



# Maladaptive Emotional Schemas and Emotional Functioning: Evaluation of an Integrated Model Across Two Independent Samples

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## Abstract

Recent advancements in emotion theory propose that emotional schemas—individualized conceptualizations and beliefs about emotions—serve a fundamental function in guiding emotional processes. To critically assess the validity of this suggestion, the current research proposed and evaluated an integrative model of emotional functioning. Two studies were completed using a combination of behavioral (Mirror Tracing Persistence Task), performance-based (Perception of Affect Task), and self-report (Leahy Emotional Schema Scale-II, Cognitive-Behavioral Avoidance Scale, Generalized Expectancy for Negative Mood Regulation Scale, UPPS-P Impulsive Behavior Scale) measures of maladaptive emotional schemas and emotional functioning. Results supported the model and suggested complex interrelations between maladaptive emotional schemas, emotion-processing deficits, avoidant coping, emotion-regulation ineffectiveness, and behavioral dysregulation, with emotional schemas playing a key role in guiding emotional experience and functioning. Given the centrality of beliefs about emotion and emotional functioning in empirically supported therapies, the proposed model may inform future research on mechanisms of change in these treatments.

**Keywords** Emotional schemas · Emotion regulation · Behavioral regulation · Avoidant coping · Emotion processing

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## Introduction

Recent years have seen a rise in the popularity of third-wave behavior therapies. Third-wave behavior therapies (e.g., dialectical behavior therapy [DBT]; functional analytic psychotherapy [FAP], Acceptance and Commitment Therapy [ACT], etc.) are characterized by experiential treatment strategies that target secondary reactions to private emotional experiences (e.g., mindfulness, acceptance, etc.; Hayes et al. 2004; Kahl et al. 2012). With some variation, these treatments theorize that *the way an individual relates to internal, private experiences contributes to these secondary reactions*, thereby shaping emotional functioning (e.g., emotion processing, emotion regulation, behavior regulation, etc.). For example, DBT's biosocial theory suggests emotion and behavior dysregulation stem in part from internalization of invalidating emotional experiences, which lead individuals who view their emotions as wrong, unacceptable, or intolerable (Linehan 1993). Similarly, ACT suggests emotional distress stems in part from perception of private experiences as in need of avoidance (Hayes et al. 1999). These conceptualizations echo a long-standing pattern of theories and treatment orientations emphasizing the role of secondary emotional reactions (e.g., Logotherapy [Frankl 1946]; Rational-Emotive Behavior Therapy [Matweychuk et al. 2019]; Cognitive Behavior Therapy [Barlow et al. 2017]).

Consistent with these suggestions, growing research suggests expectations or beliefs about emotion (i.e., emotional schemas) are associated with various forms of psychopathology (e.g., depression, anxiety, etc.; Leahy et al. 2012; Tirsch et al. 2012). However, the interrelations between emotional schemas and other aspects of emotional functioning remain largely unexamined by research. Integrating and expanding on previous literature, the current study proposes and assesses a unified model of emotional schemas and emotional functioning.

## Emotional Schemas

Emotional schemas are individualized conceptualizations and beliefs about emotions and emotional experiences that shape the ways an individual relates to private, emotional experiences. Theoretical basis for emotional schemas stems primarily from the theory of meta-cognitive beliefs (Wells 1995). Briefly, meta-cognitive theories suggest people hold beliefs about the nature of their own cognitive processes, and these beliefs shape how the individual attempts to control and respond to cognitive processes (Wells 1995). Within the context of emotions, emotional schema (also sometimes referred to as "beliefs about emotion" or "metaemotion") theories suggest core beliefs (i.e., schemas) about emotions and emotional processes drive the nature of an individual's reactions to emotional experiences (Edwards and Wupperman 2019; Leahy 2002; Manser et al. 2012; Mitmansgruber et al. 2009). Emotional schemas include various beliefs about emotion, such as typical course, causes and consequences, implications of emotions on self-concept, and appropriate and effective means of regulating emotion,

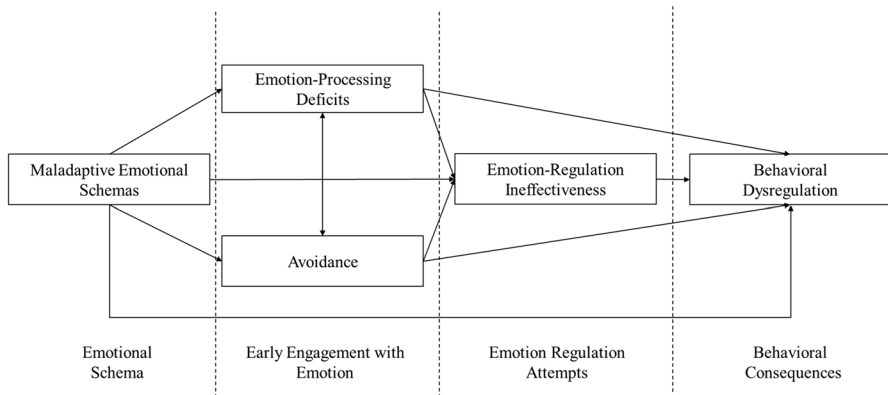
and appear strongly influenced by cultural norms, socialization history, and past emotional experience (Edwards and Wupperman 2019).

Schemas that foster self-validation and acceptance are often theorized to contribute to adaptive emotional functioning, whereas schemas that encourage self-judgment are considered maladaptive and to perpetuate emotional difficulty (Edwards and Wupperman 2019; Leahy 2002; Norman and Furnes 2016). Correspondingly, research suggests emotional schemas typically considered “maladaptive” are closely associated with psychopathology. Some schemas—such as those that characterize emotional expression as socially harmful—are common across a range of psychopathology (i.e., eating, depressive, and anxiety disorders; Brockmeyer et al. 2013; Krause et al. 2000; Mongrain and Vettese 2003; Spokas et al. 2009). In contrast, other schemas—such as those that characterize intense emotional arousal as dangerous and of indefinite duration—may be limited to certain forms of psychopathology (i.e., generalized anxiety, panic, and posttraumatic stress disorders, but not depressive, obsessive–compulsive, or phobic disorders; Naragon-Gainey 2010; Olatunji and Wolitzky-Taylor 2009).

## Emotional Schemas and Emotional Functioning

Early process models of emotional schemas (e.g., Leahy 2002) suggested complex interrelationships between emotional schemas and emotional functioning. Specifically, emotional schemas were theorized to (1) drive the nature of early engagement with emotional experiences (e.g., emotion processing, cognitive avoidance versus engagement), which in turn, (2) influences the nature and effectiveness of emotion regulation and (3) shapes behavioral regulation. Congruous with these suggestions, third-wave behavior therapies commonly suggest acceptance of and openness to emotional experiences (consistent with emotional schemas about the acceptability of emotion) allow for adaptive non-avoidance and processing of emotions (often through mindfulness). This acceptance/openness is believed to facilitate (1) effective application of emotion-regulation strategies (2) management of behavior in emotional situations (Linehan 1993; Hayes et al. 1999).

Unfortunately, research to date has not formally tested this comprehensive model of emotional schemas. However, correlational research preliminarily supports theorized associations—specifically, that individuals holding maladaptive emotional schemas (e.g., emotions as invalid and uncontrollable) also tend to display poorer emotion processing, higher emotional avoidance, and greater difficulty with emotional and behavioral dysregulation than individuals holding adaptive emotional schemas (e.g., emotions as normative and temporally finite). For example, alexithymic trait severity (i.e., an emotion processing deficit characterized by difficulties in identifying and communicating emotional experiences) correlates positively with negative expectations about the effects of somatic emotional arousal, beliefs that emotional expression is socially harmful, and general endorsement of maladaptive emotional schemas (Edwards et al. 2017; Müller et al. 2008; Sánchez et al. 2013; Stewart et al. 2002). Overreliance on avoidance-based regulation strategies also correlates with negative expectations about the effects of somatic emotional arousal and emotional expression (Krause et al. 2003; Simpson et al. 2006; Stewart et al. 2002).



**Fig. 1** Proposed theoretical model

Further, various maladaptive emotional schemas, including beliefs that emotions are uncontrollable, intolerable, and dangerous, are also commonly endorsed by persons who habitually engage in dysregulated behaviors, such as binge-eating and alcohol use (Corstorphine 2006; Manser et al. 2012; Stewart et al. 2001).

Despite the growing body of literature on relations between emotional schemas and emotional functioning, literature in this area is often fragmented by inconsistent operationalization and lack of a central, theoretical model across research. Indeed, correlational research has included a range of often idiosyncratic measures of emotional schemas (e.g., measures that specifically assess beliefs about the social consequences of emotion without assessing emotional schemas more broadly) and developed with little regard for larger theories on emotional schemas. Furthermore, such literature is built largely on young-adult samples, raising questions of generalizability. Because of these limitations, the role of emotional schemas within the broader context of emotional functioning remains largely unclear.

## Current Research

Based in previous research, the current research introduces and evaluates a theoretical model of emotional schemas and emotional functioning that integrates previous research on emotional schemas, emotion processing, emotional avoidance, emotion regulation, and behavioral regulation. This model suggests effects of maladaptive emotional schemas on dysregulated behavior are at least partially mediated by deficits in emotion processing, use of avoidance-based regulation, and emotion-regulation ineffectiveness. Consistent with third-wave behavior therapies and early models of emotional schemas, the model proposes that maladaptive emotional schemas (i.e., those which characterize emotions as problematic and encourage self-judgment) are associated with disruptions in early engagement with emotional experiences by impairing emotion processing and promoting avoidance. Such disruptions are then

associated with less success in emotion regulation attempts and, in turn, greater risk of behavioral dysregulation. See Fig. 1.

To also investigate the potential generalizability of this model across assessment methods and samples, the current research involved two independent studies. Study 1 utilized a combination of self-report (Leahy Emotional Schema Scale-II; Cognitive-Behavioral Avoidance Scale, Generalized Expectancy for Negative Mood Regulation Scale, and UPPS-P Impulsive Behavior Scale) and performance-based (Perception of Affect Task) measures with a young-adult sample, whereas Study 2 utilized a combination of self-report (Leahy Emotional Schema Scale-II, Cognitive-Behavioral Avoidance Scale), performance-based (Perception of Affect Task), and behavioral (Mirror Tracing Persistence Task) measures with a community sample. See Table 1 for a summary of study measures.

## Study 1

Study 1 investigated fit of the proposed model by using a cross-sectional design, sampling from an undergraduate population, and including a combination of self-report and performance-based measures. Similarity between this methodology and most previous research on emotional functioning (i.e., correlational or cross-sectional, undergraduate samples, self-report measures) allowed Study 1 to serve as a functional replication and integration of previous research in this area.

## Study 1 Method

### Participants

A total of 301 undergraduate students completed Study 1. Participants were recruited through a university departmental research-experience program within the Southeastern United States and compensated with course credit. Approximately 75% of participants identified as female, and most participants were under age 21. See Table 2 for detailed demographic information about participants in Study 1.

### Materials

See Table 1 for a summary of Study 1 measures. Unless otherwise specified, only measure total scores (rather than total and subscale scores) were included in data analyses to preserve statistical power.

*Maladaptive Emotional Schemas* Endorsement of maladaptive emotional schemas was assessed using the Leahy Emotional Schema Scale-II (LESS-II; Leahy 2012). The LESS-II is a 28-item self-report measure assessing endorsement of common beliefs about emotion and emotional experiences (e.g., “*Some feelings are wrong to have.*”). Total score reflects degree of general endorsement of maladaptive emotional schemas. The LESS-II total score has demonstrated good internal reliability and concurrent validity in various samples (e.g., Batmaz and Özdel 2015;

**Table 1** Study measures

Construct/operationalization	Study 1 measure	Study 2 measure
Maladaptive emotional schemas <i>Individualized conceptualizations and beliefs about emotions and emotional experiences</i>	Leahy Emotional Schema Scale-II	
Emotion-processing deficits <i>Misperception and misunderstanding of emotional cues and information</i>	Perception of Affect Task (Words-Sentences and Faces-Sentences Subtasks)	
Avoidance-based regulation <i>Tendency to adopt avoidance-based regulation strategies to manage experience</i>	Cognitive-Behavioral Avoidance Scale	
Emotion-regulation ineffectiveness <i>Ineffectiveness of down-regulating emotional intensity in emotionally-provocative situations</i>	Generalized Expectancy for Negative Mood Regulation	Self-reported interference of emotions on task performance
Behavioral dysregulation <i>Inability to persist in goal-directed behavior in emotionally-provocative situations</i>	UPPS-P Impulsive Behavior Scale—negative urgency subscale	Mirror Tracing Persistence Task

**Table 2** Participant demographics

Demographic	Study 1		Study 2	
	<i>n</i>	<i>N%</i>	<i>n</i>	<i>N%</i>
<b>Gender</b>				
Female	201	75	101	46
Male	65	24	116	53
Transgender	0	0	1	<1
<b>Race</b>				
Non-Hispanic White	130	49	66	30
Hispanic	68	25	24	11
Black/African American	35	13	91	42
Asian	19	7	25	11
Mixed-Race	12	5	0	0
Native American	2	<1	0	0
Pacific Islander	1	<1	1	<1
<b>Socioeconomic status</b>				
Working Class	36	13	87	40
Lower Middle Class	34	13	38	17
Middle Class	144	54	74	34
Upper Middle Class	51	19	18	8
Upper Class	2	<1	1	<1
<b>Sexual orientation</b>				
Heterosexual/Straight	248	93	181	83
Homosexual/Gay/Lesbian	7	3	22	10
Bisexual/Other	12	4	15	7
<b>Country/Region of Origin</b>				
United States	233	87	176	80
Caribbean Islands	11	4	2	<1
South America	6	2	2	<1
Asia	5	2	13	6
Europe/Russia	5	2	7	3
Central America	2	<1	1	<1
Africa	1	<1	5	2
Pacific Islands	0	0	1	<1
Australia	0	0	1	<1
Total sample size	268	100	219	100

Due to missing data, totals may not always equal 100%. All demographic information reflects participants' self-reported identities

Edwards et al. 2017; Leahy 2015). In the current sample, internal reliability was good ( $\alpha=0.84$ ).

*Emotion-Processing Deficits* A computerized version of the Perception of Affect Task (PAT; Rau 1988) was used to assess participants' emotion-processing ability. The PAT is a performance-based measure consisting of 140 items divided into

four, 35-item tasks. Previous research has validated each PAT task independently as well as the total PAT (Rau 1988). To decrease time and burden of study completion, Study 1 included only Tasks 1 and 3, which together assess participant ability to process both verbal and visual emotional cues. Task 1 involves matching emotional content in sentences (e.g., “Immediately upon hearing the loud barks, the child grabs her mother and holds her tight.”) with emotional words (i.e., happiness, sadness, fear, anger, disgust, surprise, neutral). Task 3 involves matching emotional content in sentences with emotional facial expressions. Proportion of accurate matches within each task is interpreted as reflecting emotion-processing ability, with higher scores denoting greater ability. The PAT has demonstrated adequate internal reliability and concurrent validity in both clinical and nonclinical samples (Lane et al. 1996; Lane et al. 2000; Rau 1988, 1992). In the current sample, the internal reliability of PAT Task 1 and 3 were adequate ( $\alpha=0.74$  and  $0.84$ , respectively).

**Avoidance-Based Regulation** The tendency to adopt avoidance-based regulation strategies was assessed using the Cognitive-Behavioral Avoidance Scale (CBAS; Ottenbreit and Dobson, 2004). The CBAS consists of 31 self-report items describing behavioral and cognitive avoidance strategies commonly used in social and nonsocial contexts (e.g., “I just wait out tension in my relationships hoping that it will go away.”). Scores on the CBAS reflect degree of reliance on avoidance-based regulation strategies, with higher scores indicating greater reliance. The CBAS has demonstrated strong internal reliability, test–retest reliability, and concurrent and discriminant validity in nonclinical samples (Carvalho and Hopko, 2011; Moulds et al. 2007; Ottenbreit and Dobson 2004). In the current study, the CBAS demonstrated good internal reliability ( $\alpha=0.94$ ).

**Emotion-Regulation Ineffectiveness** Emotion-regulation ineffectiveness was assessed using the Generalized Expectancy for Negative Mood Regulation Scale (NMR; Catanzaro and Mearns 1990). Whereas other measures of emotion regulation assess a broad range of emotional difficulties (e.g., items on the Difficulties in Emotion Regulation Scale assess lack of effective emotion-regulation strategies in addition to factors related to emotion processing, avoidant coping, emotional schemas, and behavioral dysregulation), the NMR more narrowly assesses *outcome* of emotion-regulation attempts through 30, self-report items about expectations of emotion-regulation effectiveness (e.g., “When I’m upset, I believe that I can do something to feel better.”). High scores on the NMR reflect perceived ability to regulate emotions effectively, whereas low scores reflect perceived difficulties in emotion regulation. The NMR has demonstrated strong internal reliability and concurrent and predictive validity in various clinical and nonclinical samples (Bardeen et al. 2016; Catanzaro and Mearns 1990; Totterdell and Leach 2001). Internal reliability in the current study was good ( $\alpha=0.89$ ).

**Behavioral Dysregulation** Behavioral dysregulation—specifically, the inability to persist in goal-directed behavior when experiencing high-intensity emotions—was assessed using the negative urgency subscale of the UPPS-P Impulsive Behavior Scale (UPPS-P; Lynam et al. 2006). The negative urgency subscale is a 12-item measure of the tendency to engage in impulsive behavior, particularly when feeling high-intensity emotions (e.g., “When I feel bad, I will often do things I later regret in order to make myself feel better now.”). High scores reflect greater inability



to persist in goal-directed behavior when experiencing high-intensity emotions. The negative urgency subscale of the UPPS-P has shown good internal reliability, test–retest reliability, and concurrent validity in various samples (Adams et al. 2012; Pearson et al. 2012; Racine et al. 2013). Internal reliability in the current study was good ( $\alpha=0.90$ ).

## Procedure

Potential participants for Study 1 were recruited using online advertising available through the departmental research-experience program at University of Central Florida. After registering to participate, participants were directed to an online webpage to provide consent and complete study measures. Five attention-check questions (i.e., “If you are paying attention, mark three for this question.”) were included amidst other study questions to determine participant attention; participants failing one or more of these questions (i.e., marking anything other than three) were excluded from analyses. Upon completion of the study, participants were granted course credit as compensation for their participation. All methods were pre-approved through the ethics boards at University of Central Florida and CUNY-John Jay College of Criminal Justice.

## Data Analysis Plan

Path analysis using the `lavaan` package for R (v 3.4.4) was used to assess the proposed theoretical model (Fig. 1) and estimate the relations between maladaptive emotional schemas (LESS-II), emotion-processing deficits (PAT), use of avoidance-based regulation (CBAS), emotion-regulation ineffectiveness (NMR), and behavioral dysregulation (UPPS-P). Throughout these analyses, the LESS-II total score was the exogenous variable in the model; PAT, CBAS, NMR, and UPPS-P scores were endogenous variables; demographic variables showing statistically significant correlation to study variables were also included as covariates. Potential mediational relationships were examined by calculating *z*-tests and standard errors for all indirect effects. Model fit statistics, residuals, and local fit were also analyzed using procedures outlined by Kline (2015).

## Study 1 Results

### Transformations and Descriptive Statistics

A total of 33 participants were excluded from the sample due to invalid responding (defined as providing an incorrect response to one or more attention-check questions), resulting in a final sample of 268 participants. This sample size provided adequate statistical power to complete necessary correlational and regression analyses involved in path analyses (Faul et al. 2007).

Participants’ responses to each measure were scored in accordance with previously published scoring instructions. Scores for the PAT and NMR were then

**Table 3** Study 1 descriptive statistics

	<i>M</i>	<i>SD</i>	Skew	Kurtosis
LESS-II	3.19	0.61	0.06	−0.31
PAT Task 1 (words/sentences) <sup>a, b</sup>	−9.25	0.73	1.95	5.36
PAT Task 3 (faces/sentences) <sup>a, b</sup>	−8.28	1.30	0.85	0.18
PAT Total <sup>a, b</sup>	−8.77	0.90	0.98	0.61
CBAS	2.10	0.65	0.56	−0.10
NMR <sup>a</sup>	−3.38	0.57	0.44	0.51
UPPS-P (negative urgency subscale)	2.41	0.68	0.13	−0.47

<sup>a</sup>Scores multiplied by −1

<sup>b</sup>Scores multiplied by 10

**Table 4** Correlations and covariances between Study 1 variables

	LESS-II	PAT	CBAS	NMR	UPPS
Maladaptive emotional schemas	–	0.03	0.22	0.20	0.07
Emotion-processing deficits	.06 (.31)	–	0.06	0.05	−0.02
Avoidant coping style	.55 (<.01)	.11 (.06)	–	0.22	0.00
Emotion-regulation ineffectiveness	.59 (<.01)	.09 (.13)	.60 (<.01)	–	0.06
Behavioral dysregulation	.17 (<.01)	−.04 (.58)	−.01 (.88)	0.16 (.01)	–

Correlations and *p*-values reflected in lower triangle; covariances reflected in upper triangle

multiplied by −1 so that higher scores on all measures could be interpreted as reflecting maladaptive or deficient emotional functioning. After this transformation, the following corrections were used to ensure that data satisfied assumptions of multivariate analyses (Kline 2015): (a) Mahalanobis distances were used to identify and exclude multivariate outliers ( $n=7$ ); (b) scores on the PAT were also multiplied by 10 to decrease the relative difference between score variances; rescaled scores were then used in place of raw scores in all subsequent analyses. Descriptive statistics for study measures after transformations and exclusion of outliers are listed in Table 3.

### Correlation Analyses and Demographic Covariates

Associations between study variables were first investigated using correlational analyses. See Table 4 for a summary of these analyses.

The relation of study variables to collected demographic variables was then examined through exploratory correlational and ANOVA analyses. Results of these analyses indicated significant relations between study variables and gender and race. With regard to gender, female participants' emotion-processing ability was significantly superior to that of male participants  $F(1, 257), =7.24, p < .01, d = 0.37$ . Regarding race, significant differences were noted in emotion-processing ability,  $F(5, 253) = 2.42, p = .04$ , and endorsement of emotional schemas,  $F(5, 253) = 3.63, p < .01$ . Specifically, participants identifying as Hispanic earned lower overall scores on the PAT than participants identifying as Asian,  $t(82) = 2.31, p = .02, d = -0.67$ ,

mixed race,  $t(74)=2.01$ ,  $p=.03$ ,  $d=-0.69$ , and Non-Hispanic White,  $t(191)=2.77$ ,  $p<.01$ ,  $d=-0.42$ ; participants identifying as Non-Hispanic White reported less maladaptive emotional schemas than participants identifying as mixed race,  $t(137)=2.80$ ,  $p=.01$ ,  $d=-0.89$ , Black,  $t(160)=2.67$ ,  $p<.01$ ,  $d=-0.51$ , and Hispanic,  $t(191)=2.23$ ,  $p=.03$ ,  $d=-0.35$ . Given these patterns of association, gender and race were included as covariates in all subsequent analyses.

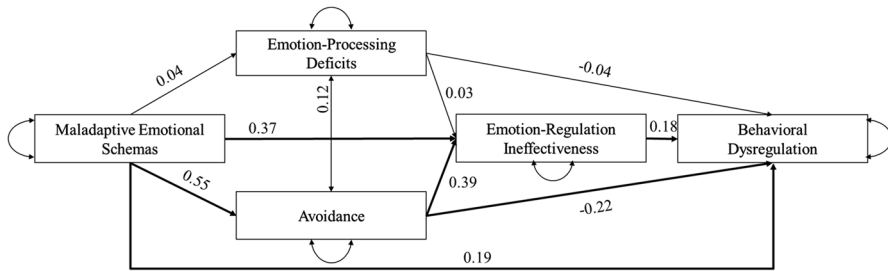
## Path Analyses

Next, the `lavaan` package for R was used to assess the proposed theoretical model through recursive path analysis using maximum likelihood estimation. Given their statistically significant association with study variables, gender and race were dummy-coded and included as exogenous variables in the path analysis, with gender predicting PAT total scores (emotion-processing deficits) and race predicting PAT total scores (emotion-processing deficits) and LESS-II total scores (maladaptive emotional schemas). For gender, male was used as the reference category; for race, Non-Hispanic White was used as the reference category.

Global fit statistics suggested the model was a good fit to the data,  $\chi^2(22, N=261)=20.58$ ,  $p=.55$ , CFI=1.00, RMSEA=0.00, 90% CI [0.00–0.05], SRMR=0.03. At the local fit level, correlation and standardized residuals reflected no appreciable disagreements between the data and the proposed model. See Supplementary Table 1 for correlation and standardized residuals in Study 1.

The proposed theoretical model explained approximately 11% of the variance in emotion-processing deficits,  $R^2=0.11$ ,  $SE=0.03$ , 95% CI [0.04–0.18], 31% of variance in avoidance-based regulation,  $R^2=0.31$ ,  $SE=0.05$ , 95% CI [0.21–0.40], 45% of variance in emotion-regulation ineffectiveness,  $R^2=0.45$ ,  $SE=0.04$ , 95% CI [0.37–0.54], and 7% of variance in behavioral dysregulation,  $R^2=0.07$ ,  $SE=0.03$ , 95% CI [0.01–0.12]. Examination of individual paths suggested some inconsistency in the strength and direction of association between variables. First, emotion-processing deficits showed no significant conditional associations with other variables of interest,  $\beta s=-0.04-0.12$ ,  $p s=.05-.56$ . These findings are consistent with correlational analyses, which suggested no significant correlations between scores on the PAT and other study measures. Also, avoidance-based regulation showed a significant, negative conditional association with dysregulated behavior ( $\beta=-0.22$ ,  $p<.01$ ). Because avoidance-based regulation was not significantly associated with dysregulated behavior in correlation analyses, such results suggest an un hypothesized suppression effect. Figure 2 provides a graphical representation of these results, with significant path coefficients denoted in bold. See Table 5 for a summary of observed path coefficients and residual variance.

Consistent with the lack of significant associations noted between emotion-processing deficits and other emotional variables in path analyses, results of mediation analyses reflected all mediation relationships *except those involving emotion-processing deficits* to be statistically significant. Specifically, the relation of maladaptive emotional schemas to behavioral dysregulation was significantly mediated by avoidance-based regulation ( $\beta=-0.14$ ,  $SE=0.05$ ,  $p<.01$ ) and emotion-regulation ineffectiveness ( $\beta=0.08$ ,  $SE=0.04$ ,  $p=.03$ ), but not



**Fig. 2** Study 1, Proposed theoretical model. \*Because demographic correlates are not theoretically central to the proposed model, paths between demographic covariates and model variables are not listed. For details regarding these paths, see Table 5

emotion-processing deficits ( $\beta < .01$ ,  $SE < .01$ ,  $p = .65$ ). The relation of maladaptive emotional schemas to emotion-regulation ineffectiveness was similarly significantly mediated by avoidance-based regulation ( $\beta = 0.20$ ,  $SE = 0.03$ ,  $p < .01$ ), but not emotion-processing deficits ( $\beta < .01$ ,  $SE < .01$ ,  $p = .67$ ). Lastly, emotion-regulation ineffectiveness significantly mediated the relation of avoidance-based regulation to behavioral dysregulation ( $\beta = 0.07$ ,  $SE = 0.04$ ,  $p = .03$ ), but not the relation of emotion-processing deficits to behavioral dysregulation ( $\beta < .01$ ,  $SE < .01$ ,  $p = .54$ ).

## Study 2

Study 2 also utilized a cross-sectional design to investigate the associations between emotional constructs. Study 2 aimed to both (a) conceptually replicate results of Study 1 and (b) investigate the extent to which the proposed model may generalize to diverse populations and/or alternative modes of assessing emotional functioning. As such, Study 2 sampled from a diverse, community population in New York City and utilized a combination of self-report, performance-based, and behavioral measures.

## Study 2 Method

### Participants

Potential participants for Study 2 were recruited using online advertising in the New York City area. A total of 219 participants completed the study in full. Each subject was provided \$10.00 and one round-trip NYC Metro Card as compensation for time and travel. Consistent with the diversity of the New York City community, most participants identified as racial minority, and 40% identified as working class. See Table 2 for detailed demographic information about Study 2 participants.

**Table 5** Study 1, proposed theoretical model path coefficients

Parameter	Unstandardized coefficient	SE	z-value	p	Standardized coefficient
LESS-II → PAT	0.05	0.09	0.59	.56	0.04
LESS-II → CBAS	0.60	0.06	10.73	< .01	0.55
LESS-II → NMR	0.35	0.05	6.74	< .01	0.37
LESS-II → UPPS	0.22	0.09	2.42	.01	0.19
PAT ↔ CBAS	0.06	0.03	1.94	.05	0.12
PAT → NMR	0.02	0.03	0.63	.53	0.03
PAT → UPPS	-0.03	0.05	-0.69	.49	-0.04
CBAS → NMR	0.34	0.05	7.03	< .01	0.39
CBAS → UPPS	-0.24	0.08	-2.83	.01	-0.22
NMR → UPPS	0.22	0.10	2.23	.03	0.18
LESS	0.34	0.03	11.42	< .01	0.93
PAT	0.73	0.06	11.42	< .01	0.89
CBAS	0.29	0.03	11.42	< .01	0.69
NMR	0.18	0.02	11.42	< .01	0.55
UPPS	0.44	0.04	11.42	< .01	0.93
<i>Demographic covariates</i>					
Hispanic → LESS-II	0.21	0.09	2.37	.02	0.15
Black → LESS-II	0.33	0.11	2.92	< .01	0.18
Asian → LESS-II	0.27	0.14	1.86	.06	0.12
Native American → LESS-II	-0.31	0.41	-0.76	.45	-0.05
Pacific Islander → LESS-II	0.56	0.58	0.97	.33	0.06
Mixed Race → LESS-II	0.55	0.18	3.04	< .01	0.19
Gender → PAT	0.37	0.12	2.99	< .01	0.18
Hispanic → PAT	0.39	0.13	2.97	< .01	0.19
Black → PAT	0.13	0.17	0.78	.44	0.05
Asian → PAT	-0.23	0.21	-1.10	.27	-0.07
Native American → PAT	-0.33	0.60	-0.55	.58	-0.03
Pacific Islander → PAT	2.58	0.85	3.04	< .01	0.18
Mixed Race → PAT	-0.20	0.27	-0.75	.45	-0.05

## Materials

See Table 1 for a summary of Study 2 measures. Unless otherwise specified, only measure total scores (rather than total and subscale scores) were included in data analyses to preserve statistical power. As in Study 1, endorsement of maladaptive emotional schemas was assessed using the Leahy Emotional Schema Scale-II (LESS-II; Leahy, 2012); emotion processing ability was assessed using a computerized version of the Perception of Affect Task tasks 1 and 3 (PAT; Rau 1988), and tendencies to adopt avoidance-based regulation strategies were assessed using the Cognitive-Behavioral Avoidance Scale (CBAS; Ottenbreit and Dobson 2004).

*Behavioral Dysregulation and Emotion Regulation Ineffectiveness* Previous research suggests behavioral and self-report measures of behavioral dysregulation do not always significantly correlate with one another, possibly because self-report measures tend to assess at the *trait level*, whereas behavioral measures assess at the *state level* (Cyders and Coskunpinar 2011). It was therefore deemed critical to also examine fit of the proposed model when using *state-level, behavioral measures* of behavioral dysregulation (rather than only examining fit with trait-level, self-report measures). Correspondingly, behavioral dysregulation was assessed using a computerized version of the Mirror Tracing Persistence Task (MTPT-C; Strong et al. 2003), a behavioral measure of behavior dysregulation. Although previous research suggests the MTPT-C (like many behavioral measures of behavioral dysregulation) does not significantly correlate with the negative urgency subscale of the UPPS-P (used in Study 1; Brown et al. 2018), it is similarly conceptualized as a measure of ability to persist in goal-directed behavior when experiencing emotional distress (Strong et al. 2003).

The MTPT-C requires participants to trace a complex, geometric figure (i.e., a 5-point star) using a computer mouse.<sup>1</sup> To increase difficulty and frustration of the task, MTPT-C is designed such that movement of the mouse corresponds to reverse movements of the on-screen cursor. Errors in tracing (i.e., gross deviations of tracing from the outline of the star) and prolonged lack of movement (i.e., 2+ seconds) sound a loud buzzer and prompt the participant to restart the task from the starting position. Consistent with initial development of the MTPT-C, participants were allowed a maximum of 5 min to complete the task and the option to discontinue the task at any time. Behavioral dysregulation was inferred from participants' persistence of goal-directed behavior, operationalized as the length of time from task start to termination. Average number of errors per second were also calculated to statistically control for skill level on persistence scores.

Following completion of the MTPT-C, participants rated the extent to which their emotions interfered with their ability to complete the MTPT-C (i.e., "*How much did your emotions interfere with your ability to complete the tracing task?*"). Ratings were completed using a Likert-format scale of 1 (no interference) to 9 (extreme interference). Given the inherently distressing nature of the MTPT-C, effective emotion regulation was presumed necessary to limit emotional interference during task completion; as such, participants' reported ratings of emotional interference were interpreted as reflecting ineffectiveness of emotion regulation during task completion. Notably, this item's focus on emotional interference is slightly different from the focus on perceived emotion-regulation effectiveness of the NMR in Study 1. Nevertheless, both measures assess a fundamental aspect of emotion dysregulation—the outcome of regulatory attempts.

<sup>1</sup> The task was programmed using JavaScript, HTML, and CSS. The 5-point star had an outer radius of 225 pixels and an inner radius of 90 pixels drawn with a line width of 15 pixels.

## Procedure

Potential participants for Study 2 were recruited using online advertising throughout the Greater New York City area. Participants completed all study measures independently via computer in a university computer laboratory. Researchers were available throughout study completion to monitor engagement and answer questions as needed. As in Study 1, an attention-check question was included amidst other study questions to determine participant attention, and participants failing this question were excluded from analyses. After participants completed all study measures, they were debriefed and compensated for their time and travel. All methods were pre-approved through the ethics board at CUNY-John Jay College of Criminal Justice.

## Data Analysis Plan

Path analysis using the `lavaan` package for R (v 3.4.4) was used to assess the proposed theoretical model (Fig. 1) and estimate the relations between maladaptive emotional schemas (LESS-II), emotion-processing deficits (PAT), use of avoidance-based regulation (CBAS), emotion-regulation ineffectiveness (emotion-regulation ineffectiveness question), and behavioral dysregulation (MTPT-C). Throughout these analyses, the LESS-II total score was the exogenous variable in the model; PAT, CBAS, emotion-regulation ineffectiveness question, and MTPT-C scores were endogenous variables; demographic variables showing statistically significant correlation to study variables and number of errors during the MTPT-C were also included as covariates. Potential mediational relationships were examined by calculating z-tests and standard errors for all indirect effects. Model fit statistics, residuals, and local fit were also analyzed using procedures outlined by Kline (2015).

## Study 2 Results

### Transformations and Descriptive Statistics

A total of 29 participants were excluded from Study 2 analyses for failing the attention-check question, resulting in a final sample size of 190 participants. This sample size provided adequate statistical power to complete necessary correlational and regression analyses involved in path analyses (Faul et al. 2007).

Participants' responses to each measure were scored in accordance with previously established scoring instructions. To aid in ease of result interpretation, PAT and MTPT-C scores were multiplied by  $-1$  so that higher scores in all measures may be interpreted as reflecting deficits in emotional functioning. As in Study 1, corrections were used to ensure data satisfied assumptions of multivariate analyses (Kline 2015). Mahalanobis distances were used to identify and exclude two multivariate outliers. Scores on the PAT and MTPT-C were also multiplied by a constant (i.e., 10 or .01) to decrease the relative difference between score variances; rescaled

**Table 6** Study 2 descriptive statistics

	<i>M</i>	<i>SD</i>	Skew	Kurtosis
LESS-II	3.02	0.72	0.32	− 0.38
PAT Task 1 (Words/Sentences) <sup>a, b</sup>	− 8.69	1.16	1.35	1.98
PAT Task 3 (Faces/Sentences) <sup>a, b</sup>	− 6.92	1.64	0.60	− 0.20
PAT Total <sup>a, b</sup>	− 7.80	1.24	0.69	− 0.06
CBAS	1.88	0.62	0.72	− 0.48
Emotion Regulation Ineffectiveness	4.68	2.48	0.08	− 0.97
MTPT-C <sup>a, c</sup>	− 1.65	1.14	− 0.15	− 1.73

<sup>a</sup>Scores multiplied by − 1

<sup>b</sup>Scores multiplied by 10

<sup>c</sup>Scores multiplied by .01

**Table 7** Correlations and covariances between Study 2 variables

	LESS-II	PAT	CBAS	EmoDys	MTPT-C
Maladaptive emotional schemas	–	0.04	0.27	0.37	0.05
Emotion-processing deficits	.05 (.54)	–	0.05	0.27	0.24
Avoidant coping style	.61 (<.01)	.07 (.34)	–	0.32	− 0.06
Emotion-regulation ineffectiveness	.21 (.01)	.09 (.22)	.21 (<.01)	–	0.64
Behavioral dysregulation	.06 (.44)	.18 (.02)	− .09 (.26)	.23 (<.01)	–

Correlations and *p*-values reflected in lower triangle; covariances reflected in upper triangle

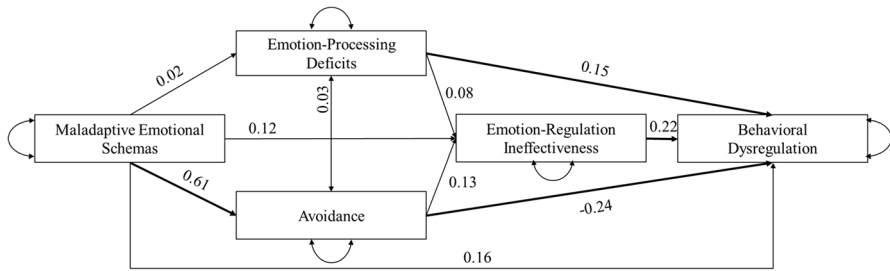
scores were then used in place of raw scores in all subsequent analyses. Descriptive statistics for study measures after transformations and exclusion of outliers are listed in Table 6.

### Correlation Analyses and Demographic Covariates

Associations between study variables were investigated using correlational analyses. See Table 7 for a summary of these analyses.

The relation of study variables to collected demographic variables was then examined through exploratory correlational and ANOVA analyses. Unlike Study 1, data in Study 2 showed no significant associations between study variables and gender or race. Significant associations were, however, noted for age and socioeconomic status; age and socioeconomic status were therefore included as covariates in all subsequent analyses. Regarding age, older participants tended to endorse less maladaptive emotional schemas,  $r = -0.23$ ,  $p < .01$ , and to rely less on avoidance-based regulation strategies,  $r = -0.15$ ,  $p = .05$ , than younger participants. Regarding socioeconomic status, participants identifying as “Lower Middle Class” tended to report significantly more maladaptive emotional schemas than participants identifying as “Middle Class,”  $t(93) = 2.77$ ,  $p = .01$ ,  $d = -0.60$ , and poorer emotion processing than participants identifying as “Middle Class,”  $t(93) = 2.23$ ,  $p = .03$ ,  $d = -0.46$ , or “Upper Middle Class,”  $t(45) = 2.42$ ,  $p = .02$ ,  $d = -0.81$ . Participants identifying





**Fig. 3** Study 2, Proposed theoretical model \*Because demographic correlates are not theoretically central to the proposed model, paths between demographic covariates and model variables are not listed. For details regarding these paths, see Table 8

as “Working Class” also demonstrated poorer emotion processing than participants identifying as “Upper Middle Class,”  $t(89) = 2.23$ ,  $p = .03$ ,  $d = -0.68$ .

### Path Analyses

The *lavaan* package for R was then used to assess the proposed theoretical model using recursive path analysis with maximum likelihood estimation. Due to their statistically significant association with study variables, socioeconomic status (dummy coded) and age were included as exogenous variables in path analyses, with socioeconomic status predicting LESS-II total scores and PAT total scores (working class used as the reference category) and age predicting LESS-II total scores and CBAS total scores.

Global fit statistics suggested the model was a good fit to the data,  $\chi^2(19, N = 188) = 21.09$ ,  $p = .33$ , CFI = 0.99, RMSEA = 0.02, 90% CI [0.00–0.07], SRMR = 0.04. At the local fit level, correlation and standardized residuals reflected no appreciable disagreements between the data and the proposed model. See Supplemental Table 2 for correlation and standardized residuals in Study 2.

In Study 2, the proposed theoretical model explained approximately 5% of the variance in emotion-processing deficits,  $R^2 = 0.05$ , SE = 0.03, 95% CI [-0.01–0.10], 38% of the variance in avoidance-based regulation,  $R^2 = 0.38$ , SE = 0.05, 95% CI [0.27–0.49], 6% of the variance in emotion-regulation ineffectiveness,  $R^2 = 0.06$ , SE = 0.03, 95% CI [0.00–0.12], and 12% of the variance in behavioral dysregulation,  $R^2 = 0.12$ , SE = 0.04, 95% CI [0.04–0.20]. As in Study 1, emotion-processing deficits showed very little association with other variables of interest. A significant, negative conditional association was also observed between avoidance-based regulation and behavioral dysregulation,  $\beta = -0.24$ ,  $p < .01$ , similar to the unhypothesized suppression effect observed in Study 1. Unlike in Study 1, however, maladaptive emotional schemas and emotion-regulation ineffectiveness showed very weak conditional associations with most other variables of interest. Also, a significant, positive conditional association was observed between emotion-processing deficits and behavioral

**Table 8** Study 2, proposed theoretical model path coefficients

Parameter	Unstandardized coefficient	SE	z-value	p	Standardized coefficient
LESS-II → PAT	0.04	0.12	0.33	.74	0.02
LESS-II → CBAS	0.51	0.05	10.36	<.01	0.61
LESS-II → EmoDys	0.41	0.30	1.36	.18	0.12
LESS-II → MTPT-C	0.25	0.14	1.86	.06	0.16
PAT ↔ CBAS	0.02	0.04	0.46	.65	0.03
PAT → EmoDys	0.16	0.15	1.09	.27	0.08
PAT → MTPT-C	0.15	0.07	2.24	.03	0.15
CBAS → EmoDys	0.54	0.36	1.47	.14	0.13
CBAS → MTPT-C	-0.46	0.16	-2.80	<.01	-0.24
EmoDys → MTPT-C	0.10	0.03	3.10	<.01	0.22
LESS	0.47	0.05	9.70	<.01	0.89
PAT	1.33	0.14	9.70	<.01	0.96
CBAS	0.23	0.02	9.70	<.01	0.62
EmoDys	5.64	0.58	9.70	<.01	0.94
MTPT-C	1.12	0.12	9.70	<.01	0.88
<i>Covariates</i>					
Age → LESS-II	-0.01	<.01	-3.45	<.01	-0.24
Lower Middle SES → LESS-II	0.21	0.15	1.44	.15	0.11
Middle SES → LESS-II	-0.23	0.12	-2.01	.05	-0.15
Upper Middle SES → LESS-II	0.10	0.18	0.57	.57	0.04
Upper SES → LESS-II	0.76	0.67	1.14	.26	0.08
Lower Middle SES → PAT	0.20	0.25	0.82	.41	0.06
Middle SES → PAT	-0.30	0.20	-1.52	.13	-0.12
Upper Middle SES → PAT	-0.64	0.31	-2.09	.04	-0.16
Upper SES → PAT	-0.64	1.12	-0.58	.57	-0.04
Age → CBAS	<.01	<.01	-0.26	.80	-0.02
Tracing Errors → MTPT-C	-0.16	0.09	-1.75	.08	-0.12

dysregulation,  $\beta = 0.15$ ,  $p = .03$ . See Fig. 3 for a graphical representation of these results, with significant path coefficients denoted in bold, and Table 8 for a summary of observed path coefficients and residual variances.

Unlike Study 1, mediation analyses in Study 2 suggested only one statistically significant mediation relationship. Avoidance-based regulation significantly mediated the relation between maladaptive emotional schemas and behavioral dysregulation,  $\beta = -0.23$ ,  $SE = 0.09$ ,  $p < .01$ . However, all other mediation relationships were not significant.

## Discussion

The current research introduced and evaluated a preliminary, integrative model of emotional schemas and emotional functioning through two independent studies. Though further research is necessary, cumulative findings provide preliminary support for the proposed model. Collapsing across studies, four major findings were noted. First, complex interrelations between emotional factors suggest that few, if any, full mediational relationships exist between variables. Second, maladaptive emotional schemas (e.g., those characterizing emotions as invalid, dangerous, unacceptable, intolerable, etc.) were associated with various emotional factors, particularly avoidant coping, emotion-regulation ineffectiveness, and behavioral dysregulation. Third, behavioral dysregulation appeared to stem from a combination of emotion-regulation ineffectiveness, avoidant coping, emotion-processing deficits, and maladaptive emotional schemas. Lastly, the proposed model did not adequately explain emotion-processing deficits as assessed in the current research. Implications of each of these findings are detailed below.

### Interrelations Between Emotional Factors

Across two, independent samples, results suggested complex interrelations between assessed emotional factors. Although Study 1 suggested various mediational relationships between variables, only one of these mediations were replicated in Study 2. These results suggest maladaptive emotional schemas, emotion-processing deficits, avoidant coping, emotion-regulation ineffectiveness, and behavioral dysregulation—while interrelated—likely serve unique and semi-independent roles within the context of emotional functioning. Accordingly, investigations into emotional functioning may benefit from a wholistic approach that considers each factor within the context of a larger emotional system.

Though further replication and investigation is needed, the proposed model could serve as a useful tool for organizing emotional research and interventions moving forward. The model suggests that targeting any singular aspect of emotional functioning (e.g., avoidant coping) may have ancillary effects on other emotional factors (e.g., emotion-regulation ineffectiveness) given strong interrelations between factors. However, the lack of meaningful mediation relationships also suggests this targeted approach is unlikely to fully resolve non-targeted factors. The model may therefore support treatments in adopting wholistic conceptualizations and treatment approaches for emotional functioning, such as those commonly seen in third-wave behavior therapies. For example, through “DBT Skills,” Dialectical Behavior Therapy addresses emotion processing, avoidance, emotion regulation, and behavioral dysregulation through instruction on mindfulness, acceptance, emotion regulation strategies, and distress tolerance (Linehan 1993). This multi-targeted approach may explain the success of recent efforts to provide DBT Skills groups as a standalone treatment for dysregulated behavior (Valentine et al. 2015). Acceptance and Commitment Therapy has a similar multi-target approach; its focus on experiential

avoidance targets both avoidant coping and reactions to private emotional experiences as treatment targets (Hayes and Wilson 1994).

### **Emotional Schemas in Emotional Functioning**

The current research also replicates and expands upon previous investigations into emotional schemas. Early emotional schema theories suggested emotional schemas to influence emotional functioning by driving reactions to and management of emotional experiences (Leahy 2002; Manser et al. 2012; Mitmansgruber et al. 2009). Consistent with this, across both studies, individuals' endorsement of common maladaptive emotional schemas (e.g., emotions as dangerous, uncontrollable, socially unacceptable, etc.) was associated with a greater tendency to adopt avoidance-based coping strategies that distance the self from emotional experiences and situations.

Though protective in the short-term (the person avoids the discomfort of experiencing emotions perceived as dangerous), avoidant coping typically restricts opportunity for learning by limiting exposure to experiences that are inconsistent with maladaptive belief systems (e.g., effectively coping with an intense emotion; Delgado et al. 2009). Changing maladaptive emotional schemas may therefore require interventions that (a) limit avoidant coping and (b) provide exposure to experiences and/or situations in which emotions are experienced as valid, acceptable, and controllable. Many third-wave therapies structure the therapeutic context in service of these aims. For example, mindfulness encourages full, nonavoidant experiencing of emotion from a stance of nonjudgment and self-validation (Bishop et al. 2004; Kabat-Zinn 1982). Use of validation strategies within therapeutic interactions may similarly challenge maladaptive emotional schemas by communicating acceptance and validity of emotional experience (Koerner and Linehan 2003; Linehan 1997). Because emotional schemas serve a prominent role within the emotional system, these approaches are likely crucial for improving emotional functioning.

### **Behavioral Dysregulation in Emotional Functioning**

Findings also highlighted, consistent with previous research, that behavioral dysregulation—specifically, the inability to persist in goal-directed activity during times of high emotionality—stems from a combination of emotional factors, particularly emotion-regulation ineffectiveness. Because behavioral dysregulation was assessed at the trait-level in Study 1 and at the state-level in Study 2, findings suggest these complexities may occur both over time and within a single instance of behavioral dysregulation.

Across two independent samples, behavioral dysregulation was most closely associated with emotion-regulation ineffectiveness. Specifically, participants were less persistent in goal-directed behaviors when emotion-regulation strategies were ineffective and/or insufficient in managing emotional distress. In Study 1, this pattern occurred at the trait level such that participants who reported low perceived ability to regulate emotions also reported higher engagement in dysregulated behavior. Similarly, in Study 2, participants who experienced momentary emotional

distress as disruptive were faster to prematurely terminate a distressing task. Such findings are consistent with previous characterizations of behavioral dysregulation as resulting from emotion-regulation burnout and serving to decrease emotional distress when other attempts at emotion regulation are unsuccessful and/or insufficient (Klonsky 2011; Wedig and Nock 2010). These results are also consistent with previous research suggesting dysregulated behavior is closely associated with difficulties in emotion regulation (Anestis et al. 2007; Edwards and Wupperman 2017; Selby and Joiner 2009).

Inconsistent with the originally proposed model, behavioral dysregulation also had a *negative* conditional association with avoidant coping after controlling for emotion-regulation ineffectiveness in both Study 1 and Study 2. These results suggest that so long as avoidant coping does not interfere with emotion-regulation effectiveness, it may have an adaptive effect on behavioral dysregulation. Findings are inconsistent with popular conceptualizations of avoidance as inherently maladaptive (e.g., Fledderus et al. 2010) and instead suggest avoidance may be adaptive in certain contexts. For example, a man struggling with alcohol use may choose to avoid bars or pubs to decrease his chance of relapse. Within this context, if the avoidance does not interfere with other emotion-regulation efforts (e.g., by introducing new emotional distress associated with social exclusion), it is likely to have adaptive effects on drinking behavior. This emphasis on contextual fit of avoidant coping is consistent with recent theories suggesting optimal emotional functioning prioritizes *flexibility* and *contextual fit* in emotion regulation rather than application of individual, inherently adaptive strategies (Aldao et al. 2015; Bendezú and Wadsworth 2017; Bonanno and Burton, 2013). Accordingly, future research should consider moving away from classifying regulation strategies as inherently “adaptive” or “maladaptive” and instead focus on identifying patterns of fit between strategies and emotional experience, situational demands, and personal goals.

## Emotion-Processing Deficits and Emotional Functioning

In both studies, the proposed model of emotional functioning was unable to replicate previously demonstrated associations between emotion-processing deficits and other emotional factors. Various factors may have contributed to this model failure. First, sample characteristics may have yielded low variability in emotion-processing scores and an underrepresentation of emotion-processing deficits in the data. Consistent with this, no statistically significant associations were noted between emotion-processing deficits and other emotional factors in Study 1, which utilized a relatively homogenous, high functioning sample. Conversely, statistically significant associations were observed between emotion-processing deficits and behavioral dysregulation in Study 2, which utilized a more diverse community sample. To avoid this limitation, future research should employ heterogeneous samples to ensure adequate variability in emotion-processing abilities across participants.

The lack of statistically significant association between emotion-processing deficits and other emotional factors may have also stemmed from issues of construct validity. The Perception of Affect Task (PAT; Rau 1988) is a performance-based

measure of processing emotional information in sentences, words, and facial expressions. It can therefore be broadly conceptualized as assessing participants' emotion-situation knowledge, emotion labeling, and facial-processing ability. The PAT does not assess other forms of emotion processing, such as recognition and understanding of emotional experiences in the self. It is therefore possible that the PAT was too narrow in scope to detect associations with other assessed emotional factors. Given the large literature establishing emotion processing as playing a fundamental role in emotional experience and functioning (e.g., Izard 2010; Kret and Ploeger 2015), future investigations may consider whether alternative measures or forms of emotion processing (e.g., alexithymia) are more adequately explained by the model.

### **Sociodemographic Considerations**

The proposed model showed strong global fit across two very disparate samples. The first sample included predominantly Caucasian, middle-class, undergraduate students in the Southeastern United States, whereas the second sample included predominantly racially and ethnically diverse, lower-socioeconomic status, community members from the greater New York City area. Though preliminary, generalization of the model across these two samples suggests the model may be valid across sociodemographic and geographic contexts within the United States. In both studies, results also suggested emotional functioning was significantly associated with sociodemographic characteristics, suggesting sociodemographic considerations are likely necessary for understanding and treatment of emotional functioning.

### **Limitations**

The current research should be understood within the context of a few methodological limitations. First, both Study 1 and Study 2 utilized cross-sectional designs. Therefore, although directionality is implied by underlying theories of emotional schemas and third-wave behavior therapies, results cannot be used to make unequivocal conclusions about causality and directionality of observed relationships. Most research on emotional functioning has similarly relied on cross-sectional designs, because emotional factors are presumed to exist as characterological traits that are unresponsive to experimental manipulation (indeed, even weeks of therapy may not be always successful in changing emotional factors). Some research, however, has effectively manipulated participants' general approach toward emotion regulation within an individual task (e.g., acceptance versus suppression; Feldner et al. 2003, 2006). Integration of such experimental methods through future research may aid in clarifying issues of causality and directionality suggested by the proposed model.

Second, the current research relied heavily on use of self-report measures of emotional functioning, particularly in Study 1. Although a similar reliance is commonly observed within the literature on emotional functioning, self-report methods are associated with various limitations, particularly biased response patterns stemming from research demand characteristics, self-presentation, and respondent insight (Paulhus and Vazire 2007). Such reliance may have also contributed to an

issue of common method variance among self-report variables, particularly in Study 1, which would at least partially explain the relatively stronger associations noted between variables in Study 1 versus Study 2. Continued research is therefore necessary to determine the extent to which the proposed model can be used to explain or predict behavioral outcomes, such as engagement in dysregulated behavior, use of emotion-regulation strategies across situations, or psychotherapy response.

Third, the current research may have included overly narrow operationalizations of study variables. For example, although the Perception of Affect Task assesses various aspects of emotion processing (i.e., emotion vocabulary, facial processing, and emotion-situation knowledge), it is not a comprehensive assessment of emotion processing. Some aspects of emotion processing are not assessed by the Perception of Affect Task—particularly ability to process emotional information in the self (e.g., emotion differentiation, affect labeling, alexithymia, etc.). The extent to which these unassessed aspects of emotion processing may be better explained by the model therefore remains a question for further research. Relatedly, the MTPT-C, used in Study 2, assesses propensity toward behavioral dysregulation by measuring participant behavior within the narrow context of an idiosyncratic stressor (i.e., a mirror tracing task; Strong et al. 2003). Although the MTPT-C has demonstrated strong convergent validity with other behavioral measures (McHugh et al. 2011), some research suggests behavioral dysregulation is more likely to occur in the context of personally relevant versus idiosyncratic stressors (e.g., rejection by a loved one versus rejection by a stranger; Ebner-Priemer et al. 2015; Rosenthal et al. 2016). It is therefore possible that scores on the MTPT-C are biased by the extent to which participants appraise the tracing task as personally relevant. Future research may prioritize ecological validity (e.g., using ecological momentary assessment or interpersonal behavioral tasks) to determine the extent to which the proposed model of emotional functioning holds in more personally relevant contexts.

Fourth, although results suggested sociodemographic considerations are likely central to understanding the proposed model and emotional functioning, this was not a central focus of the current investigation. As such, sampling strategies yielded samples with uneven sociodemographic compositions, limiting statistical power to detect possible sociodemographic effects. Relatedly, methodological differences between Studies 1 and 2 also restricted ability to directly examine the extent to which sample sociodemographic characteristics may have impacted observed results. Therefore, to clarify sociodemographic considerations, future research should include large, heterogeneous samples with strong representation across sociodemographic groups.

## Future Directions

Though results provide preliminary evidence to support the proposed model as a viable tool, ongoing research is needed to further investigate and develop the model to account for growing research findings. Specifically, future research should investigate the following: (a) generalization of the model across populations, situations, and cultures; (b) replication of the model using different research designs (e.g.,

experimental, longitudinal, etc.) and modes of measurement (e.g., behavioral, ecological momentary assessment, etc.); (c) ability of the model to predict behaviorally and clinically-relevant outcomes in emotional functioning (e.g., predicting degree of behavioral dysregulation given patterns of emotional schemas and emotion regulation); and (d) clarification of the role of emotion processing within the context of emotional functioning. As ongoing research aids development and modification of the proposed model, research may also investigate the utility of the model within a clinical context.

## Conclusions

The proposed model may be a valuable tool for organizing and guiding research. Findings across two studies suggest four key conclusions. First, emotional functioning appears to stem from complex interrelations between maladaptive emotional schemas, emotion-processing deficits, avoidant coping, emotion-regulation ineffectiveness, and behavioral dysregulation. Second, emotional schemas may play a key role in guiding emotional experience and functioning. Third, behavioral dysregulation is a complex construct stemming primarily from difficulties with emotion regulation. Last, the proposed model failed to highlight the role of emotion-processing deficits within the context of emotional functioning. The current research also underlined the importance of conceptualizing and assessing emotional functioning within the context of sociodemographic and cultural considerations. Ongoing research is needed to replicate and continue development of the proposed model of emotional functioning.

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## Compliance with Ethical Standards

**Conflict of interest** The authors declare that they have no conflict of interest.

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