Evaluation of a brief 4-session psychoeducation procedure for high worriers based on the

mood-as-input hypothesis

By

Suzanne R Dash[1], Frances Meeten[1], Fergal Jones[2,3] & Graham C L Davey[1]

[1] University of Sussex, Brighton, UK

[2] Canterbury Christ Church University, Kent, UK

[3] Sussex Partnership NHS Foundation Trust, Sussex, UK

Correspondence to:

Graham Davey, Ph.D.,
Professor of Psychology,
School of Psychology,
The University of Sussex,
Brighton,
BN1 9QH
UK.

Email: grahamda@sussex.ac.uk
Tel: +44 1273 678485

ABSTRACT

Background & Objectives: Given the ubiquity of worrying as a consuming and distressing activity at both clinical and sub-clinical levels, it is important to develop theory-driven procedures that address worrying and allow worriers to manage this activity. This paper describes the development and testing of a psychoeducation procedure based on mood-as-input hypothesis, which is a transdiagnostic model that describes a proximal mechanism for perseverative worrying. The study used nonclinical participants meeting IAPT criteria indicating GAD symptomatology.

Methods: In 4 sessions, participants in experimental groups received psychoeducation about the basic principles of the mood-as-input hypothesis and received guidance on how to identify and change worry-relevant goal-directed decision rules and negative moods. Participants in the psychoeducation conditions were compared with participants in a befriending control group.

Results: Psychoeducation about the model significantly reduced PSWQ scores at follow-up compared with the befriending control condition (a between-groups large effect size, Cohen's d=1.05), and the homework tasks undertaken by the psychoeducation groups raised mood and reduced worry immediately. At follow up 48.2% of participants in the psychoeducation groups were below the recommended cut-off for identifying GAD symptomatology compared with 20% of participants in the control condition.

Limitations: This study was conducted on a small sample, high-worry student population, without a formal diagnosis.

Conclusions: This brief, low-intensity procedure is potentially adaptable to online or self-help procedures, and can be integrated into fuller cognitive therapy packages.

Key words: Mood-as-input; worry; low-intensity intervention; mood; decision rules

Running Head: Psychoeducation for high worriers

1.   Introduction

Worry is a consuming and distressing activity at both clinical and sub-clinical levels across a range of anxious psychopathologies. As such, it would seem important to develop theory-driven procedures that specifically address worrying and allow worriers to manage this activity. Compared with non-therapy controls, generic cognitive therapy (CT) techniques (i.e. any psychotherapeutic approach that is founded on a theory which aims to modify the cognitions that are deemed to play an important role in maintaining symptoms – see Hanrahan, Field, Jones & Davey, 2013) appear to be effective in reducing pathological worry for diagnosable disorders such as Generalized Anxiety Disorder (GAD), but are still associated with arguably modest recovery rates of 57% at 12-months follow-up (Hanrahan, Field, Jones & Davey, 2013). Additional therapeutic procedures may be required to boost recovery rates. Given that an effective model for the successful amelioration of pathological worrying is likely to include elements from many theoretically valuable approaches (see Hanrahan et al., 2013), the aim of the present study was to test the effectiveness of a psychoeducation procedure based on a further theoretical approach to pathological and perseverative worrying, namely the mood-as-input (MAI) model (Meeten & Davey, 2011).

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' or decision 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 (see Meeten & Davey, 2011 for a review). The hypothesis argues that perseverative activities such as worrying are frequently associated with goal-oriented decision rules that specify that the task must be completed as thoroughly and extensively as possible (known as "as many as can"

stop rules or decision rules). However, the mood-as-input hypothesis specifies that an individual's concurrent mood is an important source of information by which goal-achievement is assessed. When applied to excessive or pathological worrying, the mood-as-input hypothesis predicts that worriers begin worrying by deploying goal-directed "as many as can" decision rules specifying that the task must be completed as thoroughly as possible, but the worrier's negative mood provides information that this has not been achieved, so worrying continues. These predictions have been substantiated in a number of analogue studies of worrying (see Meeten & Davey, 2011, for a review), and suggest that procedures designed to both identify and change goal-directed "as many as can" decision rules or alleviate negative mood should have the effect of reducing worry perseveration and severity. A consequence of this model is that designing an intervention that can shift a worrier away from the use of goal-directed "as many as can" stop rules and also develop strategies for managing negative mood will both help to alleviate the length and frequency of perseverative worry bouts.

The present paper describes the results of a psychoeducation procedure based on the mood-as-input model for excessive worrying in participants experiencing clinically-significant levels of worry. In a 4-session procedure, this study aimed to provide psychoeducation to participants about the basic principles of the mood-as-input hypothesis, provide guidance on how to identify worry-relevant goal-directed decision rules and negative moods, and provide advice about how to change their default decision rules and manage their moods. Participants in psychoeducation conditions were predicted to score significantly lower on Penn State Worry Questionnaire (PSWQ) scores than a befriending control group (Sensky et al., 2000) at the end of the 4-session procedure and at a 4-week follow-up. In particular, analyses were undertaken that would determine whether (1) psychoeducation to

the mood-as-input model in itself leads to a reduction in worry, and (2) mood and stop rule interventions (following psychoeducation) have a greater effect than psychoeducation alone.

2.   Method

The experiment was approved by the University of Sussex's Life Sciences and Psychology Cluster-based Research Ethics Committee.

2.1   Participants

2.1.1   Recruitment

Students at the University of Sussex completed the PSWQ. High worriers were identified by a score ≥62 and were invited to take part in the experiment. A cut-off of 62 was chosen because the cut-off required to sensitively and specifically distinguish individuals with GAD from individuals without GAD depends upon the sample (Startup & Erikson, 2006). Behar, Alcaine, Zuellig and Borkovec (2003) found that a PSWQ score of 45 was a successful cut-off to distinguish treatment-seeking individuals with GAD from non-anxious individuals, but that a higher cut-off of 62 was required when differentiating individuals with GAD in a large student sample..

2.1.2   Study sample

Participants were deemed ineligible, and consequently were not invited to participate, if they did not have a score on the PSWQ of 62 or higher. See section 2.1.1.

Following screening, 40 participants began the experimental study. Retention was good, with only one participant dropping out. The final sample consisted of 39 participants who were predominantly female ($n = 36$), and had a mean age of 20.75 ($SD = 1.28$) (this gender balance in those participating in the experiment reflected the gender balance in the pool of participants eligible to participate which was 84% female and 16% male). Participants were paid £5 for each 45-minute session, and were awarded £45 at the end of the experiment if all sessions and homework tasks were completed. A consort diagram is provided in Figure 1.

2.2   Design

A mixed design was used. Participants had an initial meeting, during which consent was taken, baseline measures were administered and screening for suitability occurred. The participants met the experimenter once a week over five weeks (sessions one to five), with a sixth session four weeks later. The intervention occurred in sessions one to four, and sessions five and six were used to collect post intervention and follow up measures respectively. Participants were randomly allocated to one of four conditions (see the consort diagram shown in Figure 1), and underwent each session on a one-to-one basis with the instructor. Participants in Groups MAI-1 and MAI-2 received two sessions (sessions 1 and 2) of psychoeducation about the mood-as-input model including an instructor-guided PowerPoint presentation, with session 1 presenting the MAI model of worry in general terms and session 2 focusing on developing a personalized version of this model (see below). For Groups MAI-1 and MAI-2, the two sessions of psychoeducation were followed by two sessions focused respectively on (a) lifting mood and (b) developing more helpful decision rules, with the order counterbalanced across groups (sessions 3 and 4). Group MAI_Bf received the two sessions of psychoeducation (sessions 1 and 2), followed by two sessions of befriending (sessions 3 and 4). Group Bf received four sessions of befriending. The two weeks of befriending experienced by Group MAI_Bf were similar in content to the first two weeks of befriending experienced by Group Bf. Thus, participants

in Groups MAI-1, MAI-2 and MAI_Bf received psychoeducation in sessions 1 and 2, but in addition, those in Groups MAI-1 and MAI-2 were given two sessions that addressed mood and decision rules. Following the session on lifting mood and the session on changing decisions rules, participants in Groups MAI-1 and MAI-2 were asked to try out the strategies they had learnt during the following week on three occasions when they noticed that they were worrying.

Four intervention groups were included so that we could explore the role of mood-as-input psychoeducation and the role of mood-as-input derived exercises on worrying compared to a befriending control group. We included two groups with the exercises counterbalanced – lifting mood and changing decision rules – so that order effects could be examined, should the psychoeducation only group be found to differ significantly from the psychoedcuation plus exercises groups. If a difference was found, it would be useful to know whether it was helpful to learn about lifting mood before changing decision rules, or vice versa. Consequently, analyses were conducted with the two exercise groups collapsed (both had received the psychoeducation plus the exercises) with the expectation that the groups would be subdivided to see whether the order of presentation affected worry scores, should a significant difference be found between the psychoeducation only and the psychoeducation plus exercises groups. We also included a befriending control group so that we could control for the action of noticing one's worries (through the worry diary) and the non-specific effects of attending sessions.

Participants in the befriending condition were engaged in a discussion with the experimenter about neutral topics that interested the participant, such as music, sport, books, cooking and pets (Sensky et al., 2000). A questionnaire about hobbies, the EPIC Physical Activity

Questionnaire (Wareham et al., 2002), was used to provide a discussion framework. If the topic strayed into emotionally-loaded areas, the experimenter guided it back to neutral areas of discussion.

The same experimenter delivered the psychoeducation procedures and the befriending control intervention (SRD). SRD was an experienced post-doctoral researcher, highly familiar with the mood-as-input model, and was supervised weekly by a clinical psychologist (FJ).

2.3   Materials[1]

2.3.1   Questionnaire measures.

Penn state worry questionnaire.

The PSWQ (Meyer et al., 1990) measures worry and is sensitive to changes in worry levels during worry interventions (e.g. Goldman, Dugas, Sexton, & Gervais, 2007; Borkovec & Costello, 1993; Treanor, Erisman, Salters-Pedneault, Roemer, & Orsillo, 2011). The PSWQ has good test-retest reliability (Meyer et al., 1990) and internal consistency (α = .90; Brown, Antony, & Barlow, 1992). The PSWQ was chosen because the primary focus of our intervention was pathological worry, and because the PSWQ is the disorder specific measure recommended by IAPT for GAD (National IAPT Programme Team, 2011) and shows good psychometric properties as a screen tool for GAD (Fresco, Mennin, Heimberg & Turk, 2003). The PSWQ was administered at baseline and every session subsequently, for all groups.

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[1] A full set of materials and the intervention protocol can be obtained from the corresponding author on request.

Other measures.

To assess potential participant expectancy differences across the groups, at baseline and in every session, participants responded to a 5-point Likert item assessing "I believe these sessions will be useful in managing my worries" (1 = Not the kind of thing I think at all; 5 = I think of this kind of thing a lot).

Additionally, to assess how much participants understood the mood-as-input model, a 10-item multiple-choice quiz was used. Participants were given four items to choose between for each question. This measure was administered to all participants in all four groups, during the follow-up session. This quiz provided a manipulation check of the effectiveness of the experimenter-led PowerPoint at imparting information about the mood-as-input model

2.3.2 Worry record sheets.

Participants in all groups took home a worry record sheet for completion after sessions one to four. This was a double-sided A4 sheet with the following column headings to guide what the participants recorded: 'Date and time'; 'Situation'; 'What made you notice that you were worrying?'; 'How distressing was the worry? 0 = Not at all, 10 = Very'; 'What decision-rule(s) seemed to be governing the worrying?'; 'Please rate your mood at the time you started worrying, on the scale: -10 = very negative, 0 = neutral, +10 = very positive'.

2.3.3 Psychoeducation materials

PowerPoint

Participants were introduced to the role that mood and decision rules play in maintaining worry bouts, according to mood as input theory, during a Socratic questioning style PowerPoint. For example, participants were asked to imagine that they were worrying, and that they were in a negative mood, and encouraged to think about what a negative mood would tell them about whether they had worried as much as possible. All participants volunteered the answer that a negative mood would make them feel that they had not successfully addressed their worry. Conversely, when asked about what a positive mood would tell them, participants supplied the answer that a positive mood would indicate that they could stop worrying for now, and that they did not need to worry anymore.

Personalised MAI diagram

During the second session of psychoeducation, a personalised mood-as-input diagram was used to illustrate the way that MAI theory applied to that participant's worrying (Figure 2, see Introduction for a fuller explanation). This personalised, schematic representation of the mood-as-input model was used by the instructor to help the participant understand how their mood and decision rules might interact to maintain worrying.

2.3.4 Mood materials.

To assist with the session on lifting mood, participants completed a sheet titled 'Things that lift my mood', which invited them to record five things that lifted their mood. If participants were struggling to think of things that lifted their mood, as could be expected in a group experiencing anxious mood, they were encouraged to list things that had previously lifted their mood. Participants were asked to pick one of the items that they had generated that was feasible (i.e., something that a student could realistically do) to try out during the following week when they noticed that they were worrying.

To evaluate the efficacy of the lifting mood exercises, participants who underwent the mood session completed a lifting mood homework sheet during the week following their mood session. This was a double-sided A4 sheet with the following column headings: 'Date and time'; 'At the time you noticed you were worrying, please rate your mood on the scale: -10 = very negative, 0 = neutral, +10 = very positive'; 'At the time you noticed you were worrying, level of worry: 0 (no worry) to 10 (highly worried); 'What did you do to try to lift your mood'; 'After you had tried to lift your mood, please rate your mood on the scale: -10 = Very negative, 0 = neutral, +10 = very positive'; 'After you had tried to lift your mood, level of worry: (0 = no worry) to 10 (highly worried)'.

2.3.5   Decision rule materials.

To assist with the decision rule session, participants were supported to complete a sheet that invited them to write their main, current worry decision rule at the top of the page. Participants listed points under the headings 'Evidence to support this rule or reasons why it is helpful' and 'Evidence against this rule or reasons why it is unhelpful'. Participants were supported to develop 'A more helpful alternative decision rule' and 'Ways of testing out this new rule'.

To evaluate the efficacy of the decision rule exercises, participants who underwent the decision rule session completed a changing decision rule homework sheet during the week following their decision rule session. This was a double-sided A4 sheet with the following column headings: 'Date and time'; 'Situation'; 'At the time you noticed you were worrying, please rate your mood on the scale: -10 = very negative, 0 = neutral, +10 = very positive'; 'At the time you noticed you were worrying, level of worry: 0 (no worry) to 10 (highly worried); 'What decision rule seemed to be driving the worry?'; 'What decision rule did you change to?'; 'After changing your decision rule, please rate your mood on the scale: -10 =

Very negative, 0 = neutral, +10 = very positive'; 'After changing your decision rule, level of

worry: (0 = no worry) to 10 (highly worried)'.

2.4   Analysis

Although measures were taken weekly, in order to maximize statistical power with such a

small sample, only measures from those weeks that were of most theoretical importance

were included in the analysis. Thus, in the main, the analyses were restricted to

questionnaire measures taken at baseline, at the end of the intervention and associated

homework (session five; we refer to this as the 'outcome' time-point), and at follow-up

(session 6). Where the assumption of sphericity was violated, a Greenhouse-Geisser

correction was applied for sphericity estimates less than .75, and a Huyhn-Feldt correction

was applied for estimates above .75, as recommended by Girden (1992).

3.   Results

The characteristics of the groups are shown in Table 1. Mean baseline PSWQ scores for the

four groups were MAI-1 65.10 (SD 5.13), MAI-2 67.30 (SD 7.35), MAI_Bf 67.10 (SD 4.43),

Bf 62.30 (SD 5.38). A one-way ANOVA indicated that there was no significant difference

between the groups at baseline, $F(3, 36) = 1.68$, $p = .19$.

3.1   Penn State Worry Questionnaire

A mixed two-way 4(Group) × 3(Time: baseline, outcome, and follow-up) ANOVA was

conducted, and the descriptive statistics are reported in Table 1. There was a significant main

effect of Time on PSWQ scores, $F(1.84, 64.34) = 9.98$, $p < .001$, $\eta_p^2 = .22$, but no significant

main effect of Group, $F(3, 35) = 0.44$, $p = .73$, $\eta_p^2 = .04$. The main effect of Time is clarified

by a significant Group × Time interaction, $F(5.52, 64.34) = 3.04$, $p = .01$, $\eta_p^2 = .21$,

indicating a large effect (Stevens, 2002). A series of one-way repeated measures ANOVAs

were conducted with the data split by group in order to examine how each group varied

across the three time points (baseline, outcome, and follow-up) on the PSWQ. The repeated

measures ANOVAs indicated that there was a significant effect of time in Groups MAI-1

($p = .04$), MAI-2 ($p = .004$) and MAI-Bf ($p = .04$). When a Bonferroni-correction is applied

to control for multiple ANOVAs, $p < .0125$ is significant, thus MAI-2 showed a significant

change in PSWQ scores across time, and there is a trend indicated in groups MAI-1 and

groups MAI-Bf. Importantly, the control group, Bf, did not show a significant effect of time

on PSWQ scores ($p = .36$). As is shown in Table 1, the three groups who underwent MAI

psychoeducation (Groups MAI-1, MAI-2 and MAI_Bf) showed mean decreases in PSWQ

scores from baseline to outcome, and these decreases are maintained to follow-up. In

contrast, the befriending group (Group Bf) showed an increase in PSWQ scores from

baseline to outcome, and from baseline to follow-up.

3.2   PSWQ difference scores

To further examine the nature of the interaction, difference scores were computed between

baseline and outcome, and baseline and follow-up (see Table 1 for the PSWQ difference

score descriptive statistics).

Outcome: A one-way ANOVA indicated that there was an effect of Group on the PSWQ

'baseline minus outcome' difference scores $F(3, 35) = 2.85$, $p = .05$, $\eta_p^2 = .20$. Planned

contrasts indicated that the MAI-psychoeducation groups (Groups MAI-1, MAI-2 and

MAI_Bf) significantly differed from the befriending group ($p = .008$). There was no

significant difference between psychoeducation-only (Group MAI_Bf) compared to psychoeducation-plus-techniques (Groups MAI-1 and MAI-2) ($p = .43$), or between the two psychoeducation-plus-techniques groups (Groups MAI-1 and MAI-2) ($p = .99$). Given this, a comparison was also conducted to compare difference scores between the three groups containing psychoeducation (MAI-1, MAI-2 and MAI-Bf) collapsed together with the befriending only control group (Bf). A significant difference was found, $t(37) = 2.87$, $p = .007$, $d = 1.05$. This represents a large effect size (Cohen, 1992).

Follow-up: A one-way ANOVA indicated an effect of group on the PSWQ 'baseline minus follow-up' difference scores, $F(3, 35) = 3.81$, $p = .02$, $\eta_p^2 = .25$. Again, planned contrasts were conducted. These indicated that there was a significant difference between the MAI-psychoeducation groups (Groups MAI-1, MAI-2 and MAI_Bf) and the befriending group ($p = .005$). There was no significant difference between psychoeducation-only (Group MAI_Bf) compared to psychoeducation-plus-techniques (Groups MAI-1 and MAI-2) ($p = .27$), or between the two psychoeducation-plus-techniques groups (Groups MAI-1 and MAI-2) ($p = .23$).

3.3   Understanding of the MAI model

Changes in knowledge about the mood-as-input hypothesis as a result of the psychoeducation procedure were assessed through a quiz testing knowledge of the mood-as-input model. There was a significant difference in the performance of the groups on the quiz, $F(3, 35) = 7.58$, $p < .001$, $\eta_p^2 = .39$. The three groups who received psychoeducation scored significantly higher than the befriending control group ($p < .001$) (Group MAI-1,

M=8.50, *SD*=1.27; MAI-2, *M*=8.44, *SD*=2.30; MAI+Bf, *M*=8.80, *SD*=0.92; Bf, *M*=5.70,

SD=1.89). There was no significant difference between the three groups who received

psychoeducation (Groups MAI-1, MAI-2 and MAI_Bf) (*ps* > .62). This can be considered as

a manipulation check indicating that the psychoeducation manipulation was successful.

Although there was a significant difference between psychoeducation groups and the

befriending group in terms of knowledge of the mood-as-input model, scores on the

measure did not correlate with PSWQ difference scores between session 1 and outcome, *r* =

.15, *p* = .35, or with PSWQ difference score between session 1 and the 4-week follow-up, *r*

= .21, *p* = 19.

3.4   MAI experiments

The lifting mood experiments and the changing decision rule experiments were carried out

by groups MAI - 1 and MAI - 2. In each case, the measures used are detailed in section

'Changing decision rule homework record sheet' and 'Lifting mood homework record sheet'.

Mood and the level of worry were rated using Likert-type scales.

Lifting mood

Three-way 3(attempt: 1, 2, 3) × 2(time: pre, post) × 2(condition: mood session first, decision

rule session first) ANOVAs were conducted on mood and worry reports during the lifting

mood homework task. Descriptive statistics are shown in Table 2. Participants were asked to

try out the mood lifting and decision rule exercises three times each, during the week after

their session on these techniques. The variable 'attempt' represents these three different

attempts at lifting their mood and changing their decision rule. The variable 'time' codes

whether the ratings came from immediately before the experiment or immediately after it. In

both analyses, only the main effect of time was significant, *ps* ≤ .001, η_p^2 ≥ .75. Paired

sample *t*-tests between mood ratings pre and post the mood lifting activity indicated that there was a significant difference for all three attempts, with mood levels higher following the mood lift activity, $ts \geq 3.50$, $ps \leq .003$, rs .40 - .64. Paired sample *t*-tests also indicated that worry levels were significantly lower after the lifting mood activity than before, $ts \geq 4.34$, $ps < .001$, rs .51 - .75. Mood was measured on a single scale (-10 = very negative, 0 = neutral, +10 = very positive), thus it is not possible to separate changes in negative and positive mood specifically. There were no significant differences across the three attempts at lifting mood, suggesting that there was no significant change in the participants' ability to perform this technique across the three attempts.

Changing decision rule

Similarly, three-way 3(attempt: 1, 2, 3) × 2(time: pre, post) × 2(condition: mood session first, decision rule session first) ANOVAs were conducted on mood ratings and worry ratings during the changing decision rule homework task. Again, in both analyses, only the main effect of time was significant, $ps \leq .001$, $\eta_p^2 \geq .73$. Paired sample *t*-tests between mood pre-decision rule change and mood post-decision rule change indicated that there was a significant difference for all three attempts, with a shift to a more positive mood following the change in decision rule, $ts \geq 2.25$, $ps \leq .04$, rs .22 - .63. Descriptive statistics are in Table 2. Paired sample *t*-tests also examined level of worry before the decision rule change and after the decision rule change, and indicated that there was a significant decrease in worry for all three attempts, $ts \geq 5.88$, $ps < .001$, rs .63 - .81.

3.5   Participant Expectation

One-way ANOVAs examined whether the groups had different expectations of the usefulness of their sessions on managing their worry. There was no significant difference

between the groups at baseline, $F(3, 36) = 1.94$, $p = .14$, $\eta_p^2 = .14$. Changes in expectation

throughout the course of the experiment were examined by calculating difference scores.

Change in expectation did not significantly different across the groups (baseline expectation

minus outcome expectation: $F(3, 35) = 0.30$, $p = .83$, $\eta_p^2 = .03$); baseline expectation minus

follow-up expectation: $F(3, 35) = 0.59$, $p = .63$, $\eta_p^2 = .05$). Nor did change in expectation

significantly correlate with PSWQ total scores at outcome or follow up, or difference scores,

$rs \leq .20$, $ps \geq .23$, providing little evidence that expectations alone were a significant

contributor to change.

3.6 Clinical Significance

At follow up 48.2% of participants in the psychoeducation groups were below Behar et al.'s

(2013) PSWQ criteria of 62 for GAD symptomatology compared with only 20% of

participants in the control condition (See Table 3 for minimum and maximum PSWQ scores

at follow-up). Jacobson and Traux's (1991) criteria for reliable and clinically significant

change were also applied, using the cut-offs calculated by Fisher (2006); i.e. a participant's

score on the PSWQ needed to be below 47 at follow-up and to have decreased by at least 7

points from baseline. According to this more stringent approach, only two participants from

the psychoeducation groups and none in the control group showed reliable and clinically

significant change at follow-up.

4.   Discussion

This study tested the efficacy of psychoeducation to the mood-as-input model as a

procedure to help high worriers manage their worrying. Both baseline to outcome and

baseline to follow-up PSWQ difference scores indicated a significantly larger reduction in

PSWQ scores across the procedure in those groups receiving psychoeducation than the befriending control group. Participants in the three psychoeducation groups demonstrated a significantly higher level of knowledge about the role of mood-as-input processes in perseverative worrying than the control group, suggesting that the psychoeducation manipulation was successful, and the homework 'lifting mood' and 'changing decision rule' experiments undertaken by the psychoeducation groups both had the effects of significantly raising mood and reducing worry immediately after those activities. Differences in PSWQ scores between mood-as-input psychoeducation groups and the befriending control group at follow up could not be explained simply by differing beliefs about the usefulness of the sessions.

Given that 48.2% of participants in the psychoeducation groups were below the PSWQ criteria for GAD symptomatology at the end of the procedure compared with only 20% of participants in the control condition, it appears that the brief psychoeducation intervention described here is able to move more than double the number of participants out of the GAD range on the PSWQ than a befriending control. However, the low level of clinical significance, according to Jacobsen and Traux's (1991) method, suggests that the majority of these 'GAD recovered' participants nevertheless continue to have clinically significant levels of worry, which may perhaps be associated with sub-clinical levels of GAD and/or other anxiety disorders.

Therefore we would argue that these findings provide a proof-of-concept for a psycho-educational intervention grounded in MAI theory, but also suggest that further research is needed to develop this into an intervention that leads to clinically significant change for the majority of participants.

When comparisons are made between Groups MAI-1 and MAI-2, and Group MAI_Bf, it is interesting that the additional two sessions of MAI exercises received by Groups MAI-1 and MAI-2, did not appear to provide any significant additional benefit over the basic psychoeducation received by Group MAI_Bf, and it may be the case that mood-as-input model psychoeducation plus learning how this relates to a personal worry is sufficient to generate immediate therapeutic gains through knowledge that can be actively deployed by the participant. Also, while the homework sheets had the intended effects of raising mood and decreasing informal measures of worry, the size of these shifts was relatively small. This may perhaps explain why the addition of homework did not affect PSWQ scores. One possibility here is that a greater dose of homework may be needed in order for participants to become more practised at altering mood or decision rules, and to produce the more generalized and maintained changes necessary to impact on PSWQ scores. This would need to be examined in future research.

As can be seen from the effect sizes reported for the homework tasks, and the data shown in Table 2, an interesting pattern of results emerges on the homework tasks. It appears that the lifting mood exercises provided a greater increase in mood (i.e. towards a positive mood) than the changing decision rule exercises, while the changing decision rule exercises lead to a greater reduction in worry than the lifting mood exercises. This may indicate that there are different mechanisms of change occurring when individuals attempt to change their mood and when they change their decision rule. An optimally effective worry reduction strategy may require a combination of both of these aspects, as would be predicted by the mood-as-input hypothesis. Future research could seek to replicate this pattern in a larger sample, and follow up studies could examine the mechanism through which changing a decision rule leads to a reduction in worry.

As an initial attempt to prove the concept of an intervention to alleviate worry based on mood-as-input theory, it seemed appropriate to conduct this work with a small group of non-clinical individuals. However, now that we have established proof of concept, future work needs to determine whether these findings hold up in larger groups experiencing greater levels of worry and related psychopathology, such as GAD, and how mood-as-input psycho-education can be bolstered to produce higher levels of clinically significant change.

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None of the authors have any conflict of interests to declare.

REFERENCES

Behar, E. O., Alcaine, O., Zuellig, A. R., & Borkovec, T. D. (2003). Screening for generalized anxiety disorder using the Penn State Worry Questionnaire: A receiver operating characteristic analysis. *Journal of Behavior Therapy and Experimental Psychiatry, 34*(1), 25-43.

Borkovec, T. D., & Costello, E. (1993). Efficacy of applied relaxation and cognitive-behavioral therapy in the treatment of generalized anxiety disorder. *Journal of Consulting and Clinical Psychology, 61,* 611-619.

Borkovec, T. D., Robinson, E., Pruzinsky, T., & Dupree, D. A. (1983). Preliminary exploration of worry: Some characteristics and processes. *Behaviour Research and Therapy, 21*(1), 9-16.

Borkovec, T. D., & Roemer, L. (1995). Perceived functions of worry among generalized anxiety disorder subjects: Distraction from more emotionally distressing topics. *Journal of Behavior Therapy and Experimental Psychiatry, 26,* 25-30.

Brown, T. A., Antony, M. M., & Barlow, D. H. (1992). Psychometric properties of the Penn State Worry Questionnaire in a clinical anxiety disorders sample. *Behaviour Research and Therapy, 30*(1), 33-37.

Cohen, J. (1992). "A power primer". *Psychological Bulletin, 112*(1), 155–159. doi:10.1037/0033-2909.112.1.155

Davey, G. C. L. (2006). A mood-as-input account of perseverative worrying. In G. C. L. Davey & A. Wells (Eds.), *Worry and its psychological disorders: Theory, assessment and treatment.* John Wiley & Sons Ltd.: Chichester, UK..

Davey, G. C. L., Hampton, J., Farrell, J., & Davidson, S. (1992). Some characteristics of

worrying: Evidence for worrying and anxiety as separate constructs. *Journal of Personality and Individual Differences, 13*(2), 133-147.

Davey, G. C. L., Startup, H. M., MacDonald, B., Jenkins, D., & Patterson, K. (2005). The use of 'as many as can' versus 'feel like continuing' stop rules during worrying. *Cognitive Therapy and Research, 29,* 155-169.

Davey, G. C. L., Tallis, F., & Capuzzo, N. (1996). Beliefs about the consequences of worrying. *Cognitive Therapy and Research, 20,* 499-520.

Dugas, M. J., & Robichaud, M. (2007). *Cognitive-behavioral treatment for generalized anxiety disorder: From science to practice.* New York: Routledge.

Evans, S. J. W., Day, S. J., & Royston, P. (1990). MINIM: minimisation programme for allocating patients to treatment in clinical trials. Unpublished document. Department of Clinical Epidemiology, The London Hospital Medical College, London.

Fisher, P. L. (2006). The efficacy of psychological treatments for generalised anxiety disorder. In G. C. L. Davey, & A. Wells (Eds.), Wor*ry and its psychological disor*ders: Theory, assessment and treatment (pp. 359–377). Chichester, UK: Wiley.

Fresco DM, Mennin DS, Heimberg RG & Turk CL (2003) using the Penn State Worry Questionnaire to identify individuals with generalized anxiety disorder: A receiver operating characteristic analysis. *Journal of Behavior Therapy & Experimental Psychiatry, 34*, 285-293.

Frijda, N. H. (1988). The laws of emotion. *The American Psychologist, 43,* 349-358.

Girden, E. F. (1992). *ANOVA: Repeated measures.* Newbury Park, CA: Sage.

Goldman, N., Dugas, M. J., Sexton, K. A., & Gervais, N. J. (2007). The impact of written exposure on worry. *Behavior Modification, 32*(4), 512-538.

Hanrahan, F., Field, A. P., Jones, F. W., & Davey, G. C. L. (2013). A meta-analysis of

cognitive therapy for worry in generalized anxiety disorder. *Clinical Psychology Review,*

33(1), 120-132.

Jacobson, N. S., & Truax, P. (1991). Clinical significance: A statistical approach to defining

meaningful change in psychotherapy research. Journal of Consulting and Clinical

Psychology, 59, 12-19.

Johnston, W. M., & Davey, G. C. L. (1997). The psychological impact of negative TV

news bulletins: The catastrophising of personal worries. *British Journal of Psychology,*

88(1), 85-91.

Jones, F. W., Chandler, R., Khimsharia, P., Bogdanowicz, K. and Davey, G. (2011, July)

Working with service-users to develop a mood as input based approach to worry. Paper

presented at the British Association of Behavioural and Cognitive

Psychotherapies 39th Annual Conference, University of Surrey, Surrey, UK.

Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9: Validity of a brief

depression severity measure. *Journal of General Internal Medicine, 16*(9), 606-613.

Martin, L. L., Ward, D. W., Achee, J. W., & Wyer, R. S. (1993). Mood as input: People

have to interpret the motivational implications of their moods. *Journal of Personality*

and Social Psychology, 64(3), 317-326.

Meeten, F., & Davey, G. C. L. (2011). Mood-as-input hypothesis and perseverative

psychopathologies. *Clinical Psychology Review, 31*(8), 1259-1275.

Mennin, D. S. (2006). Emotion regulation therapy: An integrative approach to treatment-

resistant anxiety disorders. *Journal of Contemporary Psychotherapy, 36,* 95-105.

Metzger, R. L., Miller, M. L., Cohen, M., Sofka, M., & Borkovec, T. D. (1990). Worry

changes decision making: The effect of negative thoughts on cognitive

processing. *Journal of Clinical Psychology, 48,* 76-88.

Meyer, T. J., Miller, M. L., Metzger, R. L., & Borkovec, T. D. (1990). Development and validation of the Penn State Worry Questionnaire. *Behaviour Research and Therapy, 28,* 487-495.

National IAPT Programme Team. (June 2011). The IAPT data handbook. Guidance on recording and monitoring outcomes to support local evidence-based treatment. Retrieved from http://www.iapt.nhs.uk/silo/files/iapt-data-handbook-v2.pdf.

Niles, A. N., Lebeau, R. T., Liao, B., Glenn, D. E., & Craske, M. G. (2012). Dimensional indicators of generalized anxiety disorder severity for DSM-V. *Journal of Anxiety Disorders, 26,* 279-286.

Roemer, L., Molina, S., & Borkovec, T. D. (1997). An investigation of worry content among generally anxious individuals. *Journal of Nervous & Mental Disease, 185*(5), 314-319.

Sensky, T., Turkington, D., Kingdon, D., Scott, J. L., Scott, J., Siddle, R., O'Carroll, M., & Barnes, T. R. (2000). A randomized controlled trial of cognitive-behavioral therapy for persistent symptoms in schizophrenia resistant to medication. *Archives of General Psychiatry, 57*(2), 165-172.

Skevington, S. M., Lofty, M., & O'Connell, K. A. (2004). The World Health Organisation's WHOQOL-BREF quality of life assessment: Psychometric properties and results of the international field trial. A report from the WHOQOL Group. *Quality of Life Research, 13,* 299-310.

Spitzer, R. L., Kroenke, K., Williams, J. B., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: The GAD-7. *Archives of Internal Medicine, 166*(10), 1092-1097.

Startup, H. M., & Davey, G. C. L. (2001). Mood as input and catastrophic worrying. *Journal of Abnormal Psychology, 110*(1), 83-96.

Startup, H. M., & Erikson, T. M. (2006). The Penn State Worry Questionnaire (PSWQ). In G. C. L. Davey & A. Wells (Eds.), *Worry and its psychological disorders: Theory, assessment and treatment.* John Wiley & Sons Ltd.: Chichester, UK.

Stevens, J. P. (2002). *Applied multivariate statistics for the social sciences (4th ed.).* Hillsdale, NJ: Lawrence Erlbaum.

Treanor, M., Erisman, S. M., Salters-Pedneault, K., Roemer, L., & Orsillo, S. M. (2011). Acceptance-based behavioral therapy for GAD: Effects of outcomes from three theoretical models. *Depression and Anxiety, 28*(2), 127-136.

Wareham, NJ, Jakes, RW, Rennie, KL, Mitchell, J, Hennings, S. et al. (2002). Validity and repeatability of the EPIC-Norfolk Physical Activity Questionnaire. *International journal of epidemiology, 31*, 168-174.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*(8), 1063-1070.

Wells, A. (2010). Metacognitive theory and therapy for worry and generalized anxiety disorder: Review and status. *Journal of Experimental Psychopathology, 1*(1), 133-145.

Wells, A., & Cartwright-Hatton, S. (2004). A short form of the metacognitions questionnaire: Properties of the MCQ-30. *Behaviour Research and Therapy, 42*(4), 385-396.

Williams, J. E. (1996). Gender-related worry and emotionality test anxiety for high-achieving students. *Psychology in the Schools, 33*(2), 159-162.

Tables

Table 1. Group characteristics and PSWQ scores.
MAI-1 – psychoeducation plus MAI exercises (mood exercises first, followed by decision rule exercises); MAI-2 – psychoeducation plus MAI exercises (decision rule exercises first, followed by mood exercises), MAI+Bf – psychoeducation followed by befriending; Bf – befriending only.

	MAI – 1	MAI - 2	MAI+Bf	Bf
Number of participants	10	9	10	10
Number of males	0	1	1	1
Age of participants	20.60	20.80	21.40	20.20
	(1.17)	(1.23)	(1.58)	(0.92)
PSWQ score at baseline	65.10	67.30	67.10	62.30
	(5.13)	(7.35)	(4.43)	(5.38)
PSWQ score at outcome	60.40	63.44	64.40	64.80
	(9.13)	(10.05)	(4.95)	(4.16)
PSWQ score at follow-up	59.80	58.89	62.90	63.80
	(7.74)	(9.47)	(7.85)	(4.39)
PSWQ difference score: baseline minus outcome	-4.70	-4.67	-2.70	2.50
	(7.20)	(7.70)	(4.40)	(5.54)
PSWQ difference score: baseline minus follow-up	-5.30	-9.22	-4.20	1.50
	(7.42)	(8.41)	(5.96)	(6.20)

Table 2. Mood and worry levels pre- and post-homework task (lifting mood activity/changing decision rule).

Homework task	Attempt	Mood[1] pre-task	Mood[1] post-task	Worry[2] pre-task	Worry[2] post-task
Mood lift	1	-1.89 (4.11)	2.16 (4.17)	5.95 (2.09)	3.84 (1.83)
	2	1.53 (3.76)	4.21 (2.88)	4.63 (2.29)	3.00 (1.91)
	3	-3.33 (4.06)	2.28 (4.25)	4.92 (1.90)	3.50 (2.20)
Change decision rule	1	0.58 (3.81)	2.18 (3.88)	5.32 (1.80)	3.63 (2.24)
	2	0.11 (4.09)	2.53 (3.63)	4.95 (1.72)	2.63 (1.21)
	3	0.26 (4.57)	0.79 (4.43)	5.21 (1.99)	2.89 (1.94)

[1] -10 (very negative) to +10 (very positive)
[2] 0 (no worry) to 10 (highly worried)

Table 3: Minimum and maximum PSWQ scores at follow-up shown by group.
MAI-1 – psychoeducation plus MAI exercises (mood exercises first, followed by decision rule exercises); MAI-2 – psychoeducation plus MAI exercises (decision rule exercises first, followed by mood exercises), MAI+Bf – psychoeducation followed by befriending; Bf – befriending only.

Group	Minimum PSWQ score	Maximum PSWQ score
MAI_1	44	72
MAI_2	38	66
MAI_Bf	52	73
Bf	56	71

Figure 1. Consort Diagram

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┌──────────────────────────────────────┐
│ Assessed for eligibility (n = 323)   │
└──────────────────────────────────────┘
                 │
                 │───────────────┐
                 │               ▼
                 │      ┌─────────────────────────────┐
                 │      │ Excluded: Ineligible (n = 207)│
                 │      └─────────────────────────────┘
                 ▼
┌──────────────────────────────────────┐
│ Invited for treatment (n = 116)      │
└──────────────────────────────────────┘
                 │
                 │───────────────┐
                 │               ▼
                 │      ┌─────────────────────────────┐
                 │      │ Excluded: Declined           │
                 │      │ participation (n = 69)       │
                 │      └─────────────────────────────┘
                 ▼
┌──────────────────────────────────────┐
│ Baseline questionnaire battery       │
│ (n = 47)                             │
└──────────────────────────────────────┘
                 │
                 │───────────────┐
                 │               ▼
                 │      ┌─────────────────────────────┐
                 │      │ Excluded: Suicide risk       │
                 │      │ (n = 7)                      │
                 │      └─────────────────────────────┘
                 ▼
┌──────────────────────────────────────┐
│ Randomized (n = 40)                  │
└──────────────────────────────────────┘
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Allocated to Psychoeducation plus techniques (*n* = 20)

Allocated to Psychoeducation plus befriending (*n* = 10)

Allocated to befriending (*n* = 10)

MAI Psychoeducation: 2 weeks (*n* = 30)

Befriending: 4 weeks (*n* = 10)

Withdrew from study (n = 1)

Mood lifting (*n* = 10)

Decision rule (*n* = 9)

Befriending 2 weeks (*n* = 10)

Decision rule (*n* = 10)

Mood lifting (*n* = 9)

Outcome questionnaire battery (*n* = 39)

4-week follow-up questionnaire battery (*n* = 39)

Negative Mood =
No. I don't feel I've resolved it, so I should keep thinking about it.

Positive Mood =
Yes. I feel I've resolved it, so I can stop thinking about it.

WORRYING
E.g. regarding money, exams, deadlines, relationships

Decision Rule:
I must continue to think about this until I've resolved the problem. Do I feel that I've resolved the problem?

STOP WORRYING

Figure 2. A schematic representation of the mood-as-input model was used by the instructor to help the participant understand how their mood and their own decision rules might interact to maintain worrying.