Selection, Optimization, and Compensation in the Domain of Emotion Regulation: Applications to Adolescence, Older Age, and Major Depressive Disorder

Philipp C. Opitz¹, James J. Gross², and Heather L. Urry¹*

¹ Tufts University  
² Stanford University

Abstract

Emotions often are well calibrated to the challenges and opportunities we face. When they are not, we may try to regulate our emotions. Interestingly, there seems to be considerable variation both in the strategies people use to regulate emotions and in the success of these emotion regulation efforts. The Selection, Optimization, and Compensation with Emotion Regulation framework suggests that variation in the resources required for particular emotion regulation strategies may be a crucial determinant of emotion regulation use and success within individuals across situations, between individuals, and between groups of individuals. In this review, we consider the ways in which two resources for emotion regulation (working memory and social support) might differ among three groups, namely adolescents, older adults, and adults with major depressive disorder. We link these between-group differences in resources to differences in emotion regulation and make suggestions for future research.

You’ve worked hard all day trying to finish a big project on time. Your eyes hurt from staring at the computer screen. Your head is pounding. Unfortunately, you submitted the project hours late, and it does not meet your personal standards. On your drive home, highly unpleasant thoughts race through your mind: “I think I really blew it this time. What if they hate my work? Will I get fired?!?” Not surprisingly, these thoughts cause a cascade of negative emotions. Normally, you would brush the negative thoughts aside with ease and move on, but not tonight. Tonight, you are tired, and simply do not have the capacity to keep your attention in check.

You arrive home a miserable wreck. You unlock your front door, and your partner greets you with a hug. He or she has prepared a meal for you, knowing you’d be home late. Over dinner, you share your feelings about your lousy day and your partner helps you see that things are likely not as bad as they seemed. Slowly, the negative thoughts fade, taking with them the negative emotions that plagued you on your drive home. By being there for you with warm support, your partner helped you regulate your negative emotions, compensating for your temporary inability to regulate your emotions on your own.

This opening example illustrates within-person variation in resources as a function of two situational contexts (work, home). However, within-person variation in resources across situational contexts is just one of many types of variation. Resources for emotion regulation may also vary between individuals and/or between groups of individuals who share characteristics or circumstances (e.g., developmental stage, diagnostic label, exposure to a particular stressor). For example, some individuals have higher levels of attentional control or social support than others; as a group, individuals diagnosed with major depressive disorder...
MDD) tend to have lower levels of attentional control and disrupted social support compared to healthy people.

Our opening example also illustrates two key ideas which form the backbone of the Selection, Optimization, and Compensation with Emotion Regulation (SOC-ER) framework (Urry & Gross, 2010). First, we draw on resources to regulate our emotions. Second, the resources we have available affect how we select and optimize emotion regulation strategies and, in turn, our success in actually altering our emotions. In this article, we apply our SOC-ER framework to understanding ER differences among three groups of individuals—adolescents, older adults, and adults with MDD. We begin with a brief description of emotion and its regulation, followed by an overview of the SOC-ER framework. Next, in the context of these three groups, we review evidence suggesting that successful emotion regulation requires resources and speculate about the ways in which selection, optimization, and/or compensation might be relevant to each group. We conclude with suggestions for future work that may provide insights about the ways people select and optimize ER based on resources they have available, and how they compensate when resources are taxed. Many of the ideas we develop here have yet to be examined empirically. Thus, our overall aim with this article is to stimulate new research that will help us to better understand emotion and its regulation.

Emotion and its Regulation

Emotions are short-term responses that often help us to achieve some immediate and momentarily valued goal (Gross & Thompson, 2007; Levenson, 2003). Emotions emerge from person-situation transactions in which we attend to and appraise the situations we face as relevant to one or more active goals. They manifest as changes in physiological activity, expressive behavior, and/or subjective experience (Gross & Thompson, 2007). For example, short-term increases in heart rate, increases in blood flow to the legs, and the subjective experience of fear may facilitate the goal of evading a predator.

Not all emotional responses are adaptive, however. Responses can be too weak or too strong, too short or too long, or can occur at the wrong time or in the wrong situation (Gross & Thompson, 2007). According to the process model of emotion regulation, we can use a number of distinct strategies to alter our emotions. These can be grouped into five broad “families”, which act on specific stages of the emotion generative cycle. Situation selection refers to choosing the situations we enter to alter our emotions. Situation modification refers to changing some aspect of our current situation to alter our emotions. Attentional deployment refers to modifying our attentional focus to alter our emotions. Cognitive change refers to modifying our appraisal (interpretation) of the situation to alter our emotions. Lastly, response modulation refers to changing the emotional response directly, for example controlling expressive behavior (Gross, 1998). These ER families encompass an extensive set of strategies that enable us to regulate our emotions. However, people vary in the ER strategies they choose to use (Sheppes, Scheibe, Suri & Gross, 2011) and in the success with which they apply those strategies in a given context (Wager, Davidson, Hughes, Lindquist, & Ochsner, 2008). The recently proposed SOC-ER framework (Urry & Gross, 2010) provides a way of explaining such variation in ER use and success.

Selection, Optimization, and Compensation with Emotion Regulation

The SOC-ER framework is a direct application of Baltes and Baltes (1990) Selection, Optimization, and Compensation (SOC) meta-theory to the domain of ER. SOC
meta-theory suggests that successful living can be achieved by anyone who sets goals that are reasonable given their capabilities (Selection), puts time and effort into meeting those goals (Optimization), and creates workarounds to make up for losses (Compensation). Applying SOC meta-theory to the domain of ER, we propose that successful ER can be achieved by anyone who chooses to use ER strategies that are reasonable given available resources (Selection), puts time and effort into improving their success in using these strategies (Optimization), and selects and optimizes different ER strategies when resource losses prevent successful ER with the current strategy (Compensation). Notice that, from this perspective, selection and optimization are processes that may be used in the service of compensation.

By “resources,” we mean internal abilities or environmental affordances that help to make a particular type of ER possible. Although little is known about the resources for ER, ER strategies likely draw on a vast number of internal and external resources. According to Urry and Gross (2010), internal resources include abilities such as the ability to control the contents of working memory, the ability to recognize information as positive or negative, and the ability to take a different perspective. External resources include environmental characteristics like access to people who encourage attention to valued aspects of situations, access to situations with valued aspects, and access to people who point out different ways to interpret situations.

Figure 1 depicts a simplified version of the relationship between two hypothetical resources and success using just one ER strategy. The word “success” in this context refers to the extent to which emotions are altered according to one’s goal (i.e., if one’s implicit or explicit goal is to feel less sad or more angry, success using reappraisal would be reflected in a reduction in sadness or an increase in anger, respectively). In this figure, high levels of both resources predict high success in using the ER strategy (light gray/white shaded area). However, low levels of both resources predict low success in using the ER strategy (black/dark gray shaded area). Of interest and as indicated by the color gradient, low levels of one resource coupled with high levels of the other resource would predict moderate success in using the ER strategy (gray shaded area). This implies that

![Figure 1](image-url)
high levels of one resource may buffer the impact of low levels of another resource on regulatory success.

Of course, the relationship between resources and ER strategies is likely much more complicated than is depicted in this figure. First, some resources may be specific to individual ER strategies (as implied in Table 1 of Urry & Gross, 2010), while others may be shared across a range of strategies. Second, ER strategies that draw on a shared resource may differ as to how much of a shared resource is used. Third, ER strategies may differ as to how many resources are required, with some strategies requiring very few resources and others very many. Fourth, even when we have sufficient resources on board to successfully regulate our emotions using a particular ER strategy, we may not choose to use that (or any) strategy. This highlights the notion that factors other than resources (e.g., motivation, personality traits, context) may be important determinants of emotion regulatory behaviors.

Resources for Emotion Regulation in Adolescence, Older Age, and Major Depression

With these complexities in mind, we turn now to considering the extent to which existing studies support a key idea of the SOC-ER framework, namely that groups of individuals vary in resources and this may impact ER success. For each group, we briefly describe what is known about emotional responding. We then ask two questions. First, is there evidence that this group exhibits enhanced or reduced ability to regulate their emotions, compared to healthy adults? Second, is there evidence that this group has higher or lower resource levels relative to healthy adults? Then, where possible, we speculate about how selection, optimization, and/or compensation processes in the ER domain may be relevant to each group. We will consider these issues in adolescence, older age, and MDD with a focus on two specific resources, namely the ability to control attention, an internal resource often labeled working memory capacity (WMC), and social support, an external resource.

A focus on resources for emotion regulation represents a natural starting point because this is the first and most basic assumption of the SOC-ER framework, and there are very few published studies that test other core features of the framework. We focus on WMC and social support in particular for three reasons. First, there is evidence that both are associated with successful ER. For example, people with higher WMC are better at evaluating emotional video clips from a detached, objective viewpoint than people with lower WMC (Schmeichel, Volokhov, & Demaree, 2008). People with higher WMC also engage in self-enhancement following negative feedback more than people with lower WMC (Schmeichel & Demaree, 2010). On the social support side, people who report experiencing more positive social relationships score higher on measures of ability to strategically regulate emotions (Lopes, Salovey, Cote, & Beers, 2005; Lopes et al., 2004, 2011). Second, as will be apparent below, WMC and social support have been relatively well-studied in the three groups of interest. Third, by focusing on WMC and social support, we hope that this article will stimulate future research on the mechanisms by which these specific resources aid the success of one, some, or all families of ER strategies. In this article, we concentrate on the relevance of these two resources to the cognitive change family of ER strategies because cognitive change has been the best studied across the three groups of interest.
Adolescence

Research sampling adolescents’ emotional experiences in everyday life has suggested that positive mood states deteriorate over the course of adolescence (Larson & Lampman-Petraitis, 1989; Weinstein, Mermelstein, Hankin, Hedeker, & Flay, 2007). Adolescents also experience the simultaneous presence of positive and negative affect more than other age groups (Riediger, Schmiedek, Wagner, & Lindenberger, 2009). The findings of laboratory studies suggest that mid- to late-adolescents exhibit increased pupillary reactivity, reaction times, and memory for emotional stimuli (Silk et al., 2009), and increases in defensive motivation (Quevedo, Benning, Gunnar, & Dahl, 2009), compared to younger adolescents. Altogether, these findings suggest that emotional responses are different in adolescence, compared to adults, which raises the possibility that differences in ER may be at play.

Consistent with this notion, adolescents around 13 years of age report using a number of cognitive change strategies significantly less than adults, including positive reappraisal and refocus on planning (Garnefski, Legerstee, Kraaij, van den Kommer, & Teerds, 2002). Although many studies have examined ER as it relates to other constructs (e.g., psychopathology, parenting, problem behavior; Carthy, Horesh, Apter, Edge, & Gross, 2010; Hughes & Gullone, 2010; Caprara, Gerbino, Paciello, Di Giunta, & Pastorelli, 2010), little research has compared ER in adolescents to healthy adults. One may still ask, though, if there is evidence that adolescents lack working memory and social support resources that might support successful emotion regulation.

While adolescence is generally considered to be a time of rapid development of many cognitive functions (Steinberg, 2005), most of which asymptote around ages 14–16 (Keating, 2004), WMC does not reach adult levels of functioning until around 19 years of age (Luna, Garver, Urban, Lazar, & Sweeney, 2004). This means that WMC is diminished for most of adolescence.

What about social support? Although adolescents frequently experience conflict with peers (Laursen & Collins, 1994), they also report having close friends and valuing friendships (Brown, 2004). Additionally, adolescents spend more time alone or with peers than with their parents, with whom they experience increased conflict (Steinberg & Morris, 2001). It thus appears that social support from parents declines while social support from peers increases. It is likely that these two forms of social support differ from one another as resources for emotion regulation. For example, peers may be less likely than parents to encourage involvement in positive situations or to provide viable alternative interpretations to situations, putative resources for situation selection and cognitive change, respectively.

As shown in Figure 2a, relative to healthy younger adults, adolescents exhibit low levels of WMC and parental social support resources. Coupled with the observations that WMC is a resource that is linked to success in using cognitive change strategies (Schmeichel et al., 2008), that adolescents use these strategies less than healthy adults (Garnefski et al., 2002), and that low parental social support might reduce access to people who can facilitate adaptive interpretations (Urry & Gross, 2010), we might speculate that adolescents are likely to be less successful than healthy adults in regulating their emotions using cognitive change strategies. The fact that adolescents use cognitive change strategies less than healthy adults (Garnefski et al., 2002) further supports the idea of age differences in selection of this ER strategy. Notably, adolescents may be able to successfully regulate their emotions by making appropriate compensatory moves, for example selecting ER strategies other than cognitive change more frequently or putting time and effort into
getting better at using (i.e., optimizing) cognitive change strategies. These speculations must be tested in future studies.

**Older age**

At the other end of the age spectrum, there is evidence of increases in well-being in older age (Carstensen, Fung, & Charles, 2003; Carstensen, Isaacowitz, & Charles, 1999; Fung, Stoeber, Yeung, & Lang, 2008). Until well-being declines very late in life (Gerstorf et al., 2010), older adults report fewer experiences of negative emotion (Gross et al., 1997) and fewer stressors in daily life (Stawski, Almeida, Shiwinski, & Smyth, 2008) than younger adults. Older adults also experience decreases in negative affect (Charles, Reynolds, & Gatz, 2001), and recall fewer negative than positive stimuli compared to younger adults (Charles, Mather, & Carstensen, 2003; Mather & Knight, 2005). These findings suggest that older age is marked by increases in positive and decreases in negative emotion, leading to an overall increase in hedonic well-being. This raises the possibility that older adults may be better at using at least some forms of ER.

Consistent with this speculation, evidence suggests that older adults report higher levels of emotional control (Gross et al., 1997). Older adults also report using reappraisal more than younger adults (John & Gross, 2004). Performance-based studies have suggested that older adults are more successful than younger adults when using some forms of reappraisal, e.g., recognizing ways in which situations may be positive to reduce negative emotion (Shiota & Levenson, 2009), or generating more negative interpretations of highly unpleasant situations (Opitz et al., forthcoming). However, older adults are less successful than younger adults when using other forms of reappraisal, e.g., using reappraisal to reduce negative emotion by generating benign interpretations of highly unpleasant situations (Opitz et al., forthcoming) or by assuming a detached viewpoint (Shiota & Levenson, 2009; but see Winecoff, LaBar, Madden, Cabeza, & Huettel, 2011, who demonstrated equivalent success when emotional load was reduced). Thus, there are age differences in successful use of cognitive change strategies in some contexts but not others. Is there evidence that older adults lack working memory and/or social support resources that might support successful emotion regulation?

Cross-sectional studies suggest that WM declines at a fairly even rate across the life span, and is lowest in older age (Borella, Carretti, & De Beni, 2008; Hedden & Gabrieli,
older adults perform worse (and slower) on moderately difficult n-back tasks than healthy younger adults, which is related to reduced DLPFC activity (Mattay et al., 2006). Older adults therefore exhibit WM declines.

In contrast to WM, evidence suggests that social support remains available for many in older age. While the overall size of the social network tends to decrease over the life span (Morgan, 1988), older adults have more very close (and fewer peripheral) relationships (Fung et al., 2008; Lang & Carstensen, 1994). Older adults also experience fewer negative interactions in close relationships than healthy younger adults (Akiyama, Antonucci, Takahashi, & Langfahl, 2003). Because their social interactions are thus focused on very close, positive relationships from which they can draw support, older adults have higher levels of social support than younger adults.

As shown in Figure 2b, relative to healthy younger adults, older adults exhibit low levels of WMC but high social support resources. The fact that older adults use cognitive change strategies more than healthy adults (John & Gross, 2004) supports the idea of age differences in selection of this ER strategy. Coupled with the fact that high social support might increase access to people who encourage adaptive interpretations (Urry & Gross, 2010), one might speculate that older adults should be more successful than healthy younger adults in regulating their emotions using cognitive change strategies. However, the presence of low WMC makes it likely that older adults will only be more successful when the type of cognitive change draws less on WMC.

These notions are in part borne out by the literature reviewed above. Based on Shiota and Levenson (2009), reappraisals focused on detached perspective-taking may require more WMC, at least when emotional load is high, which may help explain reduced success for older adults. As noted for adolescents above, our SOC-ER framework would predict that older adults will be more successful in regulating their emotions by making appropriate compensatory moves, for example more often selecting ER strategies other than cognitive change that rely less on WMC (and perhaps more on social support). There is limited evidence that this occurs; relative to younger adults, older adults are known to deploy their attention to positive more than negative information (Mather & Carstensen, 2005). Although this type of attentional deployment draws on cognitive resources (Knight et al., 2007), the load may be less than it is for cognitive reappraisals involving detached perspective-taking. Older adults may also put time and effort into getting better at using ER strategies that rely on WMC. These speculations must be tested in future studies.

Major depressive disorder

Major depressive disorder is a disorder whose primary symptoms (depressed mood and/or a loss of pleasure in nearly all activities; DSM–IV–TR, 2000) suggest a surplus of negative emotion and a deficit of positive emotion. Research has found that patients with MDD categorize facial emotion expression as more sad than healthy adults (Bourke, Douglas, & Porter, 2010), and exhibit diminished responses to anticipated reward (McFarland & Klein, 2009), and to positive and negative stimuli (Bylsma, Morris, & Rottenberg, 2008). These findings suggest that negative emotions seem to be predominant in MDD, while emotional responses are generally reduced. Might this pattern reflect an ER deficit in this group?

In support of this notion, depressive symptoms have been linked to deficits in cognitive change strategies. For example, higher levels of depressive symptoms are associated with lower perceived use of cognitive reappraisal (Gross & John, 2003). Conversely,
higher cognitive reappraisal success, indexed by self-reported emotional experience and peripheral physiological activity in a performance-based task, has been linked to decreases in depressive symptoms, at least amongst people experiencing high levels of life stress (Troy, Wilhelm, Shallcross, & Mauss, 2010). For adults with MDD, unlike healthy adults, greater reappraisal-related pupil dilation is correlated with higher amygdala activation, which may reflect counterproductive reappraisal (Johnstone, van Reekum, Urry, Kalin, & Davidson, 2007). Adults with MDD also exhibit significantly less reappraisal-related activity in DLPFC than healthy adults (Erk et al., 2010). Finally, adults with MDD tend to form negative interpretations and exhibit memory biases for negative information (Joormann & Siemer, 2011), and to expect future events to be more negative (Casement et al., 2008; Strunk & Adler, 2009; Strunk, Lopez, & DeRubeis, 2006). Do people diagnosed with MDD lack working memory and/or social support resources that might explain lack of emotion regulation success?

Adults with MDD exhibit WM deficits compared to healthy adults in neuropsychological tests (Pelosi, Slade, Blumhardt, & Sharma, 2000; Stordal et al., 2004), search tasks requiring spatial WM (Porter, Gallagher, Thompson, & Young, 2003), and n-back tasks (Pu et al., 2011; Rose & Ebmeier, 2006). These deficits have been linked specifically to deficits in updating information in WM (Harvey et al., 2008; Joormann & Gotlib, 2008), and have been associated with decreased lateral prefrontal activation (Pu et al., 2011). WM deficits have been shown to persist beyond remission of MDD symptoms (Weiland-Fiedler et al., 2004), and patients with a history of more severe depression exhibit stronger deficits (Paelecke-Habermann, Pohl, & Leplow, 2005). Furthermore, some forms of MDD have been linked with grey matter volume reductions in DLPFC, which is associated with WM (Levy & Goldman-Rakic, 2000; Mattay et al., 2006). These data suggest that people diagnosed with MDD exhibit deficits in the updating of WM content.

Social support deficits are also apparent. People diagnosed with MDD have significantly smaller social networks (Cronkite, Moos, Twohey, Cohen, & Swindle, 1998; Poradowska-Trzos, Dudek, Rogoź, & Zięba, 2009; Wade & Kendler, 2000). The symptoms of MDD may actually cause clinically significant psychological distress in the spouses of adults with MDD (Coyne et al., 1987), and are associated with spousal physical or social withdrawal (Spangenberger & Theron, 2010). As low levels of social support from spouses have been shown to increase risk for MDD (Wade & Kendler, 2000), MDD symptoms perpetuate themselves in a vicious cycle. People diagnosed with MDD, thus, generally have more limited access to people who can help them accomplish a range of tasks, including regulating their emotions.

As shown in Figure 2c, relative to healthy younger adults, adults diagnosed with MDD exhibit low levels of WMC and low social support resources. Based on the literature reviewed above, it appears that these resource deficits go hand in hand with reduced success of cognitive change ER strategies, which seem to draw on WMC and social support. One question is whether adults diagnosed with MDD can (and do) engage in SOC in the domain of emotion regulation. The fact that higher levels of depressive symptoms are correlated with lower use of reappraisal (Gross & John, 2003) is consistent with MDD-based decreases in selection of this ER strategy. Because WM deficits may vary with the severity of symptoms, lower selection of reappraisal by people with high levels of depressive symptoms may reflect a compensatory move. Similarly, people diagnosed with MDD initiate contact with their social network less frequently than healthy adults (Poradowska-Trzos et al., 2009); lower selection of contact with one’s social network may reflect a compensatory move in response to the perception that social support is less available. As noted for adolescents and older adults, these ideas require testing in future research.
Summary and Directions for Future Research

In this paper, we have suggested that resources may impact success in regulating emotions. Such resources for ER vary at different levels of analysis: within individuals across situations, between individuals, and between groups of individuals. To illustrate the SOC-ER framework, in this article we have focused on between-group variation in two putative resources for ER – working memory capacity and social support – in three different groups: adolescence, older age, and major depressive disorder. We reviewed evidence suggesting that emotion regulation, with a focus on cognitive change strategies, may differ in adolescents, older adults, and adults diagnosed with MDD compared to healthy younger adults. We further suggested that between-group variation in working memory capacity and social support may help explain at least some of this between-group variation in emotion regulation. We also suggested that this between-group variation in ER may reflect the outcome of SOC processes.

There are of course many possible resources for ER, and the workspace that describes how resources combine to influence SOC in the domain of ER is much more complex than we are able to discuss here. Despite the complexities it poses, understanding the links between resources and ER will enhance our theoretical understanding of ER, and may provide approaches to solving ER problems in any individual. With this in mind, we now highlight six promising directions for future research.

First, we have distinguished between internal and external resources, and have suggested that the availability of these resources will impact the success with which emotions are altered when using ER strategies that draw on them. We found evidence, for example, that working memory capacity and aspects of social support are linked with cognitive change strategies. However, little experimental research has examined the links between internal and external resources and the success of ER strategies. Future studies should determine whether, for example, depleting or augmenting a resource for cognitive change (and other) strategies reduces or increases, respectively, the success with which these strategies are implemented. Since differences in ER may be apparent in none, some, or all of the five families of ER, it will be essential for researchers to be explicit about which form(s) of ER they are considering as they tackle these important issues.

Second, we reviewed evidence suggesting that the success with which adolescents, older adults, and adults diagnosed with MDD regulate their emotions differs relative to healthy adults. We further suggested that between-group variation in WMC and social support may help explain some of these differences in ER. However, to our knowledge, no research has explicitly linked WMC and social support (or other resources) to ER in any of these three groups. Thus, for each group (and others that we did not consider), we need to systematically examine (1) differences in ER use and success, (2) differences in resources, and (3) links between differences in ER and resources. Again, it will be important for researchers to be explicit about which form(s) of ER they are considering.

Third, while we have focused on three specific groups of individuals in this paper, resources relevant to ER no doubt vary within individuals over time and across contexts. Thus, assessing variation in resources within individuals over time and across contexts and how this within-person variation in resources contributes to ER success represents an important direction for future research. Identifying points in time and contexts that tend to bring about changes in resources may allow us to predict changes in ER that affect health and well-being. Moving the SOC-ER framework forward in this direction will provide new approaches to identifying, monitoring, maintaining, and improving effective ER strategies in any individual.
Fourth, the existing literature only allows us to speculate above about how resource availability might contribute to SOC in the domain of ER. Research is needed to determine to what extent and in what contexts changes in resources affect SOC with ER across different situations, individuals, and groups of individuals. For example, if you deplete a resource for cognitive change strategies, do people compensate by (1) selecting a different ER strategy for which they have sufficient resources, (2) optimizing the way they implement cognitive change strategies so as to draw less on depleted resources, and/or (3) shoring up the lost resource? Are some situations, individuals, or groups more amenable to these kinds of compensatory successes or failures than others? Here it may be useful to consider that some people may have a relatively large pool of resources for ER in some contexts, and may be more flexible in which ER strategies they use as resources ebb and flow compared to people that may have a smaller pool.

Fifth, some researchers have distinguished effortful, explicit forms of ER from automatic, implicit forms (Bargh & Williams, 2007; Gyurak, Gross, & Etkin, 2011; Mauss, Bunge, & Gross, 2007). For example, Williams, Bargh, Nocera, and Gray (2009) found that priming participants with words related to reappraisal had anxiety-reducing effects similar to providing participants with explicit instructions to reappraise. This distinction is important, since automatic ER strategies may require fewer resources than effortful ones. If this is true, people who engage in automatic ER may be particularly resilient to resource losses. Conversely, individuals who are experiencing severe decreases in resources for explicit forms of ER may benefit from interventions designed to enhance implicit forms of ER (e.g., cognitive bias modification; Brosan, Hoppitt, Shelfer, Sillence, & Mackintosh, 2011).

Sixth, we defined resources as “internal abilities or environmental affordances that help to make a particular type of ER possible”. It is important to emphasize the latter part of that definition since not all internal or external factors will promote successful ER; some may in fact serve as barriers to successful ER. For example, some social factors may actually be toxic to emotional health (Repetti, Taylor, & Seeman, 2002). If these social factors have a toxic effect on emotional health by virtue of reducing successful ER, then, by our definition, these would not constitute resources for ER. It also bears emphasizing that just because a factor makes a particular type of ER possible, it does not ensure that this factor facilitates “feeling good” or healthy adaptation more generally, even if ER is successful. For example, although it feels unpleasant, we may sometimes find it useful to increase anger to meet confrontational goals (Tamir, Mitchell, & Gross, 2008). Moreover, in some contexts, expressive suppression is a response modulation ER strategy that may be detrimental to adaptive functioning (Gross & John, 2003); the same may be said about rumination, a cognitive change ER strategy (Garnefski, Teerds, Kraaij, Legerstee, & van den Kommer, 2004). Future studies should consider a full range of internal and external factors that help or hinder successful ER and determine how they relate to adaptive outcomes.

**Concluding Comment**

Our SOC-ER framework suggests that resources – internal abilities and environmental affordances that help make ER possible – contribute to successful emotion regulation by impacting SOC processes. Hence, when resources for a particular ER strategy are depleted, we may still be able to successfully regulate our emotions if we compensate! selecting a different ER strategy that does not require the depleted resource and/or if we optimize our ability to use that strategy with lower levels of the resource. In this article,
we turned to the existing literature to test these ideas in three different groups of individuals, namely adolescents, older adults, and adults diagnosed with MDD. Based on the existing literature, we were able to conclude that there is evidence that variation in two resources—working memory capacity and social support—contributes to variation in ER success across these three groups, particularly with respect to cognitive change strategies. We were also able to speculate about relations between these two resources and SOC processes. Unfortunately, the existing literature is sparse. Our hope is that the SOC-ER framework will serve to stimulate and organize future research and that this new research will in turn lead to revisions, elaborations, and extensions of our SOC-ER framework.

Short Biographies

Philipp C. Opitz received his B.A. from Boston University and his M.S. in experimental psychology from Tufts University. He is currently a Ph.D. candidate in the Emotion, Brain & Behavior Laboratory in the Department of Psychology at Tufts University. His research focuses on the physiological and behavioral correlates of age differences in emotion regulation, and the mechanisms underlying these differences.

James J. Gross received his Ph.D. in clinical psychology from the University of California, Berkeley. He is currently a Professor in the Department of Psychology at Stanford University, and Director of the Stanford Psychophysiology Laboratory. His research focuses on emotion and emotion regulation processes in healthy and clinical populations using behavioral, autonomic, and fMRI measures.

Heather L. Urry received her Ph.D. in clinical psychology from the University of Arizona and completed postdoctoral training in affective neuroscience at the University of Wisconsin-Madison. She is now an Associate Professor who directs the Emotion, Brain & Behavior Laboratory in the Department of Psychology at Tufts University. Her research focuses on the mechanisms and functional correlates of emotion regulation using a multi-method approach that includes peripheral physiology, eye tracking, functional magnetic resonance imaging, and behavioral measures.

Endnote

* Correspondence address: Department of Psychology, Tufts University, 490 Boston Ave, Medford, MA 02155, USA. Email: heather.urry@tufts.edu

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