Received: 31 July 2023 | Accepted: 24 May 2024

DOI: 10.1111/bjep.12696

the british psychological society
promoting excellence in psychology

ARTICLE

Emotion regulation styles and the tendency to learn from academic failures

Yonatan Sharabi | **Guy Roth**

School of Education, Ben Gurion University of the Negev, Beer Sheva, Israel

Correspondence
Guy Roth, School of Education, Ben Gurion University of the Negev, P.O.B. 653, 84105, Beer Sheva, Israel.
Email: rothguy9@gmail.com

Funding information
Israel Science Foundation

Abstract

Background: Research on learners' reactions to failure finds negative emotions may present an obstacle for learning; a painful experience of failure may result in disengagement and avoidance. However, research on styles of emotion regulation and learning from failure is scarce. Self-determination theory's (SDT) conception of adaptive and maladaptive emotion regulation differentiates among three styles of regulation: integrative emotion regulation (IER), suppressive emotion regulation (SER) and amotivated emotion regulation.

Aims: Two studies were conducted, one cross-sectional and one longitudinal, to test the associations between IER and learning from failure among adolescents.

Sample: Study 1 comprised 184 adolescents (mean age = 16.55; SD = 1.2). Study 2 comprised 565 adolescents (8–12 graders). The main analysis was based on 192 adolescents' perceptions of failing math grades.

Method: Study 1 surveyed adolescents on their emotion regulation styles, adaptive and maladaptive coping practices when dealing with failure and tendency to learn from failure. Study 2 was longitudinal and focused on failure in math. We approached participants twice, before and after the math test.

Conclusions: In both studies, IER was related to adaptive coping practices and the tendency to learn from failure. In Study 2, adaptive coping practices mediated relations between IER and learning from failure in math and learning from failure mediated relations between IER and future engagement. These findings suggest that styles of emotion regulation play an important role in learning from failure.

KEYWORDS
emotion regulation, integration, learning from failure, self-determination theory

INTRODUCTION

Failures are inevitable in learning processes and may foster learning (Kapur, 2008; Keith & Frese, 2005). Theoretical approaches to learning from errors and failures emphasize the beneficial role of reflection processes and self-explanations triggered by impasses or errors (De Leeuw & Chi, 2003). VanLehn et al. (2003) suggested impasses pave the way for learning via the subsequent explanation of the failure. However, there are considerable individual differences in the ability to learn from failure (Tulis et al., 2015).

Research consistently suggests that negative emotions may create an obstacle to learning (Boekaerts, 2006; Dresel et al., 2013; Tulis et al., 2015). In a recent series of studies, Eskreis-Winkler and Fishbach (2019) found support for the hypothesis that because people find failure ego-threatening, they may disengage and thus avoid learning because it is impossible to gather information from a situation they have not fully attended to. In the education context, to reduce unpleasant emotions caused by failure (e.g. fear, anxiety, frustration), students may actively take their minds off a problem or engage in task-irrelevant coping activities, for example, blaming others or denying the failure (Zhao, 2011).

To explain why some learners show adaptive affective and motivational reactions and learn from failure while others do not, researchers have examined contextual (Steuer et al., 2013) and individual factors that may influence the tendency to learn from failure (Tulis et al., 2015). Individual factors include achievement goals (Boekaerts, 2006; Dweck & Leggett, 1988), attitudes to errors (Tulis & Ainley, 2011), self-concept (Tulis et al., 2018), coping strategies (Raftery-Helmer & Grolnick, 2016) and aspects of self-regulated learning (Boekaerts & Cascallar, 2006; Pintrich & Schunk, 2002). Given how likely negative emotions are to accompany failure, it is surprising that empirical research on styles of emotion regulation is so sparse (Tulis et al., 2015). Scholars have examined emotional responses as possible determinants of learning from failure (Boekaerts, 2002; Dresel & Ziegler, 2002) and revealed practices of coping with stress (Raftery-Helmer & Grolnick, 2016), but styles of emotion regulation are relatively neglected (Tulis et al., 2015).

Given the destructive role that negative emotions may play in the tendency to learn from failure, we examined styles of emotion regulation, anchored in self-determination theory (SDT; Ryan & Deci, 2017), as possible antecedents of learning from failure.

Because strong negative emotions can be unpleasant and hamper functioning, emotion regulation research often focuses on diminishing negative experiences (e.g. Berenbaum et al., 1999). Yet SDT posits negative emotions are informational inputs assisting in the choice and self-guidance of actions, not hindrances to adaptive functioning (Vansteenkiste et al., 2010). Individuals can better grasp the nature of situations, choose coping practices (Gratz & Roemer, 2004) and adaptively react to failure when they have access to and accept both negative and positive feelings, whether through self-reflection or volitional sharing (Roth et al., 2019).

Adaptive and maladaptive emotion regulation in SDT

Being able to regulate one's emotional experience and expression fosters adaptive behaviour (Beauchaine, 2015), but difficulty doing so can generate maladjustment (Cole et al., 2013). Accordingly, emotion regulation and coping are key predictors of wellness (Weinstein et al., 2009). In the last decade, research has demonstrated the importance of the SDT conceptualization of adaptive emotion regulation

to adaptive psychological development and growth, making SDT especially relevant to education and learning (Roth et al., 2019; Roth & Benita, 2023).

People differ not only in the nature and intensity of their emotions but also in their motivational responses to them. SDT distinguishes between autonomous and controlled emotion regulation (Roth et al., 2009). Autonomous regulation is imperative for healthy development and characterizes full functioning and effective self-regulation (Ryan et al., 2016). Central characteristics of autonomous functioning are a lack of internal conflict, increased flexibility and a greater sense of well-being. In contrast, autonomy disturbances are manifested in forms of distress and psychopathology (Ryan, 2005).

SDT defines three styles of emotion regulation (Deci & Ryan, 1985; Ryan & Deci, 2017): (1) an integrative approach supporting autonomy, (2) a controlled approach directing or minimizing emotional inputs and (3) an amotivated or dysregulated approach with poorly managed emotions (Roth & Benita, 2023). They differ in their quality and depth in processing emotions and in their respective consequences.

Integrative, controlled and amotivated emotion regulation

Integrative emotion regulation (IER) is considered the most mature and adaptive form of regulation (Ryan et al., 2016). IER is an intrapersonal emotion regulation style with two components. First, consistent with mindfulness (Brown & Ryan, 2003), it involves nonjudgmental, receptive attention to an emotional experience. Emotional inputs are attended to without distortion, minimization or avoidance. Second, IER involves active interest in and volitional exploration of the experience and its relations to other aspects of self, like goals, values and preferences (Roth & Benita, 2023). Emotions are actively explored to grasp their meaning and importance to the self. Having gained awareness of the experience and its potential meaning or value, the individual can make informed choices in subsequent actions, entailing either the volitional expression of emotions, thereby relying on others as a source of emotional support (Ryan, 2005), or volitional withholding (Kim et al., 2002). Consistent with such theorizing, IER has been found to relate positively to openness to experience, authenticity, reflection (Roth, Shahar, et al., 2017; Roth, Shane, & Kanat-Maymon, 2017) and well-being (Brenning et al., 2015). We argued the active exploration of negative emotions in situations of failure may help learners approach these situations in an adaptive way that includes reflection and actions likely to promote learning, including seeking external support.

Suppressive emotion regulation (SER) is a controlled style of regulation that involves minimization or avoidance of emotional experiences, perceiving them as pressuring and threatening, such as sadness, fear, anger or frustration (Gross, 2015; Roth & Assor, 2012). Because the experience or/and expression of emotion is typically inhibited for controlled reasons, individuals high in SER may function in an inauthentic way and are less likely to turn to others for emotional support (Kim et al., 2002). High SER can impair the capacity to share personal issues or deal with negative emotions in relationships (Roth & Assor, 2012; Shahar et al., 2018). Emotion suppression has, for example, been linked with higher levels of depression (Berenbaum et al., 1999). Furthermore, because the emotional experience is not openly attended to, it may resurface, causing rumination (Thomsen et al., 2011). In the context of learning from failure, it seems reasonable to assume the attempt to avoid negative emotional experiences (consciously or unconsciously) may lessen the possibility to learn from them. A student may, for example, avoid reading the teacher's feedback on an academic assignment because it may elicit the negative emotion she is consistently and effortfully trying to avoid. She may store the assignment deep in her backpack, promising herself to do better next time without learning from the mistakes she made.

While both IER and SER entail orienting oneself to one's emotions, the former is more volitional, and the latter more controlled. In emotion dysregulation, a person feels incapable of managing emotions, experiencing them as overwhelming and/or disorganizing; consequently, they impede effective functioning. Because of their overpowering nature, emotions may be expressed in unmodulated or impulsive ways or withheld. Emotion dysregulation can entail not only greater subjective distress and

self-harming behaviour (e.g. Emery et al., 2016) but also greater peer rejection because of expressive outbursts, disruptions or withdrawal (e.g. Shields et al., 1994). The individual, when dysregulated, whether expressing or withholding emotions, seems to have little choice in behaviour, thus generating relational tensions and subjective ill-being (Moed et al., 2017; Roth et al., 2009; Roth & Assor, 2012). We argued that as dysregulation involves maladaptive task-oriented functioning (Roth et al., 2014), it could interfere with intentional learning from failure.

Over the last decade, a consistent body of research has demonstrated the adaptive role of IER in human psychological functioning and growth (Roth et al., 2019; Roth & Benita, 2023), suggesting the relevance of SDT's conceptualization of emotion regulation to education and learning. For example, IER is negatively related to the defensive processing of emotions and predicts better cognitive functioning in situations eliciting negative emotions (Roth et al., 2014; Roth, Shahar, et al., 2017; Roth, Shane, & Kanat-Maymon, 2017) and better goal pursuit (Benita et al., 2021). When pursuing goals, people often face setbacks that are likely to elicit negative emotions (Babij et al., 2020). Efforts to regulate these emotions may help them use the emotional experience as information to achieve their goals without becoming overwhelmed. Benita (2020), Benita et al. (2021) found that during goal pursuit, IER in the face of goal-related setbacks positively predicted goal progress through goal-related effort. In contrast, SER negatively predicted goal progress through goal-related depressed mood. A consistent association between IER and well-being has also been reported (Benita, 2020; Brenning et al., 2015; Van der Kaap-Deeder et al., 2020).

Emotion regulation, coping practices and learning from failure

As noted above, empirical research on emotion regulation and learning from failure is scarce. In a study considering cognitive factors (e.g. goals and beliefs) and emotion regulation, Tulis and Dresel (2012) found rumination (strongly linked to dysregulation) was maladaptive in that it did not facilitate adaptive error reactions. Tulis et al. (2015) developed a comprehensive theoretical process explaining individual reactions to learning from errors, including individual differences in emotion regulation, but they called for more research. To the best of our knowledge, no research has examined the relations between IER and learning from failure or between learning from failure and other definitions of emotion regulation emphasizing the importance of receptive attention to emotional experiences, like mindfulness or acceptance (Brown & Ryan, 2003; Hayes et al., 1999).[1]

Research has explored coping practices as possible antecedents of coping with academic failure (Raftery-Helmer & Grolnick, 2016). Coping can be defined as 'constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the re-sources of the person' (Lazarus & Folkman, 1984, p. 141). The conceptualization of coping is strongly related to emotion regulation, and several attempts have recently been made to determine overlaps and distinctions between the two (Benita, 2020; Compas et al., 2017). Unfortunately, a comprehensive discussion of this issue is beyond the scope of this paper. For present purposes, it is useful to differentiate between the trait-like tendency to either take an interest in one's negative emotional experiences (i.e. IER) or defensively avoid them (i.e. SER), and more specific coping practices like seeking instrumental support or blaming others.

Most frameworks distinguish between problem-focused and defensive coping practices; the former are active and adaptive, while the latter are avoidance-focused and non-adaptive (Carver et al., 1989). Adaptive practices include direct problem-solving, instrumental and emotional help-seeking (Newman, 2000; Raftery-Helmer & Grolnick, 2016) and perception of stressful experiences as an opportunity for development and growth (Carver, 1997). Persons using these strategies attempt to manage a task's demands by taking an outward approach. For example, students who are aware of a difficulty

[1]Due to space limitations, we will not discuss the distinctions between the SDT definition of adaptive emotion regulation and other perspectives like mindfulness (Brown & Ryan, 2003), acceptance (Hayes et al., 1999), cognitive reappraisal (Gross, 2015) and more. For an elaborate discussion of distinctions and overlaps, see Roth and Benita (2023).

they cannot overcome alone may request help (Raftery-Helmer & Grolnick, 2016). Defensive coping practices may involve shifting attention away from the task at hand to protect the self; these include cognitive avoidance, rumination and blaming others (Tero & Connell, 1984).

Arguably, an individual's general tendency to respond to negative feelings (emotion regulation style) will predict that individual's more specific coping practices (Benita, 2020; Roth et al., 2019). Thus, we hypothesized IER, the trait-like tendency to take an interest in one's negative emotions and explore them, would predict adaptive (non-defensive) coping practices (e.g., help-seeking, problem-focused coping), and these, in turn, would predict learning from failure. The tendency to perceive negative emotions as informative, as opposed to threatening, allows individuals to volitionally choose subsequent behaviour and practices that may allow overcome the failure, like seeking emotional and instrumental support. These adaptive coping practices, in turn, may predict learning from failure and future engagement in learning after the failure.

We further hypothesized the tendency to defensively avoid negative emotions (i.e. SER) would be negatively associated with adaptive coping practices in response to failure, such as seeking instrumental and emotional support or attempting to engage with failure and learn from it (e.g. identifying weaknesses in understanding the learning material) because an attempt to engage with the failure and seek help may elicit negative emotions associated with the failure, emotions that one consistently and defensively tries to avoid. Therefore, we hypothesized SER would involve avoidance and be positively related to defensive coping practices. Finally, we hypothesized the dysregulation of negative emotions would adversely affect the ability to engage in adaptive coping practices and to learn from failure because it involves an unorganized task orientation (Roth & Assor, 2012).

The present studies

The research involved two studies focusing on adolescents' perceptions of academic failure. We centred on perceptions of failure and not errors because not every error is perceived as a failure, and we were interested in the negative emotional load of failure and the subsequent challenge to emotion regulation. The first study was cross-sectional and involved adolescents' perceptions of academic failure in general. The second study was longitudinal, with two measurement points, one before and one after a specific perception of failure in math. Study 1 allowed us to test for the unique associations between emotion regulation styles, coping practices and learning from failure while controlling for alternative explanations like academic efficacy and mastery goals, which are relevant for learning from failure and academic engagement (Elliot & Thrash, 2004). The measurement over time in Study 2 allowed us to test coping practices as mediators of the associations between emotion regulation styles and learning from failure in relation to specific failure in math. We also tested engagement as a correlate of emotion regulation styles and learning from failure.

STUDY 1

Introduction

The first study was cross-sectional and involved measurement of emotion regulation styles, coping practices in response to failure and learning from failure. We hypothesized IER would be related to adaptive coping practices and learning from failure, and SER and dysregulation would be related to maladaptive coping practices. In line with the above reasoning, we hypothesized SER would be related to avoidance coping practices of denial and blaming others, dysregulation would be related to rumination and blaming others, and IER would be related to the adaptive practices of seeking emotional and instrumental support, as well as learning from failure. Because the present research focuses on IER as an adaptive emotion regulation style related to learning from failures, we also tested IER's unique associations

with adaptive responses to failure while controlling for maladaptive emotion regulation styles (SER and dysregulation). Additionally, we controlled for academic efficacy and mastery goals, which others have found to be important to the prediction of learning from failure (Boekaerts, 2006; Dweck & Leggett, 1988; Elliot & Thrash, 2004). In study 1, we did not test the mediation hypothesis in which adaptive coping practices may mediate the association between IER and learning from failure due to the shortcomings of mediation tests based on a cross-sectional design (Maxwell et al., 2011). Thus, we tested for mediation only in study 2 which included measurements over time.

Method

Participants and procedure

A priori power analysis suggested 107 participants were required to obtain 95% power for detecting a medium-sized effect ($f = .15$) in regression analysis with three predictors (Cohen et al., 2003). A sample of 184 Israeli adolescents aged 14–18 (Mean = 16.55; SD = 1.2; 55% girls) completed online self-report questionnaires. The participants were sampled by a survey company (IPANEL). Thus, the data in this study were collected from adolescents who had enrolled in a survey company with the approval of their parents. The study was approved by the institutional IRB, and consent forms were administered at the beginning of the survey. The vast majority of the participants were middle class (88.6%), 5.4% reported upper-middle SES, 4.9% lower-middle SES and 1.1% low SES. Thirty-six percent of the fathers and 45% of the mothers had at least a BA; 24% of fathers and 15.45 of mothers did not finish high school.

Measures

Emotion regulation

Three scales developed by Roth et al. (2009) were used to measure participants' emotion regulation styles in contexts of anxiety and stress. We focused on the regulation of stress and anxiety because these two emotions are frequently elicited in the context of failure (Tulis et al., 2015).

The scale for IER consists of six items focusing on the extent to which participants try to take an interest in their anxiety and stress, try to understand the source and believe the exploration of negative emotions is informative (e.g. 'I examine my fears in order to understand their sources'; 'Exploring my fears can help me understand important things about myself'). Thus, the scale measures the second dimension of IER: intentional exploration of the emotional experience. Cronbach's alpha was .91.

SER was measured with six items reflecting both the attempt to consistently avoid negative emotions and the attempt to hide them (e.g. 'I usually ignore feelings of anxiety and stress'). Cronbach's alpha was .85.

The scale for dysregulation consists of six items emphasizing the experience of being overwhelmed by negative emotions and difficulty with task-oriented functioning in situations eliciting negative emotions (e.g. 'When I'm afraid or feel anxious, I can't concentrate on other things I have to do'). Cronbach's alpha was .88.

Coping with academic failure

The measurement of coping we used was an adaptation of coping practices tools to the context of failure by Raftery-Helmer and Grolnick (2016). Its 4-point Likert-type scale ranges from 1 (not at all true) to 4 (very true). The *adaptive coping practices* include instrumental and emotional support-seeking. *Instrumental support-seeking* was measured using four items from Skinner and Wellborn (1997; adapted for the context of failure by Raftery-Helmer & Grolnick, 2016; e.g. 'If I do badly on an important test, I ask for some help with understanding the material'). Cronbach's alpha was .81. *Emotion support seeking* was measured by adaptation of Raftery-Helmer and Grolnick of three items from the 'How I cope under pressure' scale

by Ayers et al. (1996) (e.g. 'I talk about my feelings with someone who really understands'), along with four items from the COPE inventory by Carver (1997; e.g. 'I've been getting emotional support from others'). Cronbach's alpha was .74.

Defensive coping was measured using three subscales: denial, blaming others and rumination. Four items from the Children's Academic Coping Inventory (CACI) measured denial, that is, adolescents' attempts to deny the significance of failure (Tero & Connell, 1984; e.g. 'If I do badly on an important test, I try to forget about it'). Cronbach's alpha was .68. The second subscale was taken from Skinner and Wellborn (1997) and assessed the extent to which students blamed others (e.g. 'When I do badly on an important test, I blame the teacher'). Cronbach's alpha was .85. Rumination was measured using an adaptation of Treynor et al. (2003) in the context of failure (e.g. '…think about how passive and unmotivated I feel'). Cronbach's alpha was .63.

Learning from failure

Two subscales were used to measure learning from failure. The first subscale included four items from Raftery-Helmer and Grolnick (2016), focusing on an active attempt to remedy the cause of the perceived failure (e.g. 'When I do badly on an important test, I try to find out what I did wrong, so it won't happen again'). Cronbach's alpha was .86. The second consists of seven items of the Adaptive Reactions to Errors Scale (Dresel et al., 2013; Tulis et al., 2018), focusing on planning, initiation and evaluation of cognitive processes and activities aiming to overcome the error (e.g. 'When I do something wrong, I specifically try to work it out'). Cronbach's alpha was .89. This measure combines failures and errors; therefore, it does not measure pure learning from failure. However, it has been well-validated, so we chose to use it despite our focus on failures. We assumed the scale would be highly correlated with the direct measure for learning from failure described above.

Self-efficacy and mastery goals

To control for intervening variables, we measured adolescents' academic self-efficacy and mastery goals. Self-efficacy was measured using seven items from the Academic Efficacy scale by Harter and Connell (1984; e.g. 'I can almost always answer the teacher's questions'). Participants rated the items on a 6-point Likert-type scale ranging from 1 (strongly disagree) to 6 (strongly agree). Cronbach's alpha was .78. We used a subscale from the Achievement Goal Questionnaire (AGQ; Elliot & Murayama, 2008) to assess participants' mastery-approach goals. The subscale contains three items (e.g. 'My aim is to completely master the material presented in this class'.) rated on a 6-point Likert-type scale from 1 (strongly disagree) to 6 (strongly agree). Cronbach's alpha was .78.

Results

We first present descriptive statistics and correlations among the variables and then the unique effects of IER on adaptive coping practices while controlling for SER, dysregulation, academic self-efficacy and mastery goals. Table 1 gives descriptive statistics and correlations.

As opposed to SER and dysregulation, IER was positively and consistently related to the four adaptive responses to failures: learning from failure, adaptive error reactions and instrumental and emotional help-seeking. Dysregulation was related positively to the three defensive coping practices: denial, blaming others and rumination. SER was associated with the last two.

Due to our focus on IER as an adaptive emotion regulation style in the context of responses to failure, we further tested its unique associations with adaptive responses to failure while controlling for the two maladaptive emotion regulation styles along with mastery goals and academic efficacy. The results of these multiple regression analyses are presented in Table 2. For the four adaptive responses to failure, the association with IER was positive and significant. It is worth mentioning that in this analysis, dysregulation was negatively related to learning from failures and adaptive error reactions, and SER was negatively related to seeking instrumental support.

TABLE 1 Descriptive statistics and bivariate correlations in study 1.

				Pearson *r*											
		M	***SD***	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	IER	5.045	1.150	—											
2	SER	4.092	1.381	.043	—										
3	Dysregulation	3.728	1.518	.125	.166*	—									
4	Academic efficacy	3.699	.741	.167*	−.126	−.370**	—								
5	Mastery approach	4.496	1.107	.146*	.077	−.013	.281**	—							
6	Denial	2.308	.722	−.023	.122	.233**	−.380**	−.146*	—						
7	Blaming others	2.099	.736	.026	.153*	.199**	−.238**	.034	.408**	—					
8	Rumination	2.098	.734	.022	.170*	.354**	−.051	.127	.265**	.237**	—				
9	Help-seeking	2.735	.737	.244**	−.148*	−.111	.170*	.217**	−.246**	−.027	−.071	—			
10	Seeking emotional support	2.679	.907	.265**	−.094	.065	.054	.161*	−.071	.132	−.010	.444**	—		
11	Learning from failure	3.272	.662	.350**	.075	−.153*	.278**	.358**	−.359**	−.020	−.091	.490**	.254**	—	
12	Adaptive error reaction	4.538	.920	.369**	.006	−.119	.229**	.523**	−.242**	.033	−.048	.432**	.306**	.600**	—

Abbreviations: IER, integrative emotion regulation; SER, suppressive emotion regulation.

*$p < .05$. **$p < .01$.

TABLE 2 IER's unique associations with adaptive responses to failure when controlling for SER, dysregulation, efficacy and mastery goals.

Predictors	Predicted variable	*t*	*Beta*	*p*
IER	Learning from failure	4.290	.310	.000
SER		1.216	.080	.226
Dysregulation		−2.326	−.166	.021
Efficacy		1.309	.097	.192
Mastery		4.089	.277	.000
R^2	.246			
IER	Instrumental support	3.214	.233	.002
SER		−2.141	−.153	.034
Dysregulation		−1.351	−.105	.178
Efficacy		.254	.020	.800
Mastery		2.550	.188	.012
R^2	.135			
IER	Emotional support	3.357	.248	.000
SER		−1.738	−.126	.084
Dysregulation		.594	.047	.553
Efficacy		−.314	−.026	.754
Mastery		1.897	.142	.059
R^2	.11			
IER	Adaptive error reaction	5.828	.323	.000
SER		−.354	−.021	.724
Dysregulation		−2.407	−.157	.017
Efficacy		−.311	−.021	.756
Mastery		7.743	.481	.000
R^2	.385			

Abbreviations: IER, integrative emotion regulation; SER, suppressive emotion regulation.

Summary of study 1 results

Study 1's results provided preliminary support for the hypothesis that IER is associated with adaptive responses to failure and the tendency to learn from failure, whereas SER and dysregulation may hinder this tendency. However, this study did not involve responses for an experience of actual failure and did not include measures of academic engagement following failure.

STUDY 2

Introduction

The second study built on the first but examined a specific academic failure experience in mathematics and included a measurement at two time points, before and after failure. The first measurement took place in the first semester of the school year and included the assessment of emotion regulation styles, math efficacy and engagement. The second measurement took place 2 months later, after the examination period. We first asked participants to indicate whether they perceived their grade in math as a failure; then, focusing on the participants who reported failure, we measured adaptive responses to this specific failure (coping practices), learning from failure and engagement in math. Since we were

focusing on IER, we measured adaptive coping practices because Study 1 showed very low associations between IER and defensive (maladaptive) coping practices.

As in Study 1, we hypothesized IER would be related to adaptive responses to the specific failure, including the tendency to learn from failure. We further hypothesized that adaptive coping practices in response to failure would mediate the association between IER and learning from failure even when controlling for self-efficacy in math. Finally, we hypothesized learning from failure would mediate the association between IER and engagement in math after perception of failure when controlling for initial engagement in math at the first measurement. Engagement refers to the extent to which a student is actively involved in the learning process (Reeve, 2012). The construct has multiple facets, and the most common distinction is between behavioural, cognitive and emotional engagement (Skinner et al., 2009). We did not expect learning from failure to be related to emotional engagement (i.e. experiencing enthusiasm and interest). Therefore, we focused on the investment of effort, concentration and attention (behavioural engagement) and on using sophisticated learning strategies instead of superficial ones (cognitive engagement). Thus, we hypothesized that taking interest in one's negative emotional experiences (IER) may predict learning from failure, which, in turn, may predict investing effort and employing sophisticated learning strategies.

Method

Participants and procedure

A priori power analysis suggested 107 participants were required to obtain 95% power for detecting a medium-sized effect ($f = .15$) in regression analysis with four predictors (Cohen et al., 2003). A sample comprising 565 adolescents was approached online two times during the school year by IPANEL, a local survey company. At the first measurement time, they responded to measures of emotion regulation styles, math engagement and academic efficacy. Two months later, after the exam period, they were approached again and asked if they perceived their grade in math as a failure. Those who had perceptions of failure were asked to complete measures of adaptive responses to failure and math engagement. One hundred and ninety-two students (Mean = 16.49, Sd = 1.58; 24.5% males) reported perceived failure; 83% were 10–12 graders, and the rest were 8–9 graders. A majority of participants (80%) reported middle or upper-middle SES. In education measures, 45.4% of fathers and 46.4% of mothers had at least a BA; 15.9% of fathers and 22.2% of mothers did not finish high school.

Measures

Adolescents completed questionnaires using a 7-point Likert-type scale ranging from 1 (not true at all) to 7 (very true). The reliabilities reported in this section are based on 565 participants, but the results section is based on the 192 participants who perceived failure.

Emotion regulation

This was the same measure as Study 1.

Coping with academic failure

We used the same measures as in Study 1 to examine the adaptive coping practices of instrumental help-seeking and seeking emotional support (Cronbach's alpha was .75. and .84, respectively). In Study 2, we measured an additional coping practice: positive reinterpretation and growth. To measure this, we used the subscale from the COPE inventory by Carver (1997). This subscale consists of three items measuring the extent to which a stressful experience is perceived as an opportunity for development and growth (e.g. 'I try to grow as a person as a result of the experience'). Cronbach's alpha was .84.

Learning from failure

In Study 1, we used two measures for learning from failure: a 4-item scale taken from Raftery-Helmer and Grolnick (2016) focusing on an active attempt to remedy the cause of the perceived failure and the Action Adaptivity of Error Reaction Questionnaire by Tulis et al. (2018). The first scale involves direct measurement of learning from failure, whereas the second includes both learning from failure and reaction to errors, which does not necessarily involve an experience of failure. As mentioned, in study 1, we used the reaction to error scale because it was well validated, and it seemed important to relate the three styles of emotion regulation with a validated scale. For Study 2, we created a new scale that included the 4-item measure by Raftery-Helmer and Grolnick (2016) and two items from the Action Adaptivity of Error Reaction that relate specifically to experience of failure. Thus, the final scale consisted of six items focusing on the tendency to learn from failure (e.g. 'The results of the test led me to investigate topics where I wasn't as proficient'; 'Following the test, I tried to find out what I did wrong, so it won't happen again'). Cronbach's alpha was .91.

Classroom engagement

We assessed two interrelated aspects of students' classroom engagement: behavioural and cognitive engagement. For behavioural engagement, we used the 3-item scale from Skinner et al. (2009; e.g. 'I try hard to do well in this class'). To measure cognitive engagement, we used Wolters' (2004) Metacognitive Strategies Questionnaire. The scale includes three items (e.g. 'If what I am working on in this class is difficult for me to understand, I figure out how to change the way I learn the material'). Cronbach's alpha for behavioural engagement was .82 and for cognitive engagement, .78.

Engagement in math class was measured twice: before the exam and after the perception of failure. The correlations among the two measures of engagement in each measurement were .586 and .482 at time 1 and time 2, respectively. The correlations among the engagement measures over time were even higher, reflecting its consistency: .760 and .663 for behavioural and cognitive engagement, respectively.

Math efficacy

To control for self-efficacy, we assessed the extent of students' sense of math self-efficacy. We used the 5-item academic efficacy scale from Patterns of Adaptive Learning Scales (PALS; Midgley et al., 2000; e.g. 'I am certain I can master the skills taught in this class this year'). Cronbach's alpha was .88.

Results

Descriptive statistics and zero-order correlations are presented in Table 3. In line with Study 1, IER was the only emotion regulation style that was positively related to the four adaptive responses to failure, including learning from failure. It was also the only regulation style that was positively associated with engagement, with a significant association for cognitive engagement and only marginally significant for behavioural engagement.

Next, we tested the mediation hypotheses. First, we tested the hypothesis that adaptive coping practices would mediate the association between IER and learning from failure. We employed bootstrapping mediation analysis with 5000 bootstrap samples using model 4 in PROCESS, a macro developed by Hayes (2022) for SPSS. We simultaneously employed the three adaptive coping practices as mediators: (1) positive reinterpretation and growth, (2) seeking emotional support and (3) seeking guidance/help in math. In addition, we used self-efficacy in math from the first measurement as a covariate (the results are presented in Figure 1). We also controlled for SER and dysregulation, which were not included in Figure 1 since they were not related to learning from failure (the dependent variable) or mediators. All the coefficients are standardized. The total indirect effect was significant, with an effect of .172 (and 95% CI of .132, .387). Each of the three mediation paths (indirect effects) was also significant, with an effect of .041 (95% CI of .007, .132) for emotional support as a mediator, an effect of .058 (95% CI

TABLE 3 Descriptive statistics and zero-order correlations among Study 2 variables.

				Pearson *r*									
		M	***SD***	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	IER (t1)	4.777	1.053	—									
2	SER (t1)	4.110	1.208	−.087	—								
3	Dysregulation (t1)	3.707	1.362	−.044	.237**	—							
4	Math's efficacy (t1)	4.680	1.500	.216**	−.009	−.292**	—						
5	Learning from failure (t2)	4.826	1.525	.451**	−.090	−.194**	.430**	—					
6	Seeking emotional support (t2)	4.196	1.774	.284**	−.293**	−.028	.098	.368**	—				
7	Growth (t2)	4.344	1.719	.329**	−.101	−.194**	.257**	.496**	.245**	—			
8	Help-seeking (t2)	3.6953	1.785	.194**	−.063	−.055	−.100	.350**	.269**	.193**	—		
9	Behavioural engagement (t2)	4.833	1.521	.141	.024	−.053	.410**	.498**	.215**	.259**	.246**	—	
10	Cognitive engagement (t2)	4.889	1.437	.352**	−.006	−.222**	.544**	.654**	.245**	.418**	.236**	.521**	—

Abbreviations: IER, integrative emotion regulation; SER, suppressive emotion regulation.

**$p < .01$.

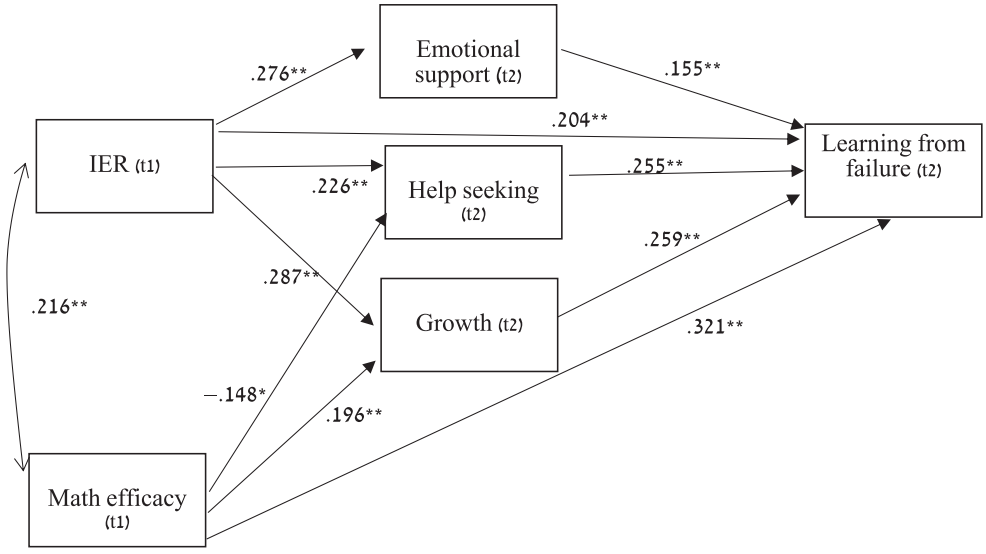

FIGURE 1 Three adaptive coping practices as mediators of the association between IER and learning from failure. $^{**}p < .001$; $^{*}p < .05$. SER and dysregulation have been controlled for. IER, integrative emotion regulation; SER, suppresive emotion regulation.

of .017, .108) for help-seeking as a mediator and an effect of .074 (95% CI of .028, .138) for positive reinterpretation and growth.

Next, we tested the hypothesis that learning from failure would mediate the association between IER and cognitive engagement in math following failure (see Figure 2). In this analysis, we controlled for self-efficacy and the initial engagement in math measured at time 1. Additionally, we controlled for dysregulation, which was omitted from Figure 2 because it was not related to the outcomes when the other predictors were statistically controlled (SER was not controlled because it has no associations with learning from failure and engagement; see Table 3). The mediation hypothesis was supported. The indirect effect was significant at .125 (95% CI of .060, .199). We did not test this hypothesis for behavioural engagement because the correlation between IER and this facet of engagement was only marginally significant.

GENERAL DISCUSSION

The results of the first study support the hypothesis that the tendency to take an interest in one's own negative emotional experiences (i.e. IER) may predict adaptive responses to failure, whereas the tendency to consistently suppress or minimize these experiences (SER) relates to maladaptive (defensive) responses. The second study replicated these findings for adaptive responses to failures and demonstrated that adaptive coping practices mediate the association between IER and learning from failure. Notably, these effects remained significant when SER, dysregulation, perception of self-efficacy in math and mastery goals were controlled for.

Study 2 also supports the hypothesis that IER predicts cognitive engagement, and this association is mediated by learning from failure. In our sample, this effect was significant above and beyond participants' initial engagement and self-efficacy at the first measurement. Finally, SER and dysregulation were positively related to maladaptive responses to failure and negatively to adaptive responses. The results

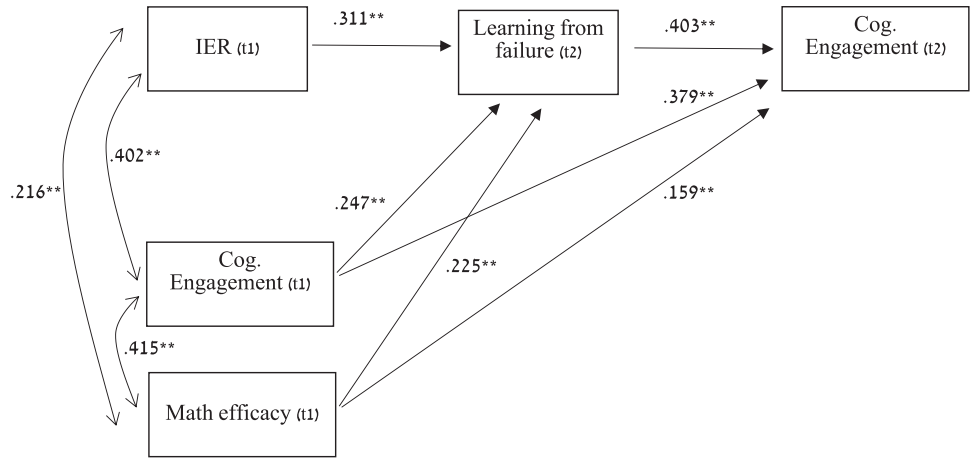

FIGURE 2 Learning from failure as a mediator of the association between IER and cognitive engagement following failure. $^{**}p < .001$, $^{*}p < .05$. Dysregulation has been controlled for. It was omitted from the figure because it has no association with the outcomes when controlled for the other variables. IER, integrative emotion regulation.

corroborate past findings demonstrating maladaptive and ruminative emotion regulation are negatively related to adaptive coping with failure (Tulis & Dresel, 2012).

Our findings suggest the ability to be attentive to negative emotions may facilitate learning even in the face of frustration. While negative emotions like anxiety, stress and frustration are painful experiences, they may feel even more painful if viewed as ego-threatening. The pain may elicit an avoidance response that limits the student's likelihood to learn from failure because it is impossible to gather information from an experience that one has not fully attended to. Learning from the teacher's feedback after a failed test is limited if attending to the content evokes emotions the student consistently tries to avoid. In contrast, IER involves receptive attention and exploration of negative emotional experiences. The emotional experience is not perceived as a threat but as a legitimate and informative response to specific situations. Our findings suggest that the general tendency to attend to emotional information predicts learning from failure and additional engagement.

Experiences of failure are inevitable in learning contexts and may pave the way for learning. However, the frustration, stress and anxiety elicited by failure may impede learning. Teachers and parents often worry that assigning difficult or challenging tasks will trigger students' resistance, negative emotions, disengagement and avoidance (Newmann, 1992; Vansteenkiste et al., 2014). Therefore, they may be reluctant to issue a challenge to avoid students' failure to promote positive emotions instead of negative ones (Tulis & Fulmer, 2013). To this end, they may lower standards and use 'shortcuts' to allow achievement with less effort. This approach may be problematic for learning because optimal challenges are important in learning processes (Reeve et al., 1999; Tulis & Fulmer, 2013).

Instead of avoiding challenges and the possibility of failure, educators should help children adaptively cope with temporary failures that are unavoidable when facing challenges. Given the consistent finding that negative emotions elicited in situations of failure may hamper learning, it seems important to explore emotion regulation styles as antecedents of adaptive responses to failure. Such research may lay the foundation for an exploration of the socialization of adaptive emotion regulation in response to failure.

The implications of the findings are not straightforward. Educational interventions focusing on emotion regulation styles are not simple to implement because these styles are not easily changed. For example, a boy may grow up in an environment in which fear is not viewed as masculine. It is likely that such a boy will do anything to avoid experiencing or at least expressing fear. For this boy, fear or anxiety that may result from a failure is ego-threatening and thus an emotional experience that should

be minimized. Changing these 'introjects' is not easy because socialization processes are powerful (Ryan & Deci, 2017). Therefore, future research should not only explore styles of emotion regulation and learning from failure but also examine the socialization of emotion regulation in relation to responses to failure and in relation to learning, more generally. This work may build on existing research on the socialization of emotion regulation in relation to self-regulation (Eisenberg & Sulik, 2012; Spinrad et al., 2020), prosocial behaviour (Eisenberg et al., 2001) and close relationships (Roth & Assor, 2012).

Admittedly, the research had some limitations. First, the hypothesis on engagement in math following failure was only partially supported. The association between IER and behavioural engagement was marginal; thus, the hypothesis was confirmed only for cognitive engagement. Future research should replicate our findings by collecting data within schools. In addition, future engagement following failure may be measured again at the end of the school year; this may better illuminate changes in engagement. In addition, the data collection from a single source limits the ability to support casual claims despite the longitudinal data that allows controlling for engagement as measured at time 1. Finally, emotion regulation was measured as a general tendency to respond to negative emotions. Future research may measure emotion regulation in relation to the specific experience of failure. In sum, academic failures elicit negative emotions. Emotion regulation styles may promote or impede adaptive responses to these failures. Our research provides an initial indication of an association between the tendency to take an interest in one's negative emotions (i.e. IER) and adaptive responses to academic failure, including the tendency to benefit from the failure in terms of learning and engagement. It also suggests the tendency to consistently avoid or minimize negative emotions (i.e. SER) and dysregulation, which are related to defensive coping practices in the context of failure and negatively related to learning from these experiences.

AUTHOR CONTRIBUTIONS

Guy Roth: Conceptualization; investigation; funding acquisition; methodology; writing – review and editing; formal analysis; supervision. **Yonatan Sharabi:** Conceptualization; investigation; writing – original draft; methodology; writing – review and editing; formal analysis; project administration; data curation.

FUNDING INFORMATION

The present research was funded by an ISF grant (844/21).

CONFLICT OF INTEREST STATEMENT

We have no conflict of interest to disclose.

DATA AVAILABILITY STATEMENT

Data files and research tools can be found at: https://researchbox.org/2535.

ORCID

Yonatan Sharabi https://orcid.org/0009-0001-5796-8851
Guy Roth https://orcid.org/0000-0002-5662-7561

REFERENCES

Ayers, T. S., Sandler, I. N., West, S. G., & Roosa, M. W. (1996). A dispositional and situational assessment of children's coping: Testing alternative models of coping. *Journal of Personality*, *64*, 923–958.

Babij, A. D., Burnette, J. L., & Hoyt, C. L. (2020). Failing and feeling bad: How we think about experiencing negative emotions during setbacks. *Motivation and Emotion*, *44*(3), 436–452.

Beauchaine, T. P. (2015). Future directions in emotion dysregulation and youth psychopathology. *Journal of Clinical Child and Adolescent Psychology*, *44*, 875–896.

Benita, M. (2020). Freedom to feel: A self-determination theory account of emotion regulation. *Social and Personality Psychology Compass*, *14*, 1–13.

Benita, M., Shechter, T., Nudler-Muzikant, S., & Arbel, R. (2021). Emotion regulation during personal goal pursuit: Integration versus suppression of emotions. *Journal of Personality*, *89*(3), 565–579.

Berenbaum, H., Raghavan, C., Le, H. N., Vernon, L., & Gomez, J. (1999). Disturbances in emotion. In D. Kahneman, E. Diener, & N. Schwarz (Eds.), *Well-being: The foundations of hedonic psychology* (pp. 267–287). Sage.
Boekaerts, M. (2002). Intensity of emotions, emotional regulation, and goal framing: How are they related to adolescents' choice of coping strategies? *Anxiety, Stress, and Coping*, *15*(4), 401–412.
Boekaerts, M. (2006). Self-regulation and effort investment. In E. Sigel & K. A. Renninger (Eds.), *Handbook of child psychology* (pp. 345–377). Wiley.
Boekaerts, M., & Cascallar, E. (2006). How far have we moved toward the integration of theory and practice in self-regulation? *Educational Psychology Review*, *18*(3), 199–210.
Brenning, K., Soenens, B., Van Petegem, S., & Vansteenkiste, M. (2015). Perceived maternal autonomy support and early adolescent emotion regulation: A longitudinal study. *Social Development*, *24*, 561–578.
Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology*, *84*, 822–848.
Carver, C. S. (1997). You want to measure coping but your protocol' too long: Consider the brief cope. *International Journal of Behavioral Medicine*, *4*, 92–100.
Carver, C. S., Scheier, M. F., & Weintraub, J. K. (1989). Assessing coping strategies: A theoretically based approach. *Journal of Personality and Social Psychology*, *56*, 267–283.
Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences*. Lawrence Erlbaum.
Cole, P. M., Hall, S. E., & Hajal, N. J. (2013). Emotion dysregulation as a risk factor for psychopathology. In T. P. Beauchaine & S. P. Hinshaw (Eds.), *Child and adolescent psychopathology* (2nd ed., pp. 341–373). Wiley.
Compas, B. E., Jaser, S. S., Bettis, A. H., Watson, K. H., Gruhn, M. A., Dunbar, J. P., Williams, E., & Thigpen, J. C. (2017). Coping, emotion regulation, and psychopathology in childhood and adolescence: A meta-analysis and narrative review. *Psychological Bulletin*, *143*(9), 939–991.
De Leeuw, N., & Chi, M. T. H. (2003). Self-explanation, enriching a situation model or repairing a domain model? In G. Sinatra & P. R. Pintrich (Eds.), *Intentional conceptual change* (pp. 55–78). Erlbaum.
Deci, E. L., & Ryan, R. M. (1985). The general causality orientations scale: Self-determination in personality. *Journal of Research in Personality*, *19*, 109–134.
Dresel, M., Schober, B., Ziegler, A., Grassinger, R., & Steuer, G. (2013). Affective-motivational adaptive and action adaptive reactions on errors in learning processes. *Zeitschrift für Pädagogische Psychologie*, *27*, 255–271.
Dresel, M., & Ziegler, A. (2002). Failure as an element of adaptive learning.
Dweck, C. S., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review*, *95*, 256–273.
Eisenberg, N., Liew, J., & Pidada, S. (2001). The relations of parental emotional expressivity with quality of Indonesian children's social functioning. *Emotion*, *1*, 116–136.
Eisenberg, N., & Sulik, M. J. (2012). Emotion-related self-regulation in children. *Teaching of Psychology*, *39*(1), 77–83.
Elliot, A. J., & Murayama, K. (2008). On the measurement of achievement goals: Critique, illustration, and application. *Journal of Educational Psychology*, *100*(3), 613–628.
Elliot, A. J., & Thrash, T. M. (2004). The intergenerational transmission of fear of failure. *Personality and Social Psychology Bulletin*, *30*, 957–971.
Emery, A. A., Heath, H. L., & Mills, D. J. (2016). Basic psychological need satisfaction, emotion dysregulation, and non-suicidal self-injury engagement in young adults: An application of self-determination theory. *Journal of Youth and Adolescence*, *45*, 612–623.
Eskreis-Winkler, L., & Fishbach, A. (2019). Not learning from failure—The greatest failure of all. *Psychological Science*, *30*(12), 1733–1744.
Gratz, K. L., & Roemer, L. (2004). Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the difficulties in emotion regulation scale. *Journal of Psychopathology and Behavioral Assessment*, *26*, 41–54.
Gross, J. J. (2015). Emotion regulation: Current status and future prospects. *Psychological Inquiry*, *26*, 1–16.
Harter, S., & Connell, J. P. (1984). A model of children's achievement and related self-perceptions of competence, control and motivational orientation. In J. Nicholls (Ed.), *Advances in motivation and achievement* (pp. 219–250). JAI Press.
Hayes, A. F. (2022). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (3rd ed.). Guilford Press.
Hayes, S. C., Strosahl, K., & Wilson, K. G. (1999). *Acceptance and commitment therapy: An experiential approach to behavior change*. Guilford Press.
Kapur, M. (2008). Productive failure. *Cognition Und Instruction*, *26*, 379–424.
Keith, N., & Frese, M. (2005). Self-regulation in error management training: Emotion control and metacognition as mediators of performance effects. *Journal of Applied Psychology*, *90*, 677–691.
Kim, Y., Deci, E. L., & Zuckerman, M. (2002). The development of the self-regulation of withholding negative emotions questionnaire. *Educational and Psychological Measurement*, *62*, 316–336.
Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. Springer.
Maxwell, S. E., Cole, D. A., & Mitchell, M. A. (2011). Bias in cross-sectional analyses of longitudinal mediation: Partial and complete mediation under an autoregressive model. *Multivariate Behavioral Research*, *46*(5), 816–841. https://doi.org/10.1080/00273171.2011.606716

Midgley, C., Maehr, M. L., Hruda, L. Z., Anderman, E., Anderman, L., Freeman, K. E., & Urdan, T. (2000). *Manual for the patterns of adaptive learning scales*. University of Michigan Press.

Moed, A., Gershoff, E. T., Eisenberg, N., Hofer, C., Losoya, S., Spinrad, T. L., & Liew, J. (2017). Parent-child negative emotion reciprocity and children's school success: An emotion-attention process model. *Social Development*, *26*(3), 560–574.

Newman, R. S. (2000). Social influences on the development of children's adaptive help seeking: The role of parents, teachers, and peers. *Developmental Review*, *20*, 350–404.

Newmann, F. (1992). *Student engagement and achievement in American secondary schools*. Teachers College Press.

Pintrich, P. R., & Schunk, D. H. (2002). *Motivation in education: Theory, research, and applications*. Prentice Hall.

Raftery-Helmer, J. N., & Grolnick, W. S. (2016). Children's coping with academic failure: Relations with contextual and motivational resources supporting competence. *The Journal of Early Adolescence*, *36*(8), 1017–1041.

Reeve, J. (2012). A self-determination theory perspective on student engagement. In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 149–172). Springer Science.

Reeve, J., Bolt, E., & Cai, Y. (1999). Autonomy-supportive teachers: How they teach and motivate students. *Journal of Educational Psychology*, *91*, 537–548.

Roth, G., Assor, A., Niemiec, C. P., Deci, E. L., & Ryan, R. M. (2009). The emotional and academic consequences of parental conditional regard: Comparing conditional positive regard, conditional negative regard, and autonomy support as parenting practices. *Developmental Psychology*, *45*, 1119–1142.

Roth, G., & Assor, A. (2012). The costs of parental pressure to express emotions: Conditional regard and autonomy support as predictors of emotion regulation and intimacy. *Journal of Adolescence*, *35*, 799–808.

Roth, G., & Benita, M. (2023). Integration versus minimization of emotional experiences: Addressing adaptive emotion regulation. In R. M. Ryan (Ed.), *The Oxford handbook of self-determination theory* (200-C9P121). Oxford University Press.

Roth, G., Benita, M., Amrani, C., Shachar, B.-H., Asoulin, H., Moed, A., Bibi, U., & Kanat-Maymon, Y. (2014). Integration of negative emotional experience versus suppression: Addressing the question of adaptive functioning. *Emotion*, *14*, 908–919.

Roth, G., Shahar, B.-H., Zohar-Shefer, Y., Benita, M., Moed, A., Bibi, U., Kanat-Maymon, Y., & Ryan, R. M. (2017). Benefits of emotional integration and costs of emotional distancing. *Journal of Personality*, *86*, 919–934.

Roth, G., Shane, N., & Kanat-Maymon, Y. (2017). Empathizing with the enemy: Emotion regulation and support for humanitarian aid in violent conflicts. *Cognition and Emotion*, *31*(8), 1511–1524.

Roth, G., Vansteenkiste, M., & Ryan, R. M. (2019). Integrative emotion regulation: Process and development from a self-determination theory perspective. *Development and Psychopathology*, *31*(3), 945–956.

Ryan, R. M. (2005). The developmental line of autonomy in the etiology, dynamics, and treatment of borderline personality disorders. *Development and Psychopathology*, *17*, 987–1006.

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. Guilford Press.

Ryan, R. M., Deci, E. L., & Vansteenkiste, M. (2016). Autonomy and autonomy disturbances in self-development and psychopathology: Research on motivation, attachment, and clinical process. In D. Cicchetti (Ed.), *Developmental psychopathology: Vol. 1. Theory and method* (3rd ed., pp. 385–438). Wiley.

Shahar, B.-H., Kalman-Halevi, M., & Roth, G. (2018). Emotion regulation and intimacy quality: The consequences of emotional integration, emotional distancing, and suppression. *Journal of Social and Personal Relationships*, *36*, 3343–3361.

Shields, A., Cicchetti, D., & Ryan, R. M. (1994). The development of emotional and behavioral self-regulation and social competence. *Development and Psychopathology*, *6*(1), 57–75.

Skinner, E. A., Kindermann, T. A., & Furrer, C. J. (2009). A motivational perspective on engagement and disaffection: Conceptualization and assessment of children's behavioral and emotional participation in academic activities in the classroom. *Educational and Psychological Measurement*, *69*, 493–525.

Skinner, E. A., & Wellborn, J. G. (1997). Children's coping in the academic domain. In S. A. Wolchik & I. N. Sandler (Eds.), *Handbook of children's coping with common stressors: Linking theory and intervention* (pp. 387–422). Plenum Press.

Spinrad, T. L., Morris, A. S., & Luthar, S. S. (2020). Introduction to the special issue: Socialization of emotion and self-regulation: Understanding processes and application. *Developmental Psychology*, *56*(3), 385–389.

Steuer, G., Rosentritt-Brunn, G., & Dresel, M. (2013). Dealing with errors in mathematics classrooms: Structure and relevance of perceived error climate. *Contemporary Educational Psychology*, *38*(3), 196–210.

Tero, P. F., & Connell, J. P. (1984). *When children think they've failed: An academic coping inventory*. Paper presented at the American Educational Research Association.

Thomsen, D. K., Tønnesvang, J., Schnieber, A., & Olesen, M. H. (2011). Do people ruminate because they haven't digested their goals? The relations of rumination and reflection to goal internalization and ambivalence. *Motivation and Emotion*, *35*, 105–117.

Treynor, W., Gonzalez, R., & Nolen-Hoeksema, S. (2003). Rumination reconsidered: A psychometric analysis. *Cognitive Therapy and Research*, *27*, 247–259.

Tulis, M., & Ainley, M. (2011). Interest, enjoyment and pride after failure experiences? Predictors of students' state-emotions after success and failure during learning in mathematics. *Educational Psychology*, *31*(7), 779–807.

Tulis, M., & Dresel, M. (2012). Motivational and emotional regulation strategies as predictors for adaptive responses to errors. Paper presented at the international conference on motivation (ICM), Frankfurt, Germany.

Tulis, M., & Fulmer, S. (2013). Students' motivational and emotional experiences and their relationship to persistence during academic challenge in mathematics and reading. *Learning and Individual Differences*, *27*, 35–47.

Tulis, M., Steuer, G., & Dresel, M. (2015). Learning from errors: Process and contextual conditions. Towards a model of individual processes within context. In M. Gartmeier, H. Gruber, T. Hascher, & H. Heid (Eds.), *Fehler: Ihre funktionen im kontext individueller und gesellschaftlicher entwicklung* (pp. 53–70). Waxmann.

Tulis, M., Steuer, G., & Dresel, M. (2018). Positive beliefs about errors as an important element of adaptive individual dealing with errors during academic learning. *Educational Psychology*, *38*, 139–158.

Van der Kaap-Deeder, J., Soenens, B., Van Petegem, S., Neyrinck, B., De Pauw, S., Raemdonck, E., & Vansteenkiste, M. (2020). Live well and die with inner peace: The importance of retrospective need-based experiences, ego integrity and despair for late adults' death attitudes. *Archives of Gerontology and Geriatrics*, *91*, 104184.

VanLehn, K., Siler, S., Murray, C., Yamauchi, T., & Baggett, W. (2003). Why do only some events cause learning during human tutoring? *Cognition and Instruction*, *21*, 209–249.

Vansteenkiste, M., Niemiec, C. P., & Soenens, B. (2010). The development of the five mini-theories of self-determination theory: A historical overview, emerging trends, and future directions. In T. C. Urdan & S. A. Karabenick (Eds.), *Advances in motivation and achievement: Vol. 16A: The decade ahead: Theoretical perspectives on motivation and achievement* (pp. 105–165). Emerald Group.

Vansteenkiste, M., Soenens, B., Van Petegem, S., & Duriez, B. (2014). Longitudinal associations between adolescent perceived degree and style of parental prohibition and internalization and defiance. *Developmental Psychology*, *50*(1), 229–236.

Weinstein, N., Brown, K. W., & Ryan, R. M. (2009). A multi-method examination of the effects of mindfulness on stress attribution, coping, and emotional well-being. *Journal of Research in Personality*, *43*, 374–385.

Wolters, C. A. (2004). Advancing achievement goal theory: Using goal structures and goal orientations to predict students' motivation, cognition, and achievement. *Journal of Educational Psychology*, *96*, 236–250.

Zhao, B. (2011). Learning from errors: The role of context, emotion, and personality. *Journal of Organizational Behavior*, *32*(3), 435–463.

How to cite this article: Sharabi, Y., & Roth, G. (2024). Emotion regulation styles and the tendency to learn from academic failures. *British Journal of Educational Psychology*, *00*, 1–18. https://doi.org/10.1111/bjep.12696