COGNITION AND EMOTION
2009, 23 (6), 1181–1220

Psychology Press
Taylor & Francis Group

On the relative effectiveness of affect regulation strategies: A meta-analysis

Adam A. Augustine
Washington University, St Louis, MO, USA
Scott H. Hemenover
Western Illinois University, Macomb, IL, USA

To examine the effectiveness of various affect regulation strategies and categories of affect regulation strategies, a meta-analysis was conducted. Results generally indicate that reappraisal ($d = 0.65$) and distraction ($d = 0.46$ for all studies; $d = 0.95$ for studies with a negative or no affect induction) are the most effective regulation/repair strategies, producing the largest hedonic shift in affect. The effectiveness of different categories of regulation/repair strategies depended on the valence of the preceding affect induction. Results also indicate that stronger affect inductions and the use of bivariate affect measures will provide a richer understanding of affect regulation. Additionally, not all specific strategies or categories of strategies have been researched and the impact of individual differences on affect regulation has received relatively little attention. Finally, results indicate that control conditions in affect regulation research may not provide a valid point for comparison, as they facilitate effective affect repair.

Keywords: Emotion; Mood; Affect regulation; Affect repair; Meta-analysis.

Affect regulation, or the purposeful alteration of one's current affective state, has garnered increased interest in recent years (Bonanno, 2001; Gross, 1998; Larsen, 2000). Our knowledge of the ways in which people regulate their affect has increased drastically due to the growing extant literature regarding

Correspondence should be addressed to: Adam A Augustine, Washington University in St. Louis, Department of Psychology, Campus Box 1125, One Brookings Drive, St Louis, MO, 63130–4899, USA. E-mail: aaaugust@artsci.wustl.edu

Portions of this paper were presented at the 8th annual meeting of the Society for Personality and Social Psychology (January, 2007).

We would like to thank Randy Larsen, Don Saucier, and Tirza Shulman for their comments regarding this work. Special thanks also go to Eva Gilboa-Schechtman for her many helpful comments throughout the editorial process. Additionally, we would like to thank the students that aided in coding the studies included in this meta-analysis: Kate Duangdao, Jobeth Kincaid, and Megan Tripp.

www.psypress.com/cogemotion DOI: 10.1080/02699930802396556

affect regulation strategies (Larsen & Prizmic, 2004). Gross (1998) defined emotion regulation as a set of "processes by which individuals influence which emotions they have, when they have them, and how they experience and express these emotions" (p. 275). Numerous models of affect regulation have been proposed (Bonanno, 2001; Gross, 1998; Larsen, 2000) and all involve attempts to modify/maintain affective states for hedonic or functional (e.g., task performance) reasons. In general, individuals compare their current affective state to their affective desires. If a sufficient discrepancy exists between one's experienced and one's desired affect, a regulatory effort is engaged. It is the form of this regulatory effort that is the focus of this meta-analysis. Numerous affect regulation strategies have been identified in the literature and the primary goal of this meta-analysis is to examine the relative effectiveness of different affect regulation strategies and categories of affect regulation strategies.

Organising affect regulation strategies

This meta-analysis will be the first attempt to determine the effectiveness of different categories of affect regulation strategies. This portion of the analysis will focus on the empirically derived (through a hierarchical cluster analysis) affect regulation strategy taxonomy developed by Parkinson and Totterdell (1999). This taxonomy allows one to give structure to the vast number (over 300 identified strategies) of affect regulations strategies in which individuals may engage (see Parkinson & Totterdell, 1999, Figures 1 and 2 for a representation of their analysis). This taxonomy also shares several key features with other theoretical taxonomies of affect regulation strategies (Larsen, 2000; Thayer, Newman, & McClain, 1994). At the superordinate level, the Parkinson and Totterdell (1999) taxonomy organises strategies based on several features of the regulation attempt; behavioural or cognitive efforts and engagement or avoidance of the affect.[1]

Both Parkinson and Totterdell (1999) and Larsen (2000) drew a distinction between behavioural and cognitive strategies. A behavioural

[1] Larsen's taxonomy is not directly presented in this meta-analysis because the coders for this study indicated perfect agreement between this classification scheme and the superordinate classification scheme of Parkinson and Totterdell (1999). Both taxonomies utilise a behavioural vs. cognitive distinction. Although there are obvious theoretical differences between the two, in practice for these coders Larsen's (2000) change situation vs. change emotion distinction was equal to the engagement vs. avoidance distinction made by Parkinson and Totterdell (1999). Additionally, although an analysis of the taxonomy developed by Thayer, Newman, and McClain (1994) was initially conducted (and is available on request), the categories in this taxonomy contain strategies of vastly differing effectiveness (i.e., the social support, venting, and gratification category contains two effective and one ineffective strategy) and/or are ill-defined (i.e., direct tension reduction). As such, there was little informative value gained from presenting these analyses.

strategy involves some type of overt physical action while a cognitive strategy involves some type of cognitive action. For instance, in a behavioural distraction, one might walk away from a negative affect laden situation. In a cognitive distraction, one might think about something other than the negative affect laden situation. Similar to behavioural strategies, two of Thayer et al.'s (1994) classes of affect regulation strategies are seeking pleasurable activities/distraction and withdrawal/avoidance. For example, in a withdrawal/avoidance strategy one might walk away from a negative affect laden situation or, in a pleasurable activities/distraction strategy, one might play a game of basketball as a distraction from an affective experience (both of these are exemplars of behavioural strategies of affect repair). Thayer et al.'s (1994) direct tension reduction category involves reducing cognitive-emotional tension, such as re-evaluating stimuli to fit with current emotional goals (a cognitive regulation attempt). For example, if one is angry at one's spouse, one would attempt to relieve the anger to conform with one's thoughts of love for one's spouse.

Parkinson and Totterdell (1999) also draw a distinction between engagement and avoidance strategies. When using a strategy of engagement, one actively attends to the affective experience (e.g., using reappraisal). When using a strategy of avoidance, one attempts to alleviate their affect by removing oneself, either behaviourally or cognitively, from the experience (e.g., playing a game of basketball). Larsen (2000) drew a distinction between efforts to change the situation and efforts to change the emotion. This is very similar to Parkinson and Totterdell's (1999) distinction between withdrawal and avoidance.

Thayer et al.'s (1994) taxonomy contains three additional categories that are not represented in the Larsen (2000) or Parkinson and Totterdell (1999) taxonomies. These categories are active mood management; passive mood management; and social support, venting, and gratification. Active mood management and passive mood management are opposites on a continuum ranging from conscious to unconscious efforts to regulate mood and are somewhat similar to strategies of engagement and avoidance, respectively. Social support, venting, and gratification is a category of seeming miscellany, which is relatively ineffectual for the differentiation of separate types of affect regulation strategies (due to the largely differential effectiveness of strategies contained in this category).

A distinction not captured by these taxonomies is that between antecedent- and response-focused emotion regulation (Gross, 2001). Antecedent-focused regulation is a regulatory attempt that occurs before an expected emotion-eliciting event. For instance, if asking someone out on a date, one might reappraise rejection (i.e., "there are other fish in the sea") before even suggesting a romantic evening. This type of antecedent-focused reappraisal would limit any emotional consequences in advance of exposure

to emotional stimuli. Conversely, in the same situation one might reappraise the situation after rejection (i.e., "I didn't like him/her that much anyway"), in a response-focused regulation attempt. The studies included in this meta-analysis focus on affect regulation attempts made in response to pre-existing or induced affect. As such, the nature of these studies necessarily limits our focus to strategies involving response-focused regulation.

In addition to the superordinate distinctions between affect regulation strategies (i.e., behavioural, cognitive, engagement, avoidance, antecedent-focused, response-focused), distinctions can be made at a subordinate level. In their hierarchical cluster analysis, Parkinson and Totterdell (1999) identified twelve subordinate categories of affect regulation strategies. Included in the behavioural strategies tier are five subordinate categories of affect regulation strategies: acting happy, relaxing/pleasant distraction, active constructive distraction, writing, and seeking social support. When engaging in an acting happy regulation strategy, one would intentionally smile, laugh, or make others laugh. If utilising strategies from the relaxing/pleasant distraction category, one might read, listen to music, sleep, or shop. On the other hand, when using an active/constructive distraction strategy one might exercise, do chores, or engage in a hobby. Strategies from the writing subordinate category include journaling or, in today's technologically advanced world, blogging. Finally, in seeking social support strategies, an individual could seek advice or reassurance from their friends, family, significant other, etc.

In addition to behavioural strategies, an individual could engage in cognitive affect regulation strategies. The seven subordinate categories of affect regulation from the cognitive tier are: catharsis/venting, running away/disengagement, cognitive relaxation, negative evaluation/rumination, rationalisation, positive reappraisal, and cognitive distraction. When engaging in a catharsis/venting strategy one might scream, shout, cry, or even break things. If utilising a running away/disengagement strategy, one will either physically or mentally get away from the issue by avoiding the issue, imagining one is someone else, running away, etc. When an individual uses a cognitive relaxation strategy, they could actively attempt to calm down, or spend some time alone. If engaging in a negative evaluation/rumination strategy, one might think about how bad one feels or focus on the causes of one's negative feelings. When one utilises a rationalisation strategy, one might consider the causes of the mood, determine if the mood is justified, or think rationally about the current problem. Examples of positive reappraisal strategies include looking at the situation in a positive manner and acknowledging that the situation will pass. Finally, when an individual chooses cognitive distraction as a strategy, they could fantasise about positive events, plan for the future, or think about something besides their negative state.

Parkinson and Totterdell's (1999) empirically derived taxonomy of affect regulation strategies uses a hierarchical structure to organise strategies into twelve subordinate and four superordinate categories. Each of these categories will likely to lead to differential levels of affect change.

Affect regulation strategies

While the category of affect regulation strategy should certainly have a bearing on the effectiveness of any regulation attempt, the specific strategy utilised should also largely determine the outcome of any regulation effort. Any specific strategy for affect regulation does fit into a category of affect regulation strategies. So, talking to a friend and going to a party are specific strategies that fit into the social support subordinate category and the behavioural superordinate category from the Parkinson and Totterdell (1999) taxonomy. Although there is some overlap between specific strategies and categories of strategies, comparing specific strategies (i.e., talking to a friend and going to a party) presents a different level of analysis than comparing categories of strategies (i.e., cognitive vs. behavioural distraction). This lowest level of analysis, comparing specific strategies, is another goal of this meta-analysis. Although this meta-analysis will be the first attempt at an analysis of the relative effectiveness of different specific affect regulation strategies, data does exist regarding the general effectiveness of certain strategies. It should be noted that the strategies discussed below do not represent an exhaustive review of all specific regulation strategies. Rather than reviewing findings for all specific affect regulation strategies, we instead focus on those strategies that are included in this meta-analysis.

Distraction and rumination

Distraction involves removing one's self (cognitively or behaviourally) from the cause of a negative affect. This may involve something as simple as turning on the television or as complex as engaging in a hobby (the cognitive reasoning task strategy presented in this meta-analysis could be considered a strategy of distraction). Distraction has been shown to be an effective method for affect repair in most situations, having been found to decrease depressed mood even in naturally depressed patients (Nolen-Hoeksema & Morrow, 1993). The overlying purpose of this strategy is to stop thinking about a negative event or emotion (i.e., avoiding rumination). Consistent rumination, or focusing on negative feelings, is associated with the experience of major depressive episodes and the onset of anxiety disorders (Nolen-Hoeksema & Morrow, 1993). This avoidance of the negative consequences of rumination leads to an effective affect regulation attempt. Distraction may also be an effective strategy because of the relative ease of

using this strategy. Engaging in alternate activities is a relatively simple strategy, which should be accessible to most individuals.

Catharsis/venting

One of the major themes of Freudian psychoanalysis is the reduction of negative emotions through catharsis. Catharsis involves the overt expression of negative emotions. One would hit a pillow to reduce anger, cry to reduce sadness, etc. Despite popular concepts to the contrary, extensive reviews of the literature reveal that catharsis is an entirely ineffective method of affect regulation (Geen & Quanty, 1977). Indeed, recent studies have revealed that catharsis will actually increase aggressive feelings rather than reduce them (Bushman, 2002). The nature of the facial expression of emotion also yields evidence of the ineffectiveness of catharsis. Catharsis involves exhibiting facial expressions of negative emotion and the facial expression of a negative emotion naturally leads to increases in the experience of negative affect (Larsen, Kasimatis, & Frey, 1992). Catharsis actually leads to increases in negative affect and is thus an ineffective method of negative affect regulation.

Suppression/inhibition

Yet another ineffective affect regulation strategy is suppression. Suppression/inhibition involves avoiding any display of negative affect. While self-report measures indicate that suppression effectively reduces negative affect, alternate measures show that one might actually experience higher levels of negative emotional arousal following the use of suppression (Larsen & Prizmic, 2004). Thus, attempting to suppress overt expressions of sadness will actually produce physiological arousal patterns more intense than if you had just allowed yourself to cry. Additionally, the use of suppression requires ongoing effort, which engages cognitive resources. Furthermore, when one suppresses negative affect, positive affect is also dampened, resulting in the loss of the social and emotional benefits associated with the experience of positive affect (Gross & John, 2003).

Reappraisal

This negative affect regulation strategy involves attempts to view negative experiences in a positive manner or to concentrate on any positive aspects of a negative situation. Reappraisal is certainly an effective negative affect regulation strategy (Larsen & Prizmic, 2004). Not only does reappraisal effectively reduce negative affect, it also has physical, immune, and psychological benefits. Those who use reappraisal more frequently: demonstrate a lower level of physiological–emotional arousal when exposed to

negative stimuli, show decreased probability of future health problems, and are relatively higher in subjective well-being (Gross & John, 2003).

Social comparison

Individuals frequently compare themselves to others; these comparisons can serve as an affect regulation strategy (Aspinwall & Taylor, 1993). For instance, if a student receives a particularly bad grade on a test, hearing about others who did worse would likely help to cheer up that student. Additionally, hearing about those who did better might give the student hope that they can improve on future exams. While the effectiveness of a social comparison for affect regulation is largely dependent on several features of the comparison (i.e., similarity to the comparator and the probability of failing to or achieving the status of the comparator; Lockwood, 2002), social comparison can be effective if appropriately employed.

Exercise

With myriad physical and psychological benefits of exercising existing in the absence of the experience of negative affect, one would anticipate that these benefits aid in the regulation of negative affect. While this is typically the case with moderate exercise, i.e., taking a brief walk (Ekkekakis, Hall, VanLanduyt, & Petruzello, 2000; Thayer, 1987), some situations can lead to ineffective affect repair. Consistent exercisers tend to get less of an energy boost following exercise. Additionally, intense or long-lasting exercise can lead to one feeling drained following the exercise session. Finally, exercise sessions in which failure can result (i.e., competitive sports) can lead to subsequent increases in negative affect (Larsen & Prizmic, 2004). Thus, the effectiveness of exercise for the purposes of affect regulation may largely depend on the content and quality of that exercise.

Sleep

In Parkinson and Totterdell's (1999) taxonomy of affect regulation strategies, sleep was seen as the most central affect regulation strategy in the relaxing/pleasant activities cluster. Certainly, sleep is one of the most relaxing activities in which one can engage and negative affect is naturally decreased after a good night of sleep (Cartwright, Luten, Young, Mercer, & Bears, 1998). However, when individuals are sleep-deprived, positive affect decreases (Colecchia et al., 1997) and feelings of anxiety and irritability increase following sleep (Clemes & Dement, 1967). Thus, the quality of sleep may largely determine the effectiveness of this strategy.

Pleasant activities

It is intuitively obvious that engaging in pleasant/rewarding activities will improve one's affective state. Dobson and Joffe (1986) demonstrated that self-reported depression decreases when individuals increase the number of pleasant activities in which they engage. Some have even suggested that engaging in a pleasant activity is the most effective method of affect repair (Fichman, Koestner, Zuroff, & Gordon, 1999). Several of the affect regulation strategies included in this meta-analysis could be considered pleasant/rewarding activities (i.e., music, gambling, fantasising, recalling positive memories) and should thus have similar affective benefits.

Other influences on the regulatory process

Several factors beyond strategy and category of strategy utilised should also impact the effectiveness of any regulation attempt and three of these factors will be explored in this meta-analysis. First, gender differences may exist in the affective consequences of regulation attempts. The extant literature indicates that men report experiencing less frequent and less intense emotions (Grossman &Wood, 1993; Schimmack, Oishi, & Diener, 2002). In addition, men show lesser reaction to affective stimuli and affective memories (Bradley, Codispoti, Sabatinelli, & Lang, 2001; Chentsova-Dutton & Tsai, 2007) and are more likely to use some (suppression; Gross & John, 2003) but not other (rumination; Thomsen, Melsen, Vijdik, Summerlund, & Zachariae, 2005) ineffective regulation strategies. Despite inconsistencies in the use of regulation strategies, these findings suggest that men should demonstrate less affect repair following an affect regulation attempt. With a lesser reaction to negative stimuli and lower reported baseline levels of negative affect, men may have less negative affect to repair in the first place. On the other hand, the consistent use of suppression by men may be indicative of a lesser ability to regulate affect.

Second, the length of the regulation attempts may have some bearing on the affective consequences of that attempt. Affect naturally decays over time (i.e., Hemenover, 2003), and thus affect regulation attempts carried out for a longer time period may lead to more effective affect regulation. However, if the type of affect regulation strategy utilised is the most important factor predicting affect regulation effectiveness, then length of regulation may play a lesser role. For instance, an ineffective strategy (especially one that increases negative affect) carried out for a long time period would likely result in a less effective regulation attempt than carrying out a highly effective strategy for a shorter period of time. Given our expectation that type of strategy utilised will largely determine the effectiveness of any regulation attempt, it is unlikely that length of the regulation attempt will

largely determine regulation effectiveness (i.e., longer regulation attempts should not be more effective than shorter attempts).

Finally, the intensity and valence of affect prior to a regulation attempt should impact the effectiveness of that regulation attempt. In Larsen's (2000) model of affect regulation, an affect regulation attempt is only made if a sufficient discrepancy exists between desired and experienced affect. Thus, in cases where negative affective experience is more intense, individuals are more likely to engage in effortful regulation (Feldman-Barrett, Gross, Conner Christensen, & Benvenuto, 2001). In addition, if one is experiencing more negative affect, there is, necessarily, more negative affect that can be regulated. In other words, intensity of negative affect should positively predict observed affect regulation effectiveness. Moreover, the valence of pre-existing (i.e., induced) affect should have a bearing on regulation effectiveness. Individuals inherently focus on negative states (the negativity bias; Cacioppo & Gardner, 1999) and are more likely to regulate in response to negative affective stimuli (i.e., negative affect inductions). Additionally, heightened positive affect is relatively transitory and individuals tend to "sit back and enjoy" this positive affect rather than engage in any regulatory attempt to maintain that state (Larsen & Prizmic, 2007). Thus, individuals may not be motivated or able to maintain the increases in positive affect caused by exposure to pleasant stimuli. Given that the motivation for self-regulation is high when experiencing negative affect and low when experiencing positive affect, it is likely that more effective affect repair will be observed in response to negative affect inductions (or naturally occurring affective states) than to positive or neutral (which, relative to naturally occurring states, heighten positive affect) affect inductions.

Overview and predictions

Given the existing research on affect regulation strategy effectiveness, one might question the need for a meta-analytical summary of these findings. However, the extant data regarding affect regulation strategies has reached a point at which an empirical summary is not just useful, but needed. There are several ways in which this meta-analysis should help to expand our current understanding of affect regulation strategy effectiveness.

First, although it is not possible at this point to empirically assess all known affect regulation strategies (due to a lack of data on a large portion of the vast amount of possible affect regulation strategies), this meta-analysis will provide a comprehensive assessment of those strategies explored in the literature to date. Although existing data does allow one to generally speak to which strategies are effective and which are not, relatively little data exists regarding the effectiveness of affect repair strategies across situations. Additionally, comparative studies of specific affect regulation strategies

are rare (and those that do exist explore relatively few strategies); this analysis will help to determine the relative effectiveness of many different affect regulation strategies. This meta-analysis will also yield information on the effectiveness of different categories of affect repair strategies. As some type of conglomerate measure is required to achieve categorical effectiveness data, this analysis will be the first to provide data regarding the effectiveness of the different categories in this taxonomy. Information regarding the relative effectiveness of different affect regulation strategies and categories of affect regulation strategies should have certain benefits for those interested in health and positive psychology. For instance, the experience of positive emotions predicts both lessened stress reactivity and greater recovery from stressful events (Ong, Bergeman, Bisconti, & Wallace, 2006). If this analysis identifies the best strategy for increasing positive affect, then these positive stress resilience effects (and the associated health benefits) could be more easily obtained through the use of the most effective strategy (or category of strategies). In terms of positive psychology, consistently using the most effective strategies in the face of negative affective experiences should serve to increase happiness and global subjective well-being.

Second, with a baseline level of affect regulation strategy effectiveness, researchers will be able to explore the impacts of various personality and situational moderators of strategy effectiveness. Personality plays a role in nearly all aspects of affective experience (Larsen & Augustine, 2008) and even predicts the effectiveness of affect regulation attempts (Hemenover, Augustine, Shulman, Tran, & Barlett, 2008; Shulman, Augustine, & Hemenover, 2006). Research into various personality predictors could benefit from baseline affect regulation effectiveness data. Comparing the effectiveness with which particular types of individuals (i.e., neurotics or introverts) utilise a strategy to the general effectiveness of a strategy (gathered from this meta-analysis) can lead to inferences regarding person-specific deficits (or successes) in affect regulation attempts. Situational variables might also impact the effectiveness of certain affect regulation strategies. For instance, some strategies may work better in groups rather than in solitary situations (Augustine & Hemenover, 2008). With a basis for comparison, research into moderators of affect repair effectiveness can be facilitated.

Third, the knowledge of which strategies are most effective can lead to the exploration of the processes behind strategy effectiveness. There may be reasons that some strategies are more effective than others. For instance, some level of mastery of the affect process may be required for effective implementation of certain strategies. Those higher in mood monitoring/labelling (Swinkels & Guiliano, 1995), negative mood regulation expectancies (Catanzaro & Mearns, 1990), or emotional intelligence (Grewal, Brackett, & Salovey, 2006) may be better able to use these strategies.

Thus, although these strategies appear less effective, it may simply be the case that not all individuals possess the necessary skills to properly implement them. Ease of use could play a major role in the observed effectiveness of affect regulation strategies, with strategies that require less skill appearing to be more effective. The analysis of the effectiveness of specific categories of affect regulation strategies (in this meta-analysis) may naturally draw some of these conclusions (i.e., cognitive or behavioural strategies may be generally more effective).

Finally, this meta-analysis should provide a good picture of the state of affect regulation research to date. Although literature reviews of this area are available, no attempt at an empirical summary has been made. Although this is a relatively new area of research, an empirical summary of the existing literature should prove useful at this time.

The primary purpose of this meta-analysis was to explore the impact of different affect regulation strategies and categories of affect regulation strategies on affect regulation effectiveness; it was predicted that both specific type and category of affect regulation strategy would largely moderate the effectiveness of the regulation attempt. Three other factors should also influence the effectiveness of affect regulation: gender, length of the regulatory effort, and pre-existing affect. Gender should predict regulation effectiveness with women exhibiting more effective affect regulation. Due to the importance of regulation strategy selection (when compared to affect decay), longer regulation attempts should not be more effective than shorter regulation attempts. Finally, more effective affect regulation should be observed under conditions of intense and negatively valenced affect.

METHOD

Collection of studies and exclusion criteria

Studies were collected using subject word searches of the database PsycINFO, which covered the publication period from 1887 through April 2007 at the time of the search. To gather all studies in which some form of affect repair was utilised, the following words/phrases were entered as search terms: affect induction, mood induction, emotion induction, affect regulation, emotion regulation, mood regulation, affect repair, emotion repair, and mood repair. The abstracts of all papers retrieved from PsycINFO were examined to determine if an identifiable type of affect repair was studied. Additionally, the Society for Personality and Social Psychology list-serve was polled for any unpublished manuscripts relevant to the meta-analysis; no additional data were obtained. Moreover, the authors of all papers not reporting sufficient information for inclusion in the meta-analysis were

contacted in an attempt to gather the lacking information. This resulted in the inclusion of two additional papers (six effect sizes). In a final effort to ensure that all relevant sources were gathered, the cited references for all included studies were examined and manuscripts that referenced the included studies were found through the Social Sciences Citation Index. These two final efforts yielded a replication of the previous search of PsycINFO (i.e., contributed no additional studies).

To be eligible for this meta-analysis, a study had to utilise an adult, non-clinical sample, use an identifiable (based on existing taxonomies of affect regulation strategies, i.e., Parkinson & Totterdell, 1999) affect repair strategy, and contain enough information to compute an effect size estimate for the strength of affect repair (within-person change) following the use of a specific affect repair strategy. All studies included in the analysis utilised, at the least, a three-part methodology: affect was measured, a regulation procedure was carried out, and affect was measured a second time. Even if affect regulation was not the main purpose of the research, all studies utilising this methodology were included. Only those studies that included examples of purposeful affect regulation were included. Indeed, finding examples of non-purposeful or less-conscious affect regulation in the research literature is a difficult task at best. The vast majority of research involves individuals' explicit attempts to alter their affective states. As such, the content of the present meta-analysis reflects that trend.

Only self-report data are included in this meta-analysis. The primary reason for this choice is that, as Feldman-Barrett (2006, p. 24) states in reference to the lack of agreement among physiological measures and the inability of physiological measures to differentiate between distinct emotions, "Verbal report, even with all of its failings, may be the only means of assessing the experience of emotion. If we want to know whether a person is experiencing an emotion, we have to ask them". Thus, studies including self-reported affect change due to some affect regulation strategy manipulation are included in this meta-analysis. Our database searches yielded approximately 1300 studies. Of the studies returned through the searches and deemed unacceptable for this analysis, approximately 40% did not involve any regulation procedures, 4% utilised physiological measures (although these studies did not necessarily involve regulation), $< 1\%$ used unidentifiable affect regulation procedures (i.e., looking at smoking advertisements), 27% involved child or adolescent samples (although these studies did not necessarily involve regulation), and 29% involved some type of clinical population (although these studies did not necessarily involve regulation). The remainder of the studies excluded did not utilise the targeted methodologies or did not report sufficient information for effect size computation (and we were unable to secure that information from the authors). The exclusionary criteria led to a loss of the vast majority of the

initial keyword-based sample. A total of 26 manuscripts, yielding 34 studies and 75 effect sizes met all inclusion criteria.

Collection of relevant study characteristics and effect sizes

Due to the complex nature of the data required for this meta-analysis, the first author and a knowledgeable graduate student collected all relevant information from the methods sections of each study including: relevant demographic variables, sample size, valence and strength (*d*) of affect induction, type of affect repair strategy utilised (as stated by the author),[2] strength of affect repair (*d*) and a verbatim description of the repair manipulation utilised.

Although affect regulation strategy at the specific level was entered as stated by the author, several higher-inference variables were also collected. Each affect repair strategy was categorised by two independent undergraduate assistants using Parkinson and Totterdell's (1999) taxonomy of affect regulation strategies. The two coders read relevant source material and then coded each case (using the verbatim descriptions of the repair manipulations) according to Parkinson and Totterdell's (1999) subordinate (Cohen's kappa = .75) and superordinate categories (behavioural vs. cognitive, phi = .68; engagement vs. avoidance, phi = .70). All codings achieved adequate reliability; for the final standing of each effect size on these categorical ratings, the coders resolved discrepancies through discussion.

Figure 1 represents those categories and specific strategies included in this analysis (behaviour avoidance, cognitive avoidance, and cognitive engagement). Also included in the figure are several examples of behavioural engagement strategies (see Parkinson & Totterdell, 1999, for a figure containing all possible strategies). Unfortunately, no instances of behavioural engagement are included in this analysis. Due to the experimenter-driven nature of affective experiences in experimental examinations of affect regulation, experimental examinations of behavioural engagement were not available for this analysis. It should be noted that not all codings agreed with the exact delineations made by Parkinson and Totterdell (1999). Several factors are responsible for this disconnect. First, some behavioural strategies can be implemented in cognitive ways and visa versa. For instance, an instance of cognitive distraction is included as a behavioural strategy; in this case, rather than taking participants to a mall, the investigators had participants imagine walking around a mall (the distraction itself is cognitive

[2] It should be noted that, although some of the strategies presented by authors could be considered exemplars of another specific strategy (i.e., a cognitive reasoning task could be considered distraction, listening to music could be considered a pleasant and rewarding activity, etc.), specific strategies utilised for each case are recorded as stated by the author. This allows for the analysis of strategy effectiveness to be carried out at the lowest and most specified level.

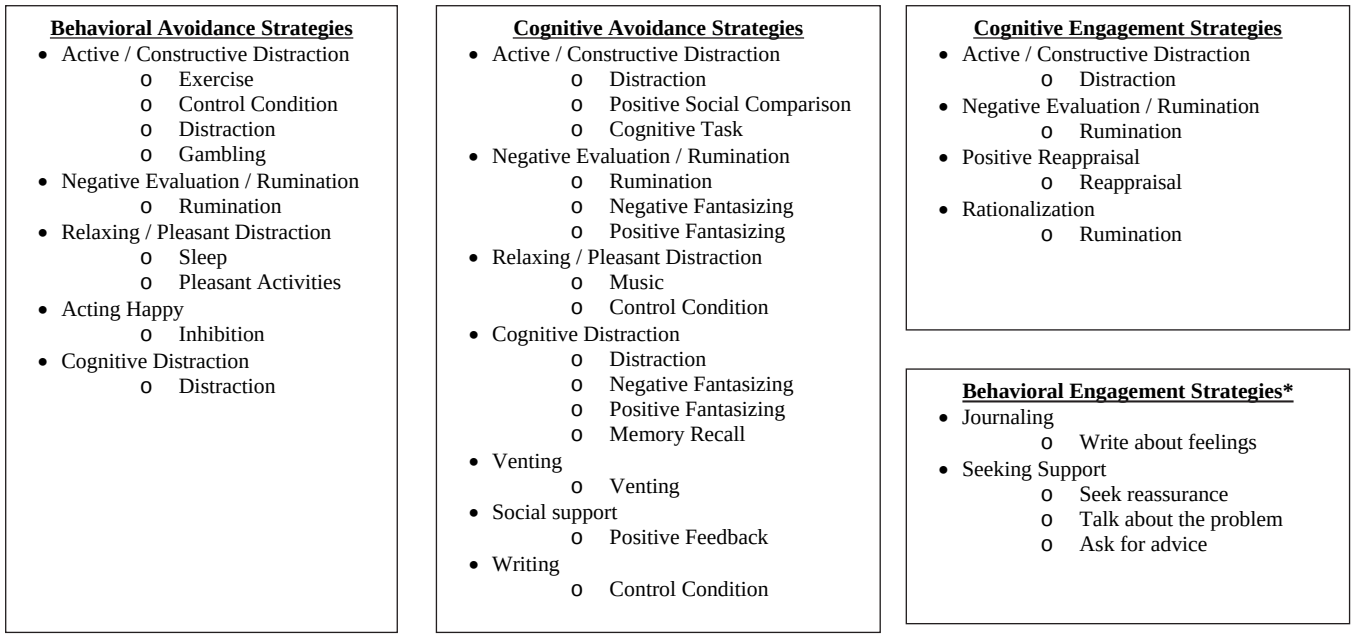

Figure 1. Hierarchical organisation of strategy categorisations included in the meta-analysis. Superordinate categories head each box, subordinate categories are leftmost in each box, and specific strategies are listed below each subordinate category. It should be noted that some overlap of subordinate categories exists due to case-specific experimental design (see text, Results: Collection of relevant study characteristics and effect sizes). *This tier is provided as an example; no experimental examinations of behavioural engagement were available for this analysis.

but the underlying theme of the distraction is behavioural). Second, experimental examinations of behavioural engagement are very rare (and none were found that met the inclusion criteria). Third, most cognitive strategies can be implemented to either engage or avoid the causal stimuli; this creates some replication in these categories.

Calculation of effect sizes

As all data in this analysis comes from time differentiation (pre vs. post), Cohen's *d* statistic was utilised. For the purposes of this meta-analysis, we are defining effective affect regulation as a hedonic shift (increase in PA or decrease in NA). As such, effect sizes are presented in terms of hedonic functioning, such that positive values indicate a move towards a hedonic state (increase in PA and/or decrease in NA) and negative values indicate a move towards an anti-hedonic state (decrease in PA and/or increase in NA). The myriad types of affect measurements used in the sample created some difficulty in the calculation of effect sizes. Some authors used univariate measures of affect (PA–NA), some used bivariate measures (PA and NA), and still others used only NA or only PA measures. To allow bivariate measures of affect to be compared to univariate measures, a conglomerate hedonic change score is required. Given that negative affect is more reactive/stronger than positive affect (at least twice as reactive; Larsen & Prizmic, 2007), average hedonic change is not a viable option; an average of positive and negative affect change values would artificially deflate the hedonic outcome given the relatively lower PA change values. To put all effect sizes "on the same scale", and do so without artificially deflating the hedonic change values in those studies that included both PA and NA measures, we used a weighted average[3] whereby NA was given twice the weight of PA, $(PA \times 2 + NA)/3$. As all effect sizes were initially calculated in terms of hedonic shift (increased PA and decreased NA have a positive value; decreased PA and increased NA have a negative value), simple weighted averages were utilised (for the 16 cases including both PA and NA measures). So, for example, if a study found an increase in PA (calculated as a positive *d* value) and a decrease in NA (also

[3] The use of this method for calculation of effect sizes creates some difficulties. First, the extant data clearly demonstrate that positive and negative affect can exist largely independent of one another (see Hemenover & Schimmack, 2007; Larsen, McGraw, & Cacioppo, 2001; Larsen, McGraw, Mellers, & Cacioppo, 2004) and thus, the use of a univariate measure of affect change is contrary to the actual structure of emotion. However, 16 cases (effect sizes) utilise univariate measures of affect and, to represent the entire literature on the subject, must be included. Second, some repair strategies are better suited for NA change while others are better suited for PA change. Although this method of effect size calculation can be problematic for the 16 cases (effect sizes) reporting both PA and NA change values, it is the only way to include all relevant data (and make meaningful comparisons between strategies) in this meta-analysis.

coded as a positive *d* value), then the resulting effect size would reflect the total hedonic shift (for both PA and NA) observed in that study. This creates a set of effect sizes for the entire sample that represents the general hedonic (rather than affect specific) consequences of the repair effort.

Effect sizes were calculated using the meta-analytical program DSTAT (Johnson, 1993), which utilises the random effects model (Hedges & Olkin, 1985) for meta-analytical techniques. Each effect size was calculated from statistics that compared pre-induction affect to post-induction affect or from statistics that compared pre-repair affect to post-repair affect (this included means and standard deviations, *t*-values, *F*-values, and *p*-values). Thus, effect sizes in this meta-analysis represent within-person change due to a repair manipulation.

Strength of affect induction

The strength of the preceding affect induction was included as a moderator variable in this meta-analysis and was calculated (*d*) using the methods described above. In some cases, no pre-induction vs. post-induction manipulation check was presented for the strength of affect induction. In these cases the manipulation check was either: (1) a comparison of two affect induction groups (i.e., positive affect induction group vs. negative affect induction group); (2) a comparison of an affect induction group to a control group; or (3) a statement of significance with no exact values given. If one were to compare two post-induction affective states of opposite valences (1), then an over-estimation of the strength of affect induction would likely result. As such, these effect sizes were not included in the final analysis. If an affect induction condition was compared to a control condition (2), the induction vs. control comparison was utilised for the calculation of the strength of the affect induction. If the authors only stated that the affect induction produced a significant change in affect, then the effect size was calculated for $p = .05$. Finally, if a study utilised a single affect manipulation and several different repair manipulations, but only presented affect induction manipulation check data for the entire sample, the effect size for the entire sample was utilised for all conditions.

Strength of affect repair

The strength of affect repair/regulation effect size is the primary dependent measure in this meta-analysis. In four cases, the authors failed to provide an exact statement of the value of tests that were non-significant (Bartholomew, 1999; Knoblock & Zillman, 2002, 3 effect sizes). In these cases, an effect size was calculated for $p = .50$ and the appropriate n. In seven cases, authors were comparing several different types of strategies or the effects of different inductions on a single strategy and indicated no significant differences

between groups (Blackhart & Kline, 2004; Knoblock & Zillman, 2002; Rusting & Dehart, 2000), but failed to provide the necessary information for computing separate effect sizes for each group. In these cases, the same effect size was computed for each group (given the statistical equity of these affect change values).

RESULTS

All effect sizes

All studies utilised and their relevant effect sizes can be found in Table 1 and a graphical representation of the distribution of effect sizes can be found in Table 2. Two mean effect sizes were calculated. When effect sizes were averaged within each study, the mean effect size was $d = 0.46$. If all effect sizes were included in the mean effect size[4] (no averaging within each study) then the overall mean effect size was $d = 0.49$. Additionally, two overall effect sizes were calculated. When studies were weighted by sample size (no averaging within each study), the combined weighted effect size was $d = 0.45$ ($N = 2958$). The combined effect size, weighted by sample size, and averaged within each study was $d = 0.52$. As the effectiveness of affect repair would be largely determined by the type of affect repair strategy employed, these combined effect sizes are meaningless without an interpretation of moderator variables.[4] Q tests were conducted to determine if significant variation existed between effect sizes. As expected, significant heterogeneity existed between effect sizes, $Q(74) = 511.46$, $p < .01$. To achieve homogeneity of effect sizes, 27 cases (36% of all effect sizes) had to be excluded. A total of 36,186 null findings would be required to bring the weighted effect size to a value of $d = 0.001$ (Fail-safe N).

Effectiveness of repair strategies

The analysis of effect size categorisations based on the specific repair strategy utilised is presented in Table 3. Significant variation was found between repair strategies, $Q_b(16) = 99.13$, $p < .00001$. Examining only those strategies with cell sizes greater than one,[5] inhibition (in these cases,

[4] The use of multiple effect sizes from a single study violates the assumption of independence in meta-analytical techniques. However, because of the moderation of effect sizes by the affect regulation strategy employed, in this meta-analysis, it was necessary to use multiple effect sizes from a single study.

[5] There are obvious assumption violations due to the differences in cell sizes in many of the comparative analyses. As such, the implications of these analyses should be viewed with some caution. Additionally, there is a great deal of overlap between category analyses (i.e., the inhibition specific strategy and act happy category contain the same two effect sizes). This again requires caution when interpreting these analyses.

TABLE 1
Studies included in meta-analysis

Study (year, study number)	*N*	*Induction*	*Induction ES (d)*	*Repair strategy*	*Superordinate categories*	*Subordinate category*	*Repair ES (d)*	*95% Confidence interval*
Bartholomew (1999, 1)	17	NA	−0.92	Exercise	B, A	Active distract	0.26	−0.42/0.94
Bartholomew (1999, 1)	17	PA	0.29	Exercise	B, A	Active distract	0.13	−0.54/0.80
Bartholomew (1999, 1)	18	Neut	0.01	Control Cond.	B, A	Active distract	0.09	−0.56/0.74
Blackhart & Kline (2004, 1)	65	NA	—	Rumination	C, E	Ruminate	0.97	0.61/1.33
Blackhart & Kline (2004, 1)	65	NA	—	Distraction	B, A	Active distract	0.97	0.61/1.33
Blagden & Craske (1996, 1)	12	NA	−1.66	Distraction	B, A	Active distract	1.59	0.67/2.51
Blagden & Craske (1996, 1)	12	NA	−0.82	Distraction	C, A	C distract	1.00	0.15/1.85
Blagden & Craske (1996, 1)	10	NA	−0.86	Rumination	B, A	Ruminate	0.24	−0.64/1.11
Blagden & Craske (1996, 1)	10	NA	−1.01	Rumination	C, A	Ruminate	0.41	−0.48/1.30
Cartwright et al. (1998, 1)	60	—	—	Sleep	B, A	Pleasant distract	0.41	0.05/0.77
Cartwright et al. (1998, 1)	60	—	—	Sleep	B, A	Pleasant distract	0.37	0.01/0.73
Duclos & Laird (2001, 1)	20	NA	−1.17	Distraction	B, A	Active distract	2.68	1.83/3.53
Duclos & Laird (2001, 1)	20	NA	−1.17	Inhibition	B, A	Act happy	1.99	1.23/2.75
Duclos & Laird (2001, 1)	20	NA	−1.17	Distraction	B, A	Active distract	2.43	1.61/3.25
Duclos & Laird (2001, 1)	20	NA	−1.17	Inhibition	B, A	Act happy	2.23	1.44/3.02
Ekkekakis et al. (2000, 1)	26	—	—	Exercise	B, A	Active distract	0.79	0.23/1.35
Ekkekakis et al. (2000, 2)	75	—	—	Exercise	B, A	Active distract	0.83	0.50/1.16
Ekkekakis et al. (2000, 3)	34	—	—	Exercise	B, A	Active distract	0.79	0.30/1.28
Ekkekakis et al. (2000, 4)	21	—	—	Exercise	B, A	Active distract	0.81	0.18/1.44
Fichman et al. (1999, 1)	91	—	—	Pleasant Activity	B, A	Pleasant distract	0.26	−0.03/0.55
Fichman et al. (1999, 1)	90	—	—	Venting	C, A	Venting	−0.24	−0.53/0.05
Gauvin et al. (1996, 1)	86	—	—	Exercise	B, A	Active distract	0.75	0.44/1.05
Gendolla & Krusken (2001, 1)	15	NA	−0.28	Neg. Fantasising	C, A	Ruminate	0.31	−0.41/1.03

TABLE 1 (*Continued*)

Study (year, study number)	*N*	*Induction*	*Induction ES (d)*	*Repair strategy*	*Superordinate categories*	*Subordinate category*	*Repair ES (d)*	*95% Confidence interval*
Gendolla & Krusken (2001, 1)	15	PA	0.08	Neg. Fantasising	C, A	C distract	0.37	−0.35/1.09
Gendolla & Krusken (2001, 1)	15	NA	0.16	Pos. Fantasising	C, A	Ruminate	−0.1	−0.82/0.62
Gendolla & Krusken (2001, 1)	15	PA	0.49	Pos. Fantasising	C, A	C distract	0.23	−0.49/0.95
Gohm (2003, 2)	41	NA	—	Distraction	C, A	Active distract	0.20	−0.23/0.63
Gohm (2003, 2)	42	PA	—	Distraction	C, A	Active distract	0.43	−0.01/0.86
Hemenover (2003, 1)	84	NA	—	Distraction	C, A	Active distract	1.10	0.78/1.42
Hemenover (2003, 1)	104	PA	—	Distraction	C, A	Active distract	−0.36	−0.63/−0.08
Hemenover (2003, 1)	74	Neut	—	Distraction	C, A	Active distract	−0.09	−0.41/0.23
Hemenover (2003, 2)	84	NA	−1.18	Distraction	C, A	Active distract	0.79	0.48/1.10
Hemenover (2003, 2)	85	PA	0.20	Distraction	C, A	Active distract	−0.31	−0.61/−0.01
Hemenover (2003, 2)	45	Neut	−0.24	Distraction	C, A	Active distract	−0.22	−0.63/0.19
Hemenover (2003, 3)	85	NA	−0.44	Distraction	C, A	Active distract	0.33	0.02/0.63
Hemenover (2003, 3)	85	PA	0.29	Distraction	C, A	Active distract	−0.26	−0.26/0.04
Hemenover (2003, 3)	44	Neut	−0.31	Distraction	C, A	Active distract	0.03	−0.39/0.48
Hills et al. (2001, 1)	40	PA	—	Gambling	B, A	Active distract	−0.69	−1.14/−0.24
Hills et al. (2001, 1)	40	NA	—	Gambling	B, A	Active distract	1.47	0.98/1.96
Hills et al. (2001, 1)	40	Neut	—	Gambling	B, A	Active distract	−0.12	−0.56/0.32
Joorman & Siemer (2004, 1)	29	NA	—	Rumination	C, E	Ruminate	0.26	−0.26/0.78
Joorman & Siemer (2004, 1)	31	NA	—	Distraction	C, E	Active distract	0.82	0.30/1.34
Knobloch & Zillman (2002, 1)	12	PA	—	Music	C, A	Pleasant distract	0.15	−0.29/0.59
Knobloch & Zillman (2002, 1)	12	NA	—	Music	C, A	Pleasant distract	0.15	−0.29/0.59

TABLE 1 (*Continued*)

Study (year, study number)	*N*	*Induction*	*Induction ES (d)*	*Repair strategy*	*Superordinate categories*	*Subordinate category*	*Repair ES (d)*	*95% Confidence interval*
Knobloch & Zillman (2002, 1)	12	Neut	—	Music	C, A	Pleasant distract	0.15	−0.31/0.61
Lane & Jarrett (2005, 1)	34	—	—	Exercise	B, A	Active distract	−0.43	−0.91/0.05
Lane & Lovejoy (2001, 1)	80	—	—	Exercise	B, A	Active distract	0.37	0.05/0.68
Lischetzke et al. (2005, 3)	52	Mixed	−0.95	Memory Recall	C, A	C distract	0.38	−0.01/0.77
Lyubomirsky & Ross (1997, 1)	23	—	—	Pos. Soc. Comp.	C, A	Active distract	0.64	0.05/1.23
Lyubomirsky & Ross (1997, 2)	41	—	—	Pos. Feedback	C, A	Social support	0.67	0.23/1.11
Neumann et al. (2004, 1)	40	NA	−1.82	Distraction	C, A	Pleasant distract	1.33	0.85/1.81
Neumann et al. (2004, 1)	40	NA	−1.99	Control Cond.	C, A	Pleasant distract	0.87	0.41/1.33
Oaksford et al. (2004, 1)	20	PA	1.73	Cognitive Task	C, A	Active distract	−1.46	−2.16/−0.76
Oaksford et al. (2004, 1)	20	NA	−0.46	Cognitive Task	C, A	Active distract	0.00	−0.62/0.62
Oaksford et al. (2004, 1)	20	Neut	0.28	Cognitive Task	C, A	Active distract	−0.31	−0.93/0.31
Rusting & Dehart (2000, 2)	20	NA	−0.69	Reappraisal	C, E	Reappraise	0.28	−0.34/0.90
Rusting & Dehart (2000, 2)	20	NA	−0.69	Rumination	C, E	Ruminate	0.28	−0.34/0.90
Rusting & Nolen-Hoeksema (1998, 1)	21	NA	−1.29	Rumination	C, E	Rationalise	−0.97	−1.61/−0.33
Rusting & Nolen-Hoeksema (1998, 1)	20	NA	−1.29	Distraction	C, A	C distract	0.34	−0.28/0.96
Rusting & Nolen-Hoeksema (1998, 3)	20	NA	−1.93	Rumination	C, E	Rationalise	−0.67	−1.31/−0.03
Rusting & Nolen-Hoeksema (1998, 3)	20	NA	−1.93	Distraction	C, A	C distract	1.6	0.89/2.31
Rusting & Nolen-Hoeksema (1998, 3)	20	NA	−1.93	Control Cond.	C, A	Writing	1.3	0.62/1.98
Shulman et al. (2006, 3)	78	NA	−1.23	Control Cond.	C, A	Writing	0.54	0.22/0.86

TABLE 1 (*Continued*)

Study (year, study number)	*N*	*Induction*	*Induction ES (d)*	*Repair strategy*	*Superordinate categories*	*Subordinate category*	*Repair ES (d)*	*95% Confidence interval*
Shulman et al. (2006, 3)	73	NA	−1.39	Reappraisal	C, E	Reappraise	0.77	0.43/1.11
Shulman et al. (2006, 3)	68	NA	−1.33	Distraction	C, A	C distract	1.73	1.34/2.12
Shulman et al. (2006, 3)	75	NA	−1.41	Rumination	C, A	Ruminate	0.64	0.31/0.97
Siemer (2005, 1)	33	NA	—	Distraction	C, A	Active distract	1.77	1.20/2.34
Siemer (2005, 1)	33	NA	—	Distraction	C, A	Active distract	0.80	0.30/1.30
Totterdell & Leach (2001, 2)	19	—	—	Exercise	B, A	Active distract	−0.80	−1.46/−0.14
Trask & Sigmon (1999, 1)	20	NA	−0.85	Distraction	B, A	C distract	0.50	−0.13/1.13
Trask & Sigmon (1999, 1)	23	NA	−0.73	Rumination	C, E	Rationalise	−0.14	−0.72/0.44
Trask & Sigmon (1999, 2)	12	NA	−0.59	Rumination	C, E	Rationalise	−0.10	−0.90/0.70
Trask & Sigmon (1999, 2)	12	NA	−0.38	Rumination	C, E	Rationalise	0.26	−0.54/1.06
Trask & Sigmon (1999, 2)	12	NA	−0.39	Distraction	B, A	C distract	0.90	0.06/1.74
Trask & Sigmon (1999, 2)	11	NA	−0.76	Distraction	B, A	C distract	1.17	0.27/2.07

Note: Effect sizes (ES) have been calculated such that a positive value indicates a hedonic shift and a negative value indicates an anti-hedonic shift. PA = positive affect induction, NA = negative affect induction, Neut = neutral affect induction, B = behavioural, C = cognitive, E = engagement, A = Avoidance.

TABLE 2
Stem and leaf plot of all effect sizes

Stem	*Leaf*
< -1.00	1 case
-0.9	7
-0.8	0
-0.7	
-0.6	79
-0.5	
-0.4	3
-0.3	116
-0.2	246
-0.1	0024
-0.0	9
0.0	0
0.0	29
0.1	3555
0.2	034666688
0.3	1347778
0.4	113
0.5	04
0.6	447
0.7	57999
0.8	01237
0.9	077
1.0	0
1.1	07
1.2	
1.3	03
1.4	7
1.5	9
1.6	0
1.7	37
1.8	
1.9	9
>2.00	3 cases

physically expressing PA when confronted with NA; $d = 2.02$), reappraisal ($d = 0.65$), the control condition manipulation (usually enacted by having participants write their thoughts or simply wait for the next part of the experiment; $d = 0.64$), exercise ($d = 0.47$), and distraction ($d = 0.46$) created the largest hedonic shifts. Inhibition created a significantly larger hedonic shift than all other specific strategies (with reappraisal, the next largest shift,

TABLE 3
Effect sizes for specific affect repair strategies

	All studies					*NA or no induction*				
Strategy type	*k*	*d*	Q_w	*p* <	*95% CI*	*k*	*d*	Q_w	*p* <	*95% CI*
Inhibition	2	2.02	0.18	.92	1.48/2.56	2	2.02	0.18	.92	1.48/2.56
Positive feedback	1	0.66	0.00	1.00	0.21/1.10	1	0.66	0.00	1.00	0.21/1.10
Reappraisal	2	0.65	1.87	.40	0.36/0.95	2	0.65	1.87	.40	0.36/0.95
Control condition	4	0.64	7.1	.13	0.41/0.87	3	0.72	3.95	.27	0.47/0.96
Positive social comparison	1	0.62	0.00	1.00	0.03/1.21	1	0.62	0.00	1.00	0.03/1.21
Exercise	10	0.47	39.27	.001	0.33/0.61	9	0.49	38.21	.001	0.34/0.63
Distraction	26	0.46	270.48	.001	0.38/0.55	19	0.95	90.09	.001	0.84/1.06
Sleep	2	0.39	0.02	.99	0.13/0.64	2	0.39	0.02	.99	0.13/0.64
Memory recall	1	0.38	0.00	1.00	−0.01/0.76	1	0.29	0.00	1.00	−0.43/1.01
Neg. Fantasising	2	0.32	0.01	1.00	−0.19/0.83	0	—	—	—	—
Rumination	11	0.31	42.67	.001	0.15/0.48	11	0.31	42.67	.001	0.15/0.48
Pleasant Activity	1	0.26	0.00	1.00	−0.03/0.55	1	0.25	0.00	1.00	−0.03/0.55
Music	3	0.15	0.00	1.00	−0.11/0.40	1	0.15	0.00	1.00	−0.30/0.59
Gambling	3	0.14	40.92	.001	−0.13/0.41	1	1.44	0.00	1.00	0.95/1.93
Pos. Fantasising	2	0.06	0.36	.84	−0.45/0.57	1	−0.09	0.00	1.00	−0.81/0.62
Venting	1	−0.24	0.00	1.00	−0.53/0.06	1	−0.23	0.00	1.00	−0.53/0.06
Cognitive reasoning task	3	−0.51	9.43	.03	−0.88/ −0.14	1	0.00	0.00	1.00	−0.62/0.62

Note: k = number of effect sizes, d = effect size measure, Q_w = heterogeneity test statistic value, p = significance value for the Q_w test, CI = confidence interval.

$\chi^2 = 19.09$, $p < .00001$).[6] No other significant differences were found between these five strategies ($\chi^2 = 0.01$–3.80, *ns*). Thus, in this analysis, it was found that (in order from most effective to least effective) inhibition, reappraisal, the control condition manipulation, exercise, and distraction were the most effective affect regulation strategies.

The effect of length of repair on strength of affect repair was analysed, $Z(54) = -3.98$, $p < .01$. The results of this analysis indicate that strategies implemented for a shorter time period were generally more effective than those implemented for a longer time period. However, it should be noted that not all studies reported the length of the repair manipulations.

Finally, the effect of gender on affect repair was analysed. The amount of men in the sample (proportion) did predict repair, $Z(68) = -5.55$, $p < .0001$, such that the lower the proportion of men in the sample, the greater the affect repair observed.

Effectiveness of different categories of affect repair

The effectiveness of categories of affect repair strategies as organised by the subordinate categories from the Parkinson and Totterdell (1999) taxonomy is presented in Table 4. As expected, significant variation existed within these categories, $Q_b(9) = 112.61$, $p < .00001$. Examining only those strategies with cell sizes greater than one (see Footnote 5), act happy ($d = 2.02$), cognitive distraction ($d = 0.84$), journaling/writing ($d = 0.66$), and positive reappraisal ($d = 0.65$) created the largest hedonic shifts. Act happy created a significantly larger hedonic shift than all other specific strategies (with cognitive distraction, the next largest shift, $\chi^2 = 16.46$, $p < .001$).[6] No other significant differences existed between these four strategies, $\chi^2 = 0.01$–2.51, *ns*. It should be noted that not all of the subordinate categories from the taxonomy are represented in this analysis. Thus, in this analysis, it was found that (in order from most effective to least effective) act happy, cognitive distraction, journaling/writing, and positive reappraisal were the most effective categories of affect regulation strategies.

Parkinson and Totterdell's (1999) superordinate distinctions can be viewed in Table 5. Results indicate that behavioural strategies ($d = 0.54$) are significantly more effective than cognitive strategies ($d = 0.33$) in terms of affect repair, $Q_b(1) = 12.78$, $p < .001$. Avoidant strategies ($d = 0.40$) were not significantly different from engagement strategies ($d = 0.38$) in their repair effectiveness, $Q_b(1) = .01$, *ns*.

[6] As it was hypothesised that significant differences would exist between different specific strategies and different categories of strategies, a priori significance values are utilised in all difference tests.

TABLE 4
Effectiveness of affect repair strategies categorised according to Parkinson and Totterdell's (1999) subordinate categories

	All studies					*NA or no induction*				
Category	*k*	*d*	Q_w	*p* <	*95% CI*	*k*	*d*	Q_w	*p* <	*95% CI*
Act happy	2	2.02	0.18	.92	1.48/2.56	2	2.02	0.18	.92	1.48/2.56
Relaxing/pleasant distraction	8	0.41	21.89	.006	0.27/0.55	6	0.47	18.68	.01	0.31/0.63
Active/constructive distraction	36	0.32	315.95	.0001	0.25/0.40	23	0.70	130.13	.0001	0.61/0.80
Journaling/writing	2	0.66	3.48	.18	0.38/0.95	2	0.66	3.48	.18	0.38/0.95
Seeking social support	1	0.66	0.00	1.00	0.21/1.10	1	0.66	0.00	1.00	0.21/1.10
Catharsis/venting	1	−0.24	0.00	1.00	−0.53/0.06	1	−0.24	0.00	1.00	−0.53/0.05
Negative evaluation/rumination	8	0.54	11.45	.18	0.35/0.72	8	0.54	11.45	.18	0.35/0.72
Rationalisation	5	−0.37	7.04	.22	−0.67/−0.07	5	−0.37	7.04	.22	−0.67/−0.07
Positive reappraisal	2	0.65	1.87	.40	0.36/0.95	2	0.65	1.87	.40	0.36/0.95
Cognitive distraction	10	0.84	37.00	.001	0.65/1.03	7	1.14	20.84	.01	0.90/1.37

Note: k = number of effect sizes, d = effect size measure, Q_w = heterogeneity test statistic value, p = significance value for the Q_w test, CI = confidence interval.

TABLE 5
Effectiveness of affect repair strategies categorised according to Parkinson and Totterdell's (1999) superordinate categories

	All studies					*NA or no induction*				
Category	*k*	*d*	Q_w	*p* <	*95% CI*	*k*	*d*	Q_w	*p* <	*95% CI*
Behavioural	27	0.54	179.41	.0001	0.44/0.63	23	0.65	134.73	.0001	0.55/0.75
Cognitive	48	0.33	319.27	.0001	0.27/0.40	34	0.57	183.22	.0001	0.49/0.65
Engagement	11	0.38	48.51	.0001	0.22/0.54	11	0.38	48.51	.0001	0.22/0.54
Avoidance	64	0.40	462.90	.0001	0.34/0.46	46	0.64	261.95	.0001	0.54/0.71

Note: k = number of effect sizes, d = effect size measure, Q_w = heterogeneity test statistic value, p = significance value for the Q_w test, CI = confidence interval.

Effect of affect induction on repair effectiveness

It is also likely that the intensity and valence of pre-repair affect will play some role in the effectiveness of any regulation attempt. Results indicate that the strength of prior affect inductions did impact the effectiveness of any following repair attempts, $Z(43) = -9.30$, $p < .00001$. The worse one felt after the affect induction, the more repair was exhibited. The valence of the preceding affect induction also had bearings on the effectiveness of any affect regulation attempts (see Table 6). Examination of these data indicates that those undergoing a negative induction or no induction exhibited successful regulation ($d = 0.73$ and 0.37, respectively) while those undergoing a positive or neutral induction felt worse after their regulation attempt ($d = -0.21$ and -0.06, respectively). In other words, the affect regulation strategies in this meta-analysis are not effective for the maintenance of hedonic affect gained from positive or neutral inductions. With this in mind, a second set of analyses, examining only those cases with no affect induction or with a negative affect induction, was conducted. This second analysis is, in some sense, an analysis specifically of affect repair (purposeful increase of positive and decrease of negative affect) strategies.

Analysis of studies with a negative affect induction or no affect induction (affect repair)

This set of effect sizes ($k = 57$, $n = 2165$) yields a mean effect size (see Footnote 4) of $d = 0.68$ (averaged within each study, $d = 0.64$). When weighted by sample size the mean effect size was $d = 0.66$ (averaged within each study, $d = 0.69$). Again, significant variation existed between cases, $Q(56) = 334.28$, $p < .00001$. To achieve homogeneity of effect size, 18 cases (31.6% of all effect sizes) had to be excluded. A total of 38,703 null findings would be required to bring the weighted effect size to a value of $d = 0.001$ (Fail-safe N).

TABLE 6
Effect of preceding induction valence on affect repair effectiveness

Preceding induction	*k*	*d*	Q_w	*p <*	*95% CI*
No induction	14	0.37	59.96	.00001	0.26/0.47
NA	43	0.73	229.18	.00001	0.65/0.81
PA	10	−0.21	32.53	.001	−0.65/−0.38
Neutral	7	−0.06	2.35	.94	−0.23/0.09
Mixed valence	1	0.37	0.00	1.00	−0.01/0.76

Note: k = number of effect sizes, d = effect size measure, Q_w = heterogeneity test statistic value, p = significance value for the Q_w test, CI = confidence interval.

Effectiveness of specific affect repair strategies

The analysis of specific affect repair strategies for this subset of effect sizes can be found in Table 3. Significant variation existed between specific repair strategies, $Q_b(15) = 142.37$, $p < .0001$. Examining only those strategies with cell sizes greater than one (see Footnote 5), inhibition ($d = 2.02$), distraction ($d = 0.95$), the control condition manipulation ($d = 0.72$), and reappraisal ($d = 0.65$) yielded the largest hedonic shifts. Inhibition created a significantly larger hedonic shift than all other specific strategies (with distraction, the next largest shift, $\chi^2 = 14.50$, $p < .001$). All other comparisons between these four strategies were not significant ($\chi^2 = 0.12$–3.65, *ns*). Thus, in this analysis, it was found that (in order from most effective to least effective) inhibition, distraction, the control condition manipulation, and reappraisal were the most effective affect repair strategies.

The length of the repair effort predicted affect repair effectiveness, $Z(42) = -3.03$, $p < .0001$, such that shorter repair attempts created larger hedonic shifts. Additionally, the strength of the preceding affect induction predicted affect repair effectiveness, $Z(32) = -4.21$, $p < .0001$, such that larger hedonic shifts were observed when more negative affect was present due to the induction.

Effectiveness of different categories of affect repair

Significant variation existed between strategies as organised by the Parkinson and Totterdell (1999) subordinated categorisation, $Q_b(9) = 125.70$, $p < .0001$. Examining only those strategies with cell sizes greater than one (see Footnote 5), act happy ($d = 2.02$), cognitive distraction ($d = 1.14$), active/constructive distraction ($d = 0.70$), and positive reappraisal ($d = 0.65$) created the largest hedonic shifts. Act happy created a significantly larger hedonic shift than all other categories (with cognitive distraction, the next largest shift, $\chi^2 = 8.67$, $p < .01$). Cognitive distraction created a significantly larger hedonic shift than all categories creating lower shifts (with active distraction, the next largest shift, $\chi^2 = 11.00$, $p < .05$). Active distraction was not significantly larger than positive reappraisal (the next largest shift, $\chi^2 = 0.11$, *ns*). Again, all of the subordinate categories from this taxonomy are not represented in this analysis. Thus, in this analysis, it was found that (in order from most effective to least effective) act happy, cognitive distraction, active/constructive distraction, and positive reappraisal represented the most effective categories of affect repair strategies.

No significant differences were observed between behavioural ($d = 0.65$) and cognitive ($d = 0.57$) strategies, $Q_b(1) = 1.41$, *ns*. Finally, avoidance strategies ($d = 0.64$) created a significantly larger hedonic shift than engagement strategies ($d = 0.38$), $Q_b(1) = 8.90$, $p < .01$.

DISCUSSION

This meta-analysis examined 26 manuscripts (34 studies; 75 effect sizes) to determine the effectiveness of various affect regulation strategies and various categories of affect regulation strategies. As expected, different strategies and categories of strategies led to differential levels of affect change. A second analysis examining regulation attempts preceded by no affect induction or a negative affect induction (57 effect sizes) was carried out due to the seeming ineffectiveness of strategies, in this data set, to maintain the hedonic affect gained from positive and neutral affect inductions. Generally speaking, strategies involving reappraisal and distraction were found to be the most effective means for affect regulation repair (i.e., created the largest hedonic shifts). Additionally, several parameters of the affect regulation/repair attempt moderated the effectiveness of the affect regulation/repair attempt including: intensity of pre-regulation affect, valence of pre-regulation affect, length of regulation attempt, and gender composition of the sample.

Effectiveness of different categories of affect regulation/repair strategies

One of the goals of this meta-analysis was to determine the effectiveness of different categories of affect regulation strategies. Starting at the highest level of analysis from Parkinson and Totterdell (1999), it was found that behavioural strategies created a larger hedonic shift than cognitive strategies in the set of all effect sizes. This finding may represent ease of implementation whereby cognitive strategies require some skill or level of cognitive resources for effective use, while behavioural strategies (i.e., playing basketball when faced with negative affect) can be used by those with less affect regulation ability. No difference was observed between avoidance and engagement strategies in the set of all effect sizes. In the analysis of negative or no affect induction effect sizes, a different pattern of results emerged for the superordinate categories. In this analysis, cognitive and behavioural strategies were found to be statistically equivalent in their affect regulation effectiveness. This is odd given the obvious underlying differences between these two types of strategies; future research is required to explore the mechanisms that might lead to differential effectiveness between these two types of strategies. Again contrary to the findings for all effect sizes, this analysis found that avoidance strategies were more effective than engagement strategies. This may be related to ease of use, such that most individuals are able to remove themselves from a negative affect laden situation while directly encountering the affective event requires some skill.

Moving to a lower level of analysis, results from the analysis of all effect sizes indicate that, among Parkinson and Totterdell's (1999) subordinate

categories, the act happy category was the most effective followed by cognitive distraction, journaling/writing, and positive reappraisal. Results from the analysis of negative or no affect induction effect sizes indicate a slightly different pattern; act happy created the largest hedonic shift, followed by cognitive distraction, active/constructive distraction, and positive reappraisal. Thus, it seems that methods involving distraction are very effective for negative affect repair. These results seem to mirror findings in the literature that implicate distraction as a more effective type of affect repair (Larsen & Prizmic, 2004). Additionally, in Gross's (1998) model of emotion regulation, the consistent use of reappraisal is seen as a key variable in determining overall affect regulation success. In line with this model, the results of this analysis suggest that reappraisal is also a very effective means of affect regulation. In general, the results for the effectiveness of different subordinate categories indicate that distraction and reappraisal strategies are the most effective. The results for superordinate categories are slightly more confusing with effectiveness being dependent on the valence of pre-existing affect.

Effectiveness of specific affect regulation/repair strategies

Another goal of this analysis was to determine the effectiveness of different specific affect regulation strategies. There is some overlap between the analysis of specific strategies and the analysis of superordinate and subordinate strategy categories presented above. Although each of these specific strategies is part of the categorical organisation of strategies (i.e., inhibition, in this case, is part of the "act happy" category), this represents the lowest level of analysis. In the analysis of all effect sizes it was found that inhibition created the largest hedonic shift followed by reappraisal, the control condition manipulation, exercise, and distraction. The results for reappraisal, exercise, and distraction are consistent with the extant data, which finds that these strategies are effective means of affect regulation. In the analysis of negative or no induction effect sizes it was found that inhibition created the largest hedonic shift followed by distraction, the control condition manipulation, and reappraisal. The two effect sizes for inhibition (which also formed the subordinate category "act happy") came from a single study (Duclos & Laird, 2001) in which participants were asked to smile following exposure to negative stimuli. It should also be noted that inhibition, in this case, was not carried out in the manner typically used when examining suppression/inhibition (Gross, 1998). In these studies, participants not only suppressed their negative affect reactions to the stimuli, but also expressed a positively valenced response. Thus, although these studies were classified as inhibition for the purposes of this meta-analysis, they represent a unique instantiation of that class of strategies.

Despite the low *k* for this strategy, it seems that inhibition, as enacted in these two studies, greatly aids in the alleviation of negative affect.

The findings for distraction and reappraisal are, again, consistent with the findings that these two strategies are effective means of affect regulation. The finding for the control condition manipulation is discussed later. These findings (as well as those for category effectiveness) seem to indicate that distraction and reappraisal are the most effective means for affect regulation.

Other influences on the regulatory process

This meta-analysis also sought to determine the effect of various parameters of the affect regulation attempt on the effectiveness of the regulatory efforts. It was found that the proportion of men in the sample did predict regulation effectiveness, such that populations with more women exhibited larger hedonic shifts. There are two potential explanations for this finding. First, gender differences do exist in reactivity to emotional stimuli, with men exhibiting a lesser reaction (Chentsova-Dutton & Tsai, 2007). It is possible that, with a lesser reaction to the emotinal stimuli used for affect inductions, men were left with less negative affect to regulate and thus, appeared to exhibit less effective affect regulation. Second, this finding may represent gender differences in the ability to regulate affect. Gross and John (2003) found that men employ strategies of suppression (a less effective affect regulation strategy) more frequently than women. This may be due to men's desire to conform to the stereotype that men are unemotional. On the other hand, this may reflect that men are generally less able to repair negative affect. If, as suggested in this meta-analysis, gender differences in affect regulation ability do exist, then these differences may be due to gender stereotypic motivations, such as the desire for men to appear unemotional. It may also be that, as men use suppression frequently, they are "out of practice" when it comes to other, more effective, affect regulation strategies. Unfortunately, the use of self-report methods does not allow one to determine which of these factors may underlie the results.

In both analyses it was also found that the length of affect regulation predicted effectiveness such that shorter strategies were more effective. This finding may indicate that there is a window of effectiveness for the use of affect regulation strategies. Additionally, this suggests that it is important to use an effective strategy quickly, rather than use any strategy (regardless of effectiveness) for a long period of time. This also suggests that these results are not due to natural affect decay patterns (i.e., Hemenover, 2003); if that were the case then the effect would occur in the opposite direction. Thus, the use of an affect regulation strategy seems to alter the natural trajectories of affect decay.

In this meta-analysis, the strength of the preceding induction predicted repair such that the more negative affect one was experiencing, the greater was their hedonic shift following a regulation attempt. This finding certainly makes intuitive sense; the more negative affect one is experiencing, the more negative affect one can eliminate. Alternatively, it may be that not all individuals feel the need to fully engage in affect repair when only mild negative affect is experienced. In other words, not everyone puts a bandage on a paper cut, but everyone goes to the hospital if they cut off a finger. This finding is in line with Larsen's (2000) model of affect regulation. Individual differences exist in the sensitivity of the comparator between desired and experienced affect, with some individuals requiring large (vs. small) discrepancies between desired and experienced affect before regulation is enacted. Additionally, it was found that the valence of the preceding affect induction moderated the effectiveness of the regulation attempt such that those participants undergoing positive or neutral induction experienced anti-hedonic shifts while participants undergoing negative or no affect induction experienced hedonic shifts. This finding (in addition to leading to a second set of analyses) suggests that the affect regulation strategies represented in this analysis are more generally suited to affect repair (the purposeful increase of PA and decrease of NA) rather than positive affect maintenance. Of course, given the transitory nature of heightened positive affect, it may simply be that positive affect maintenance is a relatively difficult task in and of itself.

Implications

This meta-analysis does shed light on the effectiveness of different categories of affect regulation strategies and specific affect regulation strategies, as well as various parameters of regulation attempts that impact effectiveness. Additionally, there are several findings that indicate that changes in the methodology used in affect regulation/repair research could lead to an even richer understanding of this field. Moreover, this analysis indicates that several important topics have yet to receive adequate attention in the extant literature.

While several mechanisms can be postulated based on these findings (i.e., ease of implementation, goal of affect repair or positive affect maintenance, etc.) the mechanisms underlying the effectiveness (or ineffectiveness) of affect regulation strategies are still generally unknown. There may be reasons that some strategies are more effective than others. For instance, some level of mastery of the affect process may be required for effective implementation of certain strategies (i.e., emotional intelligence; Grewal et al., 2006). While those who are high in emotional intelligence may be able to effectively use many strategies, those lower in this construct may not

possess the skill set to effectively use more complex strategies (i.e., engagement). Indeed, those higher in negative mood regulation expectancies, mood monitoring, and mood labelling are more effective in their use of some affect regulation strategies (Hemenover et al., 2008). While relatively complex strategies may provide a very effective means for affect regulation, they may be "out of reach" to those individuals not possessing high levels of emotional intelligence (and related constructs).

Yet another mechanism that may underlie strategy effectiveness is level of cognitive resources; some strategies may require more cognitive resources than others. As negative emotions do engage cognitive resources, it may be that those strategies requiring high levels of cognitive resources are more suited to mood regulation (as moods would not engage as many cognitive resources as emotions). Additionally, some facets of the regulation attempt itself may lead to higher effectiveness. The situation in which the regulation attempt is carried out may bear some weight. Some strategies (i.e., distraction) may be more effective if they are carried out in a social context (Augustine & Hemenover, 2008). Additionally, some strategies may be less effective if they are carried out in isolation (Larsen & Prizmic, 2007).

Homogeneity tests within categories were, for the most part, indicative of wide variance in effectiveness between relatively similar strategies. Given this, it is likely that a number of factors can also impact the success of a repair attempt. Some strategies may be more suited to specific situations or under certain motivations. Indeed, the ability to use the appropriate strategy, at the appropriate time, and for the appropriate affects, may be the hallmark of an expert affect regulator. Perhaps using data from this analysis as a baseline, future research regarding the situation, and motivation-level moderators of repair strategy effectiveness seems an important next step in the affect regulation literature.

The finding that greater hedonic shifts were observed when the preceding induction created larger levels of anti-hedonic affect has definite implications for the ways in which affect regulation research is carried out. With the use of strong inductions, the full spectrum of affect change (and variance of change) can be observed. The use of strong inductions may also lead to findings that some strategies that were previously considered effective are only effective in the face of mild negative affect.

A gap in the literature is indicated by this analysis; we still know relatively little about strategies that can effectively maintain heightened positive affect. While strategies for the halting of negative affect are certainly important, strategies that maintain positive affect are also of vital importance. The increased experience of positive affect has been linked to the cessation of various negative health experiences, including cancer (Ryff & Singer, 1998). Additionally, experiencing increased positive affect lessens stress reactivity and aids recovery from stressful events (Ong et al., 2006). The area of

positive affect maintenance provides a wealth of opportunities for future research.

One limitation of this meta-analysis is the way in which effect sizes were calculated. This limitation is the result of the use of univariate measures in affect regulation/repair research. It is well established that positive and negative affect represent two dimensions, not a single univariate dimension ranging from positive to negative (e.g., Hemenover & Schimmack, 2007; Larsen et al., 2001, 2004). The use of univariate measures does not allow us to capture the exact effect of affect regulation/repair attempts. Some affect regulation/repair strategies may largely influence negative affect, while others may influence positive affect. The use of bivariate affect measures will allow a more specific conceptualisation of the effect of various affect regulation/repair strategies.

The majority of studies in this meta-analysis lacked an exploration of individual differences (although there was sufficient data to determine the effect of gender on affect regulation effectiveness, this was primarily due to the standard reporting of demographic characteristics). While the exploration of individual difference variables was not the purpose of the vast majority of the studies included in this analysis, the addition of individual difference measures could lead to valuable conclusions regarding the affect regulation/repair process. Individual differences (i.e., neuroticism, extraversion, emotional intelligence) are related to nearly all aspects of affective experience (Larsen, 2000), including affect repair (Augustine & Hemenover, 2008; Hemenover et al., 2008; Shulman, Augustine, & Hemenover, 2006). The inclusion of personality measures in affect research will allow not only a better understanding of personality, but may also lead to a better understanding of the mechanisms underlying the effectiveness or implementation of certain strategies. For instance, are cognitive strategies best suited for those high in emotional intelligence or need for cognition? Are withdrawal/avoidance strategies best suited for the introvert? A more in-depth exploration of the influence of individual differences on the affect regulation/repair process could lead to a wealth of person-specific recommendations regarding effective means of affect regulation/repair.

The literature is also relatively lacking in data regarding the effectiveness of strategies for the alleviation of specific emotions. Certainly, this area is relatively young and a full exploration of all affects is not to be expected. However, analyses targeting specific affective states may yield important data regarding strategy effectiveness. For instance, some strategies may work better for removal of anxiety while others work better for anger or sadness. Additionally, some strategies may be more suited for mood regulation (i.e., Larsen, 2000) while others are more suited for emotion regulation (i.e., Gross, 1998). This meta-analysis focused broadly on affect (experienced

emotion and mood) due to the difficulty in experimentally separating these two distinct experiences. Emotions, when compared to moods, have a higher intensity and shorter duration. Conversely, moods last longer and consist of less-intense experiences and lower arousal levels than emotions (Larsen, 2000). Emotions are also thought to arise due to a particular antecedent event, while moods do not necessarily have an antecedent stimulus (Davidson, 1994). It may be that, given the different content, causes, and consequences of these two affective experiences, certain strategies are better suited for the regulation of moods or emotions. The possibilities for future research on the regulation of specific affects and different types of affective experiences are innumerable; data from this meta-analysis may be able to serve as a baseline for comparison in this future research.

In addition to the lack of data for specific affects and types of affective experiences, numerous affect regulation strategies (and categories of strategies) represented in the literature remain unresearched. Indeed, one cell from the basic 2 (behavioural vs. cognitive) $\times$ 2 (engagement vs. avoidance) framework (see Figure 1) was not included in this analysis; no studies to date have investigated behavioural engagement strategies (i.e., thinking about the cause of the problem, seeking advice as to how to deal with the problem). As the cause of the affective experience in affect regulation experiments is generally the researcher themselves, this is not surprising. These strategies would perhaps be best investigated through the use of experience sampling methodologies, in which the effect of some behavioural engagement regulation attempt is assessed through affective states at a later time point. In addition to this particular category of strategies, Parkinson and Totterdell (1999) identified 304 distinct methods for affect regulation and each of these represents a potential direction for future research.

One of the most striking findings from this meta-analysis is that the control condition manipulation created one of the largest hedonic shifts. Typically, participants in the control condition are left to do as they please during the regulation interval; they may list their thoughts or simply sit quietly and wait for the next phase of the experiment. There are several possible explanations for the effectiveness observed under control-condition manipulations. First, it may be that individuals know which strategies have proven most effective in the past and, with nothing else to do, enact these when in a control condition. Indeed, some research suggests that individuals may engage in spontaneous and potentially unconscious affect regulation when experiencing negative affective states (Demaree, Pu, Robinson, Schmeichel, & Everhart, 2006; Egloff, Schmukle, Burns, & Schwerdtfeger, 2006). Thus, whether they are aware of it or not, individuals may be engaging in highly effective affect regulation during these control-condition manipulations. Second, it may be that control conditions serve as a type of

distraction condition. There are certainly many things in a lab or waiting room (that are sufficiently different from one's normal surroundings) that could serve to distract individuals from negative states. Additionally, thought listing procedures leave one to enact whatever type of regulation strategy they wish on paper; these may also serve as a distraction. Third, although one might think that the control condition represents the natural decay of anti-hedonic affect over time (i.e., Hemenover, 2003), this meta-analysis did find that shorter affect regulation strategies were more effective. Thus, it seems that individuals in the control condition are engaging in some form of highly effective affect regulation. Given this finding, future studies should rely on within-person analyses, rather than utilising control-condition comparisons. Affective states can be adequately assessed with few adjectives, making measuring affect at multiple time points a relatively simple procedure. In addition, within-person studies of affect regulation will require fewer participants and the results can be expressed in an easily interpretable form (within-person affect change due to the regulation procedure, i.e., *d*).

The primary reason that potentially relevant studies were not included in this analysis is because the analyses were based on a comparison to the control condition. The finding that control-condition manipulations are creating relatively large hedonic shifts has several implications for the continuing study of affect regulation. Studies using control-condition comparisons have made valuable contributions to the literature and the conclusions drawn from this type of research are still of vital importance to understanding affect regulation/repair. However, in some cases it may be necessary to reinterpret conclusions drawn from control-condition comparisons. For instance, if a given strategy is found to be less effective than the control condition, it does not necessarily follow that the strategy is totally ineffective. This may merely mean that the strategy is less effective than whatever strategy an individual would enact given their own choice. In other words, a strategy that is less effective than the control condition may still accomplish the goal of eliminating negative affect, but does so to a lesser degree than self-regulated affect repair attempt. If, indeed, individuals are engaging in spontaneous (possibly non-conscious), self-directed affect regulation during control-condition manipulations (and this regulation is highly effective), then more research on instances of such spontaneous regulation is required. Nonetheless, the finding that control conditions are effective means for affect repair should stress that these conditions do not serve as an inactive control condition; affect repair is occurring. As research on affect regulation continues, a move to analyses of within-person affect change due to a repair manipulation seems necessary.

Conclusions

This meta-analysis provides a comprehensive assessment of the effectiveness of affect regulation strategies found in the extant literature. The effectiveness of an affect regulation/repair attempt is largely moderated by the type of strategy being utilised and results broadly indicate that strategies involving reappraisal and distraction are among the most effective. Additionally, several parameters of the regulation attempt, such as length of the regulation and intensity/valence of the pre-regulation affect, play a role in the effectiveness of affect regulation repair. This meta-analysis can also serve as an impetus for future research. It can serve to give researchers a baseline for comparison in research regarding new affect regulation/repair strategies. It can also provide a comparison baseline for the exploration of the mechanisms underlying strategy effectiveness. The data from this meta-analysis also reveals several limitations in the extant affect regulation/repair literature that provide numerous opportunities for future research. The data indicate that stronger affect inductions and the use of bivariate affect measures will provide a richer understanding of affect regulation. Additionally, certain aspects of affect regulation remain relatively unexplored: not all specific strategies or categories of strategies are represented in the literature, the impact of individual differences on affect regulation has received relatively little attention, and research regarding the effectiveness of strategies for the regulation of specific affective states is still lacking. Finally, results indicate that control conditions (as defined so far) may not provide a valid point for comparison in affect regulation research, as they represent an effective method for affect repair. Although the literature regarding affect regulation is still young, innumerable valuable conclusions have already been drawn. The future of affect regulation research is certainly a bright one.

Manuscript received 23 November 2007
Revised manuscript received 11 February 2008
Manuscript accepted 7 August 2008
First published online 18 September 2008

REFERENCES[7]

Aspinwall, L. G., & Taylor, S. E. (1993). Effects of social comparison direction, threat, and self-esteem on affect, self-evaluation, and expected success. *Journal of Personality and Social Psychology*, *64*, 708–722.

Augustine, A. A., & Hemenover, S. H. (2008). Extraversion and the consequences of social interaction on affect repair. *Personality and Individual Differences*, *44*, 1151–1161.

[7] Sources included in the meta-analysis are marked with an asterisk.

*Bartholomew, J. B. (1999). The effect of resistance exercise on manipulated preexercise mood states for male exercisers. *Journal of Sport and Exercise Psychology*, *21*, 39–51.

*Blackhart, G. C., & Kline, J. P. (2005). Individual differences in anterior EEG asymmetry between high and low defensive individuals during a rumination/distraction task. *Personality and Individual Differences*, *39*, 427–437.

*Blagden, J. C., & Craske, M. G. (1996). Effects of active and passive rumination and distraction: A pilot replication with anxious mood. *Journal of Anxiety Disorders*, *10*, 243–252.

Bonanno, G. A. (2001). Emotion self-regulation. In G. A. Bonanno & T. J. Mayne (Eds.), *Emotions: Current issues and future directions* (pp. 251–285). New York: Guilford Press.

Bradley, M. M., Codispoti, M., Sabatinelli, D., & Lang, P. J. (2001). Emotion and motivation II: Sex differences in picture processing. *Emotion*, *1*, 300–319.

Bushman, B. J. (2002). Does venting anger feed or extinguish the flame? Catharsis, rumination, distraction, anger, and aggressive responding. *Personality and Social Psychology Bulletin*, *28*, 724–731.

Cacioppo, J. T., & Gardner, W. L. (1999). Emotion. *Annual Review of Psychology*, *50*, 191–214.

*Cartwright, R., Luten, A., Young, M., Mercer, P., & Bears, M. (1998). Role of REM sleep and dream affect in overnight mood regulation: A study of normal volunteers. *Psychiatry Research*, *81*, 1–8.

Catanzaro, S. J., & Mearns, J. (1990). Measuring generalized expectancies for negative mood regulation: Initial scale development and implications. *Journal of Personality Assessment*, *54*, 546–563.

Chentsova-Dutton, Y. E., & Tsai, J. L. (2007). Gender differences in emotional response among European Americans and Hmong Americans. *Cogntion and Emotion*, *21*, 162–181.

Clemes, S., & Dement, W. (1967). Effect of REM sleep deprivation on psychological functioning. *Journal of Nervous and Mental Disease*, *144*, 488–491.

Colecchia, E., Berardi, A., Hirschfield, U., Kosslyn, S., Leproult, E., Levin, T., et al. (1997). Temporal variations in cognitive function measured by the Harvard Cognitive Performance Battery (HCPC) Sleepiness and mood across 40 h of continuous wakefulness. *Sleep Research*, *13*, 111–116.

Davidson, R. J. (1994). On emotion, mood, and related affective constructs. In P. Ekman & R. J. Davidson (Eds.), *The nature of emotion: Fundamental questions* (pp. 51–55). New York: Oxford University Press.

Demaree, H. A., Pu, J., Robinson, J. L., Schmeichel, B. J., & Everhart, D. E. (2006). Predicting facial valence to negative stimuli from resting RSA: Not a function of active emotion regulation. *Cognition and Emotion*, *20*, 161–176.

Dobson, K. S., & Joffe, R. (1986). The role of activity level and cognition in depressed mood in a university sample. *Journal of Clinical Psychology*, *42*, 264–271.

*Duclos, S. E., & Laird, J. D. (2001). The deliberate control of emotional experience through control of expressions. *Cognition and Emotion*, *15*, 27–56.

Egloff, B., Schmukle, S. C., Burns, L. R., & Schwerdtfeger, A. (2006). Spontaneous emotion regulation during evaluated speaking tasks: Associations with negative affect, anxiety expression, memory, and physiological responding. *Emotion*, *6*, 356–366.

*Ekkekakis, P., Hall, E. E., VanLanduyt, L. M., & Petruzello, S. J. (2000). Walking in (affective) circles: Can short walks enhance affect? *Journal of Behavioral Medicine*, *23*, 245–275.

Feldman-Barrett, L. (2006). Solving the emotion paradox: Categorization and the experience of emotion. *Personality and Social Psychology Review*, *10*, 20–46.

Feldman-Barrett, L., Gross, J., Conner Christensen, T., & Benvenuto, M. (2001). Knowing what you're feeling and knowing what to do about it: Mapping the relation between emotion differentiation and emotion regulation. *Cognition and Emotion*, *15*, 713–724.

*Fichman, L., Koestner, R., Zuroff, D. C., & Gordon, L. (1999). Depressive styles and the regulation of negative affect: A daily experience study. *Cognitive Therapy and Research*, *23*, 483–495.

*Gauvin, L., Rejeski, W. J., & Norris, J. L. (1996). A naturalistic study of the impact of acute physical activity on feeling states and affect in women. *Health Psychology*, *15*, 391–397.

Geen, R. G., & Quanty, M. B. (1977). The catharsis of aggression: An evaluation of a hypothesis. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 10, pp. 1–37). New York: Academic Press.

*Gendolla, G. H. E., & Krusken, J. (2001). Mood state and cardiovascular response in active coping with an affect-regulative challenge. *International Journal of Psychophysiology*, *41*, 169–180.

*Gohm, C. L. (2003). Mood regulation and emotional intelligence: Individual differences. *Journal of Personality and Social Psychology*, *84*, 594–607.

Grewal, D., Brackett, M., & Salovey, P. (2006). Emotional intelligence and the self-regulation of affect. In D. K. Synder, J. E. Simpson, & J. N. Hughes (Eds.), *Emotion regulation in couples and families: Pathways to dysfunction and health* (pp. 37–55). Washington, DC: American Psychological Association.

Gross, J. J. (1998). The emerging field of emotion regulation: An integrative review. *Review of General Psychology*, *2*, 271–299.

Gross, J. J. (2001). Emotion regulation in adulthood: Timing is everything. *Current Directions in Psychological Science*, *10*, 214–219.

Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology*, *85*, 348–362.

Grossman, M., & Wood, W. (1993). Gender differences in intensity of emotional experience: A social role interpretation. *Journal of Personality and Social Psychology*, *65*, 1010–1022.

Hedges, L. V., & Olkin, I. (1985). *Statistical methods for meta-analysis*. London: Academic Press.

*Hemenover, S. H. (2003). Individual differences in rate of affect change: Studies in affective chronometry. *Journal of Personality and Social Psychology*, *85*, 121–131.

Hemenover, S. H., Augustine, A. A., Shulman, T. E., Tran, T. Q., & Barlett, C. (2008). Individual differences in the ability to repair negative affect. *Emotion*, *8*, 468–478.

Hemenover, S. H., & Schimmack, U. (2007). That's disgusting!, but very amusing: Mixed feelings of amusement and disgust. *Cognition and Emotion*, *21*, 1102–1113.

*Hills, A. M., Hill, S., Mamone, N., & Dickerson, M. (2001). Induced mood and persistence at gaming. *Addiction*, *96*, 1629–1638.

Johnson, B. T. (1993). *DSTAT: Software for the meta-analytic review of research literatures* (version 1.11) [computer program]. Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

*Joormann, J., & Siemer, M. (2004). Memory accessibility, mood regulation, and dysphoria: Difficulties in repairing sad mood with happy memories? *Journal of Abnormal Psychology*, *113*, 179–188.

*Knobloch, S., & Zillman, D. (2002). Mood management via the digital jukebox. *Journal of Communication*, *52*, 351–366.

*Lane, A. M., & Jarrett, H. (2005). Mood changes following golf among senior recreational players. *Journal of Sports Science and Medicine*, *4*, 47–51.

*Lane, A. M., & Lovejoy, D. J. (2001). The effects of exercise on mood changes: The moderating effect of depressed mood. *Journal of Sports Medicine and Physical Fitness*, *41*, 539–545.

Larsen, J. T., McGraw, A. P., & Cacioppo, J. T. (2001). Can people feel happy and sad at the same time? *Journal of Personality and Social Psychology*, *81*, 684–696.

Larsen, J. T., McGraw, A. P., Mellers, B. A., & Cacioppo, J. T. (2004). The agony of victory and the thrill of defeat: Mixed emotional reactions to disappointing wins and relieving losses. *Psychological Science*, *15*, 325–330.

Larsen, R. J. (2000). Toward a science of mood regulation. *Psychological Inquiry*, *11*, 129–141.
Larsen, R. J., & Augustine, A. A. (2008). Basic personality dispositions: Extraversion/neuroticism, BAS/BIS, positive/negative affectivity, and approach/avoidance. In A. J. Elliot (Ed.), *Handbook of approach and avoidance motivation* (pp. 151–164). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.
Larsen, R. J., Kasimatis, M., & Frey, K. (1992). Facilitating the furrowed brow: An unobtrusive test of the facial feedback hypothesis applied to unpleasant affect. *Cognition and Emotion*, *6*, 321–338.
Larsen, R. J., & Prizmic, Z. (2004). Affect regulation. In K. D. Vohs & R. F. Baumeister (Eds.), *Handbook of self-regulation: Research, theory, and applications* (pp. 40–61). New York: Guilford Press.
Larsen, R. J., & Prizmic, Z. (2007). Regulation of emotional well-being: Over-coming the hedonic treadmill. In M. Eid & R. J. Larsen (Eds.), *The science of subjective well-being*. New York: Guilford Press.
*Lischetzke, T., Cuccodoro, G., Gauger, A., Todeschini, L., & Eid, M. (2005). Measuring affective clarity indirectly: Individual differences in response latencies of state affect ratings. *Emotion*, *5*, 431–445.
Lockwood, P. (2002). Could it happen to you? Predicting the impact of downward comparisons on the self. *Journal of Personality and Social Psychology*, *82*, 343–358.
*Lyubomirsky, S., & Ross, L. (1997). Hedonic consequences of social comparison: A contrast of happy and unhappy people. *Journal of Personality and Social Psychology*, *73*, 1141–1157.
*Neumann, S. A., Waldstein, S. R., Sollers, J. J., Thayer, J. F., & Sorkin, J. D. (2004). Hostility and distraction have differential influences on cardiovascular recovery from anger recall in women. *Health Psychology*, *23*, 631–640.
Nolen-Hoeksema, S., & Morrow, J. (1993). Effects of rumination and distraction on naturally occurring depressed mood. *Cognition and Emotion*, *7*, 561–570.
*Oaksford, M., Carlile, J., & Moore, S. C. (2004). The effects of reasoning, prior mood, and personality on emotion. *Psychologia*, *47*, 250–263.
Ong, A. D., Bergeman, C. S., Bisconti, T. L., & Wallace, K. A. (2006). Psychological resilience, positive emotions, and successful adaptation to stress in later life. *Journal of Personality and Social Psychology*, *91*, 730–749.
Parkinson, B., & Totterdell, P. (1999). Classifying affect regulation strategies. *Cognition and Emotion*, *13*, 277–303.
*Rusting, C. L., & DeHart, T. (2000). Retrieving positive memories to regulate negative mood: Consequences for mood-congruent memory. *Journal of Personality and Social Psychology*, *78*, 737–752.
*Rusting, C. L., & Nolen-Hoeksema, S. (1998). Regulating responses to anger: Effects of rumination and distraction on angry mood. *Journal of Personality and Social Psychology*, *74*, 790–803.
Ryff, C. D., & Singer, B. (1998). The contours of positive human health. *Psychological Inquiry*, *9*, 1–28.
Schimmack, U., Oishi, S., & Diener, E. (2002). Cultural influences on the relation between pleasant and unpleasant emotions: Asian dialectic philosophies or individualism–collectivism. *Cognition and Emotion*, *16*, 705–719.
*Shulman, T. E., Augustine, A. A., & Hemenover, S. H. (2006). Studies in affect regulation: Linking affective chronometry and repair ability. In A. V. Clark (Ed.), *Psychology of moods: New research* (pp. 117–142). Hauppauge, NY: Nova.
*Siemer, M. (2005). Mood-congruent cognitions constitute mood experience. *Emotion*, *5*, 296–308.

Swinkels, A., & Giuliano, T. A. (1995). The measurement and conceptualization of mood awareness: Monitoring and labeling one's mood states. *Personality and Social Psychology Bulletin*, *21*, 934–949.

Thayer, R. E. (1987). Energy, tiredness, and tension effects of a sugar snack versus moderate exercise. *Journal of Personality and Social Psychology*, *52*, 119–125.

Thayer, R. E., Newman, J. R., & McClain, T. M. (1994). Self-regulation of mood: Strategies for changing a bad mood, raising energy, and reducing tension. *Journal of Personality and Social Psychology*, *67*, 910–925.

*Totterdell, P., & Leach, D. (2001). Negative mood regulation expectancies and sports performance: An investigation involving professional cricketers. *Psychology of Sport and Exercise*, *2*, 249–265.

Thomsen, D. K., Melsen, M. Y., Vijdik, A., Summerlund, B., & Zachariae, R. (2005). Age and gender differences in negative affect: Is there a role for emotion regulation? *Personality and Individual Differences*, *38*, 1935–1946.

*Trask, P. C., & Sigmon, S. T. (1999). Ruminating and distracting: The effects of sequential tasks on depressed mood. *Cognitive Therapy and Research*, *23*, 231–246.