Emotion Regulation in Adolescence: A Mechanism in the Development of Internalizing Symptoms

By

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Abstract

The overarching goal of the current dissertation was to examine how emotion regulation (ER) underlies the development of anxious and depressive symptoms in adolescence. Each study took a comprehensive and longitudinal approach. Study 1 described spontaneous, real-time individual differences in regulation of emotional responses (experience, expression, and arousal) in adolescence and the relation with internalizing symptoms across one year. Using latent profile analysis, five different patterns of emotional responses to social stress were identified and were related to different ER habits and internalizing symptoms. The majority of adolescents had similar emotional responses one year later; however, changes in avoidance, depressive symptoms, and trait shame were related to transitions from lower emotional responses to higher emotional responses. Study 2 used a multiple mediation model to test the relations between shame and internalizing symptoms (depression and social anxiety) across two years. The relations between shame and internalizing symptoms were bidirectional. The ER habits of avoidance and suppression (measured in the laboratory) mediated relations between shame and increased internalizing symptoms, whereas rumination was more central to understanding how social anxiety symptoms led to further shame. Study 3 involved delivering a 6-week training on improving ER (e.g., improving awareness, reappraisal, acceptance, and mindfulness, and reducing avoidance, suppression, and rumination) for first year university students aged 17 to 20 years. Results indicated some significant positive change in ER across the training sessions for the training group, whereas there was no significant change in the comparison group. However, there were no significant positive effects on ER or internalizing symptoms at the post or follow-up assessments. In fact, anxiety was elevated in the training group in relation to the comparison group at the follow-up. Emotional responses and ER habits were strongly related to internalizing symptoms across all studies. Results and future directions were discussed in
relation to four major themes in adolescent emotion regulation research: (1) ER habits in adolescence, (2) ER across time, (3) Goal-Based ER, and (4) ER in social contexts.
Statement of Co-Authorship

All of the manuscripts included in this dissertation were the collaborative effort of Dianna Lanteigne, the doctoral candidate, and her supervisor Dr. Tom Hollenstein. Ms. Lanteigne was responsible for the conceptualization, design, data collection, analysis, and preparation of all of the manuscripts. Dr. Hollenstein supervised and assisted with all aspects of the research process and thus was included as a co-author on all three manuscripts. Part of the first manuscript was conducted in conjunction with Dr. Jennifer Eastabrook’s dissertation on alexithymia, thus she was included as a co-author on the first manuscript. Ms. Kalee De France assisted with the design and implementation of the third study, and thus she is included as a co-author for the third manuscript.
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Chapter 1: General Introduction
**General Introduction**

Adolescence is a developmental period in which there is a sharp increase in mood and anxiety symptoms (Birmaher et al., 1996). Internalizing symptoms cause distress and functional impairment and they are related to a higher incidence of mood and anxiety disorders later in life (Lewinsohn, Solomon, Seeley, & Zeiss, 2000; Pine, Cohen, Cohen, & Brook, 1999; Rueter, Scaramella, Wallace & Conger, 1999). For over a century, one of the prevailing frameworks for understanding adolescent emotional development was that adolescence is a normative time of “storm and stress” (Arnett, 1999; Hollenstein & Lougheed, 2013). Indeed, adolescents have more negative emotions, more intense emotions, and greater emotional fluctuations in comparison to other age groups (Arnett, 1999; Larson & Ham, 1993). However, not all adolescents develop depressive or anxious disorders - there are substantial individual differences in the development of internalizing problems (Rueter et al., 1999). The question is, why?

There is a growing consensus that emotion regulation (ER), the process of inhibiting or modifying feelings, bodily arousal, and expressive behavior, is central to understanding individual differences in the development of internalizing disorders (Gross & Muñoz, 1995; Hollenstein & Lougheed, 2013; Mennin, Heimberg, Turk, & Fresco, 2002; Silvers et al., 2012). While general emotion dysregulation - deficits in the ability to modify and inhibit emotions according to one’s goals - is clearly associated with internalizing symptoms (e.g., Aldao et al., 2010; Gross & Muñoz, 1995), individual differences in the nature and timing of the dysregulation are not well understood (Hollenstein & Lougheed, 2013). The overarching goal of this dissertation was to examine ER as a mechanism in the development of internalizing symptoms. I will first outline a general theoretical framework for understanding emotion dysregulation and internalizing symptoms, describe empirical
evidence for the framework, and then I will explain how each of the three studies in this dissertation expands current knowledge.

**Theoretical Foundations**

There are many models and conceptual articles that describe how emotion dysregulation leads to internalizing symptoms. There are four that were most influential to this dissertation: the Process Model of Emotion Regulation (Gross 1998; Gross & John, 2003; Sheppes, Suri, & Gross, 2015), the Emotion Dysregulation Model of Mood and Anxiety Disorders (Hofmann, Sawyer, Fang, & Asnaani, 2012), the Response Styles Theory (Nolen-Hoeksema, 2000), and the transdiagnostic and developmental conceptual foundations from a number a research groups (e.g., Aldao & Nolen-Hoeksema, 2010; Barlow, Allen, & Choate, 2004; Calkins, 1994; Cole, Martin, & Dennis, 2004; Gratz & Roemer, 2004; Mennin, Heimberg, Fresco, & Turk, 2005; Wilamowksa et al., 2010; Yap, Allen, & Sheeber, 2007). The common elements of these models, emotional responses, emotion regulation habits, and internalizing symptoms, formed the general framework used in this dissertation. The general framework included many of the different ER habits from multiple models in order to provide a comprehensive and integrated approach to studying individual differences in ER.

Emotions are defined by cascading changes in feelings, physiological arousal, and expressive behavior (e.g., Butler et al., 2003; Childs & de Wit, 2006; Ekman, Levenson, & Friesen, 1983). Individuals approach their emotional responses in different ways that inhibit, modify, or intensify their emotions (Eisenberg & Spinrad, 2004; Thompson, 1994). Over time, these approaches to
emotional responses become habitual and can be referred to as ER habits.\(^1\) ER habits can include observing and identifying emotions as they arise (Awareness; Gratz & Roemer, 2004; Bagby, Taylor, & Parker, 1993), taking a non-judgmental stance (Acceptance; Gratz & Roemer, 2004), trying to think about a situation in a different way (Cognitive Reappraisal; Gross & John, 2003), trying to change the outward emotional expression (Expressive Suppression; Gross & John, 2003), avoiding thoughts or behavior associated with the emotion (Avoidance; Ottenbreit & Dobson, 2004), or repeating negative thoughts associated with the emotion (Rumination; Nolen-Hoeksema, 2012). ER habits are not mutually exclusive (Egloff, Schmukle, Burns, & Schwerdtfeger, 2006). Multiple ER habits could be co-occurring in any given situation. For example, when an adolescent encounters an uncomfortable situation such as an argument with a friend, she might lack awareness about her emotions, try to suppress her outward expression of emotion, and try to avoid further discomfort by leaving the room.

ER habits can be adaptive or maladaptive depending on the context and goals of the individual (Tamir, 2015; Thompson, 1994). Maladaptive ER occurs when the individual is not able to change the emotional response in the desired way or when long-term costs are greater than short-term gains (Kring & Sloan, 2009). For example, avoidance of giving a presentation in class may reduce an adolescent’s negative emotion in the short-term, however it interferes with the adolescent’s goal of receiving a passing grade for the course. The individual may not be able to change her response because her ER habit is ineffective or implemented poorly (e.g., poor timing, inappropriate context). Adaptive ER occurs when the individual successfully implements a habit that is appropriate for the context and fits with long-term goals (Kring & Sloan, 2009). While the type of

\(^1\) Note that I refer to the various ER approaches as ER habits rather than ER strategies because ‘strategies’ seems to imply conscious application when often times the process occurs unconsciously (Mauss, Bunge, & Gross, 2007; Watkins & Nolen-Hoeksema, 2014).
ER habit needs to match the context, correlational studies with adolescents and adults have often shown that lower levels of awareness, acceptance, and reappraisal and higher levels of avoidance, suppression, and rumination are related to internalizing problems (e.g., Aldao, Nolen-Hoeksema, & Schweizer, 2010; Gratz & Roemer, 2004; Neumann, van Lier, Gratz, & Koot, 2009; Nolen-Hoeksema, 2012; Ottenbreit & Dobson, 2004). These results have likely been found because certain ER habits may produce detrimental effects if they are applied frequently or used exclusively in comparison to other habits (Bonanno, Papa, Lalande, Westphal, & Coifman, 2004).

Over time, maladaptive ER leads to more frequent or more intense states of negative emotion and less frequent and intense states of positive emotion (Hofmann et al., 2012). These emotional changes underlie anxious and depressive symptoms (Hofmann et al., 2012). Both anxiety and depression are associated with increased negative emotion, and decreased positive emotion, although, reductions in positive emotion may be more prominent with depressive symptoms (Hoffman et al., 2012). Thus, the general framework for the relationship between ER and internalizing symptoms can be summarized in Figure 1.

Figure 1. Theoretical framework for emotion regulation leading to internalizing symptoms.
The success of ER habits in any given emotional situation can be inferred from the response patterns among the three major emotion response domains: experience (self-reported feelings), expression (as observed by others), and physiological arousal (Hastings, et al., 2009; Hollenstein & Lanteigne, 2014; Mauss et al., 2005; Smith et al., 2011). Higher responses across all domains (high experience, high expression, and high arousal) suggest emotion is the least regulated; moderate responses across all domains or an uneven profile of elevations (high experience, low expression, high arousal) suggest emotion is partially regulated; and lower responses across all domains suggest emotion is successfully regulated (Lanteigne, Flynn, Eastabrook, & Hollenstein, 2014; Zalewski et al., 2011a). Theoretically, those with higher responses across all domains are more dysregulated, and are more likely to develop internalizing problems.

**Empirical Evidence for Relations between Emotion Regulation and Internalizing Symptoms**

There are four highly relevant lines of research that support the relation between emotion regulation and internalizing symptoms: (1) Correlational research between ER and internalizing symptoms, (2) Variable-centered approaches in experimental research on emotional responses, (3) Person-centered approaches to emotional responses and relations to socioemotional outcomes, and (4) Examinations of ER as a mechanism of change in therapy.

**Correlational research.** The first line of research involves correlations between ER habits and internalizing symptoms. A recent meta-analysis with the majority of studies from college student samples (although a few child, adolescent, and adult samples were also included) showed that ER habits such as avoidance, suppression, and rumination, are positively related to depression and anxiety symptoms, whereas ER habits such as reappraisal and acceptance are negatively related (Aldao, Nolen-Hoeksema, & Schweizer, 2010). The effect sizes were large for rumination, medium to large for avoidance and suppression, and small to medium for reappraisal and acceptance (Aldao,
et al., 2010). The effect sizes for rumination, avoidance, and reappraisal were larger for depression and anxiety than for other problems such as substance use and eating disorders (Aldao et al., 2010).

While fewer research studies have used adolescent samples, several studies seem to report findings similar to the Aldao and colleagues (2010) meta-analysis. Low emotional awareness factors (e.g., emotion identification, differentiating emotion, verbal sharing of emotion, bodily awareness) were positively related to depression and social anxiety symptoms (Rieffe, Oosterveld, Miers, Terwogt, & Ly, 2008) and low emotional awareness predicted increases in negative emotion in adolescents across 1 year (Ciarrochi, Heaven, & Supavadeprasit, 2008). Reappraisal was negatively associated with depressive symptoms and general emotional and behavioural problems in adolescence (Flouri & Mavorveli, 2013; Garnefski, Legerstee, Kraaij, van den Kommer, & Teerds, 2002). Emotional non-acceptance was correlated positively with symptoms of depression, anxiety, suicidal ideation, and eating disorder symptoms (Neumann, van Lier, Gratz, & Koot, 2009; Weinberg & Klonsky, 2009). Avoidance in adolescence predicted increases in emotional and behavioural problems (Cooper, Wood, Orcutt, & Albino, 2003; Flouri & Mavorveli, 2013). Rumination was positively correlated with symptoms of depression and anxiety (Garnefski et al., 2002), predicted the development of depressive symptoms (Burwell & Shirk, 2007), and predicted new onset of Major Depressive Disorder (Nolen-Hoeksema et al., 2007). Expressive suppression has also been associated with higher depressive symptoms and social anxiety in adolescence (Betts, Gullone, & Allen, 2009; Gullone & Taffe, 2011; Lanteigne et al., 2014). One study found that depressive symptoms led to greater suppression rather than the reverse in mid adolescence (Larsen et al., 2013). Suppression may be a response to depressive symptoms, as the adolescent attempts to avoid further interpersonal problems with parents or peers (Larsen et al., 2013). Thus, while most researchers have predicted that poor ER leads to internalizing symptoms, the bidirectional
relationship needs consideration. Additionally, studies measuring multiple ER habits are important for understanding relative associations and how the habits may work together.

Few studies have taken an emotion-specific approach to emotion regulation or examined the mediating impact of ER on internalizing symptoms across developmental periods (Berking & Wupperman, 2012). Understanding how different types of dysregulated emotion (e.g., fear, sadness, shame) are related to different ER habits will help define transdiagnostic models of psychopathology (Aldao, 2012; Berking & Wupperman, 2012). Regulation of self-evaluative emotions, specifically shame, has been theorized to play a central role in internalizing symptoms (Muris & Meesters, 2014; Tangney & Dearing, 2002), and empirical longitudinal research has found that shame predicts internalizing symptoms (De Rubeis & Hollenstein, 2009; Mills et al., 2015). Some preliminary research shows that ER habits such as avoidance and cognitive reappraisal mediate the relations between pre-disposing factors (e.g., shame, stress, genetic vulnerability) and internalizing outcomes (De Rubeis & Hollenstein, 2009; Ford, Mauss, Troy, Smolen, & Hankin, 2014). Shame-proneness in childhood and adolescence was also associated with higher suppression and lower general regulation of negative emotion (Hughes, Gullone, & Watson, 2011). Shame is related to both internalizing symptoms and ER habits and a comprehensive longitudinal investigation would help to clarify how shame, multiple ER habits, and internalizing symptoms are related across adolescent development.

**Variable-centered, experimental approaches to emotional responses.** Experimental research has described how implementing specific habits changes emotional responses across experiential, expressive, and physiological domains. A common technique involves giving participants instructions to evoke ER habits (e.g., reappraise, suppress, accept) during an emotional elicitation in a laboratory (e.g., delivering a speech, watching a disgusting video). The majority of this research has been conducted with adults, however there was one study that compared
experimentally induced rumination, acceptance, distancing and positive reappraisal on self-reported negative emotional experience in adolescence (Rood, Roelofs, Bogels, & Arntz, 2012). Reappraisal was the only habit that showed significant decreases in negative emotional experience and increases in positive emotional experience, although the manipulation check did not show that the acceptance instructions were effective (Rood et al., 2012).

In adult samples, there have been studies measuring experimentally induced ER habits on the three domains. Reappraisal has been found to decrease all domains, whereas suppression has been found to reduce expression, increase arousal, and induce no change on negative emotional experience (e.g., Gross, 1998b; Campbell-Sills & Barlow, 2007). Acceptance in comparison, is similar to reappraisal in regulating arousal, however it is not different than suppression in terms of failing to down-regulate the experience of negative emotion (Hofmann, Heering, Sawyer, & Asnaani, 2009). Another study found that while acceptance did not regulate the experience of negative emotion, it increased general expressivity and enhanced the experience of positive emotion (Dan-Glauser & Gross, 2015). Lack of differences in acceptance for negative emotion may be because it may have an impact later on in the emotion regulation process, or because the instructions in these experiments were too brief for participants to effectively implement (Aldao et al., 2010; Dan-Glauser & Gross, 2015). Experimentally induced rumination has been less commonly studied, however some evidence suggests that rumination leads to a continuation of an emotional state immediately after an emotional elicitation in comparison to distraction (e.g., more thoughts, higher negative emotional experience, higher arousal, and higher probability to behave in accordance with the negative emotional state; Pedersen et al., 2011).

Awareness has not been experimentally evoked in the same way as the other ER habits. However, an fMRI study showed that labeling negative emotion diminishes the responses associated
with negative emotion in the amygdala and other limbic regions (Lieberman et al., 2007) which suggests that attending to emotions and preliminary cognitive processing has a regulatory effect on negative emotional experience. Furthermore, an experimental elicitation of a sample with low awareness in comparison to high awareness (e.g., high and low alexithymia), showed that those with low awareness have higher negative emotional experience and higher expression, but no differences in physiological arousal (Eastabrook, Lanteigne, & Hollenstein, 2013).

Avoidance during an emotional elicitation has also not been tested experimentally as it would involve not completing an emotional elicitation – however an experimental elicitation of emotion with those high and low in emotional avoidance showed that those with high emotional avoidance had higher negative emotional experience and lower perceived efficacy of regulation, but no differences in physiological arousal (Feldner, Zvolensky, Eifert, & Spira, 2003). This research supports the idea that avoidance may be aimed at relieving short-term negative emotion, however it may maintain or promote negative emotion when the individual subsequently encounters a similar situation in which they are not able to escape (Spira, Zvolensky, Eifert, & Feldner, 2004).

Researchers have started looking more closely at spontaneous regulation of emotional responses during experimental inductions rather than instructing the use of a particular strategy. This generally involves eliciting an emotional response in a laboratory and measuring the three emotion response domains. Without being given any instructions on how to regulate, individuals report selecting and implementing several habits throughout the course of an emotion induction (Aldao & Nolen-Hoeksema, 2012). A study with adults found that higher reappraisal was associated with lower experience, expression, and arousal and higher suppression was related to lower expression, higher arousal, and unrelated to experience (Egloff, Schmukle, Burns, & Schwerdtfeger, 2006). Thus, the impact on of ER habit use on the emotion domains in Egloff and colleagues’ study were
similar to studies of instructed ER habit use described in the previous section (e.g., Gross, 1998b; Campbell-Sills & Barlow, 2007). Another study found that participants who had recovered from depression were more likely to spontaneously choose suppression to regulate their emotional responses than never-depressed controls, however they were able to reappraise when they were given instructions (Ehring et al., 2010).

**Person-centered approaches to emotional responses and socioemotional outcomes.**

Another approach to examining emotion regulation is to measure the spontaneous regulation (experience, arousal, expression) during an emotion elicitation and to examine the meaning of individual differences among the emotional responses within-person. Rather than taking a variable-centered approach (e.g., taking an average of the emotional experience of the sample and linking it to an ER habit), person-centered approaches focus on describing the interactions among the emotion response domains (e.g., patterns of experience, arousal, and expression) and linking the individual response patterns to ER habits and socioemotional outcomes. While it was common for one or two emotion response domains to be measured in individual difference studies, it is rare in the literature for the three domains to be measured, and even more rare for them to be analyzed in a person-centered way. A few studies have examined how emotional responses are regulated in real-time laboratory emotion inductions in childhood and adolescent samples and linked them to socioemotional outcomes (Lanteigne, Flynn, Eastabrook, & Hollenstein, 2014; Smith, Hubbard, & Laurenceau, 2011; Zalewski, Lengua, Wilson, Trancik, & Bazinet, 2011a; Zalewski, Lengua, Wilson, Trancik, & Bazinet, 2011b). These studies used laboratory tasks to induce emotions such as shame, anxiety, frustration, and anger and then grouped responses across the emotion response domains. In most of the studies, a group that is minimally reactive across all domains (low experience, low expression, low arousal) emerged and was generally related to better socioemotional
functioning. Conversely, a group that is moderately to highly reactive in at least two of the three domains was related to worse socioemotional functioning. Two of the studies also highlighted how certain less regulated real-time profiles were related to higher habitual reappraisal and lower habitual suppression and avoidance (Lanteigne et al., 2014; Zalewski et al., 2011b). Study 1 in this dissertation used a larger adolescent sample and comprehensive measurement of ER habits and internalizing symptoms to further illuminate regulatory patterns that are dysfunctional versus those that are normative.

**Emotion regulation as a mechanism of change in therapy.** Given relations of ER with internalizing symptoms, and the knowledge that ER habits can be changed, there is a growing interest in examining emotion regulation as a mechanism of change in therapy. ER has been found to mediate changes in popular treatments such as cognitive-behavioral therapy and dialectical behavior therapy (Aldao, Jazaieri, Goldin, & Gross, 2014; Gratz, Weiss, & Tull, 2015). Three research groups have been developing protocols that specifically train ER in a therapeutic context. Emotion Regulation Group Therapy (ERGT) has been successful with modifying ER in women with Borderline Personality Disorder (Gratz & Gunderson, 2006; Gratz & Tull, 2011; Gratz, Tull, & Levy, 2014). Affect Regulation Training (ART) has been successful at modifying ER in treatment for adults with Major Depressive Disorder (Radkovsky, McArdle, Bockting, & Berking, 2014). Finally, the Unified Protocol for Emotional Disorders (UP) has been successful at treating a variety of emotional disorders (e.g., MDD, GAD, Panic Disorder, Social Anxiety Disorder) in adolescents and adults (Allen, Tsao, Seidman, Ehrenreich-May, & Zeltzer, 2012; Bullis et al., 2015; Ellard et al., 2010; Ehrenreich, Goldstein, Wright, & Barlow, 2009; Fairchione et al., 2012; Norton & Barrera, 2012; Wilamowska et al., 2010). Recent research using the UP found that changes in ER habits such
as reappraisal and mindfulness mediated changes in internalizing symptoms (Boswell, Anderson, & Barlow, 2014).

While researchers have suggested that internalizing symptoms could be prevented using ER-focused programs (Sheppes et al., 2015; Berking & Wupperman, 2012), there are not many published examples of ER programs being applied in a prevention or training context. One study used a German language protocol called the Integrated Training of Emotional Competencies to reduce emotional problems in an at-risk sample (Berking, Meier, & Wupperman, 2010), which provided preliminary evidence that ER-targeted prevention may be beneficial.

**Summary of empirical research.** Past research has found that different emotion regulation habits in adolescence and adulthood were related to internalizing symptoms. Many studies were cross-sectional and did not measure a broad spectrum of ER habits. Also, the majority of the studies took a general approach to regulation rather than differentiating the type of emotion (e.g., sadness, shame, fear, anger), which could be differentially related to internalizing symptoms. In addition to correlations between ER and internalizing symptoms, research with adults has found that experimentally manipulating ER habits can impact emotional responses. The level of success of the ER habit can be inferred from the real-time pattern of emotional responses. Now that we have an idea of how ER habits generally affect emotional responses, it is possible to examine how individual emotional response patterns arise spontaneously and how these patterns relate to the reported use of different habits and internalizing symptoms in adolescence. Finally, the purpose of learning about individual differences in ER and the relations with internalizing symptoms across time is so that prevention and intervention initiatives can be informed. ER has been proposed to be a mechanism of change in treatment and prevention studies, which needs to be investigated further.
Current Dissertation

Prominent researchers in the ER field have identified many directions to expand our knowledge, including taking a person-centered, individual differences approaches to describe changes in regulation across the adolescent years, and using novel ER interventions to prevent clinical disorders (Berking & Wupperman, 2012; Sheppes et al., 2015). In the literature to date, it has been rare for the three emotion domains to be examined in one study (Hollenstein & Lanteigne, 2014), or for multiple ER habits to be measured (Lougheed & Hollenstein, 2012). To understand typical development and atypical development (internalizing symptoms), we must understand what adolescents are feeling and doing in the moments when regulation is especially needed. How are adolescents responding during social stress, and how are their responses related to what they say they do to manage their emotions? Comparing real-time emotional responses (actual regulation) to ER habits (attempted regulation) and internalizing symptoms (overall outcome), would provide information about the relative success and adaptiveness of the habit as well as explore the typicality or atypicality of ER within a specific developmental stage.

The importance behind understanding the impact of ER on internalizing symptoms is that we can focus our therapeutic attempts to change certain ER habits. Through instruction, adolescents with difficulty regulating their emotions could develop new habits, which would theoretically lower their internalizing symptoms. Attempting to change maladaptive ER habits, a factor that is common among many types of emotional disorders, may be more effective and time-efficient than targeting disorder-specific symptoms (Barlow et al., 2003).

Description of the Three Studies

Study 1 was an extension of my Master’s thesis in which I examined patterns of emotional response among experience (subjective feelings), expression (facial affect and body posture), and
physiological arousal (heart rate) during a social stressor (shame induction). Specific response patterns among emotion domains were related to specific ER habits and internalizing symptoms. Study 1 involved repeating the social stressor with the same adolescent sample one year later to evaluate within-person change in emotional responding, ER habits, and internalizing symptoms. Change or consistency in response patterns and their relations to ER habits and internalizing symptoms provided insight into both normative development and developmental psychopathology.

Study 2 was an investigation of whether specific ER habits mediated increases in internalizing symptoms for shame-prone adolescents across two years. Shame is a painful emotion associated with negative, generalized self-appraisals (Tangney & Dearing, 2002). While experiencing some amount of shame is normative and can facilitate appropriate social behavior, if it is intense and persistent it can lead to the development of psychopathology (De Rubeis & Hollenstein, 2009; Reimer, 1996). Certain ER habits may explain how the experience of shame can lead to depressive symptoms. For instance, habitually inhibiting the expression of emotion (expressive suppression), thinking about past emotions or situations over and over (rumination), and avoidance of thoughts and behaviors could increase the risk of developing internalizing symptoms. Working from the same sample as study 1, adolescents’ shame, internalizing symptoms, and ER habits were measured at three time points, each one-year apart. The stressor that they completed at time 2 included a behavioral measure of expressive suppression specifically during social evaluation, in addition to a traditional measure of expressive suppression via self-report. A mediation model was used to highlight how these ER habits contribute to the development of psychopathology in shame-prone adolescents. Furthermore, reversal of the direction of the model also addressed how internalizing symptoms influenced the use of emotion regulation habits.
Study 3 was the capstone of the dissertation. It used the knowledge gained about relations among ER habits and internalizing symptoms, and went one step further by attempting to enhance ER and evaluate the change in internalizing symptoms. Instead of inducing a social stressor in the laboratory, we used an adolescent sample that was undergoing what is known to be a significant life stressor – the transition to university. The transition to university is a stressful period given dramatic changes in social support systems, academic demand, and daily living which can lead to the development of internalizing symptoms in vulnerable students (Parker, Hogan, Eastabrook, Oke, & Wood, 2006; Sher & Rutledge, 2007). The psychological well being of students decreases substantially from pre-university to first semester (Bewick, Koutsopoulou, Miles, Slaa, & Barkham, 2010) thus first year students are all experiencing a stressor in which their regulation skills will be relied on. Adolescent first year undergraduates were screened for ER difficulties during their first month at university. Individuals that met the inclusion criteria were invited to participate in a 6-week training group informed by the transdiagnostic treatment for emotional disorders – which purports to work by targeting underlying ER habits. The ER habits of the training and comparison group were measured at nine time points. There were three comprehensive ER measurements at pre-training, post-training, and at a 6-month follow-up, as well as six weekly ER measurements. It was expected that ER habits would change in the training group and that ER habits would mediate changes seen in internalizing symptoms.

**Summary of Objectives**

The three studies in the current dissertation were designed to make novel contributions to the ER literature by taking comprehensive, longitudinal, emotion-specific, and person-centered approaches. The overall objectives of the three studies in this dissertation were to (1) describe spontaneous, real-time individual differences in regulation of emotional responses in adolescence,
(2) link the stability and change of real-time, actual regulation with self-reported ER habits and internalizing symptoms, (3) explore the mediating effects of ER on the relation between the emotion of shame and internalizing symptoms across two years of adolescent development, and (4) train adolescents to regulate more effectively and test for changes in internalizing symptoms.
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Chapter 2: Longitudinal Patterns of Adolescents’ Emotional Experience, Arousal, and Expression during Social Stress

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Abstract
The current study examined how patterns of adolescent emotional responding across three domains (experience, arousal, and expression) related to emotion regulation habits and internalizing symptoms over one year. Adolescents’ (aged 12-16 at Time 1; N=142) responses were recorded during a socially stressful speech task designed to elicit shame. The speech task was repeated with the same participants one year later and, on average, elicited similar levels of reactions from participants. Latent profile analysis revealed five distinct profiles of emotional responding, which were stable for the majority of adolescents across both time points. Internalizing symptoms and problematic emotion regulation styles were negatively associated with a Low-Average response group but positively associated in various ways with the other four higher response groups. In comparison to the Low-Average response group, the other response groups had elevations in at least one of experience, expression, or arousal domains. The emotion regulation habit of avoidance was related to transitioning from the Low-Average response group at Time 1 to an elevated response group at Time 2. These results provide a more integrated account of adolescent emotional functioning in socially evaluative contexts and therefore insight into processes occurring during typical adolescent social interactions.

Keywords: Emotion regulation, adolescence, shame, psychophysiology, observational methodology.
Longitudinal Patterns of Adolescents’ Emotional Experience, Arousal, and Expression during Social Stress

Emotion regulation (ER) involves monitoring, evaluating, and modifying emotional responses in order to reach a desired goal (Thompson, 1994). ER can be spontaneous or there can be an effortful attempt to dampen, sustain, or enhance positive or negative emotions (Eisenberg & Spinrad, 2004; Thompson, 1994). From an early age, children learn to manage their emotions through building awareness of their own and others’ reactions, learning strategies to modify their emotions, and practicing strategies through habitual use (Stegge & Terwogt, 2007). Strategies range from simple ones, such as infants changing their gaze (e.g., looking away from a distressing stimuli), or more complex ones, such as children trying to reappraise or think differently about a situation to make themselves feel better (Derryberry & Rothbart, 1988; DeCicco, Solomon, & Dennis, 2012). In addition to monitoring internal processes, children also learn that their displays of emotion are socially relevant (Saarni, 1990). Expressing positive and negative emotions at the appropriate time and intensity help develop positive social bonds (Denham et al., 2003). As children transition into adolescence, social and emotional demands become more intense and complex, overburdening some individuals’ regulatory resources (Kessler et al., 2005).

Across the lifespan, adolescence is perhaps one of the most critical times for ER to be successful or adaptive. Adolescence is marked by heightened emotional intensity, negative emotions, and intense self-conscious emotions such as shame (Arnett, 1999; Reimer, 1996). During adolescence, there are also increases in depressive and anxious symptoms and the onset of internalizing disorders (Pine et al., 1998). The frequency and intensity of the experience of sadness, guilt, and worry are part of the diagnostic criteria for mood and anxiety disorders (American Psychiatric Association, 2013). Difficulty with regulating emotions has been theorized to underlie
depressive and anxious symptoms (e.g., Allen & Sheeber, 2009; Trosper, Buzzella, Bennett, & Ehrenreich, 2009), and many studies show associations between ER difficulty and depressive and anxious symptoms (e.g., Aldao, Nolen-Hoeksema, & Schweizer, 2010; Gratz & Roemer, 2004; Neumann, van Lier, Gratz, & Koot, 2009). Thus, emotion dysregulation in a broad sense is unarguably linked to depressive and anxious symptomatology (e.g., Aldao et al., 2010; Hastings et al., 2009). However, the specific emotional experiences, developmental timing, and mechanisms that link ER difficulties and internalizing symptoms in adolescence are unclear (Gross & Jazaieri, 2014). The focus of the current study was to address some of the gaps in the ER literature by: (1) using person-centered approaches to examine individual differences in emotional responses to social stress (Lougheed & Hollenstein, 2012; Dixon-Gordon, Aldao, & De Los Reyes, 2014), (2) studying the associations among emotional responses, a broad repertoire of ER habits, and internalizing symptoms, and (3) examining longitudinal stability and change.

**Emotions in Social Evaluation Contexts in Adolescence**

Socially evaluative contexts could elicit a variety of emotions (e.g., shame, guilt, embarrassment, pride, anxiety, anger). Many prominent emotion theories stipulate that emotions can be differentiated partly by appraisals or interpretations of the event (e.g., Beck, 2002; Lewis, 2011; Scherer, 1999). For example, shame involves a negative, global evaluation of self, guilt involves a negative evaluation of one’s behavior, and anxiety involves an uncertain threat (Tangney, Miller, Flicker, & Barlow, 1996; Britton, Lissek, Grillon, Norcross, & Pine, 2011). Embarrassment is often thought of as a less intense version of shame that often occurs after physical mishaps (e.g., walking around with toilet paper stuck to one’s shoe; Lewis, 2011; Miller & Tangney, 1994). Due to the intense feeling of worthlessness and global negative self-focus that defines shame, it is thought of as one of the most painful emotional experiences (Lewis, 2011; Tangney & Dearing, 2002).
Adolescents are in a particularly unique stage of development that results in greater experience of shame. Given adolescents’ development of perspective taking and strong desire to be accepted by peers, they can become more sensitive to shame in comparison to earlier in their development (Ollendick & Hirshfeld-Becker, 2002; Reimer, 1996; Simonds et al., 2015). Hence, feeling heightened shame is typical of the adolescent experience (Reimer, 1996). Shame can become problematic if it is felt in a large number of contexts or at levels of intensity that do not match the context (De Rubeis & Hollenstein, 2009). When shame is under regulated it can lead to the development of internalizing symptoms (Mills et al., 2015; Muris & Meesters, 2014). The current study examined emotional responses of adolescents (experience, expression, and arousal) in a socially evaluative context, with a specific focus on shame.

**Person-centered Approaches**

Within every individual, a complex and dynamic emotion system responds to internal and external cues, and the result is a measurable pattern of experience (e.g., cognitions, appraisals), arousal (e.g., autonomic reactivity), and expression (e.g., facial affect, body language); a theoretical combination that is widely accepted among emotion researchers (Ekman, 1992; Frijda, 2009; Gross, 1998; Lazarus, 1991). The emotion domains of experience, arousal, and expression all interact, such that a change in any one domain leads to a change in the other domains (e.g., Butler et al., 2003; Childs & de Wit, 2006; Ekman, Levenson, & Friesen, 1983). Person-centered approaches in comparison to variable-centered approaches allow for the interpretation of response domains as interactive rather than separate. While theory calls for the integration of the three emotion response domains, research to date often has not measured all domains simultaneously, or does not take a person-centered analytic approach.
To illustrate the importance of a person-centered approach, consider three possible types of response patterns that adolescents could have during a stressful situation. Adolescent A might report low distress on a questionnaire (experience), while she displays high distress through her body language (expression) and has elevated physiological reactivity (arousal). Adolescent B might report a moderate amount of distress, show only mild distress in his expression, and have elevated physiological arousal. Adolescent C might have high responses across all domains. Comparing these adolescents on a single domain, or without considering their response pattern, would provide less insight into possible individual differences in regulatory processes, such as awareness, expressive suppression, or the absence of any explicit regulatory strategy. Measuring all three domains and using person-centered analyses allow for greater identification of different regulatory processes occurring in the moment.

**Associations among a Broad Repertoire of ER habits and Internalizing Symptoms**

ER habits are the ways that people tend to manage their emotions. Different ER habits are used to navigate personal and social worlds, such as reappraisal (thinking about an emotional situation differently), or suppression of facial expressions (Gross & John, 2003). ER theorists proposed that response patterns among experience, arousal, and expression change based on the timing of implementation, type of ER habit implemented, and the degree to which implementation is successful (Gross & Jazaieri, 2014). Furthermore, people do not necessarily approach each situation with only one specific habit. In fact, they likely have a repertoire of habits that they can implement selectively across time or in different situations (Lougheed & Hollenstein, 2012). Past research has suggested that there is a relation between different types of ER habits and internalizing symptoms (Aldao et al., 2010; Lougheed & Hollenstein, 2012), thus inclusion of a broad range of habits and symptoms in the current study will help us further understand these relations.
Stability and Change

Adolescence is a developmental period in which many changes are known to occur across physical (e.g., puberty), cognitive (e.g., development of the prefrontal cortex and executive functioning skills), and social (e.g., romantic relationships, peer relationships become more important; Hollenstein & Lougheed, 2013) domains. For these reasons, we might expect to see age-related changes in emotion responses and regulation in adolescence. For example, executive functioning, which helps control both behavioural and emotional responses, develops across adolescence and has implications for successful ER under conditions of high emotional arousal (Albert & Steinberg, 2011; Giedd, 2008; Voon et al., 2014).

Some studies have found age-related changes in ER habits that suggest that mid-adolescence is a risk period for ER difficulty, whereas other studies have found a lack of age differences or different patterns of results. Variable-centered approaches show that adolescents in mid-adolescence report lower use of some ER strategies, such as reappraisal, in comparison to younger or older adolescents (Gullone, Hughes, King, & Tonge, 2010; Gullone & Taffe, 2012; Zimmermann & Iwanski, 2014). These studies suggest, along with studies that show a peak in internalizing symptoms during mid-adolescence (Rawana, Flett, McPhie, Nguyen, & Norwood, 2014) and a decline in positive affect from early to mid-adolescence (Larson, Moneta, Richards, & Wilson, 2002), that mid-adolescence is a risk period for ER difficulty. Other studies have found little evidence of differences in the reported use of ER strategies across early adolescence (Sullivan, Helms, Kliwer, & Goodman, 2008), across early to mid-adolescence (Silk, Steinberg, & Morris, 2003), and comparing young adolescents to adolescents age 15 and over (Voon et al., 2014). One study even found more reported use of ER in 14 year olds in comparison to 11 and 17 year olds (Zeman & Shipman, 1997). It is difficult to compare the results given different study designs,
different self-report measures of ER habits, and analytic approaches (e.g., continuous versus categorical age groups). Thus, while there appears to be some age-related changes in the self-reported use of different ER habits, the relations are not clear and may be further understood by examining success of regulation during actual emotional arousal in addition to reported use of strategies.

While change is an important feature of adolescence, the evidence for stability of emotional responses and regulation within person is also strong. Some factors underlying emotional processes during adolescence are fairly stable. Genetic and early experiences are known to contribute to longstanding individual differences in emotional experience (Chorpita & Barlow, 1998; Diener, Eunkook, Lucas, & Smith, 1999). For example, behavioural inhibition, genotypic variation in the serotonin-transporter-linked polymorphic region, and early childhood neglect or abuse predict internalizing symptoms in adolescents (Hankin, Jenness, Abela, & Smolen, 2011; Kaplow & Widom, 2007; Muris, Meesters, & Spinder, 2003). There are also environmental factors that are stable for some adolescents such as family or school environments (Diener et al., 1999; Kozma, Stone, & Stones, 2000). Family factors that influence ER include observational learning, direct teaching of ER strategies (e.g., emotion coaching; Gottman, Katz & Hooven, 1996), and emotional climate of the family (e.g., parenting style, attachment relationship, expressiveness; Morris, Silk, Steinberg, Myers, & Robinson, 2007). Longitudinal studies on the broader concept of self-regulation (emotion, attention, and behavior control) have shown moderate to high correlations within-person across childhood through early adolescence despite age-related trends for increased regulation with older age (Murphy, Eisenberg, Fabes, Shepard, & Guthrie, 1999; Raffaelli, Crockett, & Shen, 2005).

During adolescence there is likely interplay between longstanding, relatively stable individual differences in emotionality and changes that occur across development due to interactions
with extrinsic and intrinsic factors. There are a wide variety of stressful events that may influence individuals at different times during adolescence. Events that evoke shameful feelings (e.g., rejection from peers, giving presentations or performances, and ending romantic relationships) can be especially painful during the adolescent developmental period because adolescents have a heightened sensitivity to the pain of shame in comparison to other age groups (Reimer, 1996). ER habits such as cognitive reappraisal may moderate the relationships among stress, genetic vulnerability, and internalizing outcomes (Ford, Mauss, Troy, Smolen, & Hankin, 2014). Examining how regulation occurs during repeated stressors as well as a wide variety of regulatory approaches will help elucidate the process of stability and change in ER during adolescence.

**Previous Experimental Research with Child and Adolescent Populations**

Many studies have examined self-regulation or ER habits by self or parent report. In contrast, only a small number of studies have examined the meaningfulness of patterns of among experience, arousal, and expression in child (Smith, Hubbard, & Laurenceau, 2011), preadolescent (Zalewski, Lengua, Wilson, Trancik, & Bazinet, 2011a; Zalewski, Lengua, Wilson, Trancik, & Bazinet, 2011b) and adolescent samples (Lanteigne, Flynn, Eastabrook, & Hollenstein, 2014) during experimental tasks designed to elicit emotions. The results from all of these person-centered studies suggest that different response patterns are associated with ER habits, coping strategies, and social functioning. Outcomes varied among the studies: social preference and overt aggression (Smith et al., 2011), social competence, effortful control, negative appraisals, coping skills, and internalizing and externalizing problems (Zalewski et al., 2011a; Zalewski et al., 2011b), and emotion regulation habits and internalizing symptoms (Lanteigne et al., 2014). In most of the studies, a group that is minimally reactive across all domains emerged and was generally related to better socioemotional functioning. Conversely, a group that is moderately to highly reactive in at least two of the three
domains was related to worse socioemotional functioning. As opposed to groups that are minimally reactive across all domains, or extremely reactive across all domains, these problematic profiles seem to reflect partial regulation. ER habits can be thought of as disrupting the concordant process of extreme reactivity across the domains (Hollenstein & Lanteigne, 2014) – some may be more adaptive or effectively implemented, resulting in fully regulated or partially regulated profiles. Lanteigne et al. (2014), the only adolescent study, specifically examined negative self-conscious emotion in a small sample of girls. Two clusters were identified in the data: (1) Higher experience, higher expression, lower arousal and (2) Lower experience, lower expression, higher arousal. Girls in cluster 1 reported more habitual difficulty with emotion regulation, more expressive suppression, and less cognitive reappraisal. Further exploration of self-conscious emotions with a larger sample of both boys and girls in adolescence could possibly reveal a larger number of patterns and associations with different ER habits.

**Current Study**

We measured the emotional responses of adolescents during a socially stressful speech task at both Time 1 and Time 2, one year later. There were three primary measures: Experience (self-reported state shame), Arousal (heart rate percent change from baseline), and Expression (Shame affect observed from video files). Emotional response patterns among Experience, Arousal, and Expression were calculated using Latent Profile Analysis (Muthén, 2001) at both time points. We also measured a broad range of self-reported ER habits (Reappraisal, Suppression, Avoidance, Lack of Awareness, Non-Acceptance, and Limited Access to Strategies) and internalizing symptoms (Depression, Anxiety, Social Anxiety, Trait Shame).
Relating Response Profiles to a Broad Repertoire of ER habits and Internalizing Symptoms

Building on the previous profiles studies (Lanteigne et al., 2014; Smith et al., 2011; Zalewski et al., 2011a; Zalewski et al., 2011b), we examined emotion response profiles in a large adolescent sample, longitudinally, to allow for a more thorough investigation of the stability of profiles. We expected that there would be at least two meaningful profiles of emotional responses. Furthermore, we examined a broader range of associated regulatory habits and internalizing symptoms.

Response profiles were expected to be associated with a variety of ER habits. Adolescents with certain patterns may use regulation strategies that functionally reduce only one emotion domain (e.g., expressive suppression) whereas those who have low responses across all domains may use other strategies (e.g., cognitive reappraisal, acceptance). Adolescents that can effectively regulate all three domains may also have more awareness of their emotional responses, which is necessary to consciously implement one or more strategies (Barrett, Gross, Conner, & Benvenuto, 2001; Eastabrook, Lanteigne, & Hollenstein, 2013). Furthermore, the strategy of avoidance could lead to a number of changes in the domains. In a context where the adolescent is not able to escape from threat, trying to rely on avoidance as a strategy would likely increase or maintain heightened emotional responses (Borkovec, Alcaine, & Behar, 2004). Similarly, cognitive avoidance, such as trying to push a thought out of mind, often paradoxically leads to a greater focus on the undesirable thought, and likely increase or maintain heightened emotional responses (Campbell-Sills, Barlow, Brown, & Hofmann, 2006; Ottenbreit & Dobson, 2004). Thus, different ER strategies can impact the patterns among the three domains and the current study will examine those relations.

Given past studies, we hypothesized that there would be a group that has a relatively mild reaction to the task, or with only high physiological arousal, which would be positively associated with reappraisal and negatively associated with suppression, avoidance, lack of awareness, non-
acceptance, lack of access to strategies, and internalizing problems. We also hypothesized that there would be a group with a high experience and expression that will be positively associated with suppression, avoidance, lack of awareness, non-acceptance, lack of access to strategies, and internalizing problems, and negatively associated with reappraisal. We expected these associations to be consistent at both time points.

**Stability and Change in Response Profiles**

Our second question was whether the response profiles would be stable within individuals or change over a one-year time period. Reasonably stable individual difference factors related to emotionality and regulation such as temperament, genetics, and family environment may actually lead to high levels of stability across a one-year time frame. At the same time, as adolescence is a period with changes across physical, cognitive, and social domains; some changes in emotional processes could be expected to occur (Hollenstein & Lougheed, 2013). The current study examined stability and change of response profiles and also examined factors associated with change among profiles (e.g., changes in ER habits or internalizing symptoms).

**Method**

**Participants**

A community sample of adolescents ($N = 187$) aged 12.0 to 16.9 years ($M = 13.6, SD = 1.12$) was recruited from a mid-size city in southern Ontario, Canada. Participants were recruited via telephone from a large database of potential children and adolescents that is maintained by the Psychology Department at a local university. Parents of children and adolescents in the database had voluntarily consented to be contacted from researchers at the time of entry into the database, which often occurred at recruitment events (e.g., information fairs, sporting events, daycares). Parents provided consent and adolescents provided assent for participation in the study. After participants
completed each time point of the study and were debriefed they had the explicit opportunity to withdraw from the study by indicating this option on the exit consent form. At Time 1, four participants decided to withdraw their data and thus the data for these participants were immediately deleted. The total number of tested participants with accessible data at Time 1 was 183 but it was only possible to examine the complete speech data (experience, arousal, and expression) of 171 participants due to equipment problems or, in one case, medical reasons that interfered with heart rate measurement. At Time 2, 155 of the possible 171 participants from Time 1 returned to complete the second wave of the study. Of the 155 participants at Time 2, 1 withdrew his/her data, 8 chose not to do the speech, and 4 had incomplete speech data due to equipment problems. Thus, the final sample with complete speech data from both time points was 142, which was used in all reported analyses. The excluded participants were not significantly different from included participants on any Time 1 measures including, sex, age, experience, arousal, expression, ER habits, and internalizing symptoms.

Included participants (N=142, 50.0% Female) were ages 12.0 to 16.4 at Time 1 (M = 13.6, SD = 1.10). Ethnic background, as described by participants were as follows: White (76.1%), Multi-Ethnic (11.3%), Chinese (<1%), Latin American (<1%), Other (1.4%), and Unknown (9.9 %). All participants were fluent in English and 94% indicated that English was their first language. For Time 1, participants were compensated with a $20 gift card to a bookstore and for Time 2 they were compensated with $60 cash. At Time 2 recruitment, participants were told that they would visit the lab to complete a study very similar to the one that they had completed the previous year.

**Laboratory Procedure**

The laboratory procedure was virtually identical for Time 1 and Time 2. The adolescent sat in a comfortable tub chair in a room with obscured video cameras monitored from an adjacent room.
The experimenter explained how to fill out the questionnaires on the computer and emphasized the confidentiality of their answers. They then filled out questionnaires on current self-reported feelings (Baseline Experience), demographics, and socioemotional functioning. Next, physiological sensors were applied to the adolescent by a female experimenter. After a brief period for the participant to relax, the sequence of tasks were: (1) Arousal Baseline (3 Minutes) – sitting quietly with no stimulation; (2) Speech (3 Minutes) – participant was instructed to make a speech as if to their class at school on any topic he/she chose in front of the experimenter; (3) Self-Reported Experience (1 minute) – report of feelings during the speech on Likert scales; (4) Exit Consent – participants completed a second consent form allowing them to withdraw data now that they had completed the lab visit and were debriefed.

**Measures**

**Laboratory measures.**

**Self-Reported Experience.** Each participant rated how he or she felt during the speech using 23 descriptive words (e.g., nervous, happy, embarrassed) on a 10-point Likert scale immediately after delivering the speech. Experience of state shame was a composite made up of the mean of 7 items from this questionnaire. The items were: “During the speech I felt…” worthless, humiliated, small, like a bad person, like I wanted to hide, ashamed, and embarrassed. Items were modified from the State Shame and Guilt Scale, specifically the Shame subscale (Marschall, Sanftner & Tangney, 1994). Experience had good internal consistency (T1: $\alpha = .84$, T2: $\alpha = .90$). To rule out baseline differences, Experience was also measured at baseline before the speech task was introduced (T1: $\alpha = .77$, T2: $\alpha = .82$).

**Physiological Arousal.** The sensors on the participant were connected to a battery pack (TEL100M-C; BioPac Systems, 2000-2005) that sent signals over a cable to an amplifier (MP150;
BioPac Systems, 2000-2005). A computer connected to the amplifier recorded the psychophysiological data using AcqKnowledge 3.9 software (Biopac, 2007). AcqKnowledge 4.1 software (Biopac, 2009) was used in the data cleaning process. Number of heart beats per minute were calculated from the raw ECG signal. To control for Baseline heart rate and examine specifically the change in arousal due to the speech, the primary index of Arousal was the heart rate percent change (Eastabrook et al., 2013; Lanteigne et al., 2014) from baseline to speech: Average heart rate during the speech minus the average heart rate during baseline divided by baseline and multiplied by 100 ([Speech-Baseline]/Baseline]*100).

*Observational coding of Expression.* The Self-Conscious Affect Code (SCAC; Lanteigne, Glozman, & Hollenstein, 2011) was used to code verbal and non-verbal cues of shame at every moment of the video-recorded speeches using The Observer 5.0 software (Noldus Information Technology, 2003). The SCAC codes were formulated from a review article by Keltner & Harker (1998) and cross-cultural research on shame expression (e.g., Tracy & Matsumoto, 2008). Keltner and Harker summarized a variety of expressions that appeared across multiple shame-inductions in a variety of samples. The shame cues from Keltner & Harker (1998) were organized into 7 SCAC codes. SCAC consists of 7 binary codes (i.e., presence versus absence) of shame cues displayed moment-to-moment (Body Tension, Facial Tension, Hiding and Avoiding, Nervous Positive Affect, Silence, Stillness, and Vocal Uncertainty). Each second of the speech corresponded with an integer score of 0 or 1 for each cue. The resulting measurement of the seven cues was continuous and included onset and offsets of the cues. Two teams of three or four student coders achieved high inter-rater reliability for Time 1 and Time 2 across the 20% of overlapping files: Duration (duration-sequence based reliability analysis), T1: $M = 88\%$, T2: $M = 89\%$, frequency agreement (frequency-
sequence based reliability analysis), T1: $M = 78\%$, T2: $M = 78\%$, and frequency kappa, T1: $M = .76$, T2: $M = .76$ (frequency-sequence based reliability analysis).

*Expression* was determined by taking the mean score calculated from the weighted proportional durations at each score level (Glozman, 2008). Expression was calculated according to modifications made by Lanteigne (2011): (1) A level of shame variable was calculated as the sum across all categories at each coded event (i.e., any new combination of the seven categories initiated by a change in one of the categories). The range of possible levels for each coded event was 0 to 6. It was 0 to 6 rather than 0 to 7 because two of the codes (Silence and Vocal Uncertainty) were mutually exclusive; it was impossible for the participant to be both silent and talking with a wavering voice. (2) The proportional duration for each level was calculated by dividing the total duration of each level by the total duration of the speech. (3) Then, the weighted duration of each level was calculated by multiplying each level value by its proportional duration. (4) The SCAC score was created by summing all of the weighted durations as expressed in the formula:

$$\sum_{i=0}^{6} Level_i \left( \frac{Duration_i}{Total \ Duration} \right)$$

Level is the integer result from summing across the six SCAC categories for each of the levels (0 through 6). Higher values of Expression indicated greater expression of shame.

**Questionnaires.**

**Internalizing measures.**

*Depressive Symptoms.* The Beck Depression Inventory II (BDI-II; Beck, Steer & Brown, 1996) is a self-report questionnaire that measures cognitive, affective, and physical symptoms of depression. For each of the 21-items, respondents selected one of four statements that describe the
severity of depressive symptoms during the past two weeks. The scale is from 0 (no depressive symptoms) to 3 (severe depressive symptoms). Two items were excluded (loss of interest in sex and suicidal thoughts). The BDI-II had high internal consistency (T1: $\alpha = .84$, T2: $\alpha = .85$). A mean of all items was calculated so the final score was on a 0-3 scale; higher scores indicated higher Depressive Symptoms.

*Anxiety Symptoms.* The Beck Anxiety Inventory (BAI; Beck, Epstein, Brown & Steer, 1988) is a self-report inventory that measures cognitive and somatic symptoms of anxiety. It consists of 21-items on a four-point scale. Anxiety Symptoms had a high internal consistency (T1: $\alpha = .92$, T2: $\alpha = .90$). A mean of all items was calculated so the final score was on a 0-3 scale; higher scores indicated higher Anxiety Symptoms.

*Social Anxiety Symptoms.* The Social Anxiety Scale for Adolescents Revised Short Form (Myers, Stein, & Aarons, 2002) is a self-report questionnaire measuring symptoms of anxiety in social contexts. Respondents rated each of the 13-items on a five-point scale ranging from “not at all true” to “true all the time”. For example, one item is “I worry that others don’t like me”. Social Anxiety Symptoms had high internal consistency (T1: $\alpha = .90$, T2: $\alpha = .90$). A mean of all items was calculated so that the final score was on a 1-5 scale; higher scores indicated higher Social Anxiety Symptoms.

*Trait Shame.* The Experience of Shame Scale (ESS; Andrews, Qian, & Valentine, 2002) measures the extent to which respondents have experienced the feeling of shame in the past year. For each of the 25 items, respondents indicate their experience of shame on a four-point scale (1= not at all, 4 = very much). For example, one item is “Have you felt ashamed when you said something stupid?” Trait Shame had a high internal consistency (T1: $\alpha = .94$, T2: $\alpha = .94$). The mean of all of
the items was calculated to create the Trait Shame measure; higher scores indicated more frequent experiences of shame.

**Emotion regulation measures.**

**Avoidance.** The Children’s Coping Strategies Checklist (CCSC; Ayers, Sandler, West, & Roosa, 1996) is a self-report measure of how people typically think and act when they are upset about a problem. Respondents select how often they use each of the 43 strategies on a scale from 1 (never) to 4 (most of the time). For example, one item is “try to put it out of my mind”. Only two subscales (4 items each) were included in the current study. A mean of the items for both Cognitive Avoidance and Avoidant Actions subscales were calculated to make an Avoidance construct, which had good internal consistency (T1: $\alpha = .77$, T2: $\alpha = .75$). Higher scores indicated more frequent use of Avoidance.

**Suppression and Reappraisal.** The Emotion Regulation Questionnaire (ERQ; Gross & John, 2003) is a self-report questionnaire with two subscales of ER habits: Expressive Suppression (4 items) and Cognitive Reappraisal (6 items). Expressive Suppression involves reducing, modifying, or inhibiting the outward expression of emotion and Cognitive Reappraisal involves thinking about an emotional situation in a different way. Respondents indicated how much they agree with each statement on a seven-point Likert scale. At Time 1, Cognitive Reappraisal ($\alpha = .78$) had high internal consistency, however Expressive Suppression ($\alpha = .62$) was lower. One item (“I’m careful not to express positive emotion”) was removed in order to improve the internal consistency of Expressive Suppression ($\alpha = .70$). At Time 2, Cognitive Reappraisal ($\alpha = .79$) and Expressive Suppression ($\alpha = .73$) both had good internal consistency without the removal of any items.

**Non-acceptance, Lack of Awareness, and Limited Access to Strategies.** The Difficulties in Emotion Regulation Questionnaire (DERS; Gratz & Roemer, 2004) is a 36-item questionnaire
measuring various aspects of ER. The three subscales used had good internal consistency: Lack of Emotional Awareness (T1: \( \alpha = .87 \), T2: \( \alpha = .87 \)), Non-Acceptance (T1: \( \alpha = .84 \), T2: \( \alpha = .91 \)), and Limited Access to Strategies (T1: \( \alpha = .78 \), T2: \( \alpha = .79 \)). Higher scores on all of the subscales indicated more difficulty with ER (lower emotional awareness, lower acceptance of emotions, and lower access to ER strategies).

**Results**

The data were checked for univariate outliers and extreme values were winsorized to 3 standard deviations from the mean. As some variables were skewed (e.g., Depressive Symptoms, Anxiety Symptoms), bootstrapping was used for all analyses that were completed in IBM SPSS Version 20. Bootstrapping is a non-parametric approach that is ideal when analyzing non-normal sampling distributions (Mooney & Duval, 1993).

**Manipulation Check: Speech Effectiveness**

Before examining stability and change in the profiles, we wanted to ensure that the speech elicited significant emotional responses at both time points. Changes in Experience, Arousal, and Expression were tested at both time points (See Table 1). Paired t-tests showed that Experience and Arousal were significantly elevated from baseline during the speech at both time points. One-sample t-tests showed that Expression was significantly different than the minimum possible score of zero at both time points (there was no baseline measure of Expression). Thus, the speech was effective at eliciting state shame at Time 1 and Time 2.

Three repeated measures ANOVAs were used to test the changes in experience, arousal, and expression from Time 1 to Time 2 (See Table 1). There were no significant differences between Time 1 and Time 2 Experience or Arousal, however Expression was higher at Time 2. Repeating the
speech task elicited reactions within person at similar levels for Experience and Arousal, and at a slightly higher level for Expression.

Table 1

*Changes in Experience, Arousal, and Expression from Baseline to Speech at Time 1 and Time 2*

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<td>M (SD)</td>
<td>Test</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>t-Test</td>
<td></td>
</tr>
<tr>
<td>Experience</td>
<td>1.39</td>
<td>2.55</td>
<td><em>p &lt;.000</em></td>
<td>1.42</td>
<td>2.77</td>
<td><em>p &lt;.000</em></td>
<td><em>p = .14, η^2_p = .02</em></td>
</tr>
<tr>
<td></td>
<td>(.69)</td>
<td>(1.47)</td>
<td><em>d = .81</em></td>
<td>(.76)</td>
<td>(1.81)</td>
<td><em>d = .82</em></td>
<td></td>
</tr>
<tr>
<td>Arousal</td>
<td>76.34</td>
<td>84.82</td>
<td><em>p &lt;.000</em></td>
<td>75.57</td>
<td>84.16</td>
<td><em>p &lt;.000</em></td>
<td><em>p = .55, η^2_p = .003</em></td>
</tr>
<tr>
<td></td>
<td>(10.73)</td>
<td>(12.80)</td>
<td><em>d = 1.00</em></td>
<td>(10.84)</td>
<td>(12.41)</td>
<td><em>d = 1.14</em></td>
<td></td>
</tr>
<tr>
<td>Expression</td>
<td>N/A</td>
<td>1.33</td>
<td><em>p &lt;.000</em></td>
<td>N/A</td>
<td>1.53</td>
<td><em>p &lt; .000</em></td>
<td><em>p = .01, η^2_p = .05</em></td>
</tr>
<tr>
<td></td>
<td>(.77)</td>
<td>1.74</td>
<td><em>d = 1.74</em></td>
<td>(.72)</td>
<td>2.13</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Response Profiles among Experience, Arousal, and Expression**

Response patterns across Experience, Arousal and Expression were grouped using Latent Profile Analysis (LPA) to examine the stability of profiles across Time 1 and Time 2. Time 1 and Time 2 were analyzed simultaneously in the same LPA (i.e., each participant contributed two cases for classification). Latent profile analysis (LPA) using Mplus software (Muthén and Muthén, 2010) was used to detect homogeneous patterns of response across the three domains. Experience, Arousal, and Expression were standardized between-subjects (z-scores) to put the variables on the same scale.
The profile membership allows specification of the particular relationships among the three response measures (e.g., high Arousal, high Experience, and low Expression).

LPA is a person-centred analysis that has advantages over traditional methods (e.g., k-means cluster analysis) because it provides criteria for selecting the best-fitting number of profiles (Smith et al., 2011). Lower values for the Bayesian information criterion (BIC; Schwarz, 1978), sample-size adjusted Bayesian information criterion (SSA BIC, Sclove, 1987), and Akaike information criterion (AIC; Akaike, 1973) indicate better model fit (Nylund, Asparouhov, & Muthén, 2007). Higher entropy values indicate better fit of the participants to the groups (range 0-1; Celeux & Soromenho, 1996). The Vuong-Lo-Mendell-Rubin Likelihood Ratio Test, Adjusted Lo-Mendell-Rubin Likelihood Ratio Test, and Parametric Bootstrapped Likelihood Ratio Test indicate that the model fit is significantly better than a model with one less group (Nylund et al., 2007). Another advantage of LPA is that each participant is assigned a value representing the probability of fit in each profile group (Probability of Classification; POC), allowing for both categorical and continuous variables for analysis.

Consistent with previous research, we decided apriori that models would be run consecutively starting with one group and then increasing by one group until the fit criteria failed to improve or the model failed to converge (Smith et al., 2011; Zalewski et al., 2011a). The majority of the fit criteria were the best with five groups. The five group model had the lowest AIC and SSA BIC and highest Entropy (See Table 2). The Parametric Bootstrapped Likelihood Ratio Test was significant, which is evidence that the five group model was a better fit than the four group model.
Table 2.

*Fit Indices for Latent Profile Analysis using Experience, Arousal, and Expression as Indicators.*

<table>
<thead>
<tr>
<th># of Groups</th>
<th>BIC</th>
<th>SSA BIC</th>
<th>AIC</th>
<th>Entropy</th>
<th>VLMR p-value</th>
<th>Adj. LMR p-value</th>
<th>Para. Boot. p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2351.16</td>
<td>2332.14</td>
<td>2329.27</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>2</td>
<td>2279.15</td>
<td>2247.44</td>
<td>2242.66</td>
<td>0.86</td>
<td>0.0003</td>
<td>0.0004</td>
<td>.000</td>
</tr>
<tr>
<td>3</td>
<td>2259.92</td>
<td>2215.52</td>
<td>2208.83</td>
<td>0.85</td>
<td>0.006</td>
<td>0.007</td>
<td>.000</td>
</tr>
<tr>
<td>4</td>
<td>2263.93</td>
<td>2206.85</td>
<td>2198.25</td>
<td>0.87</td>
<td>0.26</td>
<td>0.28</td>
<td>.000</td>
</tr>
<tr>
<td>5</td>
<td>a 2262.12</td>
<td>2192.36</td>
<td>2181.85</td>
<td>0.89</td>
<td>0.17</td>
<td>0.18</td>
<td>.000</td>
</tr>
</tbody>
</table>


The 6 class solution did not converge.

The five groups (see Figure 1) were labeled according to how their group means for Experience, Arousal, and Expression compared to overall sample means (Low < -1 SD, Low Average = -.99 to -.5 SD, Average = -.5 to .5 SD, High Average = .5 to .99 SD, High > 1 SD). The five groups were labeled as follows: Low Average (low average experience, average arousal, average expression), High Average (high average experience, average arousal, average expression), High Experience (high experience, average arousal, and average expression), High (high experience, high arousal, high-average expression), and High Arousal (average experience, high arousal, average expression). For the profiles at Time 1, there were no significant differences between the number of
boys and girls in each profile, $X^2(4) = 7.99, p = .09$. However, at Time 2, there was a significant difference between genders, $X^2(4) = 13.00, p = .01$. The percentages of boys in each group were: Low Average (58%), High Average (41%), High Experience (43%), High (0%), and High Arousal (14%). As the sample was exactly 50% boys, the Chi-Square results indicated that girls were more likely to fall in the higher response profiles in comparison to boys at Time 2. Age did not differ significantly between profiles at either time point.
Associations with Profiles, ER Habits, and Internalizing Symptoms

The LPA completed in the previous step provides a POC value from 0-1 representing the probability that any given individual could be classified in each of the profiles. For example, if an individual has a POC of .90 for a particular profile group, it means that they fit well in this profile.
group. Bootstrapped correlations were run among POC for each profile and ER habits and internalizing symptoms. At both time points there were significant correlations between the profiles, internalizing symptoms, and ER habits (see Figure 2). ER habits of suppression, reappraisal, and lack of awareness were not correlated with the profile responses and thus are not presented in the figures.
Figure 2. Bootstrapped Pearson Correlations between POC in response profiles, internalizing symptoms, and ER Habits at Time 1 (above) and Time 2 (below). Note. * $p<.05$. 
A summary state space grid (Hollenstein, 2013) was used to examine stability and changes from one profile group at Time 1 to another profile group at Time 2 (see Figure 3). A large proportion (69%) of the participants were categorized into the same profile groups for Time 1 and Time 2 (cells on the diagonal), whereas a smaller proportion (31%) transitioned into a different group at Time 2. To analyze the transitions, the profiles were grouped conceptually based on the stability (Stable versus Transition) and level of response (Low versus High). The Low Average profile group was considered a low response and all of the other profiles were considered high response. Thus the four transition groups were: (1) Low response stable, (2) High response stable, (3) Transition to low response, and (4) Transition to high response.
### Time 1 Profiles

<table>
<thead>
<tr>
<th>Low Average</th>
<th>High Average</th>
<th>High Experience</th>
<th>High</th>
<th>High Arousal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low Stable</strong></td>
<td>.5775%</td>
<td>.0916%</td>
<td>.0211%</td>
<td>.0141%</td>
</tr>
<tr>
<td><strong>Transition to Low</strong></td>
<td>.0211%</td>
<td>.0077%</td>
<td>.0070%</td>
<td>.0070%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>High Average</th>
<th>High Experience</th>
<th>High</th>
<th>High Arousal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Stable</strong></td>
<td>.070%</td>
<td>.070%</td>
<td>.0141%</td>
</tr>
<tr>
<td><strong>Transition to High</strong></td>
<td>.070%</td>
<td>.070%</td>
<td>.0014%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>High</th>
<th>High</th>
<th>High Arousal</th>
</tr>
</thead>
<tbody>
<tr>
<td>.0211%</td>
<td>.0211%</td>
<td>.0211%</td>
</tr>
</tbody>
</table>

**Total**

<table>
<thead>
<tr>
<th>Low Average</th>
<th>High Average</th>
<th>High Experience</th>
<th>High</th>
<th>High Arousal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>.0058%</td>
<td>.0034%</td>
<td>.0012%</td>
<td>.0007%</td>
</tr>
</tbody>
</table>
Figure 3. State space grid used to visualize stability and change. The number of individuals that remained in the same profile group for Time 1 and Time 2 are located in the diagonal boxes from bottom left to top right.
Profile Transition, Emotion Regulation Habits, and Internalizing Symptoms

ER differences between stable individuals and those that transitioned were tested using six ANCOVAs, one for each ER habit. Stability/Transition grouping was the independent variable. ER habits at Time 2 were the dependent variables (Avoidance, Suppression, Reappraisal, Non-acceptance, Lack of Awareness, and Limited Access to Strategies). For each ANCOVA, Time 1 levels of the ER habit being tested was controlled for by entering it as a covariate. Thus, a significant result would mean that changes in an ER habit were related to the profile transition. The only ER habit that was significantly related to transitioning was Avoidance, $F (3, 139) = 3.41, p = .02, \eta^2_p = .07$. Post hoc comparisons using the Fisher LSD test showed that those participants that transitioned from a low to a high response reported significant increases in avoidance (T1: $M = 2.51, SD = .50$; T2: $M = 2.74, SD = .58$) in comparison to those that transitioned from a high to a low response (T1: $M = 2.49, SD = .52$; T2: $M = 2.26, SD = .50; p = .004$) and those with stable low response (T1: $M = 2.33, SD = .49$; T2: $M = 2.35, SD = .45; p = .01$). Participants that transitioned from a low to a high response had only a marginal increase in avoidance in comparison to those with a stable high response (T1: $M = 2.70, SD = .61$; T2: $M = 2.53, SD = .50; p = .07$). None of the other groups were significantly different from one another for avoidance.

Similar ANCOVA analyses were completed for Depressive Symptoms, Anxiety Symptoms, Social Anxiety Symptoms, and Trait Shame. Time 1 levels of each type of internalizing symptom were controlled for as a covariate with Time 2 symptoms as the DV. A significant result would mean that changes in internalizing symptoms were related to profile transition. An increase in Depressive Symptoms at Time 2 was significantly related to profile transition, $F (3, 139) = 3.88, p = .01, \eta^2_p = .08$. Post hoc comparisons using the Fisher LSD test showed that those participants that transitioned from a low to a high response (T1: $M = .40, SD = .40$; T2: $M = .58, SD = .39$) reported
significant increases in depressive symptoms, in comparison to those that transitioned to a low response (T1: $M = .42, SD = .32$; T2: $M = .35, SD = .31, p = .01$) and those that had a stable low response (T1: $M = .28, SD = .27$; T2: $M = .30, SD = .25, p = .004$). None of the other groups were significantly different from one another for Depressive Symptoms. An increase in Trait Shame at Time 2 was also significantly related to profile transition, $F (3, 137) = 2.79, p = .04, \eta^2_p = .06$. A post hoc Fisher LSD test revealed that stable high responders (T1: $M = 2.04, SD = .60$; T2: $M = 2.31, SD = .58$) reported significant increases in Trait Shame in comparison to stable low responders (T1: $M = 1.57, SD = .42$; T2: $M = 1.73, SD = .50, p = .03$), and those that transitioned to a low response (T1: $M = 1.71, SD = .34$; T2: $M = 1.78, SD = .52, p = .04$). None of the other groups were significantly different from one another for Trait Shame. The ANCOVAs for Anxiety Symptoms and Social Anxiety Symptoms were not significant. Age also did not differ significantly between the stability/transition groups.

**Discussion**

The goal of the current investigation was to understand how patterns among emotional responses (Experience, Arousal, and Expression) during social stress are related to individual differences in socioemotional functioning in adolescence. The elicitation of state shame through the use of the video-recorded speech task was effective at both time points, as participants on average had a significant elevation in arousal, reported experiencing shame, and expressed shame. To understand within-subject responses, profiles were made using experience, arousal, and expression scores for participants at Time 1 and again at Time 2 (one year later). Five profiles emerged from the data – one profile indicating a mild response to the stressor across all domains, and four profiles with higher responses in some domains. The majority of adolescents profile responses were the same one year later, however those that did change were related to changes in avoidant ER habits, trait shame,
and depressive symptoms. Across both time points, the profiles revealed consistent and informative patterns of association with different socioemotional functioning measures. These patterns of emotional responses directly link real-event ER with habitual ER styles in adolescence.

**Emotion Response Profiles**

The profiles made from experience, expression and arousal revealed interesting and meaningful patterns. The Low-Average (low average experience, average arousal, average expression) group was the largest group. Being fairly well-regulated across all of the domains was associated with lower socioemotional problems. This group of adolescents may be more likely to accept rather than avoid their emotions and use one or more effective strategies to regulate themselves during social stress. Their internal experience matched the intensity of observer’s impressions, which may make them seem more genuine and facilitate stronger relationships (Srivastava, Tamir, McGonigal, John, & Gross, 2009). In addition to authenticity, less negative affect may also facilitate more positive social relations (Waugh & Fredrickson, 2006).

On the other hand, probability of membership in the High-Average, High-Experience, High, and High-Arousal groups was associated with more socioemotional problems. The High-Average group (high-average experience, average arousal, average expression) was a moderately sized group and was consistently associated with higher social anxiety symptoms and non-acceptance of emotions. The High-Average group reacted more overall to the social stressor. Their reactions among all of the domains may have been higher because lack of acceptance of emotions impedes the ability to regulate emotions (Berking et al., 2008).

The High-Experience group (high experience, average arousal, average expression) was a relatively small group. It was consistently associated with anxiety and social anxiety symptoms. It was associated with different ER difficulties (avoidance, non-acceptance, limited access to
strategies) at the different time points. High-Experiencers possessed some regulatory ability to manage their arousal and partially conceal the intensity of their shame, however they had difficulty regulating their internal experience. In the real world, adolescents in the High-Experience group and the High-Average group would look similar to teachers, friends, and family even though those in the High-Experience group could be experiencing much higher levels of shame. Adolescents in the High-Experience group may miss opportunities for appropriate social support because others are unable to perceive the intensity of their emotions and thus cannot act accordingly (Gross & John, 2003; Zaki, Bolger & Ochsner, 2009).

The High group (high Experience, high Arousal, high-average Expression) was the smallest group. At Time 1 it was associated only with the use of avoidance as a regulatory strategy, and at Time 2 it was associated with a wide variety of internalizing problems (depressive symptoms, anxiety symptoms, social anxiety symptoms, and trait shame) and lack of access to ER strategies. These individuals’ responses on the domains reflect extreme autonomic arousal, and a high degree of experienced shame and expression of shame. They might not conceal their expression of shame because they do not possess the resources to regulate or they unconsciously want others to know that they acknowledge their poor performance. The display of shame after an error reduces the chances that others will act aggressively towards the offender (Keltner & Harker, 1998). However, due to excessive displays of shame others may perceive them as less competent (Sieverding, 2009).

A similar pattern of concordant, unregulated responding has been found across the three domains during anger elicitations in both children (Smith et al., 2011) and preteens (Zalewski et al., 2011a & 2011b). Similar to the current study, this response pattern had a low probability of occurrence in both child (Smith et al. – 6% of the sample) and preteen samples (Zalewski et al. - 5% of the sample). Unregulated children were liked less by their peers (Smith et al., 2011). In preteens,
being unregulated was associated with lower effortful control, lower shyness, and greater high-intensity pleasure (Zalewski et al., 2011a), and negative evaluative appraisals of others but no specific coping strategies (Zalewski et al., 2011b). Together, these studies begin to reveal a possible picture of how less regulated children, preteens, and adolescents function internally and interact with others in emotional situations. Large longitudinal studies that include several different emotional elicitations may help reveal a progression of emotional responding from childhood through adolescence.

The High Arousal group was also a small group. Adolescents in this group displayed an extreme autonomic response, but only average experience and expression of shame. It was only associated with avoidance at Time 2. A different regulatory process seems to be occurring in this group, however none of measures seemed to capture information about how they are different from the other groups. It is possible that they were a group that is reluctant or guarded in their report of emotional experience and symptoms, or their arousal was not related to the experience of negative emotion.

**Stability and Change**

Results from the current study show that there is both stability and change in adolescent emotional responding within individuals. Overall, response patterns across one year were fairly consistent and provide support for trait-like individual differences being important in adolescence. Most adolescents responded to a stressful situation in a similar way, which is consistent with past research showing stability in emotional and self-regulation across adolescence (Raffaelli, Crockett, & Shen, 2005). However, a smaller proportion (approximately 30%) of adolescents’ responses did change. The changes do not appear to be linked to age, rather it appears they are linked to ways of dealing with emotions and internalizing symptoms. Specifically, the results point to changes in
avoidance, trait shame, and depressive symptoms as being related to the way that adolescents respond emotionally over one year.

Change in avoidance may be an important risk factor to monitor in the general adolescent population for the onset of anxious and depressive symptoms. When stress or sadness from daily life is avoided, the process of regulation or solving life problems is halted and lack of resolution can lead to further problems and depressive symptoms (Holahan & Moos, 1986; Leventhal, 2008). Alternatively, internalizing symptoms that also predicted change from a low response to a higher response, such as depression and trait shame, could precede changes in avoidance. For example, feeling shameful can lead to avoidance (Schmader & Lickel, 2006), as it motivates people to hide, avoid, or escape the situations that makes them feel pain about a seemingly unchangeable negative aspect of their identity (Tangney et al., 1996). Depression, defined by feelings of worthlessness, pessimism, and low energy, can lead to avoidance in order to escape pain or avoidance as a default due to low energy or difficulty with decision making (Trew, 2011; Trivedi & Greer, 2014).

Conducting a longitudinal study with more than two time-points might help to examine the potential bidirectional or sequential associations between trait shame, avoidance, and depression across development. Furthermore, we do not yet understand what processes prompts a change in ER habit use in different individuals. For example, one study with adolescents found that depressive symptoms predicted increased use of suppression, but suppression did not predict increased depressive symptoms (Larsen et al., 2013). Timing of changes in stress, relationships, or other contextual factors might play an important role in understanding why some adolescents change and why others do not.
Limitations and Future Directions

First, we started examining the emotion response patterns and socioemotional functioning of adolescents by studying emotional responses in one social stressor. The speech task is an effective stressor because it taps into the fear of evaluation and rejection sensitivity that is central to the adolescent experience (Gunnar, Talge, & Herrera, 2009; Reimer, 1996). The next step would be to examine response patterns of the same individuals across different types of emotion and multiple real-world stressors in adolescence. For example, some of the individuals in the low average group during social stress in the current study on shame may be in a high response group for other emotions (e.g., anger, happiness). Gender and age effects may be different for different types of emotion elicitation (e.g., happiness, anger) as opposed to shame as well. Second, it would be beneficial to collect measures of socioemotional functioning from multiple informants such as teachers, parents, and peers, in addition to self-report. Third, other measures of physiological arousal measures (e.g., skin perspiration) should be investigated in addition to heart rate reactivity. While heart rate is a good overall measure of arousal (Beauchaine, 2001), considering multiple autonomic nervous system measures distinguishing sympathetic and parasympathetic activation may be even more specific and informative (Cacioppo, Berntson, Larsen, Pohllmann, & Ito, 2000; Hollenstein, McNeely, Eastabrook, Mackey, & Flynn, 2012; Mauss & Robinson, 2009). Finally, time scale is also important – more consideration about how regulatory patterns unfold moment-to-moment and day-to-day will inform developmental models of typical and atypical development.

Conclusion

Emotions emerge from the integration of arousal, appraisal, and expression. An individuals’ profile of emotional responses reflects their unique self-regulation. Adolescents with various ‘under regulated’ profiles have more problematic socioemotional health. Unique profiles were related to the
use of different regulatory strategies. Avoidance may be an important mechanism, above other strategies, that relates to the change in emotional responses. Integrating experience, arousal, and expression begins to reveal the complexity of how adolescents function both internally and in the social world. We need more comprehensive and integrated examinations of emotional functioning in adolescence as looking at only one or two aspects at a time does not provide a full picture.
References


Chapter 3: Bidirectional Relations between Adolescent Shame and Internalizing Symptoms:
Mediation by Emotion Regulation and Moderation by Gender

Lanteigne, D.M. & Hollenstein, T.
Abstract

Shame is defined by an intense feeling of worthlessness, global negative self-focus, and a desire to hide or escape. While feeling shame more frequently and intensely is typical of the adolescent experience; only some shame-prone adolescents develop internalizing problems. The purpose of the present study was to better understand the shame-internalizing relationship by testing if it was mediated by emotion regulation. Adolescents (aged 12-16 at Time 1; \( N=135 \)) completed questionnaires at three time points, 1 year apart, and a shame-inducing laboratory task at Time 2. The emotion regulation habit of avoidance mediated the relation between shame and increases in depressive symptoms. The reverse model, depressive symptoms predicting shame, was not significant. Expressive suppression during the laboratory social stressor mediated the relation between shame and increases in social anxiety symptoms. Avoidance and rumination mediated the relation between social anxiety symptoms and increases in shame. Frequency of emotion regulation strategy use differed by gender. Results are discussed from a transdiagnostic emotion regulation perspective on the development of internalizing problems in adolescence.

Keywords: Shame; emotion regulation; adolescence; depression; social anxiety.
Bidirectional Relations between Adolescent Shame and Internalizing Symptoms: Mediation by Emotion Regulation and Moderation by Gender

Shame is a self-conscious emotion defined by an intense feeling of worthlessness, a global, negative self-focus and a desire to hide or escape (Tangney & Dearing, 2002). Shame is experienced when one perceives that they have fallen short of expected social standards or goals, whether real or imagined (Lewis, 1995). The experience of shame emerges in early childhood after stable self-representations have formed (Lewis, Sullivan, Stanger, & Weiss, 1989), and children are capable of understanding that they have violated standards, rules, or goals (Lewis, 2011). Experiencing self-conscious emotions at a moderate level is adaptive because it encourages socially appropriate behavior and thus facilitates an individual’s ability to successfully live in a community (Keltner & Harker, 1998; Tangney, Stuewig, Malouf, & Youman, 2013). Expressing shame can also serve to appease others after committing a transgression (Keltner & Harker, 1998) and it can motivate self-change (Lickel, Kushlev, Savalei, Matta, & Schmader, 2014).

During adolescence, the continued development of perspective taking and a strong desire to be accepted by peers can lead to more experience of shame (Ollendick & Hirshfeld-Becker, 2002; Reimer, 1996). Hence, feeling heightened shame and self-consciousness is typical of the adolescent experience (Reimer, 1996). However, shame can become problematic if it is felt in a large number of contexts or at levels of intensity that do not match the context (De Rubeis & Hollenstein, 2009). The most common problematic result of shame is the development of anxious and depressive symptoms (i.e., internalizing problems). The purpose of the present study is to better understand this shame-internalizing relationship in adolescence.
Shame has been associated with symptoms of depression in many studies (Andrews, Qian, & Valentine, 2002; Cheung, Gilbert, & Irons, 2004; Stuewig & McCloskey, 2005; Tangney & Dearing, 2002; Tilghman-Osborne, Cole, Felton, & Ciesla, 2008). Strong associations have also been found between shame and social anxiety (Li, Qian, & Ma, 2005; Weeks, Heimberg, & Heuer, 2011; Zimmerman, Morrison, & Heimberg, 2015). The experience of shame often occurs after negative social experiences or life events (Muris & Meesters, 2014). Adolescents experience many stressful social situations daily, and being unable to recover from shameful feelings may lead to both a depressed mood and more fear of negative evaluation in future social situations (Andrews et al., 2002; Reimer, 1996).

While cross-sectional research on shame and psychopathology in adolescence reveals strong associations, there are few longitudinal studies that have addressed developmental processes. Some longitudinal studies have found that shame predicts the increase of psychopathology such as depressive symptoms in children that were sexually abused and hostility in high school students over time (Feiring, Taska, & Lewis, 2002; Heaven, Ciarrochi, & Leeson, 2009). A recent study examined how shame and depressogenic thinking (catastrophizing and negative self-evaluation) impacted the development of depression and social anxiety symptoms across mid to late childhood in a typically developing sample (Mills et al., 2015). Shame was indirectly predictive of both depressive and social anxiety symptoms for boys, and social anxiety symptoms for girls (Mills et al., 2015). The relations between shame and internalizing symptoms were mediated by depressogenic thinking – the way that children thought about hypothetical negative events after they occurred (Mills et al., 2015). In contrast, given the stigma associated with psychopathology such as depression and social anxiety, adolescents may experience more feelings of shame due to their symptoms (Hinshaw, 2007). Thus,
while previous research has focused on shame predicting internalizing symptoms (e.g., De Rubeis & Hollenstein, 2009; Mills et al., 2015), it is also important to evaluate whether internalizing symptoms lead to more feelings of shame over time. The current study built on previous research by investigating the bidirectional associations among shame and internalizing symptoms and using a longitudinal design in a normative adolescent sample. Importantly, the current study also investigated whether emotion regulation was a mediating factor in the association between shame and internalizing symptoms.

**Transdiagnostic Impact of Emotion Regulation**

Emotion regulation (ER) refers to how individuals influence the magnitude or duration of an emotional response (Gross, 1998). Dysregulated ER underlies many forms of psychopathology, and thus has been referred to as a transdiagnostic factor (Wilamowksa et al., 2010). How adolescents regulate their experience of shame may partially explain why some shame-prone adolescents develop internalizing symptoms, and why others do not. We propose that ER habits involving under-engagement or over-engagement with emotional responses will lead to ineffective regulation of shame, and in turn, lead to increases in internalizing symptoms. Under-engagement involves avoidant or suppressive responses to emotions, whereas over-engagement involves processes that focus on or exaggerate emotional distress (Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007).

Under-engagement ER processes include avoidance of thoughts and behavior, as well as expressive suppression. Adolescents may react to their shame experience by trying to avoid thoughts and situations that remind them of feeling shame. Expressive suppression involves inhibiting outward expressions of emotion (Gross & John, 2003). Suppression could be used by adolescents to hide their feelings of shame from others. Conversely, rumination is an over-engagement ER process (Nolen-Hoeksema, 2000). Internally, shame-prone adolescents may have difficulty disengaging their
thoughts and feelings about shame, and spend time ruminating about how they should have changed their behavior (Clark & Wells, 1995; Nolen-Hoeksema, 2000). Thus, the way that adolescents regulate shame may be a transdiagnostic mechanism in the development of internalizing symptoms. The current study tested whether emotion regulation habits such as avoidance, expressive suppression, and rumination mediate the relationship between shame and internalizing symptoms. Each of the ER processes and their associations with internalizing symptoms will be discussed in turn.

**Avoidance and internalizing symptoms.** Cognitive and behavioral avoidance have been associated with symptoms of depression and social anxiety (Grant et al., 2013; Herman-Stahl, Stemmler, & Peterson, 1995; Hoffman, 2007; Moulds, Kandris, Starr, & Wong, 2007; Thompson, Zalewski, & Lengua, 2014). Avoidance can result in lost opportunities for adolescents to make social connections and gain social skills, and in turn foster social anxiety and depressive symptoms. Similarly, avoiding actions that could lead to shame (e.g., talking very little in a group) could increase social anxiety as individuals may receive less positive feedback from peers (Kashdan & Steger, 2006). Research with adults has found that avoidant coping predicts depressive symptoms across 10 years, even when controlling for initial levels of depressive symptoms (Holahan, Moos, Holahan, Brennan, & Schutte, 2005). One study found that shame proneness in adolescence and regulating through avoidance was associated with depressive symptoms 1 year later (De Rubeis & Hollenstein, 2009). The current study will expand on this finding by examining avoidant regulation in relation to other emotion regulation habits and examining change across multiple time points.

While previous research has often focused on avoidance preceding internalizing symptoms (e.g., Leventhal, 2008; Holahan et al., 2005), different levels of avoidance after the onset of internalizing symptoms could also increase feelings of shame about oneself. Goffman (1963)
theorized that people with mental illness vary in their level of social withdrawal because of fear of stigma. Avoidance of social contacts due to stigma can impede recovery from mental illness (Perlick, et al., 2001). Recent research with non-clinical sample of young adults has found that depressive and anxious symptoms have a bidirectional association with avoidant coping (Grant et al., 2013). Thus, the current study tested whether these avoidance-internalizing associations are bidirectional in adolescence as well.

**Suppression and internalizing symptoms.** Suppressing emotional expressions has also been related to internalizing symptoms (Aldao & Nolen-Hoeksema, 2010). Suppression can be helpful in certain situations such as when receiving an undesirable gift, however the persistent use of this strategy could impede social connections, decrease social support, and lead an adolescent to feel depressed (English, John, Srivastava, & Gross, 2012; Gross & John, 2003). Participants that have been instructed to suppress their emotions in laboratory experiments have been rated as less authentic and less socially engaging (Butler et al., 2003; Srivastava et al., 2009). Self-reported suppression in daily life is related to poorer social functioning and lower relationship satisfaction (English & John, 2013; Gross & John, 2003). Inhibiting expressions may lead to missed opportunities for social support and learning how to manage situations once negative emotions have been expressed (Keenan, Hipwell, Hinze, & Babinski, 2009). Suppressing expressions of shame specifically also may undermine the functional display of shame as an appeasement strategy within a social group. Furthermore, shame’s action tendency is to hide (Mills, 2005), which from an emotional expression standpoint is suppression. Suppression has been linked to depressive symptoms (For a meta- analysis see Aldao, Nolen-Hoeksema, & Schweizer, 2010) and social anxiety symptoms (Spokas, Luterek, & Heimberg, 2008), but few studies have examined how the use of
suppression relates to internalizing symptoms across developmental periods (e.g., Gullone, Hughes, King, & Tonge, 2010; Larsen et al., 2012; Larsen et al., 2013).

Some studies have found support for depressive symptoms preceding suppression in adolescence. Larsen and colleagues (2012; 2013) hypothesized that when adolescents begin to feel depressive feelings, they may rely on suppression to provide them with short-term relief of sadness, or to avoid rejection or relationship difficulty. They found that depressive symptoms led to greater suppression rather than the reverse in mid adolescence (Larsen et al., 2013). Lower parental support indirectly mediated the relation between depressive symptoms and expressive suppression for girls only (Larsen et al., 2012). Their results suggested that adolescents with depressive symptoms may learn to hide their emotions as it is not helpful for them in their social context. Rejection or lack of help after showing emotions with a close relationship may lead the adolescent to feel ashamed about their internalizing symptoms. Subsequent suppression could then also remove opportunities to be regulated by supportive individuals, and an inability to regulate emotions may lead to further shame. Suppression tends to have an impact on task performance, memory, and cognition, thus, adolescents trying to suppress likely are not performing at their best in a number of situations (Richards, 2004). Examining bidirectional associations in the current study will help to better understand the developmental processes underlying internalizing symptoms, suppression, and shame.

**Rumination and internalizing symptoms.** Rumination involves maintaining focus on emotions and thoughts associated with an emotionally evocative event (Nolen-Hoeksema & Girgus, 1994) and has strong relations with depression and social anxiety (Abbott & Rapee, 2004; Mellings & Alden, 2000; Nolen-Hoeksema, 2000). Rumination is a mechanism through which those experiencing shame could develop or intensify symptoms of depression and social anxiety. If an adolescent feels worthless and small in a global sense and then ruminates about these thoughts and
feelings habitually, then the shame feelings may persist and possibly intensify into internalizing symptoms. As explained in the Response Style Theory, ruminating on negative aspects of self could increase depression (Nolen-Hoeksema & Girgus, 1994). Similarly, repetitive thoughts about oneself and others’ evaluations in social situations could function to increase social anxiety (Kashdan & Roberts, 2007). Two previous cross-sectional studies using adult samples have found that rumination has a significant indirect effect on the relationship between shame and depression (Cheung, Gilbert, & Irons, 2004; Orth, Berking, & Burkhardt, 2006), but this relationship has not been examined in adolescence.

Similar to the other ER habits, the relation between rumination and internalizing symptoms may be bidirectional. Internalizing symptoms could lead to ruminating as the adolescent is trying to understand their experience and find possible solutions to relieve their symptoms (Martin, Shrira, & Startup, 2004). However, often rumination involves an abstract processing style (e.g., Why did this happen to me? What does this mean about me?), which does not lead to effective problem solving (Van Lier, Vervliet, Boddez, & Raes, 2015). Ruminating about internalizing symptoms or the impact of symptoms could lead to more shame as it could help a shame appraisal (e.g., “I am a worthless person”) become more easily accessible. While rumination has generally been thought of and evaluated as a factor that leads to increased internalizing problems, some studies in adolescence have found that depression leads to an increase in rumination as well (Nolen-Hoeksema, Girgus, & Seligan, 1992; Nolen-Hoeksema, Stice, Wade, & Bohon, 2007). The current study will provide more evidence to whether rumination has a reciprocal or directional relationship with shame and internalizing symptoms.
Gender Differences

Gender roles may affect selected habitual strategies and the process in which shame leads to depression and social anxiety. Boys report using expressive suppression more than girls (Gullone, Hughes, King, & Tonge, 2010) whereas girls report the use of rumination more than boys (Nolen-Hoeksema, 2012). Boys are socialized to be less expressive than girls and deal with their emotions independently rather than asking for help (Tamres, Janicki, & Helgeson, 2002). In one study, habitual suppression was related only to depressive symptoms in males in late adolescence (Flynn, Hollenstein, & Mackey, 2010). Suppression may have been more detrimental to boys because of gender-specific motivations for using suppression - Boys may suppress expressions of emotion to fit culturally defined roles of masculinity such as being tough and not displaying weakness (Tamres et al., 2002), whereas girls may use suppression more for prosocial reasons such as not upsetting others (Flynn et al., 2010).

In contrast to the male suppression effect, girls’ tendency to ruminate is more strongly related to their depressive symptoms than it is for boys in adolescence (Nolen-Hoeksema, 1994; Hankin & Abramson, 2001). Girls’ rumination may be characterized more by a focus on wishful thinking or unchangeable aspects of a situation in comparison to boys (Nolen-Hoeksema, 2012; Tamres et al., 2002). Girls also ruminate more within interpersonal relationships (Rose, Carlson, & Waller, 2007). Transactional interpersonal theories of depression stipulate that ruminating with others, coruminating, can cause stress in close relationships and may elicit rejection, leading to further depression (White & Shih, 2012).

Gender differences for avoidance are less clear than for rumination and suppression; some research with children and adolescents has found that boys report more avoidance than girls (Eschenbeck, Kohlmann, & Lohaus, 2007), others do not replicate a gender difference (Thompson,
Zalewski, & Lengua, 2014), and some found that adolescent and adult women report more avoidance than men (Kort-Butler, 2009; Matud, 2004). Given gender differences in emotion regulation in previous research, the current study examined gender as a possible moderator of the mechanisms involved in the relationship between shame and internalizing symptoms.

**Current Study**

The objectives of the current study were to understand: (1) How emotion regulation mediates the relationship between shame and internalizing symptoms in adolescence and, (2) How gender moderates the effects of ER as a mediator. We tested the involvement of ER habits in the relationship between shame and internalizing symptoms using a 3-wave longitudinal design. A shame measure was collected at Time 1, regulatory measures were collected at Time 2, and symptoms of depression and social anxiety were measured at Time 3. Time points were 1 year apart. Measures were also taken for symptoms of depression and social anxiety at Time 1 and shame at Time 3, in order to test for bidirectionality in the relationships. Regulatory measures included self-report measures of avoidance, rumination and expressive suppression as well as a behavioral measure of expressive suppression during a socially stressful context, a spontaneous speech. We hypothesized that ER habits that involve under-engagement or over-engagement with emotional responses likely would not lead to effective regulation of shameful feelings, which could in turn lead to internalizing symptoms. We expected that avoidance, expressive suppression, and rumination would mediate the relations between shame and internalizing symptoms. We predicted that while there may be a bidirectional relation between shame and internalizing symptoms, that we would find more support for shame preceding internalizing symptoms, as the emergence of shame experiences occur universally and early in child development. As previous research has indicated gender
differences in emotion regulation habits, it was also expected that expressive suppression may be a stronger mediator for boys, and that rumination may be a stronger mediator for girls.

Method

Participants

A community sample of adolescents \((N = 187)\) aged 12.0 to 16.9 years \((M = 13.6, SD = 1.12)\) was recruited from a mid-size city in southern Ontario, Canada at Time 1. Participants were recruited via telephone from a large database of potential children and adolescents that is maintained by the Psychology Department at a local university. Parents of children and adolescents in the database had voluntarily consented to be contacted from researchers at the time of entry into the database, which often occurred at recruitment events (e.g., information fairs, sporting events, daycares). Parents and participants provided consent for participation. After debriefing procedures, participants also had the explicit opportunity to withdraw from the study. At Time 1, the data of four withdrawn participants were deleted. The total number of tested participants with accessible data at Time 1 was 182. At Time 2, 163 participants from Time 1 returned to complete the second wave of the study. Of the 163 participants at Time 2, 1 withdrew their data, 8 chose not to do the speech task, and 1 had incomplete speech data due to equipment problems. The total number of participants with accessible data at Time 2 was 153. At Time 3, 18 of the 153 participants with full data at Time 2 did not complete the third wave of the study. The total number of participants with complete data for the current study was 135. The excluded participants \((n = 47)\) were not significantly different from included participants on any Time 1 measures including, sex, age, shame, depression, and social anxiety. Note that it was not possible to compare the excluded participants \((n=5)\) that withdrew their data.
Included participants (N=135, 53% Female) were ages 12.0 to 16.4 at Time 1 (M = 13.6, SD = 1.09). Ethnic background, as described by participants were as follows: White (75.6%), Multi-Ethnic (10.2%), Chinese (<1%), South Asian (<1%), Latin American (<1%), Other (1.5%), and Unknown (10.3%). All participants were fluent in English and 94% indicated that English was their first language. For Time 1, participants were compensated with a $20 gift card to a bookstore, for Time 2 they were compensated with $60 cash, and for Time 3, because there was no lab visit, were compensated with $50 cash.

Procedures

At Time 1, participants visited the laboratory and completed questionnaires on a computer, including demographics, shame, depression, and social anxiety. At Time 2, participants returned to the laboratory and completed questionnaires on a computer and then completed a social stressor speech task. Before the social stressor speech task, the participant filled out a paper questionnaire on their current self-reported feelings on Likert scales. Next, the participant completed the following sequence of tasks: (1) Baseline (3 Minutes) – sitting quietly with no stimulation; (2) Speech (3 Minutes) – participant was instructed to make a speech as if to their class at school on any topic he/she chose in front of the experimenter; (3) Self-Reported Experience (1 minute) – report of feelings during the speech on Likert scales; (4) Exit Consent – participants completed a second consent form allowing them to withdraw data now that they had completed the lab visit and were debriefed. The procedure for Time 3 simply involved participants completing questionnaires online from their personal computers at home using a secure login and password.

Measures

Shame. The Experience of Shame Scale (ESS; Andrews, Qian, & Valentine, 2002) measures the extent to which respondents have experienced the feeling of shame in the past year. For each of
the 25 items, respondents indicate their experience of shame on a four-point scale (1 = not at all, 4 = very much). For example, one item is “Have you felt ashamed when you said something stupid?” Shame had a high internal consistency (T1: \( \alpha = .94 \), T2: \( \alpha = .94 \), T3: \( \alpha = .96 \)). The mean of all of the items was calculated to create the Shame measure; higher scores indicated higher experience of Shame.

**Depressive Symptoms.** The Beck Depression Inventory II (BDI-II; Beck, Steer & Brown, 1996) is a self-report questionnaire that measures cognitive, affective, and physical symptoms of depression. For each of the 21 items, respondents selected one of four statements that describe the severity of depressive symptoms during the past two weeks. The scale is from 0 (no depressive symptoms) to 3 (severe depressive symptoms). Two items were excluded (loss of interest in sex and suicidal thoughts). The BDI-II had high internal consistency (T1: \( \alpha = .84 \), T2: \( \alpha = .85 \), T3: \( \alpha = .93 \)). A mean of all items was calculated so the final score was on a 0-3 scale; higher scores indicated higher Depressive Symptoms.

**Social Anxiety Symptoms.** The Social Anxiety Scale for Adolescents Revised Short Form (Myers, Stein, & Aarons, 2002) is a self-report questionnaire measuring symptoms of anxiety in social contexts. Respondents rated each of the 13-items on a five-point scale ranging from “not at all true” to “true all the time”. For example, one item is “I worry that others don’t like me”. Social Anxiety Symptoms had high internal consistency (T1: \( \alpha = .90 \), T2: \( \alpha = .90 \), T3: \( \alpha = .92 \)). A mean of all items was calculated so that the final score was on a 1-5 scale; higher scores indicated higher Social Anxiety Symptoms.

**Avoidance.** The Children’s Coping Strategies Checklist (CCSC; Ayers, Sandier, West, & Roosa, 1996) is a self-report measure of how people typically think and act when they are upset about a problem. Respondents select how often they use each of the 43 strategies on a scale from 1
(never) to 4 (most of the time). For example, one item is “try to put it out of my mind”. Only two subscales (4 items each) were included in the current study. A mean of the items for both Cognitive Avoidance and Avoidant Actions subscales were calculated to make an Avoidance construct. The Avoidance construct had good internal consistency (T2: $\alpha = .75$). Higher scores indicated more frequent use of Avoidance.

**Rumination.** The Children’s Ruminative Response Styles (CRRS; Ziegert & Kistner, 2002) is a self-report questionnaire that measures the frequency of rumination and distraction when the responder is sad on an 11-point scale from 0 (never) to 10 (always). Only Rumination was examined in the current study. Rumination refers to focusing on thoughts, feelings, and behaviours. The Rumination subscale consists of 10-items and has high internal consistency (T2: $\alpha = .89$).

**Suppression.** The Emotion Regulation Questionnaire (ERQ; Gross & John, 2003) is a self-report questionnaire with a subscale for Expressive Suppression (4 items). Expressive Suppression involves reducing, modifying, or inhibiting the outward expression of emotion. Respondents indicated how much they agree with each statement on a seven-point Likert scale. Expressive Suppression had acceptable internal consistency (T2: $\alpha = .73$).

**Lab Suppression.** The laboratory measures of Experience and Expression during a social stressor at Time 2 were used to create the Lab Suppression variable. Experience refers to how much the participant reported feeling shame during the speech, whereas Expression refers to how much the participant expressed shame affect as coded by trained observers. The following section first outlines the procedures for measuring Experience and Expression, then describes how Lab Suppression was calculated.

**Experience.** Each participant rated how he or she felt during the speech using 23 descriptive words (e.g., nervous, happy, embarrassed) on a 10-point Likert scale immediately after delivering
the speech. Experience of shame was a composite made up of the mean of 7 items from this questionnaire. The items were: “During the speech I felt…” worthless, humiliated, small, like a bad person, like I wanted to hide, ashamed, and embarrassed. Items were modified from the State Shame and Guilt Scale, specifically the Shame subscale (Marschall, Sanftner & Tangney, 1994). Experience had good internal consistency (T2: \( \alpha = .90 \)).

**Observational coding of Expression.** The Self-Conscious Affect Code (SCAC; Lanteigne, Glozman, & Hollenstein, 2011) was used to code verbal and non-verbal cues of shame at every moment of the video-recorded speeches using The Observer 5.0 software (Noldus Information Technology, 2003). The SCAC codes were formulated from a review article by Keltner & Harker (1998) and informed by cross-cultural research on shame expression (e.g., Tracy & Matsumoto, 2008). Keltner and Harker summarized a variety of expressions that appeared across multiple shame-inductions in a variety of samples. The shame cues from Keltner & Harker (1998) were organized into 7 SCAC codes. SCAC consists of 7 binary codes (i.e., presence versus absence) of shame cues displayed moment-to-moment (Body Tension, Facial Tension, Hiding and Avoiding, Nervous Positive Affect, Silence, Stillness, and Vocal Uncertainty). Each second of the speech corresponded with an integer score of 0 or 1 for each cue. The resulting measurement of the seven cues was continuous and included onset and offsets of the cues. A team of four student coders achieved high inter-rater reliability for Time 2 across the 20% of overlapping files: Duration (duration-sequence based reliability analysis), T2: \( M = 89\% \), frequency agreement (frequency-sequence based reliability analysis), T2: \( M = 78\% \), and frequency kappa, T2: \( M = .76 \) (frequency-sequence based reliability analysis).

Expression was determined by taking the mean score calculated from the weighted proportional durations at each score level (Glozman, 2008). Expression was calculated according to
the following procedure: (1) A level of shame variable was calculated as the sum across all
categories at each coded event (i.e., any new combination of the seven categories initiated by a
change in one of the categories). The range of possible levels for each coded event was 0 to 6. It was
0 to 6 rather than 0 to 7 because two of the codes (Silence and Vocal Uncertainty) are mutually
exclusive; it was impossible for the participant to be both silent and talking with a wavering voice.
(2) The proportional duration for each level was calculated by dividing the total duration of each
level by the total duration of the speech. (3) Then, the weighted duration of each level was calculated
by multiplying each level by its proportional duration. (4) The SCAC score was created by summing
all of the weighted durations as expressed in the formula:

\[
\sum_{i=0}^{6} Level_i \left( \frac{Duration_i}{Total \ Duration} \right)
\]

Level is the integer result from summing across the six SCAC categories for each of the
levels (0 through 6). Higher values of Expression indicated greater expression of shame.

**Calculating Lab Suppression.** Experience and Expression were standardized across the
sample. Z-scores of Expression were subtracted from z-scores of Experience to represent Lab
Suppression. Thus, a positive value meant that someone experienced more than they expressed
(suppression) whereas a negative values meant that someone expressed more than they experienced
in comparison to group means. Discrepancy scores between experience and expression have been
meaningfully related to internalizing symptoms in previous studies (e.g., Lanteigne, Flynn,
Eastabrook, & Hollenstein, 2014).
Results

Data were checked for univariate outliers and no concerns were identified. Variables that were positively skewed (Shame Time 1 and Depressive Symptoms Time 1 and 3) were corrected using a log transformation and transformed values were used in analyses. Raw means and bivariate correlations between all study variables were reported in Table 1. Shame, internalizing symptoms, and most of the emotion regulation habits were correlated at a moderate level. Self-reported Suppression was the only exception, as it had only a small correlation with Social Anxiety Symptoms at Time 1. Age was not significantly correlated with any measure. Multicolinearity between mediators was not an issue (correlations range from 0.05-0.42).

A Conditional Process Model, bootstrapped multiple-mediation, was used to test whether emotion regulation habits mediated the relation between Shame and Depressive Symptoms (see Figure 1a) and Shame and Social Anxiety Symptoms (see Figure 2a). The models were also run in reverse to test for bidirectional associations (see Figure 1b and 2b). For each model, Time 1 level of Shame and internalizing symptoms were statistically controlled for by entering Time 1 scores as covariates. Models were run using specialized syntax called PROCESS (Hayes, 2013) through IBM SPSS Statistics Version 17.0. We used conceptual model 4 with 1000 bootstrap samples (Hayes, 2013). Hayes (2012) defined the concepts used in conditional process modeling. The direct effect refers to how much two cases differing by one unit on X (the independent variable) are estimated to differ on Y (the dependent variable). The indirect effect estimates how much two cases differ by a unit on X are estimated to differ on Y as a result of the effect of X on M (the mediator), which in turn affects Y. The total effect is simply the sum of the direct and indirect effects of X on Y. When there are multiple mediators in a model, there are estimations of the specific indirect effects of each
mediator, as well as the total indirect effect (the sum of all specific indirect effects) of all of the mediators. Mediation occurs when the 95% bootstrap confidence interval (CI) does not contain zero.

Table 1

Correlations among Shame, Internalizing Symptoms, and Emotion Regulation Habits

<table>
<thead>
<tr>
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<th>9</th>
<th>10</th>
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<tbody>
<tr>
<td>M(SD)</td>
<td>1.70</td>
<td>.36</td>
<td>2.31</td>
<td>2.43</td>
<td>5.56</td>
<td>3.60</td>
<td>-.02</td>
<td>2.10</td>
<td>.50</td>
<td>2.42</td>
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<tr>
<td></td>
<td>(.50)</td>
<td>(.31)</td>
<td>(.73)</td>
<td>(.49)</td>
<td>(1.81)</td>
<td>(1.19)</td>
<td>(.120)</td>
<td>(.73)</td>
<td>(.48)</td>
<td>(.87)</td>
</tr>
<tr>
<td>1. T1 Shame</td>
<td>-</td>
<td>.57**</td>
<td>.65**</td>
<td>.29**</td>
<td>.35**</td>
<td>.15</td>
<td>.33**</td>
<td>.55**</td>
<td>.37**</td>
<td>.41**</td>
</tr>
<tr>
<td>2. T1 Depression</td>
<td></td>
<td>-.44**</td>
<td>.19*</td>
<td>.26**</td>
<td>.04</td>
<td>.30**</td>
<td>.35**</td>
<td>.30**</td>
<td>.31**</td>
<td></td>
</tr>
<tr>
<td>3. T1 Soc Anx</td>
<td>-</td>
<td>.32**</td>
<td>.36**</td>
<td>.17*</td>
<td>.32**</td>
<td>.40**</td>
<td>.23**</td>
<td>.50**</td>
<td></td>
<td></td>
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<tr>
<td>4. T2 Avoidance</td>
<td>-</td>
<td>.42**</td>
<td>.08</td>
<td>.08</td>
<td>.35**</td>
<td>.32**</td>
<td>.28**</td>
<td></td>
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<tr>
<td>5. T2 Rumination</td>
<td>-</td>
<td>.05</td>
<td>.20*</td>
<td>.38**</td>
<td>.29**</td>
<td>.31**</td>
<td></td>
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<td>6. T2 Suppression</td>
<td></td>
<td>.09</td>
<td>.09</td>
<td>.12</td>
<td>.11</td>
<td></td>
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<td>7. T2 Lab Suppress</td>
<td></td>
<td></td>
<td></td>
<td>.29**</td>
<td>.21**</td>
<td>.32**</td>
<td></td>
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<tr>
<td>8. T3 Shame</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td>.56**</td>
<td>.76**</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>9. T3 Depression</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.59**</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>10. T3 Soc Anx</td>
<td></td>
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</table>

Note: * p<.05. **p<.01. Depression = Depressive Symptoms; Soc Anx = Social Anxiety Symptoms.
The total, direct, and indirect effects for the four multiple mediation analyses were reported in Table 2. For the T1 Shame to T3 Depressive Symptoms Model, which controlled for T1 Depressive Symptoms, there was a significant total effect, and a significant indirect effect of all of the emotion regulation habits combined. Thus, Shame and emotion regulation were related to increases in Depressive Symptoms. Only Avoidance had a significant indirect effect on it’s own. For the reverse model, T1 Depressive Symptoms to T3 Shame, which controlled for T1 Shame, none of the effects, total, direct, or indirect effects of emotion regulation were significant. Overall, results indicated that emotion regulation, most notably Avoidance, mediated the association between T1 Shame and the increase in T3 Depressive Symptoms.

For the T1 Shame to T3 Social Anxiety model which controlled for T1 Social Anxiety, there was a significant indirect effect for emotion regulation overall. Lab Suppression also had a significant indirect effect on it’s own. For the T1 Social Anxiety to T3 Shame model which controlled for T1 Shame, the total effect, direct effect, and total indirect effects of emotion regulation were significant. Furthermore, Rumination and Avoidance were significant mediators on their own. Overall, results indicated that T1 Shame led to increases in T3 Social Anxiety Symptoms and T1 Social Anxiety Symptoms led to increases in T3 Shame. Both of these associations were mediated by emotion regulation.

In summary, Shame was related to increases in symptoms of Depression and Social Anxiety across 2 years. Social Anxiety Symptoms, but not Depressive Symptoms, were related to increases in Shame. ER mediated the associations between Shame and internalizing symptoms. Avoidance mediated the Shame and Depressive Symptom relation, whereas Lab Suppression mediated the Shame and Social Anxiety relation. Rumination and Avoidance mediated in the Social Anxiety Symptoms to Shame relations.
Table 2

*Total, Direct, and Indirect Effects of the Multiple Mediation Models*

<table>
<thead>
<tr>
<th>Model</th>
<th>Total Effect</th>
<th>Direct Effect</th>
<th>Indirect Effects [95% CIs]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Avoid</td>
<td>Rumin</td>
</tr>
<tr>
<td>T1 Shame-</td>
<td>.97**</td>
<td>.61*</td>
<td>.36*</td>
</tr>
<tr>
<td>T3 Depress</td>
<td>[.12, .73]</td>
<td>[.04, .51]</td>
<td>[-.09, .31]</td>
</tr>
<tr>
<td>T1 Depress-</td>
<td>.03</td>
<td>.005</td>
<td>.03</td>
</tr>
<tr>
<td>T3 Shame</td>
<td>[-.04, -.11]</td>
<td>[-.04, .02]</td>
<td>[-.02, .07]</td>
</tr>
<tr>
<td>T1 Shame-</td>
<td>.63*</td>
<td>.39</td>
<td>.24*</td>
</tr>
<tr>
<td>T3 Soc Anx</td>
<td>[.04, .51]</td>
<td>[-.03, .34]</td>
<td>[-.02, .32]</td>
</tr>
<tr>
<td>T1 Soc Anx-</td>
<td>.38***</td>
<td>.19*</td>
<td>.11*</td>
</tr>
<tr>
<td>T3 Shame</td>
<td>[.04, .22]</td>
<td>[.004, .11]</td>
<td>[.01, .11]</td>
</tr>
</tbody>
</table>

Note: *p = .06, *p<.05, **p<.01, ***p<.001. Depress = Depressive Symptoms; Soc Anx = Social Anxiety; Avoid = Avoidance; Rumin = Ruminate; Suppress = Suppression; Lab Suppress = Lab Suppression.
Figure 1. Multiple mediation model of (a) shame on depressive symptoms controlling for Time 1 depressive symptoms and (b) depressive symptoms on shame controlling for Time 1 shame. Note. Values represent unstandardized regression coefficients. The coefficient from Time 1 to Time 3 above the center horizontal path represents the total effect and the coefficient below the center horizontal path represents the direct effect when the mediators were in the model. *p<.05. **p<.01. ***p<.001.
**Figure 2.** Multiple mediation model of (a) shame on social anxiety symptoms controlling for Time 1 social anxiety symptoms and (b) social anxiety symptoms on shame controlling for shame at Time 1. Note. Values represent unstandardized regression coefficients. The coefficient from Time 1 to Time 3 above the center horizontal path represents the total effect and the coefficient below the center horizontal path represents the direct effect when the mediators were in the model. *p*<.05. **p**<.01. ***p***<.001.
Gender Differences

Three MANOVAs were conducted to evaluate any differences on shame, internalizing symptoms, and emotion regulation habits between boys and girls (see Table 3). Girls reported significantly higher Shame, Depressive Symptoms, and Social Anxiety Symptoms than boys at both Time 1 and Time 3. Girls reported significantly more Rumination and Avoidance, whereas boys reported more Suppression. Lab Suppression was not significantly different for girls and boys.

Table 3

Gender Differences among Shame, Internalizing Symptoms, and Emotion Regulation Habits

<table>
<thead>
<tr>
<th></th>
<th>Boys</th>
<th>Girls</th>
<th>MANOVA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>p</td>
</tr>
<tr>
<td>1. T1 Shame</td>
<td>1.57 (.40)</td>
<td>1.83 (.55)</td>
<td>.003</td>
</tr>
<tr>
<td>2. T1 Depression</td>
<td>.29 (.23)</td>
<td>.43 (.35)</td>
<td>.007</td>
</tr>
<tr>
<td>3. T1 Social Anxiety</td>
<td>2.09 (.23)</td>
<td>2.48 (.81)</td>
<td>.002</td>
</tr>
<tr>
<td>4. T2 Avoidance</td>
<td>2.31 (.50)</td>
<td>2.53 (.45)</td>
<td>.008</td>
</tr>
<tr>
<td>5. T2 Rumination</td>
<td>4.96 (1.80)</td>
<td>6.09 (1.66)</td>
<td>.000</td>
</tr>
<tr>
<td>6. T2 Suppression</td>
<td>3.93 (1.19)</td>
<td>3.31 (1.12)</td>
<td>.002</td>
</tr>
<tr>
<td>7. T2 Lab Suppression</td>
<td>-.13 (1.22)</td>
<td>.08 (1.19)</td>
<td>.31</td>
</tr>
<tr>
<td>8. T3 Shame</td>
<td>1.91 (.66)</td>
<td>2.26 (.75)</td>
<td>.005</td>
</tr>
<tr>
<td>9. T3 Depression</td>
<td>.38 (.36)</td>
<td>.60 (.54)</td>
<td>.007</td>
</tr>
<tr>
<td>10. T3 Social Anxiety</td>
<td>2.17 (.78)</td>
<td>2.62 (.90)</td>
<td>.002</td>
</tr>
</tbody>
</table>
Four moderated multiple mediation models with the 4 ER mediators (Avoidance, Rumination, Suppression, and Lab Suppression) were run using Model 59 from Hayes (2013). The model tested whether the indirect effects of emotion regulation on the relation between T1 Shame and T3 internalizing symptoms (controlling for T1 internalizing symptoms), were moderated by gender. Rather than testing for gender differences in mean levels of each variable as we did in the last section using a MANOVA, the moderated multiple mediation tests whether gender has an impact on the mediating ER processes. For the Shame-Depression and Depression-Shame models, gender did not significantly moderate any of the mediators. For the Shame-Social Anxiety, Rumination was a significant indirect mediator only for boys, Indirect Effect = .26, 95% CI = [.01, .76]. For the Social Anxiety-Shame model, Rumination was a significant indirect mediator only for boys, Indirect Effect = .15, 95% CI = [.04, .37]. Thus, the only significant gender difference was that rumination was a significant bidirectional mediator between Shame and increased Social Anxiety symptoms for boys but not girls.

Discussion

The association between shame and psychopathology is well established, however mediating and moderating factors are not yet understood, especially in adolescence (Muris & Meesters, 2014). Our main objective was to understand how emotion regulation mediates the relationship between shame and internalizing symptoms in adolescence. As expected, shame and internalizing symptoms were correlated across 2 years. By using bootstrapped multiple-mediation models, we found that shame predicted increased symptoms of depression, and this relation was mediated by avoidance. However, depressive symptoms did not predict increased levels of shame. Shame marginally
predicted increased social anxiety symptoms and lab suppression mediated this relation. Social anxiety symptoms significantly predicted increased shame, and this relation was mediated by rumination and avoidance. Thus, emotion regulation was in fact a significant mediator in almost all analyses. Different patterns of emotion regulation habits mediated the relation between shame and internalizing symptoms.

The results were consistent with transdiagnostic emotion regulation theory, such that emotion regulation underlies many forms of internalizing symptoms (Hofmann, Sawyer, Fang & Asnaani, 2012; Wilamowska et al., 2010). Emotion regulation habits involving underengagement, avoidance and lab suppression, seemed to be most central for understanding the process of shame leading to internalizing symptoms. The under-engagement effect was not surprising given that the action tendency for shame is to hide and avoid (Mills, 2005). The results of the current study showed that the extent to which adolescents avoid or suppress shame-related feelings certainly impacts the development of further internalizing symptoms. The over-engagement strategy that was evaluated in the current study, rumination, was most central to understanding how social anxiety symptoms lead to further shame. It is possible that repetitive thinking about social anxiety symptoms (e.g., “Why can’t I speak in front of people?”) led adolescents to having stronger feelings of shame about their performance, habits, or being.

**Avoidance**

In the current study, avoidance was a bidirectional mediator between shame and internalizing symptoms. The findings are consistent with previous research on the associations between shame, avoidance, and internalizing symptoms (Grant et al., 2013; Herman-Stahl, Stemmler, & Peterson, 1995; Moulds, Kandris, Starr, & Wong, 2007; Thompson, Zalewski, & Lengua, 2014). Previous research using an adolescent sample had found that avoidance mediates the relation between shame
and depressive symptoms (De Rubeis & Hollenstein, 2009). The 3-wave longitudinal design in the current study adds strength to the transdiagnostic argument that avoidant regulation in adolescence leads to depression. Furthermore, avoidance leads to more shame in adolescents with social anxiety symptoms. Avoidant behavior is a central component in cognitive models of anxiety and depression, and contemporary learning theory, and is often the target in intervention models (Clark, 1986; Mineka & Zinbarg, 2006). Given that the target of shameful feelings following avoidance may be different than initial shameful feelings, further research could investigate the implications of stigma and self-judgment in these developmental processes. Initial shameful feelings may involve feeling ashamed of any number of habits, behavior, or appearance, whereas shameful feelings after avoidance may be more directly targeted at the avoidance behavior or inability to regulate emotions. Negative emotions that arise from judgment of emotional responses may need to be approached differently in therapy. Acceptance and Commitment Therapy perspectives (Hayes, Strosahl, & Wilson, 1999) may help adolescents decrease shame arising from difficulty regulating emotion.

**Suppression**

Suppression measured in the lab was a mediator of the shame to social anxiety model in the current study, however self-reported habitual suppression was not a significant mediator in any of the models. Suppression in the lab was uniquely a measure of the suppression of shame, rather than a general measure of suppression across all emotions in a variety of situations. Suppressing shame specifically may be detrimental, as shame experiences can be central to the development of internalizing problems (Pinto-Gouveia & Matos, 2011) and suppression involves regulation of the external manifestations of shame, leaving the internalized shame under regulated. Laboratory studies of suppression show that suppression of expression does not decrease internal levels of negative affect (Egloff, Schmukle, Burns, & Schwerdtfeger, 2006). Habitually suppressing emotions in other
situations, may not be as detrimental, as there are often socially acceptable situations in which it is necessary to suppress certain emotional expressions (e.g., withholding expressions of pride when an adolescent wins a competition against a friend; Bonanno, Papa, Lalande, Westphal, & Coifman, 2004). The finding that self-reported suppression was not strongly related to internalizing symptoms in the current adolescent sample is contrary to previous studies, reviews, and meta-analyses on suppression in adults (e.g., Aldao, Nolen-Hoeksema, & Schweizer, 2010; Gross & John, 2003; Gross & Thompson, 2007). The results of the current study point towards attempted expressive suppression as a potentially normative process that occurs in adolescence. It is possible that the self-report of general suppression does not differentiate contexts where suppression would be adaptive or maladaptive for adolescents. Indeed, two of the items on the suppression scale measure suppression of positive affect. Older youth have reported using suppression less than younger youth in some previous studies (Gullone, Hughes, King, & Tonge; 2010) and there is some evidence that suppression decreases across adulthood as well (John & Gross, 2004). If suppression is not supplemented by a more mature repertoire of emotion regulation processes in adolescence, then perhaps it becomes more problematic.

The stark contrast between lab suppression and habitual suppression may also be a result of automatic versus deliberate attempts to suppress expressions (Mauss, Bunge, & Gross, 2007). Emotion regulation can happen implicitly or automatically, without the conscious awareness of the individual (Koole, Webb, & Sheeran, 2015). Thus, individuals may suppress their expression of emotion without being aware of doing so, or individuals may try to suppress their expressions but they are unsuccessful. Self-reported habitual suppression taps more into efforts to consciously suppress emotions, whereas Lab suppression taps more into actual or successful suppression
processes in the moment, regardless of conscious effort. The extent to which suppression is successful would have different social and mental health implications.

**Rumination**

Previous studies on shame and internalizing symptoms in adults have found that rumination is a significant mediator (Cheung et al., 2004; Orth, Berking, & Burkhardt, 2006). Surprisingly, in the current study, rumination was only a significant mediator between social anxiety symptoms and shame two years later, rather than the reverse. Excessive focus on negative emotions and thoughts helped explain why some adolescents with social anxiety symptoms develop more feelings of shame in every day life. As ruminating often does not lead to a resolution of a problem, perhaps it leaves adolescents feeling more inept about their ability to succeed (Lyubomirsky & Nolen-Hoeksema, 1995), which in turn creates a vulnerability for experiencing more shame. Rumination appears to be more of a response to social anxiety symptoms that leads adolescents to feel worse about themselves.

**Gender Differences**

Past research has shown differences between genders for both psychopathology and emotion regulation (Gullone, Hughes, King, & Tonge, 2010; Nolen-Hoeksema, 2012; Tamres, Janicki, & Helgeson, 2002). Girls in the current study generally had higher shame, internalizing symptoms, and used more avoidance and rumination, which is consistent with previous research on higher incidence of internalizing problems in girls (Nolen-Hoeksema, 2000). Boys in the current study used expressive suppression more habitually than girls. Results corroborate evidence from other studies suggesting that suppression is more commonly used in males (Gullone, Hughes, King, & Tonge, 2010; Flynn, Hollenstein, & Mackey, 2010), possibly because they are attempting to uphold stereotyped “masculine” gender roles (Tamres et al., 2002).
Our second objective was to understand the moderating impact of gender on ER as a mediator between shame and internalizing symptoms. The multiple moderated mediation models showed weak evidence for gender specific processes. Overall, ER processes had a similar effect with girls and boys even though the frequency of use of different ER habits was significantly different between genders. The only gender difference was that rumination was a significant mediator between shame and social anxiety in both directions for boys. It is possible that because overall boys report ruminating less, that when boys do ruminate, it has more detrimental effects. The finding regarding boys’ rumination was contrary to our intial hypothesis that rumination would be more detrimental for girls.

**Limitations and Future Directions**

The current study used only one lab measure of ER. In contrast to questionnaires about trait-like ER habits, lab measures of ER allow for testing of dynamic processes unfolding over time and the success of regulation. Given the bidirectionality of ER with shame and internalizing symptoms over 2 years, it would be important to understand the moment-to-moment processes in both directions. Further research could examine the timing of adolescents’ experience of shame, type of regulation habits, success of regulation habits, and subsequent changes in thoughts, feelings, physiology, and behavior. With the improvement of wearable technology, it may be easier for researchers to measure these micro emotional dynamics in adolescents’ natural social contexts and then map the data to the longer-term macro results that are presented in the current study. Experience sampling methods would also be well suited to investigate the effects of different ER strategies over time (Brans, Koval, Verduyn, Lim, & Kuppens, 2013).

Shame is a social emotion. While the current study did induce shame in the social context of the laboratory, it did not induce feelings of shame in pre-established peer or family relationships, nor
did it measure the daily interpersonal interactions that could lead to more feelings of shame or poor regulation. It is possible that shame may be more painful if adolescents think people that are close to them rather than strangers are evaluating them negatively. Further research could investigate more about the development of shame in the contexts of peer and family interactions. Disapproval, rejection, or criticism of an adolescent’s habits, body, or personal characteristics is painful. In line with cognitive theory (Beck, 1995; Young, Klosko, & Weishaar, 2003), repeated shaming experiences could lead to the development of a cognitive schema that all or many social interactions will result in shame, and thus the adolescent becomes more nervous and/or sad about social interactions. Avoidance of people and thoughts that make an adolescent feel ashamed may feel like the only option in many cases. While there is research into parent-child interactions and shame-proneness in childhood (Bennett, Sullivan, & Lewis, 2010; Mills, 2003; Mills, Arbeau, Lall, & De Jaeger, 2010), little is known about these processes in parent-child, and peer relationships in adolescence (Muris & Meesters, 2014). One of the few studies in this area has found a relationship between parental rejection and shame-proneness in adolescence (Stuewig & McCloskey, 2005), thus showing it is an area worthy of further investigation.

Further research may help confirm and identify new ER targets for intervention for adolescents at different ages. The results of the current study support an approach that targets avoidant and suppressive behaviors in shame-prone adolescents. Part of interventions for learning to regulate shame could first include components about awareness of shame, avoidance, and suppression. Next, it could address different approaches to shame regulation such as self-acceptance, healthy expression of emotion, and approach/skill building behaviour. Evaluating the impact of an emotion regulation intervention with shame-prone adolescents may provide further evidence for transdiagnostic theory for the development of emotional disorders (Wilamowska et al., 2010).
Furthermore, as rumination and avoidance helped explain how social anxiety symptoms led to further shame, an intervention for adolescents with internalizing symptoms could focus on how to replace rumination and avoidance with healthier styles of thinking and behaviour. Rumination-focused cognitive behavior therapy has been found to be helpful with adults with depression (Watkins et al., 2007).

**Conclusion**

Adolescents encounter strong feelings of shame in their daily lives. Shame plays an important role in the development of symptoms of depression and social anxiety. Adolescents that attempt to regulate their shame experience through suppression or avoidance suffer more in the long-term. Adolescents that avoid and ruminate about their social anxiety symptoms or inability to regulate feel more ashamed about themselves, possibly due to stigma or self-judgment. The current study made a contribution to growing movement towards a transdiagnostic, emotion regulation framework for understanding the development and maintenance of internalizing symptoms. Future research could aim to further substantiate transdiagnostic theory with more comprehensive longitudinal studies as well as studies measuring emotion regulation change across prevention and intervention programs.


Chapter 4: Training Emotion Regulation in Late Adolescence: A Transdiagnostic Approach

Lanteigne, D.M., DeFrance, K., & Hollenstein, T.
Abstract

Emotion regulation (ER) difficulty is strongly related to anxious and depressive symptoms. We hypothesized that targeting ER of first year university students with group training sessions would improve regulation, which would result in a reduction in internalizing symptoms. Participants under age 20 from an introductory psychology course were screened for high emotion dysregulation (top 33% on the Difficulty with Emotion Regulation Scale), interviewed for DSM-IV disorders, and randomly assigned to comparison (n = 62) or training (n = 65) groups. Both groups completed a broad range of ER and internalizing self-report questionnaires at pre-training, post-training, and 6-months post-training. Both groups also completed brief weekly assessments of ER and mood for 6-weeks during the training phase of the study. The training group completed 6-weeks of training sessions adapted from the Unified Protocol for the Treatment of Emotional Disorders (Barlow et al., 2003). As hypothesized, putatively adaptive ER habits (e.g., reappraisal, mindfulness) were negatively correlated with depressive and anxious symptoms at all time points, whereas putatively maladaptive habits (e.g., avoidance, rumination) were positively correlated with internalizing symptoms. The brief measure of ER showed reductions in ER difficulty for the training group in relation to the comparison group over the course of the 6-week training. However, those gains were not maintained at post or follow-up. Similarly, there were few group differences in ER habits or internalizing symptoms at post or follow-up. The discussion delves into ways of improving our approach for future studies.

Keywords: Emotion regulation, transdiagnostic intervention, adolescence, anxiety, and depression.
Training Emotion Regulation in Late Adolescence: A Transdiagnostic Approach

The percentage of adolescents that begin post-secondary education in North America has risen to approximately 75% in recent years (Shaieks, Gluszynski, & Bayard, 2007; Kirby, 2011) and the typical university student is younger than the typical student was 20 years ago (Dale, 2010). The transition to university includes new pressures such as making new relationships, modifying previous relationships with family and friends, new academic environment with increased workload, a heavy drinking culture, and the practical and emotional adjustments to living independently (Parker, Hogan, Eastabrook, Oke, & Wood, 2006; Sher & Rutledge, 2007). The stress of adjusting to the demands of university life can be difficult for adolescents, especially if pre-existing emotional vulnerabilities increase the likelihood of developing internalizing symptoms (Brougham, Zail, Mendoza, & Miller, 2009; Dyson & Renk, 2006; Keefer, Parker, & Wood, 2012).

The estimated prevalence of an anxiety or depressive disorder in undergraduates is 15.6% (Eisenberg, Gollust, Golberstein, & Hefner, 2007), and subclinical levels are even higher (Price, McLeod, Gleich, & Hand, 2006). Even subclinical symptoms can cause significant distress and disruption in adolescent’s lives (Lewinsohn, Solomon, Seeley, & Zeiss, 2000) and increase the risk of having a Major Depressive Episode in adulthood (Pine, Cohen, Cohen, & Brook, 1999). Internalizing symptoms in university students can be persistent and while individuals are aware of the need for treatment, the majority of students do not seek help (Zivin, Eisenberg, Gollust, & Golberstein, 2009). Untreated anxious and depressive symptoms can lead to academic difficulty, interpersonal difficulty, and in severe cases suicide (Avenevoli et al. 2008; Brown, Parker, & Godding, 2002; Kessler and Walters 1998; Reinherz et al. 1993; Wilson, Mason & Ewing, 1997). Thus, strengthening the emotional resilience of older adolescents could avert a multitude of problems.
While emotional problems can be worked through in traditional counseling services, the services are often crisis focused and involve long wait times, short appointments, and limited numbers of sessions due to high demand and fiscal constraints (Clapham, Jahchan, Medves, Tierney, & Walker, 2012; Dworkin & Lyddon, 1991). Individuals that fall into the late adolescence or emerging adulthood age group (age 16 to age 24) also often fall through the gap of children’s mental health services and adult mental health services, which tends to offer service to people with severe mental illness (Carver et al., 2015). Therefore, current approaches that rely on student access to mental health services are either too little or too late. What are needed are measures that will enhance students’ resilience and decrease the reliance on a crisis approach within an already overburdened mental health system. Research is needed to examine alternative treatment delivery models to meet the needs of adolescents transitioning to university (Clapham et al., 2012; DeRosier, Frank, Schwartz & Leary, 2013). The current study was designed to evaluate a training program targeting the ability to manage emotions and moods in first year students. Targeting adolescents with higher levels of emotional dysregulation, in a group format would be a cost-effective intervention with the potential for meaningful effects. To select the appropriate style of therapeutic approach to this problem, current knowledge of comorbidity in internalizing disorders and the common underlying vulnerability of emotion regulation were considered along with the limitations of approaches to date.

**Comorbidity in Depression and Anxiety**

Anxiety and unipolar depression are highly comorbid in child, adolescent, and adult samples (Brady & Kendall, 1992; Kaufman & Charney, 2000; Kessler et al., 1996). Developmental research across childhood and adolescence shows that anxiety often precedes depression, and that rate of comorbidity increases across time (Cole, Peeke, Martin, Truglio, & Seroczynski, 1998; Zahn-
Estimates for comorbidity in childhood and adolescence range from approximately 20-50% (Angold, Costello, & Erkanli, 1999; Brady & Kendall, 1992; Costello, Mustillo, Erkanli, Keeler, & Angold, 2003), however comorbidity is likely underestimated because an anxiety disorder with subclinical depressive symptoms would not be classified as comorbid (Zahn-Waxler, Klimes-Dougan & Slattery, 2000). Thus, high levels of comorbidity support a transdiagnostic approach (not specific to one diagnosis) and implications common mechanisms such as ER.

**Emotion Dysregulation Underlies Depression and Anxiety**

Depression and anxiety have been conceptualized as two separate disorders, however given high comorbidity some researchers have theorized that they are variants that emerge from similar underlying emotion regulation vulnerabilities (Hofmann, Sawyer, Fang, & Asnaani, 2012; Kim-Spoon, Cicchetti, & Rogosch, 2013). Emotion regulation (ER) is the process of inhibiting or modifying feelings, bodily arousal, and expressive behavior (Gross & Muñoz, 1995). Many studies have documented positive correlations (r’s ranging from approximately .20 to .70) between emotion dysregulation and depression and anxiety symptoms (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Hatzenbuehler, McLaughlin, & Nolen-Hoeksema, 2008; Lanteigne, Flynn, Eastabrook, & Hollenstein, 2014; Mennin, Holaway, Fresco, Moore, Heimberg, 2007).

According to the Dysregulation Model of Emotional Disorders, when emotionally triggering events occur, individuals use different ER habits or tendencies (Hofmann, Sawyer, Fang, & Asnaani, 2012). Unsuccessful or maladaptive ER habits leave high negative emotion under managed and the feelings may be more intense and persistent in comparison to successful ER habits (Hofmann et al., 2012). Persistent and intense negative emotional states such as sadness and guilt for depressive disorders and fear for anxiety disorders are key components in the diagnostic criteria for each
respective disorder (Hofmann et al., 2012; Kasper, den Boer & Sitsen, 2003). Developmental and longitudinal research supports the Dysregulation Model of Emotional Disorders. Individual differences in emotion regulation emerge before the onset of anxiety and depressive disorders (Kovacs, Joormann, & Gotlib, 2008). Emotion regulation partially mediates the relations between temperamental differences and stressful events, and internalizing symptoms (Kim-Spoon, Cicchetti, & Rogosch, 2013; Sim & Zeman, 2005). While significant environmental stresses are related to the development of internalizing disorders, emotion regulation is an independent contributor to the development of internalizing disorders (Kim-Spoon et al., 2013). Furthermore, even when controlling for initial levels of depressive symptoms in adults, successful application of emotion regulation habits was a significant predictor of subsequent depressive symptoms 5 years later (Berking, Wirtz, Svaldi, Hofmann, 2014).

There are different ways of regulating or responding to emotions that can function to increase or decrease experience of negative emotions. In the undergraduate population, depression and anxiety have been related to the greater use of maladaptive emotion regulation strategies (e.g., suppression, catastrophizing, avoidance, concealing, rumination; English et al., 2012; Flynn, Hollenstein, Mackey, 2010; Garnefski et al., 2002; Hofmann & Kashdan, 2010; Nolen-Hoeksema, 2012) and, to a lesser extent, to reduced use of adaptive regulation strategies (e.g., reappraisal, tolerance, mindfulness, awareness; Aldao et al., 2010; Gross & John, 2003; Hofmann, Sawyer, Witt, & Oh, 2010). ER difficulties are associated with a wide spectrum of problems – mostly mood and anxiety disorders but also substance abuse and eating disorders (Aldao et al., 2010). Thus, enhancing ER habits in prevention and intervention work could potentially make a large impact.
Limitations of Current Treatment Models Could be Addressed by Integrating Transdiagnostic Training Models

Globally, mental health service models are currently evolving from those that offer delayed and restricted access (e.g., treating only those with severe disorders) to those that focus on early intervention and providing services during sensitive developmental transitions (Iyer et al., 2015; McGorry, Bates, & Birchwood, 2013). Roughly two thirds of adolescents and emerging adults with a diagnosable mental health condition do not seek out treatment due to constraints to access services (e.g., stigma, financial, geographical; Iyer et al., 2015; McGorry et al., 2013). Training initiatives can target at-risk adolescents before they are in a state of crisis or develop further problems, and those who may not be able or willing to seek out traditional treatment.

In attempts to improve the status quo, prevention studies for depression and anxiety have become more popular over the last 30 years, and youth mental health services are starting to undergo a transformation as a result (Cross et al., 2014; Stice et al., 2009). Universal prevention typically involves programs that are delivered to all youth, such as all students in a grade in a particular school. The benefits are that these programs reduce stigma and promote mental health awareness on a wide-scale. However, universal prevention programs have resulted in lower effect sizes in comparison to selective prevention programs that instead target at-risk youth (Horowitz & Garber, 2006; Stice, Shaw, Bohon, Marti, & Rohde, 2009). Selective prevention programs focus on students that are at risk for developing depression or anxiety such as those with parents with depression. Selective prevention studies generally have larger effect sizes, are more cost-effective, and also help youth prior to developing more severe symptoms (Horowitz & Garber, 2006; Stice et al., 2009). Overall, selective prevention studies still have small effect sizes and only a few have shown long-term reduction in symptoms or reduction in the onset of clinical disorder (Stice et al., 2009). These
limited effects might be related, in part, to taking a disorder specific approach rather than a transdiagnostic approach and excluding participants with clinical levels of internalizing symptoms who have not received help (Seligman, Schulman, DeRubeis, & Hollon, 1999).

Training programs that are transdiagnostic in nature can treat the underlying mechanisms for the prevention or intervention for multiple disorders. Theoretically, this approach should lower current symptoms of multiple disorders and prevent the onset of multiple disorders in the future. Costs may be lowered because transdiagnostic programs can be offered to a heterogeneous group of youth, rather than only to a group of youth with risk factors for a single disorder. Dissemination of transdiagnostic methods may be more efficient for the training of mental health workers because workers could focus on enhancing their therapeutic delivery of a transdiagnostic manual rather than learning multiple treatment manuals for each separate disorder. Treatment efficiency and simplicity may result in reduced fees, better adherence to manualized treatment, and better success rates. Finally, adolescents might experience less stigma-related discomfort when working on transdiagnostic mechanisms such as ER as opposed to a clinical disorder.

**Emotion Regulation Training for Internalizing Symptoms**

The UP is a transdiagnostic, cognitive behavioral treatment protocol that has been developed through decades of successful treatment research and with consideration of emotion theory and developmental psychopathology frameworks. Rather than taking a disorder specific approach, it was designed to help people modify their ER habits. The Unified Protocol has been used successfully with a variety of samples including adolescents and adults with a wide spectrum of disorders (e.g., Barlow et al., 2011; Bullis et al., 2015; Ellard et al., 2010; Farchione et al., 2012; Norton & Barrera, 2012; Wilamowska et al., 2010). For this reason, I decided to adapt our training from the UP.

The UP aims to decrease processes related to maladaptive regulation (e.g., avoidance) and
increase processes related to adaptive regulation (e.g., reappraisal). The focus on ER allows clients to generalize lessons across a variety of intense emotions and common psychological processes (Clark, 2009). A general overview of the program is that it educates about the functionality of emotions, teaches how to observe and track emotional experiences without self-judgment, and helps people to identify common maladaptive thought and behavior patterns, tolerate the physical sensations of emotion, and practice changing thoughts and behaviours in real-life. The module progression is: (1) Motivation Enhancement for Treatment Engagement, (2) Psychoeducation and Tracking of Emotional Experiences (3) Emotional Awareness Training, (4) Cognitive Appraisal and Reappraisal, (5) Emotion Avoidance and Emotion Driven Behaviours, (6) Awareness and Tolerance of Physical Sensations, (7) Interoceptive and Situation-Based Emotion Exposures, and (8) Relapse Prevention (Barlow et al., 2011).

In one study using the UP, 73% of participants showed improvement in their principal diagnosis post-treatment which increased to 85% at 6-month follow-up (Ellard et al., 2010). Effect sizes were large, and at least comparable to those found for traditional, though less efficient and more costly, cognitive behavioral therapy (Barlow et al., 2011). The UP also shows promising results for enhancing ER and decreasing anxiety and depressive symptoms in group treatment with heterogeneous client presentations (Bullis et al., 2015). A preliminary study examining the long-term effects of the UP showed that clients either maintained their reductions in anxiety and depression symptoms or they had only marginal worsening at the 18-month follow-up in comparison to the 6-month follow-up (Bullis, Fortune, Farchione, & Barlow, 2014). Thus, there is a growing body of support for the effectiveness of the UP.

In two recent studies, ER was also measured during the course of UP treatment. Pre to post changes in awareness and acceptance of emotions were correlated with decreases in anxiety and
depression scores for a sample of adult patients with anxiety disorders (Sauer-Zavala et al., 2012). In another study using a single-case design, changes in mindfulness preceded changes in depression and anxiety, and changes in reappraisal preceded changes in depression (Boswell, Anderson, & Barlow, 2014). These preliminary studies show that the UP is indeed having an impact on emotion regulation, which is in turn reducing internalizing symptoms.

While the UP has been successful with clinical populations in several initial trials (Bullis et al., 2015; Ellard et al., 2010; Fairchione et al., 2012; Wilamowska et al., 2010) and in randomized control trials (e.g., Norton & Barrera, 2012), the UP has not yet been applied to high-risk groups. However, another transdiagnostic protocol, a German-language protocol called the Integrative Training of Emotional Competencies, has recently proven successful in enhancing ER in a high-risk sample to reduce emotional problems (Berking, Meier, & Wupperman, 2010).

A transdiagnostic training approach, based on the UP, was hypothesized to meet the needs of our sample better than disorder-specific interventions. The transdiagnostic training approach (1) improves the ER mechanisms underlying depression and anxiety symptoms for optimal current and future functioning, (2) helps students before they are in crisis, and (3) promotes access to mental health services for those with barriers such as stigma or financial constraints. First year university students are progressing through a stressful developmental transition and are at high-risk for the onset of depression and anxiety (Brougham et al., 2009; Dyson & Renk, 2006; Keefer et al., 2012; Parker et al., 2006; Sher & Rutledge, 2007). First year university students were expected to respond well to the training as meta-analyses typically show that older adolescents have larger effect sizes in comparison to younger adolescents for cognitive-behavioral therapy based prevention programs (e.g., Horowitz & Garber, 2006; Stice, Shaw, Bohon, Marti, & Rohde, 2009).
Design and Hypotheses

The current study involved delivering the UP adapted for a small group format with late adolescents (age 17-20) in their first year of university. Participants were randomly assigned to the training group or the comparison group. The training group attended six 1.5-hour training sessions where main concepts from the UP were covered. Both the comparison group and the training groups completed comprehensive measures of internalizing symptoms and ER at baseline, post-intervention, and at a 6-month follow-up. Both groups also completed six brief weekly assessments for mood and ER to monitor change during the training period.

Hypothesis 1

Previous research has identified associations between adaptive strategies and lower internalizing symptoms, and maladaptive strategies and higher internalizing symptoms (e.g., Aldao et al., 2010). In terms of overall results for our entire sample, we expected that symptoms of depression and anxiety would be positively related to putatively maladaptive ER habits and negatively related to putatively adaptive ER habits at pre, post, and follow-up. Beyond simply a replication, the comprehensiveness of our ER measures was expected to reveal relative strength and consistency of associations between internalizing symptoms and specific ER habits.

Hypothesis 2

H2a. Interventions for a number of different depressive and anxious disorders have shown that there are large gains in the early sessions (i.e., sessions 1-4) of therapy (Illardi & Craighead, 1994; Penava, Otto, Maki, & Pollack, 1998; Tang & DeRubeis, 1999). We predicted that the training group in the current study would show large declines in emotion dyregulation during the early weeks of the training phase and then decline more slowly but steadily for the remainder of the training phase. Dysregulation in the comparison group was not expected to change over the course of the
study.

H2b. While changes are not always sustained in interventions, the UP has some evidence for longer-term impact (Bullis et al., 2014). Thus, we expected that the changes in ER would be sustained in the training group at post and follow-up. Given that ER has been linked to mood (Silk, Steinberg, & Morris, 2003), we expected that the brief ER measure would be positively correlated with weekly negative affect and negatively correlated with weekly positive affect.

**Hypothesis 3**

The UP has previously been related to change in symptoms and change in ER strategies in clinical samples (Boswell, Anderson, & Barlow, 2014; Sauer-Zavala et al., 2012). We expected that the training group would have fewer internalizing symptoms, lower use of maladaptive ER strategies, and higher use of adaptive ER strategies in relation to the comparison group at post intervention and follow-up.

**Hypothesis 4**

The UP is intended to decrease negative emotion and increase positive emotion (Barlow et al., 2011). We expected that the training group would have less general negative affect and more general positive affect in comparison with the comparison group at post-training and 6-month follow-up.

**Hypothesis 5**

The Dysregulation Model of Emotional Disorders suggests that modifying ER is a central mechanism of change for internalizing symptoms (Hofmann et al., 2012). We predicted that changes in ER from pre to post training would mediate the change in internalizing symptoms and general affect from pre-training to follow-up.
Method

Participants

Procedures for the study were reviewed and approved by the General Research Ethics Board within the university. Participants were recruited through the Psychology 100 prescreening assessment (n = 1480) at the beginning of the fall term at a university in southern Ontario. Inclusionary criteria were ER vulnerability, defined by the top 33% on a measure of ER difficulty (Difficulty with Emotion Regulation Questionnaire; Gratz & Roemer, 2004) and age under 20 years. Two general recruitment emails were first sent to eligible students in the top 25% on ER difficulty. All eligible students were contacted by telephone. Students that responded to the email were contacted prior to those that had not responded to the emails. If students were interested in the study they either completed the telephone interview immediately, or they scheduled a time to complete the telephone interview. As recruitment efforts were not reaching ideal targets, the inclusionary criteria were expanded to include students in the top 25-33% on ER difficulty and followed the same process. Recruitment took place from mid November to early January.

The telephone interview began with informed consent. We confirmed that the student was less than 20 years old. Students were then asked a series of simple questions to determine if they immediately met the exclusion criteria, followed by a diagnostic interview conducted by the first author or another PhD student in clinical psychology. Students were excluded if they reported that they (1) had a diagnosis of schizophrenia, other psychotic disorders, or Personality Disorders, (2) had participated in long-term therapy in the past, which was defined by receiving therapy for more than 6 sessions, (3) were receiving treatment currently that they anticipated would continue into the winter semester, or (4) were currently on mood altering medication (e.g., antidepressants). To ensure students did not have one of the excluded diagnoses above, but they had never received a formal
diagnosis, we then conducted the Mini Neuropsychiatric Interview (MINI). The MINI also provided descriptive diagnostic information about the sample. At the end of the interview, students that continued to be eligible for the study were given more information about the study and asked if they would like to participate. Excluded participants were told that they did not meet the specific eligibility criteria for the study and were given general information about mental health services through the University or the surrounding community. Tailored information was given depending on the interest and the presenting issues of the student.

Of the 154 potential participants that were screened, 6 were excluded due to current use of medication, 5 were excluded due to current treatment, 6 were excluded due to both medication and current treatment, 7 were excluded due to past use of long-term therapy, 2 were excluded because they entered their age incorrectly on the psyc100 survey (over age 20), and 1 was excluded due to suspected manic episode and potential poor fit in a group training setting. Using diagnostic interviewing procedures as specified in the MINI which follows the DSM-IV, the remaining sample (n = 127) had the following rates of different mental illnesses: Major Depressive Disorder (Current First Episode= 2%, Current Multiple Episodes = 5%, Past = 10%), Minor Depressive Disorder (Current = 2%, Past = 3%), Generalized Anxiety Disorder (Current = 6%), Panic Disorder (Current = 1%, Lifetime = 2%, Limited Symptom Attacks Lifetime = 6%), Social Anxiety Disorder (Current = 5%), Obsessive Compulsive Disorder (Current = 2%), Post-Traumatic Stress Disorder (Current =1%), Hypomanic Episode (Current = 1%, Past = 2%), Alcohol abuse (n = 1%), Alcohol dependence (Current = 9%), Substance Abuse (Current = 1%), Substance Dependence (Current = 2%), Bulimia (Current = 3%), and Anorexia (Current = 1%). Note that no participants met criteria for Dysthymic Disorder, Bipolar Disorders, or Psychotic Disorders. The majority of subjects did not meet any diagnostic criteria (63%), some met criteria for one disorder (24%), and some met the
criteria for multiple disorders (13%). Using a chi-square, there were no significant differences between the comparison and the training group on the number of participants that met criteria for a disorder versus those that did not meet criteria for a disorder, $X^2 = .79, p = .46$.

The most common diagnoses in the present sample were depressive, anxious, and substance use disorders. The rate of current Major Depressive Disorder at 7% in the current study was similar to point prevalence for adult community samples (5-9% for women, 2-3% for men; DSM-IV). The rate of Generalized Anxiety Disorder (GAD) at 5.5% was slightly higher than 1-year prevalence rates in a community sample (approximately 3%; DSM-IV). The rate of alcohol use disorders at 10% in the current study was somewhat higher than studies using a general population (approximately 7%; Kessler et al., 1997), however the rates were lower than other studies that screened for alcohol use disorders in college students after excluding lifetime alcohol abstainers (30%-37%; Encrenaz & Messiah, 2006; Knight et al., 2002; Windle, 2005). The rates may have been somewhat higher than the general population for MDD, GAD, and substance use disorders because the current study participants were screened to be the top 33% in emotion dysregulation and they were in the middle of a life transition. Furthermore, college students perceive binge-drinking as a social norm, and approximately 45% of college students participating in binge-drinking, which could explain higher rates of substance use problems (Wechler et al., 2002).

For GAD and MDD we were able to compare the rates of diagnoses to self-reported symptoms during the pre-assessment. The 5.5% rate of GAD in the current sample matched the percentages for Severe Anxiety measured with the Beck Anxiety Inventory (BAI) at the pre-assessment. BAI clinical cutoffs at the pre-assessment were as follows: Minimal anxiety 47.7%, 34.3% Mild Anxiety, 12.6% Moderate Anxiety, 5.4% Severe Anxiety. Similarly, the rate of Major Depressive Disorder criteria for 7% of the sample was similar to the percentage for Severe Depression using the Beck Depression
Inventory (BDI) at the pre-assessment. BDI clinical cutoffs at the pre-assessment were as follows: 47.3% Minimal Depression, 24.1% Mild Depression, 21.5% Moderate Depression, 7.1% Severe Depression.

Of the 127 participants that were eligible after completing the phone interview, 12 did not complete the pre-assessment (8 Training, 4 Comparison). Of the 115 participants that completed the pre-assessment, there were more girls (87%) than boys (13%), though these percentages reflect the proportions taking introductory Psychology. Participants ranged in age from 17.9 years to 20 years ($M = 18.57$, $SD = .42$). Ethnic backgrounds, as described by participants were as follows: White (59.1%), Chinese (10.4%), Multi-Ethnic (9.6%), South Asian (6.1%), Korean (5.2%), Filipino (2.6%), Black (1.7%), South East Asian (1.7%), Arab (<1%), and unknown (<1%). All participants were fluent in English and 80% indicated that English was their first language. They described their family income as low (8.7%), middle (47.8%), upper middle (37.4%), and high (6.1%). Participants were predominately students in the Faculty of Arts and Sciences (75.7%) and Faculty of Education (18.2%), with a few students in the Faculty of Health Sciences (6%). Participants described their sexual orientation as heterosexual (93.9%), lesbian or gay (3.5%), bisexual (0.9%), and other (1.7%). Most participants lived at least 100km away from their family home (95.8%) and most moved to Kingston without having any close friends (73%) or relatives in the area (85.2%). The majority of participants reported living in university residences (93%) where as some reported living off-campus (6.1%), and some did not report their living situation (0.9%).

Between the pre-assessment and the post-assessment, 8 participants dropped out, leaving 107 participants that completed the post-assessment (52 Training, 55 Comparison). Of the 8 participants that dropped out, 7 dropped out before the beginning of the training sessions and one dropped out after the first session. Two participants in the comparison condition began taking antidepressants
during the training phase of the study and thus were excluded from group analyses. Two participants began taking antidepressants between the post assessment and the follow-up assessment of the study (one training, one comparison), thus they were excluded from group analyses involving the follow-up. The final number of included participants in the comparison and training group were 52 and 51, respectively.

Homework completion within the training group was high, with a mean of 80% completion of 4 out of 5 assignments. Session attendance was also high with session 1 (92%), session 2 (98%), session 3 (96%), session 4 (96%), session 5 (100%), and session 6 (100%). The session completion percentages included participants that took the opportunity to attend a make-up session after missing their regular weekly session. Participants were aware that if they wanted to continue in the study that they needed to complete at least 5 of 6 sessions. Only 1 participant did not meet the attendance standard and completed 4 of 6 sessions. Participants with suboptimal attendance were not excluded from analyses.

Completion of the weekly assessments for the comparison group was also high. The majority of the comparison group (96%) completed 100% of the weekly assessments, with the remaining 4% completing 60-80% of the weekly assessments.

Participants were compensated with a combination of course credit and financial remuneration. One credit or $10 was given for each full assessment and each training session (maximum of 2 credits). One credit or $10 was given to the comparison group for completing all of the brief weekly assessments. Most participants in the training group opted to get $70 and 2 credits and most participants in the comparison group opted to get $20 and 2 credits. The training group participated in a pre-training assessment, then 6 weekly training sessions with brief assessments,
followed by post-training and 6-month follow-up assessments. The comparison group participated in the pre-, weekly, post-, and follow-up assessments only (See Table 1 for Study Timeline).

Table 1

*Study Timeline*

<table>
<thead>
<tr>
<th></th>
<th>September</th>
<th>November-January</th>
<th>January</th>
<th>January to March</th>
<th>March</th>
<th>September</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Training Group</strong></td>
<td>Prescreen (Psyc100)</td>
<td>Phone Interview</td>
<td>Pre-training Assessment</td>
<td>6 Trainings with in-session brief mood/ER assessment</td>
<td>Post-Training Assessment</td>
<td>Follow-up Assessment</td>
</tr>
<tr>
<td><strong>Comparison Group</strong></td>
<td>Prescreen (Psyc100)</td>
<td>Phone Interview</td>
<td>Pre-training Assessment</td>
<td>6 Online brief mood/ER assessment</td>
<td>Post-Training Assessment</td>
<td>Follow-up Assessment</td>
</tr>
</tbody>
</table>

**Procedure**

**Both comparison and training groups.**

*Full Assessment.* At the pre-, post-, and follow-up assessments, a battery of emotion regulation measures, general positive and negative affect, and internalizing symptoms were completed by both groups. Participants in the training group also received a client satisfaction questionnaire at the post-assessment. All participants were sent a login and password for their Full Assessment and completed them online. Details regarding the questionnaires in the Full Assessment have been provided in the measures section.

*Brief Assessment.* Every week between pre- and post-assessments participants in both conditions completed a brief questionnaire about ER habits developed for this study (Brief Emotion Regulation Scale; BERS) and mood check by rating how participants felt during the past week. Training participants completed the weekly survey at the beginning of each training session and the de-identified surveys were collected and sealed in an envelop by the training leader. Training
participants also completed a report indicating the completion of their homework activity and reflections on what they had learned. Comparison participants were sent a login and password for their Brief Assessment online. A quarter of the emails to comparison participants were sent each morning Monday to Thursday. Comparison participants received their survey on the same day for each of the 6 weeks to mimic the regularity of the training sessions being on the same day. Reminder emails were sent to comparison participants if they had not completed the survey within the 48-hour deadline. Details regarding the reliability of the BERS and mood check have been provided in the measures section.

**Training group only.**

Participants in the ER training group condition attended 1.5-hour sessions weekly for 6 weeks along with 3-7 other students. Group leaders were psychology graduate students trained in the modified UP protocol by the first author. There were 5 group leaders including the first author, each leading 1-2 sessions per week. Four of the graduate students were third year PhD students in clinical psychology, with previous training and experience in cognitive-behavioral therapy. One of the graduate students was a master’s student with four years of counseling experience with adolescents. Leaders went through rigorous training and practice session materials with the first author prior to the beginning of the groups. Each session began with the Brief Assessment followed by a check-in and then the delivery of the training content. In order to engage participants, sessions were organized around the general theme of managing strong emotions while adjusting to university. The sequence of topics across sessions was: (1) Psychoeducation and Tracking of Emotional Experiences (2) Emotional Awareness Training, (3) Cognitive Appraisal and Reappraisal, (4) Emotion Avoidance and Emotion Driven Behaviors, (5) Situation-Based Emotion Exposures, and (6) Consolidation. Content was delivered in a way that related to the participants’ experiences and included discussion.
The session modules are listed in table 2. We were not able to include all of the UP modules due to time constraints. Modules 1 and 2 from the original UP were combined because they were the least time-intensive. We also decided to exclude the UP Module 6 (Awareness and Tolerance of Physical Sensations) because interoceptive exposure is not as empirically supported as the other modules are for transdiagnostic samples (Boswell et al., 2013). While interoceptive exposure is gaining evidence of usefulness as a transdiagnostic strategy, to date, it has mainly been used as a component of treatment for Panic Disorder (Boswell et al., 2013). Leaders completed a questionnaire measuring their adherence to the module guidelines. One group fell behind in content at session 2 due to the leader arriving late to a session, but were able to catch-up by session 6. Leaders were compensated $20 per session plus $15 per hour for preparatory sessions.
## Table 2

### Modules for the Training Group.

<table>
<thead>
<tr>
<th>Week</th>
<th>Module</th>
<th>ER Target</th>
</tr>
</thead>
</table>
| 1 (UP Module 1 & 2) | Psychoeducation and Tracking of Emotional Experiences | • Emotional Awareness  
• Acceptance |
| • Introduction to the group  
• Motivation Enhancement  
• Psychoeducation on adaptive function of emotions  
• 5-component model of emotional experiences |
| 2 (UP Module 3) | Emotion Awareness Training | • Emotional Awareness  
• Mindfulness  
• Acceptance  
• Tolerance  
• Rumination |
| • Practice a more non-judgmental, present-focused awareness of emotional experiences |
| 3 (UP Module 4) | Cognitive Appraisal and Reappraisal | • Reappraisal  
• Catastrophizing  
• Blame Self  
• Blame Others |
| • Cognitive Appraisal  
• Thinking Traps and Countering Questions |
| 4 (UP Module 5) | Emotion Avoidance and Emotion-Driven Behaviors (EDBs) | • Cognitive Avoidance  
• Behavioral Avoidance  
• Expressive Suppression  
• Concealing |
| • Identification of emotion avoidance strategies  
• Rationale for replacing emotion-driven behaviors with incompatible behaviors |
| 5 (UP Module 7) | Situation-Based Emotion Exposures | • Integrating all ER targets |
| • Exposure rationale  
• Create and review individual hierarchies  
• Situational emotion-focused exposures |
| 6 (UP Module 8) | Consolidation | • Integrating all ER targets  
• Adjusting |
| • Skill Review  
• Emphasis on continued implementation of exposures  
• Review of progress and future goals |
Measures

Diagnostic interview.

The Mini-International Neuropsychiatric Interview (MINI) version 6.0.0 is a brief, structured diagnostic interview that helps the interviewer assess for DSM-IV psychiatric diagnoses (Sheehan et al., 1998). The current study used the following modules: Major Depressive Episode (A), Manic and Hypomanic Episodes (C), Panic Disorder (D), Social Phobia/Social Anxiety Disorder (F), Obsessive-Compulsive Disorder (G), Post-Traumatic Stress Disorder (H), Alcohol Dependence/Abuse (I), Substance Dependence/Abuse (J), Psychotic Disorders and Mood Disorder with Psychotic Features (K), Anorexia Nervosa (L), Bulimia Nervosa (M), Generalized Anxiety Disorder (N), Rule out Medical, Organic, or Drug Causes for all disorders (O). Note that we excluded the Suicidality, Agoraphobia, and Antisocial Personality Disorder modules. The MINI has high concordance rates with other clinical diagnostic interviews such as the SCID (Sheehan et al., 1998). The MINI has been used in studies with college students (e.g., Encrenaz & Messiah, 2006; Windle, 2005).

Measures used in the pre, post, and follow-up Full Assessment.

General affect and Internalizing Measures.

Positive and Negative Affect Schedule – Expanded Form (PANAS-X; Watson & Clark, 1999). This self-report questionnaire involves rating the extent to which 60 different emotions (e.g., cheerful, disgusted, afraid) have been felt on a scale from 1 (very slightly or not at all) to 5 (extremely). This questionnaire can be used to report emotional experience at different time scales (e.g., in the moment versus across the past year). For this study participants reported how they have felt over the “past few weeks” to obtain a general sense of their emotionality pre and post intervention as well as 6-months later. Individual items load onto the positive and negative affect
subscales that will be used in analysis. Internal consistency coefficient alphas were high: .92, .89, .91 (positive) and .90, .92, .90 (negative) at pre, post, and follow-up, respectively.

*Depressive symptoms.* The Beck Depression Inventory II (BDI-II; Beck, Steer & Brown, 1996) is a self-report questionnaire that measures cognitive, affective, and physical symptoms of depression. For each of the 20-items, respondents selected one of four statements that describe the severity of depressive symptoms during the past two weeks. The scale is from 0 (no depressive symptoms) to 3 (severe depressive symptoms). One item was excluded (suicidal thoughts) due to ethical limitations of online questionnaires. For the BDI-II, internal consistency coefficient alphas were high: .90, .93, and .94 at pre, post, and follow-up, respectively. A mean of all items was calculated so the final score was on a 0-3 scale; higher scores indicated higher Depressive Symptoms.

*Anxiety symptoms.* The Beck Anxiety Inventory (BAI; Beck, Epstein, Brown & Steer, 1988) is a self-report inventory that measures cognitive and somatic symptoms of anxiety. It consists of 21-items on a four-point scale. Internal consistency coefficient alphas were high for the BAI: .91, .93, and .93 at pre, post, and follow-up, respectively. A mean of all items was calculated so the final score was on a 0-3 scale; higher scores indicated higher Anxiety Symptoms.

*Emotion regulation measures.*

*Difficulty with emotion regulation.* The Difficulties in Emotion Regulation Questionnaire (DERS; Gratz & Roemer, 2004) is a 36-item questionnaire measuring various aspects of ER including non acceptance of emotional responses, difficulty engaging in goal-directed behavior, impulse control difficulties, lack of emotional awareness, limited access to regulation strategies, and lack of emotional clarity. Internal consistency coefficient alphas for the total score were high: .93, .93, and .94 at pre, post, and follow-up, respectively. Construct validity has been demonstrated in
many past studies, as the DERS shows significant associations with constructs thought to be related to ER difficulty such as positive associations with negative affect, depression symptoms, anxiety symptoms, anxiety sensitivity, and negative associations with mindfulness and self-compassion (e.g., Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; Roemer et al., 2009; Tull et al., 2009; Vujanovic et al., 2008). Past research has shown that the DERS has good test-retest reliability over a period of 4 to 8 weeks (Gratz & Roemer, 2004). Past research has also shown that the DERS is sensitive to change due to intervention (e.g., Gratz, Lacroce, & Gunderson, 2006; Fox et al., 2008).

As DERS is one of the most widely used measures for emotion regulation, standard scores are emerging in the literature (Gratz & Tull, 2010). DERS sum scores for non-clinical samples of college students and community adults average 75-80, self-harming college student average 85-90, those with GAD average 95-100, those with PTSD average 100-105, and those with borderline personality disorder average 125 (Gratz & Tull, 2010). At the initial screening, our sample was chosen from students in psychology 100 that were in the top 33% of emotion dysregulation. At the pre-assessment approximately 4 months later, participants that were admitted into the study had a high mean DERS score ($M = 98.69, SD = 21.45$), and wide range (Min = 44, Max =148). Approximately 11% of the final sample fell at or below a DERS score of 75, 11% scored between 75 and 85, 67% scored between 85 and 125, and 11% scored over 125. Thus, the majority of the participants in our sample had DERS scores that were similar to DERS scores in clinical samples.

Suppression and reappraisal. The Emotion Regulation Questionnaire (ERQ; Gross & John, 2003) is a self-report questionnaire with two subscales of ER habits: Expressive Suppression (4 items) and Cognitive Reappraisal (6 items). Expressive Suppression involves reducing, modifying, or inhibiting the outward expression of emotion and Cognitive Reappraisal involves thinking about an emotional situation in a different way. Respondents indicated how much they agree with each
statement on a seven-point Likert scale. Internal consistency coefficient alphas were high: .79, .72, .75 (Suppression) and .85, .86, .87 (Reappraisal) at pre, post, and follow-up, respectively.

*Adjusting, tolerating, and concealing.* The Affective Style Questionnaire (ASQ; Hofmann & Kashdan, 2010) is a 20-item questionnaire where respondents indicate how much certain styles of regulation are typical of them on a 5-point scale (1 = not true of me at all; 5 = extremely true of me). Subscales are Adjusting (7 items), Tolerating (5 items), and Concealing (8 items). Adjusting is a general ability to manage emotions. Tolerance is an accepting and open view of emotions. Concealing involves trying to hide one’s true emotions from the outside world. At pre, post, and follow-up, Concealing ($\alpha = .87, .88, .90$) and Adjusting ($\alpha = .81, .82, .84$) had good internal consistency. The Tolerating subscale did not reach acceptable levels of internal consistency at any time point ($\alpha = .59, .62, .64$). As internal consistency for Tolerating could not be remedied, it was excluded from group analyses.

*Emotional awareness.* The Toronto Alexithymia Scale (TAS-20; Bagby, Parker, & Taylor, 1994) is a 20-item questionnaire designed to measure alexithymia. Respondents indicate how much they agree with each item on a 5-point Likert scale (1 = Strongly Disagree; 5 = Strongly Agree). For the purposes of the current study only the Difficulty Identifying Feelings Subscale (7 items) will be included as a measure of emotional non-awareness. Higher scores indicate less emotional awareness. Internal consistency coefficient alphas were high for Emotional Awareness: .86, .87, and .89 at pre, post, and follow-up, respectively.

*Catastrophizing and blame.* Cognitive Emotion Regulation Questionnaire (CERQ; Garnefski et al., 2001) is a 36-item questionnaire where respondents indicate how frequently they cope with events by regulating in specific ways. The scale is from 1 (almost never) to 5 (almost always). The subscales relevant to the hypotheses of the current study are self-blame (4 items), blaming others (4
items), and catastrophizing (4 items). Higher scores indicate higher frequency of blaming and catastrophizing. At pre, post, and follow-up, Self-Blame (\(\alpha = .88, .87, .82\)) and Blaming Others (\(\alpha = .78, .86, .87\)) had good internal consistency. The Catastrophizing subscale did not reach acceptable levels of internal consistency at pre (\(\alpha = .63\)), although it was at an acceptable level at post and follow-up (\(\alpha = .81, .84\), respectively). As internal consistency for catastrophizing at pre could not be remedied, it was excluded from group analyses.

**Cognitive avoidance.** The Cognitive Avoidance Scale (CAQ; Gosselin et al., 2002) is a 25-item questionnaire where respondents indicate how they typically respond to certain thoughts on a scale from 1 (Not typical at all) to 5 (Completely typical). The subscales are thought suppression, thought substitution, distraction, avoidance of threatening stimuli, and the transformation of images into thoughts. It had high internal consistency at pre, post, and follow-up (\(\alpha = .95, .93, .95\)). Higher scores indicated higher cognitive avoidance when dealing with threatening intrusive thoughts.

**Behavioral avoidance.** The Cognitive Behavioral Avoidance Scale (CBAS; Ottenbreit & Dobson, 2004) is a 31-item questionnaire where respondents indicate how they typically deal with situations and problems in their lives. The scale is from 1 (Not at all true for me) to 5 (Extremely true for me). There are four subscales, two for cognitive avoidance (social and non-social) and two for behavioral avoidance (social and non-social). Only the behavioral avoidance subscales (14 items) were used in the current study as a strong measure of cognitive avoidance was already included. The CBAS behavioral avoidance subscales had strong internal consistency at all time points (Behavioral Social, \(\alpha = .90, .92, .91\); Behavioral Nonsocial, \(\alpha = .80, .84, .84\)). Higher scores indicate more behavioral avoidance.

**Mindful awareness and acceptance.** The Kentucky Inventory of Mindfulness Skills (KIMS; Baer, Smith, & Allen, 2004) is a 39-item questionnaire in which respondents indicate to what extent
they are aware of themselves, their situation, and their surroundings on a scale from 1 (Never or very rarely true) to 5 (Very often or always true). High internal consistency was found overall for Mindfulness at pre, post, and follow-up, respectively ($\alpha = .78, .83, .84$).

*Rumination.* The Ruminative Response Scale (RRS; Treynor, Gonzalez, & Nolen-Hoeksema, 2003) is a 22-item questionnaire in which respondents indicate what they think and do when they are upset on a scale from 1 (almost never) to 5 (almost always). Given considerable overlap among items assessing rumination and depressive symptoms, only the 10 non-contaminated rumination items were selected for use in the current study (Treynor et al., 2003). Rumination had adequate internal consistency at pre, post, and follow-up ($\alpha = .77, .81, .81$, respectively).

**Client Satisfaction for the training group at the post-assessment.**

*Client Satisfaction Questionnaire.* The Client Satisfaction Questionnaire (CSQ; Larsen, Attkisson, Hargreaves, & Nguyen, 1979) is a questionnaire that is used to measure consumer satisfaction with health and human services. Questions are on a 4-point Likert scale with varying descriptors. We revised some items and removed some items to be consistent with a prevention sample rather than a help-seeking sample (e.g., “If a friend were in need of similar help, would you recommend our program to him/her?” was modified to “If a friend were starting university, would you recommend our program to him/her?”) The revised 12-item questionnaire had high internal consistency when it was delivered at the post ($\alpha = .83$). A mean of all items was calculated. Higher scores indicated higher Customer Satisfaction.

**Brief Assessment measures.**

*Mood Check.* This self-report questionnaire included a shorter list of emotions in comparison to the PANAS-X because it was used as a quick rating scale for both groups each week for the training period. It involved rating the frequency and maximum intensity at which 12 different
emotions have been felt during the last week. The scale for frequency is from 1 (Never) to 5 (Very Often) and the scale for intensity is from 1 (Very Mild) to 5 (Extreme). There are 8 negative affect items (sad, nervous, angry, guilty, ashamed, irritable, stressed, upset) and 5 positive affect items (happy, proud, excited, alert, at ease). For all weeks, internal consistency coefficient alphas were high for both frequency of negative affect (W1 = .80, W2 = .83, W3 = .82, W4 = .87, W5 = .87, W6 = .86) and intensity of negative affect (W1 = .76, W2 = .87, W3 = .87, W4 = .90, W5 = .85, W6 = .84). The internal consistency for positive affect frequency (W1 = .62, W2 = .72, W3 = .71, W4 = .75, W5 = .65, W6 = .64) and intensity (W1 = .63, W2 = .64, W3 = .72, W4 = .73, W5 = .73, W6 = .71) were not adequate and thus they were not analyzed.

Brief emotion regulation. The Brief Emotion Regulation Scale (BERS) is an 18-item questionnaire in which respondents indicated how frequently they think or act in a way that is described by the statements on a seven-point Likert scale. It was designed by the first author to measure the use of different regulation habits over the past week as there is no existing scale that measures ER on shorter time-scales. Subscales include suppression, reappraisal, awareness, cognitive avoidance, behavioral avoidance, rumination, poor emotional understanding, and externalized blame. Positive items on the reappraisal and awareness subscales were reversed, prior to taking a mean score. The mean score represents difficulty regulating emotion in the past week. The BERS was used as a quick measure of ER for both the training group and the comparison group each week. The BERS had good internal consistency for weeks 1 – 6 (α = .78, .81, .82, .84, .84, .86, respectively). The BERS was also included in the pre, post, and follow-up assessments and had high internal consistency (α = .84, .86, .88, respectively).
Results

Data were checked for missing values, normality and outliers. One univariate outlier (>3.5 SD) was identified in the Post-Blame-Others variable and it was winsorized to the second highest value. The winsorized Post-Blame-Others variable was used in all analyses. Means and standard deviations of raw scores for all study variables at the pre, post, and follow-up for the training and comparison group have been provided in Table 3.
Table 3.

*Means and Standard Deviations of Depression, Anxiety, and Emotion Regulation Measures for Comparison and Training Groups at Pre, Post, and Follow-up Assessments.*

<table>
<thead>
<tr>
<th></th>
<th>Pre</th>
<th>Post</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Comparison</td>
<td>Training</td>
<td>Comparison</td>
</tr>
<tr>
<td>Depression</td>
<td>.63 (.41)</td>
<td>.75 (.49)</td>
<td>.73 (.54)</td>
</tr>
<tr>
<td>Anxiety</td>
<td>.44 (.31)</td>
<td>.46 (.46)</td>
<td>.53 (.45)</td>
</tr>
<tr>
<td>Negative Affect</td>
<td>2.06 (.76)</td>
<td>2.16 (.90)</td>
<td>2.34 (.78)</td>
</tr>
<tr>
<td>Positive Affect</td>
<td>2.68 (.87)</td>
<td>2.73 (.85)</td>
<td>2.69 (.70)</td>
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<tr>
<td><strong>Maladaptive ER</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty Reg.</td>
<td>2.73 (.50)</td>
<td>2.76 (.70)</td>
<td>2.73 (.51)</td>
</tr>
<tr>
<td>Suppression</td>
<td>4.04 (1.25)</td>
<td>3.94 (1.19)</td>
<td>3.95 (1.23)</td>
</tr>
<tr>
<td>Concealing</td>
<td>3.42 (.93)</td>
<td>3.17 (.78)</td>
<td>3.14 (.95)</td>
</tr>
<tr>
<td>Self-Blame</td>
<td>2.87 (.93)</td>
<td>2.86 (.95)</td>
<td>2.64 (.91)</td>
</tr>
<tr>
<td>Blame Others</td>
<td>1.96 (.82)</td>
<td>2.10 (.62)</td>
<td>2.15 (.80)</td>
</tr>
<tr>
<td>Cog. Avoid</td>
<td>2.92 (.72)</td>
<td>3.10 (.74)</td>
<td>2.82 (.69)</td>
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<tr>
<td>Soc. Beh. Avoid</td>
<td>2.16 (.88)</td>
<td>2.08 (1.01)</td>
<td>2.30 (.98)</td>
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<tr>
<td>NonS. Beh. Avoid</td>
<td>2.51 (.90)</td>
<td>2.48 (.90)</td>
<td>2.75 (.88)</td>
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<tr>
<td>Rumination</td>
<td>2.47 (.60)</td>
<td>2.56 (.52)</td>
<td>2.43 (.56)</td>
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<td>Lack Awareness</td>
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<td>2.40 (.79)</td>
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<td><strong>Adaptive ER</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Reappraisal</td>
<td>4.64 (1.03)</td>
<td>4.54 (1.19)</td>
<td>4.62 (.99)</td>
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Table 1.

<table>
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<th>2.60 (.65)</th>
<th>2.80 (.67)</th>
<th>2.72 (.71)</th>
<th>2.94 (.68)</th>
<th>2.61 (.75)</th>
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<td>Mindfulness</td>
<td>2.95 (.39)</td>
<td>2.91 (.36)</td>
<td>2.93 (.39)</td>
<td>3.03 (.42)</td>
<td>2.98 (.41)</td>
<td>2.97 (.43)</td>
</tr>
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</table>


**Customer Satisfaction**

The overall mean for the customer service questionnaire, $M = 3.35$, $SD = .36$, which has a possible range from 0 to 4 (higher is more satisfied), indicated that participants were generally satisfied with the program but that there were areas to improve upon. The majority of participants reported that the program was of good or excellent quality (89%), the program helped them deal with stress more effectively (85%), the program led to positive changes in their problems or themselves (68%), and their instructors were definitely friendly and made them feel comfortable (89%). Overall participants were mostly or very satisfied with the amount of help and knowledge they received (85%).

Some participants rated the quality of the program as fair (9.4%) or poor (2%). Some participants reported that the program led to negative changes in their problems or themselves (5.7%), that it made them worse at dealing with stress (2%), or that their instructors were sometimes unfriendly or made them uncomfortable (2%). Some participants said they were indifferent or mildly dissatisfied with the amount of help or information they have received (15%).

Most participants said that the time commitment of 6 sessions of 1.5 hours was just right (66%), but some stated the sessions were too much of a time commitment (34%). Comments for improvement that were provided in a free space after the CSQ-R questionnaire included: Conducting
sessions during first semester, focus more on situations specific to first year university, more
information about healthy lifestyle (nutrition), more visual aids, more worksheets, mnemonics to
help remember information, more on self-esteem, more on social skills, more on relationship
intimacy, more on acceptance, improve comfort of the room, shorter sessions, more interactive,
same-gendered groups, constant contact with facilitator of the study, more remuneration, more
information on when symptoms surpass a “healthy threshold”, and option for one-on-one setting
rather than group.

**Hypothesis 1: Relations between Depression, Anxiety, and ER**

Pearson Bivariate Correlations were run between internalizing symptoms and ER strategies
at each time point. As hypothesized, symptoms of depression and anxiety were for the most part
positively related to maladaptive ER habits and negatively related to adaptive ER habits at pre, post,
and follow-up points (See Table 4). The main exceptions were Suppression, Concealing, and
Blaming Others, which had small and inconsistent correlations with anxiety and depression.
Table 4.

Correlations between Depression, Anxiety, and Emotion Regulation Measures.

<table>
<thead>
<tr>
<th></th>
<th>Pre</th>
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<th>Post</th>
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<th>Follow-up</th>
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<tr>
<td>Depression</td>
<td>-</td>
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<td>-</td>
<td>.61***</td>
<td>-</td>
<td>.59***</td>
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<tr>
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<td>-</td>
<td>.61***</td>
<td>-</td>
<td>.59***</td>
<td>-</td>
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<td>.43***</td>
<td>.65***</td>
<td>.45***</td>
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<td>.41***</td>
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<td>.08</td>
<td>.23*</td>
<td>.08</td>
<td>.25*</td>
<td>.27**</td>
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<td>.09</td>
<td>.08</td>
<td>.05</td>
<td>.12</td>
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<td>Blame Others</td>
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<td>.006</td>
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<td>.27**</td>
<td>.16</td>
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<td>.44***</td>
<td>.45***</td>
<td>.57***</td>
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<tr>
<td>Soc. Beh. Avoid</td>
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<tr>
<td>Rumination</td>
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<tr>
<td>Lack Awareness</td>
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<td>.49***</td>
<td>.57***</td>
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<td>-.23*</td>
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<td>-.38***</td>
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<tr>
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<td>-.43***</td>
<td>-.24**</td>
<td>-.47***</td>
<td>-.38***</td>
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</tbody>
</table>

Note. *p<.05, **p<.01, ***p<.001
Hypothesis 2: Weekly Change in Brief Measure of ER difficulty

The weekly change in ER strategies, as measured by the BERS across the pre, 6 weeks, post, and follow-up, was analyzed with a repeated measures ANOVA to test for changes in weekly difficulty regulating. There were nine levels for time (pre-training, 6 weeks of training, post-training, and follow-up) and two levels for condition (training, and comparison). Tests of between-subjects effects for the training and comparison condition were not significant, $F(1, 82) = .40, p = .53, \eta^2_p = .01$. Time was a significant predictor of change in BERS, $F(8, 656) = 4.85, p = .000, \eta^2_p = .06$, and there was a significant interaction between time and condition, $F(8, 656) = 2.47, p = .01, \eta^2_p = .03$. Within-subjects contrasts showed that the time effect for BERS was quadratic, $F(1, 82) = 15.24, p < .001, \eta^2_p = .16$, and the time by condition interaction was also quadratic $F(1, 82) = 8.01, p = .01, \eta^2_p = .08$. Figure 1 displays the means and standard errors for comparison and training groups across the 9 time points. Pairwise comparisons showed that only week 6 BERS scores for the training group were significant lower than the comparison group ($p = .04$). Our hypothesis was only partially supported. ER for the training group improved during the 6-week training sessions, but the improvements were not sustained at post and follow-up.

The weekly Brief Assessments of negative affect (NA) were positively correlated with BERS as expected. Week 1 to Week 6 NA Frequency was strongly correlated with weekly BERS scores ($r = .70$ to $.75; ps < .001$). Week 1 to Week 6 NA Intensity was also strongly correlated with weekly BERS scores ($r = .55$ to $.63; ps < .001$). It was not possible to test the relations with weekly positive affect due to inadequate reliability. Weekly ER difficulty had a strong relationship with negative emotionality.
Figure 1. Changes in the mean of the weekly Brief Emotion Regulation Scale (BERS) for Training and Comparison groups across all time points. Higher scores on BERS indicate more difficulty regulating emotion.

Note. * $p < .05$

Hypothesis 3: Changes across Pre, Post, and Follow-up for Internalizing Symptoms and Comprehensive ER Measures

Repeated measures ANOVAs were used to test for changes in dependent variables: depression, anxiety, maladaptive ER, and adaptive ER. There were three levels for time (pre-training, post-training, and follow-up) and two levels for condition (training and comparison). Means and standard deviations for the training and comparison group are provided in Table 4. Many
of the internalizing and ER measures showed significant changes over time, however none showed
the expected time by group interaction. The results for each of the internalizing and ER measures
have been provided below.

**Depression and anxiety analyses.** For Depression, tests of between-subjects effects for the
training and comparison condition were not significant, $F (1, 94) = 1.41, p = .24, \eta^2_p = .02$. Time
was a significant predictor of change in Depression, $F (2, 188) = 7.34, p = .001, \eta^2_p = .07$, however
there was not a significant interaction between time and condition, $F (2, 188) = .48, p = .62, \eta^2_p =
.01$. Within-subjects contrasts showed that the time effect for Depression was quadratic, $F (1, 94) =
8.87, p = .004, \eta^2_p = .09$. Pairwise comparisons show that depression was significantly lower at
follow-up in comparison to pre ($p = .02$) and post ($p = .001$). Thus, both groups’ depression
symptoms decreased over time (See Figure 2).

For Anxiety tests of between-subjects effects for the training and comparison condition were
not significant, $F (1, 94) = 1.33, p = .25, \eta^2_p = .01$. Anxiety had a significant change across time, $F
(2, 188) = 4.71, p = .01, \eta^2_p = .05$, and a significant interaction between time and condition, $F (2,
188) = 3.07, p = .05$. Within-subjects contrasts showed that the time effect for anxiety was quadratic,
$F (1, 96) = 17.94, p < .001, \eta^2_p = .16$. Pairwise comparisons showed that anxiety was significantly
higher at post in comparison to pre ($p = .008$) and follow-up ($p = .001$). Within-subjects contrasts
showed that the interaction between time and condition was linear, $F (1, 96) = 4.32, p = .04, \eta^2_p =
.04$. Pairwise comparisons showed that anxiety was lower in the comparison group at the follow-up
($p = .02$; See Figure 2).
Figure 2. Depressive Symptoms (BDI-II) and Anxiety Symptoms (BAI) mean scores at pre, post, and follow-up assessments for the training and comparison groups. Scales are from 0 to 3, with higher scores indicating more severe symptoms.  

Note. * p < .05

Emotion regulation analyses.

All ER habits that showed significant differences across time are presented in Figure 3. For Concealing, the test of between-subjects effects for the training and comparison condition was not significant, $F(1, 94) = 1.33, p = .25, \eta^2_p = .01$. The test of within subjects effects was significant for time, $F(2, 180) = 4.62, p = .01, \eta^2_p = .05$, but not significant for the effect of time by group, $F(2, 180) = .63, p = .53, \eta^2_p = .001$. The time effect for Concealing was quadratic, $F(1, 90) = 6.24, p =$
.01, \eta^2_p = .07. Pairwise comparisons showed that Concealing was significantly higher at pre in comparison to post (p = .004).

For Reappraisal, the test of between-subjects effects for the training and comparison condition was not significant, \( F(1, 93) = .10, p = .75, \eta^2_p = .001 \). Time was a significant predictor of change in Reappraisal, \( F(2, 186) = 3.32, p = .04, \eta^2_p = .03 \), however there was not a significant interaction between time and condition, \( F(2, 186) = .76, p = .47, \eta^2_p = .01 \). Within-subjects contrasts showed that the time effect for Reappraisal was quadratic, \( F(1, 93) = 4.35, p = .04, \eta^2_p = .05 \). Pairwise comparisons show that Reappraisal was significantly lower at follow-up in comparison to post (p = .02).

For Self-Blame, the test of between-subjects effects for the training and comparison condition was not significant, \( F(1, 92) = 1.71, p = .19, \eta^2_p = .02 \). Time was a significant predictor of change in Self-Blame, \( F(2, 184) = 3.83, p = .02, \eta^2_p = .04 \), however there was not a significant interaction between time and condition, \( F(2, 184) = 2.37, p = .10, \eta^2_p = .03 \). Within-subjects contrasts showed that the time effect for Self-Blame was linear, \( F(1, 92) = 5.81, p = .02, \eta^2_p = .06 \). Pairwise comparisons show that Self-Blame was significantly lower at follow-up in comparison to pre (p = .02) and post (p = .02).

For Blame-Others, the test of between-subjects effects for the training and comparison condition was not significant, \( F(1, 93) = .06, p = .80, \eta^2_p = .001 \). Time was a significant predictor of change in Blame-Others, \( F(2, 186) = 3.87, p = .02, \eta^2_p = .04 \), however there was not a significant interaction between time and condition, \( F(2, 186) = .80, p = .45, \eta^2_p = .01 \). Within-subjects contrasts showed that the time effect for Blame-Others was linear, \( F(1, 93) = 6.47, p = .01, \eta^2_p = .07 \). Pairwise comparisons show that Blame-Others was significantly higher at follow-up in comparison to pre (p = .01).
For Non-Social Behavioral Avoidance, the test of between-subjects effects for the training and comparison condition was not significant, $F(1, 92) = .13, p = .72, \eta^2_p = .001$. Time was a significant predictor of change, $F(2, 184) = 3.26, p = .04, \eta^2_p = .03$, however there was not a significant interaction between time and condition, $F(2, 184) = .17, p = .85, \eta^2_p = .002$. The time effect for Non-Social Behavioral Avoidance was quadratic, $F(1, 92) = 7.29, p = .008, \eta^2_p = .07$. Pairwise comparisons showed that Non-Social Behavioral Avoidance was significantly higher at post in comparison to pre ($p = .01$) and follow-up ($p = .05$).
Figure 3. ER habits with significant changes across pre, post, and follow-up assessments. There were no significant group differences for these measures.
The remainder of the repeated measures ANOVAs with ER variables including Difficulty Regulating, Suppression, Adjusting, Mindfulness, Rumination, Cognitive Avoidance, and Social Behavioral Avoidance did not show significant differences for the main effects of time and condition, or for the interaction (See Appendix A).

**Hypothesis 4: Positive and Negative Affect at Pre, Post, and Follow-up**

Repeated measures ANOVAs were used to test for changes in Negative Affect and Positive Affect (See Figure 4). There were three levels for time (pre-training, post-training, and follow-up) and two levels for condition (training and comparison).

For Negative Affect, the test of between-subjects effects for the training and comparison condition was not significant, $F(1, 95) = .61, p = .44, \eta^2_p = .01$. Time was a significant predictor of change in negative affect, $F(2, 190) = 5.12, p = .007, \eta^2_p = .05$, however there was not a significant interaction between time and condition, $F(2, 190) = 1.35, p = .26, \eta^2_p = .01$. The time effect for negative affect was quadratic, $F(1, 95) = 11.62, p = .001, \eta^2_p = .11$. Pairwise comparisons showed that Negative Affect was significantly higher at post in comparison to pre ($p = .007$) and follow-up ($p = .004$).

For Positive Affect, the test of between-subjects effects for the training and comparison condition was not significant, $F(1, 95) = .68, p = .41, \eta^2_p = .01$. There was also no significant effect of time, $F(2, 190) = 1.98, p = .14, \eta^2_p = .02$, or time by condition interaction, $F(2, 190) = .22, p = .80, \eta^2_p = .00$. 

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Hypothesis 5: ER Mediates Change in Anxiety and Depression

It was not possible to conduct the moderated mediation because the experimental manipulation of ER as evidenced by group differences were not observed at post.

Follow-up Analysis Regarding Customer Satisfaction and Change in ER and Internalizing Symptoms

As there was variation in customer satisfaction with the training, we examined correlations between customer satisfaction and changes in ER and Internalizing Symptoms from the pre assessment to the post-assessment. A change score was calculated (e.g., post anxiety mean subtracted from pre anxiety mean) for all ER habits, Depression, and Anxiety. The scales for adaptive ER habits were reversed so that all positive change scores indicated more adaptive
emotional functioning at the post-assessment. Customer satisfaction was correlated with pre-post significant reductions in Anxiety ($r = .29, p = .04$) and marginal reductions in Depression ($r = .22, p = .12$). Customer satisfaction was also related to significant increases in reappraisal ($r = .28, p = .04$), mindfulness ($r = .43, p = .002$), and awareness ($r = .34, p = .02$). It was not significantly associated with other ER habits. Participants that were satisfied with the training program experienced positive change or those that experienced some positive change were satisfied with the program.

**Discussion**

The current study is one of few that has taken a direct focus on ER during the intervention and measurement of change in the outcome measures. Recently, two studies using the UP have tested changes in ER and linked these changes to depressive and anxious symptoms in clinical populations. A study that used the UP to treat adults with anxiety disorders found that pre-post increases in awareness and acceptance of emotions were correlated with decreases in anxiety and depression scores, but not clinical severity measures (Sauer-Zavala et al., 2012). The UP was also used in a single-case design to examine the mindfulness, reappraisal, and emotional avoidance as mechanisms of change in depression and anxiety (Boswell, Anderson, & Barlow, 2014). Change in mindfulness preceded changes in depression and anxiety, and reappraisal preceded changes in depression (Boswell et al., 2014). The current study extends the literature in this field by testing the components of the UP with a high-risk sample. The current study also was comprehensive in that multiple measures of ER were taken at pre, post, and follow-up, as well as a brief measure of ER across 9-time points.

Emotion regulation is known to have strong relations with internalizing symptoms (e.g., Aldao et al., 2010; Gross & Munoz, 1995). We hypothesized that directly targeting ER using an
adapted version of the Unified Protocol would lead to improvements in ER for first year students with higher than average emotion dysregulation. We found small improvement in ER across the 6-week intervention in the training group, however these changes were not maintained at the post or the follow-up. Furthermore, we did not find significant improvements for the training group for a comprehensive measurement of targeted ER factors or internalizing symptoms at the post or follow-up. In fact, anxiety symptoms were higher in the training group at the follow-up. Although a large majority of training participants rated the program as helping them make positive changes in their lives, these changes were not reflected in the reporting of symptoms or general ER factors.

**Associations of ER habits with Internalizing Symptoms**

Using comprehensive measures of ER allowed for the testing of whether specific ER habits related to internalizing symptoms at three time points. At pre, post, and follow-up the adaptive ER habits, reappraisal, adjustment, and mindfulness, were negatively correlated with anxious and depressive symptoms. At all time points, the maladaptive habits such as avoidance, rumination, and lack of awareness were positively correlated with depressive and anxious symptoms. The results are consistent with previous research on associations between ER habits and internalizing symptoms (see Aldao et al, 2010 for a meta-analysis). The current study incorporated several perspectives on ER habits including the Process Model of Emotion Regulation (Suppression and Reappraisal; Gross & John, 2003), Emotion Dysregulation Model of Mood and Anxiety Disorders (Adjusting and Concealing; Hofmann, Sawyer, Fang, & Asnaani, 2012), and Response Styles Theory (Rumination; Nolen-Hoeksema, 2000), which makes it one of the most comprehensive studies of ER habits in late adolescence to date.

Contrary to our predictions, suppression, concealing, and blaming-others were not consistently related to depression and anxiety symptoms in the current study. Suppression and
concealing may be common habits used by young people that only become problematic when they are not replaced by more mature strategies later in life (Gullone, Hughes, Neville, King, & Tonge, 2010). Whether suppression and concealing are adaptive or maladaptive may also be particularly sensitive to context (Bonanno & Burton, 2013; Bonanno, Papa, O’Neill, Westphal, & Coifman, 2004). Excessive or unskilled use of suppression across multiple contexts may make the person seem less genuine to others, and thus hinder the formation of close interpersonal relationships (Srivastava et al., 2009). The overuse of suppression may also lead to less opportunity for social support because others are unaware of the need to provide support (Zaki, Bolger, & Ochsner, 2009). However, choosing to hide negative emotional expressions to spare others feelings, appear more competent and emotionally stable, or to reduce conflict in certain situations may be socially advantageous. For example, people that suppress more have been rated as more competent in job interviews (Sieverding, 2009). For university students, suppressing the intensity of the emotional expression in stressful circumstances (e.g., refraining from yelling at a neighbor in residence for being loud during study hour and instead asking in a friendly tone) may be helpful for maintaining relationships. Similarly, placing blame on others when they truly are responsible may also be adaptive in contrast to blaming oneself for other’s actions. While blaming others is generally related to poor adjustment (Tennen, & Affleck, 1990), some evidence shows that people with Major Depressive Disorder in remission have an imbalance such that they self-blame more than controls and other-blame less than controls (Green, Moll, Deakin, Hulleman, & Zahn, 2012).

**Changes in ER across the training using a weekly assessment**

Using a brief measure of emotion regulation throughout an intervention allowed for examination of small changes across the intervention. It appears that students’ ER improved across the 6-week training. However, approximately a week following the final session, ER difficulty
returned to pre-training levels, which is also apparent in the follow-up 6 months later. Weekly measurement of ER strategies was a major strength of the current study, which is extremely rare in published research on treatment studies (Aldao, Jazaieri, Goldin, & Gross, 2014). One study did involve examining ER strategy change across a 16-week CBT program for Social Anxiety Disorder (Aldao et al., 2014). Across the treatment, they found a decrease in maladaptive strategies and an increase in adaptive strategies. The changes were maintained at four follow-up sessions every 3 months, in which clients were encouraged to continue utilizing the skills that they learned in the treatment. The current study differed in length and also did not provide a booster of encouragement after the training ended, which could account for the lack of sustained changes in ER.

Lack of Group Differences in Comprehensive ER measures and Internalizing Symptoms

Given that the current study did not show the predicted positive changes in ER and depression and anxious symptoms the remainder of the discussion will focus on potential reasons why the study hypotheses were not supported. Without the experimental manipulation of decreasing ER problems as evidenced by group differences, it was not possible to test the final hypothesis, which was that emotion regulation changes mediate changes in depressive and anxious symptoms. The current study did not show the predicted changes in ER or depression and anxiety symptoms, possibly due to effectiveness of UP protocol, delivery of the protocol, using an at-risk sample, low motivation, low group cohesion, time of semester effects, timing of the intervention, and lack of consistency between the intervention and measures. Each of these topics will be discussed in turn.

Effectiveness of the Unified Protocol. A recent review of ER as the treatment target of psychological treatments outlines promising results for many types of therapy such as cognitive-behavioral therapy for depression, dialectical behavior therapy, and the UP (Gratz, Weiss, & Tull, 2015). However, the UP may not be as effective as other programs at targeting ER. Gratz and
colleagues argued that an acceptance-based emotion regulation group therapy (ERGT) is more strongly based on emotion regulation theory. ERGT was designed to target the same emotion regulation factors that are measured in the Difficulty in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004). ERGT focuses mainly on reducing emotional avoidance, enhancing emotional acceptance, and practicing control over behaviors, rather than a focus on emotional change strategies (e.g., reappraisal). Three studies with women with Borderline Personality Disorder (BPD) and self-harm showed a positive impact on general ER, and depression and anxiety symptoms (Gratz & Gunderson, 2006; Gratz & Tull, 2011; Gratz, Tull, & Levy, 2014). Changes in ER mediated observed reductions in BPD symptoms and self-harm (Gratz, Bardeen, Levy, Dixon-Gordon, & Tull, 2015). The ERGT has been used with a narrow spectrum of diagnoses and range of severity, but it is possible that this protocol may be more focused on ER than a broader treatment such as the UP.

Another research group uses Affect Regulation Training (ART), which is also designed specifically to target ER (Berking & Whitley, 2014). Successful application of adaptive ER skills within ART predicts the change in depression symptom severity throughout treatment for MDD (Radkovsky, McArdle, Bockting, & Berking, 2014), however it did not predict anxiety symptom severity or general distress severity (Wirtz, Radkovsky, Ebert, & Matthias, 2014). A randomized control trial for ART is underway (Ehret, Kolwalsky, Rief, Hiller, & Berking, 2014). Trials comparing the effectiveness of UP versus other ER programs, or more general stress-management programs will help determine the most effective approach moving forward. Perhaps a more acceptance-based rather than change-based approach would be more effective with a sample that is high in emotion dysregulation.

**Delivery of the Unified Protocol.** The current study used a modified version of the UP that was more feasible to implement with a large, at-risk sample. With clinical samples, the 8 modules of the
UP can be covered in 12 sessions (Bullis et al., 2015), thus the current study was comparatively brief in dosage. Previous research on depression prevention and selective intervention programs have shown that effect sizes are larger with adolescents when the programs are brief, likely because of the ability to maintain attention and also to reduce attrition (Stice, Shaw, Bohon, Marti, & Rohde, 2009). Brief cognitive-behavioral interventions (4-8 sessions) have been shown to reduce anxious and depressive symptoms in undergraduate students (see Regehr, Glancy, & Pitts, 2013 for a meta-analysis). While our approach was purposefully brief, it is possible that it simply was not enough of a dosage to do the UP in a 6-week group format. The temporary changes seen in the weekly measures may have indicated the start of implementing new strategies with support and encouragement, but students did not have sufficient time or support to integrate ER changes into their longer-term repertoire. Another study using UP in a group format indicated that the addition of 15-minute individual sessions throughout the treatment sessions provided more explicit opportunity to confirm the understanding of concepts with each client (Bullis et al., 2015). Premature termination of training with students may actually cause harm because anxiety-provoking topics may not be adequately dealt with (Lilienfeld, 2007).

Other delivery factors include training of the group leaders and integrating assessment with training delivery. The graduate student leaders in the current study had a strong background in cognitive-behavioral therapy, however they were not certified in delivering the UP by the Unified Protocol Institute. As most previous studies published on the UP seem to have been supervised by David Barlow’s team (the creator of the UP) within the Center for Anxiety and Related Disorders, the level of implementation quality is likely not as high in the current study. Furthermore, as we used a sample with high emotion dysregulation, but a predominantly non-clinical sample, we did not structure the training around having a diagnosis of an emotional disorder. Participants were not
given feedback about the severity of their symptoms at the beginning and end of the training. As comprehensive assessment and feedback has a strong impact on treatment effects (Poston & Hanson, 2010), it is possible that this is an important mechanism of change that was not included in the current study.

Using an at-risk sample. We screened for emotion dysregulation during the third week of university. Variability in normal adjustment processes may have created error in measurement of high emotion regulation. For example, approximately 20% of students reported high dysregulation during the temporary transition (prescreen), but they did not have persistent difficulty with ER (as indicated by average ER at the pre-assessment). Multiple assessments may be needed to ensure ER dysregulation is reliably high. Furthermore, more recruitment resources might allow for recruitment of participants in the top 10th percentile of ER dysregulation rather than the top 33%. For example, expanding sampling to all incoming undergraduates, not just those enrolled in psychology 100. Alternatively, screening undergraduates later on in their degrees or adolescents in late high school may have the benefit of recruiting less false positives for emotion dysregulation. Ensuring that the emotion dysregulation is indeed high in all included participants would allow for more change in emotion regulation during training.

Another issue with the at-risk sample is that it is possible that the training interfered with natural adjustment processes or produced iatrogenic effects. While no immediate changes in anxiety were observed at post between the groups, the training group reported more anxiety symptoms at the follow-up assessment. Other treatment literature, such as grief counseling for normal bereavement has noted harmful effects in a subset of clients due to iatrogenic effects (Lilienfeld, 2007; Neimeyer, 2000). Monitoring the potentially harmful effects of ER training will need to be explored further.
**Possible low motivation in an at-risk sample.** The sample in the current study can be thought of as at-risk, as we targeted students with high emotion dysregulation that were theoretically at a higher risk for anxiety or depression. Prior to the pre-assessment, clinical interviews identified that the rate of Major Depressive Disorder was 7% and 5.5% for Generalized Anxiety in the sample. The rates of depression and anxiety are similar in frequency to the severe level of depressive and anxious symptoms reported and there was a substantial amount of participants that had subclinical symptoms. However, 50% of the sample was not currently symptomatic. Theoretically, distress helps motivate engagement in the program and some prevention programs have found greater effectiveness of universal prevention programs in high-risk participants (Clake et al., 1995; Lowry-Webster et al., 2001). Less motivation could have led to both less ER change in non-symptomatic students, as well as negatively impacted the group environment.

**Possible low group cohesion.** Heterogeneity in the groups (e.g., symptom severity, gender) could have impacted group processes such as cohesion, which are known to influence treatment outcomes. Group cohesion involves the relationship quality between group members and between group members and their leaders (Burlingame, McClendon, & Alonso, 2011). Higher group cohesion is related to greater reduction in symptoms and it is strongest when a group lasts more than 12 sessions and there are between 5 and 9 group members (Burlingame et al., 2011). Group cohesion has been found to be particularly relevant for adolescent and college-age samples (Burlingame et al., 2011). We unfortunately did not measure group cohesion in the current study. The short length of the training may have limited group cohesion, in addition, there were some groups with fewer than 5 participants. Students were limited to certain training groups based on scheduling constraints thus, we did not form groups based on factors that are demonstrably effective for forming group cohesion (e.g., preferences, culture, religion; Norcross & Wampold, 2011). Subjective reports from group
leaders suggested that some groups were bonding more than others, particularly all-female groups were bonding better. Reports from some students included preference for same-gendered groups as they stated it might allow for more sharing of intimate details. These subjective suggestions are aligned with trials of depression prevention with all-female groups showing comparatively larger effect sizes than other studies (e.g., Burton, Stice, Bearman, & Rohde 2007; Forsyth, 2000).

**Time of semester effects.** The structure of the semesters in a university setting have limitations for both training implementation and measurement. The winter semester is 12 weeks with a mid-semester break. To complete a longer-term training is difficult due to the mid-semester break and exam period. In addition to implementation difficulty, students’ distress could have been influenced by cycling academic pressures in a tightly compacted semester. One study indicated that university students generally experience declining mood across the fall and winter semesters but mood improves during holiday breaks (Milyavskaya et al., 2014). The current study found that negative affect and anxiety for students was elevated at the end of a semester in mid-March (post) in comparison to the start of the semester in January (pre) and the start of another semester the following September (6-month follow-up). Staggering groups across time or taking multiple follow-up measurements may help us understand the impact of timing across the semester. Additionally, the measurement of stressful events may help contextualize the use of ER habits and changing symptoms.

**Delivering the program when it is needed most.** We recruited a first-year sample because we thought that mental health services might have a large impact on reducing the high stress of the transition. However, recruitment took place during the fall semester, and the training took place in the winter semester. Faster recruitment and admission into the study could have provided the benefit
of offering the program in a higher stress time. Some participants indicated on the customer service questionnaire that the program would have been more useful in the fall semester.

**Consistency in language between intervention and measurement of change.** The consistency in language between the concepts covered in the session and the concepts measured at the pre, post, and follow-up may have an impact on the results in these types of studies. For example, studies mentioned above by which tested Emotion Regulation Group Therapy (Gratz & Gunderson, 2006; Gratz & Tull, 2011; Gratz, Tull, & Levy, 2014) used the DERS to measure change, and the concepts in the treatment map directly onto the DERS. The current study for example, measured the same concepts that were covered in the training sessions however some of the language differed as a result of the measures being created by different research groups than the training protocol. A questionnaire measure for the UP is currently being validated by the designers of the UP (Barlow, 2015). Interventions need to be robust enough not to depend on specific language, however this is an important measurement aspect to consider when comparing the effectiveness of different ER interventions.

**Future Directions**

The current study had strengths in terms of attempting to test the mediating role of ER in predicting change in internalizing symptoms, comprehensive measurement, low attrition, and high customer satisfaction. Improvements for future studies may involve more stringent entry criteria, multi-method measurement (i.e., not simply self-report), higher dosage of training, and improvement of training implementation.

Recruiting a more narrow range of participants with high emotion dysregulation (e.g., top 10%) and confirming high emotion dysregulation with multiple measurements, would ensure that there are indeed ER factors that would benefit from an intervention. Testing the training with a
sample that is not currently in transition such as second year university or senior high school students may be less complicated before attempting to apply it to a transitioning sample.

Measurement of important factors could be improved in a number of ways. Comprehensive psychological assessment with individual feedback to students that can be integrated with personal goals and material in the training sessions may lead to larger effect sizes for the training. Measurement could also be expanded beyond self-report to concrete outcome measures (e.g., grades, drop-out), physiological stress measures (e.g., cortisol), and other-report (e.g., clinician, family member). Furthermore, the addition of a brief internalizing symptom measure during weekly sessions would be beneficial so that weekly ER change can be related to symptom change over time.

Many factors could be targeted to improve the implementation of the training. The assignment to training groups could be based on factors that would enhance group cohesion. The length of the sessions could be extended (e.g., 10-12) and incorporate booster sessions or check-ins with participants after the training sessions end to encourage continued use of ER skills. The quality of the training sessions could be enhanced by using leaders trained by the Unified Protocol Institute and being supervised weekly by a Psychologist with the UP certification. Training fidelity could be coded from video-recorded sessions.

Conclusion

Depressive and anxious symptoms are both distressing to individuals and lead to deleterious outcomes in health, academic, and social domains that are costly to society. Internalizing symptoms often precede the development of clinical disorders. The cumulative effects of daily ER result in longer-term negative emotion states such as fear and sadness that characterize anxiety and depression symptoms. To reduce distress and the costs of clinical disorders it is logical to try to ameliorate maladaptive emotional patterns before they cause significant dysfunction. Given the
mounting evidence that ER underlies the development and maintenance of internalizing symptoms, we wanted to complete a direct test of ER as the mechanism of change in an intervention study. While our initial attempt did not produce a positive long-term change in ER or internalizing symptoms, the current study will inform future research. Future research is needed to determine the best approaches for enhancing healthy emotional functioning and reducing depressive and anxious disorders.
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Chapter 5: General Discussion
General Discussion

The overarching goal of this dissertation was to examine how emotion regulation underlies the development of anxious and depressive symptoms in adolescence. The comprehensive, longitudinal studies that were conducted in the current dissertation provided important insight into the ways that adolescents regulate their emotions and how regulation changes across time. The results, implications, and future directions of the three studies have been integrated into four major themes in adolescent emotion regulation research: (1) ER habits in adolescence, (2) ER across time, (3) Goal-Based ER, and (4) ER in social contexts.

ER Habits in Adolescence

The most dominant model of ER habits is James Gross’ Process Model of Emotion Regulation, which outlines antecedent (reappraisal) and response-focused (suppression) ER habits (Gross, 1998a). While Gross stated that suppression and reappraisal were not the only ER habits, the publication of the Emotion Regulation Questionnaire (measures only suppression and reappraisal; Gross & John, 2003) prompted over a decade of focus on these two ER habits. The clear definition and measurement of suppression and reappraisal allowed for ease of use in correlational and experimental studies. Results from studies using adults were robust – reappraisal was related to more adaptive emotional functioning and suppression was related to less adaptive emotional functioning (Gross & John, 2003; John & Gross, 2004). Studies on specific ER habits such as suppression and reappraisal in adolescence were less common, but began to emerge in the 2000s (e.g., Betts, Gullone, & Allen, 2009). Applying top-down approaches (e.g., using research on adult depression to inform the treatment of adolescent depression) has unfortunately been common in the field of psychology (Zahn-Waxler, Klimes-Dougan, & Slattery, 2000) and ER research is no exception. It is
important not to make assumptions and to consider how adolescent ER habits and the relation to mental health outcomes may be different from adults.

In general, the studies in this dissertation showed that the associations seen in adolescents in terms of putatively adaptive and maladaptive ER habits were similar to the wider body of research with adults. ER habits such as avoidance, non-acceptance of emotions, and rumination were consistently associated with internalizing symptoms across all three studies. However, the support for reappraisal and suppression, the central ER habits of the Process Model, was less consistent. Reappraisal and suppression were not significantly related to the regulation of shame in Study 1. Self-reported suppression was not a significant mediator of shame and internalizing symptoms in Study 2. Both suppression and concealing, a related but more general construct than suppression, did not have significant consistent associations with internalizing symptoms in Study 3. The results of the studies in this dissertation were different than other adolescent research that reported significant associations with self-reported suppression, reappraisal, and internalizing symptoms (Betts, Gullone, & Allen, 2009; Gullone & Taffe, 2011; Lanteigne, Flynn, Eastabrook, & Hollenstein, 2014). Although, we were not the first to question the relation between suppression and internalizing symptoms – another longitudinal study found that suppression was a response to depressive symptoms in adolescence rather than a precursor (Larsen et al., 2013). Non-significant associations do not necessarily mean that there is no relationship between suppression, reappraisal, and internalizing symptoms. The results could indicate that suppression in particular (given the lack of significant results across the three studies) is (1) not as central to the development of internalizing symptoms at this age as we initially hypothesized or that (2) there are measurement issues associated with suppression.
Expressive suppression may be an immature and normative habit in adolescence that does not effectively differentiate between adaptive and maladaptive development during that stage. Older youth have reported using suppression less than younger youth in some previous studies (Gullone, Hughes, King, & Tonge, 2010) and there is some evidence that suppression decreases across adulthood as well (John & Gross, 2004). If immature ER processes such as suppression are not supplemented by more mature ER habits later in life, then perhaps it becomes more problematic.

Measurement issues may have also led to less support for self-reported suppression as a central ER habit. While suppression may be important mechanism in the development of internalizing symptoms, self-reported suppression may not capture the actual success of the habit. Adolescents may unsuccessfully attempt to suppress their expressions, or they may suppress expressions unconsciously (Koole, Webb, & Sheeran, 2015). The success of suppression, the extent to which internal experience is not communicated with others via expressions, would have social implications beyond attempted suppression. To examine the success of suppression, we did examine the relation between internal experience and external display of emotion in Study 2. Suppression, as measured in the laboratory (i.e., low expression and high negative experience) was related to symptoms of depression and social anxiety in Study 2, and symptoms of generalized anxiety in another adolescent study (Turpyn et al., 2015). Alternatively, the self-report scales used in the current dissertation may not have been ideal for measuring suppression in adolescence. The child and adolescent version of the Emotion Regulation Questionnaire (ERQ-CA) has a few changes in language to make it more child-friendly (Gullone & Taffe, 2011). Unfortunately, the ERQ-CA was published after the commencement of Study 1 and Study 2 data collection. While the studies in the current dissertation did not provide strong support for self-reported suppression and reappraisal, a future direction could be to incorporate laboratory measures of suppression in different contexts and
the use of the ERQ-CA and other measures of ER habits in an adolescent study to examine the relative contributions of suppression to the development of internalizing symptoms.

**ER across Time**

One of the major directions identified in a review of the youth ER field in the mid 2000s was to demonstrate change over time – both change in real time and change across development – using multiple, converging measures of emotion and ER processes (Cole, Martin, & Dennis, 2004). While cross-sectional studies were foundational in terms of linking poor ER with mental health, they lacked depth in explaining how ER changes across time and relates to changes in mental health. Comprehensive measurement of ER at different time-scales (e.g., real time, weekly, yearly) in the same participants helps explain how emotional intensity, frequency, and stability/variability are related to longer-term mental health implications.

Prior to this dissertation, there were few studies that had linked real-time ER patterns to longer-term socioemotional outcomes in children (Smith et al., 2011), preadolescents (Zalewski et al., 2011), and adolescent girls (Lanteigne et al., 2014). Study 1 built from the foundation of these studies and found that ER in real time was associated with a wide range of ER habits and internalizing symptoms in adolescence. Study 1 also extended previous research by finding that the ER patterns in real time were fairly stable for the majority of adolescents across one year, however a small percentage of adolescents did have different responses one year later, which was related to changes in avoidance, trait shame, and depressive symptoms.

Using a yearly time scale (three measurements across two years), Study 2 allowed for a broader view on how ER relates to shame and internalizing symptoms over time. Study 2 found that ER was a bidirectional mediator between shame and internalizing symptoms. Thus, ER differences are important to consider as a precursor of and as a response to internalizing symptoms.
Study 3 involved both a weekly time scale (six weekly assessments of ER) and monthly time scale (three larger ER assessments spaced across a 9-month period). Study 3 results indicated some changes in ER across the nine months, possibly due to developmental changes or time of year changes. The results also indicated that ER did change gradually across ER training sessions, however those gains were not sustained after the training sessions concluded. The brief training not having a long-term impact on ER is consistent with research that shows people with depression can successfully implement ER habits such as reappraisal when they are given instructions but they have difficulty implementing reappraisal spontaneously (Ehring, Tuschen-Caffier, Schnulle, Fischer, & Gross, 2010). ER habits are well entrenched and it likely takes more than 6 weeks to integrate changes in ER habits into long-term emotional functioning.

Moving forward, a closer examination of the moment-to-moment dynamics of ER in adolescence would clarify how spontaneous regulation arises and leads to adaptive or maladaptive outcomes (Koval, Butler, Hollenstein, Lanteigne, & Kuppens, 2014; Kuppens et al., 2012; Trull, Lane, Koval, & Ebner-Primer, 2015). For example, when and why do changes in avoidance occur? Are certain dysregulated emotions more problematic over time than others (e.g., fear, shame, anger)? In the adolescent ER field, there is little research directed at how ER habits are used moment-to-moment, how they are implemented throughout the day in an adolescents’ life, and how that relates to adolescent mental health (Neumann, van Lier, Frijns, Meeus, & Koot, 2011; Silk et al., 2011; Silk, Steinberg, & Sheffield Morris, 2003). Experience-sampling methods (ESM) could be used to measure experience, expression, and arousal in the daily lives of adolescents. Technological applications have improved dramatically over the last decade and are now capable of more precise measurement of the emotion domains in ecologically valid contexts. In addition to measurement, the field will also need to develop analytical techniques capable of handling large quantities of raw data.
(Scollon, Kim-Prieto, & Diener, 2009). A recent commendable study connected cortisol reactivity with daily negative affect in first year university students, but coping responses to stressors did not buffer elevated HPA axis activation (Sladek, 2015). Unfortunately, the measures of coping used in the study were not well defined – they were either too general (e.g., “I’ve been trying to come up with a strategy about what to do”) or too specific (e.g., “Overall today, how much did you tell yourself that things could be worse”) and they did not use typical measures of ER habits. Measuring well-defined ER habits (e.g., avoidance, reappraisal) on a daily basis rather than general coping may have led to different conclusions. To make this type of investigation possible, an important addition to the literature would be a fully validated and comprehensive measure of ER at different time increments (e.g., real-time, hourly, daily, weekly, monthly, and yearly).

ESM could help with improving intervention approaches. ESM could be used in therapeutic intervention, to track difficulties with regulation and changes in regulation across therapy (De Vries & Csikszentmihalyi, 2006; Forbes et al., 2012; Silk et al., 2011). ESM would also expand on the results of the current studies by determining if there are different approaches for intervention based on the stability or change in regulation patterns. For example, interventions could be tailored for adolescents with consistent difficulty with regulation versus those that have had a recent change in regulation. As internalizing symptoms and associated regulatory strategies have variability across days (Kashdan & Steger, 2006), boosts of support could also be provided on problematic days.

**Goal-Based models of ER**

All prominent definitions of ER state that ER involves helping the individual achieve their goals (Cole, Martin, & Dennis, 2004; Gross, 1998a; Hofmann, Sawyer, Fang, & Asnaani, 2012). In empirical studies of ER, measuring the goals of the individual has often been neglected. Setting goals and collaborative effort between the patient and therapist to achieve them are undoubtedly an
important part of therapeutic intervention (Matre, Dahl, Jensen, & Nordahl, 2013). While the UP involves setting goals and psychoeducation about the utility of emotions, little is known about adolescents’ ER goals and how they relate to ER habits and internalizing symptoms. Goal-based models of ER such as the instrumental account (Tamir, 2009) and the emotion regulation choice framework (Sheppes et al., 2014) could help to improve how ER is targeted in intervention for adolescents. As there is overlap between these models, I have integrated the main arguments of these models below.

ER depends on how the individual balances their short-term and long-term goals, beliefs about the utility of different emotions in reaching a goal, beliefs about different ER habits, and self-efficacy in regulation. People may want to experience negative emotions, whether consciously or unconsciously because they think it will help them reach a desired goal. For example, adults that are high in neuroticism preferred to increase their worry before a test because they believed it would help them deal with the threat of the test (Tamir, 2005). Preliminary research suggested that activating long-term goals makes certain ER habits such as reappraisal more likely and other habits such as distraction less likely (Sheppes et al., 2014). If the individual determines emotion regulation is needed to reach a goal, then there may still be variation in how much they believe different ER habits will help them reach the goal. Adults have indicated in past research that they perceive different benefits to ER habits. For example, adults who used rumination reported that the benefits of rumination included increasing self-awareness, understanding depression, and solving problems or preventing future mistakes (Watkins & Baracaia, 2001). However, the perceived benefit of an ER habit may not be reality and could cause detrimental effects. Finally, even if an individual accurately assesses their ER needs and selects an appropriate regulation habit, they may not believe that they can successfully implement it to create the desired change. In adults, people with stronger beliefs
that emotions can be controlled have higher self-efficacy in ER, used reappraisal more frequently, and had more positive emotional experience and less negative emotional experience (Tamir, John, Srivastava, & Gross, 2007). However, given the correlational nature of these results it is also possible that people who are less able to regulate their emotions have formed the perspective that regulation is less controllable over time as this accurately reflects their own reality. Further research, such as an experimental induction of increasing beliefs about regulatory control or longitudinal research examining whether ER beliefs prospectively predict poor ER are necessary to clarify this association.

While there is some knowledge about ER goals in adults, there are not yet any studies examining the goals of ER in adolescents. The current studies did not assess individual differences in how ER related to short-term or long-term goals, nor did they assess beliefs about emotions, ER, and self-efficacy. It is possible that adolescents with dysregulated patterns in Study 1 were more focused on short-term goals (e.g., getting through the speech) rather than long-term goals (e.g., spending the study money on something they want, or helping with the research). Focus on short-term goals could have prompted using habits such as avoidance. It is also possible that adolescents’ beliefs about ways of regulating or their ability to regulate influenced their responses. An extension of Study 1 could include measuring individual differences in goals and beliefs, and also to introducing the speech task in different ways to promote certain responses. For example, priming thinking about long-term goals. Participants in Study 3 were assisted in balancing short-term and long-term goals, lowering intensity of unhelpful negative emotions though acceptance and mindfulness, and making reappraisals or taking action. Helping generating these approaches did impact weekly self-reported regulation during the training. Short-term and long-term goals were listed on participant worksheets, but they were not collected for data analysis. Understanding the connections between dysfunctional...
ER choice and short-term and long-term goals may help clinicians provide better psychoeducation and identification of dysfunction in clients.

**ER in the Social Context**

Parents, other family members, and peers may be integral for the development and maintenance factors that support adaptive or maladaptive ER. Limited research has been done examining ER in the context of parents and peers in adolescence (Bariola, Gullone, & Hughes, 2011). The Selection, Optimization, and Compensation with Emotion Regulation framework draws attention to how social support can alter ER success (Urry & Gross, 2010). Across adolescence, there is a decline in social support from parents, an increase in conflict with parents, and increasing social support from peers. Peers may be less likely to promote positive ER (e.g., helping with reappraisal) in comparison to parents, and thus the decline in adequate social support partially underlies adolescent difficulty with ER (Opitz, Gross, & Urry, 2012). Individual differences in peers and parents in terms of helping with regulation or displaying adaptive regulation, likely have an impact on the adolescent’s ER (Cole et al., 1994; Morris et al., 2007). While the studies in the current dissertation did not measure social support per say, the participants in all studies may have experienced declines in social support common in their age group – Study 1 and 2 age-group might have experienced a decline in social support from parents, and Study 3 participants may have experienced a decline in social support across their entire network as the majority of participants moved to a new city for university. Individual differences in social support may have had an impact on regulatory ability and ER habit choice; for example, adolescents with more dysregulated ER may have been receiving less social support.

The impact that parents and peers have on adolescents goes beyond helping with regulation for life events; social exchanges in relationships can be triggers for strong emotions that require
regulation. Adolescents are strongly motivated for acceptance, approval, and being attractive to peers and potential sexual partners, thus criticism and rejection can result in painful feelings of shame and inferiority (Gilbert & Irons, 2009). Shame is arguably the most painful emotion in the adolescent experience (Reimer, 1996). Past research has shown that memories of adverse social events (e.g., ridiculed, criticized, rejected) can be traumatic (Cunha, Matos, Faria, & Zagalo, 2012) and they are strongly associated with the onset of social anxiety disorder (Hackmann et al., 2000), and depression (Sjoberg, Nilsson & Leppert, 2005; Slavich, O’Donovan, Epel, & Kemeny, 2010). Parenting behaviours such as sibling favoritism, hostility/rejection, invalidation, psychological control, negative family climate, interparental conflict, and low maternal warmth and sensitivity are related to emotion dysregulation in adolescence (Cui, Sheffield Morris, & Criss, 2014; Fosco & Grych, 2012; Saritas et al., 2013; Yap et al., 2008; Yap et al., 2010). Peer victimization (ridiculing, bullying, ostracizing, gossiping), is also thought to negatively impact the ER development of adolescents (Harris, 1995; Saarni, 1999; Zeman, Cassano, & Adrian, 2012).

While we did not measure parent or peer variables, Study 1 and Study 2 were focused on understanding the regulation of the social emotion of shame. Study 1 and Study 2 found that shame and the regulation of shame were strongly related to depression, social anxiety, and generalized anxiety symptoms. Avoidance and acceptance seem to be particularly important for shame regulation. The shame responses in Study 1 occurred when they were delivering a speech to a stranger in a laboratory. Shame responses with people the adolescent is involved with on a personal level may be even more central to their internalizing symptoms.

While shame was not a focus for Study 3, shame was significantly positively correlated with depressive symptoms, anxiety symptoms, and emotion regulation difficulty ($r_s = .45, .42, .45, ps <.001$, respectively) at the pre-assessment. Given the strong associations with shame and
internalizing symptoms in Study 1 and Study 2, and a lack of significant results in Study 3 with a
general emotion approach, it is possible that a greater focus on shame would have improved Study 3.
The brief intervention in a group format likely did not tap into memories of events with intense
shame. A greater focus on shame would involve trying to evoke examples of situations where
participants felt shame, rather than examples where there was any type of high negative emotion.
Regulating intense shame associated with specific events may be particularly relevant for reducing
anxious and depressive symptoms. Focusing on clinical methods to increase acceptance and reduce
avoidance may be the most advantageous in future prevention work. Increasing acceptance might
require a systemic approach to ER processes within families, classrooms, or other social groups.

Conclusion

Emotion regulation is central, or perhaps even the core process for successful socioemotional
competence in adolescence and across the lifespan. Individuals are capable of making ER changes
that enhance emotional well-being, relationships, and productivity. Enhancing ER is becoming a
focus across many industries such as education (Flook, Goldberg, Pinger, & Davidson, 2015;
Graziano, Reavis, Keane, & Calkins, 2007), business (Cote & Morgan, 2002; Grandley, Dickter, &
Sin, 2004), medicine (Larson & Yao, 2005), and law (Maroney, 2006). Future research needs to
determine the most effective and cost-conscious ways of promoting healthy ER in various
prevention and intervention contexts. Ideally, enhancing ER should result in sustained
transdiagnostic reduction in mental health symptoms, and an increase in the overall functionality and
experience of positive emotions. Stronger ER will make for a better society in future generations.
References


Appendix A: Additional Figures for Study 3

Difficulty Regulating (DERS)  
Pre | Post | Follow-up
--- | --- | ---
2.2 | 2.4 | 2.6
2.4 | 2.6 | 2.8
2.6 | 2.8 | 3.0
2.8 | 3.0 | 3.2

Suppression  
Pre | Post | Follow-up
--- | --- | ---
3.0 | 3.2 | 3.4
3.2 | 3.4 | 3.6
3.4 | 3.6 | 3.8
3.6 | 3.8 | 4.0

Adjusting  
Pre | Post | Follow-up
--- | --- | ---
2.2 | 2.4 | 2.6
2.4 | 2.6 | 2.8
2.6 | 2.8 | 3.0
2.8 | 3.0 | 3.2

Mindfulness  
Pre | Post | Follow-up
--- | --- | ---
3.0 | 3.2 | 3.4
3.2 | 3.4 | 3.6
3.4 | 3.6 | 3.8
3.6 | 3.8 | 4.0

Rumination  
Pre | Post | Follow-up
--- | --- | ---
2.2 | 2.4 | 2.6
2.4 | 2.6 | 2.8
2.6 | 2.8 | 3.0
2.8 | 3.0 | 3.2

Cognitive Avoidance  
Pre | Post | Follow-up
--- | --- | ---
2.2 | 2.4 | 2.6
2.4 | 2.6 | 2.8
2.6 | 2.8 | 3.0
2.8 | 3.0 | 3.2

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Figure 1. ER habits without significant changes across pre, post, and follow-up assessments.
Appendix B: Consent Forms and Letters of Information

LAB VISIT: INITIAL CONSENT (PARENT)

Project Title: Individual differences in psychophysiological responsivity while regulating emotion in adolescence.

Background Information:
We are requesting your child’s involvement in a research project designed to explore changes in children’s emotional and behavioural patterns as they move into adolescence. You have indicated your willingness to participate in this second phase of the study that involves a visit to Dr. Hollenstein’s laboratory at Queen's University. This study has been reviewed for ethical compliance by the Queen’s University Health Sciences and Affiliated Teaching Hospitals Research Ethics Board.

Details of the Study:
We have invited you and your child for this visit that will last approximately 1.5 hours. You will be asked to wait in an adjacent room while your child completes the study. During the study, your child will be videotaped while completing a few tasks. After the instructions are clear, we will turn on the camera and record your child as he or she proceeds through the tasks. Later, we will analyze the videotapes and look for patterns that are general to all participants.

While being videotaped, we will also record information about heart rate, breathing rate, and the perspiration on the skin of the finger. These recordings will be used to provide information about how excited your child gets during the tasks. There is no harm in having these sensors placed on your body in several places: on the finger, below each clavicle, and a strap around the upper torso under the armpits. Only female research assistants will affix these electrodes to your child’s body and anyone can refuse to have these electrodes placed on their body at any point during your visit.

No harm can result from participation in this study. However, some participants may feel embarrassed or anxious being recorded on video. If feelings of discomfort do occur, any participant is welcome to stop participation at any time. If emotional issues arise that you would like to follow up, please feel free to ask for a list of professionals who may be of service.

Benefits:
We expect the adults and children in this study to have a positive experience. It can be interesting and informative to both you and your child to learn about individual patterns of thought and feeling as they change through the early adolescent years.

Freedom to withdraw or participate:
Your child’s participation in this research is completely voluntary. He or she can decide not to participate and you can choose to stop him or her from participating at any point. He or she may also end the videotaped sessions at any time. The decision not to participate, or to stop participating, will be respected, and no negative evaluation, pressure, or any other unpleasant outcome will result.
Compensation:

Your child will receive a $20 gift certificate to Chapters. This is intended to thank you and your child for your participation in this study.

Confidentiality:

Any information gathered from this study will remain confidential, and published reports will not mention individuals. All files, including video, will be given a code number rather than a name to identify it. Only staff members of the project (including graduate students working with Dr. Hollenstein) will have access to the video recordings, unless you give us your express permission to use the videotapes for purposes of education. In that case, videos may be shown to university students and professionals in psychology and related disciplines, and these individuals will be asked to maintain confidentiality as well. The video will be saved on DVD and kept in a locked, secure cabinet in a locked room. Your data will be destroyed after 10 years. When the study is complete, we will be happy to share the results with you, and you are free to contact us at any time to learn more about the procedures or the results.
SUBJECT STATEMENT AND SIGNATURE SECTION:
I have read and understand the consent form for this study. I have had the purposes, procedures and technical language of this study explained to me. I have been given sufficient time to consider the above information and to seek advice if I chose to do so. I have had the opportunity to ask questions which have been answered to my satisfaction. I am voluntarily signing this form. If I wish, I will receive a copy of this consent form for my information.

I understand that I may contact Dr. Hollenstein at any time during the study. Dr. Hollenstein may be reached by telephone at (613) 533-3288, or by email at tom.hollenstein@queensu.ca.

I may also contact the Head of the Psychology Department (Dr. Rick Benninger: (613) 533 – 2492) or the Chair of the Queen’s University Health Sciences and Affiliated Teaching Hospitals Research Ethics Board (Dr. Albert Clark, (613) 533-6081) if I have any concerns about the project.

Circling “I agree” below indicates that I have read and understand the information provided above, that I willingly agree to participate, and that I may withdraw my consent and discontinue participation at any time.

I agree

I do not agree

I also understand that the videotapes from these sessions may be useful to show to other researchers who share an oath of confidentiality. By circling “I agree” below, I understand that I am giving permission for the video to be shared in confidential situations. By circling “I disagree” below I am not giving permission to share the video but still wish to participate in the study.

I agree

I do not agree

Signature: ____________________________   Date: _________________

STATEMENT OF INVESTIGATOR:

I, or one of my colleagues, have carefully explained to the subject the nature of the above research study. I certify that, to the best of my knowledge, the subject understands clearly the nature of the study and the demands, benefits, and risks involved to participants in this study.

Signature: ____________________________   Date: _________________
LAB VISIT: INITIAL CONSENT (CHILD)

I understand that the aim of this study is to learn more about the feeling and behaviour changes that happen when you become a teenager, and that all I will need to do is sit quietly and participate in certain tasks like talking about things that are interesting to me.

I understand that I will be videotaped while I do these tasks. I also understand that my heart rate, breathing rate, and skin perspiration will be recorded at the same time and that there is no harm from this kind of recording.

I understand that these videotapes will be private, and seen only by Dr. Hollenstein and his helpers, and possibly other adults interested in child development if that feels OK to me. I know that I will be assigned a number, and that my name will not be connected to the video.

I understand that I may skip any question that I do not want to answer. I understand that I may get out of the study at any time without giving a reason, and that nobody will be mad at me if I do. My parent can also decide, at any time, that we don’t want to be in this study any longer.

I understand that I may contact Dr. Hollenstein, or any of his helpers, at any time during the study, if I have questions. I also understand that I may contact the Head of the Psychology Department (Dr. Rick Benninger: (613) 533 – 2492) or the Chair of the Queen’s University Health Sciences and Affiliated Teaching Hospitals Research Ethics Board (Dr. Albert Clark, (613) 533-6081) if I have any concerns about the project.

Circling “I agree” below means that I would like to participate in the study.

I agree       I do not agree

Signature: ______________________________________   Date: _______________
LAB VISIT: FINAL CONSENT (CHILD)

Now that I have completed the study and understand more fully all of the things that have been recorded, I understand that I have the opportunity to review my consent. It has been explained to me that I may withdraw my participation at this point and any recordings that have been made will be destroyed. I understand I may also leave my consent unchanged so that these recordings may be kept in a secure and confidential place and analyzed.

Please complete either section A or B below:

A. I choose to remain in the study and wish to have my data included:

Name: __________________________      Date: __________________

Signature: ________________________

************************************************************************

B. I wish to withdraw from the study. Please destroy the recordings and other information gathered today.

Name: __________________________      Date: __________________

Signature: ________________________
Letter of Information – Control Participants

The Adjustment to University

This research is being conducted by Dianna Lanteigne under the supervision of Dr. Tom Hollenstein, in the Department of Psychology at Queen’s University in Kingston, Ontario. This research investigates the relationship between an individual’s stress and emotion management strategies and adjustment to the first year of university.

The study will require three online surveys (in January, March, and June). Each survey takes about 60 minutes to complete. For your participation, you can be remunerated with either 1 credit or $10 for each survey, depending on your choice. Although the last survey will be cash compensation as it takes place after the term is complete. Should you withdraw from the study before completion, you will be provided with the specified compensation for your participation up to that point. Should you miss a survey, you will not be compensated for that survey.

Surveys will involve answering questions about sensitive and personal issues. Should you feel distressed at any time and would like to speak confidentially to someone about your thoughts and feelings, the project coordinator, Dianna Lanteigne, can speak with you and discuss different possible options at Queen’s and in the community if necessary. For example, there are several free and fee-for-service resources (i.e., Counselling Services, 613-533-6000, ext. 78264; Hotel Dieu emergency (Psychiatry), 613-546-1240; Canadian Mental Health Association, 613-549-7027; Distress Center, 613-544-1771; 24-Hour Crisis Line, 613-544-4229).

Your participation at all times is voluntary and you may withdraw from the study at any time, without penalty or effect on your academic standing. While it would be greatly appreciated if you would answer all surveys, you are under no obligation to answer any questions that you find objectionable or that make you feel uncomfortable. Additionally, if you have supplied any data that you would like deleted, your request will be immediately granted. All of your responses to the surveys will be kept confidential to the limits allowed by law.

Given that this study takes place over several weeks, we do require your name and other contact information to contact you about study details, compensation, and debriefing. To ensure confidentiality, your name and other identifying information will be kept separate from your responses to the questionnaires. Instead, you will be assigned an ID number to be used in place of names. The master list matching names to ID numbers will be kept apart from the data, will be stored in a secured area, and will only be available to the researcher in charge of contacting you. Consent forms will be kept separate from your data and contact information, and stored in a secured area. All survey data will also be stored in a secured area to which only experimenters involved in the study will have access. For online surveys, data will be password-protected. All information gathered will be used for research purposes only. Any journal publications or presentations at scientific conferences that proceed from this study will be of general findings, and will not reveal personally identifying information.
Any questions about study participation may be directed to Dianna Lanteigne at 613-533-3277 or dianna.lanteigne@queensu.ca, or Dr. Tom Hollenstein at 613-533-3288 or tom.hollenstein@queensu.ca. Any ethical concerns about the study may be directed to the Chair of the General Research Ethics Board at chair.GREB@queensu.ca or 613-533-6081. This study has been granted clearance according to the recommended principles of Canadian ethics guidelines, and Queen’s policies. We thank you for your willingness in participating in our research.

Consent Form – Control participants

1. I have read the Letter of Information and have had any questions answered to my satisfaction.

2. I understand that I will be participating in the study called The Adjustment to University. I understand that this means that I will be asked to complete a number of surveys at three different time points, all of which will be online.

3. I understand that I may feel uncomfortable with some of the questions asked. I understand that my participation in this study is completely voluntary and that I may withdraw at any time, without penalty.

4. I understand that every effort will be made to protect my right to confidentiality, and that only trained research assistants will have access to the area in which data will be stored. The data may also be published in scientific journals or presented at scientific conferences, which will be of general findings and will never reveal personally identifying information.

5. I am aware that any questions about study participation may be directed to Dianna Lanteigne at 613-533-3277 or dianna.lanteigne@queensu.ca, or Dr. Tom Hollenstein at 613-533-3288 or tom.hollenstein@queensu.ca. Any ethical concerns about the study may be directed to the Chair of the General Research Ethics Board at chair.GREB@queensu.ca or 613-533-6081. I am aware that this study has been granted clearance according to the recommended principles of Canadian ethics guidelines, and Queen’s policies.

I have read the above statements and freely consent to participate in this research.

Yes

No
Letter of Information – Training Participants

The Adjustment to University

This research is being conducted by Dianna Lanteigne under the supervision of Dr. Tom Hollenstein, in the Department of Psychology at Queen’s University in Kingston, Ontario. This research investigates the relationship between an individual’s stress and emotion management strategies and adjustment to the first year of university.

The study will require three online surveys (in January, March, and June). Each survey takes about 60 minutes to complete. Participation also involves 6 weekly group meetings, each about 1.5 hours. Thus, in total this study involves 12 credit hours, however you can only receive up to five credits. If your credits are fulfilled, then the rest of your time will be compensated at a rate of $10 per hour. Should you withdraw from the study before completion, you will be provided with the specified compensation for your participation up to that point. Should you miss a meeting or survey, you will not be compensated for that meeting or survey.

Surveys will involve answering questions about sensitive and personal issues. Should you feel distressed at any time and would like to speak confidentially to someone about your thoughts and feelings, the project coordinator, Dianna Lanteigne, can speak with you and discuss different possible options at Queen’s and in the community if necessary. For example, there are several free and fee-for-service resources (i.e., Counselling Services, 613-533-6000, ext. 78264; Hotel Dieu emergency (Psychiatry), 613-546-1240; Canadian Mental Health Association, 613-549-7027; Distress Center, 613-544-1771; 24-Hour Crisis Line, 613-544-4229).

Your participation at all times is voluntary and you may withdraw from the study at any time, without penalty or effect on your academic standing. While it would be greatly appreciated if you would answer all surveys, you are under no obligation to answer any questions that you find objectionable or that make you feel uncomfortable. Additionally, if you have supplied any data that you would like deleted, your request will be immediately granted. All of your responses to the surveys will be kept confidential to the limits allowed by law.

Given that this study takes place over several weeks, we do require your name and other contact information to contact you about study details, compensation, and debriefing. To ensure confidentiality, your name and other identifying information will be kept separate from your responses to the questionnaires. Instead, you will be assigned an ID number to be used in place of names. The master list matching names to ID numbers will be kept apart from the data, will be stored in a secured area, and will only be available to the researcher in charge of contacting you. Consent forms will be kept separate from your data and contact information, and stored in a secured area. All survey data will also be stored in a secured area to which only experimenters involved in the study will have access. For online surveys, data will be password-protected. All information gathered will be used for research purposes only. Any journal publications or presentations at scientific conferences that proceed from this study will be of general findings, and will not reveal personally identifying information. In addition, some of the activities in the weekly group meetings
involve discussion of personal thoughts and feelings. Members of the group will discuss and sign a confidentiality agreement at the beginning of the first session.

Any questions about study participation may be directed to Dianna Lanteigne at 613-533-3277 or dianna.lanteigne@queensu.ca, or Dr. Tom Hollenstein at 613-533-3288 or tom.hollenstein@queensu.ca. Any ethical concerns about the study may be directed to the Chair of the General Research Ethics Board at chair.GREB@queensu.ca or 613-533-6081. This study has been granted clearance according to the recommended principles of Canadian ethics guidelines, and Queen’s policies. We thank you for your willingness in participating in our research.

Consent Form – Training participants

1. I have read the Letter of Information and have had any questions answered to my satisfaction.

2. I understand that I will be participating in the study called The Adjustment to University. I understand that this means that I will be asked to partake in 6 weekly group activity sessions and complete a number of surveys at three different time points, all of which will be online.

3. I understand that I may feel uncomfortable with some of the questions asked. I understand that my participation in this study is completely voluntary and that I may withdraw at any time, without penalty.

4. I understand that every effort will be made to protect my right to confidentiality, and that only trained research assistants will have access to the area in which data will be stored. The data may also be published in scientific journals or presented at scientific conferences, which will be of general findings and will never reveal personally identifying information.

5. I understand that some of the group meetings may involve sharing of personal thoughts and feelings. During my first group meeting we will discuss confidentiality within the group and sign a confidentiality agreement.

6. I am aware that any questions about study participation may be directed to Dianna Lanteigne at 613-533-3277 or dianna.lanteigne@queensu.ca, or Dr. Tom Hollenstein at 613-533-3288 or tom.hollenstein@queensu.ca. Any ethical concerns about the study may be directed to the Chair of the General Research Ethics Board at chair.GREB@queensu.ca or 613-533-6081. 7. I am aware that this study has been granted clearance according to the recommended principles of Canadian ethics guidelines, and Queen’s policies.

I have read the above statements and freely consent to participate in this research.

Yes
No
Appendix C: Ethics Approval Forms

QUEEN'S UNIVERSITY HEALTH SCIENCES AND AFFILIATED TEACHING HOSPITALS
ANNUAL RENEWAL

Queen's University, in accordance with the "Tri-Council Policy Statement, 1998" prepared by the Medical Research Council, Natural Sciences and Engineering Research Council of Canada and Social Sciences and Humanities Research Council of Canada requires that research projects involving human subjects be reviewed annually to determine their acceptability on ethical grounds.

A Research Ethics Board composed of:

Dr. A.F. Clark Emeritus Professor, Department of Biochemistry, Faculty of Health Sciences, Queen's University (Chair)

Dr. M. Evans Community Member

Dr. S. Horgan Manager, Program Evaluation & Health Services Development, Geriatric Psychiatry Service, Providence Care, Mental Health Services
Assistant Professor, Department of Psychiatry

Dr. L. Keeping-Burke Assistant Professor, School of Nursing, Queen's University

Ms. D. Morales Community Member

Dr. W. Racz Emeritus Professor, Department of Pharmacology & Toxicology, Queen's University

Dr. B. Simchison Assistant Professor, Department of Anaesthesiology, Queen's University

Dr. A.N. Singh WHO Professor in Psychosomatic Medicine and Psychopharmacology
Professor of Psychiatry and Pharmacology
Chair and Head, Division of Psychopharmacology, Queen's University
Director & Chief of Psychiatry, Academic Unit, Quinte Health Care, Belleville General Hospital

Dr. E. Tsai Associate Professor, Department of Paediatrics and Office of Bioethics, Queen's University

Rev. J. Warren Community Member

Ms. K. Weisbaum LL.B. and Adjunct Instructor, Department of Family Medicine (Bioethics)

Dr. S. Wood Director, Office of Research Services (Ex Officio)

has reviewed the request for renewal of Research Ethics Board approval for the project "Individual Differences in Psychophysiological Responsivity While Regulating Emotion in Adolescence" as proposed by Dr. Tom Hollenstein of the Department of Psychology, at Queen's University. The approval is renewed for one year, effective June 1, 2010. If there are any further amendments or changes to the protocol affecting the subjects in this study, it is the responsibility of the principal investigator to notify the Research Ethics Board. Any unexpected serious adverse event occurring locally must be reported within 2 working days or earlier if required by the study sponsor. All other adverse events must be reported within 15 days after becoming aware of the information.

Chair, Research Ethics Board

Date

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August 3, 2010

Dr. Tom Hollenstein
Department of Psychology
Humphrey Hall
Queen’s University

Re: “Individual Differences in Psychophysiological Responsivity While Regulating Emotion in Adolescence” PSYC-082-08

Dear Dr. Hollenstein,

I am writing to acknowledge receipt of the following:

- Your email dated Tuesday, August 03, 2010 which requested approval for some amendments to the above-named study:
  - A variation on the basic lab protocol
  - Inclusion of both male and female adolescents
  - Dropping data collection from the parents and the exit interview
- Removal of some survey questionnaires and addition of some survey questionnaires
  - Questionnaires to be replaced: Multidimensional Anxiety Scale for Children (MASC) and Child Depression Inventory (CDI) – Replaced by Beck Anxiety Inventory (BAI) and Beck Depression Inventory (BDI)
  - Questionnaires to be added: Affective Style Questionnaire (ASQ), Coping Styles Checklist (CSC), Toronto Alexithymia Scale (TAS) and Youth Self-Report (YSR)
- Lab Visit: Initial Consent (Parent) – Version 1: August 1, 2010
- Lab Visit: Initial Consent (Child) – Version 1: August 1, 2010
- Lab Visit: Final Consent (Child) – Version 1: June 27, 2008
- Debriefing Script (for experimenter to recite)
- Debriefing Form: Child

I have reviewed these amendments and the additional survey questionnaires and hereby give my approval. Receipt of these amendments and forms will be reported to the Health Sciences Research Ethics Board.

Yours sincerely,

Albert Clark, Ph.D.
Chair
Research Ethics Board

AFC/kr
QUEEN'S UNIVERSITY HEALTH SCIENCES AND AFFILIATED TEACHING HOSPITALS
ANNUAL RENEWAL

Queen's University, in accordance with the "Tri-Council Policy Statement, 1998" prepared by the Medical Research Council, Natural Sciences and Engineering Research Council of Canada and Social Sciences and Humanities Research Council of Canada requires that research projects involving human subjects be reviewed annually to determine their acceptability on ethical grounds.

A Research Ethics Board composed of:

Dr. A.F. Clark, Emeritus Professor, Department of Biochemistry, Faculty of Health Sciences, Queen's University (Chair)
Dr. H. Abdollah, Professor, Department of Medicine, Queen's University
Dr. R. Brison, Professor, Department of Emergency Medicine, Queen's University
Dr. M. Evans, Community Member
Dr. S. Horgan, Manager, Program Evaluation & Health Services Development, Geriatric Psychiatry Service, Providence Care, Mental Health Services Assistant Professor, Department of Psychiatry
Dr. B. S. Kisilevsky, Professor, School of Nursing, Departments of Psychology and Obstetrics & Gynaecology, Queen's University,
Ms. D. Morales, Community Member
Ms. P. Newman, Pharmacist, Clinical Care Specialist and Clinical Lead, Quality and Safety, Pharmacy Services, Kingston General Hospital
Dr. W. Racz, Emeritus Professor, Department of Pharmacology & Toxicology, Queen's University
Ms. S. Rohland, Privacy Officer, ICES-Queen's Health Services Research Facility, Research Associate, Division of Cancer Care and Epidemiology, Queen's Cancer Research Institute
Dr. B. Simchison, Assistant Professor, Department of Anaesthesiology, Queen's University
Dr. A.N. Singh, WHO Professor in Psychosomatic Medicine and Psychopharmacology Professor of Psychiatry and Pharmacology Chair and Head, Division of Psychopharmacology, Queen's University Director & Chief of Psychiatry, Academic Unit, Quinte Health Care, Belleville General Hospital
Dr. E. Tsai, Associate Professor, Department of Paediatrics and Office of Bioethics, Queen's University
Rev. J. Warren, Community Member

has reviewed the request for renewal of Research Ethics Board approval for the project “Individual Differences in Psychophysiological Responsivity while Regulating Emotion in Adolescence” as proposed by Dr. Thomas Hollenstein of the Department of Psychology, at Queen's University. The approval is renewed for one year, effective July 29, 2011. If there are any further amendments or changes to the protocol affecting the participants in this study, it is the responsibility of the principal investigator to notify the Research Ethics Board. Any unexpected serious adverse event occurring locally must be reported within 2 working days or earlier if required by the study sponsor. All other adverse events must be reported within 15 days after becoming aware of the information.

[Signature]
Date: September 19, 2011

Chair, Research Ethics Board
Renewal 1[ ] Renewal 2 [ ] Extension [ ] Code# PSYC-082.08 Romeo file# 6004467
August 9, 2011

Dr. Tom Hollenstein
Department of Psychology
Humphrey Hall
Queen’s University

Re: “Individual Differences in Psychophysiological Responsivity While Regulating Emotion in Adolescence” PSYC-082-08

Dear Dr. Hollenstein,

I am writing to acknowledge receipt of your email which requested approval for some amendments to the above-named study. I have reviewed the following:

- Participants will now have the option of doing the entire lab protocol or only the questionnaires
- The Cyberball computer game will be replaced with a facial emotional expression task
- Addition of one questionnaire – the Test for Self-Conscious Affect (Tangney & Dearing, 2002) – Adolescent Version
- Revised telephone contact script
- Revised Debriefing Form: Child – July 26, 2011
- Revised Debriefing Form: Child – Questionnaires (July 26, 2011)
- Revised Questionnaires: Parent Consent (July 26, 2011)
- Revised Lab Visit: Initial Consent (Parent) – July 26, 2011
- Revised Lab Visit: Initial Consent (Child) – July 26, 2011
- Revised Questionnaires: Child Consent (July 26, 2011)
- Revised Lab Visit: Final Consent (Child) – July 26, 2011
- A copy of the Test for Self-Conscious Affect (TOSCA-A) questionnaire

I have reviewed these amendments and the revised forms and hereby give my approval. Receipt of these will be reported to the Health Sciences Research Ethics Board.

Yours sincerely,

[Signature]

Albert Clark, Ph.D.
Chair
Research Ethics Board

AFC/kr
QUEEN'S UNIVERSITY HEALTH SCIENCES AND AFFILIATED TEACHING HOSPITALS
ANNUAL RENEWAL

Queen's University, in accordance with the "Tri-Council Policy Statement, 1998" prepared by the Medical Research Council, Natural Sciences and Engineering Research Council of Canada and Social Sciences and Humanities Research Council of Canada requires that research projects involving human subjects be reviewed annually to determine their acceptability on ethical grounds.

A Research Ethics Board composed of:

Dr. A.F. Clark, Emeritus Professor, Department of Biochemistry, Faculty of Health Sciences, Queen's University (Chair)
Dr. H. Abdollah, Professor, Department of Medicine, Queen's University
Dr. R. Brison, Professor, Department of Emergency Medicine, Queen's University
Dr. M. Evans, Community Member
Dr. S. Morgan, Manager, Program Evaluation & Health Services Development, Geriatric Psychiatry Service, Providence Care, Mental Health Services Assistant Professor, Department of Psychiatry
Ms. J. Hudacin, Community Member
Dr. B. Kisilevsky, Professor, School of Nursing, Departments of Psychology and Obstetrics and Gynaecology, Queen's University
Mr. D. McNaughton, Community Member
Ms. P. Newman, Pharmacist, Clinical Care Specialist and Clinical Lead, Quality and Safety, Pharmacy Services, Kingston General Hospital
Ms. S. Rohland, Privacy Officer, ICES-Queen's Health Services Research Facility, Research Associate, Division of Cancer Care and Epidemiology, Queen's Cancer Research Institute
Dr. B. Simchison, Assistant Professor, Department of Anaesthesiology and Perioperative Medicine, Queen's University
Dr. A.N. Singh, WHO Professor in Psychosomatic Medicine and Psychopharmacology Professor of Psychiatry and Pharmacology Chair and Head, Division of Psychopharmacology, Queen's University

has reviewed the request for renewal of Research Ethics Board approval for the project Individual Differences in Psychophysiological Responsivity While Regulating Emotion in Adolescence as proposed by Dr. T. P. Hollenstein of the Department of Psychology, at Queen's University. The approval is renewed for one year, effective July 28, 2012. If there are any further amendments or changes to the protocol affecting the participants in this study, it is the responsibility of the principal investigator to notify the Research Ethics Board. Any unexpected serious adverse event occurring locally must be reported within 2 working days or earlier if required by the study sponsor. All other adverse events must be reported within 15 days after becoming aware of the information.

Abdul F. Clark

Date: July 31, 2012

Chair, Research Ethics Board

Renewal 1 [ ] Renewal 2 [ ] Extension [X] Code# PSYC-082-08 Romeo file# 6004467

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July 19, 2013

Miss Dianna Lanteigne
PhD Candidate
Department of Psychology
Queen’s University
62 Arch Street
Kingston, ON K7L 3N6

GREB Ref #: GPSYC-620-13; Romeo # 6010537
Title: "GPSYC-620-13 Ameliorating Emotional Vulnerabilities in First Year Students"

Dear Miss Lanteigne:

The General Research Ethics Board (GREB), by means of a delegated board review, has cleared your proposal entitled "GPSYC-620-13 Ameliorating Emotional Vulnerabilities in First Year Students" for ethical compliance with the Tri-Council Guidelines (TCPS) and Queen’s ethics policies. In accordance with the Tri-Council Guidelines (article D.1.6) and Senate Terms of Reference (article G), your project has been cleared for one year. At the end of each year, the GREB will ask if your project has been completed and if not, what changes have occurred or will occur in the next year.

You are reminded of your obligation to advise the GREB, with a copy to your unit REB, of any adverse event(s) that occur during this one year period (access this form at https://eservices.queensu.ca/romeo_researcher/ and click Events - GREB Adverse Event Report). An adverse event includes, but is not limited to, a complaint, a change or unexpected event that alters the level of risk for the researcher or participants or situation that requires a substantial change in approach to a participant(s). You are also advised that all adverse events must be reported to the GREB within 48 hours.

You are also reminded that all changes that might affect human participants must be cleared by the GREB. For example you must report changes to the level of risk, applicant characteristics, and implementation of new procedures. To make an amendment, access the application at https://eservices.queensu.ca/romeo_researcher/ and click Events - GREB Amendment to Approved Study Form. These changes will automatically be sent to the Ethics Coordinator, Gail Irving, at the Office of Research Services or irvingg@queensu.ca for further review and clearance by the GREB or GREB Chair.

On behalf of the General Research Ethics Board, I wish you continued success in your research.

Yours sincerely,

Joan Stevenson, Ph.D.
Chair
General Research Ethics Board

c. Dr. Tom Hollenstein, Faculty Supervisor
   Dr. Kate Harkness, Co-investigator
   Dr. Stanka Fitneva, Chair, Unit REB
   Marie Tooley, Dept. Admin.
August 27, 2013

Miss Dianna Lanteigne  
Ph.D. Candidate  
Department of Psychology  
Queen's University  
62 Arch Street  
Kingston, ON K7L 3N6

Dear Miss Lanteigne:

RE: Amendment for your study entitled: GPSYC-620-13 Ameliorating Emotional Vulnerabilities in First Year Students; ROMEO# 6010537

Thank you for submitting your amendment requesting the following changes:

1) To give the weekly measures of mood (Mood Check) and emotion regulation (Brief emotion regulation questionnaire) to the control group;

2) To add a measure of Shame (The experience of shame scale; Andrews, Qian, & Valentine, 2002) to the pre, post, and follow-up package of questionnaires;

3) To add a measure of Customer Satisfaction to the post training package of questionnaires;

4) For the customer satisfaction questionnaire, the small section at the end will only be given to participants who stopped going to the sessions part way through the study;

5) To include a brief screen over the telephone for selected Axis 1 psychiatric disorders (mini neuropsychiatric interview 6.0; Sheehan et al., 2010);

6) Updated telephone scripts.

By this letter you have ethics clearance for these changes.

Good luck with your research.

Sincerely,  

Joan Stevenson, Ph.D.  
Chair  
General Research Ethics Board  

c.: Dr. Tom Hollenstein, Faculty Supervisor  
Dr. Kathryn Harkness, Co-investigator