes and emotion regulation. As a result, impulsive youth tend to have poor social status (Dodge, 1983), as they are often disliked by their peers (Olson, 1989). In response to this social ostracism, impulsive youth may seek out alternative and unconventional measures in an attempt to make gains in social status. That is, impulsiveness is an intrapersonal trait vulnerability that is associated with adolescent engagement in risky behaviour (Moore & Rosenthal, 1993; Yao et al. 2007). Therefore, risky behaviour engagement may serve multiple purposes for impulsive youth. First, risky behaviours may provide relief from the negative affect

associated with the interpersonal conflicts that result from being disliked by peers (Shrier, Harris, Sternberg, & Beardslee, 2001). Second, risky behaviours may also be the path through which adolescents attempt to regain social status (Prinstein, Boergers, & Spirito, 2001). Alternatively, the expression of an individual's personal factors becomes less apparent with age, except when faced with novel environments that render coping strategies difficult to employ (Goldsmith et al., 1987). Therefore, when adolescents with high levels of impulsiveness encounter novel difficult situations (e.g., negative life events), they may act impulsively and use risky behaviours in order to cope, as opposed to using learned adaptive measures. However, not all individuals with high levels of impulsiveness engage in risky behaviours. Therefore, it may be the combined effect of impulsiveness with another variable that leads to maladaptive behaviours. Moreover, impulsiveness is a heterogeneous factor that has been measured in many ways in the literature, but these varying forms of measurement may not be assessing the exact same construct (Dougherty et al., 2009a). For example, there is an important distinction to be made between individuals who self-injure and those who self-injure and make suicidal attempts based on their levels of self-report versus behavioural impulsiveness (Dougherty et al., 2009b). Perhaps then, some definitions of impulsivity may directly predict the engagement in risky behaviour, whereas others may do so in conjunction with another factor. Auerbach and Gardiner (2012) found that self-reported impulsiveness was associated with risky behaviour engagement and subsequent short-term declines in self-esteem, above and beyond the effects of maladaptive coping. Similarly, the current study will examine whether self-reported impulsiveness predicts risky behaviours above and beyond many other personal and environmental factors.

Temperament. Temperament can be defined as traits (e.g., irritability, fearfulness) that have biological underpinnings, are longstanding in the individual, and are associated with certain

behavioural tendencies (Goldsmith et al., 1987). In terms of behavioural tendencies, Windle (1991) found that difficult temperament factors (e.g., arrythmicity, inflexibility, high distractibility) are associated with risky behaviour engagement. Further, neuroticism (i.e., the tendency to experience negative affect more often) is a temperamental trait vulnerability that is strongly associated with adolescent engagement in risky behaviour (Auerbach et al., 2007a; Auerbach et al., 2010; Carrasco & Del Barrio, 2007; Cooper, Agocha, & Sheldon, 2000; Hendriks & Bijleveld, 2006; Kuntsche, Knibble, Gmel, & Engels, 2006; Larkins & Sher, 2006). Individuals with elevated levels of neuroticism experience mood aversive states more often, as they experience negative affect as more distressing and for longer durations as compared to individuals with low levels of neuroticism (Robinson & Clore 2002; Suls, Green, & Hillis, 1998). Therefore, due to the increased quantity and severity of negative affect experienced by individuals high in neuroticism, as well as their tendency towards avoidant behaviours (Gray, 1990), such individuals are less likely to address the issues that triggered the negative affect, and instead are inclined to engage in risky behaviors as a way to cope (Cooper et al., 2000). In other words, risky behaviors may offer immediate, but temporary relief for individuals with high levels of neuroticism, as they may choose the short-term gains over the potential long-term consequences (Baumeister & Scher, 1988). Yet, another possibility is that because there is a strong association between neuroticism and maladaptive emotion regulation (Kokkonen & Pulkkinen, 2001), individuals may seek out alternative forms of coping (i.e., risky behaviours). Although individuals with high levels of neuroticism are more prone to experience negative affect, they are also less equipped to regulate and cope with such mood states, which may lead them to experiment with risky behaviours and their accompanying short-lived benefits.

In the context of adolescence, when individuals present with high levels of neuroticism and high emotion regulation deficits, they are more likely to engage in risky behaviours (Auerbach, Abela, & Ho, 2007). However, adolescents with high levels of neuroticism and high adaptive emotion regulation do not engage in elevated levels of risky behaviours (Auerbach, Abela, & Ho, 2007). Therefore, not all adolescents with high levels of neuroticism necessarily engage in risky behaviours. It may be the combined effect of neuroticism with another factor that is the underlying cause for risky behaviours. As a result, the current study will delineate the specific predictive power of neuroticism in relation to other personal and environmental factors in order to determine whether there is an exclusive effect for neuroticism above and beyond any factor combination.

Symptoms. When individuals are unable to cope with difficult situations, the result may be increased levels of depressive symptoms (e.g., Rottenberg, Kasch, Gross, & Gotlib, 2002). However, depressive symptoms are often accompanied by serious behavioural implications. For example, depressive symptoms are associated with the engagement in risky behaviours (Auerbach, Tsai, & Abela, 2010). The relationship between depressive symptoms and risky behaviors develops gradually from at-risk symptom expression and scarce maladaptive behavior engagement to clinically significant symptoms and more frequent and serious risky behaviors (Bardone, Moffit, Caspi, & Dickson, 1996; Loeber, Burke, & Lahey, 2002). Individuals may engage in risky behaviours because they provide temporary relief from depressive states (Cooper et al., 2000); however, such engagement is positively reinforced and may encourage future use. The engagement in risky behaviours does not address the antecedent event. Therefore, once the behaviour is completed and the short-term benefits dissipate, the individual is likely to return to the same depressive state that preceded the behaviour (Auerbach et al., 2007b). Although there is a clear association between risky behaviours and depressive symptoms, it is unclear whether there is a direct causal link. Specifically, Auerbach, Tsai, and Abela (2010) found that low levels of perceived control (described earlier) led to higher levels of depressive symptoms, which then increased the likelihood of risky behaviour engagement. Therefore, it is possible that only specific individuals engage in risky behaviours in response to depressive symptoms, primarily as a result of a third vulnerability factor. The current study will examine whether there is a direct relationship between depressive symptoms and adolescent engagement in risky behaviours after controlling for other vulnerability factors.

The relationship between anxiety and risky behaviour engagement is less clear. Although some research has shown a positive association between elevated levels of anxiety and risky behaviour engagement (e.g., Haegler et al., 2010), other research has shown an inverse relationship (e.g., Suhr & Tsanadis, 2007). Moreover, Auerbach, Kertz, and Gardiner (2012) found that anxious symptoms in adolescent boys, but not girls, predicted their subsequent engagement in risky behaviours. Adolescents who present with elevated levels of anxiety may avoid engaging in risky behaviours, as they are more likely to worry, be less impulsive, and perseverate on the potential consequences of such behaviours. Conversely, higher levels of anxiety may result in increased use of risky behaviours among adolescents who may be attempting to manage their symptoms. Moreover, as anxious symptoms often reoccur over the course of a lifetime (Gliatto, 2000), individuals who manage their symptoms with risky behaviour engagement may repeatedly employ this maladaptive coping style over many years. Presently, it currently remains unclear whether anxiety exerts a direct impact on potentiating risky behaviours, and thus, the current study will aim to examine the anxiety-risky behaviour relationship in the context of personal and environmental variables.

Coping. Adolescents who use poor coping strategies (e.g., maladaptive emotion regulation) are more likely to engage in risky behaviours (Auerbach et al., 2010). Therefore, not only is there a negative impact on emotional well-being for those who use maladaptive coping, but there are important behavioural outcomes as well.

Individuals who use high levels of maladaptive coping strategies (e.g., disengagement coping, involuntary engagement coping, and involuntary disengagement coping) to manage stress tend have an increased likelihood of engaging in risky behaviours (Auerbach, Abela, Zhu, & Yao, 2007). A possible explanation centers on the fact that some aspects of negative emotional states (total, physical, and social anxiety symptoms) may be the path through which stress predicts risky behavior engagement (Auerbach, Kertz, & Gardiner, 2012). Therefore, individuals who use maladaptive coping strategies for stress may also be faced with negative affect stemming from the use of such negative strategies. Individuals may subsequently engage in risky behaviours in response to either the initial unaddressed stress or the resulting negative affect. However, as maladaptive behaviours are ineffective in managing stress, they may in turn increase overall stress levels and generate novel stressors in other areas of an individual's life (Compas, 1987). For example, a student may perform poorly on an exam, avoid informing his parents, and choose to focus on other schoolwork without addressing the initial stress and negative affect. As a result, the student may begin to fail more assignments and exams, and have their parents only discover their academic struggles at the end of the semester. The parents may choose stern home consequences, further increasing the student's stress. As the stressors begin to build, the student may seek out alternative forms of coping (e.g., engaging in risky behaviours) because they provide short-term relief, yet they do not address underlying stress and/or negative affect.

Taken together, the literature suggests that temperament, maladaptive coping, and intrapersonal factors are concurrently and prospectively associated with risky behaviours. However, little research has examined these vulnerability factors in concurrent models. Such findings are of importance because not only will they add to the etiology of the developmental path to the engagement in risky behaviours, but they can also extend existing theories such as Richard Jessor's general conceptual framework for adolescent risk behaviour (Jessor, 1991). Jessor's framework (1991) is a multi-level model that includes risk and protective factors, risk behaviours, and risk outcomes, but does not include the relative strengths of the relationships between variables. Further, by identifying the strongest vulnerability domains and specific predictors, clinicians will be better informed as to where they should target interventions.

Environmental Vulnerability Factors

Research has also found that environmental factors such as home setting (Bradley, Caldwell, & Rock, 1988), school transition (Blyth, Simmons, & Carlton-Ford, 1983), and media exposure (Klein, Brown, Dykers, Childers, Oliveri, & Porter, 1993) are important predictors of adolescent engagement in risky behaviours. Specifically, difficult immediate environments (e.g., home setting; Youngblade, Curry, Novak, Vogel, & Shenkman, 2006), a lack of interpersonal resources (e.g., social support; Ennett, Bailey, & Federman, 1999), and environmental changes (e.g., school transition; Blyth, Simmons, & Carlton-Ford, 1983) often result in elevated stress levels, which could be a factor that increases the likelihood that adolescents engage in risky behaviours.

Interpersonal. Social support, particularly as it relates to peers, classmates, and parents plays an important role in determining behaviour. These relationships make up the majority of an adolescent's immediate environment. As such, deficient social support is associated with

increased risky behaviours (Ennett, Bailey, & Federman, 1999) in adolescents. Specifically, low social support predicts higher levels of substance abuse (Piko, 2000; Wills & Vaughan, 1989), aggressive behaviours (Benhorin & McMahon, 2008), self-injury (Brausch & Gutierrez, 2010), and unsafe sexual practices (Reilly & Woo, 2004).

Low levels of social support may be associated with risky behaviours through stress. Specifically, a lack of interpersonal resources may result in interpersonal stress, which adolescents report at significantly higher levels than children and adults (Rudolph 2008). Interpersonal stress stems from difficulties with romantic and peer relationships, parenting, deficits in social skills and social support, and depressogenic attributional styles and selfcriticism, among others (Auerbach, Ho, & Kim, 2014; Hammen, 2003). In response to deficient social support, engagement in risky behaviours may provide adolescents with an outlet for their interpersonal stress. Beyond the notion of "blowing off steam," interpersonal stress can trigger emotion dysregulation and impulsivity, which may then lead to subsequent risky behavior engagement (e.g., Adrian, Zeman, Erdley, Lisa, & Sim, 2011).

Another possibility may be related to the fact that risky behaviours contribute to social isolation and that those who tend to engage in such behaviour commonly form deviant peer groups (e.g., Hawkins, Catalano, & Miller, 1992; Lerner & Vicary, 1984; Robins & Ratcliff, 1978). Specifically, as a result of poor social support elsewhere, these deviant peers may be engaging in risky behaviours as a way of seeking the support from "like" others who partake in similar behaviours. Such a pattern of behaviour may result in a vicious cycle of maladaptive behaviours and social ostracism. Taken together, the current study sought to identify the role of low perceived social support and risky behavior engagement after accounting for other variables critically implicated in the occurrence of risky behaviours.

Life Events. The occurrence of negative life events profoundly shapes the likelihood that certain adolescents engage in risky behaviours (Wallmyr & Welin, 2006). Specifically, individuals may have difficulty coping with the stress that stems from negative life events and may seek out an alternative form of coping. For example, individuals who are exposed to chronic stress environments (e.g., low income housing) where negative life events occur more regularly, engage in a greater number of risky behaviors (Youngblade, Curry, Novak, Vogel, & Shenkman, 2006). Concurrent and prospective studies have shown that the stress resulting from negative life events (e.g., abuse, interpersonal violence) is predictive of increased engagement in risky behaviours (e.g., unsafe sexual behaviour, violence; Green et al., 2005; Nash et al., 2005; Windle, 1992).

Additionally, engaging in risky behaviours may offer a welcomed distraction from negative life events. Despite the presence of different types of negative life events in adolescence (i.e., interpersonal versus achievement based), the resulting stress of such events is associated with greater engagement in risky behaviours (Liu & Lin, 2007; Unger at al., 2001). Varying types of negative life events may contribute to different levels of stress, and perhaps to distinct patterns of behaviour; however, the purpose of the engagement in risky behaviours remains the same (i.e., attenuate and/or distract oneself from stress). Unfortunately, engaging in these maladaptive patterns of behaviour may contribute to future negative events, thus perpetuating a vicious cycle. Using risky behaviours as a form of coping with or distracting from the stress associated with negative life events may result in long-term negative consequences, despite the short-term relief they provide (Auerbach, Claro, Abela, Zhu, & Yao, 2010). Thus, negative life events represent a significant vulnerability factor for risky behaviours, which in turn may provide adolescents with a quick and easy way to cope. As a result, the relative predictive power of negative life events will be explored in the current study.

Goals of the Current Study

Personal and environmental factors contribute to risky behaviour engagement (e.g., Allen, Porter, & McFarland, 2006; Windle, 1991), and in the current study, we first tested whether adolescent broad-based engagement in risky behaviours is better predicted by personal or environmental factors. Then, we tested which specific factors within these clusters are the strongest predictors of risky behaviours.

Method

Participants

Participants in the current study were recruited from seven English-language secondary schools in the greater Montreal area. Both parental and participant consent were required to participate prior to the assessment. Every student who received parental consent chose to provide personal consent. Across schools, consent rates ranged between 6% and 38%, with a median rate of 21%. The school with the lowest consent rate had also committed to another research project that had begun prior to the current study, and students could not participate in both. The final sample included 160 adolescents (46% male and 54% female) between the ages of 12 and 18 (M = 15.17; SD = 1.22). The sample was 79.4% Caucasians, 5.6% Asians, 4.4% African Americans, 2.5% Native Americans, 1.3% Hispanic, and 6.8% reported other as their ethnicity. Participants' predominant mother tongues were English (83.2%) and French (13.7%); however, 3.1% of participants reported other.

Procedure

The university ethics board granted approval for the study, and the treatment of participants was in accordance with Canadian Psychological Association ethical standards. During the assessment, which took place at the schools, students completed a demographics form and self-report questionnaires assessing personal and environmental factors. All assessments were administered by trained research assistants and were completed during the course of the school day.

Measures

Questionnaires assessing personal factors. Bandura defines personal factors as the cognitive, affective, and biological events that happen within the person (Bandura, 1978). In other words, the term personal factors can refer to an individual's temperament/personality, preferences, intelligence, and thoughts, among others.

Responses to Stress Questionnaire (RSQ; Connor-Smith, Compas, Wadsworth,

Thomsen, & Saltzman, 2000). The RSQ was designed to measure specific voluntary/controlled and involuntary/automatic coping strategies. The RSQ contains five distinct subscales and each subscale is composed of no less than three unique coping strategies: (a) primary control engagement coping (problem solving, emotion regulation, and emotional expressiveness); (b) secondary control engagement coping (positive thinking, cognitive restructuring, acceptance, and distraction); (c) disengagement coping (avoidance, denial, and wishful thinking); (d) involuntary engagement coping (rumination, intrusive thoughts, physical arousal, emotional arousal, and impulsive action); and (e) involuntary disengagement coping (emotional numbing, cognitive interference, inaction, and escape). In the current study, the Cronbach's α for RSQ subscales ranged from .67 to .83 which indicates moderate to strong internal consistency. An adaptive

subscale (RSQ Adaptive) was created by summing the primary and secondary control engagement coping. A maladaptive subscale (RSQ Maladaptive) was created by summing disengagement coping, involuntary engagement coping, and involuntary disengagement coping. The Cronbach's α for RSQ Adaptive and RSQ Maladaptive were .65 and .83, respectively.

Self-Concept Clarity Scale (SCCS; Campbell et al., 1996). There are 12 items in this scale, each anchored by "not at all" and "very much" on a seven-point Likert scale. After recoding reversed items, the mean score was calculated by averaging the ratings of the 12 items. A higher score represents greater self-clarity. This scale has satisfactory psychometric properties (see Campbell et al., 1996). The SCCS is unidimensional and is positively correlated with self-esteem, temporal stability, and internal consistency of individual's self-descriptions, and negatively correlated with negative affect, neuroticism, anxiety, depression, and the trait of repression–sensitization. The Cronbach's α was .86, which indicates high internal consistency.

NEO Five Factor Inventory—Neuroticism Subscale (FFI-N; Costa & McCrae, 1992).

The FFI-N is a 12-item self-report measure that assesses neuroticism by rating each of the items on a scale of 0 to 4. Scores range from 0 to 48. Higher scores reflect greater levels of neuroticism. Numerous studies have shown high internal consistency and high test–retest reliability (Costa & McCrae, 1992). The Cronbach's α was .83, which indicates high internal consistency.

Barratt Impulsiveness Scale (BIS-11; Patton et al., 1995). The BIS-11 measures an impulsiveness construct that is orthogonal to anxiety and is related to similar personality traits, such as extraversion and sensation seeking. The BIS-11 is made up of three subscales: attentional impulsiveness (e.g., I get easily bored when solving thought problems), motor impulsiveness (e.g., I do things without thinking), and non-planning impulsiveness (e.g., I am more interested

in the present than the future). Patton and colleagues (1995) report internal consistency coefficients for the BIS-11 total score that range from 0.79 to 0.83. In the current study, the Cronbach's α was .75, which indicates high internal consistency.

Perceived Control Scale for Children (PCS; Weisz, Southam-Gerow, & Sweeney, 1998). The PCS is a 24-item self-report questionnaire measuring beliefs about one's perceived ability to exert control over outcomes in the academic, social, and behavioural domains. Participants are asked to rate items using a Likert scale. A total score ranges from 15 (very false) to 45 (very true) with higher scores reflecting a greater level of perceived control. The PCS has strong test–retest reliability (e.g., Margaro & Weisz, 2006). In the current study, the Cronbach's α was .88, indicating high internal consistency.

Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977). The CES-D is a 20-item self-report measure that assesses levels of depressive symptoms. Items on the scale range from 0 to 3 and higher scores reflect greater depressive symptomology. The CES-D has been shown across studies to have strong test–retest reliability and validity amongst adolescents (e.g., Auerbach et al. 2008). In the current study, the Cronbach's α was.91, indicating high internal consistency.

Multidimensional Anxiety Scale for Children (MASC, March et al., 1997; March et al., 1999). The MASC is a 39-item self-report instrument comprising four empirically derived domains of childhood anxiety: physical symptoms, harm avoidance, social anxiety, and separation anxiety. A total score and subscale scores can be calculated by summing relevant items. The Cronbach's α was .90, which indicates high internal consistency.

Questionnaires assessing environmental factors. Bandura (1978) explained that environmental factors include elements in the individual's surroundings that affect their

behaviour. Specifically, environmental factors refer to elements in the physical, cultural, demographic, political, and social surroundings, among others.

Adolescent Life Events Questionnaire (ALEQ; Hankin & Abramson, 2002). The ALEQ

is a self-report questionnaire that was developed to assess a broad range of negative life events (e.g., school/achievement problems, friendship and romantic problems, and family problems) occurring in the past month. Participants were asked to indicate how often such events occurred on a Likert scale ranging from never to always, with higher scores reflecting a greater number of negative life events. Past research has found that the ALEQ has adequate reliability (Hankin & Abramson, 2002). The Cronbach's α was .92, which indicates high internal consistency.

Social Support Scale for Adolescents (SSSA; Harter, 1989). This instrument assesses adolescents' perceived social support from four sources: parents, teachers, classmates, and close friends. Each of the 24 items (six per subscale) uses a forced-choice format; wherein the adolescent first determines which of two statements is most like him or her. After choosing between the statements, the adolescent rates how true it is ("Really true for me" or "Sort of true for me"). This yields a score from 1 to 4 for each item; subscale scores are obtained by averaging relevant items. The Cronbach's α was .77, which indicates high internal consistency.

Questionnaires assessing behavioural outcomes. Bandura's (1978) notion of reciprocal determinism posits that a person's behaviour both influences and is influenced by personal and environmental factors. In the present study, the behaviour of interest is the engagement in risky behaviours.

Risky Behavior Questionnaire for Adolescents (RBQ-A; Auerbach & Gardiner, 2012). The RBQ-A is a 20-item self-report measure that was created to assess frequency of engagement in risky behaviours. Subscales assessed engagement in the following subgroups of behaviours:

(1) unsafe sexual practices; (2) aggressive and/or violent behaviours; (3) rule-breaking; (4) dangerous, destructive, and/or illegal behaviours; (5) self-injurious behaviours; and (6) alcohol and/or drug use. Respondents reported their engagement in such behaviours over the past month. In the current study, the Cronbach's α was .85, indicating high internal consistency.

Statistical Analysis Overview

Objective 1. To determine whether adolescent broad-based engagement in risky behaviours is better predicted by personal or environmental factors. Hierarchical multiple regression was performed with risky behaviours as the dependent variable and the personal (i.e., responses to stress, depressive and anxiety symptoms, self-concept clarity, neuroticism, impulsiveness, and perceived control) and environmental factors (i.e., negative life events and social support) as the predictor variables. In hierarchical multiple regression, the independent variables are entered in two stages with the variables to be controlled for entered in the first stage (e.g., age and gender), and the variables whose relationship will be examined entered in the second stage (e.g., personal and environmental factors). Age and gender were controlled because they are known predictors of risky behaviours (e.g., Auerbach, Tsai, & Abela, 2010) and are not the focus of this study. A statistical test of the change in R^2 from the first stage was used to evaluate the importance of the variables entered in the second stage. All analyses were performed using SPSS 20.0 whereby p<0.05 will indicate statistical significance.

Objective 2. To determine which specific factors (i.e., personal or environmental) are the strongest predictors of risky behaviours. Within the output for the hierarchical multiple regression run for objective 1, *t*-scores, *b* values, and significance levels were provided for each predictor's relationship with the dependent variable, risky behaviour engagement. As a result, a hierarchy within the model can be established for the strongest versus the weakest predictors.

Results

Descriptive Data

Means, standard deviations, and intercorrelations between all measures are included in Table 1. First, individuals who engaged in a greater number of risky behaviours reported higher levels of maladaptive strategies for coping with stress, depressive symptoms, neuroticism, impulsiveness, perceived control, negative life events, and perceived social support. Moreover, these individuals tended to be older adolescent males, and reported lower levels of self-concept clarity. Second, there was no correlation between the engagement in risky behaviours and adaptive strategies for coping with stress or anxious symptoms.

Cumulative Predictive Power of Personal and Environmental Factors on Risky Behaviour Engagement

Age and gender were included in the regression analysis as covariates, while adaptive and maladaptive responses to stress, depressive symptoms, anxious symptoms, self-concept clarity, neuroticism, impulsiveness, perceived control, negative life events, and social support were included as the predictor variables. Table 2 displays the parameter estimate (*b*), the standard error, the *t*-value and the degrees of freedom for the two covariates and ten predictor variables. *R* for regression was significantly different from zero, F(12, 148) = 22.95, p < .001 with R^2 at .47, suggesting a statistically significant relationship between the set of 12 regression coefficients and the dependent variable. The adjusted R^2 value of .43 indicates that almost half of the variability in risky behaviour engagement is predicted by the 12 selected covariates, personal, and environmental factors.

The Influence of Personal Factors on the Engagement in Risky Behaviours

First, the control variables were entered into the regression analysis. *R* for regression was significantly different from zero, $F_{inc}(2, 158) = 8.01$, $p \le .001$ with R^2 at .09, suggesting a statistically significant relationship between the control variables age and gender and the dependent variable risky behaviour engagement. The adjusted R^2 value of .07 indicates that a little less than a tenth of the variability in risky behaviour engagement is predicted by age and gender.

After accounting for the effects of the control variables, the personal factors (i.e., adaptive and maladaptive responses to stress, depressive and anxious symptoms, self-concept clarity, neuroticism, impulsiveness, and perceived control) were entered. Again, *R* for regression was significantly different from zero, $F_{inc}(10, 150) = 7.15$, p < .001 with R^2 at .31, suggesting a statistically significant relationship between the control variables and personal factors and the dependent variable risky behaviour engagement. The *R* Square Change statistic for the increase in R^2 associated with the addition of the personal factors was found to be significant $F_{change}(8, 150) = 6.09$, p < .001, and indicates that the addition of the personal factors to the model increased the predictability of the variability in risky behaviour engagement by 22%. The adjusted R^2 value of .26 indicates that age, gender, adaptive/maladaptive responses to stress, depressive/anxious symptoms, self-concept clarity, neuroticism, impulsiveness, and perceived control predict slightly more than a quarter of the variability in risky behaviour engagement.

The Influence of Environmental Factors on the Engagement in Risky Behaviours

Next, the environmental factors (i.e., negative life events and social support) were entered into the model. *R* for regression was significantly different from zero, $F_{inc}(12, 148) = 6.29$, *p*< .001 with R^2 at .47, suggesting a statistically significant relationship between the control

variables, personal factors, and environmental factors and the dependent variable risky behaviour engagement. The *R* Square Change statistic for the increase in R^2 associated with the addition of the environmental factors was found to be significant $F_{\text{change}}(2, 148) = 22.95$, *p*<.001, and indicates that the addition of the environmental factors to the model increased the predictability of the variability in risky behaviour engagement by 16%.

Taken together, 47% (43% adjusted) of the variability in risky behaviour engagement was predicted by knowing the scores of the 12 regression coefficients. The size and direction of the relationship suggest that a higher level of risky behaviour engagement is associated with older males, low anxious symptoms, low self-concept clarity, high impulsiveness, and high occurrence of negative life events. As indicated by the standardized regression coefficients, the strongest predictor variable was negative life events, followed by low anxiety, low self-concept clarity, and impulsiveness. Table 2 displays the parameter estimate (*b*), the standard error, the t-value and the degrees of freedom for the two covariates and ten predictor variables.

Examining Individual Predictors of Risky Behaviours within the Model

Personal Factors. A statistically significant relationship was found between anxious symptoms and risky behaviour engagement, t(12, 148) = -2.55, $p \le .01$. The *b* coefficient associated with anxious symptoms is negative, indicating a direct relationship in which lower numeric values for anxious symptoms are associated with higher numeric values for risky behaviours.

Similarly, a statistically significant relationship was found between self-concept clarity and risky behaviour engagement, t(12, 148) = -2.39, p < .05. The *b* coefficient associated with self-concept clarity is also negative, indicating lower self-concept clarity is associated with higher engagement in risky behaviours.

Finally, a statistically significant relationship was found between impulsiveness and risky behaviour engagement, t(12, 148) = 223, p < .05. However, the *b* coefficient associated with impulsiveness is positive, indicating higher impulsiveness is associated with higher engagement in risky behaviours. The relationships between risky behaviours and the remaining personal factors (i.e., depressive symptoms, responses to stress, neuroticism, and perceived control) were not significant.

Environmental Factors. A statistically significant relationship was found between adolescent life events and risky behaviour engagement, t(12, 148) = 6.70, p < .001. The *b* coefficient associated with adolescent life events is positive, indicating a direct relationship in which higher numeric values for adolescent life events (i.e. negative events) are associated with higher numeric values for risky behaviour engagement. The relationship between perceived social support and the engagement in risky behaviours was not significant.

Discussion

Using social cognitive theoryas a theoretical framework, the current study examined personal and environmental vulnerability factors that may contribute to adolescent risky behaviour engagement. As a whole, results indicated that personal factors play a more important predictive role, as compared to environmental factors, with regard to adolescent engagement in risky behaviours. Further, lower levels of anxious symptoms, poor self-concept clarity, high impulsiveness, and negative life events were independently significant predictors of risky behaviours.

Influence of Personal versus Environmental Factors

The current study is the first to examine Bandura's social cognitive theory (1986) within a risky behaviours framework. That is, in line with our hypothesis, trait-based personal factors were found to be slightly stronger predictors of adolescent engagement in risky behaviours than state-based environmental factors. However, environmental factors do play an important predictive role for adolescent risky behaviour, but an individual's cumulative inventory of personal factors plays a slightly stronger function in determining an adolescent's propensity toward engagement in risky behaviours. The separate effects of personal and environmental vulnerability factors suggest that their effects may be additive. Furthermore, as past research has suggested (Forehand & Grier, 2003), it is likely that all individuals are influenced by environmental factors, but individuals who possess high levels of trait-based vulnerability factors are at the greatest risk when faced with adverse situations.

Specific Predictors of Risky Behaviour Engagement

Past research has argued that risky behaviour engagement can be used as a form of coping with negative affect (Auerbach et al., 2010). Thus, it was anticipated that increased levels of depressive and anxious symptoms would be associated with increased risky behaviour engagement. Similarly, neuroticism has been defined as "the tendency to experience negative, distressing emotions" (Costa & McCrae, 1987, p. 301) and has been previously associated with adolescent engagement in risky behaviour (Auerbach et al., 2007a). Further, adolescent engagement in risky behaviours is strongly associated with impulsiveness and maladaptive responses to stress (Auerbach et al. 2007a, b; Yao et al. 2007). Lower levels of social support, perceived control, and self-concept clarity, as well as frequent negative life events are thought to incite negative feelings and reactions, and thus individuals may use risky behaviours in response to such factors.

In line with our hypothesis, results indicated that higher impulsiveness is associated with higher engagement in risky behaviours. Such results are in line with past research that suggests impulsiveness is a vulnerability factor for broad-based engagement in risky behaviours, risktaking in gamblers, and illegal activities (Auerbach et al. 2007a; 2007b; Martins, Tavares, Lobo, Galetti, & Gentil, 2004; Yao et al. 2007). Moreover, risky behaviour engagement mediates the relationship between impulsiveness and low self-esteem (Auerbach & Gardiner, 2012). That is, individuals with higher levels of impulsiveness are more likely to engage in maladaptive behaviours (e.g., unsafe sexual activity, substance use, self-harm, and rule-breaking), which precipitate negative self-evaluations and declines in self-esteem. Impulsive youth often have deficits in motor, attentional, and planning skills. As a result, they may not consider the immediate and potentially long-term consequences of their behaviours. Engaging in risky behaviours may not be in line with their core values (Coyne et al., 2011); therefore, such engagement may negatively shape their self-perceptions and subsequent self-esteem.

Second, lower self-concept clarity was associated with higher engagement in risky behaviours. The results are consistent with past findings that demonstrate low self-concept clarity acts as a significant predictor of aggressive behaviours (Strucker & Sporer, 2002). Nezlek and Plesko (2001) found that low self-concept clarity is predicted by increases in negative affect that are brought on by negative life events. Given that the results indicate that depressive symptoms do not predict risky behaviours, our initial hypothesis that the engagement in risky behaviours might be a form of coping with negative affect should be adjusted. Instead, the engagement in risky behaviours may still act as a coping strategy, yet these adolescents may be coping with or attempting to improve their low self-concept clarity. As self-concept clarity is related to an individual's ability to accurately self-describe, and individuals often strive to forge their own identity during adolescence, the engagement in risky behaviours may be another form of selfexpression. Alternatively, greater engagement in risky behaviours may be an escape from their identity; especially if they are unhappy with their self-concept. In sum, low self-concept clarity may play a particularly pernicious role in leading to risky behaviours among adolescents.

Third, findings from the current study suggest negative life events are associated with increased risky behaviour engagement. These results are consistent with both concurrent and prospective past findings (Auerbach et al., 2007b; Nash et al., 2005; Windle, 1992). Such a finding adds to the body of literature that highlights the important influence of an individual's environment on their subsequent behaviour. For example, individuals who live in chronic stress environments (i.e., experience multiple negative life events), engage in a greater number of risky behaviours than other individuals (Youngblade et al., 2006). In fact, negative life events proved to be the strongest predictor of adolescent engagement in risky behaviours in the model. Individuals may be using risky behaviours as a form of coping with the affect that stems from negative life events, which in some, but not all, cases may initiate a positive feedback loop involving potentiated stress and risky behaviour engagement.

Surprisingly, low levels of anxiety were associated with increased engagement in risky behaviours. This result is contrary to the hypothesis that certain individuals may cope with negative affect through the use of risky behaviours. Conversely, it supports the notion that anxiety may contribute to more risk-aversive or -avoidant behaviours (e.g., Maner et al., 2007; Maner & Schmidt 2006) and behavioural inhibition (Hirshfeld et al., 1992; Muris, Merckelbach, Schmidt, Gadet, & Bogie, 2001). Further, anxiety may result in diminished sensation-seeking tendencies (e.g., Zuckerman, Kolin, Price, & Zoob, 1964), which would ultimately decrease an individual's propensity and desire to engage in risky behaviours. Furthermore, past research has indicated that individual differences exist in how people respond to anxious symptoms (Nolen-Hoeksema, 2000); that is, some may choose to engage in maladaptive behaviours, whereas others may not. The current findings suggest that individuals who possess low levels of anxiety may be less inhibited, thus allowing for the possibility of minimized concern for associated dangers and increased use of risky behaviours. Although anxiety was not correlated with risky behaviours, it nevertheless predicted adolescent engagement. There are a number of reasons why this may have occurred, one of which is that anxiety predicts adolescent engagement in risky behaviours in conjunction with a third variable (e.g., stress). In fact, past research suggests that anxiety may serve as a mediating factor for risky behaviours (Auerbach et al., 2007b). For example, Auerbach, Kertz, and Gardiner (2012) demonstrated that higher levels of anxious symptoms mediated the relationship between stress and subsequent engagement in risky behaviours, but only in males. However, they also found that different domains of anxiety are predictive of increases (i.e., total and physical anxious symptoms) in risky behaviour engagement, whereas others (i.e., separation and social anxiety) are not.

In contrast to our hypothesis, depressive symptoms, adaptive/maladaptive responses to stress, neuroticism, perceived control, and social support were not significantly predictive of risky behaviour engagement. There may be a number of reasons for this. First, within the current paper's model, the effects of the aforementioned factors may have been depreciated. That is, these factors may yet be important, but others account for a greater proportion of the variance in predicting risky behaviours. Second, risky behaviour engagement may be in part reactionary to negative affect, as hypothesized in past research (e.g., Auerbach et al., 2010); however there also appears to be a significant relationship with an individual's difficulty in identifying their true self. Specifically, although negative life events often precede negative affect, and low anxiety was predictive of risky behaviour engagement, it appears that an individual's underlying personality traits related to their identity (e.g., impulsiveness, self-concept clarity) are stronger

predictors of risky behaviours. In fact, it is also possible that an individual who struggles with their concept of self, may engage in risky behaviours in response to negative life events, regardless of whether they experience negative affect. As opposed to coping with negative feelings, these individuals may be exploring different behaviours as a function of identifying who they really are, and how people such as themselves react to certain situations and events.

Limitations

Several limitations of the current study should be noted. First, all data were collected using self-report measures. Given that self-report measures are inherently influenced by the participant's affective state, as well as social desirability and retrospective recall biases, future research would benefit from using semi-structured interviews. Semi-structured interviews provide more reliable and valid data related to participants' behaviours, thoughts, and emotions than checklists. Second, the current study consisted of a predominantly homogeneous sample (79% Caucasian). Such homogeneity may reduce the generalizability of findings, especially given that the rates of physical aggression (Stets, 1990), alcohol, cigarette, and marijuana use (Wallace, Brown, Bachman, & Laviest, 2003), as well as depression (Dunlop, Song, Lyons, Manheim, & Chang, 2003), among others, all vary according to race and ethnicity. Thus, future research should attempt to replicate our findings in more diverse samples. Third, the present study used a cross-sectional design that measured potential vulnerability factors and risky behaviours at one time point in an adolescent's life. Given that adolescence is a peak period for the engagement in risky behaviours (Arnett, 1992), future research would benefit from assessing adolescent behaviour over time. Longitudinal research conducted across the high school years would help to clarify changes in vulnerability factors and their respective influence on the engagement in risky behaviours. A deeper understanding of the independent and interactive

effects of an individual's personal and environmental vulnerabilities should lead to a greater understanding of the developmental unfolding of risky behaviour engagement in adolescence. Last, 43% of the variability in risky behaviour engagement was predicted by knowing the scores of the 12 variables. Therefore, a sizeable portion of the variance remains unknown. Future studies should expand on the present findings by examining additional personal and environmental factors that may predict adolescent engagement in risky behaviours. However, many studies have found that past behaviour is one of the best predictors of current and future behaviour (e.g., Aarts, Verplanken, & Knippenberg, 1998; Conner & Armitage, 1998; Ouellette & Wood, 1998); thus, including past measures of risky behaviours to predict current and future risky behaviour use may significantly increase the regression's predicted variability.

Clinical Implications

In sum, the findings provide insight into the multi-causal pathway through which adolescent engagement in risky behaviours occurs. Importantly, both personal (i.e., impulsiveness, anxious symptoms, and self-concept clarity) and environmental (i.e., negative life events) factors are strongly associated with risky behaviours including drug/alcohol use, unsafe sexual activity, and violent/aggressive behaviours. These findings have important clinical implications. For example, individuals may use risky behaviours in an effort to address the painful affect and consequences associated with negative events rather than employing more effective long-term problem solving. This would be especially true for impulsive youth who may not consider the immediate consequences of their behaviours. Interventions such as acceptance and commitment therapy (ACT) may prevent feelings of worthlessness in impulsive youth, whose self-concept would undoubtedly be skewed by continuous risky behaviour engagement (Coyne et al., 2011). ACT aims to align the individual's core values with their behaviours, which often results in symptom attenuation (Greco & Hayes, 2008).

Further, the current results suggest that clinicians should shift to a more person-centered approach (see Persons, 2008) in order to apply cognitive and interpersonal factors to an individual, as opposed to using a rote format of therapy. Such an approach may provide adolescents with adaptive alternatives to better manage stress and anxiety, which may reduce the engagement in, and the consequences of, risky behaviour engagement. Moreover, intervention programs should simultaneously aim to reduce risk and promote protective factors (Jessor, 1991). Therefore, by focussing on building resilient personal factors, these adolescents will be better equipped to deal with negative life events as they emerge. Such programs should also acknowledge the context within which the intervention takes place, as both the results of the current study and past findings underscore the importance of environmental factors (Jessor, 1991). In sum, clinicians should aim to understand a patient's core values and target known vulnerability factors in intervention in order to curb risky behaviours.

Acknowledgements

Randy P. Auerbach was partially supported through funding from: NIMH K23MH097786 and a McGill University Social Sciences and Humanities Student Research Grant.

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ADOLESCENTS AND RISKY BEHAVIOURS

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1. Age	_											
2. Depression	.04	_										
3. Anxiety	05	.56**	-									
4. Negative life events	.08	.66**	.41**	_								
5. Adaptive responses	.05	15*	.11	06	_							
6. Maladaptive responses	.01	.53**	.56**	.55**	.14*	_						
7. Neuroticism	.03	.71**	.66**	.59**	11	.63**	_					
8. Risky behaviours	.20**	.28**	07	.52**	10	.19**	.14*	_				
9. Impulsiveness	.11	.29**	.05	.38**	07	.31**	.32**	.36**	_			
10. Self-concept clarity	.07	43**	40**	42**	.27**	50**	61**	24**	32**	_		
11. Perceived control	04	.41**	.28**	.52**	30**	.44**	.46**	.23**	.34**	53**	_	
12. Social support	09	.30**	.16*	.39**	24**	.25**	.34**	.18**	.19**	32**	.49**	_
Mean	15.17	33.84	77.58	104.30	49.48	68.49	33.50	8.60	68.34	38.68	37.38	32.55
Standard deviation	1.22	10.41	15.93	25.27	10.05	17.20	8.64	8.33	8.92	7.88	8.30	5.43
Low	12	20	41	61	31	39	16	0	44	20	24	20
High	18	67	131	183	77	115	52	50	91	58	65	53

Table 1. Means, Standard Deviations, and Correlations for Baseline Measures

Note. *p < .05; $**p \le .01$; Depressive Symptoms = Center for Epidemiologic Studies Depression Scale (Radloff, 1977); Anxious Symptoms = Multidimensional Anxiety Scale for Children (March et al., 1997; March et al., 1999); Negative Life Events = Adolescent Life-Events Questionnaire (Hankin & Abramson, 2002); Responses to Stress = Responses to Stress Questionnaire (Connor-Smith, Compas, Wadsworth, Thomsen, and Saltzman, 2000); Neuroticism = NEO Five Factor Inventory—Neuroticism Subscale (Costa and McCrae 1992); Risky Behaviours = Risky Behaviors Questionnaire for Adolescents (Auerbach & Gardiner, 2012); Impulsiveness = Barratt Impulsiveness Scale (Patton et al., 1995); Self-Concept Clarity = Self-Concept Clarity Scale (Campbell et al., 1996); Perceived Control = Perceived Control Scale for Children (Weisz, Southam-Gerow, & Sweeney, 1998); Social Support = Social Support Scale for Adolescents (Harter, 1989)

Predictors	Parameter	Standard	<i>t</i> -Value	DF
	Estimate (b)	Error		
Age	1.26	.43	2.93**	161
Gender	-3.54	1.12	-3.20**	161
Depressive symptoms	.06	.08	.79	161
Anxious symptoms	12	.05	-2.55**	161
Negative life events	.20	.03	6.70***	161
Adaptive responses	01	.06	21	161
Maladaptive responses	.01	.04	.15	161
Neuroticism	18	.11	-1.62	161
Impulsiveness	.14	.07	2.23*	161
Self-concept clarity	22	.09	-2.39*	161
Perceived control	14	.09	-1.69	161
Social support	01	.11	08	161

Table 2. Predictors of Risky Behaviours

Note. *p < .05; $**p \le .01$; $***p \le .001$.

Bridging Manuscripts

Bandura's (1986) social cognitive theory, which laid the foundation for the previous chapter, suggests that behavior is the result of an exchange between personal and environmental factors. Unexceptionally, risky behaviour engagement is a product of both an individual's personal factors, as well as their environment. However, there was a greater quantity of personal factors involved in predicting risky behaviours. This finding is clinically significant, as intervening on personal factors is often more plausible than altering a youth's environment. Therefore, the next chapter aims to focus and extend the extant research on personal factors in relation to risky behaviour engagement. Specifically, executive function, a broad based personal factor that has major implications for development, is examined in terms of its potential effects on adolescent risky behaviours. Furthermore, individual executive function skills (e.g., inhibition, emotional control, working memory), as well as different forms of executive function (i.e., performance-based versus observer-reported) are measured to assess whether strengths or deficits in particular executive function skills predict varying levels of maladaptive behaviours.

Chapter III – Manuscript II

Clarifying the Relationship between Executive Function and Risky Behaviour Engagement in

Adolescents

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This manuscript is currently under review at Canadian Journal of School Psychology

Abstract

The study tested whether deficits in executive function is associated with adolescent risky behaviour engagement. At baseline, adolescents (n = 102) aged 12 to 19 years were administered a performance-based measure of executive function and self-report measure of broad-based risky behaviour engagement. Additionally, a teacher report for each participant delineating executive function was obtained. In line with our hypothesis, hierarchical multiple regression analyses indicated that adolescents exhibiting poor observer-reported executive function (i.e., teacher report) were more likely to engage in a greater frequency of risky behaviours. Conversely, there was no relationship between the performance-based measure of adolescent executive function and risky behaviours. These findings highlight the importance of obtaining teacher input when operationalizing youth vulnerability; particularly as this relates to understanding executive function deficits. Clinical implications for in-school intervention programs are discussed.

Key Words: adolescents, executive function, risky behaviours

Clarifying the Relationship between Executive Function and Risky Behaviours Engagement in Adolescents

For many, adolescence is a time of transition and newfound independence during which relationship and identity exploration occur (Arnett, 2000). Adolescents experience mounting academic pressures and social stressors as they attempt to forge their desired path into adulthood. This developmental period can be stressful, and as a result, serious mood disruptions (Avenevoli, Swendsen, He, Burstein, & Merikangas, 2015), risky behaviour engagement (Auerbach & Gardiner, 2012; Auerbach, Tsai, & Abela, 2010), and suicidal behaviours (Auerbach, Millner, Stewart, & Esposito, 2015; Stewart et al., 2015) frequently occur.

Individual differences exist in how people respond to depressive and anxious symptoms (Nolen-Hoeksema, 2000). Whereas some individuals use adaptive means to manage negative affective states, other individuals use maladaptive strategies that may serve to perpetuate the initial stressor. One maladaptive strategy may be the engagement in risky behaviours. Risky behaviours are broadly defined as activities or behaviours (e.g., unsafe sexual practices, aggressive and violent behaviours, rule-breaking, dangerous, destructive and illegal behaviours, self-injurious behaviours, alcohol and drug use) that expose an individual to an increased risk of harm (i.e., suffering a particular condition, illness, or injury). Although there are different pathways leading to the engagement in risky behaviours, one potential pathway is the use of such behaviours to attenuate negative emotional states (Auerbach, Claro, Abela, Zhu, & Yao, 2010).

Executive Function

Executive function is a broad umbrella term defined as the cognitive skills related to the control of thoughts and behaviour (Banfield, Wyland, Macrae, Münte, & Heatherton, 2004). These skills include planning and organizing, working memory, inhibition, mental flexibility,

initiation, and monitoring of actions. The wide array of high-level cognitive processes is necessary for the planning and directing of daily activities, and executive function deficits are related to difficulty establishing goals, poor emotional well-being, and low academic achievement (Dawson & Guare, 2010). Additionally, past research has demonstrated that individuals with poor executive function are more likely to engage in risky behaviours (e.g., shoplifting, excessive alcohol consumption) and to over-emphasize the benefits associated with engaging in such behaviour (Magar, Phillips, & Hosie, 2008). Further, executive function deficits predicted broad-based risky behaviours, including substance use and aggression (Brand, Roth-Bauer, Driessen, & Markowitsch, 2008; Nigg et al., 2006; Paschall & Fishbein, 2002; Pharo, Sim, Graham, Gross, & Hayne, 2011; Ready, Stierman, & Paulsen, 2001; Romer et al., 2012). It is believed that individuals with executive function deficits lack the necessary skills to manage daily stressors, and as a result, may use risky behaviours to manage negative affect. Although the use of negative coping strategies (e.g., risky behaviours) may provide immediate short-term relief, often these behaviours become reinforced, increasing the likelihood of using them in the future (Auerbach et al., 2010a).

Executive function encompasses many interrelated domains, and perhaps not surprisingly, there are different ways of measuring executive function (i.e., self-report, observerreport, and performance-based). Many past studies have relied on self-report measures to assess executive function, and some researchers suggest that there are advantages to using this approach (e.g., Barkley & Fischer, 2011; Moffitt & Henry, 1989). Barkley and Fischer (2011) showed that self-report measures of executive function were better at predicting impairment in major life activities and occupational functioning compared to performance-based measures. Other research has argued that self-report measures may be, at times, more sensitive to subtle changes in executive function that reflect structural and functional brain changes, as compared to performance-based measures (Rabin et al., 2006). On the other hand, self-report measures are susceptible to retrospective recall biases and social desirability, which may limit the ecological validity of this approach. Consequently, observer-report and performance-based measures of executive function have been developed; however, there is limited information that has examined the relationship between observer-report and performance-based executive function measures and risky behaviour engagement among adolescents.

Observer-report measures focus on observable behaviours. The distinction is important as focusing on how individuals behave can have implications for reducing biases related to how individuals see themselves, think, and feel. However, it is important to consider the relationship between the rater and the ratee, as well as the environment within which the observations take place. In particular, the quality of the observations is more critical to accurate ratings than the quantity of observations (Connelly & Ones, 2010). Observer-report (e.g., parent and teacher) measures of executive function are reliable predictors of observable behaviour (e.g., attention deficit/hyperactivity disorder symptomology; Toplak, Bucciarelli, Jain, & Tannock, 2008), yet their relationship with adolescent broad-based engagement in risky behaviours has not been studied. The current study explores teacher ratings of executive function, as assessed through observable behaviours, in an attempt to determine whether observation-based teacher reports in the classroom are associated with adolescent risky behaviour engagement.

Performance-based measures of executive function are experimental tasks that assess components of executive function and have been shown to be sensitive to frontal-lobe dysfunction (e.g., Milner & Petrides, 1984). These tasks are administered in a standardized fashion and reliably differentiate typically achieving adolescents in mainstream schools from atrisk adolescents attending alternative schools (Toglia & Berg, 2013). Therefore, as risky behaviours are common in at-risk youth (Bachanas et al., 2002), performance-based measures of executive may also be associated with risky behaviour engagement. Moreover, performancebased measures of executive function can identify functional problems that self- and observerreports may be unable to detect (Curb et al., 2006). In particular, many performance-based measures of executive function, including the Trail Making Test – Part B, are unrelated to observer-report measures (i.e., Behavior Rating Inventory of Executive Function; Vriezen & Pigott, 2002). As performance-based and observer-reported measures of executive function assess fundamentally different constructs (Toplak et al., 2008), it is important to delineate the differential relationship with adolescent risky behaviour engagement.

Goals of the Current Study

The current study addresses important empirical gaps in the literature and tests whether deficits in executive function – assessed through observer- and performance-based measurement – are associated with broad-based risky behaviour engagement in adolescents. In order to test our hypotheses, we used hierarchical multiple regression and examined the effects of observerreported and performance-based executive function on risky behaviours. We hypothesized that lower overall ratings on both instruments would be significantly and uniquely related to increased levels of risky behaviour engagement.

Method

Participants

Participants (n = 102; 48% male, 53% female) between the ages of 12 and 19 (M = 15.07, SD = 1.53) were recruited from eight secondary schools in the greater Montreal area. The sample was 72.5% Caucasians, 9.8% African Americans, 2.9% Latino Americans, 3.9% Asians, 1.9%

Native Americans, and 8.8% reported other as their ethnicity. Both legal guardian consent and adolescent assent were obtained prior to the assessment. Every student who received parental consent chose to provide personal assent. Participation rates ranged across schools from 20 - 93%.

Procedure

The University Research Ethics Board granted approval for the study, and the treatment of participants was in accordance with Canadian Psychological Association ethical standards. During the assessment, which took place at each school, participants completed a demographics form, a self-report questionnaire assessing risky behaviours, and a performance-based measure of executive function. Furthermore, each participant's homeroom teacher completed a questionnaire assessing the participant's executive function. All assessments were administered by trained research assistants and were completed during the course of the school day.

Measures

Risky Behavior Questionnaire for Adolescents (RBQ-A; Auerbach & Gardiner,

2012). The RBQ-A is a 20-item self-report measure that was created to assess frequency of engagement in risky behaviours. Examples of questions include: "Have you bullied or threatened a peer(s)?" "Have you destroyed property (other than your own)?" and "Have you used illegal drugs?" Subscales assessed engagement in the following subgroups of behaviours: (1) unsafe sexual practices; (2) aggressive and/or violent behaviours; (3) rule-breaking; (4) dangerous, destructive, and/or illegal behaviours; (5) self-injurious behaviours; and (6) alcohol and/or drug use. Respondents reported their engagement in such behaviours over the past month using the following scale: never, 1 time per month, 2 to 4 times per month, 2 to 3 times per week, 4 times

or more per week. In the current study, the Cronbach's \dot{a} was .88, indicating high internal consistency.

Trail Making Test – Part B (TMT-B; Army Individual Test Battery, 1944). The TMT-B assesses executive functions and requires the participant to alternatively connect 25 circles containing numbers (from 1 to 13) and circles containing letters (from A to L), in numeric and alphabetical order (1-A, 2-B, 3-C, etc.). The time elapsed from the start of the task to when the trail is complete represents their overall TMT-B score. If an error is made, the test administrator informs the participant of the error and instructs them to return to the circle where the error was made. The only penalty incurred is reflected in the time required to correct any errors. A maximum allowed time of 600 seconds is allowed for the test.

Behavior Rating Inventory of Executive Function – Teacher Form (BRIEF; Gioia, Isquith, Guy, & Kenworth, 2000). The BRIEF assesses problem behaviours associated with executive function. Teachers are asked to rate 86 descriptions of behaviours as occurring never, sometimes, or often. The ratings are then subsumed into eight distinct subscales of executive function: (a) inhibit, (b) shift, (c) emotional control, (d) initiate, (e) working memory, (f) plan/organize, (g) organization of materials, and (h) monitor. The subscales form two broader Indexes (i.e., Behavioral Regulation [BRI] and Metacognition [MI]), and an overall composite score (i.e., Global Executive Composite [GEC]). Higher scores suggest an increased level of dysfunction. In the current study, the alphas ranged from .91 to .95 across subscales, which indicates strong internal consistency.

Data Analytic Overview

All analyses were performed using IBM SPSS Statistics, Version 20.0 (IBM Corp., Armonk, NY). Hierarchical multiple regression was performed with risky behaviours as the dependent variable and observer-reported executive function and performance-based executive function as the predictor variables. Step 1 included covariates (e.g., age and gender), and for Step 2 independent variables were entered into the model. Age and gender were covaried, as they are known predictors of risky behaviours (e.g., Auerbach et al., 2010b).

Results

Descriptive Data

Means, standard deviations, and correlations among all measures are summarized in Table 1. First, with the exception of performance-based executive function, deficits in all other domains of executive function were associated with greater risk behaviour engagement. Additionally, compared to females, males reported using risky behaviours more frequently, t(100) = 3.30, p = .001; however, no age differences emerged, t(100) = -1.53, p = .13.

Association between Observer-Reported and Performance-Based Executive Function with Risky Behaviour Engagement

First, age and gender were included in the regression analysis as covariates. The model was significantly different from zero (see Table 2). The adjusted R^2 value of .09 indicates that a little less than a tenth of the variability in risky behaviour engagement is predicted by age and gender. Contrary to past studies (e.g., Auerbach et al., 2010b), gender was not associated with adolescent risky behaviour engagement, while age was a significant predictor. After accounting for the effects of the covariates, the BRIEF's GEC and the TMT-B were included as the predictor variables. When examining the differential influence of observer-reported and performance-based executive function, the model was significantly different from zero (see Table 2). The adjusted R^2 value of .14 indicates that more than a tenth of the variability in risky behaviour engagement is predicted by the selected covariates, GEC, and TMT-B. With the addition of the

executive function variables, gender was no longer a significant predictor of risky behaviours. The addition of GEC and TMT-B made a significant contribution to the prediction of risky behaviours $F_{\text{change}}(2, 97) = 3.86$, p = .024, and increased the predictability of the variability by 5%. Specifically, of the four variables, only observer-reported executive function (i.e., GEC) added to the prediction at a statistically significant level. The size and direction of the relationship suggest that a higher level of risky behaviour engagement is associated with an elevated GEC (i.e., greater executive function deficits; see Table 2).

Observer-Reported Executive Function Skills on the Engagement in Risky Behaviours

As observer-reported executive function was a significant predictor of risky behaviours, we examined whether specific GEC indexes (i.e., BRI, MI) were associated with risky behaviour engagement. Similar to the model described above, covariates (i.e., age and gender) were entered in Step 1. Step 2 included observer-reported BRI and MI. The regression model was significantly different from zero (see Table 3), suggesting a statistically significant relationship between the control variables, BRI, MI, and the dependent variable risky behaviour engagement. The adjusted R^2 value of .12 indicates that more than a tenth of the variability in risky behaviour engagement is predicted by the selected covariates, BRI, and MI. However, although the addition of BRI and MI increased the predictability of the variability by 3%, the R^2 associated with the addition of the indexes was not significant $F_{change}(2, 97) = 2.77$, p = .07. This finding suggests that although the GEC in the previous model was a significant predictor of risky behaviours, the indexes that comprise the GEC do not make statistically significant independent contributions to the model.

Another regression analysis was conducted in order to examine the individual effects of the eight distinct subscales (i.e., inhibit, shift, emotional control, initiate, working memory,

plan/organize, organization of materials, and monitor) of executive function that comprise the BRI and MI. Although the regression model, including age and gender as covariates, was significantly different from zero (see Table 4), the R^2 associated with the addition of the eight specific skills was not significant $F_{\text{change}}(8, 91) = 1.16$, p = .33. None of the eight subscales contributed to the predictability of the variability in adolescent engagement in risky behaviours (All ps = .21 to .94).

A priori power analysis with a moderate anticipated effect size of 0.15 and a desired statistical power of 0.80 was conducted to determine whether the study design had significant power to detect main effects (Faul, Erdfelder, Lang, & Buchner, 2007). Based on the number of control variables and predictor variables, a sample size of approximately 110 would have been needed to obtain statistical power at the recommended .80 power level (Cohen, 1988). Given the limited sample size of the current study, there was a reduced chance of detecting a true effect, as well as a reduced likelihood that a statistically significant result reflects a true effect (Button et al., 2013).

Discussion

The current study tested whether executive function deficits are associated with risky behaviour engagement in adolescents. Researchers have determined that particular executive function deficits are related to specific risky behaviours (e.g., Brand et al., 2008; Nigg et al., 2006; Paschall & Fishbein, 2002). However, to date, less research has investigated the differential impact of observer-reported versus performance-based executive function on adolescent broad-based risky behaviour engagement. In line with our hypothesis, observerreported (i.e., teacher report) executive function was associated with risky behaviours. In contrast, performance-based executive function was not associated with adolescent engagement in risky behaviours.

Several findings warrant additional attention. First, the current study examined teachers' ratings of their students' executive function skills. The results indicate that deficits in overall observer-reported executive function are associated with increased risky behaviour engagement among adolescents. Although an adolescent's overall level of executive function, as rated by their homeroom teacher and measured by the BRIEF, was significantly associated with risky behaviours, the specific indexes (i.e., Behaviour Regulation and Metacognition) and skills (i.e., inhibit, shift, emotional control, initiate, working memory, plan/organize, organization of materials, and monitor) were unrelated. As opposed to self-reported executive function, observer ratings are a strong predictor of an individual's performance in the workplace (Connelly & Ones, 2010). Similarly, an adolescent's success in school is often determined by skills unrelated to reading, writing, and mathematics, and may be better accounted for by executive function skills (Jacobson, Williford, & Pianta, 2011). Further, adolescents who engage in a greater number of risky behaviours are more likely to be out of school (Kebede et al., 2005). Therefore, teacher ratings of student executive function may be a useful assessment tool for targeting adolescents at-risk for academic failure and dropout. Future research should examine whether intervening on specific executive function skills can increase an individual's overall level of executive function, and whether that may have subsequent benefits related to decreasing risky behaviours.

Second, results indicated that deficits on an experimental measure of executive function (TMT-B) were not associated with increased risky behaviour engagement among adolescents. One possibility for these null findings is that the TMT-B is conducted in a one-on-one, quiet environment, over a span of minutes, and therefore may not possess sufficient ecological validity to determine how youth will respond to stress or painful emotional states. Alternatively, the TMT-B task probes working memory and task-switching ability (Sanchez-Cubillo et al., 2009), whereas risky behaviours may be more associated with other executive functions skills (e.g., inhibition; Lawrence, Luty, Bogdan, Sahakian, & Clark, 2009). Therefore, future research is needed to examine alternative performance-based measures that assess other specific executive function skills.

For many youth, risky behaviours may arise during stressful and emotional circumstances (Auerbach et al., 2010b), and thus, the interaction between negative affect and executive function deficits may increase the likelihood of using risky behaviours. Individuals who lack proficient executive function skills are more susceptible to maladaptive forms of coping, as the basic facets of executive function (e.g., working memory operations, behavioural inhibition, and task-switching) subserve successful self-regulation (Hofmann, Schmeichel, & Baddeley, 2012). Whereas observational teacher reports may capture this broader context, performance-based measures may not. These findings are consistent with past research (e.g., Toplak et al., 2008) indicating that observer-reported and performance-based measures of executive function assess different constructs, and thus, the results have significant implications for early identification and treatment within school contexts. In particular, relative to performance-based measures, teacher-observer reports seem to be a better indicator of which adolescents engage in risky behaviours. Thus, teachers' perceptions and in-class observations may provide important diagnostic and prognostic insight, which may help identify targets for intervention.

Limitations

There are several limitations to the current study. First, data on risky behaviour engagement was collected using a self-report measure. Self-report measures can be influenced by the participant's affective state, social desirability, and recall biases. Future studies examining risky behaviours would benefit from using semi-structured interviews, as they may increase reliability and validity (e.g., Chawarski, Pakes, & Schottenfeld, 1998). Second, the present study used a cross-sectional design. During adolescence, there is a significant increase in morbidity and mortality as compared to childhood and the primary cause for this is the heightened use of risky behaviours (Arnett, 2000; Pharo et al., 2011). Future research would benefit from assessing risky behaviours over time and across this peak period in adolescence. Third, both observerreported and performance-based measures of executive function were used to assess executive function skills. Although the BRIEF is a reliable and valid measure (Ciszewski, Francis, Mendella, Bissada, & Tasca, 2014), and the TMT-B is one of the most widely used instruments in neuropsychological assessment as an indicator of executive function (AITB, 1944; Lezak, 1995; Mitrushina, Boone, Razani, & D'Elia, 2005), they only assess a few of the many skills that comprise the umbrella construct of executive function. Future studies may benefit from using alternative assessment methods such as different report (e.g., Childhood Executive Functioning Inventory; Thorell & Nyberg, 2008; Deficits in Executive Function Scale; Barkley & Murphy, 2010) or performance-based (e.g., Wisconsin-Card Sorting Test; Heaton, Chelune, Talley, Kay, & Curtis, 1993; Stroop test; Stroop, 1935) measures to examine other skills that comprise executive function.

Clinical Implications

Clearly defined constructs are important when examining risky behaviours, particularly with respect to designing and implementing interventions. As mentioned above, discrepancies in the literature can be attributed to the use of umbrella terms that cover an array of skills. As a result, interventions that target empirically valid vulnerability factors are more likely to be successful. That is, programs that focus on one-to-one cause and effect relationships are less likely to be confounded by other variables. However, in the current study, only the overall level of observer-reported executive function was found to have a significant effect on risky behaviour engagement. As opposed to focusing on a singular skill, our findings suggest that interventions would be best-served to cover, inform, and aim to improve general executive function strategies. In fact, Diamond and Lee (2011) argue that to improve executive function when intervening, focusing narrowly on them is not effective and instead, interventions should take an allencompassing approach. Such an intervention program could be disseminated weekly in schools, over the course of an academic year. Intervening in schools may be the ideal strategy, as adolescents can participate in an intervention program in a familiar and comfortable environment.

Acknowledgements

A Fonds de recherche du Québec - Société et culture grant awarded to Anthony Claro supported this research.

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Means, Standard Deviations, and Correlations for Baseline Measures

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Age	_													
2. Risky Behaviours	15	_												
3. Inhibit	35**	.34**	_											
4. Shift	21*	.33**	.71**	_										
5. Emotional Control	24*	.25*	.79**	.84**	_									
6. Initiate	11	.28**	.63**	.63**	.47**	_								
7. Working Memory	26*	.32**	.76**	.66**	.54**	.85**	_							
8. Plan/Organize	14	.37**	.72**	.69**	.53**	.88**	.88**	_						
9. Org. of Materials	20	.30**	.66**	.45**	.38**	.65**	.75**	.76**	_					
10. Monitor	13	.33**	.84**	.73**	.72**	.76**	.77**	.82**	.64**	_				
11. BRI	30**	.33**	.91**	.91**	.95**	.62**	.71**	.69**	.53**	.83**	_			
12. MI	17	.35**	.79**	.71**	.59**	.92**	.95**	.97**	.81**	.88**	.75**	_		
13. GEC	23*	.36**	.89**	.84**	.77**	.85**	.91**	.92**	.76**	.91**	.90**	.96**	_	
14. TMT-B	13	15	10	.09	11	.21	.28	.18	01	.10	05	.18	.10	_
Mean	15.07	12.31	59.22	63.06	61.84	62.17	61.90	63.38	59.71	62.10	62.52	63.63	64.44	74.40
Standard deviation	1.53	11.07	15.41	19.00	18.52	15.16	16.26	16.22	17.49	14.20	17.77	16.22	17.41	20.80
Low	12	0	45	45	45	42	43	43	44	42	45	42	42	34
High	19	56	108	114	123	96	111	101	123	94	118	102	109	198

Note. *p < .05; $**p \le .01$; BRI = Behavioral Regulation Index; MI = Metacognition Index; GEC = Global Executive Composite; TMT-B = Trail Making Test B; Org. = Organization

Clarifying the Relationship between Observer-Reported and Performance-Based Executive Function with Adolescent Risky Behaviour Engagement

Predictors	b	SE	t	р
Step 1: F(2, 99) = 5.89, ς_p^2 = .11, R^2 = .11				.004
Age	09	.70	96	.338
Gender	29	2.14	-3.04	.003
Step 2: F(4, 97) = 5.04, ς_p^2 = .04, R^2 = .17				.001
Age	07	.69	71	.477
Gender	19	2.34	-1.75	.084
GEC	.25	.07	2.34	.021
TMT-B	15	.05	-1.56	.121

Note. GEC = Global Executive Composite; TMT-B = Trail Making Test B.

Examining the Association between the Indexes that Comprise Observer-Reported Executive

Predictors	b	SE	t	р
Step 1: F(2, 99) = 5.89, ς_p^2 = .11, R^2 = .11				.004
Age	09	.70	96	.338
Gender	29	2.14	-3.04	.003
Step 2: F(4, 97) = 4.43, ς_p^2 = .15, R^2 = .16				.002
Age	05	.72	51	.611
Gender	19	2.44	-1.67	.097
BRI	.15	.09	.99	.325
MI	.13	.11	.81	.419

Function and Risky Behaviours

Note. BRI = Behavioral Regulation Index; MI = Metacognition Index.

Assessing the Relationships between Specific Observer-Reported Executive Function Skills and

Risky Behaviours

Predictors	b	SE	t	р
Step 1: F(2, 99) = 5.89, ς_p^2 = .11, R^2 = .11				.004
Age	09	.70	96	.338
Gender	29	2.14	-3.04	.003
Step 2: $F_{inc}(10, 91) = 2.12, q_p^2 = .01, R^2 = .19$.031
Age	08	.79	70	.487
Gender	20	2.60	-1.72	.089
Inhibit	.13	.18	.53	.597
Shift	.27	.13	1.28	.205
Emotional Control	21	.14	91	.364
Initiate	13	.16	59	.559
Working Memory	20	.17	81	.421
Plan/Organize	.31	.19	1.11	.269
Organization of Materials	01	.10	08	.940
Monitor	.08	.19	.34	.733

Bridging Manuscripts

The findings in Manuscript II highlight that only overall observer-reported (i.e., teacher) executive function was associated with adolescent risky behaviour engagement. In particular, no singular executive function skill was significantly and independently associated with risky behaviours. Moreover, performance-based executive function was unrelated to risky behaviours. The results may be in part accounted for by the fact that executive function is an allencompassing term for a variety of skills (e.g., planning and organizing, working memory, inhibition, mental flexibility, initiation, and monitoring of actions) whose association with risky behaviours appears to vary as a function of the particular assessed skill. Therefore, exploring specific skills that comprise umbrella terms (e.g., executive function) is essential for effective intervention, as clinicians may be able to prioritize relevant vulnerability factors versus unrelated skill deficits. Whereas only an individual's overall level of executive function was related to risky behaviours, other large-scale concepts may yield specific relationships within its specific skills and risky behaviours.

For example, emotion regulation is an umbrella term for numerous behavioural (Phillips & Power, 2007) and cognitive coping strategies (Garnefski, Kraaij, & Spinhoven, 2001) for both positive and negative emotions. However, whereas Manuscript II did not identify specific executive function skill deficits related to risky behaviours, there are numerous studies linking specific maladaptive cognitive emotion regulation strategies (e.g., rumination, catastrophizing, self-blame) with risky behaviours (Auerbach, Claro, Abela, Zhu, & Yao, 2010; Garnefski et al., 2001; Leung & Wong, 1998). Despite the substantial evidence linking maladaptive cognitive emotion regulation strategies of intervention on the relationship. The use of negative coping strategies often provides immediate short-term relief,

but they become negatively reinforced, and as a result may be more difficult to curtail through intervention.

In the final article, we developed a new in-school intervention entitled Cognitive Emotion Regulation Training Intended for Youth (CERTIFY) that aims to reduce maladaptive strategies, while promoting adaptive strategies. Examining the potential benefits related to cognitive emotion regulation of CERTIFY may provide a new avenue for intervention for adolescent engagement in risky behaviours. Alternatively, knowledge of the strengths and limitations of CERTIFY may assist practitioners and school personnel in selecting future interventions.

Chapter IV – Manuscript III

Targeting Vulnerabilities to Risky Behavior: An Intervention for Promoting Adaptive Emotion Regulation in Adolescents Anthony Claro, Marie-Michelle Boulanger, and Steven R. Shaw

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Author Note

This manuscript is published in Contemporary School Psychology's special issue: School- Based Approaches to Promote Complete Mental Health: School Psychologists Working to Foster Students' Thriving Well-Being.

Claro, A., Boulanger, M. M., & Shaw, S. R. (2015). Targeting vulnerabilities to risky behavior: An intervention for promoting adaptive emotion regulation in adolescents.
 Contemporary School Psychology, 19, 330-339. doi:10.1007/s40688-015-0063-9

Abstract

The paper examined the effectiveness of an in-school intervention for adolescents designed to target emotional regulation skills related to risky behaviors. The Cognitive Emotion Regulation Intended for Youth (CERTIFY) program was delivered to at-risk adolescents in Montreal, Canada. Participants were drawn from an alternative high school and a dropout prevention program within an urban high school. The pilot was a student-focused therapeutic modality without parental intervention for maladaptive cognitive emotion regulation (CER) and engagement in risky behaviors. CERTIFY is a school-based group intervention targeting CER strategies and was implemented with 28 adolescents from two English-language secondary schools. The intervention was conducted for 12 weeks for the intervention group versus controls who were offered usual school supports. Program outcomes were evaluated using the Cognitive Emotion Regulation Questionnaire and Risky Behaviors Questionnaire for Adolescents. The intervention group made significant gains with regard to using adaptive CER strategies. Specifically, the intervention resulted in increases in self-reported use of positive reappraisal and refocusing on planning. No significant gains were found for reducing the use of maladaptive CER strategies or risky behaviors. This school-based intervention program for high-risk adolescents increased overall use of adaptive CER strategies and provided insight for future intervention design.

Keywords: adolescents, cognitive emotion regulation, risky behaviors, intervention

Targeting Vulnerabilities to Risky Behavior: An Intervention for Promoting Adaptive Emotion

Regulation in Adolescents

For children and adolescents, success in school requires more than reading, writing, and math skills. There are a variety of skills that are not explicitly taught in schools, yet are necessary for academic achievement during the early years and success later in life. For example, executive functions (Jacobson, Williford, & Pianta, 2011), social skills (Agostin & Bain, 1997), and language skills (Maier, Vitiello, & Greenfield, 2011) are all related to school success. Such skills are imperative for academic success because they act as protective factors against negative influences, such as the engagement in risky behaviors. Individuals with poor emotion regulation have increased aggressiveness and delinquent behavior (Garnefski, Kraaij, & Spinhoven, 2001). These students may be using maladaptive behaviors as a form of coping with negative affect. However, adolescents who commonly engage in negative behavioral patterns are at-risk for developing more serious problems later in life (e.g., substance abuse; Oltmanns & Emery, 1995). Therefore, in order to promote academic success and mental health it is necessary to develop effective interventions that decrease engagement in risky behaviors. Intervention programs that aim to reduce specific behaviors (e.g., alcohol, drugs, and unsafe sexual practices) in adolescents through lectures outlining the negative consequences of such behaviors are ineffective in changing actual behavioral patterns (Ennett, Tobler, Ringwalt, & Flewelling, 1994). Instead, interventions that target vulnerabilities to these negative behaviors may have a more generalizable positive impact. That is, the secondary goals of such programs are unannounced and less transparent, which is likely to be more appealing to an adolescent group. They may also result in positive benefits without the participants' full awareness.

Adolescence is widely recognized as a period of significant and interrelated biological, cognitive and social change in a person's life (Rosenblum & Lewis, 2006; Steinberg, 2005).

During this age period, the individual transitions from less developed and transient characteristics, to mature and permanent qualities across many domains of functioning (Rosenblum & Lewis, 2006). In addition to changes occurring within the individual, other factors such as family economic challenges, parental divorce, media influence, and lack of mental health support place many adolescents at risk for a variety of difficulties (Weissberg & O'Brien, 2004). As a result, adolescents are faced with a variety of stressors and negative life events, in response to which effective emotion regulation is crucial.

Adolescence is a critical developmental stage for the reorganization of many regulatory systems (Steinberg, 2005). Unlike many areas of cognitive development that correlate with age, developmental changes in arousal, motivation, emotions, sensation seeking, risk taking, and reckless behaviors are linked to pubertal maturation (Steinberg, 2005). As such, emotion regulation is one of the most important developmental processes influencing the adolescent's experience of affect; including its quality, intensity, timing, and other dynamic features (Kesek, Zelazo, & Lewis, 2009). Furthermore, adolescents' ability to control their emotions and level of emotional arousal is related to success in many areas of life, including their academic achievement (Gumora & Arsenio, 2002). By high school, a significant difference exists between students who regulate their emotions effectively, versus those who do not. Specifically, students with poor emotion regulation skills demonstrated poorer academic performance, increased school disengagement, and greater conduct problems, as compared to students who effectively regulate affect (e.g., Blum & Libbey, 2004; Macklem, 2008). Further, in response to stressful events, deficits in emotion regulation result in increased vulnerability to maladaptive coping strategies (e.g., illicit drug use and self-injury; Pardini, Lochman, & Wells, 2004). As such, adolescence represents a crucial developmental period for learning effective strategies to regulate

122

emotions in the face of stressful situations and negative life events.

Cognitive Emotion Regulation

The way in which individuals think about the world influences their emotional responses to the environment (Steinberg, 2005). Further, cognitions (i.e., conscious mental activities, thoughts, and processes) allow individuals to regulate their own emotions in order to process and manage difficult events and situations. The use of cognitions to regulate one's emotions is particularly important when coping with situations over which the individual has little or no control, such as parental divorce or familial economic hardship (Garnefski et al., 2001). The concept of cognitive emotion regulation (CER) is defined as the "conscious, mental strategies individuals use to cope with the intake of emotionally arousing information" (Garnefski et al., 2009, p. 450). Garnefski and colleagues (2001) have suggested that prior to their proposed theory of CER, the cognitive components of emotion regulation have not been studied independent of other coping dimensions. As a result, studying CER independently has expanded our understanding of the role of cognitive processes in emotion regulation. Despite less than 15 years' worth of studies investigating the construct of CER, there are important findings related to how cognitive processes regulate emotions and the potential effects on emotional development.

CER has been shown to play an important role in the course of emotional development and psychological adjustment in adolescents (Garnefski, Koopman, Kraaij, & Cate, 2009). Individuals increasingly use CER strategies as they mature cognitively and encounter stressful situations more frequently from early adolescence well into adulthood (Garnefski & Kraaij, 2006). The use of CER strategies occurs and becomes more prevalent in conjunction with the many physiological changes that take place in adolescence. That is, younger adolescents use fewer CER strategies than older adolescents and adults (Garnefski & Kraaij, 2006). For example, an increase in the use of positive reappraisal is particularly marked in the transition from later adolescence to adulthood as individuals master more advanced cognitive abilities (Aldwin, 1994; Garnefski & Kraaij, 2006).

A theory-based or "rational" approach was used to identify, define, and clarify the various dimensions of cognitive coping central to Garnefski and colleagues' (2001) theory of CER. Specifically, as a guide to the content of their theory, the authors considered emotion regulation strategies from existing theories and measures (Ridder, 1997). Garnefski and colleagues (2001) reformulated existing cognitive coping strategies, transformed non-cognitive coping strategies into cognitive ones, and developed new cognitive strategies (Carver, Scheier, & Weintraub, 1989; Endler & Parker, 1990). As a result, they identified nine dimensions of CER, including five adaptive strategies (i.e., acceptance, positive reappraisal, positive refocusing, refocusing on planning, and putting into perspective), and four maladaptive strategies (i.e., self-blame, other blame, rumination, and catastrophizing; Garnefski et al., 2001). These coping strategies have been shown to have a significant impact on an individual's well-being. For example, a number of past studies have linked the presence of maladaptive and absence of adaptive CER strategies with various psychopathological factors (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Garnefski & Kraaij, 2007). Specifically, psychological maladjustment, depressive and anxious symptoms, stress, and anger are associated with the use of maladaptive CER strategies (Garnefski et al., 2009; Garnefski & Kraaij, 2006). Additionally, adults with psychiatric disorders scored significantly higher on self-blame, rumination, catastrophizing and other blame, as compared to typically healthy adults from the general population (Garnefski & Kraaij, 2006).

Finally, specific patterns of coping are related to different clinical presentations. In fact, Garnefski and colleagues (2002) found that certain CER strategies (i.e., self-blame, catastrophizing, and positive reappraisal) reliably differentiate between clinical and non-clinical samples. More precisely, internalizing problems have been associated with higher levels of selfblame, rumination, and lower positive reappraisal, while externalizing problems have been associated with lack of positive refocusing (Garnefski, Kraaij, & Etten, 2005). These findings highlight the fact that certain patterns of CER strategy use are related to negative mental health outcomes and as a result, may serve as effective targets for prevention and intervention; especially during adolescence, which is a critical time in the development of the emotion regulation system (Garnefski et al., 2002). In fact, adolescents who present with deficits in CER have been shown to be at-risk for serious negative behavioral patterns (i.e., risky behaviors; Auerbach et al., 2010a).

Recent studies have identified CER as an important target for intervention (e.g., Garnefski & Kraaij, 2012, 2014; Garnefski, Kraaij, De Graaf, & Karels, 2010; Garnefski, Kraaij, Wijers, & Hamming, 2013). Despite the importance of the aforementioned findings and the severity of many of the associated consequences related to deficits in CER, there is a paucity of research and program evaluations examining the potential benefits of targeted interventions. In fact, to our knowledge, the current study introduces the first group intervention that attempts to directly and simultaneously promote adaptive CER strategies and discourage maladaptive strategies. CER strategies are amenable to a psychosocial approach and explain a unique and significant part of the variation in quality of life (Extremera & Rey, 2014). Furthermore, psychotherapeutic interventions that use a cognitive behavioral therapy approach (i.e., define increased use of adaptive coping as a key goal) have resulted in decreased symptoms of psychological distress (Creed, Machin, & Hicks, 1999). Extremera and Rey (2014) argue that effective interventions should not only aim to increase adaptive coping, but should also aim to

125

modify certain maladaptive CER strategies. Specifically, interventions that encourage individuals to use adaptive (i.e., positive refocusing, refocusing planning) rather than maladaptive CER strategies (i.e., self-blame, blaming others, rumination, and catastrophizing) have proven successful in populations with various physical disabilities or medical conditions (Garnefski & Kraaij, 2012; Garnefski et al., 2010, 2013). However, since CER intervention programs have only recently been examined at an individual level, in populations with chronic strains (Garnefski & Kraaij, 2012; Garnefski et al., 2010, 2013), it is important to examine the potential effectiveness of such programs on typical populations, as well as group-based interventions. Given that schools have limited resources and are often in need of extra support to promote academic achievement, they are the ideal environments to pilot an intervention with the potential to produce multiple benefits. In fact, many studies have shown that social and emotional learning (SEL) programs administered during school hours have produced increases in students' academic performance, attitudes, behaviors, and emotional development (Durlak & Weissberg, 2010). Moreover, these gains span ethnic groups, and benefit students with or without behavioral and emotional problems (Durlak & Weissberg, 2010).

Risky Behaviors

Despite experiencing more frequent and intense emotions than younger children and older adults (Arnett, 1999), many adolescents are ill equipped to regulate their emotions effectively following negative or stressful events (Macklem, 2008; Steinberg, 2005). In response to negative life events and stress, many adolescents turn to alternative forms of coping that provide a rapid decrease in negative emotions, such as engaging in risky behaviors (Auerbach et al., 2010a). Risky behaviors (e.g., unsafe sexual practices, aggressive and violent behaviors, rule-breaking, dangerous, destructive and illegal behaviors, self-injurious behaviors, alcohol and drug

126

use) may provide adolescents with temporary relief from negative affective states, and may allow for brief returns to their typical functioning. However, adolescents who engage in risky behavior as a coping style have the potential to fall into an avoidance trap (Auerbach et al., 2010a). Specifically, because risky behaviors are negatively reinforced due to the short-term relief they provide, they have an increased propensity to continue using risky behaviors in the future. As opposed to addressing the underlying issues responsible for the negative affect, adolescents may continue to use risky behaviors as a form of coping due to this immediate, but temporary reprieve. However, prolonged engagement in risky behaviors may result in the development of more serious problems later in life (e.g., drug dependence; Chen, Kandel, & Davies, 1997). Adolescents may employ risky behaviors as a form of maladaptive coping because they have not been taught or have not yet mastered the skills necessary for adaptive coping, or because they cannot employ the adequate skills when needed. Regardless, maladaptive emotion regulation strategies are strongly associated with depression, anxiety, and eating disorders (Aldao et al., 2010). In fact, the use of maladaptive strategies is a stronger determinant of subsequent psychopathology than a lack of adaptive strategies (e.g., reappraisal; Aldao et al., 2010). The experience of distressing events and the accompanying negative affect, as well as some misconduct is considered typical in adolescence. However, it is regarded as clinically significant when such factors interfere with the adolescent's functioning over longer periods of time (Oltmans & Emery, 1995).

Current Study

Given the potential long-term problems associated with the engagement in risky behaviors, there is a need for intervention programs that target vulnerability factors (Auerbach, Abela, Zhu, & Yao, 2007). For example, promoting adaptive emotion regulation strategies may equip adolescents with the tools they need to address the re-occurring stress in their lives and prevent the potential for a destructive cycle involving negative affectivity, risky behaviors, and adverse long-term consequences (Auerbach, Abela, & Ho, 2007). As such, the current study is a pilot study of a theory-based intervention for adolescents, designed to target a vulnerability (i.e., maladaptive emotion regulation) to risky behaviors (Auerbach et al., 2010a). The primary objective centers on assessing the effectiveness of a school-based intervention program specifically designed to increase the use of adaptive CER strategies and decrease the use of maladaptive strategies. Participants completed self-report questionnaires pre- and postintervention assessing CER and risky behaviors. It was hypothesized that increases in adaptive CER strategies and decreases in maladaptive strategies would be noted for the intervention group, but not the control group. Furthermore, it was expected that self-reported engagement in risky behaviors would be significantly lower for participants in the intervention group following the CERTIFY program, but not the control group. Findings from this study will inform future intervention programs and will test the hypothesis that effective emotion regulation intervention decreases risky behaviors.

Method

Participants

Participants included 41 adolescents (71% male) between the ages of 12 and 17 (M = 14.2, SD = 1.4), recruited from two English-language secondary schools in the greater Montreal area. The sample was predominantly White (75.6%), with a quarter of the sample reporting African American (12.2%), Latin American (2.4%), or other (9.8%) ethnicity. The majority of participants reported English (78%) or French (12.2%) as their primary language; however, 9.2% of participants reported another first language. Students in the sample considered at-risk for

school failure were assigned to the intervention group (n = 28), whereas the remaining students comprised the control group (n = 13). The intervention group (82.1% male) consisted of individuals between the ages of 12 and 17 (M = 13.9, SD = 1.3), who were primarily White (75%) and English speaking (71.4%). A subset of the intervention group reported African American (14.3%), Latin American (3.6%), or other (7.1%) for ethnicity, and French (17.9%) or other (10.7%) for primary language. The control group (46.2% male) consisted of individuals between the ages of 13 and 17 (M = 14.7, SD = 1.4), who were primarily White (76.9%) and English speaking (92.3%). The remaining control group participants reported African American (7.7%) or other (15.4%) for ethnicity, and other (7.7%) for primary language.

Homeroom and resource teachers, in conjunction with guidance counselors and school psychologists, identified at-risk students for the intervention group. School staff selected students that they felt would benefit most from an intervention targeting emotion regulation and risky behaviors. All participants in the intervention group were enrolled in their respective schools' special education programs. These programs provide students with extra academic support from tutors and resource teachers, access to guidance counselors, nurses, social workers, school psychologists, and drug counselors. Typically, these students present with poor academic performance, frequent absenteeism, and increased delinquent behaviors (e.g., smoking, alcohol/drug use).

Intervention

The principal investigator, based on the theoretical construct of CER, developed the intervention program entitled Cognitive Emotion Regulation Training Intended for Youth (CERTIFY; Garnefski et al., 2001). Garnefski and colleagues (2001) posit that conscious cognitive processes help people regulate their emotions after negative life events. Specifically,

CERTIFY introduces the notion of CER to adolescents, and explains that there are adaptive and maladaptive strategies of regulating one's emotions. CERTIFY aims to reduce maladaptive strategies (i.e., risk factors), while promoting adaptive strategies (i.e., protective factors) in CER. It consists of a series of 11 sessions including an introductory and concluding session. During the introductory session students are introduced to the concept of CER, as well as the different cognitive strategies that can be used to regulate one's emotions. The concluding session serves as a review period of all of the strategies learned over the course of the intervention. The remaining sessions each focus on one of nine CER strategies, five adaptive strategies (i.e., acceptance, positive refocusing, positive reappraisal, putting into perspective, and refocusing on planning) and four maladaptive strategies (i.e., rumination, catastrophizing, self-blame, and other blame). The goal of each session is to raise students' awareness of the different cognitive strategies that individuals may use when coping with stressful life events, while attempting to reduce the participants' propensity to use maladaptive strategies and increase the likelihood of using adaptive ones.

Program design was based on Durlak and Weissberg's (2010) SAFE framework for school-based interventions. Specifically, school intervention programs were found to be more effective in developing skills if the curriculum was sequential and integrated, involved active forms of learning, focused on skill development, and had explicit learning objectives. As such, the structure of the CERTIFY sessions included a review of the previous session followed by a discussion about a new CER strategy lead by the principal investigator (i.e., building upon previous skills), while including learning activities designed to engage the students. Sessions are reinforced through the use of personal examples, storytelling, role-play, videos, and games.

The Intervention Team

The intervention sessions were led by the principal investigator (PI) and accompanied by two research assistants. A teacher or guidance counselor was present during all of the intervention sessions for behavioral management support.

Procedure

Following approval from the University Research Ethics Board, both parental and personal consent were required to participate in the current study. All students who received parental consent chose to provide assent.

The intervention group participated in the 11-session program, whereas the control group was placed on a waitlist for the intervention. Students in the intervention group attended a series of 11 sessions over the course of 12 weeks (i.e., one session per week, with an extra week between sessions 10 and 11). Each session was conducted by the research team to groups of six to eight students, lasting approximately 45-min per session. All sessions were scheduled during the regular school day, usually in the morning. Students in the intervention group were excused from their regular class time in order to participate in the session. The control group attended their regular school program only.

Measures

Cognitive Emotion Regulation Questionnaire (CERQ; Garnefski et al., 2001). The CERQ is a 36-item self-report measure designed to assess specific CER strategies. The CERQ includes nine conceptually distinct scales. Scores on the CERQ range from one (*almost never*) to five (*almost always*), and each subscale contains four items. Total scores for the subscales are obtained by summing the items, and thus, each subscale has a minimum score of 4 and a maximum score of 20. Higher scores on subscales indicate a propensity to employ that cognitive strategy and/or strategies in response to negative life events. Theoretically, the CERQ contains

131

nine distinct subscales: (a) self-blame, (b) acceptance, (c) rumination, (d) positive refocusing, (e) refocus on planning, (f) positive reappraisal, (g) putting into perspective, (h) catastrophizing, and (i) blaming others. A maladaptive subscale was created by summing the self-blame, rumination, catastrophizing, and blaming others subscales (CERQ Maladaptive). Research has shown that the CERQ has good factorial validity and high reliabilities, with alphas ranging between .75 and .87 (Garnefski & Kraaij, 2007). Specifically, principal component analyses have provided strong empirical support to the allocation of items to subscales across adolescent and adult samples. Confirmatory factor analyses have confirmed the factorial validity. Furthermore, test-retest correlations demonstrated that CER strategies are relatively stable, even after a follow-up period of one year (Garnefski & Kraaij, 2007). In the current study, the alphas ranged from .89 to .95 across administrations.

Risky Behaviors Questionnaire for Adolescents (RBQ-A; Auerbach & Gardiner, 2012). The RBQ-A is a 20-item self-report measure that assesses frequency of engagement in risky behaviors. Examples of questions include: "Have you bullied or threatened a peer(s)?" "Have you destroyed property (other than your own)?" and "Have you used illegal drugs?" Subscales assessed engagement in the following subgroups of behaviors: (a) unsafe sexual practices; (b) aggressive and/or violent behaviors; (c) rule-breaking; (d) dangerous, destructive, and/or illegal behaviors; (e) self-injurious behaviors; and (f) alcohol and/or drug use. Respondents reported their engagement in such behaviors over the past month using the following scale: *never, 1 time per month, 2 to 4 times per month, 2 to 3 times per week, 4 times or more per week.* Although the reliability and validity of the RBQ-A have not been examined, past research with an adolescent sample has indicated that it is positively associated with depressive symptoms and negatively correlated with perceived control (e.g., Auerbach, Tsai et

al., 2010). For the current study, the alphas across assessments were .88 to .90.

Data Collection

Data were collected before and after the intervention program. The pre- and postintervention assessment consisted of the Cognitive Emotion Regulation Questionnaire (CERQ) and Risk Behaviors Questionnaire – Adolescent (RBQ-A). The principal investigator and research assistants collected all data for the intervention group during the introductory session (T1) and concluding session (T2). Participants in the control group were excused from their regular class time for approximately 15 minutes to complete the CERQ and RBQ-A at T1 and 16 weeks later, at T2. Similarly, participants in the intervention group completed their T2 assessment 16 weeks after T1; 4 weeks after their final CERTIFY session.

Data Analysis

A repeated measures MANOVA analysis was conducted to identify differences between the study and control groups on the CERQ and RBQ-A before and after the intervention. Age and gender variables were entered as covariates and the treatment effect was entered as a predictor variable.

Results

Table 1 presents the characteristics of all participants. Statistical comparison of the groups showed that individuals in the intervention group were not significantly different from the control group on any of the CER variables. However, there was a significant difference for risky behavior engagement between the two groups. Specifically, individuals in the intervention group presented with a higher engagement in risky behaviors at baseline.

A repeated-measures MANOVA test was conducted to test the effects of intervention (i.e., CERTIFY) on adolescent self-report ratings of CER and risky behavior engagement. Table 2

presents the means and standard deviations for the dependent variables at pretest and posttest for the intervention and control groups.

Preliminary multivariate analyses indicated that there were no significant within subject changes in CER strategies or risky behaviors, F(10, 30) = 1.36, p = .24, due solely to Time elapsed. Additional multivariate analyses indicated that there was no main between subject effect for Group (i.e., CERTIFY versus Control), F(10, 30) = 1.95, p = .07. Finally, preliminary multivariate analyses indicated that Group x Time did not have a significant interaction effect F(10, 30) = .51, p = .87 for the combination of dependent variables, however, there were significant interaction effects for certain variables (presented below).

Cognitive Emotion Regulation

To address the multipurpose aim of CERTIFY, several components of CER were analyzed. Altogether, 11 measures of CER were included in the analyses. Specifically, overall adaptive and maladaptive CER strategies were included. As a means of specifying which areas/strategies of adaptive and maladaptive regulation were most influenced by the intervention, the five adaptive and four maladaptive strategies were also included.

Adaptive cognitive emotion regulation. First, the results of CERTIFY's aim to promote adaptive coping strategies are presented. MANOVA results indicate that overall adaptive CER strategies, F(1, 39) = 5.22, p = .03, significantly increased from pre- to post-intervention. Following Cohen (1988), effects sizes (Cohen's *d*) of 0.20, 0.50, and 0.80 were considered small, medium, and large, respectively. The effect size for this sample is 0.35, indicating a small positive effect for the CERTIFY intervention on the promotion of overall adaptive strategies. Specifically, refocusing on planning, F(1, 39) = 4.75, p = .04, and positive reappraisal F(1, 39) = 4.09, p = .05, are the adaptive strategies that were reportedly used significantly more after the

intervention program. The effect sizes are 0.18 and 0.16, respectively. Conversely, although the increases approached significance, the remaining adaptive strategies, acceptance, F(1, 39) = 3.53, p = .07, positive refocusing, F(1, 39) = 3.36, p = .07, and putting into perspective, F(1, 39) = 2.95, p = .09, did not significantly increase post-intervention.

Maladaptive cognitive emotion regulation. Second, the results of CERTIFY's aim to reduce the use of maladaptive coping strategies are presented. MANOVA results indicate that CERTIFY was unsuccessful at significantly reducing overall maladaptive CER strategies, F(1, 39) = 1.77, p = .19, as well as specific maladaptive strategies: self-blame, F(1, 39) = 1.11, p = .30, rumination, F(1, 39) = 1.94, p = .17, catastrophizing, F(1, 39) = .74, p = .40, and otherblame F(1, 39) = .93, p = .34.

Risky Behaviors

Last, it was hypothesized that a possible secondary benefit of CERTIFY might be a decrease in risky behaviors, given its well-documented relationship with CER (Auerbach et al., 2010a). However, contrary to our hypothesis, there was no significant decrease in self-reported engagement in risky behaviors, F(1, 39) = .04, p = .85, following the CERTIFY intervention.

A post hoc power analysis was conducted to determine whether the study design had significant power to detect both main and interaction effects (Faul, Erdfelder, Lang, & Buchner, 2007). The effect sizes (*f*) for between and within subjects were .81 (i.e., large effect) and .67 (i.e., medium effect), respectively. However, based on the interaction effect size observed in the present study (f = .26), a sample size of approximately 58 would be needed to obtain statistical power at the recommended .80 power level (Cohen, 1988).

Discussion

Overall, the results show that the school-based intervention program (i.e., CERTIFY) for at-risk adolescents had a small, but positive impact with regard to promoting adaptive CER strategies. Participation in the school-based group intervention encouraged the use of positive coping strategies weeks after the group was terminated, yet did not have an impact on adolescent engagement in risky behaviors. Further, although CERTIFY had positive effects on promoting adaptive strategies, the intervention was not associated with decreases in maladaptive CER strategies. Such findings suggest that school-based group intervention programs may be well suited to educate and promote adaptive CER strategies among at-risk adolescents, yet may not have a sufficient enough impact on group participants to decrease and discourage long-standing maladaptive behaviors and coping strategies.

Limitations

Several limitations of the current study should be noted. First, students for the control group were chosen based on age and availability of willing participants and were not matched to the intervention group on other important variables, such as academic achievement or risk status. Furthermore, the current study used a highly specific, urban, high school student sample, most of who were White, male, and English speaking. In particular, given that the participant sample was comprised primarily of male students, the generalizability of the findings should be interpreted with caution, as there are important gender differences in both CER and risky behaviors (Garnefski, Teerds, Kraaij, Legerstee, & van den Kommer, 2004; Nichols, Graber, Brooks-Gunn, & Botvin, 2006). Moreover, the total number of participants was limited, as a post-hoc power analysis indicated the sample would have ideally been comprised of at least 58 students. The intervention group consisted of students identified by school personnel as being most at-risk for school failure, whereas the control group consisted of typically achieving students. As a result,

the intervention group engaged in significantly more risky behaviors than the control group at T1. The specificity of this sample limits the generalizability of the results. Future research should examine these hypotheses in more diverse populations, including examining whether CERTIFY can have positive gains for typical high school students. Second, the current study examined the effects of an in-school intervention on CER and possible secondary benefits on risky behaviors. Although CER is an integral part of emotion regulation and a known predictor of risky behaviors, it is not an all-encompassing term for emotion regulation. Therefore, future research would benefit from examining the effects of intervention on other emotion regulation strategies and subsequent risky behaviors. Third, a self-report measure was used to assess CER strategies. Although the CERQ is a reliable and valid measure, it only assesses a few of the many conscious and unconscious emotion regulation strategies. Future studies may benefit from using alternative assessment methods such as experimental observation to examine emotion regulation. Last, the post-intervention assessment was completed only four weeks after implementation. Thus, it is difficult to conclude whether the benefits of CERTIFY are long-lasting. Future intervention studies would benefit from longitudinal data collection designs.

Clinical Implications

The current study found that the effect of time alone did not have a significant impact on the level of CER strategies, suggesting they may remain relatively stable. The stability of maladaptive strategies, coupled with their associated detrimental effects, highlights the need for intervention. Although CERTIFY facilitated the increased use of adaptive strategies, it was unsuccessful in decreasing maladaptive strategies. Risky behaviors were also unaffected, suggesting that despite the increased use of adaptive strategies, maladaptive strategies may be a stronger determinant of adolescent risky behavior (Aldao et al., 2010). These findings may be

137

important to consider with regard to the development of future intervention programs. Given the strong relationship between CER and risky behaviors (Auerbach et al., 2010a), identifying adolescents who tend to use maladaptive strategies more frequently would highlight students most in need of intervention. Moreover, clinicians could target these students with programs designed with a primary objective of reducing maladaptive strategies. Such an approach may prevent individuals from entering a potentially destructive cycle involving negative affect, risky behaviors, and the associated negative consequences.

Although CER strategies are typically responsive to intervention (Extremera & Rey, 2014), certain aspects of CERTIFY may not have been salient enough to contribute to gains related to maladaptive strategies. For example, practicing desirable responses (i.e., adaptive CER strategies) in response to general, simulated stressful events in a group format appears to be an effective tactic for promoting and generalizing the use of adaptive strategies across real world situations. However, with regard to discouraging maladaptive CER strategies, perhaps the intervention and simulated stressful events need to be tailored to the participants through more detailed and rigorous pre-intervention data collection. That is, if the intervention team has prior knowledge of specific situations whereby their participants consistently use a maladaptive strategy, they can address said situation by practicing adaptive strategies and exposing the participants to an unaccustomed, but more positive way of coping.

Conclusion

In order to reduce risky behaviors, interventions would be well served to address specific targets related to emotion regulation difficulties (Slee, Spinhoven, Garnefski, & Arensman, 2008). Future research would also benefit from examining potential factors that may play a role in determining an adolescent's propensity to use negative coping strategies. As such, there is a

need for programs like CERTIFY, however, modifications are needed in order for the program to address the rigidity of maladaptive strategy use. One such potentially beneficial change may entail the intervention administrators. As opposed to intervention teams based outside of the school environments, Durlak, Weissberg, Dymnicki, Taylor, and Schellinger (2011) found that school teaching staff could successfully administer evidence-based SEL programs, thus contributing to the social and emotional development of their students. Thus, as CERTIFY demonstrated small positive gains, future implementations of the intervention may benefit from administration by trained, school-based personnel. Should the administration of CERTIFY by school staff become a reality, ensuring that the program is delivered as intended by measuring and evaluating implementation fidelity is an important consideration (Carroll et al., 2007). Given that many teachers have close, healthy relationships with their students, intervention participants may be more eager to participate and respond to the intervention material, which could in turn result in more significant benefits. A Fonds de recherche du Québec - Société et culture grant awarded to Anthony Claro supported this research.

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Mean Group Differences between the Intervention and Control Groups' Performance on Pretest

Scales/Subscales	Intervention $(n = 28)$	Control ($n = 13$)	4	46	
	MSD	MSD	l	аj	p
RBQ Total	17.89 (13.51)	7.92 (7.83)	2.47	39	.02
CERQ Adaptive	51.46 (12.72)	59.15 (12.16)	-1.83	39	.08
Acceptance	10.57 (3.35)	12.00 (2.89)	-1.33	39	.19
Positive refocusing	9.82 (3.32)	10.31 (3.97)	-0.41	39	.68
Refocus on planning	10.18 (3.80)	12.46 (3.43)	-1.84	39	.07
Positive reappraisal	10.14 (3.35)	12.31 (5.02)	-1.64	39	.11
Putting into perspective	10.75 (3.25)	12.08 (3.07)	-1.24	39	.22
CERQ Maladaptive	36.96 (8.81)	36.85 (9.25)	0.04	39	.97
Self-blame	9.32 (2.98)	10.54 (3.73)	-1.13	39	.27
Rumination	9.68 (3.16)	10.08 (2.78)	-0.39	39	.70
Catastrophizing	9.50 (3.66)	8.77 (3.68)	0.59	39	.56
Other-blame	8.46 (3.40)	7.46 (2.26)	0.96	39	.34

Risky Behavior Questionnaire and Cognitive Emotion Regulation Questionnaire Self-Reported

	Intervention $(n = 28)$		Control $(n = 13)$		
Scales/Subscales	Pretest	Posttest	Pretest	Posttest	
	MSD	MSD	MSD	MSD	
RBQ Total	17.89 (13.51)	15.86 (13.13)	7.92 (7.83)	5.38 (5.42)	
CERQ Adaptive	51.46 (12.72)	57.79 (18.05)	59.15 (12.16)	51.77 (16.33)	
Acceptance	10.57 (3.35)	11.82 (4.12)	12.00 (2.89)	10.69 (3.68)	
Positive refocusing	9.82 (3.32)	11.29 (3.971)	10.31 (3.97)	9.15 (4.54)	
Refocus on planning	10.18 (3.80)	11.57 (4.29)	12.46 (3.43)	10.77 (4.46)	
Positive reappraisal	10.14 (3.35)	11.79 (4.42)	12.31 (5.02)	11.08 (4.19)	
Putting into perspective	10.75 (3.25)	11.32 (4.07)	12.08 (3.07)	10.18 (4.37)	
CERQ Maladaptive	36.96 (8.81)	36.50 (10.94)	36.85 (9.25)	30.85 (10.47)	
Self-blame	9.32 (2.98)	9.07 (3.22)	10.54 (3.73)	9.08 (4.52)	
Rumination	9.68 (3.16)	9.86 (3.27)	10.08 (2.78)	8.46 (4.08)	
Catastrophizing	9.50 (3.66)	8.86 (3.41)	8.77 (3.68)	6.85 (2.23)	
Other-blame	8.46 (3.40)	8.71 (3.53)	7.46 (2.26)	6.46 (1.98)	

Means and Standard Deviations

It has been well established that adolescence is the peak period for risky behaviour engagement (Lahey et al., 2000), which often stems from vulnerabilities ranging from maladaptive emotion regulation strategies (Auerbach, Claro, Abela, Zhu, & Yao, 2010), diminished perceived control (Auerbach, Tsai, & Abela, 2010), and executive function deficits (Ready et al., 2001). Identifying factors that confer vulnerability to risky behaviours will be essential to informing early identification and intervention programs. Thus, the present research program aimed to test potential vulnerability factors implicated in risky behavior engagement and then, examine whether intervening on these specific factors leads to positive and observable diminishment in adolescent risky behaviours.

General Discussion and Original Contributions to Knowledge

Altogether, the series of articles presented in this dissertation extend prior research on the exploration of vulnerability factors and intervention of adolescent risky behaviours. Specifically, Manuscript I is the first to investigate the applicability of Albert Bandura's (1986) social cognitive theory to adolescent risky behaviour engagement. The interplay between personal and environmental factors can have important consequences for behaviour. Manuscript I contributes to the literature as it assessed which factors account for a greater proportion of the variance in risky behaviour engagement. Results of the first manuscript highlight the relative importance of personal factors, as compared to environmental factors for predicting risky behaviours. However, while a greater number of personal factors (i.e., impulsiveness, low anxious symptoms, and poor self-concept clarity) were associated with adolescent engagement in risky behaviours, the strongest single predictor of risky behaviours was an environmental factor (i.e., negative life events). Overall, findings support Bandura's social cognitive theory (1986), as both personal and environmental factors interact to predict adolescent risky behaviour. As a whole, these findings

suggest that adolescents engage in risky behaviours more as a function of their personal vulnerability factors, but that their environment can also have a meaningful impact.

Additionally, the results of Manuscript I indicate that the interaction between two or more factors, regardless of domain, confers greater risk for risky behaviour engagement. Therefore, there seems to be an additive effect whereby the presence of more vulnerability factors leads to greater risky behaviour engagement. Meaning, individuals with multiple vulnerability factors are more likely to be engaging in risky behaviours, and from a clinical perspective, these individuals would benefit from prioritization in intervention and prevention programs. Further, age-related comparisons revealed that older male adolescents are most at-risk for risky behaviours. This may be due to a number of reasons; some of which may include the accessibility of resources and finances to support certain behavioural patterns, peer influence over many years, increased autonomy, and decreased parental influence.

Deficits in executive function have long been associated with risky behaviours (Magar, Phillips, & Hosie, 2008; Ready et al., 2001). However, given that executive function is an umbrella term for many distinct, but highly related skills (e.g., planning and organizing, working memory, inhibition, mental flexibility, initiation, monitoring of actions), Manuscript II aimed to delineate the influence of specific executive function skills on adolescent risky behaviour engagement. There are a number of ways to measure executive function, and Manuscript II contributes to the literature by being the first attempt to examine different measures (i.e., performance-based versus observer-reported) and their association with broad-based risky behaviours. The results suggest that observer-reported (Behavior Rating Inventory for Executive Function– Teacher Form; BRIEF) deficits in overall executive function skills are associated with increased adolescent risky behaviour engagement, whereas poor results on the performance-

based measure (Trail Making Test – Part B; TMT-B) of executive function were unrelated to risky behaviour engagement. However, only adolescents' total level of observer-reported executive function (General Executive Composite, as measured by the BRIEF) was associated with risky behaviours, suggesting that deficits within specific skillsets (i.e., Behavioral Regulation and Metacognitive Indices) are not necessary or sufficient to predict risky behaviour engagement. The results contribute to the literature by highlighting which aspects of the executive function umbrella term are relevant and associated with negative behavioural patterns in adolescents. The findings are important in that they underlie the significance of the role of the teacher in identifying adolescents at-risk. That is, observer-reported (i.e., teacher) executive function was a better gauge of an adolescent's susceptibility to engage in risky behaviours, in comparison to the experimental (i.e., performance-based) measure of executive function. This may not be altogether surprising given that teachers have repeated exposure to their students and have the luxury of observing them over time - across different situations and environments whereas experimental measures are time-limited and may not possess sufficient ecological validity.

Finally, Manuscript III (Claro, Boulanger, & Shaw, 2015) is the first study in adolescents designed to target emotional regulation skills related to risky behaviors as part of an in-school intervention. The Cognitive Emotion Regulation Intended for Youth (CERTIFY) program uses a group format – 11 sessions – to teach the use of adaptive and dissuade maladaptive cognitive emotion regulation strategies. The program was piloted and implemented with adolescents at-risk (i.e., poor academic achievement and behavioural problems) for school dropout. Interestingly, greater gains were made for youth to implement more adaptive strategies to reduce risky behaviour engagement, and surprising, there was no reduction in used maladaptive strategies or

risky behaviours. Results from this study provide an original contribution to the literature as it examines the efficacy of a novel intervention program designed to target specific vulnerability factors to minimize broad-based risky behaviours.

Implications for School Psychology

The results of the current program of research inform the field of school psychology in many ways, particularly with respect to intervention program design and implementation. First, Manuscript I provided insight into the multi-causal pathway through which adolescents engage in risky behaviours. Although both personal and environmental factors are strongly associated with risky behaviours, a greater quantity of personal factors (i.e., impulsiveness, anxious symptoms, and self-concept clarity) were found to be significant predictors. However, an environmental factor (i.e., negative life events) had the strongest association with risky behaviours. Therefore, when planning interventions or choosing goals for counselling, there are a number of reasons school psychologists should target personal factors. Within a school setting, clinicians would benefit from considering the breadth of their intervention. Given there are more personal factors that contribute to risky behaviours, interventions that target these factors are more likely to have a positive effect for behaviour. Further, school psychologists should consider the numerous personal factors that make a student vulnerable to risky behaviours when attempting to identify those who are at the greatest risk for school failure. In fact, priority lists for prevention programs could be created based on the presence and quantity of personal vulnerability factors. Although intervening on environmental factors from the school setting may be difficult, a school psychologist may benefit from attempting to improve decision making in an in order to minimize the events that teens may be able to control (e.g., pregnancy, getting

arrested). Also, working in conjunction with an adolescent's family system may help facilitate the aim of reducing controllable negative life events.

Manuscript II aimed to narrow the focus for executive function intervention among school psychologists. Although executive function is an umbrella term for a number of skills, the findings suggest that risky behaviours are only associated with overall observer-reported executive function (GEC), as measured by the BRIEF. As opposed to focusing on a singular skill that make up the GEC, the findings from Manuscript II suggest that in-school interventions would be best-served to improve a greater number of executive function skills in an attempt to improve an individual's overall level of executive function. An all-encompassing approach for executive function intervention, that targets all of the skills that comprise the GEC, could be disseminated weekly in schools, over the course of an academic year. Intervening on numerous executive function skills could theoretically result in an increased overall level of executive function, which may then lead to a decrease in risky behaviour engagement. Based on the results of Manuscript II, school psychologists can provide teachers with the BRIEF to identify students most likely to engage in risky behaviours. That is, students with lower overall scores for executive function, as opposed to deficits in singular skills could then be targeted for intervention.

Finally, Manuscript III examined the efficacy of an in-school intervention (i.e., CERTIFY) aimed at targeting cognitive emotion regulation strategies, which is a predictor of adolescent risky behaviour engagement (Claro et al., 2015). CERTIFY resulted in increased use of adaptive strategies, but was unsuccessful in decreasing maladaptive strategies or risky behaviours. School psychologists should consider these results when developing novel intervention programs or for future CERTIFY administrations. Specifically, reducing

maladaptive strategies should be the primary objective of intervention, which could in turn prevent students from entering a potentially destructive cycle involving negative affect, risky behaviors, and the associated negative consequences. Certain aspects of CERTIFY may not have been salient or intense enough to contribute to gains related to maladaptive strategies. Therefore, future interventions would benefit from more detailed and rigorous pre-intervention data. These data would inform the simulated situations and role-plays and thus, allow the participants to address and practice adaptive strategies in situations that are more typical.

Future Research

The results of the current program of study offer several directions for future research. Data for the first two manuscripts were collected across the island of Montreal; however, the sample consisted primarily of Caucasian adolescents. Given that risky behaviours vary as a function of race and ethnicity (Stets, 1990; Wallace et al., 2003), future studies would benefit from examining the relationship between vulnerability factors and the engagement in risky behaviours in more diverse samples. Similarly, Manuscript III (Claro et al., 2015) examined the effects of CERTIFY on a specific, at-risk sample of adolescents. Given these participants are arguably some of the most 'challenging' adolescents in the Montreal school system, it would be important to gauge whether CERTIFY has more impactful results in terms of reducing risky behaviours in community samples of adolescents.

A significant portion of the data were collected through self-report measures, which are inherently biased by the participant's mood during completion, as well as social desirability and retrospective recall biases. Future studies would benefit from using alternative methods of data collection. For example, semi-structured interviews may provide a more in depth assessment of how the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; American Psychiatric Association, 2013) diagnoses map onto patterns of risky behavior engagement. In general, semistructured interviews provide more reliable and valid data than checklists. Further, given that the correlation between self-report and experimental observation methods are generally low to moderate (Prince et al., 2008), future studies should attempt to focus on direct observation of risky behaviours, as well as specific emotion regulation strategies. Finally, with regard to questionnaire selection, given that emotion regulation and executive function are umbrella terms for a large number of diverse skills, future research would benefit from broadening and diversifying the scope of their studies. In particular, examining other potential executive function vulnerability factors and their association with risky behaviours, as well as the effects of intervention on other emotion regulation strategies and subsequent risky behaviours is warranted.

This program of research spanned adolescence, as participants ranged between the ages of 12 and 19 years. However, the studies were cross-sectional and thus, cannot gauge changes in adolescent behaviours over time. Longitudinal studies could provide important insight into cause and effect, and additionally, these studies can establish the time-lagged relationship between vulnerability factors, symptoms, and subsequent risky behaviours. Furthermore, Manuscript III (Claro et al., 2015) included a post-intervention follow-up assessment, yet it was completed only four weeks after CERTIFY concluded. Thus, it is difficult to evaluate whether the positive gains related to adaptive coping strategies are enduring. Future intervention studies would benefit from longitudinal data collection that persists 6-months and a year after the intervention.

Summary

The current program of research sought to outline reliable predictors of adolescent engagement in risky behaviours, as well as design and implement an in-school intervention program. The main objective was to narrow future targets for intervention. Specifically, the first manuscript addressed whether in general, personal, or environmental factors are typically more predictive of risky behaviours. Subsequently, the second manuscript examined executive function; an umbrella term and vulnerability factor for risky behaviours. Moreover, the study aimed to examine specific skill deficits within the executive function umbrella, and their relation to risky behaviours. Finally, the third manuscript piloted an intervention that targeted specific skill deficits (i.e., cognitive emotion regulation) related to the engagement in risky behaviours. Results of the current program provide insight into adolescents' propensity to engage in risky behaviours. Specifically, personal factors account for a greater proportion of the variance in risky behaviour engagement as compared to environmental factors. Further, results highlight that deficits in adolescents' overall levels of observer-reported executive function was associated with greater risky behaviours, whereas specific executive function skill deficits and performancebased executive function were not. In addition, an in-school intervention targeting deficits in cognitive emotion regulation (i.e., a vulnerability factor for risky behaviours) increased the use of adaptive strategies, but did not dissuade adolescents from engaging in maladaptive strategies or risky behaviours. In sum, the combined results from this research offer new insight into etiological models of adolescent risky behaviour engagement, as well as intervention targets for school-based psychologists.

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Appendix A

Consent for Executive Function Study (Manuscript II)

RESEARCH CONSENT FORM CN ADOPT AN ALOUETTE PROGRAM PARTICIPANTS

Institution:	Faculty of Education, McGill University			
Title of Project:	Understanding the Influence of Emotion Regulation on Adolescents' Engagement in Risky Behaviors			
Researcher:	Melissa Stern, M.A. Student, School/Applied Child Psychology & Anthony Claro, M.A., PhD Student, School/Applied Child Psychology			
Project Supervisor:	Steven Shaw, Ph.D.			

Dear Parent or legal guardian,

What is the purpose of the study?

The purpose of this study is to understand how adolescents' ability to control their emotions following a negative event is related to their participation in problem behaviors, which range from mild behaviors, such as lying to a friend or family member, skipping class, to more serious behaviors, such as bullying a peer, as well as drug and alcohol use.

Your child's participation is this study is entirely voluntary and your child is allowed to refuse to participate in this task, decline to answer any question, or withdraw at any point from the research study without penalty. In addition, as this research study is not part of the CN Adopt an Alouette program, whether or not your child participates in this research study will have no effect on their participation in the CN Adopt an Alouette program, nor their academic performance.

The results of this study will be used to evaluate the effectiveness of the CN Adopt an Alouette program. In addition, the findings from this study will be disseminated to a range of professionals including educators and psychologists through a Master's and doctoal thesis, presentation at both national and international conferences, and article(s) in peer-reviewed, scientific journals.

What will my child be required to do?

Upon your written consent, your child will be asked to complete four questionnaires that pertain to their ability to regulate their emotions as well as their engagement in problem behaviors. The questionnaires will take approximately 30 minutes to complete and your child's participation will take place in their classroom during the On Point program hours. Furthermore, a brief

questionnaire assessing your child's behaviour in school will be administered to one of their teachers and will in no way affect their grades or academics.

In order to compensate your child for their participation, their name will be entered into a draw to win one of several prizes including one iPod touch and ten movie passes.

Privacy and Confidentiality

To ensure confidentiality, your child will be assigned a file number, and all materials collected from your child will be labeled with only the case number. A list of the participant's names with their assigned file numbers will be kept separately from the collected materials and stored in a locked cabinet at our research unit on the McGill University campus.Only the principal investigator (Melissa Stern), co-investigator (Anthony Claro), the research supervisor (Dr. Steven Shaw), and designated undergraduate research assistants will have access to this information. If and when the data is included in future academic presentations and publications, no mention of your child's identity will be made and only group results will be reported. However, should your child's repsonses indicate that they are either a danger to themselves or others, the school-based mental health professionals will be notified and consulted about the situation. Parents will also be informed.

Benefits, Potential Harms and Risk

Your son/daughter's participation will help us to better understand how adolescents' emotions influence engagement in problem behaviors. In addition, these findings will later inform interventions used in the Alouettes program.

There is minimal risk associated with completing these questionnaires and your child does not have to complete any questionnaires or questions at any point that he/she does not feel comfortable answering. However, due to the nature of the questions asked, it is possible, that they may ellicit an emotional reaction from the individuals participating in the study. In the case that the questions do trigger an emotion reaction, your child will be provided with information on psychological services available to them in the school and community should they be necessary.

Declaration of the parent or legal guardian:

I have read the above description and have been fully informed about the procedures, demands, risks and benefits of the study. I freely and voluntarily consent for my child to participate in this study.

 Name of participant
 Signature of parent/legal guardian

 Date of birth of participant

Name of investigator

Signature of investigator

Date

We thank you kindly for considering this request and hope that we can have your child's participation in this study.

If you have any questions or concerns about your child's rights as a volunteer in this project you may contact the McGill Research Ethics Officer at 514-398-6831.

Sincerely,

Melissa Stern Master's Student, School/Applied Child Psychology Faculty of Education, McGill University 3700 Rue McTavish, Room 614 Montreal, Quebec, H3A1Y2

Contact Information:

Melissa Stern Email: Melissa.Stern@mail.mcgill.ca Telephone : (514) 398-5833 Steven Shaw, Ph.D. Email: Steven.Shaw@mcgill.ca Telephone : (514) 398-4913

Anthony Claro Email: Anthony.Claro@mail.mcgill.ca Telephone: 514-398-5833

Appendix B

Assent for Executive Function Study (Manuscript II)

RESEARCH ASSENT FORM CN ADOPT AN ALOUETTE PROGRAM PARTICIPANTS

Institution:	Faculty of Education, McGill University
Title of Project:	Understanding the Influence of Emotion Regulation on Adolescents' Engagement in Risky Behaviors
Researcher:	Melissa Stern, M.A. Student, School/Applied Child Psychology & Anthony Claro, M.A., PhD Student, School/Applied Child Psychology
Project Supervisor:	Steven Shaw, Ph.D.

What is the purpose of the study?

The purpose of this study is to understand how adolescents' ability to control their emotions following a negative event is related to their participation in problem behaviors, which range from mild behaviors, such as lying to a friend or family member, skipping class, to more serious behaviors, such as bullying a peer, as well as drug and alcohol use.

The findings stemming from this study will be disseminated to a range of professionals including educators and psychologists through a Master's and a doctoal thesis, presentation at both national and international conferences, and article(s) in peer-reviewed, scientific journals. In addition, the CN Adopt an Alouette program will be identified in these reports.

What will I be required to do?

With my written permission, I will be asked to complete four questionnaires that pertain to my ability to regulate my emotions as well as my participation in risky behavior. The questionnaires will take approximately 30 minutes to complete and my participation will take place in my classroom during the On Point program hours. Furthermore, a brief questionnaire assessing my behaviour in school will be administered to one of my teachers and will in no way affect my grades or academics.

My participation is this study is entirely voluntary and I am allowed to refuse to participate in this task, decline to answer any question, or withdraw at any point in time without penalty.In addition, as this research study is not part of the CN Adopt an Alouette program, whether or not I choose to to participate in this research study will have no effect on my participation in the CN Adopt an Alouette program, nor on my academic performance.

In addition, in order to compensate me for my participation, my name will be entered into a draw to win one of several prizes including one iPod and ten movie passes.

Privacy and Confidentiality

To ensure confidentiality, I will be assigned a file number, and all materials collected from me will be labeled with only the case number and not any of my personal information, such as my name or birth date. A list of the participant's names with their assigned file numbers will be kept separately from the collected materials and stored in a locked cabinet at our research unit on the McGill University campus. Only the principal investigator (Melissa Stern), co-investigator (Anthony Claro), the research supervisor (Dr. Steven Shaw), and designated undergraduate research assistants will have access to this information. If and when the data is included in future academic presentations and publications, no mention of my identity will be made and only group results will be reported.

However, should my repsonses indicate that I am a danger to myself or others, the school-based mental health professionals will be notified and consulted about the situation. My parents will also be informed.

Benefits, Potential Harms and Risk

Your participation will help us to better understand how adolescents' emotions influence engagement in problem behaviors. In addition, these findings will later inform interventions used in the Alouettes program.

There is minimal risk associated with completing these questionnaires and you do not have to complete any questionnaires or questions at any point that you do not feel comfortable answering. However, due to the nature of the questions asked, it is possible, that they may ellicit an emotional reaction from the individuals participating in the study. In the case that the questions do trigger an emotion reaction, you will be provided with information on psychological services available to you in the school and community should they be necessary.

Declaration of assent from the participant:

I have read the above description with one of the investigators. I have been fully informed about the procedures, demands, risks and benefits of the study. I understand that I may withdraw from this study at any time without any penalty. I freely and voluntarily assent to participate in this study.

Name of participant	Signature of participant	Date	
Date of birth of participant			
Name of investigator	Signature of investigator	Date	

We thank you kindly for considering this request and hope that we can have your participation in this study.

If you have any questions or concerns about your rights as a volunteer in this project you may contact the McGill Research Ethics Officer at 514-398-6831.

Sincerely,

Melissa Stern Master's Student, School/Applied Child Psychology Faculty of Education, McGill University 3700 Rue McTavish, Room 614 Montreal, Quebec, H3A1Y2

Contact Information:

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Anthony Claro Email: Anthony.Claro@mail.mcgill.ca Telephone: 514-398-5833

Appendix C

Consent for Intervention Study (Manuscript III)

RESEARCH CONSENT FORM Dr. Shaw's Meta-Academic Program

Institution:	Faculty of Education, McGill University
Title of Project:	Understanding the Influence of Emotion Regulation on Adolescents' Engagement in Risky Behaviors
Researcher:	Melissa Stern, M.A. Student, School/Applied Child Psychology & Anthony Claro, M.A., PhD Student, School/Applied Child Psychology
Project Supervisor:	Steven Shaw, Ph.D.

Dear Parent or legal guardian,

What is the purpose of the study?

The purpose of this study is to understand how adolescents' ability to control their emotions following a negative event is related to their participation in problem behaviors, which range from mild behaviors, such as lying to a friend or family member, skipping class, to more serious behaviors, such as bullying a peer, as well as drug and alcohol use. Also, this study will examine whether such behaviours and emotional control change over time.

Your child's participation is this study is entirely voluntary and your child is allowed to refuse to participate in this task, decline to answer any question, or withdraw at any point from the project without penalty. In addition, your child's participation will have no effect on their academic performance at school nor in their participation in Dr. Shaw's Meta-Academic program.

The findings stemming from this study will be disseminated to a range of professionals including educators and psychologists through a Master's and a doctoral thesis, presentation at both national and international conferences, and article(s) in peer-reviewed, scientific journals.

What will my child be required to do?

Upon your written consent, your child will be asked to complete four questionnaires that pertain to their ability to regulate their emotions as well as their engagement in problem behaviors. The questionnaires will take approximately 30 minutes to complete and your child's participation will take place in their classroom during their lunch break. Furthermore, they will be asked to complete the same questionnaires 2 months later in order to examine the potential benefits of Dr. Shaw's Meta-Academic Program.

In order to compensate your child for their participation, their name will be entered into a draw to win one of several prizes including one iPod and ten movie passes.

Privacy and Confidentiality

To ensure confidentiality, your child will be assigned a file number, and all materials collected from your child will be labeled with only the case number. A list of the participant's names with their assigned file numbers will be kept separately from the collected materials and stored in a locked cabinet at our research unit on the McGill University campus. Only the principal investigator (Melissa Stern), co-investigator (Anthony Claro), the research supervisor (Dr. Steven Shaw), and designated undergraduate research assistants will have access to this information. If and when the data is included in future academic presentations and publications, no mention of your child's identity will be made and only group results will be reported. However, should your child's repsonses indicate that they are either a danger to themselves or others, the school-based mental health professionals will be notified and consulted about the situation. Parents will also be informed.

Benefits, Potential Harms and Risk

Your son/daughter's participation will help us to better understand how adolescents' emotions influence engagement in problem behaviors and whether teaching specific emotional skills may help deter your child from engaging in problem behaviours. In addition, these findings will help inform and perfect future interventions.

There is minimal risk associated with completing these questionnaires and your child does not have to complete any questionnaires or questions at any point that he/she does not feel comfortable answering. However, due to the nature of the questions asked, it is possible, that they may ellicit an emotional reaction from the individuals participating in the study. In the case that the questions do trigger an emotion reaction, your child will be provided with information on psychological services available to them in the school and community should they be necessary.

Declaration of the parent or legal guardian:

I have read the above description and have been fully informed about the procedures, demands, risks and benefits of the study. I freely and voluntarily consent for my child to participate in this study.

Name of participant	Signature of parent/legal guardian	Date	
Date of birth of participant			
Name of investigator	Signature of investigator	Date	

We thank you kindly for considering this request and hope that we can have your child's participation in this study.

If you have any questions or concerns about your child's rights as a volunteer in this project you may contact the McGill Research Ethics Officer at 514-398-6831.

Sincerely,

Melissa Stern Master's Student, School/Applied Child Psychology Faculty of Education, McGill University 3700 Rue McTavish, Room 614 Montreal, Quebec, H3A1Y2

Contact Information:

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Anthony Claro Email: Anthony.Claro@mail.mcgill.ca Telephone: 514-398-5833 Steven Shaw, Ph.D. Email: Steven.Shaw@mcgill.ca Telephone : (514)398-4913

Appendix D

Assent for Intervention Study (Manuscript III)

RESEARCH ASSENT FORM Dr. Shaw's Meta-Academic Program

Institution:	Faculty of Education, McGill University
Title of Project:	Understanding the Influence of Emotion Regulation on Adolescents' Engagement in Risky Behaviors
Researcher:	Melissa Stern, M.A. Student, School/Applied Child Psychology & Anthony Claro, M.A., PhD Student, School/Applied Child Psychology
Project Supervisor:	Steven Shaw, Ph.D.

What is the purpose of the study?

The purpose of this study is to understand how adolescents' ability to control their emotions following a negative event is related to their participation in problem behaviors, which range from mild behaviors, such as lying to a friend or family member, skipping class, to more serious behaviors, such as bullying a peer, as well as drug and alcohol use.

Also, this study will examine whether such behaviours and emotional control change over time.

The findings stemming from this study will be disseminated to a range of professionals including educators and psychologists through a Master's and a doctoral thesis, presentation at both national and international conferences, and article(s) in peer-reviewed, scientific journals.

What I be required to do?

With my written permission, I will be asked to complete four questionnaires that pertain to my ability to regulate my emotions as well as my participation in risky behavior. The questionnaires will take approximately 30 minutes to complete and my participation will take place in my classroom during my lunch break. Furthermore, I will be asked to complete the same questionnaires 2 months later in order to examine the potential benefits of Dr. Shaw's Meta-Academic Program.

My participation is this study is entirely voluntary and I am allowed to refuse to participate in this task, decline to answer any question, or withdraw at any point in time without penalty. In addition, whether or not I choose to to participate in this research study will have no effect on my academic performance nor my participation in Dr. Shaw's Meta-Academic Program. In addition, in order to compensate me for my participation, my name will be entered into a draw to win one of several prizes including one iPod and ten movie passes.

Privacy and Confidentiality

To ensure confidentiality, I will be assigned a file number, and all materials collected from me will be labeled with only the case number and not any of my personal information, such as my name or birth date. A list of the participant's names with their assigned file numbers will be kept separately from the collected materials and stored in a locked cabinet at our research unit on the McGill University campus. Only the principal investigator (Melissa Stern), co-investigator (Anthony Claro), the research supervisor (Dr. Steven Shaw), and designated undergraduate research assistants will have access to this information. If and when the data is included in future academic presentations and publications, no mention of my identity will be made and only group results will be reported.

However, should my repsonses indicate that I am a danger to myself or others, the school-based mental health professionals will be notified and consulted about the situation. My parents will also be informed.

Benefits, Potential Harms and Risk

Your participation will help us to better understand how adolescents' emotions influence engagement in problem behaviors and how effective the training program is at teaching effective emotion regulation skills and whether it may influence problem behaviours. In addition, these findings will help inform and perfect future interventions.

There is minimal risk associated with completing these questionnaires and you do not have to complete any questionnaires or questions at any point that you do not feel comfortable answering. However, due to the nature of the questions asked, it is possible, that they may ellicit an emotional reaction from the individuals participating in the study. In the case that the questions do trigger an emotion reaction, you will be provided with information on psychological services available to you in the school and community should they be necessary.

Declaration of assent from the participant:

I have read the above description with one of the investigators. I have been fully informed about the procedures, demands, risks and benefits of the study. I understand that I may withdraw from this study at any time without any penalty. I freely and voluntarily assent to participate in this study.

Name of participant	Signature of participant	Date
Date of birth of participant		
Name of investigator	Signature of investigator	Date

We thank you kindly for considering this request and hope that we can have your participation in this study.

If you have any questions or concerns about your rights as a volunteer in this project you may contact the McGill Research Ethics Officer at 514-398-6831.

Sincerely,

Melissa Stern Master's Student, School/Applied Child Psychology Faculty of Education, McGill University 3700 Rue McTavish, Room 614 Montreal, Quebec, H3A1Y2

Contact Information:

Melissa Stern Email: Melissa.Stern@mail.mcgill.ca Telephone : (514) 241-4858

Anthony Claro Email: Anthony.Claro@mail.mcgill.ca Telephone: 514-398-5833 Steven Shaw, Ph.D. Email: Steven.Shaw@mcgill.ca Telephone : (514)398-4913

Appendix E

Risky Behavior Questionnaire for Adolescents

School: Participant ID:

Date:_____

RBQ-A

In this questionnaire we are interested in whether certain events have happened to you in the **PAST MONTH**. Please indicate how often the following events have happened to you in the **PAST MONTH**.

Scale: (0) Never

(1) Almost Never (1 Time Per Month)

(2) Sometimes (2-4 Times Per Month)

(3) Almost Always (2-3 Times Per Week)

(4) Always (4 or More Times Per Week)

PAST MONTH

		Never	Almost Never	Sometimes	Almost Always 2 3/wook	Always
			1/11011111	2-4/1101101	2-3/ WEEK	4+/ WCCN
1.	Have you destroyed property (other than your own)?	(0)	(1)	(2)	(3)	(4)
2.	Have you been unfaithful to your boyfriend or girlfriend?	(0)	(1)	(2)	(3)	(4)
3.	Have you been in a physical fight?	(0)	(1)	(2)	(3)	(4)
4.	Have you bullied, threatened, or intimidated a peer(s)?	(0)	(1)	(2)	(3)	(4)
5.	Have you been binge drinking and/or drinking to get drunk?	(0)	(1)	(2)	(3)	(4)

6.	Have you used illegal drugs?	(0)	(1)	(2)	(3)	(4)
7.	Have you sold illegal drugs?	(0)	(1)	(2)	(3)	(4)
		Never	Almost	Sometimes	Almost	Always
			1/month	2-4/month	Always 2-3/week	4+/week
8.	Have you skipped class (or entire days of school)?	(0)	(1)	(2)	(3)	(4)
9.	Have you cheated or plagiarized?	(0)	(1)	(2)	(3)	(4)
10.	Have you shoplifted?	(0)	(1)	(2)	(3)	(4)
11.	Have you stolen money?	(0)	(1)	(2)	(3)	(4)
12.	Have you had unsafe sex?	(0)	(1)	(2)	(3)	(4)
13.	Have you verbally harassed someone?	(0)	(1)	(2)	(3)	(4)
14.	Have you made attempts to cut or burn yourself?	(0)	(1)	(2)	(3)	(4)
15.	Have you purged or binged?	(0)	(1)	(2)	(3)	(4)
16.	Have you gambled?	(0)	(1)	(2)	(3)	(4)
17.	Have you lied to your family members (e.g., grandparents, parents, siblings)?	(0)	(1)	(2)	(3)	(4)

18.	Have you driven (a bicycle, a moped, and/or a car) recklessly (e.g., at fast speeds, under the influence of a substance)?	(0)	(1)	(2)	(3)	(4)
19.	Have you used cigarettes?	(0)	(1)	(2)	(3)	(4)
20.	Have you engaged in acts of revenge?	(0)	(1)	(2)	(3)	(4)

Appendix F

Cognitive Emotion Regulation Questionnaire

CERQ

© Garnefski, Kraaij & Spinhoven, 2001

How do you cope with events?

Everyone gets confronted with negative or unpleasant events now and then and everyone responds to them in his or her own way. By the following questions you are asked to indicate what you generally think, when you experience negative or unpleasant events.

	(almost) never	some- times	regu- larly	often	(almost) always
1. 1 feel that I am the one to blame for it	1	2	3	4	5
2. I think that I have to accept that this has happened	1	2	3	4	5
3. I often think about how I feel about what I have experienced	1	2	3	4	5
4. I think of nicer things than what I have experienced	1	2	3	4	5
5. I think of what I can do best	1	2	3	4	5
6. I think I can learn something from the situation	1	2	3	4	5
7. I think that it all could have been much worse	1	2	3	4	5
8. I often think that what I have experienced is much worse than what others have experienced	1	2	3	4	5
9. I feel that others are to blame for it	1	2	3	4	5
10. I feel that I am the one who is responsible for what has happened	1	2	3	4	5
11. I think that I have to accept the situation	1	2	3	4	5
12. I am preoccupied with what I think and feel about what I have experienced	1	2	3	4	5
13. I think of pleasant things that have nothing to do with it	1	2	3	4	5
14. I think about how I can best cope with the situation	1	2	3	4	5
15. I think that I can become a stronger person as a result of what has happened	1	2	3	4	5
16. I think that other people go through much worse experiences	1	2	3	4	5
17. I keep thinking about how terrible it is what I have experienced	1	2	3	4	5
18. I feel that others are responsible for what has happened	1	2	3	4	5
19. I think about the mistakes I have made in this matter	1	2	3	4	5
20. I think that I cannot change anything about it	1	2	3	4	5
21. I want to understand why I feel the way I do about what I have experienced	1	2	3	4	5
22. I think of something nice instead of what has happened	1	2	3	4	5
23. I think about how to change the situation	1	2	3	4	5
24. I think that the situation also has its positive sides	1	2	3	4	5

ADOLESCENTS AND RISKY BEHAVIOURS

25. I think that it hasn't been too bad compared to other things	1	2	3	4	5
26. I often think that what I have experienced is the worst that can happen to a person	1	2	3	4	5
27. I think about the mistakes others have made in this matter	1	2	3	4	5
28. I think that basically the cause must lie within myself	1	2	3	4	5
29. I think that I must learn to live with it	1	2	3	4	5
30. I dwell upon the feelings the situation has evoked in me	1	2	3	4	5
31. I think about pleasant experiences	1	2	3	4	5
32. I think about a plan of what I can do best	1	2	3	4	5
33. I look for the positive sides to the matter	1	2	3	4	5
34. I tell myself that there are worse things in life	1	2	3	4	5
35. I continually think how horrible the situation has been	1	2	3	4	5
36. I feel that basically the cause lies with others	1	2	3	4	5

Thank you for filling out the questionnaire!

Appendix G

Research Ethics Certificate (Manuscript I)

McGill University

ETHICS REVIEW RENEWAL REQUEST/FINAL REPORT

Continuing review of human subjects research requires, at a minimum, the submission of an annual status report to the REB. This form must be completed to request renewal of ethics approval. If a renewal is not received before the expiry date, the project is considered no longer approved and no further research activity may be conducted. When a project has been completed, this form can also be used as a Final Report, which is required to properly close a file. To avoid expired approvals and, in the case of funded projects, the freezing of funds, this form should be returned 3-4 weeks before the current approval expires.

REB File #: 26-0605 Project Title: A transactional model of risky behaviors, stress, and vulnerability to depression in adolescents Principal Investigator: Randy Patrick Auerbach Department/Phone/Email: Psychology Department/514-398-6133/randy.auerbach@mail.mcgill.ca Faculty Supervisor (for student PI): John R. Z. Abela, PhD

- 1. Were there any significant changes made to this research project that have any ethical implications? ___Yes _X_No If yes, describe these changes and append any relevant documents that have been revised.
- 2. Are there any ethical concerns that arose during the course of this research? ____ Yes _X_ No. If yes, please describe.
- 3. Have any subjects experienced any adverse events in connection with this research project? ____ Yes _X_ No If yes, please describe.

4. __X__ This is a request for renewal of ethics approval.

5. ____ This project is no longer active and ethics approval is no longer required.

6. List all current funding sources for this project and the corresponding project titles **if not exactly the same** as the project title above. Indicate the Principal Investigator of the award if not yourself.

\mathcal{P}	
Principal Investigator Signature:	Date: June 21, 2006
Faculty Supervisor Signature:	Date: June 24, 2006

For Administrative Use	REB:	AGR _	EDU	REB-I	REB-II	
The closing report of this terminated project has been reviewed and accepted						
The continuing review for this project has been revie	wed and appro	wed				
Expedited Review	A		11	2		
Signature of REB Chair or designate:	K	_ Date:	July 6.	2000		
Approval Period: 144 15, 2006 to 144	14, 200 1		/ ()			

Submit to Lynda McNeil, Research Ethics Officer, James Administration Bldg., rm 419, fax: 398-4644 tel:398-6831 (version October 2002)

Appendix H

Research Ethics Certificate (Manuscripts II and III)

McGill University

ETHICS REVIEW RENEWAL REQUEST/STUDY CLOSURE FORM

Continuing review of research involving humans requires, at a minimum, the submission of an annual status report to the REB. This form must be completed to request renewal of ethics approval. If a renewal is not received before the expiry date, the project is considered no longer approved and no further research activity may be conducted. When a project has been completed, this form can also be used to officially close the study. To avoid expired approvals and, in the case of funded projects, the freezing of funds, this form should be returned 2-3 weeks before the current approval expires.

REB File #: 5-0611

Project Title: Understanding the influence of emotion regulation on adolescents' engagement in risky behaviours Principal Investigator: Melissa Stern

Department / Email: Department of Educational and Counselling Psycholgy/Melissa.stern@mail.mcgill.ca Faculty Supervisor (if student PI): Dr. Steven Shaw

- 1. Were there any significant changes made to this research project that have any ethical implications? Yes <u>x</u> No If yes, describe these changes and append any relevant documents that have been revised.
- 2. Are there any ethical concerns that arose during the course of this research? Yes x No. If yes, please describe.

4. Is this a funded study? <u>Yes x No.</u> If yes, list the agency name and project title and the Principal Investigator of the award if not yourself. This information is necessary to ensure compliance with agency requirements and that there is no interruption in funds.

x Check here if this is a request for renewal of ethics approval.

Check here if the study is to be closed and continuing ethics approval is no longer required. A study can be closed when all data collection has been completed and there will be no further contact with participants.

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Principal Investigator Signature:	Hem	Date: JUNE 22, 2012		
Faculty Supervisor Signature:	878	Date: 22 Jun 2012		
For Administrative Use	REB:	REB-I REB-II KEB-III		
The closing report of this terminated project has been reviewed				
The continuing review for this project has been reviewed and approved				
Expedited Review	Full Review			
Signature of REB Chair or designate	2 mar	Date: Jul 1. 2012		
Approval Period: July 1, 1012	10 June 30, 2013			

Submit to Lynda McNeil (lynda.mcneil@mcgill.ca), Research Ethics Officer, James Administration Building, 845 Sherbrooke Street West suite 429, fax: 398-4644 tel: 398-6831. Electronic submissions with scanned signatures are accepted but must come from the PI's McGill email.

(version 10/10)