Mood-as-input hypothesis and perseverative psychopathologies

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ABSTRACT

Mood-as-input hypothesis is a theory of task perseveration that has been applied to the understanding of perseveration across psychopathologies such as pathological worrying, compulsive checking, depressive rumination, and chronic pain. We review 10 years of published evidence from laboratory-based analogue studies and describe their relevance for perseveration in clinical populations. In particular, mood-as-input hypothesis predicts that perseveration at a task will be influenced by interactions between the individual’s stop rules for the task and their concurrent mood, and that the valency of an individual’s concurrent mood is used as information about whether the stop rule-defined goals for the task have been met. The majority of the published research is consistent with this hypothesis, and we provide evidence that clinical populations possess characteristics that would facilitate perseveration through mood-as-input processes. We argue that mood-as-input research on clinical populations is long overdue because (1) it has potential as a transdiagnostic mechanism helping to explain the development of perseveration and its comorbidity across a range of different psychopathologies, (2) it is potentially applicable to any psychopathology where perseveration is a defining feature of the symptoms, and (3) it has treatment implications for dealing with clinical perseveration.

Keywords: Mood-as-input hypothesis; perseverative psychopathology; pathological worrying; compulsive checking; depressive rumination; negative mood; stop rules
Deciding when to terminate a train of thought or a course of action is something that we all take for granted, yet it is a decision process that will inevitably involve the integration of various sources of information related to the purpose of the activity and whether the goals for that activity have been achieved. What information is accessed and utilized in this decision-making process and the conditions under which this information is accessed is therefore critical in determining whether the individual will persevere at an activity or terminate it. This has an important relevance for many psychopathologies. Understanding how decisions about terminating or continuing an activity are made is important in the context of many psychopathologies where perseveration at an activity is either a defining diagnostic feature of the psychopathology (e.g. hand washing and checking in Obsessive Compulsive Disorder (OCD); DSM, 4th Ed., DSM-IV-TR, American Psychiatric Association, 2000), causes the individual distress (e.g. pathological worrying), or is viewed as unnecessarily excessive in relation to the goal-related function of the activity (e.g. compulsions in OCD). These perseverative psychopathologies often have shared characteristics of repetitive and persistent thought or behaviour and negative affect (Davey, 2006a), and examples include depressive rumination (Nolen-Hoeksema, 1991; Watkins, 2008), catastrophising in Generalised Anxiety Disorder (GAD) (Davey & Levy 1998), and obsessions (Brown, Moras, Zinbarg & Barlow, 1993) and compulsions (Schut, Castonguay, & Borkovec, 2001; Tallis & de Silva, 1992) in OCD.

One important theoretical approach to understanding task perseveration is known as the mood-as-input hypothesis (Davey, 2006a; Martin & Davies, 1998; Martin, Ward, Achee & Wyer, 1993), and over the past 10 years this hypothesis has been applied extensively to an understanding of perseveration in a range of psychopathologies. The mood-as-input hypothesis views decisions about whether to continue or terminate a task as based on interactions between the individual's ‘stop rules’ for the task (i.e. what rules have been explicitly or implicitly deployed to define the goals of the task) and the real-time availability of information about whether those goals have been met. If there is information available during a task that implies that the goals of
the task have been met, then task-related activity will be terminated. If that information implies that the goals have not been met, then the individual is likely to persist with those task-related activities. What is special about the mood-as-input hypothesis is that it specifies an individual’s concurrent mood as an important source of information by which goal-achievement is assessed. This represents a rather specific way of conceptualising the motivating effects of moods (George & Zhou, 2002; Martin et al.; Martin and Davies, 1998; Sanna, Turley, & Mark, 1996), and rather than being intrinsically linked to certain default processing strategies (such as mood-congruent processing), the mood-as-input hypothesis proposes that it is an individual’s interpretation of their mood rather than the mood per se that has particular performance implications. For example, during the course of task performance, people may ask themselves, either explicitly or implicitly, 'Have I reached my goal?' People in positive moods would tend to answer yes, whereas people in negative moods would tend to answer no. That is, people in a positive mood are likely to interpret their positive affect as a sign that they have attained or made progress toward their goal (Hirt, Melton, McDonald, & Harackiewicz, 1996; Martin et al.). In contrast, in a negative mood, individuals may interpret their negative affect as a sign that they have not attained or made progress toward their goal and so continue to persist at the task (Frijda, 1988; Martin et al., 1993; Schwarz & Bless, 1991).

It is the role of negative mood in providing information about lack of goal-achievement and thus fostering task persistence that is at the heart of the mood-as-input account of perseverative psychopathologies. Negative affect is a well documented and common feature of perseverative psychopathologies. Examples include OCD, where checkers as compared with non-checkers are significantly more depressed (Frost, Sher, & Geen, 1986; Maki, O’Neil, & O’Neil, 1994; Salkovskis, 1985), negative mood is higher in worriers than non-worriers (Davey, Hampton, Farrell, & Davidson, 1992; Metzger, Miller, Cohen, Sofka, & Borkovec, 1990; Meyer, Miller, Metzger, & Borkovec, 1990), and depressive rumination regularly occurs in response to negative affect (Lyubomirsky & Nolen-Hoeksema, 1993, 1995; Nolen-Hoeksema & Morrow, 1993;
Nolen-Hoeksema, Parker, & Larson, 1994). Another significant factor that is important in the mood-as-input account of perseverative psychopathology is that perseverative activities are frequently associated with goal-oriented stop rules that specify that the task must be completed as thoroughly and extensively as possible (known as “as many as can” stop rules). Thus, the individual is driven to perform the activity as thoroughly as they can and stop rules will be very stringently defined, but endemic negative mood continually provides information that the goals of the task have not been achieved. For example, OCD, GAD and major depression are all characterized by dispositional characteristics that would give rise to the deployment of “as many as can” stop rules, including inflated responsibility, intolerance of uncertainty, perfectionism, and metacognitive beliefs about the benefits of worrying and ruminating (Borkovec & Roemer, 1995; Davey, Tallis & Capuzzo, 1996; Frost et al.; Papageorgiou & Wells, 2001, 2003; Salkovskis; Salkovskis et al., 2000; Wells, 1995).

The purpose of the present paper is to review the evidence relating to the mood-as-input hypothesis of task perseveration and its relevance to perseverative psychopathologies. This includes (1) a review of the extensive body of published literature that has now accumulated on experimental studies relating mood-as-input to psychopathology-relevant activities, (2) a review and discussion of the theory of mood-as-input and the conditions which facilitate or prevent mood-as-input effects, and (3) a discussion of the clinical relevance of the mood-as-input hypothesis. We continue by discussing in more detail what mood-as-input hypothesis is and its relevance to perseverative psychopathology.

**What is the Mood-as-Input Hypothesis?**

A mood-as-input approach assumes that mood can have differential effects on behaviour depending on the nature of the task that is being carried out, the stop rules associated with that task, and how the information conveyed by the mood is interpreted in the context of the task.
(Martin & Davies, 1998). For example, if pathological worrying is viewed as an attempt to problem solve, and the individual sees solving the problem as being of uppermost importance (Davey, 1994a), then the 'mood-as-input' hypothesis would predict that negative mood would be interpreted as evidence that the problem-solving process was not yet complete (e.g. "I still feel negative, so I cannot have completed the problem-solving task satisfactorily"). Thus, rather than determining how information is processed, the mood-as-input hypothesis states that mood provides information about whether the task has been successfully completed or not.

**What are stop rules?:** The concept of stop rules can be understood by thinking about task motivation. Our behaviour is often governed by how motivated we feel to complete the task in hand. Broadly, task motivation can be conceptualised in two ways, either task focused, or performance focused (Vaughn, Malik, Schwartz, Petkova, & Trudeau, 2006). For example, task focused is when one engages in a task that is either enjoyable, or where there is no concern about evaluation. Here the motivation is to continue with the task as long as it is enjoyable (e.g. Hirt et al., 1996; Martin et al., 1993). However, when the focus is on meeting a certain standard, or level of performance, motivation for the task is performance focused. Thus we are more likely to continue with the task until we have done enough to meet the task requirements (e.g. Hirt et al. 1996; Martin et al., 1993). According to the mood-as-input theory (Martin et al.; Martin & Davies, 1998), these different decision rules (Vaughn et al. 2006), or *stop rules* have different implications for performance depending on one’s concurrent mood.

Mood-as-input literature to date has commonly focused on two stop rules, the ‘as many as can’ and the ‘feel like continuing’ stop rule. These two stop rules represent a broad description of people’s motivational states when they begin a task, i.e. task focused (feel like continuing) and performance focused (as many as can). As such, the use of these two stop rules has been ideal when examining how two different task goals interact with concurrent mood states to affect perseverance. There may of course be other more nuanced ways of conceptualising task
motivation, but with a view to experimentally testing the mood-as-input model, these two stop rules have provided a useful conceptualisation of performance and task orientated approaches to perseveration. Furthermore, the continued use of these two stop rules after they were defined and tested in some of the initial mood-as-input studies (e.g. Martin et al., 1993) means that the original mood-as-input model can be tested with a number of open-ended tasks.

**How does mood act as information?:** Martin et al. (1993) demonstrated how moods experienced in different contexts could have different motivational implications. They asked participants who were either in a positive or a negative mood to generate a list of birds’ names. However, to ensure that they could control for the way in which participants would be interpreting their moods, they also manipulated the context or ‘stop rule’ for each mood. Once participants had undergone a negative or positive mood induction, half of the participants were told to stop generating the names of birds when they no longer felt like doing it (a 'feel like continuing' stop rule), whereas the other half were asked to stop when they thought they had generated as many as they could (an 'as many as can' stop rule). Performance on the item generation task differed depending on the context (stop rule) in which either the negative or positive mood was experienced. When in a negative mood and having received instructions to stop when they felt they had done as much as they could, participants took longer and generated a longer list of names than participants in a positive mood using the same stop rule. Conversely, participants in a negative mood with instructions to stop when they no longer felt that they were enjoying the task spent less time on the task, and generated less names than those in a positive mood using an enjoy stop rule. Martin et al. interpreted the results of their study by suggesting that the “extent to which they performed the task differed as a function of both their mood and stop rule” (Martin et al., p. 323). Thus the same moods can have different implications for task performance depending on the context, or stop rule in which the mood was experienced.
**Predictions from the Mood-as-Input Hypothesis:** In the non-psychopathology literature, a number of studies have demonstrated how the effects of mood on processing are determined by the stop rules, or context in which the mood is experienced (e.g. Martin et al., 1993; Martin, Abend, Sedikides, & Green, 1997; Norem & Illingworth, 2003; Sanna et al., 1996; Sanna, Meier, & Wegner, 2003; Wright, Startup, & Mathews, 2005). When the mood-as-input hypothesis is applied to clinically relevant perseveration tasks such as a worry task, it is assumed that worriers are experiencing significantly greater negative mood than non-worriers and they apply an ‘as many as can’ stop rule to the worrying task (cf. Davey, Field, & Startup, 2003; Startup & Davey 2001). Using ‘as many as can’ stop rules means that the individual will try to solve their worry as effectively and as thoroughly as they can, but their negative mood continually provides information that they have not yet fully succeeded in this task and so they continue to persevere with their worrying. Nevertheless, it is worth pointing out that the mood-as-input hypothesis would also predict another route to perseveration through the configuration of positive mood and the use of a ‘feel like continuing’ or enjoy stop rule (Davey, 2006a). That is, if the goal motivation is to continue with the task ‘as long as I feel like doing it’, then participants in a positive mood will persevere for longer than participants in a negative mood. However, this latter mood-as-input prediction has significantly less relevance to perseverative psychopathology because it will be argued that the vast majority of psychopathology-related perseveration takes place under conditions of negatively valenced affect and under the deployment of ‘as many as can’ rather than ‘feel like continuing’ stop rules. Thus, the following reviews will focus on the effects of negative mood and ‘as many as can’ stop rules in generating perseveration in psychopathology relevant tasks.

**Evidence from Laboratory-Based Analogue Studies**
While there is evidence that high worriers, obsessive checkers, and depressed ruminators experience negative mood and have dispositional characteristics that are more likely to lead them to adopt ‘as many as can’ stop rules, what evidence is there that mood acts as information to signal progress, or a lack of progress toward one’s goals in these open-ended perseveration tasks? We review evidence from analogue experimental studies of pathological worrying, perseverative checking, depressive rumination, and chronic pain.

**Pathological Worrying:** Laboratory work with an analogue sample has extensively examined the role of mood and stop rules on perseverative worrying (e.g. Davey, Eldridge, Drost, & MacDonald, 2007; Davey, Startup, MacDonald, Jenkins, & Patterson, 2005; Startup & Davey, 2001, 2003). Mood-as-input theory would predict that worriers experience endemic negative mood and use implicit ‘as many as can’ stop rules while undertaking a worry task and this would lead them to persevere with the task longer than non-worriers. In a series of three studies, Startup & Davey (2001) tested these predictions. They found that perseverative worrying during a catastrophising interview task (Davey, 2006b) could not be explained by mood-congruency effects (i.e. mood did not simply facilitate the perseveration at mood-congruent tasks), but was best explained by mood-as-input processes. Startup & Davey (2001, Experiment 3) also asked high and low worriers to complete a catastrophising task whilst using either an ‘as many as can’ or a ‘feel like continuing’ stop rule. When using an ‘as many as can’ stop rule high worriers generated a significantly greater number of catastrophising steps than the low worriers. However, when asked to use a ‘feel like continuing’ stop rule, high worriers generated fewer steps than non-worriers.

One important finding from these studies is that worriers do not have a perseverative iterative style that is independent of the stop rules they deploy (Kendall & Ingram, 1987; Davey & Levy, 1998). However, if mood-as-input hypothesis is to be considered a parsimonious account of catastrophic worry, it is necessary that worriers are a) experiencing increased negative
mood and b) adopting the use of ‘as many as can’ stop rules. Startup & Davey (2003) investigated whether high worriers possess characteristics that would lead them to naturally adopt ‘as many as can’ stop rules, and found that naturally occurring and experimentally manipulated responsibility appeared to influence the deployment of ‘as many as can’ stop rule use in worry tasks. Experiment 1 indicated that worriers began a catastrophising interview with higher self-reported levels of responsibility towards fully considering all the issues involved in the worry than did non-worriers, and this elevated sense of responsibility was associated with the generation of significantly more catastrophising steps. In Experiment 2, Startup & Davey (2003) experimentally manipulated responsibility levels and then subjected participants to either a negative, positive, or neutral mood induction. Results indicated that elevated levels of responsibility did indeed have a facilitative causal effect on perseveration, but only in participants that were in a concurrent negative mood.

Further evidence that worriers do deploy strict ‘as many as can’ stop rules at the outset of a worry bout comes from a study by Davey et al. (2005). They developed a worry stop rule check list which allowed some assessment of the types of internal statements that individuals used to determine whether they should continue or abort their worry bout. These statements fell into two main types which corresponded reasonably well to either ‘as many as can’ stop rules or ‘feel like continuing’ stop rules. This series of studies continued by investigating (1) the extent to which the endorsement of ‘as many as can’ stop rules was related to trait measures associated with chronic worrying, and (2) the extent to which the use of ‘as many as can’ stop rules was related to perseveration in a catastrophising interview task. The results of the first study indicated that scores on the ‘as many as can’ stop rule sub-scale were highly correlated with a variety of worry-relevant variables, including measures of trait worry (PSWQ – Meyer et al., 1990), beliefs about both the positive and negative consequences of worrying (as measured by the Consequences of Worry Scale – Davey et al., 1996), and measures of shame and guilt. These findings suggest that the deployment of ‘as many as can’ stop rules is significantly related to
measures of worry frequency, and a subsequent regression analysis indicated that, although the use of ‘as many as can’ stop rules is best predicted by PSWQ scores, scores on both the negative and positive scales of the Consequences of Worry Scale (COWS) independently predicted additional variance in stop rule scores. This suggests that the stop rules used by worriers may be closely linked to, or derived from, the more stable, global beliefs that worriers have about the nature of worrying. This in turn supports the view that ‘as many as can’ stop rule measures are not just another measure of worry frequency and intensity, but are probably derived from other meta-cognitive constructs that maintain beliefs in the need to worry (e.g. Davey et al., 1996; Wells, 1995, 2010).

To further explore the mechanisms that underlie catastrophic worry, Davey et al. (2007) examined the conditions under which worry closure occurs by exploring how mood and stop rule use change over the course of a worry bout. At regular points during a catastrophising interview, Davey et al. asked participants to rate their mood on measures of sadness, happiness and anxiety. Results supported previous findings (e.g. Vasey & Borkovec, 1992) suggesting that high worriers experience increasing levels of distress and negative mood across the catastrophising task. Davey et al. (2007) also examined stop rule use throughout the course of a worry catastrophising task. They found that ‘as many as can’ stop rule endorsements were significantly higher at the outset of catastrophising than at the end of the task, conversely ‘feel like continuing’ endorsements were significantly higher at the end of catastrophising than at the beginning. This was found across all participants regardless of whether they were classified as high or low worriers.

These findings suggest that worriers eventually terminate a worry bout – not because their negative mood had dissipated, but because their deployed stop rules have shifted from ‘as many as can’ towards ‘feel like continuing’ during the course of the bout. Thus, high worriers start a worry bout with negative mood using ‘as many as can’ stop rules (which facilitate
perseveration), but end the bout with negative mood and deploying more ‘feel like continuing’ stop rules (which would facilitate termination).

In summary, the controlled experimental studies described in this section indicate that worriers deploy ‘as many as can’ rather than ‘feel like continuing’ stop rules, they are usually in a significantly more negative mood than non-worriers (either in terms of higher levels of anxiety or sadness), and - as predicted by mood-as-input theory - a combination of ‘as many as can’ stop rules and negative mood leads to facilitated perseveration at a worry catastrophizing task. In addition, the deployment of ‘as many as can’ stop rules is significantly related to worry frequency as measured by the PSWQ and is closely linked to the more stable global beliefs that worriers have about the nature of worrying. Finally, worriers do not appear to possess an iterative style that is independent of the stop rules they adopt, and their perseveration at a worry task can be significantly modified under experimental conditions by changing the type of stop rule they deploy.

**Perseverative checking:** Further evidence that mood-as-input theory is a viable mechanism to help explain perseveration in psychopathology can be found in studies of perseverative checking, where mood-as-input accounts would predict negative mood and ‘as many as can’ stop rule use associated with increased perseveration (Davey et al., 2003). There is already existing evidence that compulsive checkers exhibit negative mood and possess beliefs and dispositional characteristics consistent with the deployment of ‘as many as can’ stop rules that would predict perseveration. For example, Rachman (2002), Radomsky, Ashbaugh, Gelfand, & Dugas (2007), and Steketee, Frost, & Cohen (1998) highlight that amongst other beliefs, compulsive checkers have an inflated responsibility for harm – a feature that would be consistent with the adoption of ‘as many as can’ stop rules. Meyers, Fisher, & Wells (2009) also provide evidence that compulsive checkers have maladaptive stop signals which result in task perseveration. The metacognitive model of obsessive-compulsive symptoms (Meyers et al.; Wells, 1997, 2000; Wells & Matthews,
assumes that individuals with OCD possess beliefs about the need to fully and properly perform their compulsive rituals (e.g. “I must perform this ritual to ensure I do not harm my children”), but that the termination of these rituals is often based on subjective stop criteria, such as an ‘internal feeling that it is safe to stop’, or ‘a sense of certainty’. As well as deploying ‘as many as can’ stop rules, individuals suffering from OCD have also been shown to experience negative mood in the form of higher levels of anxiety and depression than non-checkers (Frost et al., 1986), especially just prior to the onset of a checking bout (Röper & Rachman, 1976).

In an initial experiment, Davey et al. (2003) examined how mood-as-input theory could be applied to perseverative checking thoughts. In study 1 participants were asked to complete a check-generation task whereby they were asked to imagine that they were going on a 3 week holiday and to list the things around the home that should be checked for safety or security reasons before going away. This task was designed to represent a number of features that are common to compulsive checking activities such as being an open ended task, generating items which if left unchecked could have negative consequences, and for which the individual may feel responsible. Results indicated that those in a negative mood using an ‘as many as can’ stop rule generated significantly more items than those in a positive mood using the same stop rule, the same pattern of results was found for time spent on the checking-generation task. A second study examined another aspect of perseverative checking, in this case repeated attempts to recall whether a checking activity had been properly carried out. Again those in a negative mood and using an ‘as many as can’ stop rule spent significantly longer recalling check items than those in a negative mood using a ‘feel like continuing’ stop rule. The inverse was found for those in a positive mood (Davey et al.).

In later studies, MacDonald & Davey (2005a,b) developed an open-ended judgemental proof-reading checking task to test mood-as-input predictions of perseverative checking behaviour. This task allowed the measurement of checking perseveration in terms of the amount of time allocated to checking, the number of items checked, and the number of individual items
rechecked – all factors which are relevant to the checking behaviours of compulsive OCD sufferers. Participants received either negative or positive mood inductions and were then asked to carry out the proof-reading task using either an ‘as many as can’, or ‘feel like continuing’ stop rule. Results indicated that on all checking measures, participants in a negative mood condition using an ‘as many as can’ stop rule showed significantly increased perseveration than those using a ‘feel like continuing’ stop rule. Furthermore, those in a negative mood using an ‘as many as can’ stop rule rated significantly greater confidence in their performance on completion of the checking task than at the outset of the task, and this is consistent with the behaviour of OC checkers who will continue to check until they are fully confident of having properly completed their checks (e.g. Coles, Frost, Heimberg & Rheaume, 2002).

MacDonald & Davey (2005b) also examined how negative affect and inflated responsibility (another dispositional characteristic in individuals suffering from OCD) are implicated in perseverative checking. They hypothesized that individuals scoring high on the construct of inflated responsibility would be more likely to deploy ‘as many as can’ stop rules prior to a checking task than individuals scoring low on that construct, and so persevere more at the task when in a negative mood. Prior to undertaking the proof-reading checking task, participants were split into either high or low responsibility conditions based on their scores on the Responsibility Attitude Scale (RAS; Salkovskis et al., 2000) and underwent either a positive or negative mood induction procedure. Results indicated that participants high in responsibility and in a negative mood showed significantly greater perseveration of checking behaviours than those in a negative mood in the low responsibility group. High responsibility participants in a negative mood also showed significantly greater checking behaviours than high responsibility participants in a positive mood. This suggests that high responsibility alone may not be a sufficient condition to generate perseverative checking, but that perseverance occurs most prominently in combination with negative mood. A second study (MacDonald & Davey, 2005b) with experimentally induced responsibility showed the same pattern of findings where perseverance
was greatest in those participants with high levels of experimentally-manipulated responsibility and in a negative mood. These two studies demonstrated that the circumstances in which checking perseveration was severest was under conditions which most closely resemble characteristics possessed by clinically-diagnosed compulsive checkers – e.g. high levels of responsibility and significant concurrent negative mood (Frost et al., 1986; Salkovskis, 1985; Salkovskis et al., 2000). In addition, participants possessed levels of inflated responsibility that were favourably comparable to those found in OCD clinical populations (Experiment 1), undertook checking tasks which had tangible negative outcomes for failure to check properly (Experiment 2), and both studies used dependent variables that measured important aspects of compulsive checking performance (e.g. time spent checking, re-checking of single items, etc.).

In summary, experimental studies have demonstrated that configuring negative mood with ‘as many as can’ stop rules facilitates perseveration of checking across a range of measures and checking related tasks, including check generation and memory tasks (Davey et al., 2003) and a variety of OC checking relevant measures using an analogue proof-reading checking task (MacDonald & Davey, 2005a,b). These studies also indicate that the OC relevant construct of inflated responsibility is not a sufficient condition for checking task perseveration, but facilitates perseveration when combined with a negative mood.

**Depressive rumination:** Depressive rumination is characterised by repetitive and recurrent thoughts which are often self-focused and centred around the causes and consequences of current negative mood (Nolen-Hoeksema, 1991, Watkins, 2008). Although, like worry, rumination is a perseverative cognitive process, rumination commonly focuses on the past whereas worry tends to be about the future (Ehring & Watkins, 2008). Watkins and Mason (2002) were the first to suggest that perseverative depressive rumination may usefully be explained by the mood-as-input hypothesis. They argued that because high ruminators hold positive beliefs about the utility of rumination for solving problems and preventing future
mistakes (Watkins & Baracaia, 2001), they will usually bring a default ‘as many as can’ stop rule to a rumination task. Using a rumination interview similar to that devised by Vasey & Borkovec (1992), high and low ruminators were instructed to catastrophise a current depressive topic using either an ‘as many as can’ or ‘feel like continuing’ stop rule. Results indicated that high ruminators using an ‘as many as can’ stop rule generated significantly more rumination steps than high ruminators using a ‘feel like continuing’ stop rule. Watkins & Mason interpreted their findings within a mood-as-input framework suggesting that high ruminators do not possess a perseverative style that is independent of stop rule use. Thus if the ruminator deploys an ‘as many as can’ stop rule while in a negative mood, that negative mood is likely to signal that their rumination goals have not yet been met leading to perseveration at the task.

Further clarification of the mood-as-input model was provided by Hawksley & Davey (2010) in an experimental study of mood-as-input variables in depressive rumination. Here, both mood (negative vs. positive) and stop rule (‘as many as can’ and ‘feel like continuing’) were manipulated in a group of nonclinical participants who undertook a depressive rumination task adapted from the original worry catastrophising task (cf. Davey, 2006a; Vasey & Borkovec, 1992). This rumination task involved participants being asked to iterate what they thought it was that had made them feel depressed during a recent episode of depression. As predicted by mood-as-input theory, there was no main effect of mood or stop rule on performance, but there was a significant mood × stop rule interaction whereby those in the negative mood/‘as many as can’ group generated a significantly greater number of rumination steps that those also in a negative mood, but using a ‘feel like continuing’ stop rule. Both the Watkins & Mason (2002) and Hawksley & Davey studies indicate that perseveration at a depressive rumination task can be explained within a configural account where mood and stop rules interact to affect perseveration. This type of explanation is consistent with the symptomatology of depressive rumination in which ruminators are reported to experience endemic negative mood (Kash, Klein, & Lara, 2001; Lyubomirsky & Nolen-Hoeksema, 1993, 1995; Nolen Hoeksema & Morrow, 1993) and hold
positive metacognitive beliefs about the utility of rumination (Papageorgiou & Wells, 2001, 2003), the interaction of which would be likely to generate perseveration.

Chronic Pain: The mood-as-input hypothesis has also been extended to clinical populations who experience chronic pain in an attempt to account for both the persistence and avoidance behaviour observed in chronic pain sufferers (Karsdorp, Nijst, Goossens, & Vlaeyen, 2010; Vlaeyen, & Morley, 2004). In a review paper, Vlaeyen & Morley (2004) highlight two common types of pain experience. They cite a ‘Fear-Avoidance’ model of pain where catastrophic misinterpretation of pain gives rise to fear of pain, which results in avoidance of pain and decreased activity levels. A second highlighted common pain disability is associated with task persistence and overuse, normally in patients with work-related extremity pain and fibromyalgia. Vlaeyen & Morley argue that the mood-as-input hypothesis can help explain both types of pain experience. In the case of fear-avoidance, the mood-as-input hypothesis would predict that if the sufferer is in a negative mood (for example due to pain or thwarted goal attempts) and deploying a ‘feel like discontinuing’ (FLDC) stop rule (e.g. the individual is not enjoying the task and considers terminating the activity), task avoidance or disuse of certain behaviours will occur, which results in a cycle of avoidance and decreased activity levels. However, in the same negative mood using an ‘as many as can’ (AMAC) stop rule, task persistence will occur, resulting in overuse and possible tissue damage.

In this way, the mood-as-input hypothesis was proposed as a potential explanation of both persistence and avoidance behaviour in chronic pain. In support of this view, Karsdorp et al. (2010) experimentally manipulated mood (positive vs. negative) and stop rule (‘feel like discontinuing’ vs. ‘as many as can’), then asked patients with work-related upper extremity pain disorders (WRUED) to complete an upper extremity and lower extremity task in counter balanced order. Although the results did not support a mood-as-input account of pain in which mood and stop rule were predicted to interact to affect task performance, there were significant
main effects of mood and stop rule. Those using an ‘as many as can’ stop rule showed greater
task persistence than those using a ‘feel like discontinuing’ stop rule and those in a positive mood
performed better than those in a negative mood. Dissipation of induced moods and a small
sample size are possible explanations as to why there was no expected mood × stop rule
interaction. The authors suggest that in previous mood-as-input studies which use cognitive
tasks, for example the item generation task (Martin et al., 1993) and check generation task
(Davey et al., 2003), mood was unrelated to the tasks themselves and so would be more likely to
be used as independent information about goal-achievement, hence mood × stop rule
interactions were found. However, within a pain context negative mood is very likely to be
attributed at least in part to the pain experience, and so may be less likely to be used as
independent information about goal achievement (Schwarz & Clore, 1983). This is known as the
dISCOUNTING hypothesis and is discussed in more detail below.

Summary of Evidence from Laboratory-Based Analogue Studies. This review of
experimental analogue studies has shown that a substantial majority of these studies have
supported predictions from the mood-as-input hypothesis across a range of psychopathology-
relevant analogue tasks. In particular, studies have found significantly facilitated perseveration at
these tasks when the tasks have been undertaken in a negative mood with deployment of an ‘as
many as can’ stop rule – conditions which closely mimic the mood and dispositional factors
involved in perseverative psychopathologies such as pathological worrying, compulsive checking
and depressive rumination. These studies also strongly indicate that perseveration is not a single
characteristic style possessed by worriers, checkers or ruminators, but is a performance factor
determined by the configural interaction between the individual’s mood and the stop rule they
deploy for the task. A summary of these lab-based studies, their methodologies and their
findings is presented in Table 1.
Limitations of Analogue Studies: While analogue studies provide evidence under controlled experimental conditions that mood-as-input predictions may be relevant to perseverative psychopathology, such studies by their analogical nature will have limitations and it is worth discussing these here. First, the tasks used in most laboratory-based studies have been created as analogues of perseverative symptoms in ways that will facilitate measurement of perseveration rather than as faithful replications of perseverative symptoms \textit{per se}. For example, the catastrophizing task used in most studies of pathological worrying and depressive rumination allows for easy measurement of perseveration in terms of the number of steps completed before termination (Davey, 2006b), but chronic worrying in pathological worriers or depressive rumination in dysphoric individuals does not always take on the iterative or catastrophic form generated by the catastrophizing interview. It is therefore important to test out mood-as-input predictions on other forms of worrying which are not constrained by the catastrophizing structure (e.g. McLaughlin, Borkovec & Sibrava, 2007). Similarly, studies investigating mood-as-input predictions and depressive rumination have been limited to tasks where participants have been asked to focus on the causes and symptoms of their negative affect. While this is a central feature of many definitions of depressive rumination (e.g. Nolen-Hoeksema, 1991; Watkins & Teasdale, 2001), it may provide participants with an analytical rather than experiential focus (Watkins, 2004; Watkins & Teasdale, 2001), and there is some evidence that rumination with an analytical focus may be less adaptive than rumination with an experiential focus (Watkins, 2008; Rimes & Watkins, 2005; Watkins & Moulds, 2005). Future studies would be needed to determine whether an experientially-focused iterative task responds under mood and stop rule conditions in a similar way to an analytical task.

A further criticism of analogue studies of the mood-as-input model is that many of the checking measures used in analogue studies of perseverative checking are not representative of OC checking (van den Hout, Kindt, Luigjes, & Marck, 2007). Van den Hout et al.’s critique of the mood-as-input model as an explanation of OC perseveration focuses on the checking task
itself, which they suggest is too complex to represent the type of checking normally performed by an OC checker. In particular, they question how mood-as-input predictions would apply to typical OC perseverative tasks (e.g. repeatedly checking that a cooker is off or a window is shut) that for healthy people would require little or no cognitive effort or resources, and would rarely result in the detection of errors. Replicating MacDonald & Davey’s original study, van den Hout et al. included versions of the checking task that were either simple or intermediate in complexity as compared to the original checking task. In replicating the original task van den Hout et al. found that as predicted, the more people checked, the more accurate they became, suggesting that “persistence in the text-correction paradigm may be functional and might result in more errors being detected” (van den Hout et al., p. 1228). However, because OC checking involves tasks which are normally non-functional and which rarely result in increased accuracy, they predicted that if the task became less demanding perseveration would be less influenced by configurations of mood and stop rule. Consistent with this view, results indicated that when the task became simpler, a smaller difference in perseveration was observed between those using an ‘as many as can’ or ‘feel like continuing’ stop rule when in a negative mood. These results are in fact consistent with the finding that mood is more likely to be used as information the more complex the task (Schwarz, Strack, Kommer & Wagner, 1987; see Figure 1), and so mood-as-input effects are more likely to be observed with complex rather than simple tasks. However, mood is also more likely to be used as information if the individual is in a negative mood and is attempting to explain, understand or repair that mood (Schwarz & Clore, 1983; Clark & Isen, 1982). For OC checkers, the goal-directed function of their checking – regardless of how much or how little cognitive effort is required to check - is to check until they are fully confident that they have reduced anxiety (Rachman, 2002; Röper & Rachman, 1976), eradicated all threats that may cause anxiety (Rasmussen & Eisen, 1992), or have eliminated any ‘not quite right’ feelings (Coles et al., 2003). So, regardless of the complexity of the task, if repairing or eliminating
negative mood is an important function of the task, then mood is more likely to be used as information and perseveration at the task.

Finally, by their very nature, analogue studies have employed nonclinical populations, and the validity of mood-as-input predictions still needs to be tested using clinical populations with perseverative symptoms. We will argue in later sections of this paper that mood-as-input research on clinical populations is long overdue and provide evidence that clinical populations possess characteristics that would facilitate perseveration through mood-as-input processes.

Factors Affecting the Informational Value of Mood

Although the majority of mood-as-input studies reviewed above support mood-as-input predictions, these predictions are still based on the assumption that mood is used as information, that the information provided by mood will inform decisions about goal achievement, and these decisions will inform judgments about whether to continue or terminate the task. In this section, we review some of the factors known to affect whether and how mood is used as information – especially those factors that have a relevance to perseverative psychopathologies.

Using Mood as Information: One of the key features of the application of the mood-as-input hypothesis to perseverative psychopathologies is that all perseverative psychopathologies exhibit endemic negative mood (such as anxiety or sadness), and it is this negative mood that provides information about whether the goals of the individual’s symptomatic behaviour have been met. However, negative mood can have effects other than providing context-dependent information. For example, it can initiate and facilitate default processing strategies such as mood-congruency effects (Bower, 1981; Isen, Clark, Shalker, & Karp, 1978) in which a negative mood would facilitate the recall and processing of mood-congruent negative information. Mood congruency effects alone could potentially explain the consistent finding that negative mood facilitates
perseveration at worrying (Johnston & Davey, 1997; Buhr & Dugas, 2009), depressive rumination (Lyubomirsky & Nolen-Hoeksema, 1993, 1995; Nolen-Hoeksema & Morrow, 1993), checking (Britton & Davey, 2010; Rachman, 1976), and task persistence during chronic pain (Karsdorp et al., 2010). In these cases, mood congruency would predict that negative mood facilitates the recall and processing of congruent negative information from memory which is likely to generate negative evaluations of goal achievement which will encourage task persistence.

However, there is evidence from the worry literature that is clearly contrary to a mood congruency explanation of this kind. First, Davey & Levy (1998, Study 4) found that chronic worriers would also perseverate for longer than non-worriers at iterating what is positive about a situation – even though they reported being in a significantly greater negative mood than non-worriers. These results appear to be difficult to interpret in mood congruency terms, because those participants in a more negative mood (chronic worriers) are persevering for longer iterating the positive features of a topic than are participants in a more positive mood (non-worriers).

Secondly, Startup & Davey (2001, Experiment 1) induced negative, positive and neutral moods in three groups of analogue, nonclinical participants. They then asked half the participants in each condition to catastrophise a worry, and the other half to iterate what was good about a topic. Participants in a negative mood generated more catastrophising steps than those in a positive and neutral mood in both the catastrophising and the positive iteration task. What these results imply is that negative mood causes perseveration at an iterative task regardless of the valency of that task. These findings are not at all easy to incorporate into a mood congruency explanation that claims that perseveration should be facilitated only when there is a congruency between the valency of the material being iterated and the mood under which the task is being conducted.

To summarise, there is evidence to suggest that negative mood will generate perseveration at any open ended task, and that the valency of the task is not important. These findings are quite consistent with the mood-as-input account, which suggests that mood (1) is
not simply an experienced outcome of psychopathology, (2) is not simply intrinsically linked to certain default processing strategies (such as mood congruency), but (3) acts as information which is interpreted in the context of the task.

**Mood-as-Input & Attribution Effects - The Discounting Hypothesis:** When examining the mechanisms underlying the relationship between mood and evaluative strategies (e.g. stop rules), it is important to consider situations where mood and stop rule may not interact to affect task perseveration, for example when mood is attributed to an obvious source. Mood saliency is one factor known to influence the way in which mood is used as information. Schwarz and Clore (1983) demonstrated that if the source of one’s mood is made highly salient and also deemed by the individual to be irrelevant to the judgement at hand, mood is discounted as a source of information. Schwarz and Clore (1983) found that participants tended to report greater satisfaction with their lives on sunny than rainy days, unless their attention was drawn by the experimenter to the weather, in which case the effect of the weather on life satisfaction was eliminated. However, this effect was significant only for participants that were in negative rather than happy moods. This is known as the discounting effect, and implies that affect is used as information unless “alternative plausible causes for an effect are made salient” (Schwarz & Clore, 1983, p. 518). That mood salience affected participants’ judgements of their life satisfaction only when they were in a bad mood also led the authors to suggest that those in a negative mood are more likely to search for information to explain their negative mood than those in a positive mood (Schwarz & Clore, 1983).

Similarly, Scott & Cervone (2002) suggested that experienced negative affect would inform individuals that they are dissatisfied with current levels of performance and would thus lead to setting of higher performance standards. However, negative mood influenced self-regulatory conditions only if the source of experienced negative mood was non-salient, supporting the discounting hypothesis.
Bohner & Weinerth (2001) also demonstrate the influence of mood saliency on judgements, this time in message persuasion. They examined the role of affect in message persuasion and found that participants who questioned the legitimacy of the message processed to a low extent when experiencing negative affect, compared to those who did not question message legitimacy and processed to a high extent. They explain their findings from a mood-as-input perspective. The authors propose that priming participants in a negative mood to either question or not question the legitimacy of a message would lead them to answer different questions. In the case of a non-legitimate message, participants' concurrent negative affect would inform them not to process a message because it represents an illegitimate influence of persuasion (in the case of being informed the message is propaganda), but where there is no suspicion about the intention of the communicator, participants' negative affect would inform them to process a message as the contents may be problematic, thus requiring attention (Bohner & Weinerth). However, when the cause of negative affect was made highly salient and affect was deemed irrelevant to the judgement in hand, negative mood was discounted as a source of information and its effect on processing was no longer observed.

Taken together, the above findings have some important implications for mood-as-input effects in clinical populations. First, mood will be less likely to be used as information if the source of that mood is salient and deemed to be unrelated to the task at hand, and more likely to be used as information if it is attributed as being important to the task at hand. Schwarz & Clore (1983) also argue that sources of information, such as mood, are more likely to be used as information if the individual is in a negative mood because of the motivation to explain, understand and repair that mood (see also Clark & Isen, 1982). Thus, mood-as-input effects are more likely to be found in clinical populations because of their endemic negative affect. In addition, in many cases of clinical perseveration, mood is an important feature of the psychopathology in that the sufferer views the perseverative tasks as a means to eliminating,
avoiding, or repairing negative affect such as anxiety or depression (Borkovec & Inz, 1990; Borkovec & Roemer, 1995; Röper & Rachman, 1976).

**Mood-as-Input & Other Sources of Information:** Just as mood saliency is known to influence the informational properties of mood, there are also other factors that have implications for the way that mood is used as information. For example, mood effects are more commonly observed when there is little or no other subjective evidence such as instructions or task demands on which to base judgments (Schwarz, 2001). Also, the greater the level of knowledge that one brings to a task or judgement, the less likely one is to rely on the informational properties of mood. This has been observed in studies of mood and political choice, where participants who had little political knowledge, but who had received a positive or negative mood induction procedure, evaluated political candidates in a mood congruent manner using their mood as information. However, those with more political expertise relied less on their affective state to make judgments and more on other cognitive resources (Ottati & Isbell, 1996). Similarly, Forgas & Tehani (2005) examined mood effects on expert and novice verbal communication. Again, experts who had access to a bank of strategies and a larger knowledge base were less influenced by their concurrent affective state than novices.

An important implication of this for clinical populations is that mood is more likely to be used as information about whether a task is complete if the individual is unable to use other more concrete and objective evidence or lacks expertise suitable for deciding whether the task goals have been met. This is certainly the case with pathological worriers and depressive ruminators. If worrying and ruminating are attempts to solve problems or look for precipitants or sources of current distress (Davey, 1994a; Watkins, 2004) then worriers and depressed individuals are known to lack some of the important skills necessary for achieving these goals. For example, pathological worriers possess significantly poorer problem-solving confidence than non-worriers and poorer problem-orientation skills (Davey 1994b; Laugesen & Dugas, 2000)
which would prevent such individuals from successfully drawing together relevant information to be confident of closure on a worry. Worriers also express feelings of personal inadequacy that infiltrate the worry process (Davey & Levy, 1998), possess an intolerance of uncertainty (Dugas, Buhr, and Ladouceur, 2004), have a narrow negative focus (Gasper & Clore, 2002), and an avoidance coping style (Davey, 1993; Meyer et al., 1990) - all characteristics that would potentially impair an objective assessment of solutions for worries (see Berenbaum, 2010, for some further examples of processes that may ‘thwart’ closure of the worry process). Similarly, depressed individuals also exhibit poorer social problem-solving abilities than non-depressed individuals (Marx, Williams, & Claridge, 1992), depressive rumination and the abstract thinking typical of this type of rumination impairs problem-solving (Donaldson & Lam, 2004; Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008; Watkins & Baracaia, 2002; Watkins & Moulds, 2005), and the lack of memory specificity usually found in individuals with a diagnosis of major depression also generates ineffective problem-solving (Raes et al., 2005), all suggesting that depressed ruminators are also likely to be unable to successfully collate relevant information to resolve their ruminative attempts to understand their distress. Finally, repetitive checking in OCD may also lead to greater reliance on mood as a source of information if checking serves to decrease rather than increase confidence that a task has been performed properly. Repeated checking in both a virtual (van den Hout & Kindt, 2003) and a real (Radomsky, Gilchrist, & Dussault, 2006) scenario was found to reduce memory confidence, vividness, and detail. Arguably, in the absence of concrete evidence from memory and increased doubt (van den Hout & Kindt, 2003), concurrent mood would have important informational value.

**Mood-as-Input & Cognitive Load:** Increased cognitive load may also lead to greater reliance on concurrent affect as a source of informational value. For example, Schwarz, Strack, Kommer, and Wagner (1987) showed that mood effects are stronger when tasks are more complex. After inducing positive or negative moods they asked participants to assess judgements of general life
satisfaction and judgements of more specific life domains. Results showed that when asked to evaluate satisfaction of life as a whole (something that would involve multiple, complex comparisons and assessments), participants relied more on their mood as information. These findings were replicated by Siemer and Reisenzein (1998) who also asked participants to make evaluative judgements of life satisfaction. Again, they found that when cognitive load was increased (here with competing task demands and time pressure), the effects of mood on performance were enhanced. These findings imply that when task demands or cognitive load are high, mood is more likely to be used as information.

There is plenty of evidence that individuals with anxious or depressed psychopathologies adopt information processing strategies that inflict a high cognitive load, and so would be more likely to use concurrent mood as information. For example, individuals in a negative mood are more likely to deploy a more systematic or deliberative information-processing style (e.g. Ambady & Gray, 2002; Tiedens & Linton, 2001). Systematic processing is described as “a comprehensive, analytic orientation in which perceivers access and scrutinize all informational input for its relevance and importance to their judgment task, and integrate all useful information in forming their judgments” (Chaiken, Liberman & Eagly, 1989, p212), and such motivated, effortful processing has been shown to be a characteristic of worriers (Dash & Davey, 2010) as well as depressed and dysphoric individuals (Andrews & Thomson, 2009; Yost & Waery, 1996). We would therefore expect clinical populations that deploy these systematic and deliberative processing styles to be more likely to use mood as information in deciding whether to continue or terminate perseverative tasks.

**Are Mood and Stop Rules Independent?:** So far, we have talked of stop rules and mood being relatively independent contributors to the process that generates perseveration. However, we do have to consider the possibility that mood and stop rule may not be entirely independent of each other. From a functional perspective, negative mood does indeed produce more detailed
systematic processing of information and can be found in experiments examining message persuasion, where being in a negative mood results in an increased use of facts and a more systematic processing style (Forgas, 2007). Similarly, negative mood also induces comparatively higher performance standards than positive or neutral mood (Scott & Cervone, 2002), causing individuals to become relatively dissatisfied with any given level of imagined performance (Cervone, Kopp, Schaumann & Scott, 1994). These factors are likely to facilitate the deployment of ‘as many as can’ stop rules which define rather strict criteria for goal attainment. This being the case, an individual’s negative mood will not only provide negative information about the attainment of goals during a task, but it will also define more stringent goals for closure by raising performance standards and facilitating the systematic processing of information relevant to the task.

As noted above, there are a number of factors that are likely to affect the way in which mood may influence decision making (e.g. mood saliency, cognitive load) and it is possible that that mood and stop rule do not operate independently of each other. Another example of the interaction between task motivation and affect is where worriers have been shown to shift from using an ‘as many as can’ to using a ‘feel like continuing’ stop rule (Davey et al., 2007). The observed shift in stop rule endorsement (Davey et al., 2007) can be understood by examining the goal motivation literature. For example, Martin, Tesser, & McIntosh (1993) note that individuals will pursue a goal until it is attained, or until they disengage from it. However, if the goal is unachieved, individuals seem to disengage from the goal only temporarily (i.e. a shift in stop rule) and the motivation to reach the goal still remains and the goal will subsequently be pursued once more (Martin et al., 1993). Furthermore, the failure to attain a desired goal also induces negative affect (Caver & Scheier, 1990; Hsee & Abelson, 1991). This explanation sits well with perseverative worrying, where at some point the individual will have to terminate a worry bout, perhaps by shifting stop rule. However, experienced negative mood due to lack of progress towards a goal, as observed by Davey et al, and only temporary disengagement from the
goal means that worry is recurrent and persistent over a substantial time period, as observed in GAD (DSM-IV-TR, APA, 2000).

These findings suggest that negative affect and stop rule deployment may not be truly independent factors contributing to mood-as-input perseveration effects, but that negative mood can influence the nature of the stop rule that is deployed (e.g. Dash & Davey, 2011). This implies that perseveration effects are not simply dependent on the independent configuration of mood and stop rule, but that this configuration is itself facilitated by negative mood.

**Mood-as-Input & Specific Negative Moods:** While the mood-as-input hypothesis assumes that an interaction between mood valency (either positive or negative mood) and stop rule can have differential effects on processing, little is known about how discrete negative moods of the same valence interact with stop rules to affect processing. To address this issue, Meeten & Davey (under review) explored the effects of specific negative moods within a mood-as-input paradigm. Using a catastrophic worry task (cf. Startup & Davey, 2001; Vasey & Borkovec, 1992) participants were randomly assigned to either a sad, happy, anxious, angry, or neutral mood induction condition with half of the participants in each group using a ‘feel like continuing’ stop rule and the other half using an ‘as many as can’ stop rule.

Experimental findings on task perseveration confirmed standard mood-as-input predictions. Perseveration at the task was greatest when an ‘as many as can’ stop rule was paired with a negatively valenced mood or a ‘feel like continuing’ stop rule was paired with a positively valenced mood. In the sad, anxious, and angry mood groups the number of catastrophising steps was significantly greater when using an ‘as many as can’ stop rule than a ‘feel like continuing’ stop rule. The opposite was the case with the happy mood group, and in the neutral condition there was no significant difference in performance between stop rule groups. These findings are consistent with the view that overall mood valency is the important factor in mood-as-input
Russell (2003), Barrett (2006a,b) and Lindquist & Barrett (2008) propose that underlying all specific emotions are fundamental elements such as core valenced affect, and it is the way in which one attributes or appraises an event that results in core affective elements being experienced as specific emotions (e.g. Russell, 2003). Thus, participants will rely on information from valenced core affect when making judgments about whether the task goals had been met, and this explains why a similar pattern of results was found for each specific negative mood.

In addition, the fact that valenced core affect appears to be the main informational factor driving mood-as-input effects using specific emotions provides a basis for understanding the transdiagnostic nature of mood-as-input effects in psychopathology. As such, we should expect to find similar processes of perseveration across a range of psychopathologies characterized by core negative affect, including depression, anxiety and anger.

**Summary:** This section has reviewed some of the processes that can facilitate or restrict the use of mood as information. We have argued that mood-as-input effects represent the use of mood as information rather than default processing strategies in determining task perseveration, and that there are a range of factors that can influence whether mood is utilized as information. In all of these latter cases those factors that facilitate the use of mood as information can be found across a variety of psychopathologies, thus making individuals with these psychopathologies more susceptible to mood-as-input effects. In particular, mood is more likely to be used as information if the individual is in a negative mood, if the individual is unable to use more concrete or objective evidence to make decisions (e.g. because of poor problem-solving confidence or abilities), and if the individual deploys an information processing strategy that inflicts a high cognitive load (e.g. deploys systematic or deliberative processing during negative mood). Figure 1 provides a schematic representation of these factors and how they interact with concurrent negative mood to influence whether mood is used to inform decisions about
terminating or continuing the task. Finally, it appears to be core negatively valenced affect that provides the informational content in mood-as-input effects and so will contribute to the transdiagnostic nature of perseverative psychopathologies, and negative affect is also likely to lead to the deployment of stricter ‘as many as can’ stop rules for the task at hand and combine with negative mood to provide a configuration conducive to perseveration.

Clinical Implications of the Mood-as-Input Hypothesis

After 10 years of published analogue research on the mood-as-input hypothesis and perseverative psychopathologies, there are still no studies on clinical populations with diagnosed anxiety-based symptoms and only one study incorporating clinical populations with diagnosed depression-based problems (Watkins & Mason, 2002). There is no doubt that the negative moods and the perfectionist styles that might lead to the deployment of ‘as many as can’ stop rules are commonly experienced in the population generally, so why do some people and not others develop the perseverative patterns of behaviour that give rise to diagnosable perseverative symptoms? This section will discuss some of the specific characteristics of clinical populations that make them vulnerable to longer-term use of negative mood as information and are likely to lead to chronic perseverative tendencies. This section also provides some arguments for extending mood-as-input research to perseverative psychopathology in clinical populations, identifies some of the vulnerability factors that put some individuals at risk of developing diagnosable perseverative symptomatology, and provides some suggestions as to the kinds of research that could be valuable for understanding and treating perseverative psychopathologies.

Mood-as-Input & the Characteristics of Clinical Populations: The specific dynamics and principles of the mood-as-input hypothesis make it a perseverative mechanism to which clinical populations would be particularly vulnerable. Firstly, most clinical populations – especially those
suffering anxiety - or mood-based disorders – experience endemic negative mood when compared with nonclinical populations (Decker, Turk, Hess, & Murray, 2008; Mennin, Heimberg, Turk, & Fresco, 1995). This will not only provide information that task-oriented goals have not been met, but will also tend the individual to deploying ‘as many as can’ stop rules (Dash & Davey, 2011), thus resulting in the configuration of negative mood and ‘as many as can’ stop rules that will foster perseveration. Secondly, many clinical populations possess characteristics that will facilitate the use of mood as information when assessing progress on a task. As we have reviewed in the previous section, clinical populations are (1) more likely to use their mood as information if they are in a negative mood because of the motivation to explain, understand and repair that mood (Schwarz & Clore, 1983), (2) more likely to use mood to judge goal attainment if they lack the skills and expertise to make objective judgements about goal attainment (such as poor-problem solving skills or confidence, feelings of personal inadequacy, intolerance of uncertainty, avoidance coping style, etc.), and (3) more likely to use their mood as information if the individual deploys an information processing strategy that inflicts a high cognitive load (e.g. deploys systematic or deliberative processing during negative mood or as a consequence of their specific psychopathology symptoms). Thus, if their symptoms represent a goal-directed activity (such as solving a worry-based problem, checking that potential sources of harm have been eliminated, trying to understand depressed mood, etc.), many clinical populations possess characteristics that will activate mood-as-input processes and facilitate perseveration at that activity.

Relevance of Analogue Studies to Clinical Symptoms: There has already been some discussion in the literature about whether analogue laboratory-based studies provide accurate simulations of perseverative clinical symptoms (e.g. van den Hout et al., 2007), and if mood-as-input hypothesis is to contribute usefully to an understanding of perseverative psychopathologies, then it needs to be argued that analogue studies provide sufficient and
convincing grounds for pursuing mood-as-input research with clinical populations. However, mood-as-input hypothesis can be applied to any activity (cognitive or behavioural) if that activity is goal-directed – so an accurate formalistic similarity between laboratory studies and clinical symptoms is not as necessary as it might seem. The activities that make up perseverative symptoms are usually goal-directed, although different theories of these psychopathologies may specify different goals for the activities. For example, pathological worrying has been variously viewed as a problem-solving activity designed to deal with potential future threats (Berenbaum, 2010; Davey, 1994b), an activity that functions to distract the individual from experiencing aversive imagery (Sibrava & Borkovec, 2006), and an activity that the individual believes is necessary to indulge in to avoid bad things happening (Davey et al., 1996; Wells, 2010). In all of these examples, the individual will be implicitly or explicitly asking themselves the question “have I done enough worrying in order to achieve my goal of solving the problem/avoiding aversive imagery/avoiding bad things happening, etc.”. If they are concurrently experiencing negative mood, this will suggest they have not yet sufficiently achieved these goals, and they will persevere with their worrying. Both compulsive checking and depressive ruminating can also be viewed as goal-directed activities, although the nature of the goal may differ depending on the specific theoretical stance that the researcher supports. In the case of compulsive checking, the goal of checking behaviour may be to eliminate potential harm (Rasmussen & Eisen, 1992; Salkovskis et al., 2000), reduce anxiety (Rachman, 2002; Röper & Rachman, 1976), or to eradicate ‘not quite right’ experiences (Coles et al., 2003). For depressive rumination, the purpose may be to explain the causes of current distress (Watkins, 2004), analyze previous losses and failures (Fresco, Frankel, Mennin, Turk & Heimberg, 2002; Papageorgiou & Wells, 2001), or to attempt a self-critical analysis of the individual’s apparent inability to cope (e.g. “brooding”) (Crane, Barnhofer & Williams, 2007). Nevertheless, the activity is goal directed and so possesses characteristics which make mood-as-input predictions about perseverance relevant.
What is important about the laboratory analogue studies is not that they are faithful replications of clinical symptoms, but that they help to flesh out predictions about mood-as-input hypothesis that are relevant to perseverative psychopathologies. These include (1) establishing the nature of the tasks that are subject to mood-as-input effects (Hawksley & Davey, 2010; MacDonald & Davey, 2005b; Startup & Davey, 2001; Watkins & Mason, 2002), (2) clarifying the way in which relevant clinical constructs (such as responsibility) interact with mood and stop rules to influence perseveration (MacDonald & Davey, 2005b; Startup & Davey, 2003), and (3) confirming that analogue sub-clinical samples possess characteristics that would predict perseveration (e.g. endemic negative mood, dispositional characteristics that would lead to the deployment of ‘as many as can’ stop rules, and the actual deployment of ‘as many as can’ stop rules in goal-directed task situations) (Davey et al., 2005; Startup & Davey, 2001).

**Mood-as-Input as a Mechanism for Acquisition or Maintenance of Perseveration:** Once they have become established, the perseverative activities that meet criteria for DSM-IV-TR diagnosis are often very rigid and structured, and would not necessarily seem to be activities that are sensitive on a moment-to-moment basis to the goal requirements of that particular bout. For example, in chronic cases of OC compulsions, these compulsions are usually highly ritualized and must be fully completed before the individual is ready to terminate the activity (Radomsky, Shafran, Coughtrey, & Rachman, 2010). Chronic worriers with a diagnosis of GAD also find their worrying uncontrollable to the point where once it is triggered they report an inability to terminate or control it, and they instead paradoxically report using more thinking and worrying to control their worrying rather than attempt to assess progress on that particular worry problem (Wells, 2010). Thus, once these types of perseverative symptoms are well established they take on a more structured and complex form where beliefs about the potential purpose of the activity are supplemented by beliefs about the form of the behaviour and beliefs about how to terminate the behaviour (Wells; Myers, Fisher & Wells, 2009; Solem, Myers, Fisher, Vogel, & Wells, 2010),
all of which bring an added influence to bear on perseveration. Given the complex structure of well-established, chronic perseverative psychopathologies and the importance of various belief systems that influence perseveration, mood-as-input processes may well be more influential during the acquisition of such psychopathologies than during their maintenance. The conditions that would begin to develop perseveration through a mood-as-input mechanism would be (1) the experience of negative mood, possibly precipitated by current life events, (2) a perfectionist disposition that would give rise to the deployment of ‘as many as can’ stop rules, (3) increased perception of specific threats, requiring coping, neutralizing or ameliorative activities designed to control or reduce these threats, and (4) the presence of factors that would increase the use of mood as information to judge whether those coping, neutralizing or ameliorative activities had been successful (e.g. poor problem-solving skills/confidence, lack of expertise or knowledge about the threats and the ability of the ameliorative activities to deal with them, the deployment of information processing strategies that inflict a high cognitive load, etc.). Therefore, if mood-as-input is involved in the acquisition process we would expect to identify this combination of factors in the aetiology of perseverative psychopathologies such as chronic pathological worrying, OC compulsions, and depressive rumination. We already know that individuals with diagnosed perseverative psychopathologies exhibit many of these factors and that onset of these disorders is gradual rather than sudden, and the first signs of symptoms of GAD, OCD and depression most frequently occur during a period of stress, threat, loss or failure in an individual’s life (Gosselin & Laberge, 2003; Kendler, Gardener, & Prescott, 2002, 2006; Kessler, 1997; Rheaume, Freeston, Leger & Ladouceur, 1998). Systematic longitudinal studies of the development of symptoms in relation to life events are significantly lacking from the literature and it will require longitudinal and epidemiological studies to gather evidence on whether mood-as-input factors are critical components in the development of the more complex forms of chronic perseverative activity that get referred to the clinic.
Mood-as-Input as a Transdiagnostic Mechanism: There is an emerging view within psychopathology that many cognitive and behavioural processes are transdiagnostic (e.g. Harvey, Watkins, Mansell & Shafran, 2004). Excessive perseveration is also a symptom that crosses diagnostic categories (Serpell, Waller, Fearon, & Meyer, 2009), and mood-as-input hypothesis describes a mechanism that is potentially common to these differing psychopathologies and perseverative activities. The experimental studies described earlier provide evidence that a single mechanism can generate perseveration across a range of differing activities which are analogous to psychopathology symptoms, and a fuller understanding of mood-as-input processes in clinical populations should provide predictions about vulnerability to perseverative comorbidity. The basic assumption from a mood-as-input approach is that the variables required to generate preservation need not be activity specific, and if an individual suffers endemic negative mood, has a perfectionist approach to goal-directed activities, and lacks the cognitive skills necessary to objectively determine goal achievement, then perseveration across a range of goal-directed activities is possible. One implication of this is that – if a mood-as-input mechanism contributes to perseveration of clinical symptoms – then those individuals will be highly vulnerable to the development of other, related perseverative symptoms. This can occur through two routes. Firstly, symptoms may be driven by heightened perception of a single specific type of threat (e.g. contamination in certain forms of OCD), but a number of different activities may be deployed to cope with, neutralize or ameliorate this perceived threat, and if the individual possesses those characteristics that will facilitate mood-as-input processes, then perseveration will occur across all these coping and neutralizing activities (e.g. cleaning activities, worrying about the threat and its consequences, ruminating about the negative mood generated by the psychopathology, etc.). Secondly, perseverative comorbidity may occur because the individual has heightened perception of many different threats which support different sets of coping, neutralizing or ameliorating activities, and all of these will be vulnerable to perseveration if the individual possesses the relevant mood-as-input characteristics. For example, an individual with a diagnosis of GAD will
have identified many different types of potential threats that give rise to perseverative worrying, at least some of these potential threats may lead to the development of other neutralizing and coping activities such as checking that things are safe or that surfaces are not contaminated, and these additional activities will also be vulnerable to those mood-as-input factors that generate perseveration.

These potential processes are consistent with what we know about the comorbidity of perseverative symptoms. GAD (with its cardinal diagnostic symptom of excessive worrying) is highly comorbid with major depression (and the ruminative and brooding activities that represent vulnerability and relapse factors for depressive bouts - Eshun, 2000; Lyubomirsky, Kasri, & Zehm, 2003; Lyubomirsky & Tkach, 2003; Smith, Alloy, & Abramson, 2006; Watson, 2005). In addition, anxiety disorders such as GAD and pathological worrying can precede the onset of major depression (Besiroglu et al., 2007; Regier, Rae, Narrow, Kaelber & Schatzberg, 1998). Indeed, many studies have argued that anxious worrying and depressive rumination are often difficult to distinguish theoretically and may represent different examples of a broader category of repetitive thought subject to similar underlying mechanisms (Giorgio et al., 2010; Hawksley & Davey, 2010; Smith & Alloy, 2009). Similarly, obsessive and compulsive OCD symptoms are also regularly comorbid with depression (Canavera, Ollendick, May & Pincus, 2010; Nestadt et al., 2003;) and with pathological worrying (Brown, Dowdall, Cote & Barlow, 1994), and OCD symptoms can also act as a vulnerability factor for subsequent depressive symptoms themselves (Bartz & Hollander, 2006; Besiroglu et al.; Hasler et al., 2005). The complex comorbidity and inter-relatedness of obsessive thoughts and compulsions in OCD, rumination and brooding in major depression, and pathological worrying in GAD suggest the presence of common vulnerability factors, and research is needed to determine whether perseveration through underlying mood-as-input mechanisms is one of these factors.
The Range of Application of Mood-as-Input Hypothesis: So far we have discussed mood-as-input hypothesis in relation to a relatively small number of psychopathologies that have been explored in laboratory-analogue studies. However, the mood-as-input approach is applicable to any cognitive or behavioural goal-oriented task, and so is potentially applicable to a wide range of psychopathologies where perseveration is a feature. For example, impulse-control disorders such as pathological gambling, binge eating disorder and bulimia nervosa may be susceptible to mood-as-input processes, where the individual commences a goal-directed activity (such as gambling or eating) in a negative mood and is driven to achieve the goal deploying ‘as many as can’ stop rules (e.g. “I must continue to gamble until I am winning/until I have recouped my losses”, “I must continue eating until I feel better”).

In the case of pathological gambling, it is well established that negative mood states commonly accompany gambling (e.g. Blaszczynski & McConaghy, 1989; Dickerson, Cunningham, Legg England & Hinchy, 1991; Gee, Coventry & Birkenhead, 2005; McCormick, Russo, Ramirez & Taber, 1984) and that gamblers in a negative mood persevere longer and gamble at a faster rate than gamblers in a positive mood state (Dickerson, et al., 1991). Pathological gambling is also highly comorbid with other perseverative psychopathologies such as OCD (Bland, Newman, Orn & Stebelsky, 1993), GAD (Petry, Stinson, & Grant, 2005) and major depression (Cunningham-Williams, Cottler, Compton, & Spitznagel, 1998), and mood-as-input processes may provide a common mechanism leading to the acquisition of perseveration across these various psychopathologies.

Binge eating in binge eating disorder and bulimia nervosa also possesses similar characteristics. Bingeing usually begins during periods of negative mood (Petersen, Miller, Crow, Thuras, & Mitchell, 2005; Stice, 2001; Wolff, Crosby, Roberts, & Wittrock, 2000) and individuals with a diagnosis of binge eating disorder or bulimia nervosa also score high on measures of perfectionism (Bardone-Cone, Weishuhn & Boyd, 2009; Cassin & von Ranson, 2005; Sherry & Hall, 2009), and both disorders are also frequently comorbid with other perseverative
psychopathologies, particularly GAD, OCD and major depression (Bulik, Sullivan & Kendler, 2002; Bushnell et al., 1994; Sallet et al., 2010). While these facts are consistent with mood-as-input explanations of perseveration, they are also consistent with many other theories of pathological gambling and binge eating, and further research is required to differentiate between these various explanations and to test predictions from mood-as-input hypothesis under controlled experimental conditions.

Pathological gambling and binge eating are just two examples of perseverative behaviours that mood-as-input hypothesis might be applied to, and there are clearly many other candidates, including addictive behaviours generally and perseverative thought/brooding across a range of psychopathologies, and an example of the latter is a study by Startup, Freeman and Garety (2007) which has applied mood-as-input hypothesis predictions to an understanding of paranoid brooding in psychosis. Gathering information about the nature of the explicit or implicit stop rules that individuals use for gambling or bingeing activities and determining experimentally how these interact with valenced mood states would provide a start in testing mood-as-input accounts of these psychopathologies.

In all of the examples discussed so far in this review, mood-as-input is a hypothesis that has been applied to explaining perseveration during discrete ‘bouts’ of activity, but there is no reason to suppose that the same principles cannot be applied across multiple bouts to explain longer-term behavioural persistence. Examples include persistent dieting in eating disorders and addictive behaviours generally. For example, if the goals of an activity are longer-term ones (e.g. weight reduction in the case of dieting), then strict ‘as many as can’ stop rules can be deployed that specify attainment and performance standards over an extended rather than a discrete time period. Maintained, endemic negative mood over this extended time period will provide the information that these high performance standards are continually not being met, and will maintain the goal-directed activity. What are needed in these cases are some clear empirical tests that mood-as-input processes are operating. This would involve demonstrating that (1) such
individuals possessed the dispositional and mood characteristics known to facilitate mood-as-input effects (see above), (2) that interventions to identify and change the stop rules deployed by the individual significantly affected the target activity, and (3) natural or artificially-induced changes in mood valency also affected the target activity in ways predicted by mood-as-input hypothesis. A more radical test of the role of mood-as-input hypothesis would involve the manipulation of mood and stop rule configurations to replace existing ‘as many as can’/negative mood configurations with other configurations that would be predicted to reduce perseveration (‘as many as can’/positive mood or ‘feel like continuing’/negative mood) or to facilitate perseveration (‘feel like continuing’/positive mood). Although in the latter case it may be difficult ethically to implement symptom-enhancing configurations in clinical populations, it may be possible to simulate these effects in analogue studies.

**Mood-as-input hypothesis and existing models of perseverative psychopathologies:** The mood-as-input hypothesis is not a model that necessarily competes with other current cognitive models of perseverative psychopathologies, but instead is able to supplement other models by defining a specific proximal mechanism by which within-bout perseveration is generated. In relation to psychopathology, mood-as-input hypothesis merely specifies just two conditions necessary for perseveration to occur – the deployment of ‘as many as can’ stop rules and a context of concurrent negative mood. While most cognitive models of individual perseverative psychopathologies take negative mood as a defining feature of the psychopathology (i.e. because distress is a cardinal diagnostic feature of each of these psychopathologies), the explanatory constructs defined within most of these models are generally likely to give rise to the deployment of strict ‘as many as can’ stop rules. For example, clinical constructs developed to help explain OCD compulsions and pathological worrying (such as inflated responsibility, intolerance of uncertainty, clinical perfectionism) are all of the kind that would lead the individual to deploy ‘as many as can’ stop rules when engaging in the goal-oriented tasks driven by these cognitive
constructs (Dugas, Gagnon, Ladouceur & Freeston, 1998; Salkovskis, 1985; Salkovskis et al., 2000; Shafran, Thordarson & Rachman, 1996). This is because a significant part of the explanatory role for the construct centers around the individual’s motivation to fully resolve conflicts (e.g. to eliminate uncertainty or to ensure that bad things cannot happen) or to maintain high personal performance standards (e.g. clinical perfectionism). This will be reflected in the setting of high-standard task goals and the deployment of performance-related stop rules to ensure that those target goals are achieved. Furthermore, theories of perseverative psychopathologies do not need to contain sophisticated clinical constructs to be relevant to mood-as-input hypothesis. If the perseverative activity is a simple goal-directed activity and the individual places considerable importance on achieving that goal, then they will probably deploy ‘as many as can’ stop rules. For example, if the goal of an activity such as checking is to reduce anxiety or feelings that things are ‘not quite right’ (Coles et al., 2003; Rachman, 2002; Röper & Rachman, 1976), if these are important goals for the individual, then this alone will be sufficient to generate the deployment of ‘as many as can’ stop rules. The psychopathology theory does not have to contain sophisticated constructs, it merely has to hypothesize that the perseverative activity is purposeful and goal-directed in a way that is important for the individual. Finally, meta-cognitive theories of perseverative psychopathologies are also consistent with a mood-as-input explanation of bout perseveration. Meta-cognitive approaches to OCD, GAD and depression all specify a central role for meta-cognitive beliefs. These beliefs stipulate that many perseverative symptoms are associated with metacognitions that lead to monitoring of threat, self-focused attention, and activation of repetitive, negative thinking styles (Papageorgiou & Wells, 2001; Wells, 2010; Wells & Matthews, 1994; Myers, Fisher & Wells, 2009; Solem, Myers, Fisher, Vogel & Wells, 2010), and in many cases these meta-cognitive beliefs are positively held beliefs that activities such as worrying, checking and ruminating are important and necessary things to do. Because of their importance to goal-directed behavior, these meta-cognitive beliefs are likely to give rise to the deployment of ‘as many as can’ stop rules for the activity, and mood-
as-input processes may represent how meta-cognitive beliefs are operationalized in practice. In addition, the relevance of stop rules to metacognitive theories of perseverative psychopathologies has already been recognized by the fact that recent studies have already begun to identify the significance of ‘stop signals’ to the termination of perseverative activities such as checking in OCD (e.g. Myers, Fisher & Wells, 2009).

**Implications of Mood-as-Input Hypothesis for Clinical Interventions:** There are a number of implications that mood-as-input hypothesis has for clinical interventions for perseverative psychopathologies. Firstly, according to the hypothesis it is a configuration of negative mood and ‘as many as can’ stop rule that facilitates perseveration, so interventions need to address these two factors. For many individuals, awareness of the stop rules they may implicitly deploy and the interaction of these stop rules with their mood may be modest, and so helping the individual to control perseveration will involve heightened awareness of the mood and stop rule conditions under which perseverative activity is undertaken and training in how to change or control those moods and stop rules. This is especially important given that awareness of concurrent mood reduces the extent to which negative mood will be used as information, and so should minimize perseveration caused through any mood-as-input mechanism. Secondly, as we have already noted, many clinical populations tend to possess characteristics that will prevent them from making objective judgements about goal attainment and as a result are more likely to use their endemic negative mood as information about whether goals have been achieved. This will require interventions that train the skills and expertise needed in making objective assessments of goal attainment (e.g. problem-solving therapy; D’Zurilla & Nezu, 2007), and psychoeducational interventions which help individuals to understand the effects of current mood on cognitions, or highlight how heavy cognitive load may affect one’s reliance on negative emotional states. Thirdly, existing cognitive interventions that address metacognitive beliefs related to the deployment of stop rules for a perseverative task should have significant benefits.
For example, cognitive interventions that address positive beliefs about worrying in GAD (Wells, 2010) and beliefs about the need to perform rituals in OCD (Meyers et al., 2009) are likely to reduce ‘as many as can’ stop rule deployment and weaken perseveration caused by the configuration of ‘as many as can’ stop rule and negative mood. Finally, we have argued that mood-as-input is a transdiagnostic mechanism for perseveration, so any interventions developed to lessen the effects of this mechanism should have cross-diagnostic benefits. As a consequence, intervention components aimed at mood-as-input factors would effectively add value to existing CBT interventions for a variety of conditions.

**Summary:** This section has covered some of the reasons why clinical populations may be particularly vulnerable to mood-as-input processes which will generate perseveration at activities that function to cope with, neutralize or ameliorate perceived threats. Mood-as-input processes may be particularly active during periods when perseveration is developing, and more longitudinal research is required to assess this possibility. Mood-as-input processes also represent a transdiagnostic mechanism through which perseveration can be developed across a range of psychopathology-relevant activities, and contribute to comorbidity across disorders that are characterised by perseveration. This section has also highlighted a number of other psychopathologies to which mood-as-input processes can be relevant, and suggests some tests for the involvement of these mood-as-input processes. Finally, some of the implications for interventions for perseverative psychopathologies have been described.

**Conclusions**

We have reviewed the extensive body of published literature on experimental studies relating to the mood-as-input hypothesis and its application to perseverative psychopathologies. This evidence suggests that perseveration at an analogue psychopathology task can be significantly modified in line with mood-as-input hypothesis predictions by manipulating both
mood and stop rule conditions. Little or no research on the mood-as-input hypothesis has yet been carried out on clinical populations, and we argue that this research is long overdue. It is particularly overdue because clinical populations possess many of the characteristics that will facilitate mood-as-input perseverative effects, including negative affect, the deployment of ‘as many as can’ stop rules for activities that function to cope with, neutralize or ameliorate perceived threats, and they possess dispositional features that will tend them towards using their concurrent negative affect as information. Mood-as-input hypothesis also has potential as a transdiagnostic mechanism helping to explain the development of perseveration and its comorbidity across a range of different psychopathologies.

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REFERENCES


FIGURE 1: A schematic representation of the factors influencing the use of mood as information during an open-ended activity. This example portrays the individual’s own assessment of their progress on this activity (e.g. worrying, checking, rumination) following the deployment of ‘as many as can’ stop rules for the task during a concurrent negative mood. The factors facilitating the use of mood as information (as a means of assessing goal attainment) are displayed in the lower box. Use of negative mood as information will usually lead to perseveration at the task (because this signals that goals have not been achieved), whereas ignoring mood as information will lead to non-mood sources of information being used to assess goal attainment. See text for further elaboration.
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| Davey, Eldridge, Drost, & Macdonald (2007) | Study 1: 60 nonclinical participants  
Study 2: 49 nonclinical participants | Study 1: Lab-based examination of stop rules in catastrophic worrying.  
Study 2: Lab-based examination of stop rules in catastrophic worrying. | 1. Measures of mood  
Outcome measure = Catastrophising interview  
2. Measures of stop rule endorsement  
Outcome measure = Catastrophising interview | Study 1: Increases in negative mood and decreases in positive mood over the course of catastrophising.  
Study 2: A shift away from endorsing the use of AMA stop rules and a significant increasing tendency to endorse FLC stop rules over the course of catastrophising. |
| Davey, Startup, MacDonald, Jenkins, & Patterson (2005) | Study 1: 104 nonclinical participants  
Study 2: 30 nonclinical participants | Development and lab-based examination of the stop rule checklist to examine processes involved in perseverative worry. | Study 1: Questionnaire study using the stop rules checklist, PSWQ, COWS, OBQ, & PFQ  
Study 2: PSWQ and STAI Y-2 completion, mood ratings, stop rule checklist.  
Outcome measure = Catastrophising interview | Study 1 & 2: Use of an AMA stop rule (measured by stop rules check list) was significantly related to PSWQ scores and perseveration in a worry catastrophising task as measured by the number of catastrophising steps emitted. |
| Davey, Startup, Zara, MacDonald, & Field (2003) | Study 1: 60 nonclinical participants  
Study 2: 40 nonclinical participants | A lab-based examination of mood-as-input predictions with an analogue checking task. | 1. Negative, positive, or neutral MIP + stop rule manipulation.  
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