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# Optimism - Is the Conceptual Glass Half-Empty (or Half-Full)

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Optimism: Is the Conceptual Glass  
Half-Empty (or Half-Full)?

by

Phillip A. Ianni

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

Windsor, Ontario, Canada

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## ABSTRACT

Optimism has been a favourite topic of research in positive psychology. Optimism, defined as a generalized positive expectancy for the future, is generally regarded as a positive trait. However, despite positive findings for optimism, some researchers have suggested that optimism is not beneficial in all contexts. Alternatives to optimism have been proposed, including flexible optimism (Seligman, 1991; Forgeard & Seligman, 2012) and cautious optimism (Wallston, 1994). While such criticism of optimism lacks substantial empirical support, there are a few studies that appear to support these contentions. Previous research suggests that optimism is associated with maladaptive persistence in gambling (Gibson & Sanbonmatsu, 2004) and poorer health (de Ridder, Schreurs, & Bensing, 2000). Furthermore, research on defensive pessimism and unrealistic optimism supports the notion of a “dark side” of optimism.

A new construct is proposed to reconcile these divergent findings: expectancy flexibility. Expectancy flexibility is defined as the ability to change one’s expectations of the future in response to contextual cues. It was hypothesized that expectancy flexibility would moderate or mediate the associations between optimism and various outcomes.

Four studies were conducted to validate the Expectancy Flexibility Scale (EFS), an instrument developed to measure expectancy flexibility. The first two studies were used to develop a scale with good internal consistency reliability, a low correlation with optimism (to provide discriminant validity), and a moderate correlation with theoretically related constructs (to provide convergent validity). The purpose of the third study was to test whether shifts in expectations actually occur in response to negative feedback, and whether these shifts were predicted by scores on the EFS. The fourth study tested

whether the EFS was associated with constructs believed to be outcomes, including preventive health behaviours, academic success, and problem gambling. In all four studies, participants were undergraduate students who were recruited through a participant pool at a Canadian university. The EFS and several other self-report questionnaires were completed by participants via an online platform.

The findings of Study 1 and Study 2 supported the reliability and validity of the EFS. Internal consistency reliability was in the acceptable range ( $\alpha > 0.70$ ). Supporting the scale's convergent validity, expectancy flexibility was associated with related measures like defensive pessimism and cognitive flexibility. Weak and non-significant correlations were found between expectancy flexibility and optimism, locus of control, and coping flexibility, supporting the scale's discriminant validity.

The findings of Study 3 partially supported the hypothesis that expectancy flexibility is associated with shifts in expectations. In the gambling scenario, losses were generally associated with reduced expectations, while gains were associated with no change or slight increases in gambling expectations. This pattern of findings was not evident in the academic scenario, where disappointing exam results did not produce a negative shift in expectations.

In Study 4, expectancy flexibility was positively associated with academic approach coping, social health, general academic skills, and confidence; it was negatively related to substance use and problem gambling. Analysis of the qualitative questions generally supported the hypothesis that expectancy flexibility is associated with shifts in expectations. However, the moderational and mediational models were not supported. Overall, the results provide support for the validity of the flexible optimism construct.

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## Introduction

### Optimism: Is the Conceptual Glass Half Empty (Or Half Full)?

#### Overview

The field of positive psychology has attempted to refocus research on what is right with people, rather than what is wrong. One of the most extensively studied topics in positive psychology is that of optimism. Optimism has usually been defined as a trait that characterizes individuals who hold positive expectations for the future (Scheier & Carver, 1985). More than three decades of empirical research have documented the purported benefits of optimism. Optimism has been associated with positive mood, perseverance, achievement, and good physical health (Peterson, 2000) and is considered an important ingredient for achieving a happy and successful life (Seligman, 1991; Seligman, 2011).

Despite strong evidence for the apparent advantages of optimism, some researchers have suggested that optimism is not beneficial in all contexts. While a few published studies support their claims, their criticism of optimism currently lacks substantial empirical support. One purpose of this research study is to consider a variety of contexts wherein the costs and benefits of pessimism and optimism vary and to find an optimal balance between the two extremes. Put another way, when it comes to optimism, is it possible to have too much of a good thing?

Some psychologists (e.g., Held, 2002; Lazarus, 2003) have expressed concerns about the potential devolvement of positive psychology into a “fad science” of positive thinking. In reaction to this criticism, there has been a call (McNulty & Fincham, 2012) for a more contextual view of psychological processes in positive psychology. McNulty

and Fincham (2012) note that “psychological traits and processes are not inherently positive or negative; instead, whether psychological characteristics promote or undermine well-being depends on the context in which they operate” (p. 101). This quote suggests two things. First, there ought to be more attention paid to context in research in positive psychology. Second, the degree of benefit of a personality trait may be thought of as a function of an interaction between the trait and the context.

In contrast to the recent consensus regarding the beneficial nature of optimism, early literary references to optimism were less than positive. Peterson (2000, p. 44) notes that “a positive psychology should not hold up Dr. Pangloss or Pollyanna as role models”. This statement refers to two fictional caricatures of positive thinking that have exemplified negative stereotypes about optimists for more than a century. In *Candide*, Voltaire (1759) describes an overly-optimistic character named Dr. Pangloss, who believes that “everything is for the best and that this is the best of all possible worlds” (a satire on the optimistic views of Voltaire’s contemporary, the philosopher Leibniz). Similarly, Porter’s (1913) story of the permanently positive *Pollyanna* and her “glad game” (which involved turning every misfortune into a blessing to maintain a façade of vapid cheerfulness) has been used to paint optimists as being hopelessly naïve or living in a massive state of denial.

Attitudes toward optimism in the psychological community in the twentieth century were similarly skeptical. Freud (1928/2012) believed that optimism was a neurotic delusion, and represented a fundamental denial of reality. Meanwhile, the psychiatric establishment adopted a disease model of psychopathology primarily focused on what was wrong with individuals (Maddux, 2002). For many years, optimism was

generally ignored, and research instead focused on extreme pessimism in the form of hopelessness (Beck, Weissman, Lester, & Trexler, 1974).

It was not until the 1980s that research on optimism as a positive personality trait began (Scheier & Carver, 1985), and optimism research has flourished ever since. Much of this research can be attributed to the Zeitgeist of the positive psychology movement, which started as a reaction to deficit-based research (Seligman & Csikszentmihalyi, 2000). Seligman and Csikszentmihalyi defined positive psychology as being about valued subjective experiences, positive individual traits, and civic virtues. This focus on what is right with people, rather than what is wrong, is a striking departure from past research and has filled a large gap in the research literature. As stated by Seligman and Csikszentmihalyi (2000), “This almost exclusive attention to pathology neglects the fulfilled individual and the thriving community” (p. 5).

Today, optimism is considered a vital component of well-being. Research on optimism has spurred the development of interventions, such as the Best Possible Self Intervention (King, 2001; Meevissen, Peters, & Alberts, 2011), that are designed to make people more optimistic. However, the idea of promulgating optimism is not new, and has long been the mainstay of self-help authors. From the *Power of Positive Thinking* (Peale, 1956) to more recent books like *The Secret* (Byrne, 2008), the promotion of positive thinking has created a thriving (and lucrative) industry. Even some well-respected academic researchers (e.g., Lyubomirsky, 2007; Seligman, 2002) have joined the self-help bandwagon, though their books are more firmly grounded in psychological research.

But is optimism as beneficial as its advocates claim? In a scathing critique entitled *Bright-Sided*, Ehrenreich (2009) claims that the “relentless” promotion of positive

thinking by self-help authors, positive psychologists, business executives, political leaders and others has done more harm than good, causing everything from widespread unhappiness to the Iraq War to the stock market collapse of 2008. Given these potential negative consequences, researchers ought to take heed and investigate whether such deleterious effects of optimism do exist. The potential for negative side effects also calls into question the wisdom of optimism-promoting interventions. It would do no good to increase optimism at the expense of overall well-being.

**Definitions of Optimism and Pessimism.** Before discussing the research literature on optimism, it is necessary to define what optimism is. This is not simple, as there are several competing definitions of optimism and pessimism in the research literature. Distinguishing between different definitions of optimism is important because these definitions of optimism are only modestly associated with one another (e.g., Peterson & Vaidya, 2001) and thus cannot be considered interchangeable. Four of these definitions are reviewed: dispositional optimism, optimistic explanatory style, unrealistic optimism, and defensive pessimism.

Perhaps the most common conceptualization of optimism is that of dispositional optimism (Scheier & Carver, 1985). Of the four operationalizations of the optimism construct, dispositional optimism is probably the most similar to the lay usage of the term (Norem, 2002). Dispositional optimism is defined as a generalized positive outcome expectancy (Scheier & Carver, 1985). Stated another way, optimists anticipate that good things (positive) will happen (outcomes) in the future (expectancies). Additionally, dispositional optimism is generalizable; that is, it is applicable to a range of situations and is stable over time (Carver & Scheier, 2014). Dispositional optimism is usually

conceptualized as a bipolar construct, with low levels of dispositional optimism called dispositional pessimism. It is related to constructs like hope and self-efficacy, which also involve positive outcome expectancies, but is not confounded by agency or self-confidence (Carver & Scheier, 2014).

Dispositional optimism is measured using a brief self-report scale known as the Life Orientation Test-Revised (LOT-R), which was developed by Scheier, Carver, and Bridges (1994) as a modification of the earlier Life Orientation Test (Scheier & Carver, 1985). The LOT-R consists of three items that assess optimism and three reversed-scored items that assess pessimism. Traditionally, the LOT-R is treated as a unidimensional measure; however, some authors (Kubzansky, Kubzansky, & Maselko, 2004; Marshall, Wortman, Kusulas, Hervig, & Vickers, 1992) have suggested that it is better to treat the dispositional optimism and pessimism items as separate subscales.

Another conceptualization of optimism is that of optimistic explanatory style, which was based on Seligman's learned helplessness theory (Seligman, 1972) and Beck's cognitive triad (Beck, 1967). According to this view, optimism is how individuals explain the causes of bad events. People employing an optimistic explanatory style make unstable, specific, and external attributions for past negative events (Peterson, 2000). When negative events occur, optimists consider them temporary, particular to that situation, and due to someone else's actions. Pessimists, on the other hand, explain negative events as having stable, global, and internal causes. Stated differently, when bad things occur, pessimists consider them to be long-lasting, pervasive, and due to their own actions (justified or not). Optimistic explanatory style is weakly correlated with



dispositional optimism (Scheier & Carver, 1992), suggesting that the two constructs are distinctly different, despite the similarity of name.

Explanatory style is usually measured using either the Attributional Style Questionnaire (ASQ; Peterson et al., 1982) or the Content Analysis of Verbatim Explanations (CAVE; Peterson, Schulman, Castellon, & Seligman, 1992). The ASQ presents respondents with a series of hypothetical negative events. Participants are asked to provide the most likely cause of the event, and rate the degree to which they perceive the cause as internal, stable, and global (Peterson, 2000). In contrast, the CAVE is a qualitative tool that can be used to code written causal explanations for events. Researchers score the CAVE by extracting respondents' explanations for bad events and rating them as being either internal or external, stable or unstable, and global or specific (Peterson et al., 1992).

Yet another view of optimism is that of unrealistic optimism, which is sometimes called optimistic bias or comparative optimism (Shepperd, Waters, Weinstein, & Klein, 2015; Weinstein, 1980). In contrast to dispositional optimism, unrealistic optimism is a cognitive bias rather than a trait (Schwarzer, 1994). Unrealistic optimists perceive themselves as being at lower risk of experiencing negative life events in the future *relative to other people*. Thus, unrealistic optimism is influenced by social comparison processes (Klein & Weinstein, 1997).

Unrealistic optimism is often measured by administering a scale developed by Weinstein (1980) that assesses comparative risk judgments. This scale lists 18 positive and 24 negative life events. Respondents are asked to judge the likelihood that these events will happen to them relative to their peers (i.e., a typical person of the same age

and sex as the respondent). According to the unrealistic optimism perspective, those who think that positive events are more likely to happen to themselves and negative events are less likely to happen to themselves are considered unrealistic optimists.

A fourth type of optimism is known as defensive pessimism (its opposite is called strategic optimism, though this term is not often used). Defensive pessimism is defined as a strategy where people set their own expectations low in an effort to avoid feelings of disappointment after failure or to increase their likelihood of a positive outcome in a performance situation (Norem & Cantor, 1986a). Defensive pessimists differ from their dispositional pessimist counterparts in that they deliberately set their expectations low in an effort to cope with anxiety. For example, defensive pessimists differ from depressed individuals (who are similar to dispositional pessimists) in that they exhibit less avoidant coping, less residual anxiety, and less rumination after stressful events (Showers & Ruben, 1990). By setting their expectations low, defensive pessimists harness their anxiety and convert it into motivation to prevent the negative outcome they anticipate.

Defensive pessimism is usually measured using the Defensive Pessimism Questionnaire (Norem, 2001). The DPQ is a self-report measure that assesses one's level of defensive pessimism. It has typically been used in academic contexts to assess students' use of defensive pessimism (e.g., Seginer, 2000), but the scale has also been used in health (Chang & Sivam, 2004) and athletics (Wilson, Raglin, & Pritchard, 2002).

Optimism is related conceptually to hope (Snyder, Harris & Anderson, 1991) and self-efficacy (Bandura, 1977; Sherer, Maddux, Mercandante, Prentice-Dunn, Jacobs, & Rogers, 1982). Optimism, hope, and self-efficacy share positive expectations for the future. They are generally moderately correlated with one another, with a typical

correlation of about .50 (Alarcon, Bowling, & Khazon, 2013). However, both hope and self-efficacy are conceptually distinct from each other and from optimism (Magaletta & Oliver, 1999). Briefly, hope is made up of two components: agency (a belief that one will meet goals in the future) and pathways (the belief that one will be able to generate successful plans to meet those goals). Optimism is similar to the pathways component of hope; both pertain to expectancies about outcomes. However, the pathways component of hope refers only to outcomes obtained by oneself; optimism also includes expectancies about outcomes obtained through others and forces outside oneself. Similarly, self-efficacy refers to one's belief in one's ability to perform a specific behavior that will produce a desired outcome. Self-efficacy is similar to the agency component of hope; both pertain to expectancies about one's ability to perform a behaviour. In contrast, most definitions of optimism lack this belief in one's capability.

This variety of definitions suggests that there is no conclusive operationalization of optimism or pessimism. Whereas the definitions have some overlap, they appear to measure distinct constructs. Because of the diversity of definitions, studies using different operationalizations of optimism ought to be considered separately, rather than pooled together. This is important because different operationalizations of optimism often have different correlates. The lack of a unitary definition is one of the challenges that confronts optimism researchers.

**Current Skepticism of Optimism.** One might expect that positive psychologists would have an uncritically favourable view of optimism. Surprisingly, some of the most prominent researchers in positive psychology have been among optimism's biggest skeptics. For example, Peterson (2000) noted: "Optimism in some circumstances can

have drawbacks and costs, although researchers rarely look for these qualifying conditions.” (p. 44). Even Martin Seligman, often called the father of positive psychology, has expressed skepticism of optimism. In the closing words to *Learned Optimism*, Seligman (1991) said that optimism is not always the answer to every situation: “What we want is not blind optimism but flexible optimism—optimism with its eyes open. We must be able to use pessimism’s keen sense of reality when we need it” (p. 292). Forgeard and Seligman (2012) speculated that optimism is the best strategy in most circumstances because it allows individuals to pursue their goals, be persistent, and be open to opportunities. However, Seligman thinks that pessimism is the better strategy when danger is near because pessimism can help re-direct one’s actions (similar sentiments were expressed previously by Gibson & Sanbonmatsu, 2004). In addition, pessimism may cushion the effects of disappointment if it seems that a desirable goal cannot be achieved. Thus, Seligman advocates for a careful balance of optimism and pessimism.

Seligman is not the only researcher who has proposed a re-examination of the optimism construct. In a brief commentary, Wallston (1994) speculated that there are two kinds of optimists: cautious optimists and cockeyed optimists. These two types of optimists, he describes, differ in terms of the certainty of their optimism and this has consequences for their behaviour. Cautious optimists are fairly certain that favourable outcomes will occur, while cockeyed optimists are absolutely certain that everything will work out for the best. Similarly, Wallston speculates that while cautious optimists engage in actions that they think will produce positive outcomes and ward off negative outcomes, cockeyed optimists do not engage in actions that could foster positive outcomes or

prevent negative outcomes. Because of this, Wallston believes that cockeyed optimism is potentially hazardous to one's health because these optimists are less likely to engage in functional health behaviours than cautious optimists. Wallston's conjecture is thought-provoking; unfortunately, more than 20 years have passed since Wallston's paper was published, and these speculations have remained untested.

### **Correlates of optimism**

**Review of meta-analyses.** Several meta-analytic studies have been conducted to examine the association between optimism and psychological and physical well-being, coping, and other personality traits across studies. These meta-analyses have found that optimism is consistently associated with positive constructs, including better physical health (Alarcon et al., 2013; Rasmussen et al., 2009), better psychological well-being (Alarcon et al., 2013; Andersson, 1996), and positive coping strategies (Andersson, 1996; Nes & Segerstrom, 2006). The hundreds of studies reviewed by these authors appear to support the idea that optimism is associated with beneficial outcomes. Or do they?

A critical analysis of these findings suggests that optimism may not be as beneficial as some have claimed. In some cases, the effect sizes found in meta-analyses – while significant – were quite weak, especially for health-related variables. The effect sizes (as measured by  $r$ ) of the associations between optimism and health indices (Rasmussen et al., 2009) and between optimism and various coping measures (Nes & Segerstrom, 2006) were generally in the 0.1-0.2 range. These findings suggest that only 1-4% of the variance (as measured by  $r^2$ ) in health and coping measures can be attributed to optimism. The small magnitude of effects is unsurprising, given that many studies investigating associations between optimism and health and coping have found null

results (as reviewed previously). These small effect sizes suggest that optimism has a limited impact on health. This is sensible considering that one's health can be affected by a multitude of factors, many outside of one's control. To paraphrase Seligman (2011), being optimistic will not prevent a crane from falling on top of you!

Other associations have been more robust, particularly between optimism and measures of personality constructs (such as the Big Five) and psychological well-being. But it is important to note that in cross-sectional studies these affective constructs cannot be considered outcomes and therefore should not be construed as "benefits" of optimism. Rather than demonstrating benefit, these findings merely establish that optimism is associated with theoretically related constructs. As Norem and Chang (2001) caution, relationships between optimism and affective variables are correlational, not causal. Constructs like happiness and anxiety are not necessarily the consequences of optimism. The reverse is equally plausible: perhaps being happy or less anxious results in having a more optimistic outlook. A third possibility is that optimism and other positive traits are correlated because they are subtly different facets of the same underlying trait of positivity.

This begs the question: What *are* the consequences of optimism? Despite much research documenting optimism's relationship to various constructs of psychological well-being, there has been comparatively little research into the bona fide outcomes of optimism. Theoretical work in personality research emphasizes the importance of examining the consequential outcomes of personality factors (Ozer & Benet-Martinez, 2006). Ozer and Benet-Martinez stated that the practical importance of personality

variables is demonstrated by the degree to which they predict important individual, interpersonal, and social/institutional outcomes.

**Potential Outcomes of Optimism.** Most of the research examining hypothesized effects of optimism has been conducted with constructs like physical health, coping, and academic success. It can be stated with some degree of confidence that these are the consequences of trait optimism, rather than contributing factors. The following sections will review some of the more prominent studies in these domains.

Many studies on optimism have examined its association with subjective well-being. Again, it is important to stress that because most of this research is correlational, it is dubious to infer causality. However, the temporal order of longitudinal studies strengthens inferences regarding a causal relationship. Several longitudinal studies have found that optimism is associated with later subjective well-being among people experiencing stressful health events (note that this does not imply that optimistic people are less likely to experience negative health outcomes, but instead relates to their adjustment to negative health events). These studies have found a positive relationship between optimism and later well-being (usually assessed by a lack of depression or distress, or better quality of life) in several contexts, including childbirth (Carver & Gaines, 1987), coronary artery bypass surgery (Fitzgerald, Tennen, Affleck, & Pransky, 1993; Scheier et al., 1989), treatment for breast cancer (Carver et al., 1994; Carver, Smith, Antoni, Petronis, Weiss, & Derhagopian, 2005), and AIDS (Taylor et al., 1992). Although the results of these longitudinal studies are compelling, as they can more convincingly demonstrate (in comparison to studies employing a cross-sectional design) that optimism can predict subsequent subjective well-being, they are still not causal.

It is often claimed that optimists are healthier than pessimists, yet research on the health effects of optimism remains relatively scant. Research on optimism's relationship with physical health has examined optimism's effects on health outcomes in several disease contexts. Some of the more common contexts are heart disease, cancer, HIV, and immune function. Each context is reviewed below.

Several studies have examined the relationship between optimism and heart disease. By examining odds ratios, dispositional optimism has been found to be associated with slower development of atherosclerosis (Matthews, Raikkonen, Sutton-Tyrrell, & Kuller, 2004), lower risk of coronary heart disease (Tindle et al., 2009), and faster recovery from coronary bypass surgery (Scheier et al., 1989). However, Contrada et al. (2004) found no relationship between dispositional optimism and recovery from cardiac surgery.

Several studies examining optimism's association with cancer outcomes have yielded inconsistent results (Coyne & Tennen, 2010). While optimism was modestly related to lower mortality risk in head and neck cancer patients (Allison, Guichard, Fung, & Gilain, 2003) and general cancer mortality risk amongst Black women (Tindle et al., 2009), optimism was not associated with mortality risk amongst lung cancer patients (Schofield et al., 2004). In addition, optimism was only associated with lower mortality risk among younger patients in a mixed cancer sample (Schulz, Bookwala, Knapp, Scheier, & Williamson, 1996).

Optimism's associations with HIV-related outcomes have also been mixed. Optimism has been associated with positive immunological indicators such as higher natural killer cell cytotoxicity and CD3+CD8+ cell percentage (Byrnes et al., 1998) and



lower HIV viral load (Milam, Richardson, Marks, Kemper, & McCutchan, 2004).

However, other findings suggest that dispositional optimism had either a curvilinear relationship with CD4+ cell counts (Milam et al., 2004) or no relationship with CD4+ count (Tomakowsky, Lumley, Markowitz, & Frank, 2001).

Optimists may also have better immune functioning under some circumstances. Research suggests that optimists generally have stronger immune responses than pessimists (e.g. Kohut, Cooper, Nickolaus, Russell, & Cunnick, 2002). However, optimists may have *lower* immune responses under high-stress conditions (Cohen et al., 1999; Segerstrom, 2006). Other studies have found no association between optimism and immune functioning (Segerstrom, 2005; Segerstrom & Sephton, 2010).

Research on coping has been similarly mixed. Optimism tends to be associated with healthier forms of coping, such as planning, active coping, and positive reinterpretation (Scheier, Weintraub, & Carver, 1986) and is inversely related to avoidant coping responses, such as denial, behavioural disengagement, mental disengagement, and using alcohol or drugs (Carver et al., 1989). However, pessimists scoring high on hope were found to be less likely to engage in passive coping than pessimists scoring low on hope (Lopes & Cunha, 2008),

One specific kind of coping germane to health is that of preventive health behaviours. Preventive health behaviours are defined as activities undertaken by a person for the purpose of preventing disease (Kasl & Cobb, 1966). These behaviours are considered a form of approach-based coping (Carver, Scheier, & Segerstrom, 2010).

Several studies have examined whether optimism is related to preventive health behaviours. For example, Friedman, Bruce, Webb, Weinberg, and Cooper (1993) found

that dispositional optimism was associated with a greater frequency of skin self-examination. Other studies have found that optimists exhibited less delay in seeking treatment for breast cancer symptoms (Lauver & Tak, 1995) and were more likely to comply with prescribed health-promoting regimens (Shepperd, Maroto, & Pbert, 1996).

However, previous studies have found no association between optimism and preventive behaviours relevant to hypertension (O'Brien, VanEgeren, and Mumby, 1995) or between optimism and intentions to use condoms or get tested for sexually transmitted infections (Zak-Place & Stern, 2004). In addition, health behaviours only partially mediated the relationship between optimism and physical health among elderly people (Stephoe, Wright, Kunz-Ebrecht, & Iliffe, 2006). Several studies have found that optimistic bias (a.k.a. 'unrealistic optimism') in risk perception may actually inhibit health-promoting behaviours (Schwarzer, 1994; Davidson & Prkachin, 1997).

Evidence for optimism's salubrious effects in academic contexts is scant and mixed. In a longitudinal study of first-year university students, optimism and grades were measured at several points in time (Gibbons, Blanton, Gerrard, Buunk, & Eggleston, 2000). Compared to pessimistic students, optimistic students had higher grades in their first semester. This pattern (of optimists' better performance compared to pessimists) continued for several semesters. A similar association was between LOT-R scores and GPA (Rand, 2009).

However, Robbins, Spence, and Clark (1991) found no association between optimism and GPA, with a correlation close to zero for both males and females. In addition, Haynes et al. (2006) found that the final exam and GPA scores of highly optimistic students did not differ from that of less optimistic students. One could

speculate that these null findings mean that optimism is unrelated to academic performance. However, it could be argued that GPA (the usual measure of academic performance) may not be the best measure of student success, as some critics have suggested (Pritchard & Wilson, 2003; Robbins, Lauver, Le, Davis, Langley, & Carlstrom, 2004). These authors instead propose that social and psychological factors are better predictors of students' graduation than GPA.

The review above suggests that, on the balance, optimism is generally associated with positive outcomes. But caution is needed, as optimism does have some negative consequences. Optimism may “feel good” in the short run, but what about its long-term effects? Research on the consequences of unrealistic optimism suggests that this type of optimism could lead to taking unnecessary risks, failing to take health precautions, or being inadequately prepared for tasks (Shepperd, Pogge, & Howell, 2017). The consequences of dispositional optimism could be similarly negative, but these potentially negative consequences have yet to be explored, aside from a handful of studies with what could be termed “anomalous findings”.

### **A Review of Anomalous Findings for Optimism**

Several studies have reported associations between optimism and undesirable outcomes and between pessimism and positive outcomes (the focus on these studies in this paper is a deliberate choice, and should not be construed as suggesting that these anomalous findings are commonplace in the literature). How can these anomalous findings be explained and reconciled with findings suggesting salubrious effects of optimism? As Norem and Chang (2001) put it, “there are potential benefits and costs to both optimism and pessimism that may be highly sensitive to context” (p. 348).

A systematic review of the literature yielded six studies. The studies reviewed found that dispositional optimism was associated with negative outcomes in three domains: risk-taking behaviour (Gibson & Sanbonmatsu, 2004; Hmieleski & Baron, 2009), health (de Ridder, Schreurs, & Bensing, 2000; Milam, Richardson, Marks, Kemper, & McCutchan, 2004), and academics (Haynes, Ruthig, Perry, Stupnisky, & Hall, 2006; Sweeny & Shepperd, 2010). Similarly, researchers have found that defensive pessimism is associated with positive outcomes, like performing preventative behaviours for SARS (Chang & Sivam, 2004) and passing more classes (Eronen, Nurmi, & Salmela-Aro, 1998). These studies are summarized in the next section.

**Optimism and monetary risk-taking.** Gibson and Sanbonmatsu (2004) examined the association between dispositional optimism and gambling in a sample of undergraduate psychology students. They measured optimism using the Life Orientation Test. The authors found that optimists were more likely than pessimists to: have positive gambling expectations, maintain these expectations following losses, indicate that winning money was a primary motivation for their gambling, and remember more near wins. They also found that pessimists reduced their betting and expectations after experiencing poor gaming performance. These findings demonstrate that traits such as optimism are not always useful and may actually be a liability in some contexts. This is because the optimist's tendency to persist leads to continued effort (Carver & Scheier, 2001). In contexts where the potential for loss is high (as in gambling), it appears that optimists' persistence does them more harm than good. Gibson and Sanbonmatsu suggested that the tendency to ignore negative feedback causes optimistic gamblers to

continue gambling even as they continue to lose. Pessimists, on the other hand, disengaged from gambling when they began to accrue losses.

This association between optimism and persistence in gambling despite failure is typical of people with gambling problems (Gilovich, 1983). Gibson and Sanbonmatsu attributed this vulnerability to optimists' perseverance and illusion of control (the belief that one will win through effort), which causes them to continue to gambling even after losing. Normally, persistence is beneficial (Duckworth, Peterson, Matthews, & Kelly, 2007), but in a gambling context it can have negative effects. Gibson and Sanbonmatsu speculated that optimists continue to gamble because they hold onto the optimistic belief that their luck will turn around. Previous studies have found that having a belief that one will win at gambling because of good luck or through persistence is related to problem gambling (Gilovich, 1983; Wohl & Enzle, 2003). Similarly, having a belief in good luck is related to optimism (Day & Maltby, 2003).

Entrepreneurship, like gambling, is another context that involves monetary risk-taking. Hmieleski and Baron (2009) tested the hypothesis that dispositional optimism would be negatively related to the performance of entrepreneurs' new ventures. Participants, who were executive officers of new business ventures, completed the Life Orientation Test, as well as measures of entrepreneurial experience and performance (as measured by revenue growth and employment growth). Consistent with their hypothesis, there was a negative relationship between entrepreneurs' optimism and the performance of their new ventures. Interestingly, the negative relationship between entrepreneurs' optimism and performance was stronger when entrepreneurs had more experience. The authors speculated that the findings can be attributed to optimists' high confidence and

tendency to ignore negative information. These tendencies can interfere with making good business decisions. These findings highlight the importance of adjusting one's expectations in light of new information, especially if it is unfavourable. The implication of this is that ignorance of unfavourable information may result in impaired decision making, which can have negative consequences (especially in high-risk contexts).

What can be concluded from both studies is that entrepreneurship and gambling are similar in that they involve taking risks with money and require some degree of persistence in order to achieve a successful outcome. But this is often a double-edged sword. Just as the maladaptive persistence of the problem gambler can lead to large losses of money, optimism may make entrepreneurs persist in their pursuit of unmanageable goals, which in turn can lead to impaired business performance.

**Optimism and health.** In the domain of health, de Ridder and colleagues (2000) examined the effects of optimism among people diagnosed with two types of chronic illness: Parkinson's disease and multiple sclerosis. Although the authors found that optimism (as measured using the Life Orientation Test) was associated with greater physical autonomy, social adjustment, and psychological adjustment among people diagnosed with multiple sclerosis (a disease marked by extreme levels of uncontrollability and unpredictability), no significant associations were found between optimism and physical autonomy or social adjustment among people with Parkinson's disease (a more controllable disease). The authors speculated that optimism was less beneficial for people with Parkinson's disease because it can interfere with behaviours that help people manage their condition. In addition, they found a curvilinear relationship between optimism and both task-oriented and avoidant coping for people diagnosed with

either disease. This suggests that moderate levels of optimism promoted higher levels of both forms of coping. It is important to note that avoidant coping is not always harmful, particularly in the context of chronic illness (Suls & Fletcher, 1985). The authors speculated that high levels of optimism may have inhibited more constructive forms of coping amongst people who are experiencing chronic stressors.

Milam and colleagues (2004) examined the relationships between dispositional optimism and pessimism and the course of HIV infection. The participants were patients diagnosed with HIV who were undergoing antiretroviral therapy. Optimism and pessimism (assessed using the Life Orientation Test) were examined separately. Disease progression was assessed by measuring viral load and CD4 counts. While there was a positive correlation between baseline pessimism and higher viral load, patients who reported higher levels of optimism had lower CD4 counts (indicating more advanced HIV) compared to patients with moderate levels of optimism. The authors speculated that stress occurs when HIV patients who have high levels of optimism are disappointed with their treatment's modest benefits, which compromises the immune system. The implication of this study is that some optimists may experience stress when things go worse than they expected. These findings support the idea that moderate levels of optimism may be better than high levels of optimism under adverse conditions.

Chang and Sivam (2004) examined the effects of defensive pessimism on compliance with direct and indirect SARS-related preventive health behaviours in a general sample of people from Singapore (the location of a major SARS outbreak). Direct preventive behaviours were those that limited one's risk of contracting SARS, such as wearing a face mask. Indirect preventive behaviours were those that were perceived to

improve one's general health, like exercising and taking health supplements. While defensive pessimism was found to be associated with negative affect and SARS-related fears, the results also showed that there was a positive correlation between defensive pessimism and both indirect and direct preventive health-related behaviours. The implication of this study is that strategically pessimistic expectations can serve to motivate people into action, rather than inhibit such behaviour with paralyzing anxiety. These findings are consistent with the idea that pessimism can be beneficial in decision-making contexts, where anxiety can lead to protective behaviours to avert possible negative outcomes (e.g. Gibson & Sanbonmatsu, 2004).

How might optimism lead to being less likely to engage in health behaviours? Optimists are prone to having an attentional bias for positive stimuli relative to negative stimuli (Segerstrom, 2001). This 'blind spot' may contribute to a sense of personal invulnerability amongst optimists that may lessen genuine concern about health threats. Perceived vulnerability is a key component of the Health Belief Model (Janz & Becker, 1984). According to this model, individuals who underestimate the risk of experiencing a negative health outcome are less likely to take actions in an effort to avoid that outcome (Rosenstock, 1974). Unrealistic optimism interacts with the Health Belief Model by reducing risk perception (Clarke, Lovegrove, Williams, & Machperson, 2000). Previous studies have found that people scoring high on danger invulnerability are less likely to engage in preventive health behaviours (Ravert & Zimet, 2009) and more likely to engage in risky behaviours (Ravert, Schwartz, Zamboanga, Kim, Weisskirch, & Bersamin, 2009). Unrealistic optimism has been found to be associated with



invulnerability (Lapsley & Hill, 2010). Thus, it is plausible that perceived invulnerability might moderate the association between optimism and preventive health behaviours.

**Optimism and academics.** Haynes and colleagues (2006) compared the academic performance of students who scored either in the lower tertile (“low-optimists”) or upper tertile (“over-optimists”) on the Life Orientation Test. The authors randomly assigned university students to either an attributional retraining intervention or a control group. Attributional retraining (Ruthig, Perry, Hall, & Hladkyj, 2004) is a cognitive intervention designed to promote the use of internal attributions for poor performance (e.g. effort or strategy) rather than uncontrollable factors (e.g. test difficulty or instructor quality). They found students who did not receive attributional retraining and scored high on optimism showed an increase in maladaptive attributions for poor academic performance (they attributed poor academic performance to external, uncontrollable factors such as test difficulty and teacher quality). The authors speculated that these maladaptive attributions may reduce students’ motivation and achievement performance. Among students who did not receive the attributional retraining intervention, over-optimists had slightly (but not significantly) lower final exam and GPA scores than low-optimists. Overall, these findings suggest that optimism (in the absence of attributional retraining) may have little effect on exam scores.

Sweeny and Shepperd (2010) examined whether optimistic expectations would be associated with negative affect after receiving feedback in a sample of undergraduate psychology students. The authors found that optimistic expectations were unrelated to pre-feedback negative affect after controlling for students’ exam performance. However, they found that optimistic students experienced an increase in negative affect after

receiving exam feedback. In contrast, pessimistic students experienced a decrease in negative affect after receiving exam feedback. The authors concluded that the findings support the idea that bracing for negative feedback by lowering expectations can be beneficial for one's emotional well-being. These findings suggest that in contexts where there is a good chance that one may receive negative feedback, it may be wise to adopt a more pessimistic stance in order to prevent feelings of disappointment.

Eronen and colleagues (1998) investigated the effects of several achievement strategies on students' academic achievement. Students were classified as using either defensive pessimistic, optimistic, impulsive, or self-handicapping strategies. Participants filled out questionnaires measuring achievement strategies, planning strategies, self-esteem, depression, and academic satisfaction. Academic achievement was assessed using data on the number of classes students passed, which was obtained from university records. Defensive pessimists passed more courses than students who used an optimistic strategy in their first two years of university (there was no difference between the two groups in their third year of study). They also engaged in more rational planning than the students using the other three strategies. These results suggest that pessimism may be useful for challenging tasks like exams, where anxiety can be harnessed and used to motivate preparation (although pessimists may be more likely to give up following failure).

What mediators might cause the relationship between optimism and academic performance to turn negative? Eronen et al. attributed defensive pessimists' better academic performance to their greater use of rational planning, a type of problem-focused coping strategy usually associated with optimists (Carver, Scheier, & Weintraub, 1989).

Similarly, Haynes et al. (2006) speculated that optimists' tendency to make external attributions may make them less likely to engage in proactive learning behaviours (i.e. attending class regularly, studying, or seeking help from the instructor). In addition, Shields (2001) found that approach coping strategies were related to academic success.

### *Summary*

As can be seen from this review, there are only a few studies that have found negative effects of optimism. There are two explanations for the lack of studies showing a deleterious effect of optimism that will be reviewed here. First, it may be because optimism is simply far more beneficial than it is harmful, and the ratio of studies is an accurate reflection of optimism's benefits relative to its drawbacks. Although this is plausible, it would be premature to make this inference. In order to draw this conclusion, more studies allowing for the detection of negative effects of optimism would need to be conducted. Second, there is a possibility that there are unpublished studies where researchers did not find support for a directional hypothesis that predicted positive effects of optimism. A finding of null, non-hypothesized, or contrary results may have dissuaded researchers from submitting their studies for peer review. This "file-drawer" effect, while plausible, is impossible to ascertain.

### **Sobering up: Shifting from Optimism**

As suggested by Norem and Chang (2001; 2002), there are benefits and costs to both optimism and pessimism, and these costs and benefits depend on the context. Theorists have suggested that situational factors can cause people to "sober up" (Sweeny & Krizan, 2013) and lower their expectations. In what circumstances do some people change their expectancies (from optimism to pessimism and vice versa)?

Insight into why shifts from optimism occur can be drawn from several papers on bracing (Shepperd et al., 1996; Sweeny & Shepperd, 2007; van Dijk, Zeelenberg, & van der Pligt, 2003). Similarly to defensive pessimism, bracing often occurs when individuals perceive that an undesirable outcome is more likely to occur than would be justified by objective evidence, in order to prepare for bad news (Carroll et al., 2006; Shepperd, Findley-Klein, Kwavnick, Walker, & Perez, 2000; Sweeny & Shepperd, 2007). While optimism is considered the most optimal strategy in most circumstances, there are contexts in which people become more pessimistic. Shifts from optimism are thought to occur in response to new information and in an attempt to brace for anticipated disappointment (Sweeny et al., 2006). The authors assert that these shifts from optimism serve a useful purpose. They propose that these changes in expectancies are the result of a need for preparedness, which enables individuals to respond in situations with uncertain outcomes.

First, when outcomes are perceived as important, people tend to shift from optimism (Shepperd et al., 2000; Sweeny & Shepperd, 2007; Taylor & Shepperd, 1998; van Dijk et al., 2003). For example, people are more likely to shift from optimism when the consequences of a disease are severe rather than benign. It is thought that this shift serves to motivate behaviours intended to avoid risk in high-risk situations.

Second, when people perceive feedback is imminent, people shift from optimism (Shepperd et al., 1996; van Dijk et al., 2003). It is thought that immediately before receiving feedback in performance situations, people lower their expectations in order to prepare for the possibility that they may be disappointed. By lowering expectations right before receiving feedback, one can remain optimistic (and thus reap the benefits of

optimism) up until the point at which optimism would become more detrimental than beneficial (Sweeny & Shepperd, 2007).

Third, when it is easy to imagine undesired outcomes, people are more likely to shift from optimism (Sanna, 1999). This occurs because people engage in mental simulations of potential outcomes prior to their occurrence. When negative outcomes are difficult to imagine, people are less likely to engage in mental simulations of their occurrence, and thus can remain optimistic. For example, the possibility of failing a difficult test would be easier for individuals to imagine than failing an easy test (Sweeny & Shepperd, 2007).

Lastly, when outcomes are perceived to be uncontrollable, people shift from optimism. For example, students feel a high degree of control at the beginning of the semester and are thus optimistic (Shepperd et al., 1996). At the final exam, however, there is little that students can do to affect the outcome, and they become more pessimistic. Similarly, people feel optimistic when they think they can control the impact of an undesirable outcome. For example, people perceive controllable diseases as being less serious than uncontrollable diseases (Carroll et al., 2007).

### **A New Construct: Expectancy Flexibility**

To reconcile the inconsistent findings for optimism and pessimism, I propose that expectancy flexibility moderates the effects of optimism/pessimism. Expectancy flexibility is defined as the ability to change one's expectations of the future in response to contextual cues. It is my belief that optimism may interact with expectancy flexibility to influence whether outcomes are positive or negative.

Expectancy flexibility was inspired by Seligman's unheeded suggestion that individuals ought to practice flexible optimism (Forgeard & Seligman, 2012; Seligman, 1991). Seligman (1991) defines flexible optimists as people who are generally optimistic, but are occasionally pessimistic in some situations: "The most adaptive outlook therefore seems to be mostly optimistic, tempered with small doses of realistic pessimism when needed... The key appears to be able to shift between optimism and pessimism, rather than being locked into constant pessimism, or rigid optimism" (p. 115). Similarly, Norem and Chang (2001) noted that: "situations where the potential 'downside' is either relatively likely or relatively serious would seem especially to call for a balance of pessimism and optimism. Currently, almost no research exists on the extent to which individuals (or on *which* individuals) are able to achieve this kind of balance or flexibility" (p. 354). Norem and Chang's observation that there is a dearth of research in this area remains true today. The present research aims to rectify this gap in the literature.

In this dissertation, I present a model of flexible optimism. Of particular interest to the present study is inflexible optimism. Based on the evidence provided above, it seems that expectancy flexibility is independent of optimism and pessimism. Both optimists and pessimists have the potential to react flexibly (or inflexibly) to contexts based on the perceived level of risk and reward in that situation. To this end, I have developed a measure of expectancy flexibility called the Expectancy Flexibility Scale (EFS). The development and validation of this scale is described in detail in Studies 1 through 4.

**Proposed model of expectancy flexibility.** The precise nature of expectancy flexibility and its correlates is currently unknown. However, several aspects of its nature

can be deduced from prior research. First, expectancy flexibility is a personality trait because some people are better able to shift their expectations than others. Second, given that both optimists and pessimists can adjust their expectations, expectancy flexibility is distinct from optimism and pessimism. Third, inflexibility is not simply extreme optimism (or pessimism) and flexibility is not merely the midpoint of optimism and pessimism. This differs somewhat from Wallston's (1994) untested speculation that cockeyed optimists would score higher on the LOT than cautious optimists. If this were the case, then curvilinear effects for optimism would be evident in the research literature, but only one study (Milam et al., 2004) supports this notion. It is my belief (based on what information has been gathered so far) that it is not that being overly optimistic that is harmful, but rather being optimistic at the wrong time. Thus, it is proposed that expectancy flexibility is a personality trait distinct from dispositional optimism/pessimism.

This approach could be used to bring disparate theories on optimism into a unified framework. Expectancy flexibility may potentially reconcile dispositional optimism (Scheier & Carver, 1985) with defensive pessimism (Norem & Cantor, 1986) and unrealistic optimism (Weinstein, 1980). Defensive pessimism can be thought of as analogous to flexible pessimism. Defensive and flexible pessimists both share negative expectancies for the future, but only in circumstances where pessimism can be beneficial. Similarly, unrealistic optimism can be thought of as analogous to inflexible optimism. Both unrealistic and inflexible optimists are positive about the future even when it is potentially disadvantageous. Lastly, dispositional optimism and pessimism are similar to flexible optimism and inflexible pessimism, respectively.

**Alternatives to expectancy flexibility.** Before creating a new construct and measure, I consulted the literature to determine whether pre-existing constructs could be used as a measure of expectancy flexibility. The reason for this is that if a reliable and valid construct already exists, then there is no need for a new measure. I will review these considered alternatives in turn.

As an alternative to optimism, several researchers have advocated for realism (Bortolotti & Antrobus, 2015; Schneider, 2001). However, defining realism is problematic, as Held (2002) points out. To briefly paraphrase Held's argument, reality is too subjective to define objectively because it is subject to individual bias and cultural influences. Injunctions to "be realistic" are of little help as everyone has their own idea of subjective probabilities, which may or may not turn out to be accurate. This is a serious limitation of the unrealistic optimism approach (Weinstein, 1980), which relies on events with exact probabilities. Although it is possible to compare individuals' subjective probabilities with known probabilities for narrowly-defined events (e.g. the probability that a smoker will develop lung cancer), this approach cannot be applied to most everyday events, for which probabilities are unknown. Because of these flaws, I believe flexibility is preferable as it avoids the potential pitfalls of realism in a subjective world.

Other definitions of flexibility exist, including psychological flexibility, cognitive flexibility, and coping flexibility. Although all of these constructs have flexibility in their names, they appear to be conceptually distinct from expectancy flexibility. Psychological flexibility is similar to expectancy flexibility in that it allows people to adjust to fluctuating situational demands (Kashdan & Rottenberg, 2010), but in practice has more to do with having an awareness and acceptance of one's thoughts and feelings (Hayes,



Strosahl, & Wilson, 1999). Similarly, cognitive flexibility (Martin & Rubin, 1995) is defined as having an awareness that one can behave in many different ways in a given situation. However, cognitive flexibility is not limited to one's beliefs about the future. Lastly, coping flexibility (Kato, 2012) is defined as the ability to stop using coping strategies when they are ineffective and adopt more effective coping strategies. There is some similarity between this construct and expectancy flexibility, especially if one views optimism as a strategy rather than a trait. Even so, coping is a far broader concept than optimism so it is expected that any association with coping flexibility will be modest.

In a recent article, Hanssen, Vancleef, Vlaeyen, Hayes, Schouten, and Peters (2015) proposed that the ability to flexibly adjust goals might mediate the relationship between dispositional optimism and various types of well-being, including general well-being, anxiety, and depression. They found that flexible goal adjustment was the primary mechanism through which dispositional optimism influences well-being. In contrast, no such mediational effect was found for tenacious goal pursuit. These findings are relevant because they suggest that flexibility may mediate the beneficial effects of optimism. However, despite the similarities, Hanssen et al.'s view of flexibility concerns flexible goal adjustment, rather than flexible expectations (of interest in the present study).

The last alternative to expectancy flexibility is defensive pessimism. While defensive pessimism has its benefits, it also has negative effects on psychological well-being. For example, defensive pessimists have higher levels of anxiety (Showers & Ruben, 1990). Clearly, the benefits of defensive pessimism are diminished if it is accompanied with unpleasant feelings of anxiety.

## **Hypotheses**

**Rationale.** The first aim of this study is to extend past research to investigate whether there are some contexts in which optimism is disadvantageous. The second, and more important, aim is to investigate the mechanism that explains this, i.e. expectancy flexibility. This study will determine whether expectancy flexibility adds incremental validity to the prediction of outcomes above and beyond that of optimism. That is, is it truly better to be a flexible optimist (as Seligman suggests) rather than simply an optimist?

Three contexts were chosen to test whether optimism can sometimes be maladaptive: gambling, health behaviours, and academic performance. These contexts were chosen because past research (e.g. Chang & Sivam, 2004; Eronen et al., 1998; Gibson & Sanbonmatsu, 2004; Haynes et al., 2006) has suggested that pessimism may be a better strategy than optimism in these contexts. These contexts may also provide a way to test whether expectancy flexibility ameliorates the harmful effects of optimism.

Problem gambling behaviours were chosen as an outcome variable based on the findings of earlier research (e.g. Gibson & Sanbonmatsu, 2004) that suggested that optimism was related to problem gambling behaviours. Although Gibson and Sanbonmatsu's sample was not comprised exclusively of problem gamblers, their findings suggest that optimists (especially inflexible optimists) may be more vulnerable to gambling problems. Flexibility's role in this relationship can be elucidated from a study of optimism's effects on entrepreneurial performance (Hmieleski & Baron, 2009). The qualities that Hmieleski and Baron ascribe to optimistic entrepreneurs (i.e. a tendency toward unrealistic expectations, overconfidence, and discounting of negative information) are similar to my conceptualization of inflexibility. It seems plausible that

expectancy flexibility could reduce maladaptive persistence. Expectancy flexibility could help optimists get “unstuck” from persistence by lowering their expectations in situations where their optimism leads them to persevere despite unfavourable odds.

Another context in which optimism may have negative effects is in inhibiting preventive health behaviours (Chang & Sivam, 2004). How might flexibility affect this relationship? The finding of a curvilinear relationship between optimism and both task-oriented and avoidant coping suggests that moderate level of optimism may be more beneficial than the extremes of optimism and pessimism (de Ridder et al., 2000). It is plausible that flexibility may reduce feelings of invulnerability amongst optimists by putting them in a more realistic mindset. In the presence of a perceived threat to their health, flexible optimists may be more likely to undertake preventive health behaviours than their inflexible counterparts. Taken together, it seems that expectancy flexibility may influence one’s feelings of invulnerability about one’s health, which in turn moderates the association between optimism and preventive health behaviours.

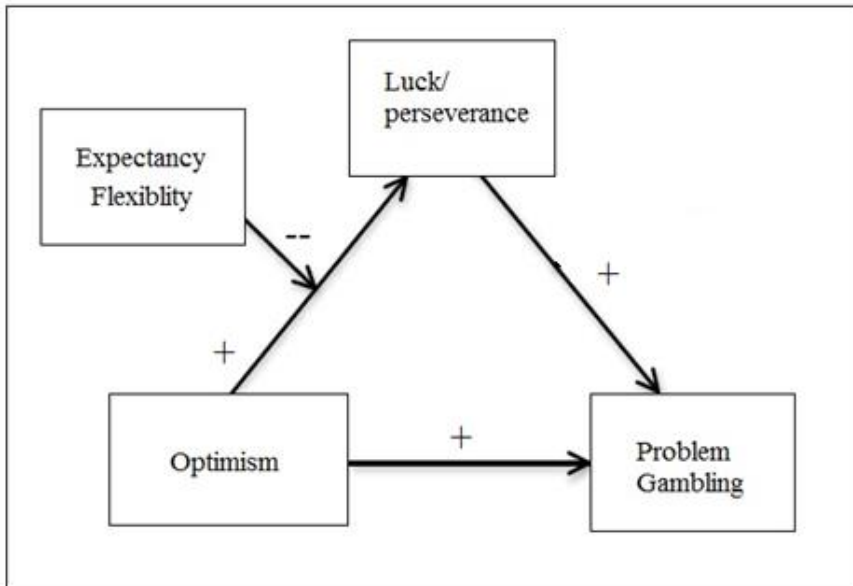
In the academic domain, optimism’s negative or null effects on academic performance (Haynes et al., 2006) may be attributed to expectancy flexibility. I would propose that this moderating role would manifest in an inverse relationship between optimism and academic success among those scoring low on flexibility. Based on the findings reviewed earlier, I would speculate that this association is mediated by approach coping style. Optimists scoring high on flexibility are thought to be more likely to use approach forms of coping and less avoidant forms of coping. In contrast, optimists scoring low on flexibility may be more prone to using more avoidant forms of coping and less approach forms of coping.

**Current study.** The primary purpose of the current study was to investigate the link between optimism and several outcomes (problem gambling, preventive health behaviour, and academic success) and the role of expectancy flexibility in these associations. The primary research question in this study was: Does optimism have detrimental effects in some contexts? A secondary research question was: What variables mediate or moderate these effects? A third research question was: Does flexibility moderate or mediate associations between optimism and its outcomes?

Two moderated mediation models (Preacher, Rucker & Hayes, 2007) and a mediated moderation model (Muller, Judd, & Yzerbyt, 2005) were proposed to examine these research questions. In both moderated mediation models, optimism was selected as the independent variable and expectancy flexibility was selected as the moderator. The models differed with regard to their mediator and outcome. Problem gambling was thought to be mediated by luck/perseverance and moderated by expectancy flexibility (Figure 1). Similarly, academic success was thought to be mediated by academic approach coping and moderated by expectancy flexibility (Figure 3).

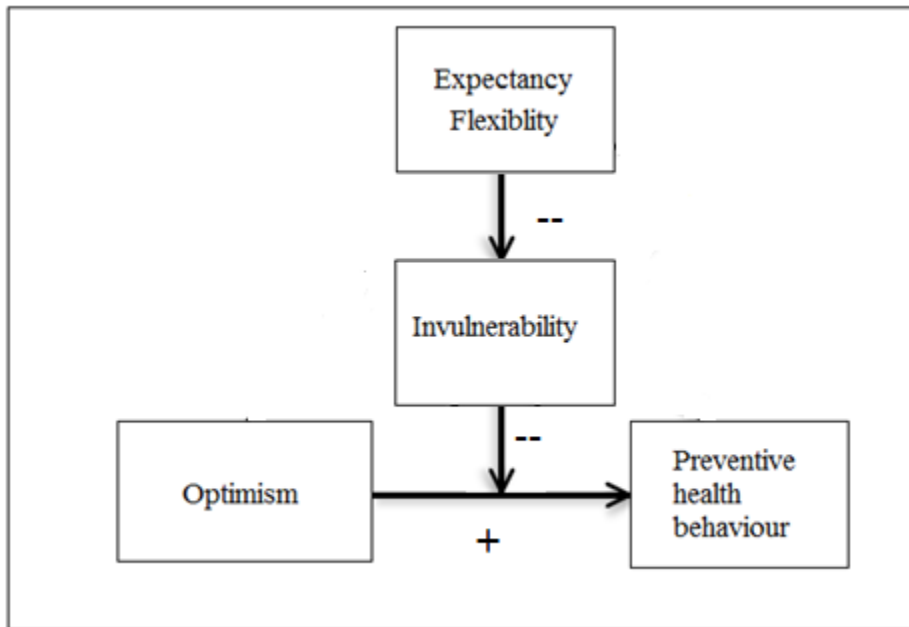
In the first model, it was hypothesized that luck/perseverance would mediate the relationship between optimism and problem gambling such that higher levels of optimism would lead to higher levels of luck/perseverance, which in turn would lead to higher levels of problem gambling. It was also hypothesized that expectancy flexibility would moderate the association between optimism and luck/perseverance. That is, people scoring high on expectancy flexibility would exhibit a smaller association between optimism and luck/perseverance.

Figure 1. Moderated mediation model for problem gambling



In the second model, I examined the moderating effect of expectancy flexibility on the relationship between optimism and preventive health behaviours, mediated by invulnerability. Research on defensive pessimism (e.g. Chang & Sivam, 2004), which is believed to be closely related to expectancy flexibility, suggests that low levels of expectancy flexibility increase feelings of invulnerability. This, in turn, would weaken the association between optimism and preventive health behaviours. It was hypothesized that expectancy flexibility would moderate the positive relationship between optimism and preventive health behaviours such that it would reduce the effect of optimism on preventive health behaviours (i.e. lower levels of flexibility would reduce the relationship between optimism and preventive health behaviours). In addition, this moderating effect would be mediated by danger invulnerability. That is, it is predicted that individuals scoring low on expectancy flexibility would score higher on invulnerability, which in turn would moderate the association between optimism and preventive health behaviours.

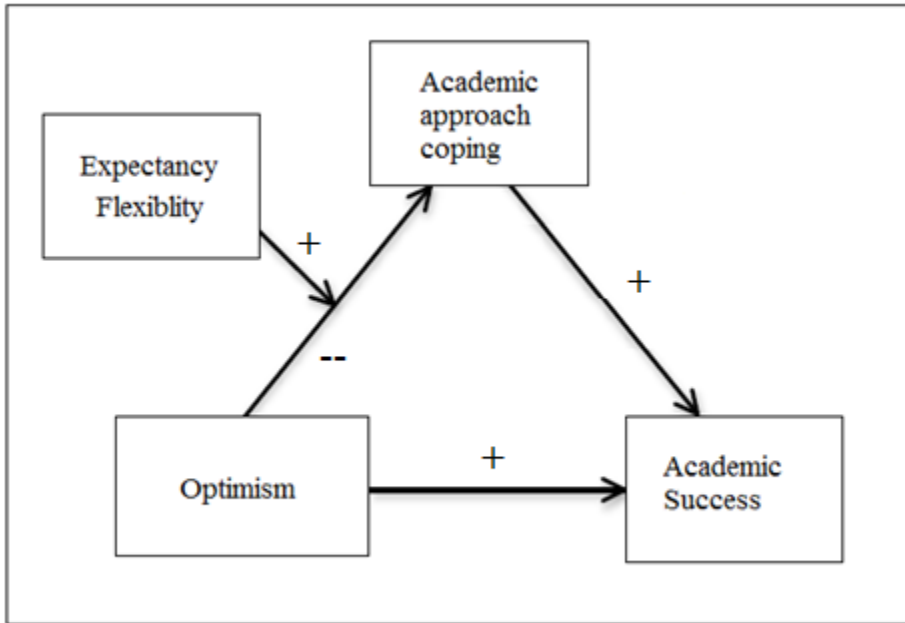
Figure 2. Mediated moderation model for preventive health behaviour.



In the third model, I tested whether academic approach coping would mediate the relation between optimism and academic success. It was hypothesized that expectancy flexibility would moderate the indirect effect of optimism on academic success through academic approach coping. That is, it was predicted that people scoring high on expectancy flexibility would exhibit a weaker relationship between optimism and academic approach coping.



Figure 3. Moderated mediation model for academic success



## Study 1

A new scale known as the Expectancy Flexibility Scale (EFS) was developed to examine the construct of expectancy flexibility. To develop and validate this scale, three pilot studies were conducted. Items for the new scale were inspired by the writings of several authors who have written about flexible optimism and related concepts (Forgeard & Seligman, 2012; Norem & Chang, 2001; Sweeny et al., 2010; Wallston, 1994). In addition, items needed to be answerable by both optimists and pessimists (which ruled out items that could only be endorsed by optimists or pessimists). The objective of these pilot studies was to test the reliability and validity of the EFS. Reliability of the scale was assessed by examining internal consistency reliability. Validity was assessed by examining convergent and discriminant validity.

**Internal consistency reliability.** Internal consistency reliability is defined as the degree to which test items measure the same construct (Miller, Lovler, & McIntire, 2013). The items of a scale ought to be broad enough in scope so as not to be redundant, but related enough to be internally consistent. The internal consistency reliability of the EFS was assessed by examining Cronbach's  $\alpha$  for the entire scale.

**Convergent validity.** Evidence for convergent validity of a new scale can be found by correlating it with measures of similar constructs. To establish convergent validity for the EFS, the EFS was evaluated against several related scales. If an instrument has good convergent validity, it should be significantly correlated with scales that are thought to assess similar constructs. However, very strong correlations would be cause for concern. This is because high correlations would suggest that the EFS

instrument is a redundant and unnecessary scale (Garson, 2001). Other existing (and better-validated) measures could be used to assess the construct of expectancy flexibility.

Because expectancy flexibility is thought to explain the phenomenon of defensive pessimism, the Expectancy Flexibility Scale should be positively correlated with the Defensive Pessimism Questionnaire and the Cognitive Flexibility Scale. Both concepts have conceptual overlap with expectancy flexibility. However, defensive pessimism is conceptualized as a strategy rather than a personality trait. In addition, cognitive flexibility is not limited to one's beliefs about the future, but applies to all situations. Although a robust correlation is expected, a very high correlation ( $r > .50$ ) would be concerning because it would suggest that the expectancy flexibility construct strongly overlaps with an existing construct.

**Discriminant validity.** Evidence for discriminant validity of a new scale can be found by correlating it with measures of unrelated constructs. To establish discriminant validity for the EFS, the EFS was evaluated against several scales that could be related to expectancy flexibility but should be unrelated. It was expected that the EFS would be independent of the constructs of social desirability and dispositional optimism. A significant correlation with social desirability would suggest that EFS scores were influenced by perceived desirability. It was expected that expectancy flexibility and optimism would be distinct constructs; thus, it was expected that expectancy flexibility would have no more than a small correlation with optimism. In other words, as a group, optimists ought not to be more flexible than pessimists (or vice versa).

In addition, the Coping Flexibility Scale was included as evidence of discriminant validity. However, despite the similarity in names, this scale does not appear to measure a

construct similar to expectancy flexibility. It is expected that the Expectancy Flexibility Scale will not be associated with this scale.

Lastly, expectancy flexibility was thought to be uncorrelated with locus of control, as measured by the Locus of Control of Behaviour Scale (Craig, Franklin, & Andrews, 1984). Locus of control (Rotter, 1966) is defined as either being internal (a sense that one has control over one's life) or external (one's life is controlled by luck or fate). While a modest correlation may be possible (because both inflexibility shares a sense of fatalism with having an external locus of control), it is expected that locus of control is a distinct construct from flexibility.

**Hypotheses.** The hypotheses for Study 1 were:

H1: The EFS scale measures a unitary construct with a single factor.

H2: To demonstrate convergent validity, the EFS will be moderately positively correlated with conceptually similar constructs (defensive pessimism and cognitive flexibility).

H3: To demonstrate discriminant validity, the EFS will be uncorrelated with conceptually dissimilar constructs (coping flexibility, social desirability and optimism).

### **Method (Study 1)**

**Participants.** A sample of 250 students was recruited using the University of Windsor's Department of Psychology Participant Pool in the Fall semester of 2014. This sample size is consistent with the heuristic that for scales with fewer than 40 items, a sample size of 200 respondents is considered adequate (DeVellis, 2003). No restrictions were placed on participant recruitment.

The sample was comprised of 210 participants identifying as female and 40 participants identifying as male. No participants identified as transgender. The mean age

was 20.53 years (range = 17 to 48). The ethnic characteristics of the sample were as follows, ordered from largest to smallest: White / European ( $n = 177$ , 70.8%), Middle Eastern ( $n = 17$ , 6.8%), South Asian / Indian / Pakistani ( $n = 12$ , 4.8%), East Asian / Chinese / Japanese ( $n = 12$ , 4.8%), Black / African / Caribbean ( $n = 11$ , 4.4%), Bi / Multiracial ( $n = 10$ , 4.0%), Aboriginal / Metis / First Nations ( $n = 5$ , 2.0%), “Other” ( $n = 4$ , 1.6%), and Latin / South American ( $n = 2$ , 0.8%).

**Measures.** The measures chosen for this study were included in order to test the convergent and discriminant validity of the EFS. The measures used in this study were administered in the following order:

**Expectancy Flexibility Scale (EFS).** Expectancy flexibility was operationally defined as the ability to adjust one’s expectations for the future depending on contextual factors. The initial scale was composed of 20 items (consistent with the recommendations of Clark and Watson, the size of this item pool was intentionally greater than is necessary). Participants used a 5-point Likert scale to respond to the items, on which a “0” represented “strongly disagree” and a “4” represented “strongly agree”. This was (by intention) the same rating scale used for the LOT. The author evaluated each item for its content validity and clarity. All of the items were tested for readability. The average reading level of the items as assessed using the Flesch–Kincaid Grade Level was 6.7, with a range from 3.7 to 9.3 (for comparison, the six non-filler items of the LOT-R have an average reading level of 5.0). The items were preliminarily tested by asking several individuals to complete the EFS and to remark on any problematic items. The items administered to participants in the pilot study are summarized in Table 1, along with the readability index.

Table 1

*The Expectancy Flexibility Scale (used in Study 1)*

Item	Readability
1. My predictions about the future change when I get new information.	8.0
2. I often ignore information that doesn't fit my expectations.*	8.9
3. There are times when I choose to be optimistic.	3.7
4. I am optimistic some of the time.	4.0
5. I stubbornly refuse to change my expectations.*	9.1
6. My expectations for the future are based on similar past events.	8.0
7. I only raise my expectations when I can imagine things going well.	7.8
8. When I think about the future, I try to put my own biases aside.	5.0
9. I change my expectations when I receive information I did not expect.	8.8
10. I lower my expectations when I am facing an important event.	9.1
11. I am optimistic only when I think it will help me.	4.8
12. I lower my expectations only when I can imagine things could go badly.	8.5
13. I believe that being too optimistic is just as bad as being too pessimistic.	9.3
14. I lower my expectations when future outcomes are beyond my control.	8.0
15. I am pessimistic some of the time.	4.0
16. I create the future that I want by preparing for the worst.	3.8
17. I become more pessimistic right before I receive my grades.	7.2
18. There is a place for both optimism and pessimism.	7.6
19. There are times when I choose to be pessimistic.	3.7
20. I am pessimistic only when I think it will help me.	4.8

\* Item was reverse-scored.

**Marlowe-Crowne Social Desirability Scale.** This scale was published by Crowne and Marlowe (1960). It measures a tendency to respond in a socially desirable manner and was used by Scheier and Carver (1985) in their validation of the LOT. Most of the items reflect a desire to present oneself as always behaving appropriately and lacking in unacceptable impulses. An example item is “I’m always willing to admit it when I make a mistake.” The scale is composed of 33 items, 15 of which are reverse-scored. The items are answered using a true-or-false format. Crowne and Marlowe (1960) reported that the internal consistency coefficient for the scale (using KR-20) was .88 and found a one-month test-retest correlation of  $r = .89$ .

**Defensive Pessimism Questionnaire (DPQ).** Participants’ defensive pessimism was measured using the Defensive Pessimism Questionnaire (DPQ), which was originally published by Norem (2001). The DPQ is a 12-item measure rated on a 7-point Likert scale ranging from 1 (not at all true of me) to 7 (very true of me). Defensive pessimism is defined as a strategy that involves lowering one’s expectations in order to help manage anxiety or prevent disappointment. This scale is designed to measure defensive pessimism in a general situation. An example item is “Considering what can go wrong helps me prepare.” The DPQ contains no reversed-scored items. The DPQ demonstrated acceptable internal consistency reliability ( $\alpha = .78$ ), as reported by Lim (2009).

**Coping Flexibility Scale.** This scale was designed by Kato (2012) to measure coping flexibility. Coping flexibility is composed of two subscales: evaluation coping and adaptive coping. According to Kato, evaluation coping is defined as “the ability to discontinue an ineffective coping strategy” (p. 262). Adaptive coping is defined as the

ability to “produce and implement an alternative coping strategy” (p. 262). The scale is composed of 10 items, and has two 5-item subscales that measure evaluation coping and adaptive coping. Participants rated each item using a 4-point scale (ranging from 0 = not applicable to 3 = very applicable). An example item is: “When a stressful situation has not improved, I try to think of other ways to cope with it.” Kato (2012) reported good internal consistency for the evaluation coping ( $\alpha = .72-.88$ ) and adaptive coping ( $\alpha = .78-.89$ ) subscales. Six-week test–retest reliability coefficients were adequate for both the evaluation coping ( $r = .73$ ) and adaptive coping ( $r = .71$ ) subscales.

**Cognitive Flexibility Scale.** This scale was designed by Martin and Rubin (1995) to measure one’s ability to change cognitive sets to adapt to environmental change. The Cognitive Flexibility Scale is composed of 12 items. Four items are reverse-scored. Participants respond to these items using a 6-point Likert scale that ranges from 1 (strongly disagree) to 6 (strongly agree). Higher scores indicate greater cognitive flexibility. The internal consistency reliability was reported to be in the good range ( $\alpha = .76-.77$ ; Martin & Rubin, 1995). An example item is: “I can communicate an idea in many different ways”.

**Life Orientation Test-Revised (LOT-R).** Participants’ optimism was assessed by administering the Life Orientation Test-Revised (LOT-R; Scheier, Carver, & Bridges, 1994). The LOT-R consists of six scored items and four filler items. Three of the items measure optimism, and the other three items measure pessimism. An example of an optimism item is: “Overall, I expect more good things to happen to me than bad”. An example of a pessimism item is: “If something can go wrong for me, it will”. Participants respond to these items using a Likert scale that ranges from 0 (strongly disagree) to 4



(strongly agree). The three pessimism items are reverse-scored. Scores can range from 0 to 24, with higher scores meaning greater optimism.

**Locus of Control of Behavior Scale.** This scale was developed by Craig, Franklin, and Andrews (1984) to measure individuals' perception of the degree of control that they have over their lives. This scale is composed of 17 items that are rated on a six-point scale ranging from 0 ("strongly disagree") to 5 ("strongly agree"). Six items (1, 5, 7, 8, 13 and 16) are reverse-scored. Thus, scores can range from 0 to 85, with higher scores indicating a greater external (rather than internal) locus of control. Craig et al. (1984) reported that the scale has acceptable internal consistency reliability ( $\alpha = .79$ ) and has excellent one-week test-retest reliability ( $r = .90$ ). An example of an item measuring (internal) locus of control was: "I can anticipate difficulties and take action to avoid them".

**Demographics.** The participants were asked to provide their age, gender, ethnic identity, and year of study.

### **Procedure**

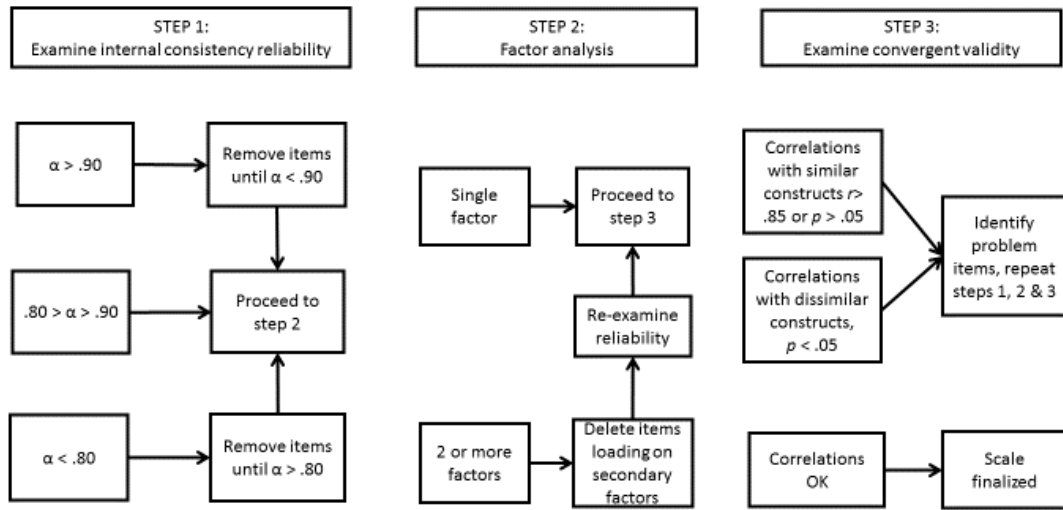
The pilot study was conducted using an online survey hosted on FluidSurveys. The study took approximately 30 minutes to complete. In compensation for their participation in the study, participants received one-half of a bonus point that could be added to their grade in a psychology course. The scales were administered in the same order as they appeared in the Measures section. To ensure that the participants' responses to the EFS would not be biased by reading other measures in the questionnaire battery, participants completed the EFS first.

### **Data analysis**

Before analyses began, the dataset was examined for missing data. Data were examined for whether they were missing completely at random (MCAR), missing at random (MAR), or missing not at random (MNAR). Missing data were replaced using the multiple imputation technique, which is the preferred method for handling missing data (Tabachnick & Fidell, 2006).

The scale was refined in three steps (see the flowchart depicted in Figure 4). These steps are based on published guidelines on scale development (DeVellis, 2003). The first step was to conduct an analysis of the internal consistency reliability of the EFS items. This step was intended to remove items that correlated poorly with the scale total. In the second step, I conducted a factor analysis of the EFS items that remained after the first step. This step was intended to determine whether or not the scale was multifactorial. In the third step, I conducted a series of correlations between the EFS items remaining after the second step with related and unrelated scales. This step was intended to establish convergent and divergent validity of the EFS.

Figure 4. Algorithm for EFS scale development.



In the first step, I conducted a reliability analysis of the EFS items. Following published recommendations for scale developers (Nunnally, 1978; Clark & Watson, 1995), I expected a minimum value for coefficient  $\alpha$  of .70 (while this value is arbitrary, it is the most generally accepted minimum standard for internal consistency reliability of a scale in the literature). If the scale's reliability was between .70 and .90, then no revisions were deemed necessary and I proceeded to the second step. If the alpha coefficient of the scale was less than .70, corrected item-total correlations were examined. The item with the lowest item-total correlation was deleted in an effort to increase the scale's overall  $\alpha$  level. Each time an item was deleted, a new reliability analysis was performed. This process continued until the alpha level reached .70 or until there were no items left to remove that would substantially raise the scale's reliability. If  $\alpha > .90$ , this was also cause for concern. Very high reliabilities indicate that the scale items may be redundant and that the construct measured may be overly specific (Briggs & Cheek, 1986; Streiner, 2003). Inter-item correlations were examined. The most strongly correlated item pair was identified and considered for deletion. In these highly-correlated item pairs, I removed the item that had the lower item-total correlation. This process continued until the scale had an alpha coefficient less than .90 or until there were no items left to remove that would substantially lower the scale's reliability.

In the second step, an exploratory factor analysis was conducted. The purpose of the factor analysis was to test whether multiple factors were present within the revised EFS. An oblique (promax) rotation was used to allow for the possibility of correlated factors. The number of factors was obtained using a parallel analysis (O'Connor, 2000). Items with low factor loadings (less than .3) were deleted. This number is based on

Stevens' (1992) recommendation for a cut-off point for a sample size of 250. If one factor was obtained (as expected), then I proceeded to the third step. If more than one factor was obtained, the factor with the lowest correlation with optimism was chosen as a measure of expectancy flexibility and any items loading on other factors were deleted. This was done on the basis that flexibility ought to be uncorrelated with optimism. This factor was re-analyzed for its internal consistency reliability using the steps described in the previous paragraph.

In the third step, correlations were conducted between the revised EFS and conceptually similar constructs (defensive pessimism and internal locus of control) and conceptually dissimilar constructs (coping flexibility, cognitive flexibility, social desirability and optimism). If correlations between the revised EFS and any of the conceptually similar constructs were greater than .85 (Garson, 2001), then individual items of the EFS were examined for their correlation with these measures. The items with the strongest correlations were deleted, and steps 1-3 were repeated. If the correlations between the revised EFS and any of the conceptually similar constructs were non-significant, then individual items of the EFS were examined for their correlation with these measures. Items with the weakest (or negative) correlations were deleted, and steps 1-3 were repeated. If correlations between the revised EFS and any of the conceptually dissimilar constructs were significant, then individual items of the EFS were examined for their correlation with these measures. The items with the strongest correlations were deleted, and steps 1-3 were repeated.

## **Results**

Undergraduate students were recruited through the Psychology participant pool. Two hundred and fifty participants completed the survey. None of the participants met criteria for listwise deletion (i.e. none of the participants had more than 20% of their data missing). Little's MCAR test indicated that data were missing completely at random. Because of this, missing data were replaced using the multiple imputation technique.

An analysis of the internal consistency reliability of the original 20-item scale found an initial overall alpha value of .68. Removal of six of the items (2, 3, 4, 5, 8, and 20) increased the overall reliability of the 14-item scale ( $\alpha = .79$ ). No further items were removed because removing them would decrease the scale's overall reliability. The alpha value of .79 is very close to the ideal range of .80-.90 and is still considered adequate for research purposes (Nunnally, 1978).

The correlations between the 14-item version of the EFS and conceptually similar and dissimilar constructs are shown in Table 2. A high correlation with defensive pessimism was expected; however, the correlation of greatest interest is the correlation between the EFS and optimism. The high correlation between optimism and expectancy flexibility was cause for concern as it suggested an unexpectedly high degree of overlap between the two measures. Because of this, correlations between individual items of the EFS and the LOT-R were examined for items that could explain the high correlation.

Items that had a correlation of more than .3 were considered for deletion. An additional six items (12, 13, 14, 15, 16, and 17) were shown to have high correlations with optimism and were deleted. These six items from the EFS and their correlations with the LOT are shown in Table 3.

Table 2

*Correlations between the EFS and similar and dissimilar constructs*

Construct	<i>r</i>
Defensive pessimism	.44**
Internal locus of control	-.28**
Coping flexibility (EC subscale)	-.13*
Coping flexibility (AC subscale)	-.11 (ns)
Cognitive flexibility	.04 (ns)
Social desirability	-.31**
Optimism	-.57**

\* $p < .05$ , \*\* $p < .01$

Table 3

*Correlations between items removed from the EFS and LOT-R*

Item	<i>r</i>
Item 13	-.44
Item 16	-.40
Item 17	-.34
Item 14	-.33
Item 15	-.32
Item 12	-.32



Table 4

*Items comprising the 8-item EFS scale*

- 
1. My predictions about the future change when I get new information.
  6. My expectations for the future are based on similar past events.
  7. I only raise my expectations when I can imagine things going well.
  9. I change my expectations when I receive information I did not expect.
  10. I lower my expectations when I am facing an important event.
  11. I am optimistic only when I think it will help me.
  18. There is a place for both optimism and pessimism.
  19. There are times when I choose to be pessimistic.
-

Table 5

*Correlations between the 8-item EFS and similar and dissimilar constructs*

Construct	<i>r</i>
Convergent validity	
Defensive pessimism	.37**
Cognitive flexibility	-.24**
Discriminant validity	
Coping flexibility (evaluative coping)	-.04 (ns)
Coping flexibility (adaptive coping)	-.03 (ns)
Internal locus of control	-.27**
Social desirability	-.29**
Optimism	-.41**

\* $p < .05$ , \*\* $p < .01$

The next scale (shown in Table 4) included items 1, 6, 7, 9, 10, 11, 18, and 19 from the original scale. The correlation between optimism and the remaining eight EFS items was moderate ( $r = -.41$ ). This means that the amount of variance in the LOT-R explained by the EFS was cut in half, decreasing from 33% to 17%. While this is considerably lower than the initial correlation ( $r = -.57$ ), it is still relatively high. However, removing the six items lowered reliability ( $\alpha = .66$ ).

For Step 3, correlations were re-calculated for the revised EFS and similar and dissimilar constructs (see Table 5). The correlations between the 8-item EFS and similar scales were similar to those of the 14-item EFS. As can be seen, there are no major changes except that the correlation with optimism went down and the correlation with cognitive flexibility went up.

### **Brief Discussion**

It is clear that there was a trade-off between the reliability of the EFS and the magnitude of the correlation between the EFS and the LOT-R. That is, the version of the scale with the highest reliability was strongly associated with pessimism. Conversely, the version of the scale that had a weaker (though still quite robust) relationship to pessimism had lower reliability. The low internal consistency of the EFS is also concerning, as it could have attenuated correlations between it and the other measures. In an attempt to resolve this issue, another pilot study was conducted to assess whether additional items could augment the scale's internal consistency.

## Study 2

Due to the unexpected and disappointingly high correlation between the EFS scale and LOT-R, another pilot study was conducted. One method commonly used for increasing scale reliability is to add more items (Kaplan & Sacuzzo, 2012). In the second pilot study, five more items were added to the EFS (see items 21-25 in Table 6). It was hoped that new items would increase the scale's reliability.

### Method

**Participants.** I recruited 190 students from the University of Windsor's Department of Psychology Participant Pool in the Winter semester of 2015. Three participants were removed from the dataset because of large quantities of missing data, leaving a final total of 187. The sample was composed of 138 participants identifying as female and 47 participants identifying as male. No participants identified as transgender and two participants did not indicate their gender. The mean age was 20.73 (range = 18 to 36). The ethnic characteristics of the sample was as follows, in descending order of frequency: White / European ( $n = 121$ ), Black / African / Caribbean ( $n = 16$ ), Middle Eastern ( $n = 13$ ), South Asian / Indian / Pakistani ( $n = 10$ ), Bi / Multiracial ( $n = 9$ ), East Asian / Chinese / Japanese ( $n = 8$ ), Latin / South American ( $n = 6$ ), and "Other" ( $n = 4$ ).

**Measures.** The measures used were identical to those used in Study 1. These measures were the Expectancy Flexibility Scale, Marlowe-Crowne Social Desirability Scale, Defensive Pessimism Scale, Coping Flexibility Scale, Cognitive Flexibility Scale, Life Orientation Test-Revised, and the Locus of Control of Behavior Scale. Five new items (21-25) were appended to the EFS (see Table 6). Flesch-Kincaid Grade Levels are shown in parentheses. Asterisks indicate reverse-scored items.

Table 6

*Items included in the EFS for Study 2*

- 
1. My predictions about the future change when I get new information. (8)
  2. I often ignore information that doesn't fit my expectations.\* (8.9)
  3. There are times when I choose to be optimistic. (3.7)
  4. I am optimistic some of the time. (4)
  5. I stubbornly refuse to change my expectations.\* (9.1)
  6. My expectations for the future are based on similar past events. (8)
  7. I only raise my expectations when I can imagine things going well. (7.8)
  8. When I think about the future, I try to put my own biases aside. (5)
  9. I change my expectations when I receive information I did not expect. (8.8)
  10. I lower my expectations when I am facing an important event. (9.1)
  11. I am optimistic only when I think it will help me. (4.8)
  12. I lower my expectations only when I can imagine things could go badly. (8.5)
  13. I believe that being too optimistic is just as bad as being too pessimistic. (9.3)
  14. I lower my expectations when future outcomes are beyond my control. (8.0)
  15. I am pessimistic some of the time (4).
  16. I create the future that I want by preparing for the worst. (3.8)
  17. I become more pessimistic right before I receive my grades. (7.2)
  18. There is a place for both optimism and pessimism. (7.6)
  19. There are times when I choose to be pessimistic. (3.7)
  20. I am pessimistic only when I think it will help me. (4.8)
  21. I try to hope for the best but prepare for the worst. (1.9)
  22. I am usually optimistic unless the potential 'downside' is relatively likely or serious. (4.9)
  23. I adjust my expectations for the future in order to cope with the situation. (9.3)
  24. I try to think about all possible outcomes when I think about the future. (6.7)
  25. When thinking about the future, I try to be as realistic as possible. (7.6)
- 

\*Item was reverse scored

**Procedure.** The procedure used in this study was identical to that used in the first study.

**Data analysis.** The approach used to address missing data was the same as that used in the first pilot study. The strategy used to develop the EFS was tried again with the new data provided by Study 2. Doing so largely replicated the findings of Study 1 and yielded similarly disappointing results. Because of this, a new approach was used to develop the EFS.

The approach to scale development used in Study 2 was different from that used in Study 1. In the second pilot study, an iterative process was used to develop the final scale. It was decided that the ideal scale should have adequate reliability ( $\alpha > .70$ ) and a modest correlation with optimism ( $r < .30$ ) to demonstrate discriminant validity.

Guidelines for evaluating the discriminant validity of new measures vary greatly; however, a cutoff of .30 was judged to be appropriate evidence for discriminant validity, as it is smaller than the correlations between the EFS and similar measures, such as defensive pessimism. A similar method was used by Lucas, Diener, and Suh (1996) to assess the discriminant validity of several well-being measures.

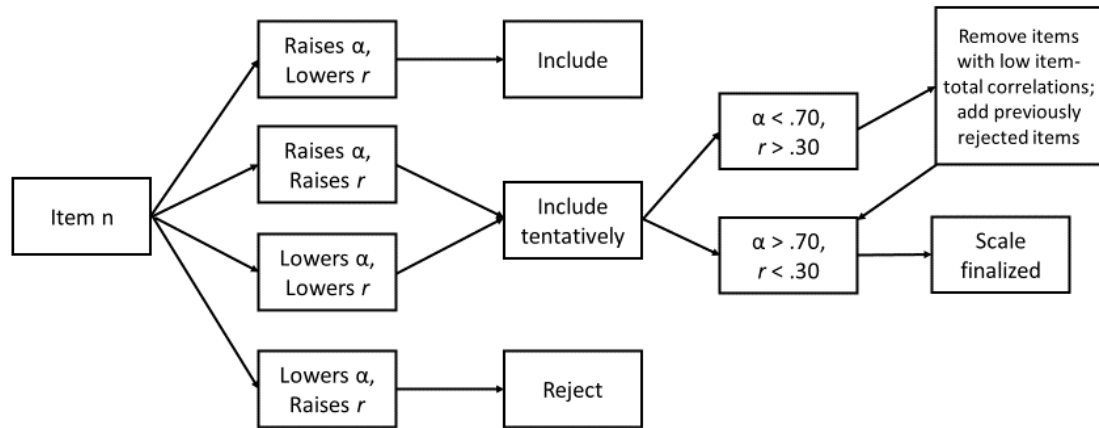
Starting at item 1, each item was added to the developing scale depending on how the addition of the item affected the internal consistency reliability of the overall scale and the scale's correlation with optimism. If the item raised  $\alpha$ , but lowered  $r$ , the item was added to the scale and was not considered for deletion. If the item raised both  $\alpha$  and  $r$ , or lowered both  $\alpha$  and  $r$ , the item was added to the scale but was considered for deletion in the second round. If the item lowered  $\alpha$ , but raised  $r$ , the item was not added to the scale. If, at the end of this process,  $\alpha$  failed to reach .70, or if the correlation with

optimism exceeded  $r = -.30$ , the items were re-examined and considered for deletion. Once the scale reached a semi-finalized state, previously rejected items correlating highly with the overall scale were re-considered for addition to the scale if they increased  $\alpha$  and/or decreased  $r$ . The scale was finalized when  $\alpha$  could not be increased without substantially raising  $r$ . The algorithm for scale construction is depicted visually in Figure 5.

Once a finalized scale was obtained, a factor analysis was conducted. Using promax rotation (to allow for the possibility of an oblique solution), two factors were extracted. The rationale for extracting two factors was that there are two scales (EFS and LOT-R). If the scales were distinct, it was thought that the items from each scale would load on the same factor (e.g. the EFS items would load on one factor and the LOT-R items would load on the other factor), with few items that did not load on a factor or loaded on both factors. If the overall pattern of factor loading was not consistent (exhibited either by a large amount of cross-loading items or inconsistent loading), this would suggest that expectancy flexibility and optimism were not distinct constructs.

Lastly, evidence for convergent and discriminant validity was gathered by correlating the scale with scales that were thought to be conceptually similar (defensive pessimism and internal locus of control) and conceptually dissimilar (coping flexibility, cognitive flexibility, social desirability and optimism). Moderate positive correlations were expected for the EFS and conceptually similar scales; this would provide evidence for convergent validity. No significant correlations were expected for the EFS and conceptually dissimilar scales; this would provide evidence for discriminant validity.

Figure 5. Algorithm for EFS scale development used in Study 2.





## Results

The EFS was constructed using the method stated previously. At the end of the first step, items 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 14, 18, 21, 22, 23, 24, and 25 were included. The internal consistency reliability of this scale was marginal ( $\alpha = .65$ ), but the correlation with optimism was quite low ( $r = -.20, p < .01$ ).

Because  $\alpha$  was less than .70, the items were re-examined. Items with low item-total correlations ( $r < .30$ ) were examined. These items were 2, 5, 6, 8, and 11. Items were only removed if the alpha of the EFS could be increased without increasing the correlation with optimism too much. Items 2, 6, 8, and 11 were removed. At this point, the scale now consisted of items 1, 3, 4, 5, 7, 9, 14, 18, 21, 22, 23, 24, and 25. The internal consistency reliability of this scale increased ( $\alpha = .67$ ) and the correlation with optimism remained the same ( $r = -.20, p < .01$ ).

Lastly, items not previously included that were highly correlated with this combination of items were considered for inclusion (despite not being included in previous steps). These items were 10, 12, 16, 17, and 19. Items were only added if the alpha of the EFS could be increased without increasing the correlation with optimism too much. Of these five items, only item 19 was included. With the inclusion of item 19, no other items were deleted or added. The final scale consisted of 14 items (1, 3, 4, 5, 7, 9, 14, 18, 19, 21, 22, 23, 24, and 25). The internal consistency reliability of the scale was acceptable ( $\alpha = .69$ ). While the correlation with optimism was significant, it was quite low ( $r = -.25, p < .01$ ). This scale is both fairly reliable and relatively uncorrelated with optimism. The 14 items included in the final scale are shown in Table 7.

Table 7

*Expectancy Flexibility Scale used in Study 2*

- 
1. My predictions about the future change when I get new information.
  2. There are times when I choose to be optimistic.
  3. I am optimistic some of the time.
  4. I stubbornly refuse to change my expectations.
  5. I only raise my expectations when I can imagine things going well.
  6. I change my expectations when I receive information I did not expect.
  7. I lower my expectations when future outcomes are beyond my control.
  8. There is a place for both optimism and pessimism.
  9. There are times when I choose to be pessimistic.
  10. I try to hope for the best but prepare for the worst.
  11. I am usually optimistic unless the potential ‘downside’ is relatively likely or serious.
  12. I adjust my expectations for the future in order to cope with the situation.
  13. I try to think about all possible outcomes when I think about the future.
  14. When thinking about the future, I try to be as realistic as possible.
-

An informal analysis of the items included and not included in the final scale suggests that the empirical method used to select or reject items has face validity. Some of the rejected items were too suggestive of pessimism (i.e. “I lower my expectations when I am facing an important event.”). Other items were probably too vague (i.e. “When I think about the future, I try to put my own biases aside.”). The included items, however, seem to have little to do with optimism or pessimism but instead seem to suggest flexible expectations and cautiousness (i.e. “I adjust my expectations for the future in order to cope with the situation” and “I try to hope for the best but prepare for the worst.”). It is interesting to note that all five of the new items added to the EFS in the second pilot study were included in the final scale. Descriptive statistics for the EFS are shown below in Table 8.

Table 8

*Descriptive statistics for the EFS*

Statistic	Value
Mean	51.18
Median	52
Standard Deviation	5.31
Skewness	-.46
Kurtosis	1.36
Minimum	33
Maximum	70

To confirm that the flexibility items were distinct from optimism items, a factor analysis was conducted. I included all 14 items from the finalized EFS and the six scored items from the LOT-R. To allow for the possibility of an oblique solution, I used a promax rotation (a varimax rotation was also tried, and the results were very similar to the promax rotation). Two factors were extracted. The reason for extracting two factors was because there were two scales; it was expected that the items from each scale would load on the same factor. If this pattern was not observed, this would indicate some overlap between optimism and flexibility items. None of the items were expected to load on more than one factor. The pattern matrix is shown in Table 9. Only factor loadings greater than .3 (or less than -.3) are displayed in the table.

The items from the LOT-R all loaded on Factor 1 only. In contrast, all of the items from the EFS loaded on Factor 2. However, three items from the EFS (items 3, 4, and 19) also loaded on Factor 1. For items 3 and 19, the magnitude of the loading was actually greater for Factor 1 than on Factor 2. The positive loading of items 3 and 4 on Factor 1 makes sense given that both items contain the word “optimistic”. The negative loading of item 19 on Factor 1 also makes sense given that the item contains the word “pessimistic” (it is almost identical in wording to item 3). Notwithstanding the cross-loading of these three items, the overall pattern suggests that optimism and expectancy flexibility are distinct constructs.

Table 9

*Factor component matrix for the EFS and LOT-R items*

	Factor 1	Factor 2
EFS items		
1		.501
3	.547	.483
4	.323	.421
5*		.305
7		.468
9		.552
14		.407
18		.552
19	-.385	.350
21		.441
22		.446
23		.541
24		.386
25		.363
LOT-R items		
1	.613	
3*	.602	
4	.673	
7*	.719	
9*	.644	
10	.738	

\*Item was reverse-scored

To test the convergent and discriminant validity of the EFS, a series of correlations was conducted. As shown in Table 10, there was no significant correlation between the EFS and either subscale of the coping flexibility measure. No significant correlation was found with internal locus of control. There was a modest (though significant) positive correlation between the EFS and cognitive flexibility and a negative correlation between EFS and social desirability. As aforementioned, there was also a small (though statistically significant) negative correlation between the EFS and optimism.

Table 10

*Correlations between the EFS and related and unrelated scales.*

Construct	<i>r</i>
Convergent validity	
Defensive pessimism	.39**
Cognitive flexibility	.17*
Discriminant validity	
Coping flexibility (EC subscale)	.10(ns)
Coping flexibility (AC subscale)	.06(ns)
Internal locus of control	-.02(ns)
Social desirability	-.26**
Optimism	-.25**

\* $p < .05$ , \*\* $p < .01$



**Brief Discussion**

The moderate positive correlation between expectancy flexibility and defensive pessimism came as no surprise. It is important to note, however, that the correlation was not so high as to suggest that expectancy flexibility is synonymous with defensive pessimism. This finding suggests that expectancy flexibility has considerable conceptual overlap with defensive pessimism while still remaining a distinct construct. Thus, the moderate magnitude of the correlation provides support for both convergent and discriminant validity. This can be explained using the framework outlined above; that is, expectancy flexibility primarily differs from defensive pessimism in that it is a trait rather than a strategy. People who score high on expectancy flexibility may engage in defensive pessimism as a strategy, while still allowing for the possibility that they may also raise their expectations under some circumstances.

There was no significant correlation between expectancy flexibility and locus of control. This finding suggests that one's locus of control has little to do with the amount of flexibility one has. Individuals who have an internal locus of control were no more flexible than people who have an external locus of control.

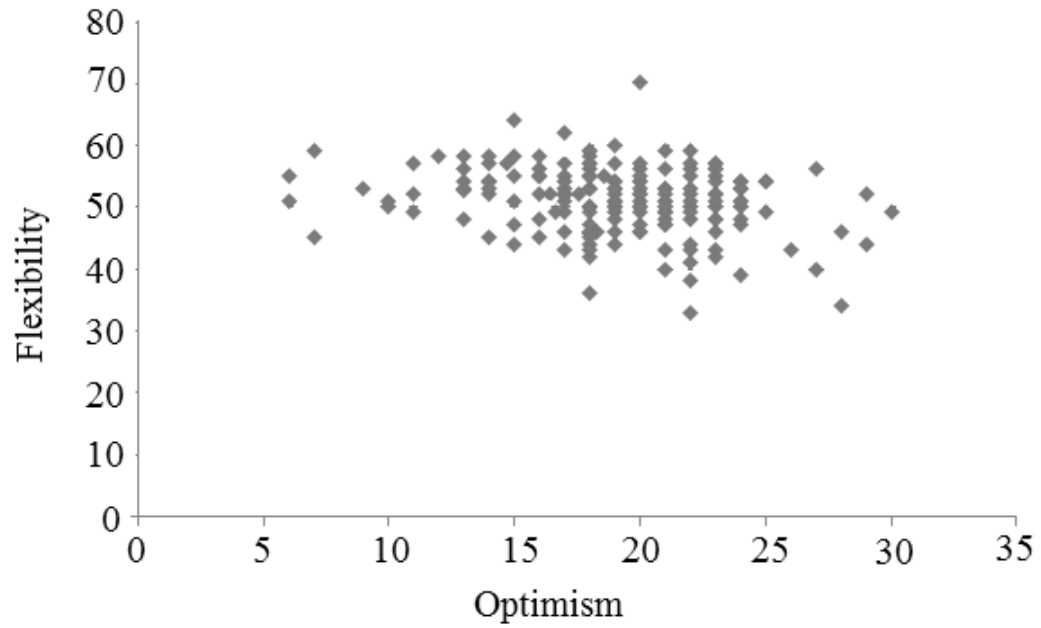
As expected, there was no significant correlation between expectancy flexibility and either subscale of coping flexibility. It seems that these constructs have little in common except for having the word "flexibility" in their name. In addition, there was only a modest positive correlation between expectancy flexibility and cognitive flexibility. While this is evidence for construct validity, these findings suggest that expectancy flexibility is not redundant with other types of flexibility that already exist in the literature.

Unexpectedly, there was a small negative correlation between expectancy flexibility and social desirability. People who scored high on expectancy flexibility tended to score low on social desirability. In contrast, expectancy inflexibility tends to be associated with social desirability. Although this finding was unexpected, in hindsight it was unsurprising. Flexible people are probably less prone to attempt to make a good impression and/or deceive themselves. Instead, they try to see things (including themselves) as they really are rather than how they want them to be. Meanwhile, individuals scoring low on flexibility (particularly inflexible optimists) are likely prone to self-deception (Wallston, 1994).

The significant negative correlation between expectancy flexibility and optimism was also unexpected. While they are distinct constructs, expectancy flexibility is related to pessimism. However, it should be emphasized that the effect size of this association is quite small. The significance of the association is in part due to the large sample size; or as stated by Furr and Bacharach (2013): “If the correlation is small but the sample is quite large, then the results might not indicate poor discriminant validity” (p. 267).

It should be noted that this finding appears to dispel the notion of pessimists as being rigid and inflexible. Instead, pessimists are generally more flexible than their optimistic counterparts. This suggests that expectancy flexibility resembles a mild, healthy form of pessimism that differs from the pathological form of pessimism measured by the LOT-R. Examination of the scatterplot in Figure 6 suggests that flexible optimists, flexible pessimists, inflexible pessimists, and inflexible optimists are approximately equally common.

Figure 6. Scatterplot showing the association between expectancy flexibility (X axis) and optimism (Y axis).



Even with five items added, the reliability of the scale was still lower than .70 (albeit very close). One plausible explanation for this low reliability is that the context of the items could have influenced the respondents' responses to the items (Knowles, 1988; Parducci, 1968). That is, the content of the other items not included in the final EFS scale could have suppressed the overall reliability of the item included in the final EFS scale. Thus, these items were removed when the scale was administered to participants in Study 3.

### Study 3

A new study was conducted to assess whether receiving negative feedback would lead to a shift in participants' expectations. Participants were given a brief academic vignette, where they were asked to imagine how they expect to perform on an upcoming exam. They were also given a brief gambling vignette, where they were asked to imagine how they would respond in a simple gambling scenario (no gambling experience was required to respond to this vignette). The objective of this study was to examine whether people who scored high on expectancy flexibility are more likely to react to negative feedback by raising or lowering their expectations (compared to people scoring low on expectancy flexibility).

### Method

**Participants.** Two hundred students were recruited in the Fall semester of 2015 from the University of Windsor's Department of Psychology Participant Pool. Seven participants were removed from the dataset because of large quantities of missing data, which resulted in a final sample of 193. One hundred and fifty one females (78%) and 42 males (22%) participated in this study (none of the participants identified as transgender or did not indicate their gender). The mean age was 21.06 (range = 18 to 40). The ethnic characteristics of the sample were as follows, in descending order of frequency: White / European (n = 122, 63%), Middle Eastern (n = 18, 9%), Black / African / Caribbean (n = 15, 8%), South Asian / Indian / Pakistani (n = 12, 6%), East Asian / Chinese / Japanese (n = 9, 5%), Bi / Multiracial (n = 8, 4%), "Other" (n = 5, 3%), Latin / South American (n = 2, 1%), First Nations/Aboriginal (n = 2, 1%).

**Measures.** Participants completed the EFS, LOT-R, an academic-related vignette, a gambling-related vignette and a basic demographics questionnaire. The EFS and LOT-R have been described before; the vignettes are explained in detail below.

**Academic vignette.** Participants were asked the following question: “Imagine that you are taking a midterm test in a course in your major. You have prepared in your usual way for taking the test. What percentage grade do you expect that you will receive on this midterm test?” Participants were given six response options, in increments of 10 points. On the next page, all participants received feedback that was 10 points lower than they had expected (for example, participants who indicated that they would get a 75, would get ‘feedback’ that said they had received a 65). Participants were then asked, “Imagine that you received a grade of [a number 10 points lower than expected] on this midterm test. How do you think you would do on the next exam in this course?”

Participants were given the same response options described above.

**Gambling vignette.** In the Gambling Vignette, participants were asked to respond to this hypothetical scenario: “Imagine that you are in a casino playing the slot machines. You have \$40 to gamble with. Each pull is \$1 (if you win, you win a dollar; if you lose, you lose a dollar). Estimate how much you will be up (have more money than you originally started with) or down (have less money than you originally started with) after 30 pulls.” Participants were given the following response options: “Up by \$20”, “Up by \$10”, “Neither up or down”, “Down by \$10”, or “Down by \$20.” Participants were randomly directed to one of five situations. “After 30 pulls, you are now [x]. Please estimate by how much you will be “up” or “down” after an additional 30 pulls.” (in the brackets, one of the following five scenarios would appear: “up by \$20”, “up to \$10”,

“Neither up or down”, “Down by \$10”, or “Down by \$20”). Participants were given the same response options described above.

**Procedure.** After clearance was obtained from the Research Ethics Board of the University of Windsor, data collection began. Participants for this study were recruited through the University of Windsor Psychology Department Participant Pool, which hosted the Study Advertisement. Participants completed the survey online, using FluidSurveys software.

Individuals who chose to participate in the study were directed to the Letter of Information page. In the Letter of Information, participants were informed of the purpose of the study, procedure, right to confidentiality, and right to withdraw from the study. Participants indicated their consent to participate in the study by clicking “I agree to participate” at the bottom of the page, which directed them to the survey. Participants who clicked “I do not agree to participate” did not continue to the survey, and were directed to the exit page.

Participants completed several questionnaires online. These measures included the EFS, LOT-R, an academic-related vignette, a gambling-related vignette and a basic demographics questionnaire, which were described in the previous section. Participants were given one of two different versions of the survey. The order of the questionnaires was counterbalanced, so that some participants saw the vignettes first, and the self-report questionnaires second. Other participants saw the self-report questionnaires first, and the vignettes second.

Upon completing the survey, participants received 1 bonus point for their participation, which could be used toward any Psychology or Business course that

accepted bonus points. Participants were taken to a separate page (also hosted on FluidSurveys) that asked participants to provide their name for the purpose of assigning bonus points (identifying information was stored in a dataset separate from the rest of the data to protect participant confidentiality). After providing their names, participants were thanked for their participation.

## Results

Separate analyses were conducted for the two administration formats; no noticeable differences in the results were found between the two methods. Thus, the findings presented here combine data collected using both methods.

In the academic scenario, a new variable was calculated by subtracting the post-feedback expectation scores from the pre-feedback expectation scores. Individuals were divided into two groups; those who changed their expectations were coded as 1, and those who did not change their expectations were coded as 0. Those who changed their expectations were called “flexible” ( $n = 59$ ) and those who did not change their expectations were called “inflexible” ( $n = 134$ ). An independent samples t-test found no differences in flexibility (as measured by the EFS) between the two groups ( $t = .028, p = ns$ ).

For the gambling scenario, only participants who indicated that they had some experience gambling were included in the analyses. Out of the initial sample of 193, 93 participants (48%) had gambling experience. A series of regressions were conducted, using only the 93 participants with gambling experience. The pre-feedback score, optimism scores, and expectancy flexibility scores were entered as independent predictor variables. Of greatest interest was the association between flexibility and post-feedback



gambling expectation scores. Optimism was included as a covariate to demonstrate that it was not related to post-feedback gambling expectation scores (as would be expected, given that optimists ought to have high expectations regardless of feedback). The pre-feedback score was also included as a covariate. The five groups' post-feedback gambling expectation scores served as the dependent variable in each regression.

For the loss of \$20 group, there was a marginally-significant association between flexibility and the post-feedback gambling expectation scores ( $\beta = -.44, t = -1.94, p = .07$ ). No such association was found for optimism ( $\beta = .31, t = 1.14, p = ns$ ) or pre-feedback expectations ( $\beta = -.02, t = -.07, p = ns$ ).

For the loss of \$10 group, there was no significant association between expectancy flexibility and the post-feedback gambling expectation scores ( $\beta = -.22, t = -.78, p = ns$ ). In addition (as expected), no associations were found between post-feedback gambling expectation scores and optimism ( $\beta = -.04, t = -.17, p = ns$ ) or pre-feedback expectations ( $\beta = -.38, t = 1.31, p = ns$ ).

For the “no change” group, there was a strong significant association between flexibility and the post-feedback gambling expectation scores ( $\beta = .63, t = 3.69, p < .01$ ). In addition (as expected), no associations were found between post-feedback gambling expectation scores and optimism ( $\beta = -.20, t = -1.19, p = ns$ ) or pre-feedback expectations ( $\beta = -.15, t = .87, p = ns$ ).

For the “gain of \$10” group, there was a significant positive association between expectancy flexibility and the post-feedback gambling expectation scores ( $\beta = .44, t = 2.05, p = .05$ ). In addition (as expected), no associations were found between post-

feedback gambling expectation scores and optimism ( $\beta = .37, t = 1.68, p = ns$ ) or pre-feedback expectations ( $\beta = .04, t = .17, p = ns$ ).

For the “gain of \$20” group, there was unexpectedly no significant association between flexibility and the post-feedback gambling expectation scores ( $\beta = .10, t = .42, p = ns$ ). In addition (as expected), no associations were found between post-feedback gambling expectation scores and optimism ( $\beta = .01, t = .04, p = ns$ ) or pre-feedback expectations ( $\beta = .30, t = -1.24, p = ns$ ).

### **Brief Discussion**

The findings from the gambling scenario (but not the academic scenario) supported the idea that shifts in expectations do occur in response to negative information, and that these shifts are associated with expectancy flexibility. The findings also demonstrate the complex nature of gambling cognitions. The increase in expectations for the “gain of \$10” group and decrease in expectations for the “loss of \$20” group were unsurprising. However, there were some unexpected findings.

The lack of association between expectancy flexibility and post-feedback expectations was unexpected. In hindsight, it is not surprising that this occurred. A slightly negative result would come as no surprise to gamblers, since it is expected that the “odds favour the house”.

Similarly, the positive association between expectancy flexibility and post-feedback expectations for the “no change” group was not anticipated. But because people tend to be slightly pessimistic about gambling (the odds are stacked in favor of the house), even a neutral outcome may raise gamblers’ hopes.

Another unanticipated finding was the lack of association between expectancy flexibility and the post-feedback gambling expectation scores for the “gain of \$20” group, when one includes optimism and pre-feedback expectations in the same model. After all, one would expect such a positive outcome to be accompanied by an increase in one’s expectations. I speculate that this is because the participants interpreted such particularly good fortune as a singular event. This is called the gambler’s fallacy (Ayton & Fischer, 2004), which is the belief that if an outcome (e.g. a win) happens frequently, it will be balanced out by the opposite outcome (e.g. a loss) in the future. In the gambler’s fallacy, a large win may be treated as a rare instance of good luck, and individuals may think that they will not be so lucky next time.

However, the fact that no pattern of differences was found in the academic scenario suggests that a shift in expectations may not occur in all contexts. In the academic scenario, there was no change in expectations that was associated with expectancy flexibility. It is reasonable to speculate that other processes may operate in academic contexts to influence grade expectations (Svanum & Bigatti, 2006). For example, students may feel that their exam grade on an individual exam may have little influence on their overall grade for the course because there are usually several exams or assignments during a semester. With these findings in mind, the final study was conducted.

## Study 4

### Method

**Participants.** Two hundred and fifty undergraduate students were recruited using the University of Windsor's Department of Psychology Participant Pool in the Spring/Summer semesters of 2016. Participants were recruited from pool-eligible courses in Psychology and Business. One hundred ninety one females (76.4%) and 58 males (23.2%) participated in this study. None of the participants identified as transgender and one participant did not indicate their gender. The mean age of the sample was 21.72, ranging from 17 to 56. The total number of participants identifying as a particular ethnic group was as follows, in descending order of frequency: 134 identified as White / European (53.6%), 30 identified as Middle Eastern (12.0%), 22 identified as East Asian / Chinese / Japanese (8.8%), 21 identified as Black / African / Caribbean (8.4%), 16 identified as South Asian / Indian / Pakistani (6.4%), 13 identified as Bi / Multiracial (5.2%), two identified as Aboriginal/Metis/First Nations (0.8%), and one identified as Latin / South American (0.4%). Eleven participants identified as "Other" (4.4%).

**Measures.** The measures that were used in this study are shown below in Table 11. With the exceptions of the Expectancy Flexibility Scale and qualitative questions, each scale is an existing measure. The scales are described in more detail below.

Table 11

*Measures Completed by Participants in Study 4*

Scale name	# of items	Citation
Academic Coping Strategies Scale (ACSS)	56	Sullivan (2010)
Adolescent Invulnerability Scale (AIS)	21	Lapsley and Duggan (2001)
Academic Success Inventory for College Students (ASICS)	50	Prevatt et al. (2011)
Expectancy Flexibility Scale (EFS)	14	New scale
Gamblers' Beliefs Questionnaire (GBQ)	21	Steenbergh, Meyers, May, and Whelan (2002)
Life Orientation Test-Revised (LOT-R)	10	Scheier, Carver, and Bridges (1994)
Multidimensional Health Behavior Inventory (MHBI)	56	Kulbok, Carter, Baldwin, Gilmartin, and Kirkwood (1999)
Problem Gambling Severity Index (PGSI)	9	Ferris and Wynne (2001)
Qualitative items	7	New scale

**Demographics.** The participants will be asked to provide their age, gender, ethnic identity, and year of study. The scale is shown in Appendix J.

**Expectancy Flexibility Scale (EFS).** The EFS was created for the purpose of this dissertation. The development and validation of this scale is described in Studies 1 and 2. The final form of the scale can be found in Appendix E.

**Academic Coping Strategies Scale (ACSS).** The ACSS is a self-report measure of how students respond to an academic stressor – namely, receiving a grade that was lower than they had anticipated (Sullivan, 2010). The ACSS is composed of 56 items (22 are filler items that do not load on any subscale). Each item describes a behavioural or cognitive coping strategy. Respondents are asked to indicate how often they use this strategy in this context, using a Likert scale (1 = almost never, 5 = almost always). The ACSS has three subscales: Approach (15 items), Avoidance (11 items), and Social Support (8 items). Sullivan (2010) reported good internal consistency reliability for all three subscales: Approach ( $\alpha = .91$ ), Avoidance ( $\alpha = .82$ ), and Social Support ( $\alpha = .81$ ). The ACSS can be found in Appendix B.

**Adolescent Invulnerability Scale (AIS).** The Adolescent Invulnerability Scale is a 21-item self-report measure of personal perceptions of invulnerability (Lapsley & Duggan, 2001). Individuals respond to the AIS items using a 5-point Likert scale that ranges from strongly disagree (1) to strongly agree (5). The scale has been validated in both adolescent and young adult samples (Duggan, Lapsley, & Norman, 2000). In the young adult sample (with a mean age of 21.85 years), the authors reported a two-factor solution. The first factor was a twelve-item “danger invulnerability” subscale ( $\alpha = .85$ ), which represented individuals’ invulnerability to external danger. A second factor, a

nine-item “psychological invulnerability” subscale ( $\alpha = .79$ ) measured invulnerability to psychological distress. In this young adult sample, scores on both subscales were positively correlated with risk behaviors (Duggan et al., 2000). The AIS can be found in Appendix C.

**Academic Success Inventory for College Students (ASICS).** The ASICS was developed as a holistic measure of student success (Prevatt, Li, Welles, Festa-Dreher, Yelland, & Lee, 2011). Most studies operationalize student success as grade point average (GPA); however, GPA has been criticized as being a limited way of predicting academic outcomes (Pritchard & Wilson, 2003; Robbins et al., 2004). To address this limitation, the ASICS was developed to efficiently measure several psychosocial predictors of positive academic outcomes identified by previous research (Astin, 1998; Deci & Ryan, 1985; Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002; Tinto, 1998; Weiner, 1985). The ASICS has 50 items, and is divided into 10 subscales: General academic skills, Internal motivation, Perceived instructor efficacy, Confidence, External motivation, Socializing, Career decidedness, Lack of anxiety, Personal adjustment, and Self-Regulation. In general, higher scores on each subscale meant greater amounts of that construct (with the exception of socializing, where higher scores mean less engagement in negative social behaviours, i.e. partying). Each item is rated on a Likert scale that ranges from 1 (strongly disagree) to 7 (strongly agree). The internal consistency reliability of the ASICS subscales was generally good (i.e.  $\alpha > .70$ ), except for the External Motivation/Current subscale, which had a Cronbach’s  $\alpha$  of .62 (Prevatt et al., 2011). The ASICS can be found in Appendix D.

**Gamblers' Beliefs Questionnaire (GBQ).** The GBQ is a self-report measure of gamblers' cognitive distortions that was developed by Steenbergh, Meyers, May, and Whelan (2002). The GBQ consists of 21 items, and each item is rated on a Likert scale that ranges from 1 (strongly disagree) to 7 (strongly agree). In the original study, the authors included non-gamblers, because "gambling status does not dictate the presence or absence of gambling-related irrational beliefs" (Steenbergh et al., 2002, p. 144). The GBQ has two subscales: the 13-item Luck/Perseverance subscale, which reflects the belief that people can make their own good luck if they just keep trying, and the 8-item Illusion of Control subscale, which reflects the belief that one's behaviour can influence chance occurrences. The Luck/Perseverance subscale contains items such as "If I am gambling and losing, I should continue because I don't want to miss a win". In contrast, the Illusion of Control scale includes items such as "My knowledge and skill in gambling contribute to the likelihood that I will make money." These statements resemble the beliefs of optimistic gamblers (Gibson & Sanbonmatsu, 2004). Both the Luck/Perseverance subscale ( $\alpha = .90$ ) and the Illusion of Control subscale ( $\alpha = .84$ ) had good internal consistency reliability. The GBQ can be found in Appendix F.

**Life Orientation Test-Revised (LOT-R).** The LOT-R was developed by (Scheier, Carver, & Bridges, 1994) to measure dispositional optimism. The LOT-R consists of six scored items and four filler items. Three of the scored items measure optimism, and the other three items measure pessimism. An example of an item measuring optimism is: "Overall, I expect more good things to happen to me than bad". An example of an item measuring pessimism is: "If something can go wrong for me, it will". Participants respond to these items using a 5-point Likert scale that ranges from



“strongly disagree” (1) to “strongly agree” (5). The three pessimism items are reverse-scored. Higher scores on the scale mean greater optimism. The six items of LOT-R had a Cronbach’s  $\alpha$  of .78, suggesting good internal consistency reliability (Scheier et al., 1994). The LOT-R can be found in Appendix G.

**Multidimensional Health Behavior Inventory (MHBI).** The Multidimensional Health Behavior Inventory was developed to measure young adults’ healthy and risky behaviors (Kulbok, Carter, Baldwin, Gilmartin & Kirkwood, 1999). The MHBI was chosen because it was developed to be used with a young adult population and taps a wide variety of health domains (most health questionnaires are designed for people with chronic or serious illnesses). The MHBI consists of 58 items, and participants indicate the relative frequency that they engage in a behaviour using a Likert scale that ranges from 1 (almost never) to 5 (almost always). The MHBI has seven subscales relating to checkup behaviours (10 items), dietary behaviours (13 items), exercise behaviours (4 items), safety behaviours (9 items), social behaviours (6 items), stress behaviours (6 items), and substance use behaviours (10 items). The authors state that the scale is intended to measure different dimensions of health promotion behaviour, not as a summative scale. A pair of gender-specific items on the Checkup subscale that pertained to breast self-examination (for females) and testicular self-examination (for males) were not included in the present study. All subscales are coded such that higher scores mean higher functioning (this is of particular relevance to the Substance Use and Stress subscales). Kulbok et al. (1999) reported that the internal consistency reliability of all seven subscales were within the acceptable range, from  $\alpha = .74$  (for the Social subscale) to  $\alpha = .88$  (for the Diet subscale). The MHBI can be found in Appendix H.

**Problem Gambling Severity Index (PGSI).** The PGSI was developed by as part of the Canadian Problem Gambling Index (Ferris & Wynne, 2001). The PGSI consists of nine items that measure behaviours that suggest a problem with gambling (e.g. betting more than one could afford), and adverse consequences (e.g. feelings of guilt or financial problems). Individuals respond to PGSI items using a 4-point Likert scale, with anchors of ‘never’ (0), ‘sometimes’ (1), ‘most of the time’ (2), or ‘almost always’ (3). The PGSI is designed to be used in general population samples, rather than for use in a clinical context. Ferris and Wynne (2001) reported good internal consistency reliability ( $\alpha = .84$ ). The PGSI can be found in Appendix I.

**Qualitative items.** A set of seven items was used to tap into participants’ thought processes. These items were developed based on previous research on shifts in expectations (e.g., Carroll, Sweeny, & Shepperd, 2006). Participants were asked to respond to the following questions: 1) “When something bad happens that you don’t expect, does this influence your expectations of the future? If so, how?”, 2) “If you get a bad grade, do your expectations for your grade on the next test change? If so, how?”, 3) “How does getting a bad grade change your behaviour for the next exam?”, 4) “When the outcome an upcoming future event is uncertain, how optimistic or pessimistic are you about what will happen?”, 5) “When something happens that far exceeds your expectations, how does this affect your expectations of the future?”, 6) “When you feel in control of the outcome, how does this affect your expectations of the future?”, and 7) “When something unusually good or unusually bad happens, how does this affect your expectations of the future?”

**Procedure.** Prior to collecting data, clearance from the Research Ethics Board of the University of Windsor was obtained. Participants were recruited through the University of Windsor Psychology Department Participant Pool. Participants participated in the study online by clicking on a link provided in the Study Advertisement hosted on the Participant Pool website.

Individuals who chose to click on the link to the study were directed to the Letter of Information page (shown in Appendix A). The Letter of Information informed participants of the purpose of the study, procedure, right to confidentiality, and right to withdraw from the study. After reading the Letter of Information, participants could indicate their consent to participate in the study by clicking “I agree to participate” at the bottom of the page. This link directed them to the survey, which was hosted on FluidSurveys.com. Participants who opted to click “I do not agree to participate” were not allowed to continue to the survey, and were instead directed to an exit page.

All of the questionnaires listed in the Measures section were administered. Participants completed the ACSS, ASICS, AIS, EFS, GBQ, LOT-R, MHBI, PGSI, the qualitative items, and a brief demographics questionnaire. On average, it took 47 minutes for participants to complete the survey. Upon completing the survey, participants received 1 bonus point for their participation, which could be used toward any course in Psychology or Business that accepted bonus points.

After completing the survey, participants were taken to a separate page (also hosted on FluidSurveys) that asked participants to provide their name for the purpose of assigning bonus points. To protect participant confidentiality, this identifying information

was stored in a dataset separate from the rest of the data. After providing their names, participants were thanked for their participation.

**Data analyses.** Prior to conducting the data analyses, the data were inspected for missing values. Missing data were replaced using a multiple imputation technique. Descriptive data (such as means, standard deviations, skewness, and kurtosis) will be presented for all study variables. Correlational analyses will focus on expectancy flexibility, optimism, and cognitive flexibility. All analyses will be performed using SPSS version 24.

The data analyses tested the hypotheses described earlier. The mediated moderation and moderated mediation were tested using SPSS PROCESS macros (Preacher & Hayes, 2004; Hayes, 2013) designed to estimate indirect effects in simple mediation models. The SPSS macros included a series of regression analyses to test the requirements for mediation (Baron & Kenny, 1986). The method developed by Preacher and Hayes (2004) was chosen because it is considered to be superior to the traditional procedures for testing mediational analyses developed by Baron and Kenny (1986) and Sobel (1982). The Baron and Kenny method has been criticized because it is prone to both Type I and Type II error, it does not directly address the mediation hypothesis, and has low statistical power (Preacher & Hayes, 2004). The Sobel method has also been criticized because it requires several assumptions that are rarely met; i.e. a large sample and that the sampling distributions for mediation paths be normally distributed (Preacher & Hayes, 2004). The model developed by Preacher and Hayes improves upon these methods by using a bootstrapping procedure. Bootstrapping is a non-parametric method that can take a large number of samples (e.g. 1,000) from the raw data of a sample size

equal to the original sample size and computes estimates of the indirect effect for each sample. The bootstrapping macro computes an estimate of the indirect effect, an estimated standard error for the effect, and the 95% and 99% confidence intervals for the population value of the indirect effect.

To test the hypotheses, the independent variable (optimism) and the moderator (expectancy flexibility) were centered (Aiken & West, 1991). Centering was performed because it resolves the problem of multicollinearity between the independent variable, moderator, and the interaction terms without affecting the level of significance of the interaction terms or the simple slopes of regression lines. To center, the sample mean is subtracted from all participants' scores, which results in a variable mean of zero. The interaction variable was calculated by multiplying the centered optimism and expectancy flexibility variables together (Aiken, West, & Reno, 1991).

Three models were tested. In each analysis, optimism served as the independent variable. In the first model, problem gambling served as the dependent variable. The Luck/Perseverance subscale of the GBQ served as the mediator, and expectancy flexibility served as the moderator. In the second model, preventative health behaviors (as measured by the seven subscales of the MHBI) served as the dependent variable. For the purposes of this analysis, the Danger Invulnerability subscale of the AIS served as the mediator, and expectancy flexibility served as the moderator. In the third model, the ten subscales of the ASICS served as the dependent variable. For the purposes of this analysis, academic approach coping served as the mediator, and expectancy flexibility served as the moderator.

## Results

**Data cleaning.** Prior to data analysis, data were examined for response patterns that were contradictory or inattentive (endorsing “strongly agree” to both optimism and pessimism items). No cases met these criteria. Missing values were identified using Missing Values Analysis. Less than 5% of data were missing. Using Little’s MCAR test, it was determined that these data were missing completely at random,  $\chi^2(4791) = 843.02$ ,  $p = ns$ . Missing data were imputed using the multiple imputation technique available in SPSS.

Data were then examined for potential violations of the assumptions of multiple regression. To test the assumption of normality, skewness and kurtosis were calculated for each study variable. The acceptable range for skewness is between -3 and 3 and the acceptable range for kurtosis is between -7 and 7 (Kline, 2005). For every variable except PGSI, skewness and kurtosis were found to be within the acceptable range. To test the assumptions of linearity and homoscedasticity, residual scatterplots were analyzed. These scatterplots showed that the data met these assumptions. Next, outliers were identified. Univariate outliers were those that were less than  $z = -3.29$  or greater than  $z = 3.29$ . Multivariate outliers were those with a Mahalanobis’ distance that was significant ( $p < .001$ ), and influential observations were those for which Cook’s distance  $> 1$  and standardized DFFITS  $> 2$  (Stevens, 2002; Tabachnick & Fidell, 2001). The assumption of multicollinearity was tested by examining Tolerance and VIF statistics. Tolerance scores less than .10 or VIF scores greater than 10 would indicate a violation of this assumption (Cohen, Cohen, West, & Aiken, 2003). Lastly, the assumption of independence of errors

was tested by examining the Durbin-Watson statistic, which should be greater than 1 and less than 3 (Field, 2005).

**Basic demographic statistics.** Means, standard deviations, floor, ceiling, skewness, kurtosis, and Cronbach's  $\alpha$  are reported for each scale and subscale in Table 12. Floor and ceiling scores show the percentage of participants scoring at the theoretical minimum and maximum for the scale. Floors were scores associated with low functioning and negative well-being; ceilings were scores associated with high functioning and positive well-being. To test for possible gender differences, a set of t-tests was run for each study variable using gender (male/female) as the independent variable.

Table 12

*Basic descriptive statistics for Study 4*

Variable	Mean (SD)	Floor	Ceiling	Skew	Kurt	$\alpha$
ACSS – approach	51.57 (10.20)	0	0	-.36	.64	.92
ACSS – avoidance	30.58 (6.69)	0	0	.14	-.34	.82
ACSS - social support	23.34 (6.27)	1.6	0	-.13	-.24	.83
AIS-danger invulnerability	25.73 (7.03)	0	2.0	.64	1.16	.85
AIS-psych. invulnerability	20.12 (6.22)	0	2.8	.21	-.28	.87
ASICS-General academic skills	42.06 (11.22)	0.4	2.4	-.22	-.34	.91
ASICS-Instructor efficacy	19.40 (7.56)	2.0	0.8	.04	-.84	.87
ASICS-Career decidedness	20.30 (5.73)	0	10.8	.44	-.76	.82
ASICS-External motivation	20.06 (5.21)			-.52	-.13	.81
ASICS-Confidence	28.78 (7.04)	0.8	2.0	-.53	.32	.85
ASICS-Personal adjustment	11.16 (4.85)	5.6	4.0	.24	-.82	.87
ASICS-Self regulation	18.26 (5.92)	0.4	0.4	.25	-.24	.78
ASICS-Socializing	25.90 (6.73)	0	6.4	-.61	-.40	.80
ASICS-Internal motivation	26.09 (6.73)	0.4	1.2	-.23	-.56	.86
ASICS-Lack of anxiety	26.09 (8.09)	13.2	0	.71	.14	.78
Cognitive Flexibility Scale	53.11 (6.59)	0	0	.04	-.53	.76
Expectancy Flexibility Scale	51.47 (5.80)	0	0.8	.04	.92	.76
GBQ-Luck/Perseverance	28.45 (15.53)	0	27.2	.83	-.25	.96
GBQ-Illusion of Control	21.01 (10.38)	0	20.0	.34	-.86	.90
LOT-R	18.72 (4.27)	1.2	0.4	-.57	.56	.80
MHBI-Diet	39.30 (8.74)	0	0	.04	.05	.84
MHBI-Substance Use	42.89 (6.21)	0	10.8	-.87	-.24	.77
MHBI-Safety/Environment	24.86 (6.33)	0	0.8	.41	.48	.80
MHBI-Checkup	22.24 (6.67)	0.8	0.8	.14	-.33	.85
MHBI-Social	21.28 (4.11)	0	3.6	.04	-.12	.75
MHBI-Stress/Rest	19.22 (4.30)	0	1.2	.21	-.12	.82
MHBI-Exercise	12.41 (3.98)	0.8	4.4	.07	-.79	.84
PGSI	1.31 (3.36)	0	76.4	3.12	9.62	.93



Gender differences were found for the following variables: AIS-danger invulnerability, AIS-psychological vulnerability, PGSI, ASICS-social support, ASICS-skills, ASICS-career decidedness, ASICS-socializing, ASICS-lack of anxiety, GBQ-luck, GBQ-illusion of control, MHBI-social. Males scored higher than females on danger invulnerability,  $t(78.74) = 4.52, p < .01$ ; psychological invulnerability,  $t(247) = 4.89, p < .01$ ; PGSI,  $t(75.04) = 2.68, p < .01$ ; ASICS-lack of anxiety,  $t(247) = 3.36, p < .01$ ; GBQ-luck,  $t(247) = 4.65, p < .01$ ; and GBQ-illusion of control,  $t(247) = 4.09, p < .01$ . Females scored higher than males on ASICS-social support,  $t(247) = 2.29, p < .05$ ; ASICS-skills,  $t(247) = 2.79, p < .01$ ; ASICS-career decidedness,  $t(247) = 2.04, p < .05$ ; ASICS-socializing,  $t(247) = 3.75, p < .01$ ; and MHBI-social,  $t(247) = 3.04, p < .01$ .

**Outliers.** Analysis of  $z$  scores showed that there were several univariate outliers, i.e.  $z$  scores greater than 3.29 or less than -3.29. There were seven participants with  $z$  scores greater than 3.29 on the PGSI, one participant with a  $z$  score less than -3.29 on the ACSS approach subscale, and one participant with a  $z$  score greater than 3.29 on the danger invulnerability subscale of the AIS. Analyses were run with and without outliers removed. The analyses showed only slight differences (likely due to the fact that the outliers did not greatly exceed the cutoff of  $|3.29|$ ); the results shown here are without outliers removed.

**Internal consistency reliability.** Variables were also examined for internal consistency reliability. Cronbach's  $\alpha$  values greater than .70 were deemed acceptable. As shown in Table 12, every variable exceeded this threshold (notably, including the EFS). Overall, these values were similar to those reported in previous studies (Sullivan, 2010;

Lapsley & Duggan, 2001; Prevatt et al., 2011; Steenbergh et al., 2002; Scheier et al., 1994; Kulbok et al., 1999; Ferris & Wynne, 2001).

**Correlational analyses.** Tables 13 and 14 show the Pearson correlations between all of the variables used in this study for all participants. Of greatest interest were the correlations between expectancy flexibility and optimism with the other variables. Correlations between cognitive flexibility and all other study variables were also examined for comparison purposes. Separate correlational analyses were conducted with males and females only; however, there were no substantial differences in magnitude or direction of association (although many associations were non-significant in the male-only sample; this is likely due to the smaller sample size).

Table 13

*Correlation matrix among predictor, mediator, and moderator variables*

	EFS	LOT-R	CFS	APP	ACSS AVO	SS	AIS		GBQ	
							DI	PI	LP	IOC
EFS	1									
LOT-R	-0.109	1								
CFS	.218**	.326**	1							
ACSS approach	.160*	.306**	.444**	1						
ACSS avoidance	-0.006	-.292**	-.332**	-.425**	1					
ACSS social support	0.098	0.016	0.121	.373**	-.234**	1				
AIS Danger invulnerability	-0.087	-0.022	-.208**	-0.098	.252**	-0.119	1			
AIS Psychological invulnerability	-0.043	.272**	.190**	.146*	0.037	-.147*	.429**	1		
GBQ Luck/Perseverance	-.134*	0.005	-.286**	-0.023	.135*	-0.036	.457**	.166**	1	
GBQ Illusion of control	-0.003	-0.019	-.229**	0.027	.152*	-0.024	.365**	.132*	.819**	1

\* $p < .05$ , \*\* $p < .01$

Table 14

*Correlations between EFS and dependent variables*

	MHBI										ASICS								
	EFS	DIET	SUB	SAFE	CHK	SOC	STR	EXR	SKI	EFF	CAR	EXT	CNF	PA	SR	SOC	INT	LAX	PGSI
EFS	1																		
MHBI diet	0.105	1																	
MHBI substance	.145 <sup>†</sup>	0.084	1																
MHBI safety	0.043	.425 <sup>**</sup>	0.069	1															
MHBI checkup	0.062	.379 <sup>**</sup>	0.086	.644 <sup>**</sup>	1														
MHBI social	.161 <sup>†</sup>	.126 <sup>†</sup>	0.085	.277 <sup>**</sup>	.334 <sup>**</sup>	1													
MHBI stress	0.101	.202 <sup>**</sup>	.146 <sup>†</sup>	.316 <sup>**</sup>	.311 <sup>**</sup>	.470 <sup>**</sup>	1												
MHBI exercise	0.058	.540 <sup>**</sup>	0.029	.339 <sup>**</sup>	.251 <sup>**</sup>	.278 <sup>**</sup>	.374 <sup>**</sup>	1											
ASICS skills	.181 <sup>**</sup>	.177 <sup>**</sup>	.274 <sup>**</sup>	.356 <sup>**</sup>	.298 <sup>**</sup>	.295 <sup>**</sup>	.245 <sup>**</sup>	.297 <sup>**</sup>	1										
ASICS efficacy	-0.059	0.01	-0.04	0	0.023	0.04	-0.028	-0.006	0.017	1									
ASICS career	0.066	0.032	.192 <sup>**</sup>	.130 <sup>†</sup>	0.114	.233 <sup>**</sup>	0.035	.124 <sup>†</sup>	.393 <sup>**</sup>	0.118	1								
ASICS external	.146 <sup>†</sup>	0.021	.160 <sup>†</sup>	.142 <sup>†</sup>	0.089	.140 <sup>†</sup>	-0.027	0.092	.474 <sup>**</sup>	.178 <sup>**</sup>	.344 <sup>**</sup>	1							
ASICS confidence	.217 <sup>**</sup>	0.085	.193 <sup>**</sup>	.157 <sup>†</sup>	.165 <sup>**</sup>	.251 <sup>**</sup>	.275 <sup>**</sup>	.258 <sup>**</sup>	.531 <sup>**</sup>	0.094	.388 <sup>**</sup>	.525 <sup>**</sup>	1						
ASICS personal adj.	-0.037	0.026	.131 <sup>†</sup>	0.016	0.06	0.056	.219 <sup>**</sup>	0.092	0.092	0.057	.127 <sup>†</sup>	-.175 <sup>**</sup>	0.011	1					
ASICS self-reg.	-0.031	0.114	0.104	.283 <sup>**</sup>	.126 <sup>†</sup>	0.117	.240 <sup>**</sup>	.203 <sup>**</sup>	.558 <sup>**</sup>	0.12	.194 <sup>**</sup>	.317 <sup>**</sup>	.403 <sup>**</sup>	0.12	1				
ASICS socializing	-0.033	0.063	.584 <sup>**</sup>	0.058	0.053	-0.049	-0.02	-0.04	.338 <sup>**</sup>	0.087	.221 <sup>**</sup>	0.087	0.109	.252 <sup>**</sup>	.267 <sup>**</sup>	1			
ASICS internal	-0.004	0.063	0.059	.225 <sup>**</sup>	0.123	.150 <sup>†</sup>	0.08	.162 <sup>†</sup>	.466 <sup>**</sup>	.481 <sup>**</sup>	.294 <sup>**</sup>	.561 <sup>**</sup>	.551 <sup>**</sup>	-0.106	.522 <sup>**</sup>	.130 <sup>†</sup>	1		
ASICS lack of anx.	-.273 <sup>**</sup>	-0.114	-.183 <sup>**</sup>	-.156 <sup>†</sup>	-.167 <sup>**</sup>	-.199 <sup>**</sup>	0.054	0.003	-.235 <sup>**</sup>	.126 <sup>†</sup>	-.167 <sup>**</sup>	-.213 <sup>**</sup>	-0.085	.191 <sup>**</sup>	0.116	-0.086	-0.036	1	
PGSI	-.182 <sup>**</sup>	0.044	-.411 <sup>**</sup>	0.093	0.066	-.170 <sup>**</sup>	0.009	-0.008	-.147 <sup>†</sup>	-0.038	-.126 <sup>†</sup>	-0.124	-0.078	-0.023	-0.023	-.266 <sup>**</sup>	-0.01	.175 <sup>**</sup>	1

\* $p < .05$ , \*\* $p < .01$

Expectancy flexibility was positively correlated with three ASICS subscales: General Academic Skills ( $r = .18, p < .05$ ), External Motivation ( $r = .15, p < .05$ ), and Confidence ( $r = .22, p < .01$ ), and was negatively correlated with the ASICS Lack of Anxiety subscale ( $r = .27, p < .01$ ). However, expectancy flexibility was not significantly correlated with the other six subscales of the ASICS (i.e., Personal Adjustment, Self-regulation, Socializing, Instructor Efficacy, Career Decidedness, or Internal Motivation).

Expectancy flexibility was positively correlated with two MHBI subscales: Substance Use ( $r = .14, p < .05$ ), and Social Health ( $r = .16, p < .05$ ); however, it was not significantly correlated with the other five subscales of the MHBI. Expectancy flexibility was only significantly correlated with one of three ACSS subscales, i.e. Approach coping ( $r = .16, p < .05$ ). Expectancy flexibility was negatively correlated with PGSI scores ( $r = -.18, p < .01$ ) and luck beliefs in gambling ( $r = -.13, p < .05$ ), but was uncorrelated with illusion of control beliefs in gambling.

Optimism was positively correlated with five ASICS subscales, including confidence, personal adjustment, self-regulation, socializing, and lack of anxiety. No significant correlation was found between optimism and the other ASICS subscales (i.e., skills, instructor efficacy, career decidedness, external, or internal). Optimism was positively correlated with cognitive flexibility. Optimism was positively correlated with ACSS approach coping and negatively correlated with ACSS avoidance coping, but uncorrelated with ACSS social support. Optimism was also positively correlated with three MHBI subscales, including (lack of) substance use, social health, and (lack of) stress, but uncorrelated with exercise, safety, checkup, or diet behaviours. Optimism was positively correlated with psychological invulnerability, but uncorrelated with danger

invulnerability. Optimism was not significantly correlated with any of the gambling-related measures.

**Mediation/moderation analyses.** It was hypothesized that luck/perseverance would mediate the relationship between optimism and problem gambling such that higher levels of optimism would lead to higher levels of luck/perseverance, which in turn would lead to higher levels of problem gambling. It was also hypothesized that expectancy flexibility would moderate the association between optimism and luck/perseverance. That is, people scoring high on expectancy flexibility would exhibit a smaller association between optimism and luck/perseverance.

Baron and Kenny (1986) identified three criteria for determining mediation. First, the independent variable must be significantly associated with the dependent variable. Second, the independent variable must be significantly associated with the mediating variable. Third, the mediator must be associated with the outcome variable in analyses that include both the independent variable and the mediator. Mediation analyses were conducted only when the first two criteria could be established.

Contrary to expectations, no association was found between optimism and problem gambling ( $\beta = -.04, p = ns$ ). Since this violated the first criterion, there was no effect to mediate or moderate. Thus, no additional analyses were conducted with the first model.

The second model examined the moderating effect of expectancy flexibility on the relationship between optimism and preventive health behaviours, mediated by invulnerability. Research on unrealistic optimism (Weinstein, 1987), which I believe to be closely related to expectancy inflexibility, suggests that feelings of invulnerability may

be associated with low levels of expectancy flexibility. This, in turn, would weaken the association between optimism and preventive health behaviours. It was hypothesized that expectancy flexibility would moderate the positive relationship between optimism and preventive health behaviours such that it would reduce the effect of optimism on preventive health behaviours (i.e. lower levels of flexibility would reduce the relationship between optimism and preventive health behaviours). In addition, this moderating effect would be mediated by danger invulnerability. That is, it is predicted that individuals scoring low on expectancy flexibility would score higher on danger invulnerability, which in turn would moderate the association between optimism and preventive health behaviours.

Mediated moderation was tested in three steps (Muller et al., 2005). First, the predictor, moderator, and their interaction term are regressed on the dependent variable (this is the same as a test of moderation). Second, the predictor, moderator, and their interaction term are regressed on the mediator variable. Third, the predictor, moderator, mediator, interaction of the predictor and moderator, and the interaction of the mediator and moderator are all regressed on the dependent variable. If there is a significant interaction (predictor x moderator) in the first step, and this interaction becomes non-significant in third step, then moderation is mediated. Thus, at minimum, this interaction term must be significant before additional analyses can be conducted.

Table 15

*Regression (beta) weights for moderation analysis*

DV	Optimism	Expectancy flexibility	Optimism x Expectancy flexibility
MHBI-Diet	.10	.11	.12
MHBI-Substance Use	.23**	.17**	.04
MHBI- Safety/Environment	.07	.05	.02
MHBI-Checkup	.08	.07	.05
MHBI-Social	.20**	.18**	-.09
MHBI-Stress/Rest	.47**	.15*	-.04
MHBI-Exercise	.08	.07	.02

\* $p < .05$ , \*\* $p < .01$



As shown in Table 15 above, although both optimism and expectancy flexibility were significantly associated with three of the MHBI subscales (Substance use, Social, and Stress/Rest), all of the interaction terms were non-significant. Because of this, no additional analyses were conducted.

The third model investigated the mediating effect of academic approach coping on the association between optimism and academic success. This model initially tested whether academic approach coping would mediate the relation between optimism and academic success. It was hypothesized that expectancy flexibility would moderate the indirect effect of optimism on academic success through academic approach coping. That is, it was predicted that people scoring high on expectancy flexibility would exhibit a weaker relationship between optimism and academic approach coping.

Ten separate models were examined, one for each of the academic success subscales (which were used as dependent variables). In each of the models, optimism served as the predictor variable, academic approach coping served as the mediator, and expectancy flexibility served as the moderator. The same criteria described above were used for determining the existence of mediation. The Sobel test was used to determine whether the decrease in  $\beta$  resulting from mediation was statistically significant. To reiterate, the independent variable must be significantly associated with the dependent variable, the independent variable must be significantly associated with the mediating variable, and the mediator must be associated with the outcome variable in analyses that include both the independent variable and the mediator. Mediation analyses were conducted only when the first two criteria could be established.

As shown in Table 13, no association was found between optimism and the skills ( $r = .11, p = ns$ ), instructor efficacy ( $r = -.07, p = ns$ ), career decidedness ( $r = .11, p = ns$ ), external ( $r = -.08, p = ns$ ), and internal ( $r = -.02, p = ns$ ) subscales. This violated the first criteria of mediation; as a result, no mediational analyses were conducted using these dependent variables. However, there was a significant association between optimism and confidence ( $r = .25, p < .01$ ), personal adjustment ( $r = .28, p < .01$ ), self-regulation ( $r = .15, p < .05$ ), socialization ( $r = .13, p < .05$ ), and lack of anxiety ( $r = .15, p < .05$ ). These subscales were entered into the mediational analyses as dependent variables. Since optimism was significantly associated with the academic approach coping ( $r = .31, p < .01$ ), the second criterion could be established.

Full mediational effects were found for academic approach coping on the association between optimism and self-regulation and between optimism and socialization. With the inclusion of academic approach coping in the model, optimism had no significant direct effect on self-regulation ( $\beta = .07, p = ns$ ). This association was lower in magnitude than the significant direct effect of optimism without academic approach coping ( $\beta = .15, p < .05$ ). Results of the Sobel test indicated that this mediational effect was significant (Sobel's  $z = 3.23, p = .001$ ).

For socialization, with the inclusion of academic approach coping in the model, optimism had no significant direct effect on self-regulation ( $\beta = .07, p = ns$ ). This association was smaller in magnitude than the significant direct effect of optimism without academic approach coping ( $\beta = .13, p < .05$ ). Results of the Sobel test indicated that this mediational effect was significant (Sobel's  $z = 2.61, p = .04$ ).

A partial mediation effect was found for academic approach coping on the association between optimism and confidence. Although optimism was still significantly associated with confidence ( $\beta = .15, p < .05$ ), the magnitude of this association was considerably smaller than the direct effect of optimism without academic approach coping ( $\beta = .25, p < .01$ ). Results of the Sobel test indicated that this mediational effect was significant (Sobel's  $z = 3.81, p < .001$ ). Thus, academic approach coping partially mediated optimism's association with confidence.

However, academic approach coping did not mediate the effect of optimism on personal adjustment and lack of anxiety. The effect of optimism on personal adjustment with academic approach coping included ( $\beta = .27, p < .05$ ) was only slightly lower than the direct effect of optimism without academic approach coping ( $\beta = .28, p < .01$ ), and the Sobel test was non-significant (Sobel's  $z = .70, p = ns$ ). For the lack of anxiety variable, not only was there no mediational effect, there was evidence for a suppressor effect (Conger, 1974). With the inclusion of academic approach coping in the model, optimism had a significant direct effect on lack of anxiety ( $\beta = .21, p < .01$ ), but this was unexpectedly *greater* in magnitude than the direct effect without academic approach coping ( $\beta = .15, p < .05$ ). Results of the Sobel test indicated that this mediational effect was significant (Sobel's  $z = -2.60, p = .01$ ).

**Moderated mediation.** In the next series of analyses, I tested the moderated mediation hypotheses. The first step was to conduct a simple moderation analysis. Expectancy flexibility was predicted to moderate the effect of optimism on academic success. Models previously shown to exhibit a mediation effect were examined to determine whether these mediational effects were moderated by expectancy flexibility.

Evidence for moderation would be given by a significant interaction effect. If moderation was supported, a second moderation analysis would be conducted wherein expectancy flexibility would moderate the effect of optimism on academic success, with academic approach coping treated as a covariate. Lastly, a final analysis combining moderation and mediation was conducted that included all four variables (i.e., optimism, academic success, academic approach coping, and expectancy flexibility).

In the first set of analyses, optimism, expectancy flexibility, and their interaction were entered into a regression as independent variables. Confidence, self-regulation, and socialization were treated as dependent variables in three separate regressions. Table 16 shows the results of these analyses.

Confidence was predicted by optimism ( $\beta = 0.27, p < .01$ ), expectancy flexibility ( $\beta = 0.25, p < .01$ ), but not the optimism x expectancy flexibility interaction ( $\beta = -0.08, p = ns$ ). Self-regulation was predicted by optimism ( $\beta = 0.14, p < .05$ ), but not expectancy flexibility ( $\beta = -0.02, p = ns$ ) or the optimism x expectancy flexibility interaction ( $\beta = -0.11, p = ns$ ). Socialization was predicted by optimism ( $\beta = 0.13, p < 0.05$ ), but not expectancy flexibility ( $\beta = -0.02, p = ns$ ) or the optimism x expectancy flexibility interaction ( $\beta = -0.01, p = ns$ ). The lack of a significant interaction effect in all three analyses suggested that moderated mediation was not present; therefore, no additional analyses were conducted.

Table 16

*Regression beta-weights for moderated mediation analyses*

	Optimism	Expectancy flexibility	Optimism x Expectancy flexibility
Confidence	.27**	.25**	-.08
Self-regulation	.14*	-.02	-.11
Socialization	.13*	-.02	-.01

\*\* $p < .01$ , \* $p < .05$

**Analysis of Qualitative Items.** The qualitative items were analyzed to determine whether meaningful differences could be found between different types of participants. Participants were divided into four groups: flexible optimists (those scoring above the median on both the LOT-R and EFS), flexible pessimists (those scoring below the median on the LOT-R, but above the median on the EFS), inflexible optimists (those scoring above the median on the LOT-R, but below the median on the EFS), and inflexible pessimists (those scoring below the median on both the LOT-R and EFS). Scores of 52 or greater for the EFS were coded as “flexible” and scores 19 and over for the LOT-R were coded as “optimistic”. Scores of 51 or lower on the EFS and 18 or lower on the LOT-R were coded as “inflexible” and “pessimistic”, respectively. This method yielded four groups of approximately equal size: 73 flexible optimists, 61 flexible pessimists, 66 inflexible optimists, and 50 inflexible pessimists. Twenty-one percent of flexible optimists were male ( $n = 15$ ), 21% of flexible pessimists were male ( $n = 13$ ), 21% of inflexible optimists were male ( $n = 14$ ), and 32% of inflexible pessimists were male ( $n = 16$ ). The remaining participants in each group were female. The proportion of males in each group did not significantly differ ( $\chi^2 = 2.73, p = ns$ ).

Participant responses were read and coded by the author and were organized into various themes (often, more than one theme was identified in a participant’s responses). Participant responses were discarded if they were too brief (e.g., a simple yes/no) or were not relevant (e.g. did not answer the question with a cogent response).

The order of the questions started off general and became more specific, so as to avoid “priming”. For each question, two to five themes were identified. The proportion and frequency of each theme is given below, for each of the four groups identified above

(i.e., flexible optimists, flexible pessimists, inflexible optimists, and inflexible pessimists. Percentages may not add to 100% because some participants expressed multiple themes, or their responses could not be easily categorized. These results are summarized in Tables 17-23.

**Question 1:** “When something bad happens that you don't expect, does this influence your expectations of the future? If so, how?”

Two-hundred and forty participants responded to this item. An additional 19 responses were discarded because they were too brief or were not relevant. This left 221 responses, which was composed of 67 flexible optimists, 54 flexible pessimists, 58 inflexible optimists, and 42 inflexible pessimists. Several themes emerged from the responses to this item. In general, the responses to this item were mostly in the affirmative, suggesting that most participants became more pessimistic in these situations. Four common themes were identified: contingent shift, hopelessness/doubt, approach coping, and positive thinking. These results are shown in Table 17.

Table 17

*Frequencies and percentages for each theme for Question 1*

Themes	Flexible optimists	Flexible pessimists	Inflexible optimists	Inflexible pessimists
Contingent shift	25 (37%)	17 (32%)	7 (12%)	8 (19%)
Hopelessness/doubt	12 (18%)	15 (28%)	8 (14%)	17 (41%)
Approach coping	19 (28%)	14 (26%)	9 (16%)	4 (9%)
Positive thinking	11 (16%)	4 (7%)	22 (38%)	4 (9%)



Most participants (regardless of their level of optimism or expectancy flexibility) indicated that such an event would shift their expectations toward pessimism. However, most participants stated that this shift toward pessimism was temporary. A subgroup of participants indicated that they would become more pessimistic, but only in the face of a severely negative event. As one participant put it, “It depends on the situation, but yes, sometimes if something bad and unexpected happens it will cause anxiety and distress in me.” This “contingent shift” in expectations was quite common among flexible optimists (37%) and flexible pessimists alike (32%), and less common among inflexible pessimists (19%) and inflexible optimists (12%). Another subset of participants expressed a loss of confidence, hopelessness, and self-doubt in the face of negative events. This was dubbed the “hopelessness/doubt” theme. For example, one participant said that such negative events “often can lead to bringing up other feelings and I can get depressed very easily.” Unsurprisingly, many inflexible pessimists expressed this theme (41%), though flexible pessimists (28%) also commonly expressed this kind of thinking. These participants typically made what Seligman et al. have called “pessimistic attributions” (stable and global negative beliefs about the future). Both inflexible (14%) and flexible optimists (18%) expressed this theme, but were less likely to do so than both groups of pessimists.

Other participants expressed what could be called “positive thinking.” These participants expressed that negative events would not change their expectations. This was common among inflexible optimists (38%) and less common among the other groups: 16% of flexible optimists, 9% of inflexible pessimists, and 7% of flexible pessimists. These participants expressed an unflappable optimism even in the face of adversity (as one participant put it, “My hope will never drop”). But not all such participants were

cockeyed optimists. In some cases, their responses included coping styles like positive reframing, wherein individuals try to see negative situations in a more positive light.

Some participants indicated that negative events would cause them to reappraise the situation or be better prepared for the future. This “approach” style was often accompanied by a shift in expectations. That is, a shift toward pessimism often motivated participants into action. Often participants saw it as an opportunity for self-improvement or said that they would deal with it by talking it over with someone or that they would find another way to reach their goals, e.g. “When something bad happens, I question myself as to why it had to happen... I try to prevent the same thing to happen [sic] in the future.” This theme was most common among flexible optimists (28%) and flexible pessimists (26%) and less common among the other groups: 16% of inflexible optimists, and 9% of inflexible pessimists.

**Question 2:** “If you get a bad grade, do your expectations for your grade on the next test change? If so, how?”

Most of the respondents completed this item ( $n = 240$ , 96%). Here, the responses were more mixed. An additional 17 responses were discarded because they were either too brief (a simple yes/no) or were not relevant. This left 223 responses, which was composed of 67 flexible optimists, 54 flexible pessimists, 56 inflexible optimists, and 46 inflexible pessimists. Three primary themes were identified: “discouragement”, “lowered expectations” and “motivation” (many participants also believed that a poor exam grade would not change their expectations for the future, but there was little difference between optimists and pessimists and between inflexible and flexible participants). These results were summarized in Table 18.

Table 18

*Frequencies and percentages for each theme for Question 2*

Themes	Flexible optimists	Flexible pessimists	Inflexible optimists	Inflexible pessimists
Discouragement	12 (18%)	10 (19%)	7 (13%)	21 (45%)
Lowered expectations	4 (6%)	17 (31%)	1 (2%)	13 (28%)
Motivation	43 (64%)	28 (51%)	27 (48%)	14 (31%)

Participants expressing discouragement believed that getting a bad exam grade was a sign of failure or inability to succeed in their coursework. They generally did not indicate that they would change their behavior for the next exam. As one participant put it, “If I get a bad grade on a test, then I have the expectation that I will do poorly again.” This was common among inflexible pessimists (45%), but uncommon among flexible pessimists (19%), flexible optimists (18%) and inflexible optimists (13%).

Some participants indicated that they would intentionally lower their expectations about their next grade. For example, one participant stated, “I usually tend to lower my expectations for the next test...then there is less room for disappointment if another bad grade is received.” This theme was sometimes accompanied by a belief that they would take action to do better on the next exam. Lowered expectations were common among both flexible pessimists (31%) and inflexible pessimists (28%), but less common among flexible optimists (6%) and rare among inflexible optimists (2%).

Many participants indicated that getting a bad grade would motivate them to work harder on the next exam. These participants indicated that they were determined to do better to raise their average by making “adjustments” to their study strategy. For example, one participant stated, “Yes, I start to work a lot harder so I can obtain the grade I want.” This was common among flexible optimists (64%) and flexible pessimists (51%), with smaller percentages among inflexible optimists (48%) and inflexible pessimists (31%). However, flexible optimists and flexible pessimists were differentiated primarily in what motivated them. Flexible pessimists said that the fear of getting another bad grade motivated them into action, while flexible optimists said that the hope of getting a good grade provided them with motivation.

**Question 3:** “How does getting a bad grade change your behaviour for the next exam?”

Most of the respondents completed this item ( $n = 238$ , 95%). An additional 12 responses were discarded because they were too brief (a simple yes/no) or were not relevant. This left 226 responses, which was composed of 68 flexible optimists, 55 flexible pessimists, 58 inflexible optimists, and 45 inflexible pessimists. Due to the similarity to the previous question, similar themes appeared. Predictably, almost all (82%) of the participants indicated that getting a bad grade would motivate them to study more. Three themes appeared, specifically: “anxiety-as-motivation”, “motivation without anxiety” and “feelings of failure”. These results were summarized in Table 19.

Table 19

*Frequencies and percentages for each theme for Question 3*

Themes	Flexible optimists	Flexible pessimists	Inflexible optimists	Inflexible pessimists
Anxiety-as-motivation	14 (21%)	29 (53%)	5 (8%)	5 (12%)
Feelings of failure	1 (2%)	4 (8%)	9 (15%)	13 (28%)
Motivation	47 (69%)	24 (44%)	38 (65%)	25 (56%)

This anxiety-as-motivation theme was particularly common amongst flexible pessimists (53% of flexible pessimists expressed this theme, compared to 21% of flexible optimists, 12% of inflexible pessimists, and 8% of inflexible optimists). Both flexible optimists and inflexible optimists were motivated to study harder, with little anxiety.

Feelings of failure were endorsed by relatively few participants (9% overall). These feelings were largely confined to inflexible pessimists (28%); however, it was also a common theme amongst inflexible optimists (15%). Many of these participants did not express a motivation to study harder (suggesting helplessness). Flexible pessimists (8%) and flexible optimists (2%) were unlikely to express these themes.

The last theme was called “motivation without anxiety”. This theme was similar to the anxiety-as-motivation theme, except the motivation that participants felt was accompanied by relatively little anxiety. For example, one participant responded, “No...One bad grade motivates me to try harder to achieve my expected grade on the next test.” This theme was quite common amongst all four groups (69% of flexible optimists expressed this theme, compared to 65% of inflexible optimists, 56% of inflexible pessimists, and 44% of flexible pessimists).

**Question 4:** “When the outcome an upcoming future event is uncertain, how optimistic or pessimistic are you about what will happen?”

Most of the respondents completed this item ( $n = 234$ , 94%), but 15 responses were discarded because they were too brief (a simple yes/no) or were not relevant. This left 219 responses (66 flexible optimists, 53 flexible pessimists, 56 inflexible optimists, and 44 inflexible pessimists). Four themes emerged: “optimistic”, “defensive pessimistic”, “mixed”, and “pessimistic”. These results were summarized in Table 20.

Table 20

*Frequencies and percentages for each theme for Question 4*

Themes	Flexible optimists	Flexible pessimists	Inflexible optimists	Inflexible pessimists
Optimistic	26 (39%)	18 (34%)	43 (76%)	7 (15%)
Defensive pessimistic	12 (18%)	22 (41%)	4 (8%)	7 (15%)
Mixed	14 (21%)	15 (28%)	5 (9%)	2 (5%)
Pessimistic	0 (0%)	10 (22%)	3 (6%)	32 (72%)



The optimistic theme was characterized by positive expectations about the future. These participants said that their optimism helped them cope with uncertain outcomes. It was most common among inflexible optimists (76%), with smaller numbers among flexible optimists (39%), flexible pessimists (34%), and inflexible pessimists (15%). This theme was occasionally accompanied by magical thinking, e.g., “I believe...that something good will happen if I think positive.”

The defensive-pessimistic theme was characterized by a deliberately setting expectations low so as not to be disappointed, e.g., “I usually try to set my expectations low because it's always nice to be pleasantly surprised.” One common statement that emerged for the defensive pessimistic theme was a sentiment of “hope for the best, prepare for the worst” (one participant stated this verbatim). It was most common among flexible pessimists (41%), with smaller numbers among flexible optimists (18%), inflexible pessimists (15%), and inflexible optimists (8%).

The “mixed” theme was characterized by a mix of pessimistic and optimistic beliefs. It was common among flexible pessimists (28%) and flexible optimists (21%), and rarer among inflexible optimists (9%) and inflexible pessimists (5%). Participants endorsing this theme often emphasized their neutrality or equanimity in the face of such an event. Participants often qualified their response by saying that their optimism or pessimism would depend on their familiarity or confidence with the event, e.g., “If I feel fairly confident in the event, I would be optimistic... If it is an event I'm not familiar with, than I usually am pessimistic.”

The pessimistic theme was most common among inflexible pessimists (72%), with smaller amounts among flexible pessimists (22%), inflexible optimists (6%), and no

occurrences among flexible optimists. This theme was characterized by negative expectations about the future, but unlike the defensive pessimistic theme, participants did not express this a strategic lowering of expectations to prevent possible disappointment, e.g., “I am highly pessimistic about the future event being negative.”

**Question 5:** “When something happens that far exceeds your expectations, how does this affect your expectations of the future?”

Most of the respondents completed this item ( $n = 235$ , 95%). An additional 21 responses were discarded because they were too brief (a simple yes/no) or were not relevant. This left 214 responses, which was composed of 65 flexible optimists, 52 flexible pessimists, 56 inflexible optimists, and 41 inflexible pessimists. Several themes emerged for this question, including: “shift toward optimism”, “defensive pessimism” and “no change in expectations”. These results were summarized in Table 21.

Table 21

*Frequencies and percentages for each theme for Question 5*

Themes	Flexible optimists	Flexible pessimists	Inflexible optimists	Inflexible pessimists
Shift toward optimism	33 (51%)	17 (32%)	27 (48%)	10 (25%)
Defensive pessimism	5 (8%)	10 (19%)	1 (2%)	11 (28%)
No change in expectations	16 (25%)	11 (20%)	13 (23%)	12 (29%)

Many participants expressed a shift toward optimism as a consequence of a very positive event. In many cases, these participants thought that it would lead to other good things (e.g., “It makes me feel more excited for the future, like more good things will keep happening”). This theme was most common among flexible optimists (51%) and inflexible optimists (48%); though it was also quite common among flexible pessimists (32%) and inflexible pessimists (25%).

Some participants reported that such a rare event would have no effect on their expectations. These participants stated that although such a positive outcome improved their mood and gave them a “big confidence boost”, it would not make them more optimistic. A few (mostly inflexible pessimists) shrugged it off, attributing such good fortune to luck or other people, e.g., “must of [sic] been luck... or something someone did to help.” This theme was widely endorsed; 29% of inflexible pessimists, 25% of flexible optimists, 23% of inflexible optimists, and 20% of flexible pessimists expressed this theme.

Other participants indicated that they did not raise their expectations to prevent getting their hopes up too much. As expressed by one participant, “In the past, high grades or outstanding feedback has made me so confident that I could even get cocky...I would study less for the second midterm if I did really well on the first midterm because I didn’t think I needed to study as much. I got too confident and then had to pay for it later when I had a bad mark on my second midterm from not studying as much”). This theme was most common among inflexible pessimists (28%), and flexible pessimists (19%), and less common among flexible optimists (8%) and inflexible optimists (2%).

**Question 6:** “When you feel in control of the outcome, how does this affect your expectations of the future?”

Most of the respondents completed this item ( $n = 238$ , 96%). An additional 28 responses were discarded because they were too brief (a simple yes/no) or were not relevant. This left 210 responses, which was composed of 65 flexible optimists, 51 flexible pessimists, 53 inflexible optimists, and 41 inflexible pessimists. Several themes emerged: An “optimistic” theme and a “pessimistic” theme. These results were summarized in Table 22.

Table 22

*Frequencies and percentages for each theme for Question 6*

Themes	Flexible optimists	Flexible pessimists	Inflexible optimists	Inflexible pessimists
Optimistic	65 (100%)	45 (88%)	50 (95%)	33 (81%)
Pessimistic	0 (0%)	6 (12%)	3 (5%)	8 (19%)

Participants who expressed optimism said that a sense of control made them feel more confident in a positive outcome. As one participant put it, “I feel more confident and get more done.” As one would expect, the optimistic theme was almost universal among inflexible optimists (95%) and flexible optimists (100%), but was also expressed by most flexible pessimists (88%) and inflexible pessimists (81%).

Participants who expressed pessimism were unaffected by having a sense of control (e.g. “I usually feel like things could still go wrong”). This theme was much rarer than the optimistic theme, even among inflexible pessimists (19%) and flexible pessimists (12%). None of the flexible optimists and only 5% of inflexible optimists expressed this pessimistic theme.

**Question 7:** “When something unusually good or unusually bad happens, how does this affect your expectations of the future?”

Most of the respondents completed this item ( $n = 237$ , 95%). An additional 26 responses were discarded because they were too brief (a simple yes/no) or were not relevant. This left 211 responses, which was composed of 65 flexible optimists, 52 flexible pessimists, 54 inflexible optimists, and 40 inflexible pessimists. In general, the responses to this question were similar to those of Question 5. However, the three major themes that emerged were subtly different: “shift to optimism (but not pessimism)”, “no change”, and “pessimistic”. These results were summarized in Table 23.

Table 23

*Frequencies and percentages for each theme for Question 7*

Themes	Flexible optimists	Flexible pessimists	Inflexible optimists	Inflexible pessimists
Shift to optimism	18 (28%)	13 (25%)	21 (39%)	4 (11%)
No change	38 (58%)	13 (25%)	22 (41%)	7 (18%)
Pessimistic	10 (15%)	19 (37%)	5 (9%)	25 (62%)



Some participants said that regardless of how good or bad the event, their expectations would remain unchanged. This theme was endorsed by 58% of flexible optimists (as one flexible optimist put it, “It doesn't usually affect my expectation for the future”). Forty-one percent of inflexible optimists, 25% of flexible pessimists and 18% of inflexible pessimists also expressed this theme in their responses.

Other participants said that a positive, but not a negative event, would change their expectations, e.g., “If it is something unusually good my expectations tend to increase for the future; however if it is something bad they may decrease but not to same scale.” This theme was most common among inflexible optimists (39%) and flexible optimists (28%). However, about one quarter flexible pessimists also expressed this theme (though only 11% of inflexible pessimists expressed this theme).

A third group of participants expressed a pessimistic attitude even in the face of positive events, e.g. “I expect that good things won't last for long and when very bad things happen I feel hopeless and like I cannot reach my expectations anymore.” This theme was especially prevalent among inflexible pessimists (62%), though 37% of flexible pessimists also expressed this theme. Fifteen percent of flexible optimists and nine percent of inflexible optimists expressed pessimism.

### **Brief Discussion**

The above findings demonstrate that both expectancy flexibility and optimism were related to many indices of psychological and physical well-being. These associations between expectancy flexibility and various measures were independent from those of optimism. The findings reported in the previous section are interpreted below.

Expectancy flexibility was positively associated with academic approach coping. This finding is consistent with the idea of flexibility promoting preparedness. People who scored high on expectancy flexibility may be more apt to change their behaviour to achieve their desired future (or avoid a negative alternative future). By engaging in approach coping, it is plausible that students may be better prepared for exams and graded assignments.

In terms of health outcomes, expectancy flexibility was negatively related to substance use and positively related to social health. These findings suggested that individuals who are more flexible may consider the negative consequences that excessive engagement in substance use might have. Meanwhile, individuals scoring high on expectancy flexibility were more likely to engage in positive social activities.

Expectancy flexibility was also related to less problem gambling. This suggested that, consistent with predictions, having flexible expectations allows people to disengage when persistence is a bad strategy. Expectancy flexibility was also associated with several subscales on the ASICS. The positive association with General Academic Skills suggests that individuals scoring high on flexibility are more likely to have better study skills; this is not unusual, given that flexibility is thought to motivate people into taking anticipatory action. This was consistent with the association between expectancy flexibility and confidence. Perhaps their confidence comes from the ability of flexible people to be prepared, and this sense of preparedness gives them a sense of self-assurance, despite higher levels of anxiety (the negative association between expectancy flexibility and the lack of anxiety subscale means higher scores on expectancy flexibility were associated with higher levels of anxiety). Given expectancy flexibility's association

with defensive pessimism, this association was not surprising. Although anxiety is an unpleasant emotion and is considered a clinical disorder in its extreme, anxiety need not be unhealthy and at mild levels could motivate students to engage in proactive behaviour (Raffety, Smith, & Ptacek, 1997). Lastly, the positive association with External Motivation suggested that individuals scoring high in expectancy flexibility are motivated by extrinsic rewards (i.e. grades).

Unlike expectancy flexibility, there is already an extensive literature base on optimism. Thus, the findings for optimism can be compared and contrasted with past findings. These correlations between optimism and the other study measures were largely consistent with those of previous studies, though there were a few new findings. These comparisons are described in the section below.

Optimism was positively correlated with several ASICS subscales, including Confidence, Personal adjustment, Self-regulation, Socializing, and Lack of Anxiety subscales. This was consistent with previous research that has shown that optimists have greater confidence (Grove & Heard, 1997), better personal adjustment (Chemers, Hu, & Garcia, 2001), better self-regulation (Carver & Scheier, 2001), and have less anxiety (Scheier et al., 1994). The finding that optimists were less likely to engage in negative socializing was unexpected, and suggests that some pessimists may engage in partying as a form of self-handicapping (Graham & Williams, 2009). However, null findings for the other five subscales (i.e. Career Decidedness, Skills, Instructor Efficacy, Internal, and External) contradicted previous findings suggesting that optimism was related to career decision-making self-efficacy and both intrinsic and extrinsic forms of motivation (Creed, Patton, & Bartrum, 2002; Hoekman, McCormick, & Barnett, 2005). The lack of

association between optimism and perceived instructor efficacy was unsurprising, considering that optimism has little conceptual relationship to the perceived efficacy and competence of others.

Optimism's positive association with cognitive flexibility and approach coping and negative association with avoidance coping suggests that the optimists engaged in healthier coping styles than did pessimists. This was consistent with previous findings for optimism and coping (Carver et al., 1989; Scheier et al., 1986).

Optimism's positive association with the substance use subscale of the MHBI (because this scale is reverse-scored this means that more optimism was associated with less substance use) suggested that optimism may have a buffering effect against substance use, consistent with the findings of other studies (Carvajal, Clair, Nash, & Evans, 1998). This finding, however, contradicted studies suggesting that unrealistic optimism may be related to negative experiences related to alcohol (Dillard, Midboe, & Klein, 2009). Optimism was also positively associated with the Social and Stress subscales of the MHBI, indicating that optimists had better social health and lower stress than pessimists. This was consistent with previous literature suggesting that optimists are more likely to seek social support and have less stress than pessimists (Brissette, Scheier, & Carver, 2002).

Because no association between optimism and problem gambling was found, there was a lack of support for the first model. This contradicts previous findings, suggesting that optimism would be associated with problematic gambling behaviours (Gibson & Sanbonmatsu, 2004). However, because Gibson and Sanbonmatsu did not employ a comprehensive measure of problem gambling in their study, it was uncertain

whether the findings of the present study contradict their findings. Because of the lack of association, no further analyses were conducted.

The lack of support for a moderating effect for the second model was unexpected. The lack of an interaction contradicts the results of prior studies suggesting an association between invulnerability and health/risk behaviours and between health/risk behaviours and optimism (Lapsley & Hill, 2010; Ravert et al., 2009; Ravert & Zimet, 2009). However, no known studies have used this moderational model before. It is possible that invulnerability does not moderate the relationship between optimism and health behaviours.

There was limited support for the third model. Full mediational effects were found for academic approach coping on the association between optimism and both self-regulation and socialization, and a partial mediation effect for academic approach coping on the association between optimism and confidence. This was consistent with previous findings suggesting that optimism's effects on academic success can be explained by academic approach coping (Chemers et al., 2001). It is plausible that optimists were more apt to engage in approach coping in academic situations. This in turn may increase self-regulation and boost confidence, while reducing activities that may potentially inhibit academic performance, like excessive partying.

Qualitative analysis of the open-ended questions generally supported the hypothesis that expectancy flexibility was associated with shifts in expectations. However, shifts were not always seen, particularly for events perceived as uniquely positive or negative. Flexible optimists were the most likely to modify their expectations in the face of negative feedback. This observed shift in expectations may have been an

effort to reduce disappointment (van Dijk et al., 2003). Flexible pessimists showed a similar pattern of expectation shifts. Lastly, both inflexible optimists and pessimists tended to maintain their expectations regardless of the context. That is, inflexible optimists remained positive in light of negative events and inflexible pessimists remained negative in light of positive events.

### **General Discussion**

The findings of these studies generally supported the validity of the EFS scale and associated hypotheses. Yet, one should exercise cautious optimism about this new measure, because some of the hypotheses were not supported. Consistent with previous research on defensive pessimism, lowering one's expectations may have value as a strategic form of coping, and ought not to be perceived as merely being a symptom of hopelessness. Furthermore, these findings lend support to the existence of the construct that Seligman calls "flexible optimism." The findings of Study 3 suggest that people do shift their expectations under some circumstances. Consistent with hypotheses, these shifts appear to be related to receiving negative feedback. Bracing for potentially negative situations may help people to be better prepared for them when they occur. Maintaining unrealistic optimism in such situations may do more harm than good.

The first aim of this study, which was to extend past research to investigate whether there are some contexts in which optimism is disadvantageous, found no support for the purported negative effects of optimism. Instead, the associations between optimism and positive outcomes (including the lack of negative outcomes) were either positive or non-significant. This suggests one of two things: either the negative effects of optimism are limited or the sample used was not sensitive to finding such negative

effects. In the latter case, perhaps negative effects of optimism would have been evident in a sample of problem gamblers or alcoholics.

The second aim was to determine whether expectancy flexibility adds incremental validity to the prediction of outcomes above and beyond that of optimism. Expectancy flexibility was associated with several positive outcomes, including greater academic approach coping, social health, general academic skills, and academic confidence, and less substance use and problem gambling. Notably, optimism was not associated with general academic skills or with problem gambling. Thus, it is fair to say that expectancy flexibility had incremental validity.

Three models were tested in Study 4. Unfortunately, for the most part, the results did not support the hypotheses. There was no support for the first model because no association between optimism and problem gambling was found. There was also no support for a moderational effect of expectancy flexibility on the association between optimism and health behaviours. There was, however, limited support for the hypothesis that academic approach coping would mediate the association between optimism and several aspects of academic success, including self-regulation, socialization, and confidence.

This study had several limitations which limit the interpretability of the findings. First, studies 1, 2, and 4 used a cross-sectional, correlational design. This means that (like previous studies) causality cannot be inferred. It is possible that optimism is the outcome of good health or positive coping, to name a few examples. Another possibility is that a third variable explains these relationships.

Another limitation involves sampling. This study employed a general sample of university students, who were disproportionately young and female. This is particularly relevant for the gambling measures. Most individuals in the sample had little experience with gambling. A sample of people who have more gambling experience (not necessarily problem gamblers) may have been a better choice for testing the hypothesis that expectancy flexibility would be inversely related with problem gambling.

Another set of limitations concerned the EFS scale itself. Its internal consistency reliability, while in the acceptable range, was relatively low (ideally, Cronbach's  $\alpha$  should be greater than .80). The low reliability may have attenuated some of the correlations. Additionally, no data were collected on the test-retest reliability of the EFS, which could have been used to demonstrate the temporal stability of the construct. That being said, the EFS demonstrated good convergent and discriminant validity. More refinement of the EFS may be necessary to better capture the nature of the expectancy flexibility construct.

Despite these limitations, the findings of the present study have important implications for future research. Of particular interest would be an examination the effects of flexible optimism in a population of individuals diagnosed as having a gambling addiction. Some of the hypotheses regarding gambling were not supported in this sample; this could be attributed to the low base rate of problem gambling in the general population of university students (Gainsbury, Russell, & Blaszczynski, 2014; Lesieur et al., 1991). Similarly, the effects of expectancy flexibility on health would be better tested using a large population of middle-aged and older adults studied over a period of several years. With sufficient time and funding, such a study could be undertaken, but this is beyond the scope of this paper.



Another interesting line of inquiry would be to test whether there are cross-cultural differences in expectancy flexibility. Research from the United States suggests that Caucasian Americans are generally more optimistic than other racial and ethnic groups. For example, Chang (1996) found that Asian Americans were more pessimistic, but not less optimistic, than Caucasian Americans, and no difference in measures of positive and negative affect was found between the two groups. This somewhat contradictory finding could be explained by expectancy flexibility; perhaps people of Asian ancestry are more pessimistic, but also more flexible, than Caucasians living in North America. Similarly, researchers ought to examine whether expectancy flexibility has differing effects based on age. This was not possible in the present study due to the restricted age range associated with university student samples; however, research suggests that associations between optimism and affect differ by age (Palgi, Shrira, Ben-Ezra, Cohen-Fridel, & Bodner, 2011). It is possible that similar patterns exist for expectancy flexibility.

The findings of the present study also have applied value for interventions. Current optimism-promoting interventions are potentially flawed. The most common optimism-boosting intervention is the “best possible self” intervention, which typically involves instructing individuals to imagine an ideal future and to think about goals that they would like to attain. There are two potential problems with this type of intervention. First, there is very little research to suggest that optimism-boosting interventions create long-term changes in optimism. Malouff and Schutte (2017) found that studies of optimism-promoting interventions that collected outcome data within a day of the end of the intervention had more than twice the effect size of studies that collected data more

than one day after the intervention commenced. It is plausible that changes in optimism as a result of these interventions are only short-term. Worse yet, if individuals fail to realize their best possible selves, do they fall back into despair? Second, it is possible that optimism interventions could make individuals maladaptively and inflexibly optimistic. Replacing pessimism with a superficial optimism may do more harm than good: individuals may become more prone to taking unnecessary risks in order to achieve their goals. Lastly, attempts to reduce *unrealistic* optimism have fared poorly. Interventions to reduce unrealistic optimism have been mostly unsuccessful in changing behaviour (Weinstein & Klein, 1995). It is reasonable to speculate that these interventions may make individuals defensive or they may simply lapse into bad habits.

It may be more prudent to recommend cultivating flexible optimism, while emphasizing that lowering expectations may be preferable in some contexts. Potentially, researchers could develop interventions boosting expectancy flexibility alongside optimism. A particularly fruitful use of such interventions would be in circumstances where a constant optimism may not be beneficial. Judging by the findings of the present study, expectancy flexibility interventions could be particularly useful in increasing academic confidence and skills, and reducing problem gambling. Interventions that promote expectancy flexibility could be used to treat problem gambling by dampening some of the unrealistically optimistic expectations that some gamblers may have (Gibson & Sanbonmatsu, 2004).

Expectancy flexibility interventions would likely take different forms depending on the age of the individuals targeted by the intervention. Interventions developed for young adult and adolescent populations might address drug and alcohol abuse, sexual

health (e.g. condom and birth control use), and academic skills. In older populations, interventions could be developed to reduce the risk of severe health conditions. Such interventions could promote taking preventive action against health threats, including eating well, getting sufficient exercise, quitting smoking, and obtaining regular health screening (e.g. mammograms, prostate exams, colonoscopies). People who are inflexibly optimistic might be prone to ignoring or discounting important health cues and warnings (Norem & Chang, 2001), while those who are inflexibly pessimistic might tend towards despair and apathy about their health. Promoting flexibility could reduce these disparate barriers to better health in both populations. Interventions could even be developed for young children as well, similar to what has been developed for optimism (Seligman, 2007). For example, children could be shown how to temper their expectations in order to deal with potential disappointment and to remain optimistic in the face of negative outcomes.

The findings of the present study may be of relevance to clinicians. Clients who manifest with depressive or anxious symptoms may be prone to extreme inflexible pessimism and may benefit from being more flexible in their expectations. It may be more effective to help these clients to become more flexible, rather than trying to replace their pessimism with optimism. Although no single diagnosis corresponds to extreme inflexible optimism (there is no such thing as clinical optimism, though perhaps there ought to be), I speculate that people diagnosed with addictive disorders or bipolar disorder may be at high risk. Inflexible optimism may also be in part a defensive reaction against extreme pessimism. For inflexibly optimistic clients, a dose of reality may be beneficial, as is often emphasized in cognitive-behavioural approaches.

Expectancy flexibility could also be applied to organizational contexts. Extending the findings of Hmieleski and Baron (2009), perhaps expectancy flexibility could dissuade businesses from making risky decisions. In social contexts, expectancy flexibility may promote “big optimism” (Peterson, 2000), the collective optimism of groups. Social movements, to an extent, depend on the optimism of group members. Extreme pessimism often leads to apathy, while extreme optimism may cause disappointment if the movement initially fails in its objectives. Expectancy flexibility may help social movements succeed by reducing apathy, but not raising expectations so high that they lead to disappointment in the face of failure. This raises the possibility that expectancy flexibility may be related to resilience or self-efficacy.

In conclusion, the findings of the present study provide tentative support for the notion that expectancy flexibility can have beneficial effects. Individuals who can flexibly adjust their expectations may be better able to cope with challenging situations in ways that those who express blind optimism cannot. Pessimism may occasionally be beneficial, even if optimism feels better in the short-run. Occasionally, we must “have the courage to endure pessimism” (Seligman, 1991, p. 292).

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## APPENDICES

### **Appendix A** Letter of Information



#### LETTER OF INFORMATION FOR CONSENT TO PARTICIPATE IN RESEARCH

Title of Study: Student Health and Well-being Study

You are asked to participate in a research study conducted by Mr. Phillip Ianni and Dr. Kathryn Lafreniere, from the Psychology Department at the University of Windsor. The data collected from this study will contribute to Mr. Ianni's dissertation. This research will be conducted under the supervision of Dr. Lafreniere. If you have any questions or concerns about the research, please feel free to contact the principal investigator, Phillip Ianni, Psychology Dept., University of Windsor. Phone: (519) 253-3000 ext. 2233, email: ianni1@uwindsor.ca or the faculty supervisor: Dr. Kathryn Lafreniere, Psychology Dept., University of Windsor. Phone: (519) 253-3000 ext. 2233, email: lafren1@uwindsor.ca

#### PURPOSE OF THE STUDY

This study will examine the relationships between several personality measures and several indices of well-being (health, gambling behaviour, and academic success).

#### PROCEDURES

If you volunteer to participate in this study, you will be asked to: Go to the survey by clicking on the link at the end of this form. The survey will involve a number of different sections that ask about your personality tendencies, particularly your expectations about the future. You will also be asked to provide some background information about yourself. It is expected that it will take no more than 60 minutes to complete the questionnaire, including the time it takes to read this consent form and get started.

#### POTENTIAL RISKS AND DISCOMFORTS

This research involves minimal risk to you. However, if you feel uncomfortable answering some of the questions, you are free to skip them.

#### POTENTIAL BENEFITS TO PARTICIPANTS AND/OR TO SOCIETY

Participating in this study will allow you to experience research in the area of personality, which may be useful for you if you will conduct research or read about research in this area in the future. Your participation is important, since findings from research studies such as this one contribute to scientific knowledge about the design of personality tests.

#### COMPENSATION FOR PARTICIPATION

Participants will receive 1 bonus point for up to 60 minutes of participation towards the Psychology Participant Pool, if registered in the pool and enrolled in one or more eligible courses. You will not receive payment for your participation.

#### CONFIDENTIALITY

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission. Your questionnaire responses will be stored separately from your identifying information, and will be grouped with other people's responses so that your identifying information will never be linked with the data that you provide. All the information you provide will be stored on a secure, password-protected computer that will only be accessed by the researchers.

#### PARTICIPATION AND WITHDRAWAL

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you don't want to answer and still be in the study. The investigator may withdraw you from this research if circumstances rise which warrant doing so. You can remove yourself at any time during the study before completion by discontinuing your participation and exiting your browser. However, if you discontinue your participation in the study by exiting your browser, you will not be eligible to receive credit for participation. You can choose to skip questions and complete the survey and still be eligible to receive credit for your participation. You can withdraw up to the point of submitting your survey data. You cannot withdraw after you have submitted your data.

#### FEEDBACK OF THE RESULTS OF THIS STUDY TO THE PARTICIPANTS

The findings for this research study will be analyzed by September 1, 2016. Once the results are analyzed, a summary of the findings of this study will be posted on the Research Ethics Board website. Web address: [www.uwindsor.ca/reb/study-results](http://www.uwindsor.ca/reb/study-results) Date when results are available: September 1, 2016

#### SUBSEQUENT USE OF DATA

These data may be used in subsequent studies, in publications and in presentations.

#### RIGHTS OF RESEARCH PARTICIPANTS

If you have questions regarding your rights as a research participant, contact: Research Ethics Coordinator, University of Windsor, Windsor, Ontario N9B 3P4; Telephone: 519-253-3000, ext. 3948; e-mail: [ethics@uwindsor.ca](mailto:ethics@uwindsor.ca)

Please click the button below "I agree to participate" in order to continue to the survey.

I agree to participate

I do not wish to participate

PLEASE PRINT A COPY OF THIS FORM AND KEEP IT FOR YOUR RECORDS (you can use your browser's 'Print' option to print this page)

**Appendix B**  
Academic Coping Strategies Scale (ACSS)

Think about a time when you received a low grade on an important exam, significantly lower than what you usually get. Indicate below how often you used each strategy.

1	2	3	4	5
Almost never	Hardly ever	Sometimes	Often	Almost always

1. I tried to stay calm
2. I talked to another student for emotional support
3. I left the problem situation altogether
4. I got other peoples' perspective of the problem
5. I talked to a friend from outside school, or a family member, for specific advice on how to solve the problem
6. I tried to find out what I did wrong
7. I avoided talking to anyone about the problem
8. I used drugs or alcohol
9. I tried to gain control over the problem
10. I thought about hurting myself
11. I talked to a professor/supervisor for specific advice on how to solve the problem
12. I drew on my past experiences to help me solve the problem
13. I engaged in physical activity or exercise
14. I gave up
15. I hid my feelings from others, keeping my feelings to myself
16. I wished that I was more capable of dealing with the problem situation
17. I told myself the problem isn't that important
18. I ignored the problem
19. I expressed my emotions to someone
20. I thought positively about the problem
21. I brainstormed a variety of possible solutions to the problem
22. I gathered additional information about the problem, finding out more about the problem
23. I tried to learn something from the experience
24. I withdrew from other people
25. I put forth more effort into developing skills to master the problem
26. I tried to learn from my mistakes
27. I engaged in activities to distract myself from the problem (reading, watching a movie, watching TV, listening to music)
28. I tell myself that everything will be all right
29. I adjust my priorities
30. I talked to a friend from outside school, or a family member, for emotional support
31. I got advice from someone who has had the same problem
32. I denied that the problem exists
33. I expressed my emotions by crying

34. I kept a sense of humor about the problem
35. I avoided people or things that reminded me of the problem
36. I tried to think about the problem carefully before acting
37. I spent time with someone I care about
38. I did nothing about the problem
39. I wished that the problem would go away on its own
40. I was persistent in trying to solve or fix the problem
41. I set specific goals for solving the problem
42. I hoped that the problem would fix itself
43. I tried to avoid thinking about the problem
44. I thought of something good that will come from the problem situation
45. I created a specific plan of action for solving the problem
46. I worked hard to solve the problem
47. I asked questions about the problem
48. I hoped for the best
49. I accepted responsibility for the problem
50. I talked to a professor/supervisor for emotional support
51. I blamed others for the problem
52. I talked to someone about my feelings
53. I blamed myself for the problem
54. I got angry about the problem
55. I talked to another student for specific advice on how to solve the problem
56. I accepted that I can't do anything about the problem



**Appendix C**  
Adolescent Invulnerability Scale (AIS)

How well do the following statements describe you? Rate each statement below:

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

1. I'm unlikely to be injured in an accident.
2. My feelings don't get hurt.
3. Nothing bad will happen to me when I go to a place by myself.
4. Nothing seems to bother me.
5. There are times when I think I am indestructible.
6. I could probably drink and drive without getting into an accident.
7. My feelings are easily hurt.
8. I'm unlikely to get hurt if I did a dangerous thing.
9. I'm a fragile person.
10. Special problems, like getting an illness or disease, are not likely to happen to me.
11. Nothing can harm me.
12. The problems that happen to people my age are unlikely to happen to me.
13. The opinions of other people just don't bother me.
14. What people say about me has no effect on me at all.
15. Driving very fast wouldn't be dangerous if I were driving.
16. I feel very badly when I know there is gossip about me.
17. Taking safety precautions is far more important for other people than it is for me.
18. Safety rules do not apply to me.
19. It is just impossible for people to hurt my feelings.
20. It is not necessary for me to worry about being injured or harmed.

**Appendix D**

## Academic Success Inventory for College Students (ASICS).

When responding the statements below, think about one class that has been the hardest or most difficult for you within the past year.

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Slightly Agree	Neutral	Slightly Agree	Agree	Strongly Agree

1. I studied a lot for this class
2. The instructor really motivated me to do well
3. I am certain about what occupation I want after I graduate
4. I need to do well to get a good job later on
5. I was able to pick out the main, important ideas in lectures and on tests
6. Personal problems kept me from doing well
7. It was easy to keep my mind from wandering
8. Sometimes I partied when I should have been studying
9. I got satisfaction from learning new material
10. I was nervous for tests even when I was well prepared
11. I tried everything I could to do well in this class
12. I was disappointed in the quality of the instructor
13. I know what I want to do after I graduate
14. This class is important to my future success
15. I felt confident I could understand even the most difficult material
16. I would have done much better if I didn't have to deal with other problems in my life
17. I had an easy time concentrating
18. My grades suffered because of my active social life
19. I enjoyed the challenge of just learning for learning's sake
20. Studying for this class made me anxious
21. I worked really hard in this class
22. I did poorly because the instructor was not effective
23. I am certain that my major is a good fit for me
24. In the future I will use the material I learned in this class
25. I was pretty sure I could get an A or a B
26. I had some personal difficulties that affected my performance
27. I paid attention in this class
28. I got behind because I spent too much time partying or hanging out with friends
29. I worked hard because I wanted to understand the material
30. I got anxious when taking tests in this class
31. I kept on a good schedule in this class
32. What I learned I learned on my own
33. I'm having a hard time choosing a major
34. This class will be very useful to me in my career

35. I knew that if I worked hard I could do well
36. I had a hard time concentrating
37. Sometimes my drinking behaviour interfered with my studying
38. This class was very interesting to me
39. I made good use of tools, such as planners, calendars and/or organizers
40. I would have done better if the instructor were better
41. I was pretty sure I would get a good grade.
42. I got easily distracted in this class
43. I skipped this class a lot
44. I enjoyed attending lectures in this class
45. I used goal setting as a strategy in this class
46. I felt pretty confident in my skills and abilities
47. This class was very boring to me
48. I was good at setting specific homework goals
49. I was organized

**Appendix E**  
Expectancy Flexibility Scale (Study 4)

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

1. My predictions about the future change when I get new information.
2. There are times when I choose to be optimistic.
3. I am optimistic some of the time.
4. I stubbornly refuse to change my expectations.
5. I only raise my expectations when I can imagine things going well.
6. I change my expectations when I receive information I did not expect.
7. I lower my expectations when future outcomes are beyond my control.
8. There is a place for both optimism and pessimism.
9. There are times when I choose to be pessimistic.
10. I try to hope for the best but prepare for the worst.
11. I am usually optimistic unless the potential 'downside' is relatively likely or serious.
12. I adjust my expectations for the future in order to cope with the situation.
13. I try to think about all possible outcomes when I think about the future.
14. When thinking about the future, I try to be as realistic as possible.

**Appendix F**  
Gamblers' Beliefs Questionnaire (GBQ)

Read each of the following statements carefully. Rate to what extent you agree or disagree with each statement.

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Slightly Agree	Neutral	Slightly Agree	Agree	Strongly Agree

1. I think of gambling as a challenge
2. My knowledge and skill in gambling contribute to the likelihood that I will make money
3. My choices or actions affect the game on which I am betting
4. If I am gambling and losing, I should continue because I don't want to miss a win
5. I should keep track of previous winning bets so that I can figure out how I should bet in the future
6. When I am gambling, "near misses" or times when I almost win remind me that if I keep playing I will win
7. Gambling is more than just luck.
8. My gambling wins are evidence that I have skill and knowledge related to gambling
9. I have a "lucky" technique that I use when I gamble
10. In the long run, I will win more money than I will lose gambling
11. Even though I may be losing with my gambling strategy or plan, I must maintain that strategy or plan because I know it will eventually come through for me
12. There are certain things I do when I am betting (for example, tapping a certain number of times, holding a lucky coin in my hand, crossing my fingers, etc.) which increase the chances that I will win
13. If I lose money gambling, I should try to win it back.
14. Those who don't gamble much don't understand that gambling success requires dedication and a willingness to invest some money
15. Where I get money to gamble doesn't matter because I will win and pay it back
16. I am pretty accurate at predicting when a "win" will occur
17. Gambling is the best way for me to experience excitement.
18. If I continue to gamble, it will eventually pay off and I will make money
19. I have more skills and knowledge related to gambling than most people who gamble
20. When I lose at gambling, my losses are not as bad if I don't tell my loved ones
21. I should keep the same bet even when it hasn't come up lately because it is bound to win

**Appendix G**  
Life Orientation Test-Revised (LOT-R)

Please be as honest and accurate as you can throughout. Try not to let your response to one statement influence your responses to other statements. There are no "correct" or "incorrect" answers. Answer according to your own feelings, rather than how you think "most people" would answer.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

1. In uncertain times, I usually expect the best.
2. It's easy for me to relax.
3. If something can go wrong for me, it will.
4. I'm always optimistic about my future.
5. I enjoy my friends a lot.
6. It's important for me to keep busy.
7. I hardly ever expect things to go my way.
8. I don't get upset too easily.
9. I rarely count on good things happening to me.
10. Overall, I expect more good things to happen to me than bad.

**Appendix H**  
**Multidimensional Health Behavior Inventory (MHBI)**

The following statements describe a broad range of health-related actions or behaviours that you may or may not do. Read each statement and indicate how often you do this behaviour.

1	2	3	4	5
Never	Rarely	Sometimes	Often	Almost Always

1. Take time for relaxation every day
2. Limit red meat in your diet every day
3. Plan for home fire escape
4. Limit fat in your diet every day
5. Check your home for safety
6. Eat red meat more than two times a week
7. Eat fewer calories to lose weight
8. Use biodegradable cleaning products
9. Ask for help from friends when you are in need
10. Avoid being exposed to second hand smoke (someone else smoking at home or at work)
11. Eat at least one serving or more of red meat on most days (including beef, pork, ham, bacon, lamb, liver and lunch meat not made from poultry).
12. Use drugs to get high or feel better
13. Test home smoke detector every month
14. Recycle newspaper, glass, and/or other products
15. Discuss problems/concerns with someone close to you
16. Limit sugar in your diet every day
17. Take part in social groups, functions, or classes
18. Eat non-fat or low-fat dairy products
19. Do something good for yourself every day
20. Choose foods with whole grains every day, for example, whole wheat bread instead of white, brown rice instead of white, etc.
21. Check your cholesterol level at least once a year
22. Seek health information
23. Get adequate sleep every day
24. Check your blood pressure at least twice a year
25. Read food and medicine labels before purchasing or consuming the product
26. Question your health care provider or seek a second opinion
27. Maintain a first aid kit
28. Get 7-8 hours sleep every day
29. Praise people easily
30. Spend time with close friends

31. Participate in recreational physical activities as walking, biking, dancing or sports regularly at least twice a week
32. Limit salt in your diet every day
33. Smoke cigarettes every day
34. Drink 5 or more alcoholic beverages (beer, wine, wine coolers, or hard liquor) on one occasion.
35. Check condition of equipment (Household, recreational, automotive) regularly
36. Limit intake of "sweets" in your diet
37. Do stretching exercises every day
38. Fix things as needed
39. Obtain a regular health check-up when you are not sick
40. Avoid using tobacco products (cigarettes, cigars, pipe chewing tobacco, or snuff)
41. Control stress in your life.
42. Exercise vigorously for at least 20 minutes 3 times a week
43. Keep daily stress levels low
44. Avoid drinking and driving
45. Increase your physical activity to lose weight
46. Run, jog, or swim for exercise at least 3 times per week
47. Drink one or more alcoholic beverages (beer, wine, wine coolers, or hard liquor) every day
48. Use touch appropriately (hold someone's hand or give someone a hug).
49. Discuss health concerns with health resource person
50. Report unusual or persistent symptoms to a health care provider
51. Drink alcohol and take medications at the same time
52. Limit your intake of alcoholic beverages (beer, wine, wine coolers, or hard liquor).
53. Keep emergency numbers by the telephone (poison control, rescue squad, fire department)
54. Participate in health care programs (health education, health fair, screening).
55. Eat at least one or more servings of the following items every day: chips, candy bars, cake, donuts, pastries, muffins, cookies, ice cream, pudding, chocolate
56. Drink alcohol and drive



**Appendix I**  
**Problem Gambling Severity Index (PGSI)**

Thinking about the last 12 months...

0	1	2	3
Never	Sometimes	Often	Most of the time

1. Have you bet more than you could really afford to lose?
2. Still thinking about the last 12 months, have you needed to gamble with larger amounts of money to get the same feeling of excitement?
3. When you gambled, did you go back another day to try to win back the money you lost?
4. Have you borrowed money or sold anything to get money to gamble?
5. Have you felt that you might have a problem with gambling?
6. Has gambling caused you any health problems, including stress or anxiety?
7. Have people criticized your betting or told you that you had a gambling problem, regardless of whether or not you thought it was true?
8. Has your gambling caused any financial problems for you or your household?
9. Have you felt guilty about the way you gamble or what happens when you gamble?

**Appendix J**  
Demographics

What is your gender? \_\_\_\_\_

What is your age? \_\_\_\_\_

To what racial or ethnic group do you belong?

White/ European

Black/ African/ Caribbean

Latin/ South American

East Asian/ Chinese/ Japanese

South Asian/ Indian/ Pakistani

Aboriginal/ Metis/ First Nations

Middle Eastern

Bi/ Multiracial (please specify) \_\_\_\_\_

Other (please specify) \_\_\_\_\_

**Year of Study**

1st year

2nd year

3rd year

4th year

5th year and beyond

Thank you for completing this questionnaire. Your participation is very valuable to us! To receive your Psychology Participant Pool bonus point, please check the box below and click SUBMIT. You will be taken to a separate page to enter your name, so that your personal information is not connected with your questionnaire responses. The study findings will be posted on the REB website at: [www.uwindsor.ca/reb/study-results](http://www.uwindsor.ca/reb/study-results)

Please take me to the bonus point page

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