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### Effective regulation of affect: An action control perspective on emotion regulation

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## Effective regulation of affect: An action control perspective on emotion regulation

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The present review adopts an action control perspective on emotion regulation, contextualising the gap between emotion control goals (e.g., I want to remain calm) and emotional outcomes (e.g., anger, anxiety, and aggression) in terms of the broader literature on goal pursuit. We propose that failure to effectively regulate emotions can result from difficulties with the self-regulatory tasks of (i) identifying the need to regulate, (ii) deciding whether and how to regulate, and (iii) enacting a regulation strategy. Next we review evidence that a technique traditionally associated with regulating behavioural goals (forming implementation intentions or “if-then” planning) can help to overcome these difficulties. Meta-analysis indicated that forming implementation intentions is effective in modifying emotional outcomes, with a large effect relative to no regulation instructions ( $k = 21$ ,  $N = 1306$   $d_+ = 0.91$ ,  $95\% CI = 0.61$  to  $1.20$ ) and a medium-sized effect relative to goal intention instructions ( $k = 29$ ,  $N = 1208$ ,  $d_+ = 0.53$ ,  $95\% CI = 0.42$  to  $0.65$ ). Our conclusion is that research on emotion regulation might benefit from an action control perspective and the interventions that this perspective offers.

**Keywords:** Emotion regulation; Affect regulation; Action control; Implementation intentions.

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The question of how people regulate their emotions has scientific and societal significance and a vibrant research field has developed investigating the nature and effects of different forms of emotion regulation (for reviews, see Gross & Thompson, 2007; Koole, 2009; Webb, Miles, & Sheeran, 2012). Emotion regulation is studied by a broad range of disciplines from neuroscience (e.g., Berkman & Lieberman, 2009; Ochsner & Gross, 2008) to sociology (Wharton, 2009). Investigations pose questions that are fundamental to understanding human behaviour: how do people keep calm in stressful situations? (e.g., Mauss, Evers, Wilhelm, & Gross, 2006); how do emotions influence the goals that people strive to attain? (e.g., Tice, Bratslavsky, & Baumeister, 2001); when are feelings helpful and when are they a hindrance? (e.g., Blanchette & Richards, 2010); is happiness always associated with positive outcomes? (e.g., Gruber, Mauss, & Tamir, 2011). Problems with emotion regulation are “transdiagnostic” to the extent that they cut across a range of common clinical problems such as depression, anxiety, PTSD, and psychosis (Kring & Sloan, 2009) and there are a burgeoning number of self-help books that purport to deal with emotional problems like anger management and mood swings (e.g., Davies, 2009; Scott, 2001). Issues pertaining to emotion regulation are also popular with the media, with daily stories of the emotional outbursts of celebrities, sports stars, and politicians.

Emotion regulation has been defined as the set of automatic and controlled processes involved in the initiation, maintenance, and modification of the occurrence, intensity, and duration of feeling states (Eisenberg, Fabes, Guthrie, & Reiser, 2000; Gross & Levenson, 1993; Gross & Thompson, 2007). A wide range of strategies for emotion regulation have been identified. For example, Larsen and Prizmic (2004) identified 10 strategies for downregulating (reducing) negative affect (e.g., dealing with disappointment, keeping calm at the sight of a spider): (1) distraction (engaging in preoccupying activities to get one’s mind off a negative event or emotion), (2) suppression (trying to inhibit the expression or experience of a negative feeling), (3) venting (expressing the negative affect), (4) cognitive reappraisal (thinking about the emotion-eliciting event or the emotion in a different way), (5) downward social comparison (comparing oneself to others who are worse off), (6) problem-directed action (thinking about and acting on the problem responsible for the unpleasant mood), (7) self-reward (e.g., buying oneself a treat), (8) physical manipulations (e.g., exercise), (9) socialising (ideally with people who are not in the same mood), and (10) withdrawal (intentionally removing oneself from the emotion eliciting situation). Larsen and Prizmic also identified three strategies that are used to upregulate (increase) positive affect (e.g., generating excitement at the prospect of supervising a toddler’s birthday party): (1) gratitude

(e.g., counting one's blessings), (2) helping others (e.g., giving blood), and (3) expressing positive emotions (e.g., laughing).

Some of the key challenges confronting people who need to regulate their affect are deciding when to regulate, which strategy to use, and how to implement that strategy. This will not be news to scholars interested in the role of motivation in shaping behavioural outcomes. Indeed, a considerable body of research attests to the gap between goals and action (for reviews, see Sheeran, 2002; Sheeran & Webb, 2011; Webb & Sheeran, 2006). For example, despite their "good" intentions, dieters tend to regain weight (Kumanyika et al., 2000), patients with coronary heart disease do not adopt healthier lifestyles (Johnston, Johnston, Pollard, Kinmonth, & Mant, 2004), and people procrastinate over starting even important tasks (Tice, 1991). There is also evidence that people struggle to enact their emotion regulation goals. For example, although most people rate happiness as a very important goal (Diener, Suh, Smith, & Shao, 1995), disorders involving negative affect, such as depression and anxiety, are common (e.g., one in six people will experience severe depression during their lifetime; Kessler et al., 2003). An annual national survey in the United States indicated that only one-third of people describe themselves as "very happy" (Yang, 2008), and research in positive psychology (Seligman & Csikszentmihalyi, 2000) has found that fewer than one in five people are "flourishing", defined as high emotional well-being (Keyes, 2002). Failing to achieve emotion regulation goals also has implications for other goals. Happiness is associated with improved outcomes in terms of relationships, income, work, and health (see Lyubomirsky, King, & Diener, 2005, for a review), although excessive levels of happiness can have negative effects (e.g., Gruber et al., 2011). Relatedly, failure to effectively regulate emotions has been implicated not only in emotional disorders, but also in problems such as eating disorders and substance abuse disorder (Nolen-Hoeksema, Stice, Wade, & Bohon, 2007).

The gap between emotion regulation goals and felt experience is supported by a recent review of studies that manipulated emotion regulation using a strategy derived from Gross' process model of emotion regulation (Gross, 1998a, 1998b) and examined effects on emotional outcomes (Webb, Miles, et al., 2012). The process model distinguishes five emotion regulation processes on a temporal dimension according to when each one is deployed (for a review, see Gross & Thompson, 2007). Antecedent-focused processes occur before appraisals give rise to a full-blown emotional response. This category includes situation selection, situation modification, attentional deployment, and cognitive change. Response-focused processes, on the other hand, occur after the emotional responses are generated. This category includes response modulation, which typically refers to efforts to suppress

the expression or experience of emotion. Webb, Miles, and Sheeran observed relatively modest effect sizes across different emotion regulation processes: attentional deployment had no effect on emotional outcomes ( $d_+ = 0.00$ ), response modulation had a small effect ( $d_+ = 0.16$ ), and cognitive change had a small-to-medium effect ( $d_+ = 0.36$ ), according to Cohen's (1992) criteria for interpreting effect sizes. Thus, even when participants are explicitly instructed to try to regulate their emotions in a particular manner (i.e., participants hold intentions to regulate in a certain way), they often struggle to modulate emotional responses. Furthermore, in many instances people seem to be unaware that they struggle to control their emotions. For example, Miles, Webb, and Sheeran (2012) asked students to rate their regulation ability (e.g., "I can stop myself getting disgusted") on a 7-point scale from "not true of me" to "very true of me" before being instructed to regulate their emotional responses to a series of disgusting videos. There was no correlation between self-reported regulation ability and experience of disgust during the task ( $r = -0.04$ , *ns*). Taken together, these findings provide clear evidence that there is a gap between emotion regulation goals and emotional outcomes.

### AN ACTION CONTROL PERSPECTIVE ON EMOTION REGULATION

We argue that explanations of how and why people fail to achieve emotion regulation goals would benefit from an action control perspective. Given that research on emotion regulation has increased almost exponentially in recent years, one might expect that we are now closer to understanding how people achieve their emotional goals. However, contemporary perspectives rarely analyse why people fail to achieve emotion regulation goals and offer little prescription as to what they might do to overcome these problems. An action control perspective on emotion regulation could address both of these shortcomings. Drawing links between the self-regulation of action and the self-regulation of emotion is not a new idea. For example, Koole, van Dillen, and Sheppes (2010, p. 25) pointed out that "emotion regulation belongs to a larger family of processes whereby people exert control over their own behaviour" and that "emotion regulation research has drawn considerable inspiration from theories of human self-regulation and cognitive control". Tice and Bratslavsky (2000) also emphasised that "emotion regulation has many similarities to other regulatory tasks such as dieting, and abstaining from smoking, drugs, alcohol, ill-advised sexual encounters, gambling, and procrastination" (p. 149). Previous reviews have tended to focus on the interface between self- and emotion regulation (e.g., how emotions and emotion regulation influence self-regulation; Baumeister, Tice, & Zell, 2007; Tice & Bratslavsky, 2000) or the integration of

self-regulatory (or goal-driven) perspectives with other approaches (e.g., need- or person-oriented models; Koole et al., 2010). The issue of how research on the self-regulation of action provides insights into emotion regulation has rarely been considered. A notable exception is Tice and Bratslavsky's (2000) adoption of a systems theory approach (Carver & Scheier, 1981, 1982, 1990; Powers, 1973; Powers, Clark, & McFarland, 1960) to emotion regulation that points to the importance of three components: standards, monitoring, and (self-regulatory) strength. The present review seeks to complement and extend this approach by considering what we can learn about emotion regulation from an action-control perspective in more detail (Tice & Bratslavsky's review was relatively brief) and in the light of contemporary research on emotion regulation (it is now over 10 years since Tice & Bratslavsky's review was published). The present review also offers empirical support for an action control perspective by meta-analysing the effects of forming implementation intentions (Gollwitzer, 1993, 1999; Gollwitzer & Sheeran, 2006) on emotion regulation.

One of the key insights of an action control perspective is that goal pursuit typically involves a number of distinct but interrelated self-regulatory tasks. For example, control theory (Carver & Scheier, 1981, 1982) proposes two key tasks: (i) monitoring to identify discrepancies between desired and current rates of goal progress, and (ii) operating to reduce discrepancies. This distinction suggests that, at a broad level, people may fail to enact goals either because they fail to identify a discrepancy or because they do not act upon this discrepancy. Drawing on control theory (and other theoretical models, e.g., Heckhausen, 1987; Heckhausen & Gollwitzer, 1986, 1987; Myrseth & Fishbach, 2009), the action control perspective on emotion regulation subdivides the process of operating to reduce discrepancies into three broad self-regulatory tasks; (i) identifying the need to regulate, (ii) deciding whether and how to regulate, and (iii) enacting regulation. The three tasks, along with their associated subtasks, are depicted in Table 1.

### Identifying the need to regulate

According to a number of influential models of self-control, monitoring and obtaining feedback on goal progress is central to identifying the need to regulate (Ashford & Cummings, 1983; Carver & Scheier, 1981, 1982, 1990; Kluger & DeNisi, 1996; Powers, 1973; Powers et al., 1960). Monitoring involves periodically noting one's current state (e.g., levels of anxiety) and comparing these perceptions with salient reference values (e.g., I need to stay calm; Carver & Scheier, 1990). If a discrepancy between the current state and the reference state is identified, this indicates the need for regulation. Effective monitoring of goal progress therefore requires an appropriate

TABLE 1  
An action control perspective on emotion regulation

<i>Self-regulatory tasks</i>	<i>Subtasks</i>
Identify the need for regulation	Set reference value Monitor current state Construe discrepancy as requiring action
Decide whether and how to regulate	Believe that emotions can be changed Believe that one is capable of changing emotions (self-efficacy) Predict the development of the emotion Select an appropriate strategy Flexibly switch between strategies to maximise utility
Enact a regulation strategy	Identify and seize a suitable opportunity to regulate Possess sufficient resources (or select a resource-efficient strategy)

standard (or reference value) against which to evaluate current performance (Carver & Scheier, 1982; 1990). Koole et al. (2010) suggest that standards may be derived from verbal instructions about the desirability of certain emotional states (e.g., Muraven, Tice, & Baumeister's, 1998, Expt 3 told participants to avoid showing any amusement), task demands (e.g., people may try to ignore emotionally charged information that is irrelevant to the focal task; Van Dillen & Koole, 2007, 2009), by implicit or explicit beliefs about the utility of particular emotional states (e.g., that worry would be useful for avoiding certain threats; Tamir, Chiu, & Gross, 2007), or by more abstract theories that people hold about emotion regulation (e.g., that emotions are fixed and so should not be regulated; Tamir, John, Srivastava, & Gross, 2007). However, monitoring may break down if standards are either lacking or inappropriate. Models of emotion regulation frequently assume that people want to reduce negative emotions or increase positive emotions (Larsen, 2000), which is termed "hedonic" regulation. However, it is sometimes adaptive to feel negative emotions, whether this is because they are appropriate for the situation or because they assist with the pursuit of particular goal. For example, athletes may associate anxiety or anger with improved performance (Lane, Beedie, Devonport, & Stanley, 2011). Thus utilitarian perspectives on emotion regulation (those that do not necessarily assume that people only regulate emotions for hedonic reasons; e.g., Tamir, 2009; Tamir & Ford, 2009; Tamir, Chiu, et al., 2007; Tamir, Mitchell, & Gross, 2008) accept that it is sometimes adaptive for people to want to feel bad. Whether or not people's standards for emotion regulation reflect this idea is an open empirical question.

Standards also vary between individuals and are influenced by factors such as personality, culture, and emotional values. Certain personality factors or traits appear to be associated with setting inappropriate standards



(either too high or too low). For example, people with low self-esteem are less motivated to repair negative moods (Heimpel, Wood, Marshall, & Brown, 2002), perhaps because they feel undeserving of positive emotions (Wood, Heimpel, Manwell, & Whittington, 2009). The way in which people wish to experience and express emotions also varies between cultures. People from Eastern cultures tend to place a higher value on controlling their emotions than those in Western cultures (Mauss, Butler, Roberts, & Chu, 2010), which suggests that emotion regulation goals are also influenced by cultural factors. Finally, the value that people attach to particular emotions can influence their standards. People who, for example, place a high value on remaining calm (e.g., the serene attentional state of Samatha in Buddhists; Wallace, 1999) are more likely to hold a corresponding standard. Sometimes, however, these values can lead to paradoxical effects; strongly valuing happiness actually appears to lead to decreased happiness (Mauss, Tamir, Anderson, & Savino, 2011) due to the disappointment experienced when high standards of happiness are not met.

Having determined an appropriate standard, people must then monitor the relation between their current feeling state and that standard. The ability to monitor emotions is part of emotional intelligence (e.g., Salovey & Mayer, 1990) and is recognised as necessary for successful emotional functioning. Although the evidence to date is sparse, we suspect that monitoring (like many other cognitive and behavioural processes) varies on a continuum from effortful to relatively automatic (Moors & De Houwer, 2006). When people have extensive practice in regulating emotions this comparison and regulation process should be relatively automatic. However, in novel, challenging, or highly involving situations monitoring emotions may require more in the way of attentional and regulatory resources (Diefendorff & Gosserand, 2003; Ouellette & Wood, 1998). If monitoring is a precursor to successful regulation, then paying attention to emotional experiences should increase our success at enacting emotion regulation goals. In support of this idea, Moon and Berenbaum (2009) found that diminished attention to emotions was associated with binge eating (conceptualised as a disorder of emotion regulation), and that a manipulation designed to draw attention towards emotions (completing a mood checklist) decreased binge eating. These findings suggest that attending to emotions can facilitate successful goal enactment. However, concentrating on emotions has also been shown to lead to increased experience of those emotions (Webb, Miles, et al., 2012), and mood monitoring has been associated with lower psychological well-being (Wismeijer, van Assen, Sijtsma, & Vingerhoets, 2009). It may be the case that there is an optimal level of attention to emotions; too much attention (“ruminating”) or too little attention (“ignoring”) to emotions may prevent goals from being achieved. Future research might usefully investigate the

level of attention to emotion that is most beneficial, bearing in mind that this level may differ as a function of the person, the situation, and their interaction.

Even if a discrepancy is detected, the need for regulation might not be identified. Myrseth and Fishbach (2009) found that when potentially discrepant behaviours (e.g., eating a cookie when on a diet) could be construed as an isolated incident that did not lead participants to perceive a discrepancy between their behaviour and their goals and so identify the need to regulate. In contrast, framing situations in a way that highlighted the likely occurrence of the situation in the future (e.g., I have lapsed once, so I am likely to do so again) increased the likelihood that the person perceived a discrepancy between their current and desired actions. It is easy to imagine how this might translate into the emotional domain. For example, imagine a mother who catches herself shouting at her teenage child for returning home late. If the mother can contextualise this outburst as an isolated incident triggered by the child's behaviour then it may not be construed as discrepant with her goal to remain calm. However, if the outburst is construed as another instance of a general tendency to lose one's temper, then there is a clear discrepancy and thus a need to regulate.

In summary, an action control perspective on emotion regulation suggests that the first task in the effective regulation of emotions is identifying the need to regulate. This need to regulate arises when there is a discrepancy between people's current emotional state and their desired state as defined by their emotional standards. Difficulties can occur when the person (i) does not have appropriate standards against which to compare the current state, (ii) does not monitor the relation between the current and desired emotional state, or (iii) does not construe the discrepancy as requiring action.

### Deciding whether and how to regulate

Once people have identified that they need to regulate their emotions, they must decide whether and what to do about it. For people to attempt to regulate their emotions they must believe first that regulation will be effective. There are substantial individual differences in beliefs about whether emotions are changeable and these beliefs have been shown to influence regulation success. Tamir, John, et al. (2007) showed that whereas some people view emotions as malleable, others view emotions as fixed entities: people who believed that emotions were fixed had less confidence in their ability to regulate emotions and had poorer emotional outcomes. Therefore the evidence suggests that possessing a belief that emotions are changeable (or not) can influence whether people decide to act on an identified need to regulate. Second, people must believe that they have the

ability to enact the chosen strategy to change their emotions. This belief is termed self-efficacy (Bandura, 1977, 1997). If people do not believe that they are capable of controlling their emotions, then they are unlikely to attempt to do so. People who report having difficulty in regulating emotions have poorer emotional outcomes (e.g., past depression is associated with increased levels of self-reported emotion regulation difficulties; Ehring, Fischer, Schnulle, Bøsterling, & Tuschen-Caffier, 2008) and the perception of these difficulties might also impair regulation. Self-efficacy theory therefore predicts that people who do not believe that they will be successful at regulation will have lower motivation to regulate and will expend less effort doing so.

A final determinant of whether regulation is necessary is the predicted time course of the emotion. For example, if a discrepancy between current emotional state and desired emotional state has been identified, but the emotional response is predicted to be short-lived, then the person may decide that regulation is not necessary. However, if the person predicts that their emotional response will be long-lasting or will become more intense, they may decide to regulate even if the discrepancy is small. Unfortunately people are often inaccurate at making predictions about their future emotions (or “affective forecasting”), and there is evidence that people tend to overestimate the duration and intensity of their emotional responses (Wilson & Gilbert, 2005). Such findings suggest that people may not always make optimal decisions about whether regulation is necessary. Our ability to predict emotions accurately is also influenced by individual differences, such as personality (Hoerger & Quirk 2010) and the experience of psychological disorders (Wenze, Gunthert, & German, 2012). Inaccurate predictions about the time-course of emotions may lead to over- or under-regulation and thus difficulties in affective forecasting could lead to failure to achieve emotional goals.

Having decided to regulate, the next self-regulatory task is deciding how to do so. Most goals can be achieved in a variety of different ways (e.g., the goal to lose weight can be achieved by exercising, regulating food intake, or both, cf. Bagozzi & Kimmel, 1995) and effective goal pursuit requires that the person select an appropriate means to attain the goal (Aarts & Dijksterhuis, 2000; Austin & Vancouver, 1996; Wegner & Vallacher, 1986). In the case of emotion regulation, too, there are typically a large number of potential means by which emotions could be controlled. In one study, for example, participants reported 162 different strategies that they could use to make themselves feel better (Parkinson & Totterdell, 1999). It might be assumed that, through a lifetime of experiencing emotions and the emotional consequences of different actions and events, people would acquire accurate knowledge about which strategies are the most effective at changing their emotions. However, the evidence suggests that people often

have poor knowledge about how events, behaviours, and actions will influence their emotions (Wilson & Gilbert, 2003, 2005). For instance, Dunn, Aknin, and Norton (2008) asked participants to predict which of two options would make them happier: spending a sudden windfall of money on themselves, or spending it on someone else. Approximately two thirds of the participants voted that spending the money on themselves would make them happier. However, when the researchers gave \$20 to a different group of participants and instructed them to spend it on themselves or on others, the participants who spent money on others were happier than those who spent it on themselves.

Choosing an effective regulation strategy is all the more difficult because a strategy that is effective in one situation may not be effective in other situations (Gross & Thompson, 2007). If a person is anxious about an upcoming exam, for example, then spending a few minutes distracting themselves by thinking about a holiday that they are going to take once the exam is over might help to relieve their negative emotions. However, if a person is anxious *during* the exam, this same strategy may interfere with the focal task of doing well on the exam. Similarly, the effectiveness of strategies for emotion regulation may depend on whether individuals pursue either short-term or long-term goals in a given situation. For example, suppression might help to avoid feeling offended by one's partner over dinner, but perspective taking might be a better strategy for managing negative emotions with respect to the long-term goal of having a good relationship. Strategies may also be effective for some emotions but not for others (Larsen & Prizmic, 2004). A strategy that effectively modifies a sad mood may not work for anxiety, and it is possible that some strategies may have rebound effects on other emotions. For example, if an individual is caring for a relative with a terminal illness, then going out for the evening may relieve their stress but also increase their guilt. This example also highlights the difficulty of regulation when more than one emotion needs to be regulated. In general, regulation is more difficult when people hold multiple goals and seek a "multifinal" means (a means that can advance more than one goal, Kopetz, Faber, Fishbach, & Kruglanski, 2011). Many goals do not lend themselves to multifinal means (e.g., the goals to socialise with friends and care for a relative) and there is evidence that conflict between goals is associated with rumination rather than action (Emmons & King, 1988). In short, regulation is likely to be more difficult when multiple emotions or goals are involved.

Finally there is evidence that being able to choose strategies flexibly is necessary for successful regulation. Cognitive inflexibility has been associated with the use of ineffective strategies (Davis & Nolen-Hoeksema, 2000) and Bonanno and colleagues found that students who were able to both enhance *and* suppress their emotions showed better

psychological adjustment in the 2 years following the 9/11 terrorist attacks (Bonanno, Papa, Lalande, Westphal, & Coifman, 2004; see also Westphal, Seivert, & Bonnano, 2010). Applying strategies flexibly might also involve being able to switch between strategies when required, e.g., to balance short-term requirements with the longer-term pursuit of the goal (Crowley & Siegler, 1993). Sheppes, Scheibe, Suri, and Gross (2011), for example, found that healthy individuals switched between different emotion regulation strategies on a trial-by-trial basis according to the intensity of the presented negative stimuli. This suggests that people are capable of adapting their approach quickly to the needs of the situation, and that this on-line flexibility is important for effective emotion regulation.

In summary, the action control perspective on emotion regulation suggests that the second task in the effective regulation of emotions is deciding whether and how to regulate. Difficulties can occur when the person (i) does not believe that emotions are malleable, (ii) does not believe that they are capable of changing emotions (self-efficacy), (iii) chooses a strategy that is ineffective for the emotion or situation, or (iv) is unable to flexibly switch between strategies in order to maximise utility.

### Enacting the strategy

Once a course of action has been chosen the individual must then enact the intended response. Research on the intention-behaviour gap suggests that, even when people have decided how to act, they often struggle to implement the strategy that they have chosen (for reviews, see Sheeran, 2002; Webb & Sheeran, 2006). The first task in implementing a chosen emotion regulation strategy is identifying and seizing a suitable opportunity to use that strategy. For example, there is evidence that identifying the situations that trigger anxiety (e.g., by completing a diary to identify when, where, and with whom one feels anxious) can help people to reduce their anxiety (at least when accompanied by a plan specifying how to deal with those situations; Varley, Webb, & Sheeran, 2011). One reason why identifying and seizing opportunities to regulate can be difficult is that the opportunity may only be available for a short period of time. For example, a person intending to reappraise an emotional situation must reinterpret the situation quickly, before the onset of the full-blown emotional response. If reappraisal is initiated after the emotional response has already been triggered, then it is likely to be less effective (Sheppes & Meiran, 2007). In short, there may be a “critical moment” where regulation efforts are likely to be most effective (likely, early in the emotion generative process) and effective emotion regulation requires that the person quickly identify and seize that opportunity.

People may also struggle to seize good opportunities to regulate their emotions because they lack the resources to do so. Urry and Gross (2010) propose that different resources are required for different regulatory strategies. For example, while successfully enacting cognitive change may require adequate working memory in order to be enacted successfully, situation modification may instead require the resource of social support. Access to these resources varies across individuals (e.g., older adults have increased social support resources, but lower working memory resources; Opitz, Gross, & Urry, 2012), and the likelihood of successfully enacting a strategy will depend on the availability to the individual of the resources upon which that strategy relies.

One resource which may be required for all strategies is that of self-control. The Strength Model of Self-Control (Baumeister, Vohs, & Tice, 2007) suggests that the availability of regulatory resources influences the effectiveness of emotion regulation efforts. For example, Muraven et al. (1998, Expt 3) found that participants who tried to suppress thoughts of a white bear were subsequently less able to suppress their amusement when watching two funny videos than were participants who were not asked to suppress their thoughts (these participants completed difficult maths puzzles instead). The idea is that exerting self-control in the initial thought suppression task led to a temporary depletion of limited self-regulatory resources (an effect termed “ego-depletion”) meaning that participants had less self-control resources at their disposal when confronted with the goal to regulate their emotions. There is, however, evidence that some types of regulation are more resource-efficient than others. Sheppes and Meiran (2008) found that when participants were given instructions to reappraise or distract themselves halfway through a sad film, distraction consumed fewer resources (as evidenced by better subsequent performance on the Stroop test) than did reappraisal. There is also accumulating support for the idea that emotion regulation goals can be initiated and run to completion automatically (for reviews, see Bargh & Williams, 2007; Mauss, Bunge, & Gross, 2007). For example, Mauss, Cook, and Gross (2007) found that exposing participants to words associated with emotion control (e.g., suppress, hide, conceal) in a scrambled sentence task reduced the experience of anger following provocation. The implication is that more automatic forms of emotion regulation could avoid the cognitive and physiological costs associated with conscious, effortful forms of emotion regulation (Richards, 2004; Richards & Gross, 1999, 2000) because they draw less upon limited regulatory resources.

People who have better self-control skills or exert self-control more regularly may have a greater pool of self-control resources than others (Muraven, Collins, Shiffman, & Paty, 2005) and thus be more capable of persisting at demanding tasks such as emotion regulation. Similarly, some



people may be better able to regulate their emotions in an efficient manner that does not draw on limited regulatory resources. Niven, Totterdell, Miles, Webb, and Sheeran (2012) found that individuals who reported that they were good at emotion regulation were able to achieve a positive mood with less cost to their self-regulatory resources than were participants who reported being poor at emotion regulation. Niven et al.'s interpretation of these findings was that good emotion regulators have developed relatively automatic (i.e., efficient) means of regulating their emotions.

In summary, the action control perspective on emotion regulation suggests that the third task in the effective regulation of emotions is initiating the chosen regulation strategy. Difficulties can arise when the person does not (i) identify an opportunity or seize it in a timely manner, or (ii) possess sufficient resources to enact the strategy.

### Action control perspective: Concluding comments

The action control perspective highlights the complexity of emotion regulation and the numerous tasks and subtasks that need to be coordinated in order to ensure effective regulation. It is therefore not surprising that merely having strong goal intentions to regulate one's emotions is not necessarily sufficient to secure the desired emotional outcomes (recall that Webb, Miles, et al., 2012, reported relatively modest effects of explicit regulation instructions on emotional outcomes). It is recognised that there are a multitude of factors that can determine whether, when, and for whom emotion regulation will be successful. By considering the process of emotion regulation as one that involves multiple interdependent tasks, rather than as a single act of regulation, we present a framework within which the diverse factors that influence emotion regulation can be integrated and in which their interactions can be considered.

The action control perspective also affords new insights into interventions to promote effective regulation. First, it highlights the multiple regulatory tasks that could potentially be targeted by interventions (from helping people to set appropriate standards, to encouraging people to persist until their goal has been achieved). Second, if the process of regulating emotions is viewed as analogous to the process of achieving any other goal, then interventions that have proven effective in helping people to achieve behavioural goals might also help them to achieve emotion regulation goals. Specifically, research into the intention-behaviour gap has developed a number of volitional interventions that can address the difficulties associated with goal striving and increase the correspondence between goals and action; such interventions may hold the potential of helping people to deal with the self-regulatory tasks associated with emotion regulation. Perhaps the best validated volitional intervention is forming if-then plans or

*implementation intentions* (Gollwitzer, 1993, 1999; Gollwitzer & Sheeran, 2006).

## IMPLEMENTATION INTENTIONS

Implementation intentions derive from the Rubicon Model of Action Phases (MAP: Heckhausen, 1987; Heckhausen & Gollwitzer, 1986, 1987), which suggests that motivation is just the starting-point for regulating unwanted responses. The MAP suggests that effective self-control requires an additional step wherein the person also decides when, where, and how to act in advance (i.e., forms an implementation intention). Implementation intentions have the format “*If situation x is encountered, then I will initiate response y!*” and link a critical situation (in the if-part of the plan) with a suitable goal-directed response (in the then-part of the plan). Implementation intentions are therefore distinct from goal intentions that specify a desired performance or outcome and have the format of: “*I intend to reach z!*” For example, “*I intend to stay calm*”. Goal intentions only designate desired end-states that the individual feels committed to attain, while implementation intentions create a commitment to respond to a specified critical situation in a planned, goal-directed manner. For example, “*If I am provoked, then I will pause and breathe!*” Implementation intentions are thus formed in the service of attaining respective goal intentions (Sheeran, Webb, & Gollwitzer, 2005).

Although a large body of research attests to the benefits of forming implementation intentions for promoting the achievement of behavioural goals (review by Gollwitzer & Sheeran, 2006), the idea that forming implementation intentions might also be an effective way to regulate emotion is much newer and no review to date has considered whether forming implementation intentions can also help people to achieve emotion regulation goals. There is good evidence that forming implementation intentions can help people to deal with a range of self-regulatory tasks including: (i) identifying and seizing opportunities and (ii) promoting efficient initiation of the intended strategy. A comprehensive review is provided by Gollwitzer and Sheeran (2006), but some examples follow. Gollwitzer and Brandstätter (1997, Study 3) demonstrated that forming implementation intentions could help people to seize opportunities to act in a study concerned with counteracting racial prejudice. Participants were asked to take a convincing counter position towards xenophobic remarks made by a confederate presented on videotape. In addition, one group of participants was asked to form an implementation intention to commit themselves to counter-argue at preselected suitable opportunities. It was found that participants who formed an implementation intention seized suitable opportunities to express themselves more immediately (i.e., closer to



the specified time) than did participants who had familiarised themselves with these favourable opportunities and participants who were simply told that they would have to counter-argue.

Webb and Sheeran (2003) provided evidence that forming implementation intention leads to relatively efficient goal striving that conserves self-regulatory capacity. Participants performed the Stroop task for 10 minutes under either goal intention (*name the ink colour of each word as quickly as possible*) or implementation intention instructions (“*As soon as I see the word I will ignore its meaning [for example, by concentrating on the second letter only] and I will name the colour ink it is printed in!*”). Next, participants were asked to work on a series of puzzles that, unbeknown to the participants, were unsolvable. The main dependent variable was how long participants persisted on the puzzles. As expected, participants who completed the Stroop task under standard instructions gave up on the puzzles more quickly than participants who formed implementation intentions, suggesting that performing self-control tasks under if-then planning instructions does not deplete self-regulatory capacity. In short, forming implementation intentions is likely to help people with the third task identified by the action control perspective—enacting the intended regulation strategy.

### Mechanisms of implementation intention effects

Research on the processes underlying the effect of forming implementation intentions points to two psychological processes that mediate the effects of if-then planning on goal attainment. First, by forming an implementation intention, the mental representation of the selected opportunity becomes highly activated, and hence more accessible. For example, Aarts, Dijksterhuis, and Midden (1999) found that participants who formed an implementation intention specifying when, where, and how they would collect a coupon for a subsequent experiment responded more quickly to words representing the location of the coupon (left, corridor, swing door, red, and fire-hose) in an ostensibly unrelated language task when compared to participants who also intended to collect the coupon, but who formed an irrelevant implementation intention (about how they would spend the coupon). Crucially, response latencies to the words representing the specified opportunity mediated the beneficial effect of forming implementation intentions on the likelihood of coupon collection. Since Aarts et al. a number of studies have demonstrated heightened cue accessibility (e.g., Parks-Stamm, Gollwitzer & Oettingen, 2007; Webb & Sheeran, 2007, 2008) and the consequent improved detection of good opportunities to act. For example, Varley et al. (2011) found that participants who planned to use a self-help exercise when they experienced feelings of anxiety (e.g., *If I feel*

*stressed, then I will use my breathing tactic to relax!*) reported being better able to detect triggers of anxiety than participants who did not make a plan (see also, Webb & Sheeran, 2004; Wieber & Sassenberg, 2006). Forming implementation intentions can therefore help people to initiate goal striving because they are better able to detect good opportunities to act.

When people form implementation intentions they also select, in advance, a suitable response to the identified opportunity. By so doing, a strong linkage is forged between the specified opportunity (the if-part of the plan) and the intended response (the then-part of the plan). For example, forming the plan “*And if I see blood, then I will take the perspective of a physician!*” (Schweiger Gallo, McCulloch, & Gollwitzer, 2012) should create a strong link between blood (the situational cue) and perspective taking (the intended response) that parallels the associations formed via frequent and consistent experience (e.g., that one might expect to observe among medics). The second psychological process engendered by implementation intention formation is, therefore, a strong association between the specified opportunity and the intended response. Evidence in this regard was provided by Aarts and Dijksterhuis (2000) who found that Dutch students who formed implementation intentions specifying when, where, and how to travel to five locations around the city selected modes of transport in response to locations (a) more quickly than did participants who did not form a plan and (b) as quickly as participants who possessed learned, habitual associations between the particular locations and modes of transport. Webb and Sheeran (2007, 2008) went a step further and showed that the strength of association between opportunity and response simultaneously (along with cue accessibility) mediated the effect of forming implementation intentions on goal achievement.

The consequence of strong opportunity–response links is that control of the specified response is delegated to the specified opportunity that triggers the planned response in a relatively automatic manner. That is, action initiation under implementation intentions is relatively immediate (Gollwitzer & Brandstätter, 1997), efficient (Brandstätter, Lengfelder, & Gollwitzer, 2001), redundant of conscious awareness (Bayer, Achtziger, Gollwitzer, & Moskowitz, 2009), and does not tax self-control resources (Webb & Sheeran, 2003); thereby facilitating a number of the self-regulatory tasks associated with effective emotion regulation. Returning to Schweiger Gallo, McCulloch, et al.’s (2012) example above, participants who formed an if-then plan had decided, in advance, how they would regulate (“... *then I will take the perspective of a physician!*”) and had tied this response to the critical opportunity (“*If I see blood*”). By so doing, participants were likely to quickly and easily identify and seize a suitable opportunity to regulate their emotions; the need for self-regulatory resources is obviated by the relatively automatic fashion with which planned responses are triggered (Gollwitzer &

Schaal, 1998). Finally, it is worth noting that the two mechanisms underlying implementation intention effects—heightened cue accessibility and strong cue–response links—may be differentially important depending on the nature of the intervention. Parks-Stamm et al. (2007) demonstrated, for example, that implementation intentions could achieve their effects by one or other mechanism (or both).

## REVIEW OF STUDIES INVESTIGATING THE EFFECT OF FORMING IMPLEMENTATION INTENTIONS AS A STRATEGY FOR REGULATING EMOTIONS

In early 2012 we conducted a systematic review to investigate the effect of forming implementation intentions as a strategy for emotion regulation. We conducted computerised searches of social scientific databases (Web of Science, PsycINFO, UMI Dissertation Abstracts) using the search terms “implementation intention”/plan AND emotion/mood/affect. Reference lists in each article were evaluated for inclusion and authors were contacted and requests were made for unpublished and in-press studies. Studies were deemed suitable for inclusion if participants were asked to form implementation intention designed to target (i) emotional outcomes or (ii) a behaviour that is hypothesised to be influenced by emotions. Studies that did not involve implementation intention instructions (e.g., Eder, Rothermund, & Proctor, 2010) or that did not target emotional outcomes or a behaviour expected to be influenced by emotions (e.g., Masicampo & Baumeister, 2011) were excluded. In addition, the effect of forming implementation intentions had to be compared to conditions where no relevant planning instructions were provided. Suitable studies typically either gave participants (a) no instructions (e.g., Sheeran, Aubrey, & Kellett, 2007, asked participants in the control condition simply to complete a questionnaire), (b) goal intention instructions (e.g., Webb, Sheeran, et al., 2012, asked participants in the goal intention condition to try to stay in a positive mood over the next week), or (c) irrelevant planning instructions (e.g., Eder, 2011, compared the effects of congruent and incongruent planning instructions on the Simon task). Additionally, we computed effect sizes for the comparison between goal intention and no instruction conditions (among studies that included both types of comparison condition) in order to evaluate the effects of explicit regulation instructions on emotional outcomes. In total, 30 studies were located that could be included in the review. These studies provided 21 comparisons of implementation intention and control instructions, 29 comparisons of implementation intention and goal intention instructions, and 15 comparisons of goal intention and control instructions. Tables 2, 3, 4, and 5 present the characteristics and effect sizes for each study included in the review.

Studies of forming implementation intentions as a strategy for regulating emotional outcomes could be subdivided into: (i) studies investigating effects on specific emotions, typically disgust (e.g., Schweiger Gallo, McCulloch, et al., 2012; see Table 2), fear (e.g., Schweiger Gallo & Gollwitzer, 2007; see Table 3), and anxiety (e.g., Varley et al., 2011; see Table 4), and (ii) studies that investigate whether forming implementation intentions can help people to control the effect of affect on decision making (e.g., Webb, Sheeran, et al., 2012), action tendencies (e.g., Eder, 2011), or work performance (e.g., McCormack, Sheeran, & Totterdell, 2010) (see Table 5). The next section reviews studies in each of these categories.

To compute the sample-weighted average effect of implementation intentions as a strategy for emotion regulation, we meta-analysed the effect sizes from the primary studies (see Table 3). Where studies examined more than one outcome (e.g., Schweiger Gallo & Gollwitzer, 2007, measured valence, arousal, and dominance) or outcomes at more than one time-point (e.g., McCormack et al., 2010, measured outcomes weekly, for 5 weeks following the intervention), the effect sizes within each study (across outcomes and/or time-points) were computed prior to inclusion in the main data set. This procedure captures the richness of the data while maintaining the independence of samples that is central to the validity of meta-analysis (Hunter & Schmidt, 1990). The only exception was when studies explicitly specified that their instructions were designed to influence one particular outcome. For example, Schweiger Gallo, McCulloch, et al. (2012) targeted the regulation instructions towards either valence (Study 1) or arousal (Study 2). Intention-to-treat analyses (i.e., analyses based on initial treatment assignment and not on whether participants complied with the treatment) were used wherever possible. For example, Sheeran et al. (2007) posted clients attending an initial mental health appointment a questionnaire along with their appointment letter. For one-half of the participants this questionnaire asked participants to form an implementation intention. Intention-to-treat analyses involve comparing attendance rates between participants who received the augmented questionnaire with those who received the standard questionnaire (regardless of whether or not participants returned the questionnaire).

Effect sizes were computed separately for comparisons with no instruction conditions versus comparisons with goal intention conditions. The two studies that did not include a goal intention or no instruction condition (Eder, 2011; Parks-Stamm, Gollwitzer, & Oettingen, 2010) were excluded from the meta-analysis, but are included in Table 2 for information. Additionally we computed effect sizes for the comparison between goal intention and no instruction conditions. Where studies included multiple planning and comparison conditions, implementation intention instructions were compared only to relevant control instructions

(e.g., McCormack et al., 2010, compared interpersonal implementation intention instructions to interpersonal goal intention instructions while intrapersonal implementation intention instructions were compared to intrapersonal goal intention instructions). Whenever multiple comparisons from one experiment led to the same participants being represented in more than one effect size, we adjusted the  $N$  for each group accordingly when calculating the standard error (i.e., if control instructions were compared to both interpersonal and intrapersonal implementation intention instructions, we computed effect sizes for both comparisons, but halved the  $N$  for the control group when calculating the standard error; see Higgins & Green, 2009). Computations were undertaken using Schwarzer's (1988) META program and weighted average effect sizes ( $d_+$ ) were based on a random effects model because studies were likely to be "different from one another in ways too complex to capture by a few simple study characteristics" (Cooper, 1986, p. 526). Effect sizes were interpreted using Cohen's (1992) guidelines. According to Cohen,  $d = .20$  should be considered a "small" effect size,  $d = .50$  is a "medium" effect size, whereas  $d = .80$  is a "large" effect size.

### The effect of forming implementation intentions on disgust

To date, 10 studies examined the effect of forming implementation intentions on disgust (see Table 2), though 5 of these are unpublished pilot studies by the same author (Hallam et al., 2012). Studies typically exposed participants to a series of disgusting images (e.g., Hallam et al., 2012; Schweiger Gallo, Keil, McCulloch, Rockstroh, & Gollwitzer, 2009), videos (Christou-Champi, Farrow, & Webb, 2012), or sounds (e.g., Schweiger Gallo, Fernández-Dols, Álvaro, & Gollwitzer, 2012). Before being exposed to the emotional stimuli participants were typically randomly allocated to instructions simply to look at the images (control condition), to try to regulate their responses (goal intention condition, e.g., "*I will not get disgusted!*"), or to form implementation intentions. Implementation intention instructions ranged from if-then plans designed to suppress emotion (e.g., "*If I see suppress, then I block out all bad feelings and just stay cool!*" Hallam et al., 2012; or "*If I see blood, then I will stay calm and relaxed!*" Schweiger Gallo et al., 2009, Study 1) to plans directing participants to reappraise the image (e.g., "*If I see reappraise, then I tell myself these are just pixels on a screen and the picture can't get to me!*" Hallam et al., 2012) or to take a different perspective in relation to the image ("*And if I see blood, then I will take the perspective of a physician!*" Schweiger Gallo, McCulloch, & Gollwitzer, 2012). Participants typically rated their emotional response to the disgusting stimuli (e.g., using Self-Assessment Manikin scales; Schweiger Gallo et al., 2009) or participants' reactions were videotaped and later coded

TABLE 2  
Studies of the impact of implementation intention formation on disgust

Author(s)	Participants	Goal/target emotion	Dependent variable	Experimental condition	Control condition	N <sub>exp</sub>	N <sub>cont</sub>	d
Christou-Champi, Farrow, and Webb (2011) <sup>a</sup>	Undergraduate students	Downregulate expressions of disgust	Observer rated disgust	Implementation intention	No instruction	18	18	1.92***
				Goal intention	Goal intention	18	18	-0.28 (ns)
				Implementation intention	Implementation intention	18	18	2.16***
Hailam et al. (2012, Study 2) <sup>a</sup>	Undergraduate students	Downregulate disgust	Heart rate variability	Goal intention	Goal intention	18	18	0.83*
				Implementation intention	Implementation intention	18	18	0.10 (ns)
				Goal intention	Goal intention	18	18	0.51 (ns)
Hailam et al. (2012, Study 3) <sup>a</sup>	Undergraduate students	Downregulate sadness and disgust	Blood glucose levels	Implementation intention	Implementation intention	18	18	0.48 (ns)
				Goal intention	Goal intention	18	18	0.48 (ns)
				No instruction	No instruction	18	18	0.00 (ns)
Hailam et al. (2012, Study 4) <sup>a</sup>	Undergraduate students	Downregulate disgust	Affect	Implementation intention	Implementation intention	9	8	0.11 (ns)
				Arousal	Implementation intention	9	8	0.24 (ns)
				Valence	Implementation intention	9	8	-0.31 (ns)
Hailam et al. (2012, Study 5) <sup>a</sup>	Undergraduate students	Downregulate disgust	Affect	Implementation intention	Goal intention	13	13	0.33 (ns)
				Arousal	Goal intention	13	13	0.71 (ns)
				Difficulty	Goal intention	13	13	0.37 (ns)
Hailam et al. (2012, Study 6) <sup>a</sup>	Undergraduate students	Downregulate disgust	Affect	Implementation intention	Goal intention	10	9	0.05 (ns)
				Arousal	Goal intention	10	9	0.01 (ns)
				Difficulty	Goal intention	10	9	0.22 (ns)
Hailam et al. (2012, Study 7) <sup>a</sup>	Undergraduate students	Downregulate sadness and disgust	Affect	Implementation intention	Goal intention	10	10	-0.13 (ns)
				Arousal	Goal intention	10	10	0.25 (ns)
				Valence	Goal intention	10	10	0.14 (ns)
Hailam et al. (2012, Study 8) <sup>a</sup>	Undergraduate students	Downregulate sadness and disgust	Affect	Implementation intention	Goal intention	9	9	-0.03 (ns)
				Arousal	Goal intention	9	9	0.05 (ns)
				Difficulty	Goal intention	9	9	0.22 (ns)
Schweiger Gallo et al (2009, Study 1)	Female undergraduate students	Downregulate disgust in response to pictures	Arousal as measured by the Self-Assessment Manikin (SAM)	Implementation intention	No instruction	18	18	1.12**
				Goal intention	Goal intention	18	18	0.90**
				Implementation intention	No instruction	18	18	0.19 (ns)
Schweiger Gallo, McCulloch, & Gollwitzer (2012, Study 1)	Female undergraduate students	Downregulate disgust in response to pictures	Valence as measured by the Self-Assessment Manikin (SAM)	Implementation intention	No instruction	18	18	1.29***
				Goal intention	Goal intention	18	18	0.81*
				Implementation intention	No instruction	18	18	0.51 (ns)
Schweiger Gallo, McCulloch, & Gollwitzer (2012, Study 1)	Female undergraduate students	Downregulate disgust in response to pictures	Arousal as measured by the Self-Assessment Manikin (SAM)	Implementation intention	No instruction	18	18	0.60 (ns)
				Goal intention	Goal intention	18	18	0.45 (ns)
				Implementation intention	No instruction	18	18	0.19 (ns)

(Continued)

TABLE 2  
Continued

Author(s)	Participants	Goal/target emotion	Dependent variable	Experimental condition	Control condition	N <sub>exp</sub>	N <sub>cont</sub>	d
Schweiger Gallo, McCulloch, & Gollwitzer (2012, Study 2)	Female undergraduate students	Downregulate disgust in response to pictures	Valence as measured by the Self-Assessment Manikin (SAM)	Implementation intention Goal intention	No instruction Goal intention	12	12	0.73 (ns) 0.55 (ns)
			Arousal as measured by the Self-Assessment Manikin (SAM)	Implementation intention Goal intention	No instruction Goal intention	12	12	0.12 (ns) 1.15** 1.21**
Schweiger Gallo et al (2012) <sup>a</sup>	Undergraduate students	Downregulate feelings of 'grima'	Valence as measured by the Self-Assessment Manikin (SAM) Arousal as measured by the Self-Assessment Manikin (SAM)	Implementation intention Implementation intention	No instruction Goal intention	12	12	-0.02 (ns) 0.60*
			Valence as measured by the Self-Assessment Manikin (SAM) Arousal as measured by the Self-Assessment Manikin (SAM)	Implementation intention	Goal intention	20	24	0.70*

<sup>a</sup>Data for studies marked with superscript a are unpublished. Interested readers can access these unpublished datasets by contacting the lead authors: Spyros Christou-Champi, Academic Clinical Psychiatry, The University of Sheffield, The Longley Centre, Norwood Grange Drive, Sheffield, UK, S5 7JT, e-mail: mdq09sec@sheffield.ac.uk; Glyn Hallam, Academic Clinical Psychiatry, The University of Sheffield, The Longley Centre, Norwood Grange Drive, Sheffield, UK, S5 7JT, e-mail: g.hallam@sheffield.ac.uk; Inge Schweiger Gallo, Departamento de Psicología Social, Facultad de Ciencias Políticas y Sociología, Campus de Somosaguas, 28223 Pozuelo de Alarcón, Madrid, Spain, e-mail: ingesg@cps.ucm.es. \* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$ .



for expressions of emotionality (e.g., Christou-Champi et al., 2012). Christou-Champi et al. also measured the amount of effort expended in regulation by assessing heart rate variability (HRV) and blood glucose levels before and after the regulation task (Gailliot & Baumeister, 2007; Gailliot et al., 2007; Segerstrom & Nes, 2007).

The sample-weighted average effect of forming implementation intentions versus receiving no instructions on the regulation of disgust was  $d_+ = 1.07$  with a 95% confidence interval from 0.70 to 1.44, based on four comparisons and a total sample size of 132 participants (see Table 6). The sample-weighted average effect of forming implementation intentions versus goal intentions on the regulation of disgust was  $d_+ = 0.46$  with a 95% confidence interval from 0.21 to 0.72, based on 10 comparisons and a total sample size of 276 participants.

### The effect of forming implementation intentions on fear

Studies investigating the effect of forming implementation intentions on fear (see Table 3) have adopted similar paradigms to those used to investigate the regulation of disgust. Typically participants are exposed to a fear-inducing stimulus (e.g., weapons, Azbel-Jackson, 2012; or pictures of spiders for participants with spider phobia, Schweiger Gallo & Gollwitzer, 2007; Schweiger Gallo et al., 2009, Study 3) under instructions to regulate responses (e.g., “*I will not get frightened!*”, Schweiger Gallo & Gollwitzer, 2007). Another group of participants are typically asked to form an implementation intention (e.g., “*If I see a weapon, then I will keep calm and relaxed!*” Azbel-Jackson, 2012; or “*If I see a spider, then I will ignore it!*” Schweiger Gallo et al., 2009). In addition to self-report measures of emotional experience, one study measured event related potentials (ERP) as an additional physiological index of fear (Schweiger Gallo et al., 2009, Study 3).

The sample-weighted average effect of forming implementation intentions versus receiving no instructions on the regulation of fear was  $d_+ = 1.26$  with a 95% confidence interval from 0.95 to 1.58, based on 6 comparisons and a total sample size of 202 participants (see Table 6). The sample-weighted average effect of forming implementation intentions versus goal intentions on the regulation of fear was  $d_+ = 0.86$  with a 95% confidence interval from 0.54 to 1.19, based on five comparisons and a total sample size of 162 participants.

### The effect of forming implementation intentions on anxiety

Studies have investigated the effect of forming implementation intentions on a number of different forms of anxiety (see Table 4), including social anxiety



TABLE 3  
Studies of the impact of implementation intention formation on fear

<i>Author(s)</i>	<i>Participants</i>	<i>Goal/target emotion</i>	<i>Dependent variable</i>	<i>Experimental condition</i>	<i>Control condition</i>	<i>Nexp</i>	<i>Ncont</i>	<i>d</i>
Azbel-Jackson (2012, Study 1) <sup>a</sup>	Undergraduate students	Downregulate fear following exposure to weapons	Arousal as measured by the Self-Assessment Manikin (SAM)	Implementation intention	No instruction	20	20	0.92**
				Goal intention	Goal intention	20	20	0.70*
Azbel-Jackson (2012, Study 2) <sup>a</sup>	Undergraduate students	Downregulate fear following exposure to weapons	Arousal as measured by the Self-Assessment Manikin (SAM)	Implementation intention	No instruction	20	20	0.20 (ns)
				Goal intention	Goal intention	30	30	1.68***
Schweiger Gallo & Gollwitzer (2007)	Female undergraduate students with spider fear	Downregulate fear in response to pictures of spiders	Valence as measured by the Self-Assessment Manikin (SAM)	Implementation intention	No instruction	15	15	1.37***
				Goal intention	Goal intention	15	14	1.19**
				Implementation intention	No instruction	14	15	0.20 (ns)
				Goal intention	Goal intention	15	15	1.31**
				Implementation intention	No instruction	15	14	1.44***
				Goal intention	Goal intention	14	15	0.12 (ns)
Schweiger Gallo et al (2009, Study 2)	Female undergraduate students with spider fear	Downregulate fear in response to pictures of spiders	Dominance as measured by the Self-Assessment Manikin (SAM)	Implementation intention	No instruction	15	15	0.83*
				Goal intention	Goal intention	15	14	1.37**
				Implementation intention	No instruction	14	15	-0.18 (ns)
				Goal intention	Goal intention	18	15	1.16**
				Implementation intention	No instruction	18	18	0.65*
				Goal intention	Goal intention	17	15	1.27***
Schweiger Gallo et al (2009, Study 3)	Female undergraduate students with spider fear	Downregulate fear in response to pictures of spiders	Negative affect index (valence, arousal, dominance) measured by the Self-Assessment Manikin (SAM)	Implementation intention	No instruction	17	18	0.91**
				Goal intention	Goal intention	18	15	0.31 (ns)
				Implementation intention	No instruction	10	12	1.63**
				Goal intention	Goal intention	10	12	1.65**
				Implementation intention	No instruction	12	12	-0.11 (ns)
				Goal intention	Goal intention	12	12	0.89*
Schweiger Gallo et al (2009, Study 3)	Female undergraduate students with spider fear	Downregulate fear in response to pictures of spiders	ERP responses (P1) Right occipital	Implementation intention	No instruction	10	12	0.96*
				Goal intention	Goal intention	10	12	0.20 (ns)
				Implementation intention	No instruction	10	12	1.81**
				Goal intention	Goal intention	10	12	0.67 (ns)
				Implementation intention	No instruction	12	12	0.78 (ns)
				Goal intention	Goal intention	12	12	0.78 (ns)

<sup>a</sup>Data for studies marked with superscript a are unpublished. Interested readers can access these unpublished datasets by contacting the lead authors: Lena Azbel-Jackson, School of Psychology and Clinical Language Sciences, The University of Reading, Earley Gate, Whiteknights Road, PO Box 238, Reading, Berkshire, UK, RG6 6AL, e-mail: yb006292@reading.ac.uk. \* =  $p < .05$ , \*\* =  $p < .01$ ; \*\*\* =  $p < .001$ .

TABLE 4  
Studies of the impact of implementation intention formation on anxiety

Author(s)	Participants	Goal/target emotion	Dependent variable	Experimental condition	Control condition	N <sub>exp</sub>	N <sub>cont</sub>	<i>d</i>
Parks-Stamm, Gollwitzer & Oettingen (2010)	Undergraduate students with low test anxiety	Downregulate test anxiety	Number of problems completed from Ditker's Concentration Achievement Test	Temptation-inhibiting implementation intention	Task-facilitating implementation intention	13	13	-0.49 (ns)
	Undergraduate students with high test anxiety	Downregulate test anxiety	Achievement Test	Implementation intention	No instruction	11	11	1.67**
Varley, Webb, & Sheeran (2011)	Staff and students with high levels of anxiety	Downregulate anxiety	Hospital Anxiety and Distress Scale	Implementation intention	No instruction	90	81	0.65***
	Undergraduate students with high levels of social anxiety	Direct attention away from social threat words	Spielberger State Anxiety Inventory	Goal intention Implementation intention	Goal intention No instruction	90 78	78 81	0.68*** -0.09 (ns)
Webb, Onoaiye et al (2010, Study 1)	Undergraduate students with high levels of social anxiety	Direct attention away from social threat words	Attentional bias scores from a visual dot probe (VDP) task	Goal intention Implementation intention	No instruction Goal intention	90 78	81 81	0.37* 0.47** -0.12 (ns)
	Undergraduate students with high levels of social anxiety	Direct attention away from social threat words	Time taken to respond to probe presented alongside social threat word	Goal intention Anxiety inhibiting implementation intention	Goal intention Goal intention	13 16	13 19	3.66*** 0.33 (ns) 0.33 (ns)
Webb, Onoaiye et al (2010, Study 2)	Undergraduate students with high levels of social anxiety	Direct attention away from social threat words	Attentional bias scores from a visual dot probe (VDP) task	Task facilitating implementation intention	No instruction	22	20	0.36 (ns)
	Undergraduate students with high levels of social anxiety	Direct attention away from social threat words	Attentional bias scores from a visual dot probe (VDP) task	Goal intention Implementation intention	Goal intention Specific goal intention	22 17	19 17	0.36 (ns) -0.01 (ns) 0.86*
Webb, Onoaiye et al (2010, Study 3)	Undergraduate students with high levels of social anxiety	Direct attention during a speech	Self-rated speech performance	Implementation intention	No instruction	15	26	0.91**
	Undergraduate students with high levels of social anxiety	Direct attention during a speech	Self-rated speech performance	Goal intention	No instruction	15	16	0.59 (ns)
						16	26	0.48 (ns)

\* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$ .

(Webb, Ononaiye, Sheeran, Reidy, & Lavda, 2010), test anxiety (Parks-Stamm et al., 2010), general anxiety (Varley et al., 2011) and anxiety associated with attending a specific event (namely, attending a mental health appointment, Sheeran et al., 2007). The measures of anxiety employed by these studies have been quite varied. For example, Webb, Sheeran et al. (2012, Expt 1) used the visual dot probe task to measure attentional responses associated with social anxiety. Participants were told that they would have to give a speech before their attentional processes were measured. Participants with high levels of social anxiety (relative to less-anxious participants) exhibited an attentional bias towards social threat words (e.g., criticised, failure). However, socially anxious participants who formed implementation intentions designed to control attention (“*If I see a neutral word, then I will focus all my attention on it!*”) did not exhibit this bias.

Other studies have employed validated clinical measures of anxiety. For example, Varley et al. (2011) used the Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983) and the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) to investigate whether implementation intentions could be used to augment self-help interventions for generalised anxiety. Participants who self-identified as experiencing high levels of anxiety were randomly allocated to standard self-help, augmented self-help, or no-intervention conditions. Participants in the standard self-help condition received a self-help booklet incorporating relaxation techniques; participants in the augmented self-help condition received the same booklet but also additional materials that asked them to form an implementation intention specifying when they would use the techniques (e.g., “*If I feel stressed, then I will use my breathing tactic to relax!*”); and participants in the control condition did not receive any intervention. Eight weeks later participants completed the HADS and STAI. Consistent with the idea that forming implementation intentions helped participants to initiate relaxation exercises, levels of anxiety were lower in the augmented self-help condition than in both the standard self-help and no instruction conditions.

Forming implementation intentions appears to be an effective way to regulate anxiety. The sample-weighted average effect of forming implementation intentions versus receiving no instructions on the regulation of anxiety was  $d_+ = 0.89$  with a 95% confidence interval from  $-0.12$  to  $1.91$ , based on six comparisons and a total sample size of 678 participants (see Table 3). The sample-weighted average effect of forming implementation intentions versus goal intentions on the regulation of anxiety was  $d_+ = 0.75$  with a 95% confidence interval from  $0.24$  to  $1.27$ , based on seven comparisons and a total sample size of 332 participants.

## The effect of forming implementation intentions on the relationship between affect and outcomes

Affective states can have a profound impact on higher-level cognition such as decision making (for reviews, see Blanchette & Richards, 2010; Finucane, Alhakami, Slovic, & Johnson, 2000; Forgas, 1995) and there are occasions when people may want to avoid this influence. Several studies have investigated whether forming implementation intentions can reduce the impact of affect on outcomes such as stereotyping (Bayer, Gollwitzer, & Achziger, 2010), decision making (Bayer et al., 2010; Kirk, Gollwitzer, & Carnevale, 2011; Sheeran & Webb, 2012; Webb, Sheeran, et al., 2012), action tendencies (Eder, 2011), and work performance (McCormack et al., 2010) (see Table 5). Studies investigating this issue have adopted a range of different procedures, but each has in common that a measure or manipulation of affect (e.g., a mood induction) has an (unwanted) influence on an outcome of interest (e.g., stereotyping, work performance). Participants formed implementation intentions designed either to regulate the affect (e.g., “*If I start to get in a bad mood, then I immediately ignore that feeling and get on with what I’m doing!*” Sheeran & Webb, 2012) or to control the outcome of interest in the hope that the affective influence on that outcome is blocked (e.g., “*Whenever I analyse a given person, then I will ignore her gender!*” Bayer et al., 2010). In the latter set of studies the emotion remains unchanged (e.g., Bayer et al. reported no differences in mood between participants who formed goal or implementation intentions), but the effect of the emotion on the outcome of interest is blocked (Bayer et al. found that participants who formed implementation intentions did not show the effect of positive mood on judgements that characterised participants who did not make a plan).

The sample-weighted average effect of forming implementation intentions versus receiving no instructions on the regulation of affective influences on outcomes was  $d_+ = 0.40$  with a 95% confidence interval from 0.16 to 0.63, based on five comparisons and a total sample size of 294 participants (see Table 6). The sample-weighted average effect of forming implementation intentions versus goal intentions on the regulation of affective influences on outcomes was  $d_+ = 0.39$  with a 95% confidence interval from 0.20 to 0.58, based on seven comparisons and a total sample size of 438 participants.

## The overall effect of forming implementation intentions on emotional outcomes

Across all of the studies the sample-weighted average effect of forming implementation intentions compared to receiving no instructions on emotional outcomes was  $d_+ = 0.91$  with a 95% confidence interval from

TABLE 5  
 Studies of the impact of implementation intention formation on the relationship between affect and outcomes

Author (s)	Participants	Goal/target emotion	Dependent variable	Experimental condition	Control condition	N <sub>exp</sub>	N <sub>cont</sub>	d		
Bayer, Gollwitzer, & Achziger (2010, Study 1)	Undergraduate students	Control effect of positive mood on stereotyping	Level of stereotyping in an impression formation task	Implementation intention	No instruction	20	20	0.73*		
				Goal intention	Goal intention	20	20	0.78*		
Eder (2011)	Undergraduate students	Classify emotional stimuli	Reaction time	Congruent implementation intention	Incongruent implementation intention	38	38	-0.03 (ns)		
				Congruent implementation intention	Incongruent implementation intention	38	38	0.45*		
Kirk, Gollwitzer, & Carnevale (2011, Study 2)	Undergraduate students	Downregulate negative affect	Acceptance of inequitable offers	Emotion down-regulation implementation intention	Emotion down-regulation goal intention	46	47	0.37 (ns)		
		Make money	Acceptance of inequitable offers	Task promotion implementation intention	Task promotion goal intention	45	42	0.09 (ns)		
McCormack, Sheeran, & Totterdell (2010) <sup>a</sup>	Trainee hairdressers	Upregulate positive affect	Positive affect (reported weekly)	Interpersonal implementation intention	No instruction	15	12	1.39***		
				Interpersonal goal intention	Interpersonal goal intention	15	13	0.29*		
				Intrapersonal implementation intention	No instruction	13	12	1.01***		
				Intrapersonal goal intention	No instruction	16	12	1.10***		
				Intrapersonal implementation intention	Intrapersonal goal intention	16	15	1.10 (ns)		
				Intrapersonal goal intention	No instruction	15	12	0.69***		
		Positive affect (reported daily)	Amount of tips	Interpersonal implementation intention	Positive affect (reported daily)	Interpersonal goal intention	No instruction	15	12	0.53**
				Interpersonal goal intention	Interpersonal goal intention	15	13	0.19 (ns)		
				Intrapersonal implementation intention	Positive affect (reported daily)	No instruction	13	12	0.46***	
				Intrapersonal goal intention	Interpersonal goal intention	16	15	0.62***		
				Intrapersonal implementation intention	Interpersonal goal intention	16	15	0.12 (ns)		
				Intrapersonal goal intention	Intrapersonal goal intention	15	12	0.56***		
Work performance	Amount of tips	Work performance	Amount of tips	Interpersonal implementation intention	No instruction	15	12	0.34*		
				Interpersonal goal intention	Interpersonal goal intention	15	13	0.02 (ns)		
				Intrapersonal implementation intention	Interpersonal goal intention	13	12	0.32*		
				Intrapersonal goal intention	No instruction	16	15	0.34*		
				Intrapersonal implementation intention	Intrapersonal goal intention	16	15	0.20 (ns)		
				Intrapersonal goal intention	No instruction	15	12	0.16 (ns)		

(Continued)

TABLE 5  
Continued

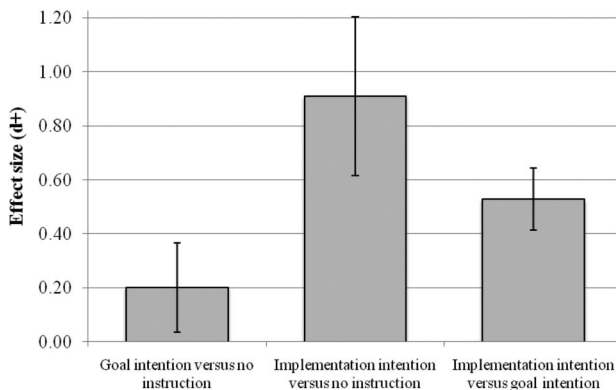
Author (s)	Participants	Goal/target emotion	Dependent variable	Experimental condition	Control condition	N <sub>exp</sub>	N <sub>cont</sub>	d
Sheeran, Aubrey, & Kelllett (2007)	Community adults with a problem	Work satisfaction	Self-reported satisfaction	Interpersonal implementation intention	No instruction	15	12	0.75***
				Interpersonal goal intention	Interpersonal goal intention	15	13	0.47**
				Intrapersonal implementation intention	No instruction	13	12	0.31*
				Intrapersonal goal intention	No instruction	16	12	0.89***
				Intrapersonal goal intention	Intrapersonal goal intention	16	15	0.61***
Sheeran & Webb (2012, Experiment 2)	Undergraduate students	Downregulate impact of emotions on decision-making	Attendance at an initial mental health appointment	Implementation intention	No instruction	15	12	0.23 (ns)
				Implementation intention	No instruction	199	191	0.26**
Sheeran & Webb (2012, Experiment 3)	Undergraduate students	Downregulate impact of emotions on decision-making	Number of frustrating puzzles offered to complete	Implementation intention	No instruction	30	30	0.60*
				Implementation intention	No instruction	76	75	0.18 (ns)
Webb, Sheeran et al (2012, Study 1)	Undergraduate students	Downregulate negative emotions stemming from being unable to solve anagrams	Willingness to engage in risky behaviours	Implementation intention	Goal intention	34	44	0.75***
				Implementation intention	Goal intention	41	40	0.37**
Webb, Sheeran et al (2012, Study 2)	Undergraduate students	Downregulate high levels of arousal	Sensitivity to odds of winning on gambling task	Implementation intention	Goal intention	41	40	0.37**

<sup>a</sup>Data for studies marked with superscript a are unpublished. For a copy of the dataset for McCormack et al. (2010) please contact Paschal Sheeran, Department of Psychology, The University of Sheffield, Western Bank, Sheffield, UK, S10 2TN, e-mail: p.sheeran@sheffield.ac.uk. \* =  $p < .05$ , \*\* =  $p < .01$ ; \*\*\* =  $p < .001$ .

0.61 to 1.20, based on 21 comparisons and a total sample size of 1306 participants (see Figure 1). This means that implementation intentions had a large-sized effect on emotional outcomes relative to receiving no instructions, according to Cohen's (1992) guidelines. The homogeneity  $Q$  statistic (Cochran, 1954) was significant,  $Q(20) = 66.81$ ,  $p < .001$ , suggesting that the effect sizes were heterogeneous.

The sample-weighted average effect of forming implementation intentions compared to forming goal intentions on emotional outcomes was  $d_+ = 0.53$  with a 95% confidence interval from 0.42 to 0.65, based on 29 comparisons and a total sample size of 1208 (see Figure 1). This means that implementation intentions had a medium-sized effect on emotional outcomes relative to goal intentions according to Cohen's (1992) guidelines for interpreting effect sizes. The homogeneity  $Q$  statistic for the effect of forming implementation intentions relative to goal intentions was not significant,  $Q(28) = 37.56$ , *ns*, indicating that the effect sizes were homogeneous.

Finally, the sample-weighted average effect of goal intention instructions (i.e., instructions to try to regulate emotions in some way) versus no instructions was  $d_+ = 0.20$  with a 95% confidence interval from 0.03 to 0.36, based on 15 comparisons and a total sample size of 615 (see Figure 1). This means that goal intention instructions had a small effect on emotional outcomes relative to no instructions: effect sizes were also homogenous,  $Q(14) = 14.58$ , *ns*. This effect size is comparable to that found in a larger set of studies by Webb, Miles, et al. (2012) where  $d_+$  was 0.00, 0.16, and 0.36 for attentional deployment, response modulation, and cognitive change, across 205, 92, and 91 comparisons, respectively). The small effect of goal intentions relative to no instructions observed here (i) corroborates the



**Figure 1.** Sample-weighted average change in emotional outcomes as a function of goal intention and implementation intention instructions.

relatively modest effects of explicit regulation instructions on emotional outcomes and (ii) confirms that studies evaluating the effects of forming implementation intentions on emotional outcomes do not underestimate the effect of forming goal intentions.

The findings of the present meta-analysis are consistent with Gollwitzer and Sheeran's (2006) review that reported a medium-to-large effect ( $d_+ = 0.65$ ) of forming implementation intentions on (primarily non-emotional) outcomes across 94 studies. This effect size falls between the medium-sized effect of forming implementation intentions relative to goal intentions ( $d_+ = 0.53$ ) and the large-sized effect of forming implementation intentions relative to no instructions ( $d_+ = 0.91$ ) reported in the present review. Given that Gollwitzer and Sheeran did not evaluate implementation intention effects relative to different control conditions (goal intentions or no instructions), it seems fair to conclude that implementation intentions have comparable effects on emotional and non-emotional outcomes.

In the present review the effect of forming implementation intentions relative to goal intentions ( $d_+ = 0.53$ ) was significantly smaller than the effect relative to no instructions ( $d_+ = 0.91$ ),  $Q(1) = 17.41$ ,  $p < .001$ , suggesting that the nature of the comparison group influences the effect of forming implementation intentions. The difference between the two comparison conditions can be understood in terms of the differing self-regulatory tasks and subtasks that are faced by people who have formed goal intentions versus those who have received no instructions. Specifically, people who have received no instructions have to face all three self-regulatory tasks (identify the need to regulate, deciding whether and how to regulate, and enact regulation) whereas people who have formed goal intentions only face the issue of deciding how to regulate (depending on whether the instructions specify a strategy for emotion regulation) and how to enact their strategy. Thus comparing goal intention instructions with no instructions provides the effect of having tackled the first and, to an extent, the second self-regulatory task—identifying the need to regulate and deciding to do so. In contrast, comparing implementation intention instructions to goal intention instructions provides the effect of forming plans specifying when and how to regulate. Therefore, goal intention instructions represent the more stringent and specific comparison condition for evaluating the effect of forming implementation intentions.

### MODERATORS OF THE EFFECT OF FORMING IMPLEMENTATION INTENTION ON EMOTIONAL OUTCOMES

Studies differed in terms of (i) the target emotion (e.g., anxiety, fear, disgust), (ii) participants' goal (e.g., to up- or to downregulate emotion), (iii) the sample,



(iv) the nature of the dependent variable, and (v) publication status. To investigate the effect of each of these potential moderators, effect sizes from each study were coded into one of the levels of the moderator (see Eagly & Wood, 1994). Next the sample-weighted effect size ( $d_+$ ) was calculated separately for each level of the moderator and the  $Q$  statistic was then used to compare the effect sizes (see Table 6). Moderators were evaluated separately

TABLE 6  
Moderators of the effect of forming implementation intentions on emotional outcomes

<i>Moderator</i>	<i>k</i>	<i>N</i>	<i>95% CI</i>	<i>Q</i>	<i>d<sub>+</sub></i>
<b>Sample</b>					
<i>Comparison with no instruction control conditions</i>					
With psychological problems	10	788	0.39 to 1.57	37.14***	0.98 <sub>a</sub>
Without psychological problems	11	526	0.52 to 0.88	23.52**	0.70 <sub>b</sub>
<i>Comparison with goal intention control conditions</i>					
With psychological problems	11	436	0.47 to 1.14	14.36	0.80 <sub>a</sub>
Without psychological problems	18	754	0.27 to 0.56	13.73	0.42 <sub>b</sub>
<b>Type of emotion</b>					
<i>Comparison with no instruction control conditions</i>					
Disgust	4	132	0.70 to 1.44	0.57	1.07
Fear	6	202	0.95 to 1.58	3.12	1.26 <sub>a</sub>
Anxiety	6	678	-0.12 to 1.91	25.88***	0.89 <sub>b</sub>
<i>Comparison with goal intention control conditions</i>					
Disgust	10	276	0.21 to 0.72	9.56	0.46 <sub>a</sub>
Fear	5	162	0.54 to 1.19	1.96	0.86 <sub>b</sub>
Anxiety	7	332	0.24 to 1.27	11.39	0.75
<b>Outcome measure</b>					
<i>Comparison with no instruction control conditions</i>					
Experiential	13	553	0.72 to 1.08	15.68	0.90
Behavioural	10	801	0.12 to 1.44	39.58***	0.78
Physiological	2	58	0.27 to 1.50	1.21	0.88
<i>Comparison with goal intention control conditions</i>					
Experiential	19	720	0.43 to 0.77	15.73	0.60
Behavioural	12	529	0.07 to 0.82	22.73*	0.45
Physiological	2	58	-0.06 to 0.99	0.81	0.46
<b>Publication status</b>					
<i>Comparison with no instruction control conditions</i>					
Published studies	14	916	0.56 to 1.39	45.30***	0.98
Unpublished studies	7	390	0.45 to 1.08	21.24**	0.77
<i>Comparison with goal intention control conditions</i>					
Published studies	19	929	0.48 to 0.90	26.97	0.69 <sub>a</sub>
Unpublished studies	10	279	0.08 to 0.56	4.11	0.32 <sub>b</sub>

Effect sizes with different subscripts differ significantly.

\* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$ .

for comparisons with goal intention and no instruction comparison conditions, respectively (recall that the effect of forming implementation intentions relative to goal intentions was significantly smaller than the effect relative to no instructions, see Figure 1, so it was not deemed legitimate to aggregate across different comparison conditions when evaluating moderators).

The type of sample has the potential to influence the effectiveness of implementation intentions. With the exception of three studies (McCormack et al., 2010; Sheeran et al., 2007; Varley et al., 2011) all of the studies recruited undergraduate students. However, a number of studies specifically targeted participants with particular psychological problems (typically high levels of anxiety, e.g., Schweiger Gallo et al., 2009) or subdivided participants into those with and without psychological problems (e.g., Parks-Stamm et al., 2010, divided participants into those with high versus low levels of test anxiety). Given that previous research has found that forming implementation intentions is especially beneficial to goal attainment among people who have difficulties with regulating their behaviour (Gollwitzer & Sheeran, 2006), we examined effects separately for samples with and without a psychological problem. Consistent with previous research, forming implementation intentions was associated with larger effect sizes among people with psychological problems ( $d_+ = 0.98$  and  $0.70$ , for comparisons with no instruction control conditions,  $Q(1) = 5.70$ ,  $p < .05$ ;  $d_+ = 0.80$  and  $0.42$ , for comparison with goal intention control conditions,  $Q(1) = 9.37$ ,  $p < .01$ ). This finding suggests that forming implementation intentions is especially beneficial among people who experience difficulties regulating their emotions.

The type of emotion significantly moderated effect sizes. Forming implementation intentions (relative to no instruction control conditions) had a larger effect on fear ( $d_+ = 1.26$ ) than on anxiety ( $d_+ = 0.89$ ),  $Q(1) = 4.43$ ,  $p < .05$ . There was no difference between the effects on disgust ( $d_+ = 1.07$ ) and the effects on fear,  $Q(1) = 0.63$ , *ns*, or anxiety,  $Q(1) = 0.74$ , *ns*. When compared to goal intention control conditions, forming implementation intentions also had a larger effect on fear ( $d_+ = 0.86$ ) than on disgust ( $d_+ = 0.46$ ),  $Q(1) = 3.76$ ,  $p < .05$ . There was no difference between the effects on anxiety ( $d_+ = 0.75$ ) and the effects on fear,  $Q(1) = 0.29$ , *ns*, or disgust,  $Q(1) = 3.01$ , *ns*. So why did forming implementation intentions tend to have larger effects on fear than on other outcomes? One possibility is that emotion regulation is simply more effective for some emotions than for others. In support of this hypothesis, Webb, Miles, et al. (2012) found that the effectiveness of emotion regulation strategies varied as a function of the emotion being regulated (for example, emotion regulation strategies had a larger effect on amusement than on sadness). There is also evidence that emotion regulation processes may operate differently in clinical samples (e.g., Watkins, 2008) and so the recruitment of spider-phobic participants in

Schweiger Gallo and Gollwitzer's studies (2007, 2009) may have influenced the observed effect size for fear, either because the effect of implementation intentions was larger overall among participants with psychological problems, or because the emotional response being regulated was stronger in those participants, thereby providing greater scope for change.

The way that emotional outcomes are measured could influence the effectiveness of emotion regulation strategies. Mauss and Robinson (2009) reviewed measures of emotion, dividing them into experiential (typically, self-reported emotional experience), physiological (e.g., heart rate, blood glucose), and behavioural measures (e.g., reaction times, observer ratings of emotional expression). The nature of the outcome measure did not significantly influence effect sizes, however. Implementation intentions had comparable effects on experiential ( $d_+ = 0.90$ ), behavioural ( $d_+ = 0.78$ ), and physiological ( $d_+ = 0.88$ ) measures, relative to no instruction control conditions,  $Qs(1) < 1.10$ , *ns*. Implementation intentions also had comparable effects on experiential ( $d_+ = 0.60$ ), behavioural ( $d_+ = 0.45$ ) and physiological ( $d_+ = 0.46$ ) measures, relative to goal intention control conditions,  $Qs(1) < 1.70$ , *ns*. In short, implementation intentions have reliable effects on emotional outcomes across a range of measures.

Finally, publication status moderated the effect of forming implementation intentions relative to goal intentions, with larger effect sizes being reported in published ( $d_+ = 0.69$ ) relative to unpublished ( $d_+ = 0.32$ ) studies,  $Q(1) = 7.18$ ,  $p < .01$ . Publication status also had a marginally significant moderating effect on the effect of forming implementation intentions relative to no instruction conditions, with marginally larger effect sizes being reported in published ( $d_+ = 0.98$ ) relative to unpublished ( $d_+ = 0.77$ ) studies,  $Q(1) = 2.79$ ,  $p < .10$ . There are two main reasons why unpublished studies may be associated with smaller effect sizes. The first is that unpublished data may not be of high enough quality to warrant publication. The second reason is that significant effect sizes may be more likely to be published. We are unable to evaluate which of these reasons explains the impact of publication status here (not least because the published data were all collected within the last 2 years and could still be published). However, we note that all of our key findings were replicated in the data from unpublished studies: Implementation intentions have reliable effects on emotional outcomes compared to both goal intention ( $d_+ = 0.32$ ) and no instruction conditions ( $d_+ = 0.77$ ); and the effect size is larger when the control condition involves no instructions as compared to goal intention instructions.

## FUTURE DIRECTIONS

The review of implementation intention effects on emotional outcomes has revealed consistent benefits of forming if-then plans relative to no

instruction and goal intention (control) conditions. However, it is still relatively early days for this type of research. The effects of forming implementation intentions have only been examined on a relatively limited set of emotions to date, namely disgust, fear, or anxiety. To our knowledge no studies have yet investigated the effects of forming implementation intentions on other negative emotions such as annoyance or anger. Given that anger appears to be harder to regulate compared to other emotions (Webb, Miles, et al., 2012), future research into whether implementation intentions can aid people in regulating this type of emotion could be particularly beneficial. Whether forming implementation intentions can help people to upregulate positive affect (e.g., to get excited about celebrating with a friend after a long day at work) also remains to be investigated. Findings indicating that positive emotions broaden the scope of attention and build resilience (e.g., Fredrickson & Losada, 2005) suggest that implementation intention interventions could engender important impacts not only on emotional well-being but also on social functioning and task performance. In addition, instrumental perspectives on emotion regulation (e.g., Koole, 2009, Tamir, 2009; Tamir & Ford, 2009; Tamir, Chiu, et al., 2007; Tamir et al., 2008) indicate that it may sometimes be necessary to regulate emotions in a contra-hedonic direction (i.e., upregulate negative affect and downregulate positive affect). For example, people may try to make themselves more anxious before a test (to improve performance), or stifle laughter when in a library (for normative reasons). There is evidence that people are less effective at regulating contra-hedonically than hedonically (Webb, Miles, et al., 2012), again suggesting that forming implementation intentions might be of particular benefit for contra-hedonic emotion regulation.

The present review analysed the self-regulatory tasks involved in successful emotion regulation in terms of (i) identifying the need to regulate, (ii) deciding whether and how to regulate, and (iii) enacting a regulation strategy. Studies that compared emotional outcomes for implementation intentions versus no instruction conditions speak to the benefits of forming if-then plans across these three tasks; studies that compared implementation intentions versus goal intention conditions, on the other hand, indicate the benefits of forming if-then plans for the specific task of enacting an emotion regulation strategy. Undertaking more fine-grained analyses of implementation intention effects for self-regulatory tasks and subtasks constitutes an important avenue for future research. For instance, studies could address whether if-then plans aid setting appropriate emotion goals (reference values)—especially in contexts where people may have little insight into which emotions may be instrumental for goal attainment (e.g., worry in relation to avoidance goals; Carver, 2001; Tamir, Chiu, et al., 2007). Implementation intentions may also prove

helpful for ensuring that one's current emotional state is monitored with optimal frequency (neither too infrequently nor too often; cf. Wismeijer et al., 2009), and that discrepancies from standards initiate immediate and efficient regulatory efforts.

Similarly, in relation to the task of deciding whether and how to regulate, implementation intentions have been shown to be effective in enhancing self-efficacy, improving the selection of behavioural strategies, and promoting flexible strategy use in relation to changing circumstances (e.g., Bayer & Gollwitzer, 2007; Henderson, Gollwitzer, & Oettingen, 2007; for a review, see Gollwitzer, Parks-Stamm, Jaudas, & Sheeran, 2008). However, research is needed to confirm that if-then plans promote the attainment of each of these subtasks in the specific context of emotion regulation. Relatedly, although the mechanisms underlying the effects of forming implementation intentions on action control are well understood (review by Gollwitzer & Sheeran, 2006), the extent to which these mechanisms also pertain to the regulation of emotional outcomes by implementation intentions warrants further research. Future studies will need to test whether implementation intentions enable people both to identify and seize opportunities for emotion regulation, and investigate whether strategies that have been specified in implementation intentions better conserve self-regulatory capacity compared to forming mere goal intentions. Finally, several studies have indicated that implementation intention effects are augmented when participants first engage in the process of mental contrasting (i.e., contrast a desired future with obstacles from the present reality that stand in the way; Oettingen, 2012; Oettingen, Mayer, Sevincer, Pak, & Hagenah, 2009; Oettingen, Pak, & Schnetter, 2001). It may well be the case that emotion regulation is especially effective when participants first engage in mental contrasting and then form if-then plans in relation to the self-regulatory tasks that have been identified by the mental contrasting exercise.

## CONCLUSION

Research suggests that there is a gap between people's emotion regulation goals (e.g., I want to remain calm) and their emotional outcomes (e.g., anger, anxiety, and aggression). The present review applied an action control perspective to emotion regulation by analysing discrepancies between emotion regulation goals and emotional outcomes in terms of the literature on intention-behaviour relations. We propose that the failure to effectively regulate emotion regulation goals can result from difficulties in: (i) identifying the need to regulate, (ii) deciding whether and how to regulate, and (iii) enacting a regulation strategy. Meta-analysis suggested that forming implementation intentions is effective way to regulate emotions,

having a large effect on emotional outcomes, relative to no regulation instructions and a medium-sized effect relative to goal intention instructions (see Figure 1). Our hope is that an action control perspective on emotion regulation will provide a conceptual framework for analysing why people struggle to regulate their emotions and what tasks they need to resolve in order to overcome these difficulties.

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