



## The relative effects of abstract versus concrete thinking on decision-making in depression



Shanta Dey, Ben R. Newell, Michelle L. Moulds\*

School of Psychology, The University of New South Wales, UNSW Sydney, Australia

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### ABSTRACT

In two studies we tested the hypothesis that abstract thinking is linked to decision-making problems in depression. In Study 1, we compared the extent to which high dysphoric ( $n = 24$ ) and low dysphoric ( $n = 26$ ) individuals engaged in abstract thinking while completing a decision-making task. As predicted, high dysphoric participants demonstrated more abstract thinking and worse outcomes on decision-making measures indexed before and after they made decisions about both personal and hypothetical scenarios. In Study 2, we tested the prediction that abstract thinking leads to worse decision-making outcomes relative to concrete thinking. Participants were randomly allocated to engage in either abstract ( $n = 43$ ) or concrete ( $n = 44$ ) thinking, and then given an online writing task and encouraged to complete it as early as possible within a 9-day timeframe. Depressive symptoms were associated with longer task completion time in the abstract condition; no such relationship was observed in the concrete condition. Our findings have the potential to inform the clinical management of depression by demonstrating that abstract thinking could contribute to decision-making difficulties in depression, and raise the possibility that facilitating the use of concrete thinking may reduce these difficulties.

### 1. Introduction

Decision-making is a fundamental cognitive process through which one decides how to proceed in a given scenario. The decision-making process is characterised by a number of features, including the decision-maker's levels of indecision, evidence of problem-solving, the length of time it takes to make the decision, and their final choice. Whilst decision-making can be challenging for all individuals, the process appears to be particularly difficult for depressed individuals. Indecision is a key symptom of a major depressive episode (DSM-5, American Psychiatric Association, 2013). There is evidence that depressive symptomatology is linked to suboptimal decision-making strategies (Radford, Mann, & Kalucy, 1986), less productive decisions, and less willingness to expend effort as a result of the decision (Leykin, Roberts, & DeRubeis, 2011). There is also evidence that depressed individuals have a tendency to regret the decisions that they make (Monroe, Skowronski, MacDonald, & Wood, 2005). Clearly, then, decision-making deficits are important to target in depressed individuals. However, in order to do so, research needs to be conducted that will enable a better theoretical understanding of the source of decision-making problems in this population. To date, this topic has received little research attention. One idea that has been recently proposed in the literature is that abstract ruminative thinking, a style of thinking that is characteristic of depressed

individuals, may play a key role in decision-making problems in the context of depression.

Abstract rumination is a common thinking process reported by depressed individuals (Watkins, 2016), and involves repeatedly thinking about the higher-order aspects of a situation, such as the reasons for and implications of a situation (Watkins, 2004). In depression, the content of such thinking is typically focused on the meanings and consequences of one's negative emotions (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008); for example, 'why do I always feel so down?', 'what is wrong with me?' and 'why can't I handle this better?' (Watkins, 2008). This style of thinking is in direct contrast to concrete rumination, which involves thinking about low-level specific details of a situation (Watkins, 2004). Some examples of such thoughts include 'what occurred in this situation?', 'how did it happen?' and 'what steps can I take to address the problem?' (Watkins, 2008).

The literature thus far has primarily demonstrated that abstract thinking leads to negative outcomes while concrete thinking leads to comparatively positive outcomes. For example, abstract thinking increases negative future thinking in depression (Lavender & Watkins, 2004), worsens social problem solving (Watkins & Baracaia, 2002; Watkins & Moulds, 2005), and dampens executive functioning in dysphoric individuals by reducing their ability to ignore irrelevant information during mental activities that require strategic thinking

\* Corresponding author. School of Psychology, The University of New South Wales, Sydney, NSW, 2052, Australia.  
E-mail address: [m.moulds@unsw.edu.au](mailto:m.moulds@unsw.edu.au) (M.L. Moulds).

(Philippot & Brutoux, 2008). The harmful effects of abstract thinking in depression are in contrast to the relatively positive effects of concrete thinking. For example, there is evidence that depressed participants who received a concrete thinking induction reported less self-worthlessness and incompetency (Rimes & Watkins, 2005) and demonstrated better social problem solving (Watkins & Moulds, 2005), relative to depressed participants who received an abstract thinking induction. Taken together, these findings demonstrate that abstract thinking has maladaptive effects while concrete thinking leads to relatively adaptive outcomes.

Given that abstract thinking is a common and unconstructive thought process in depression, it is not implausible that abstract thinking could be contributing to decision-making problems in depressed individuals. Following from this is the possibility that the converse more adaptive style of thinking, namely concrete thinking, is helpful in the decision-making process. Decision-making necessitates concrete representations of the decision scenario, with attention focused on the available options and actions that an individual may need to take in order to arrive at a decision. A number of researchers (Schiena, Luminet, Chang, & Philippot, 2013; Watkins, 2016) have proposed that the lack of concrete thinking and overuse of abstract thinking in depressed individuals underpins their difficulties with decision-making. They hypothesise that abstract thinking may bring about overly analytical representations of the decision scenario that are not conducive to arriving at a decision. For example, focusing on the general meanings and implications that a choice option may have for one's life is likely to be less helpful than focusing on the concrete steps that an individual needs to take in order to make a decision, or on the concrete outcomes of the decision.

The possibility that abstract thinking is unhelpful in decision-making in comparison to concrete thinking has been tested in two studies conducted by Schiena et al. (2013). In their first study, participants who scored more highly on a measure of abstract rumination scored more highly on a trait measure of indecisiveness, and conversely, those who scored highly on a measure of concrete rumination tended to score lower on the indecisiveness measure. In the second study, high dysphoric participants were instructed to think in either an abstract or concrete way about a list of ten scenarios (e.g., succeeding in a job interview), and then completed decision-making tasks pertaining to those scenarios. Participants in the abstract condition took longer to make a decision than did participants in the concrete condition. There was also a trend towards those in the abstract condition finding the process of decision-making more difficult than participants in the concrete condition. To our knowledge, no other study in the published literature has tested the relative effects of abstract versus concrete thinking on decision-making in depression.

The study by Schiena et al. (2013) is undoubtedly an important experiment such that it is the first to have tested the hypothesis that abstract thinking plays a causal role in decision-making problems in depression. However, we see the need for an even more preliminary step in this line of investigation; specifically, to assess the level of abstract thinking that naturally emerges when depressed/dysphoric individuals engage in decision-making. Whilst it is well established that abstract thinking is common in depression (Watkins, 2016), no study has explicitly examined whether abstract thinking is evident during decision-making in the context of depression.

To address this gap in the literature, in Study 1 we compared the style of thinking that high dysphoric individuals, in comparison to low dysphoric individuals, naturally adopted during decision-making. Evidence that abstract thinking is the default style of thinking that naturally emerges during decision-making in depression would provide a stronger basis for conducting follow-up experimental studies to examine the relative effects of abstract versus concrete thinking on decision-making measures. Accordingly, in Study 2 we investigated whether abstract thinking may be contributing to problems in the length of time that it takes to make a decision (decision latency), and

whether inducing a converse style of concrete thinking may help to counteract this problem.

## 2. Study 1

In Study 1 we instructed participants to write down the thoughts that came into their mind while they attempted to make decisions on a range of laboratory decision-making tasks, and then coded their written responses for levels of abstractness versus concreteness. Guided by the notion that abstract thinking may be underpinning decision-making problems in depression, we hypothesised that high dysphoric participants would demonstrate more abstract than concrete thinking during decision-making than would low dysphoric participants as well as worse outcomes on decision-making ratings items administered immediately before and after participants completed each decision-making task.

In Schiena et al. (2013) study, participants completed hypothetical decision scenarios. In order to increase the ecological validity and clinical utility of our findings, we utilized personally relevant decision tasks in addition to hypothetical decision tasks. We expected that the high dysphoric participants would report worse decision-making outcomes for both the personal and hypothetical scenarios. In line with the evidence that depressed individuals have a tendency to experience more difficulties than non-depressed individuals, we also expected the high dysphoric group to report worse outcomes on all subscales of a trait questionnaire of decision-making in comparison to the low dysphoric group.

## 3. Method

### 3.1. Participants and design

Fifty first-year psychology students (29 females, mean age = 18.9;  $SD = 1.69$ ) from The University of New South Wales (UNSW Sydney) participated in return for course credit.<sup>1</sup> Participants were classified as either high or low dysphoric on the basis of their scores on the depression subscale of the Depression Anxiety Stress Scale (DASS-21; Lovibond & Lovibond, 1995). Participants who scored in the moderate depression range or above (i.e.,  $\geq 14$ ;  $n = 24$ ) were classified as high dysphoric, while participants who scored in the normal or mild range (i.e.,  $< 14$ ;  $n = 26$ ) were classified as low dysphoric. These sample sizes were guided by the sample sizes of previous studies in which there was a difference between abstract and concrete thinking (e.g., Schiena et al., 2013. Study 2; Watkins & Baracaia, 2002). The study adopted a correlational design, and high and low dysphoric participants were compared on abstractness of thought and a number of decision-making indices.

### 3.2. Measures

#### 3.2.1. Study sign-up email

Within 24 hours of signing up to take part in the study, participants received an email requesting that they come to their scheduled lab session having identified two real-life decision-making scenarios that they were currently facing in their personal life. They were informed that they would be asked questions about these two scenarios during the study, and should therefore identify the scenarios before coming into the lab. To ensure that the personal decision-making scenarios were somewhat standardised across participants, the email indicated that the scenarios should be personally important, and that participants should already have given them some thought. In addition, participants

<sup>1</sup> The study received ethical approval from the UNSW Human Research Ethics Advisory Panel- Panel C (HREAP – Behavioural Sciences; approval number 2514).

were informed that they should select scenarios for which they have to make a decision within the next 6 months, and for which they were primarily responsible for making the decision (i.e., scenarios that do not require a group decision).

### 3.2.2. Depression Anxiety Stress Scale-21 (DASS-21; Lovibond & Lovibond, 1995)

The DASS-21 is a 21-item self-report questionnaire that consists of three subscales that assess the presence and level of depression, anxiety, and stress symptoms. Participants rated the extent to which each item (e.g., “I felt that I had nothing to look forward to”) applied to them over the past week. Ratings are indexed on a 4-point scale, where 0 = *did not apply to me at all* and 3 = *applied to me very much or most of the time*. The DASS-21 has very good psychometric properties (e.g., Ashiq, Majeed, & Malik, 2016). In this study, Cronbach's alpha was .89, .84, and .88 for the depression, anxiety, and stress subscales, respectively.

### 3.2.3. Ruminative Response Scale (RRS) of the Response Styles Questionnaire (Nolen-Hoeksema & Morrow, 1991)

The RRS is a 22-item self-report questionnaire that indexes the tendency to ruminate in response to sad mood. Participants rate the frequency with which they engage in a ruminative response described in each item (e.g., think “Why can't I get going?”) when feeling sad, down, or depressed. Ratings are indexed on a 4-point scale, where 1 = *almost never* and 4 = *almost always*. The RRS possesses strong psychometric properties (e.g., Yook, Kim, Suh, & Lee, 2010). In this study, alpha was .95.

### 3.2.4. Decision Behaviour Questionnaire (DBQ; Radford, Mann, Ohta, & Nakane, 1993)

The DBQ is a self-report questionnaire that indexes participants' general sense of self-esteem as a decision-maker (6 items), the stress they usually experience during decision-making (10 items), and their typical decision response styles (4 subscales, 6 items per subscale). In the current study, the decisional self-esteem scale, decisional stress scale, and only 2 of the 4 decision-response style subscales (decisional avoidance and decisional hyper-vigilance) were administered. The decisional choice subscale and the decisional complacency subscale were not administered due to time constraints and given that of the four subscales, these two possess the lowest internal consistency (Radford et al., 1993). The DBQ has good psychometric properties (e.g., Radford et al., 1993). In this study,  $\alpha = .68, .65, .93, \text{ and } .70$ , for the self-esteem, stress, avoidance, and hyper-vigilance subscales, respectively.

### 3.2.5. Decision-making tasks

Participants completed four decision-making scenarios. Of the four decision-making tasks, two pertained to decision-making dilemmas that they were currently facing in their personal life, and two pertained to hypothetical decision-making scenarios. The first hypothetical scenario described a situation in which they were asked to imagine that they had started a new high-pressure job 3 months ago, and were recently given an unfair and demanding job task. The participant's task was to decide whether they would complete the task or quit the job. The second scenario described a situation in which participants were asked to imagine that they had been having a tough week and, in order to feel better, had paid a deposit to join a sports club in which they could play their favourite sport on the weekends. The scenario goes on to describe that on the first day the club members do not appear to be very welcoming, and as a result, for most of the game, they had no choice but to watch the others play. The participant's task was to decide whether to continue participating in the upcoming weeks or to quit the club. These two scenarios were created due to the fact that they were scenarios that university students could plausibly face. Pilot testing also revealed that the scenarios were ones that could be processed in a concrete way (i.e., by adopting a course of action to address the situation) or abstract way (i.e., by focusing on the meaning, implications, and consequences of the

situation).

For all four of the decision-making tasks, participants were given the following instructions: “Write out the thoughts that come to mind when trying to arrive at decision for this scenario. You should arrive at, and state your decision by the end of your written response, even if you are not completely confident in your decision.” Participants were instructed to spend 7–10 min on each decision-making task and were encouraged to write as much as possible. They were also advised that they did not need to be concerned with their grammar, spelling, or sentence structure.

### 3.2.6. Pre-decision measures

Immediately before commencing each of the two personally relevant decision scenarios, participants rated: i) the extent to which they had already thought about the decision scenario (from 1 = *I've thought about it once or twice* to 7 = *I think about it constantly*). They then rated (from 1 = *not at all* to 7 = *highly/very*): ii) the extent to which the decision scenario was personally important to them, iii) how difficult they expected it would be to make the decision, iv) the extent to which they felt capable of making the decision, and v) the extent to which they felt unhappy when they thought about having to make a decision. No pre-decision measures were obtained for the hypothetical decision scenarios.

### 3.2.7. Post-decision measures

Immediately following the completion of each of the four decision-making tasks, participants rated items that indexed their experience of the decision-making process. Specifically, they rated: i) the extent to which they felt capable of carrying out their stated decision, ii) the level of stress and iii) indecision they experienced during the decision-making process, iv) the level of confidence they felt in their decision, v) the extent to which they were likely to regret their decision, vi) the level of uncertainty and vii) satisfaction they currently felt with their decision, and viii) the extent to which they believed the decision they made was in their best interest. Ratings were provided on a 5-point scale, where 1 = *not at all*, and 5 = *very much*.

### 3.2.8. Levels of abstract versus concrete thinking

Written responses to each of the four decision-making tasks were coded for levels of abstract versus concrete thinking according to Stober, Tepperwien, and Staak (2000)'s coding scheme. The coding scheme defines *abstract thought* as “indistinct, cross-situational, equivocal, unclear, aggregated” and *concrete thought* as “distinct, situationally specific, unequivocal, clear, singular.” In addition to these definitions, characteristics of abstract versus concrete thought drawn from the findings of researchers who have tested the differences between these two styles of thought (e.g., Watkins & Baracaia, 2002) were also included in the coding manual. Ratings for each written response was provided on a 5-point scale, where 1 = *abstract*, 2 = *somewhat abstract*, 3 = *neither abstract nor concrete*, 4 = *somewhat concrete*, and 5 = *concrete*.

### 3.3. Procedure

On the day of signing-up to the study, participants received an email requesting that they come to their scheduled lab session having identified two real-life decision-making scenarios that they were currently facing in their personal life. Participants were resent this email the day before their scheduled lab session. Upon arriving at the lab, participants were seated at a computer and asked to provide informed consent. Participants were then instructed to complete the DASS-21, RRS, and the DBQ. Next, participants were reminded of the instructions that they received in the two emails that the experimenter sent before they came into the lab, and were informed that the next task would pertain to the two personal decision scenarios they had thought of. Participants first completed the pre-decision measures for the first personal decision

**Table 1**  
Means and standard deviations for age, trait measures, and decision behaviour questionnaire subscales.

	Group			
	High dysphoric (n = 24)		Low dysphoric (n = 26)	
	M	SD	M	SD
Age	18.75	1.54	19.04	1.84
DASS-21 depression	22.00	5.04	4.15	3.62
DASS-21 anxiety	8.75	8.88	9.15	8.49
DASS-21 stress	14.25	10.78	14.62	9.10
RRS	52.46	11.44	34.81	9.22
Decisional self-esteem	13.33	1.88	15.88	1.21
Decisional stress	14.75	2.51	9.42	3.28
Decisional avoidance	15.50	3.51	9.50	3.26
Decisional hyper-vigilance	10.96	2.26	7.42	2.76

Note. For each scale, a higher score indicates a higher level of the indexed variable.

scenario, completed the decision-making writing task for the scenario, and then provided ratings on the post-decision measures. This procedure was then repeated for the second personal decision scenario and then the two hypothetical decision scenarios. Finally, participants were debriefed and thanked for their participation.

#### 4. Results

For all statistical analyses, an alpha level of 0.05 was used. Effect sizes for independent *t*-tests are reported, whereby values up to .2 refer to small, 0.5 to moderate, and 0.8 to large effect sizes (Cohen, 1988).

##### 4.1. Sample characteristics

Means and standard deviations of sample characteristics are presented in Table 1. The high dysphoric group had an average DASS-21 depression score of 22 and thus fell within the 'severe' range, according to DASS-21 depression cut-offs (Lovibond & Lovibond, 1995). For the low dysphoric group, the average DASS-21 depression score was 4.15 (within the 'normal' range). Independent samples *t*-tests revealed that, unsurprisingly, the groups differed significantly on the DASS-21 depression subscale,  $t(41.47) = -14.28, p < .001, d = 4.07$ , and the RRS,  $t(48) = -6.03, p < .001, d = 1.70$ , such that the high dysphoric group reported greater depressive symptoms, and a greater tendency to ruminate in response to sad mood.

Further independent samples *t*-tests revealed that the two groups did not differ in age,  $t(48) = 0.60, p = .55$ , or on the DASS-21 anxiety,  $t(48) = 0.16, p = .87$ , or DASS-21 stress subscales,  $t(48) = 0.13, p = .90$ . A Pearson's chi-square analysis revealed that the high (58% female) and low dysphoric groups (58% female) were also comparable on gender ( $\chi^2(1, N = 50) = 0.002, p = .96$ ). These findings confirm that any between-group differences on the decision-making indices are more likely to be attributable to differences in symptoms of depression and ruminative tendencies, rather than age, stress, or anxiety symptoms.

##### 4.2. Decision Behaviour Questionnaire

To examine whether participants in the high and low dysphoric groups differed on the Decision Behaviour Questionnaire subscales, a second series of independent samples *t*-tests was conducted, with decisional self-esteem, decisional stress, decisional avoidance, and decisional hyper-vigilance scores as the dependent variables. As expected, the high dysphoric group reported worse decisional self-esteem,  $t(38.75) = 5.65, p < .001, d = 1.61$ , more decisional stress  $t(46.45) = -6.49, p < .001, d = 1.83$ , more decisional avoidance,  $t(48) = -6.26, p < .001, d = 1.77$ , and more decisional hyper-vigilance,  $t(48) = -4.94, p < .001, d = 1.40$ . See Table 1 for means and standard deviations.

**Table 2**  
Means and standard deviations for pre-decision ratings averaged across personal decision scenarios.

	Group			
	High dysphoric (n = 24)		Low dysphoric (n = 26)	
	M	SD	M	SD
Time	5.58	0.75	4.94	0.82
Importance	6.04	0.75	5.88	0.79
Expectation	5.31	1.49	4.08	1.14
Capability	3.50	1.29	5.54	0.77
Unhappy	5.02	1.32	2.62	1.00

Note. Time = time spent thinking about the decision; Importance = personal importance of decision; Expectation = expectation of decision-making difficulty; Capability = decision-making capability; Unhappy = unhappiness at the thought of having to make a decision.

Ratings can range from 1 to 7, with higher ratings indicating greater levels of the indexed variable.

(48) = -6.26,  $p < .001, d = 1.77$ , and more decisional hyper-vigilance,  $t(48) = -4.94, p < .001, d = 1.40$ . See Table 1 for means and standard deviations.

##### 4.3. Pre-decision measures

The high and low dysphoric groups were then compared on their pre-decision ratings for the personal decision scenarios. Ratings were averaged across the two personal decisions, and then entered as dependent variables in a series of independent samples *t*-tests. There was no between-group difference in ratings of the personal importance of the decision scenario,  $t(48) = -0.72, p = .48$ . However, high dysphoric participants reported that they spent more time thinking about the decision scenario,  $t(48) = -2.89, p = .006, d = -0.81$ , expected more difficulty in making a decision,  $t(48) = -3.31, p = .002, d = 0.93$ , felt less capable of being able to make a decision,  $t(36.98) = 6.69, p < .001, d = 1.92$ , and felt more unhappy at the thought of having to make a decision,  $t(42.80) = -7.20, p < .001, d = 2.05$ . See Table 2 for the means and standard deviations.

##### 4.4. Post-decision measures

High and low dysphoric participants were then compared on scores on the post-decision measures for all four decision scenarios (means and standard deviations of the measures are presented in Table 3 for the personal scenarios and hypothetical scenarios). Theoretically similar and highly correlated measures (i.e., with a bivariate correlation of 0.7 or above) were averaged to produce two key composite measures. A composite negative affect score was created, averaging scores on the items that indexed indecision, stress, and uncertainty during the decision-making process. A positive affect score was also created by averaging scores on the items indexing decisional confidence, satisfaction, and capability.

The high and low dysphoric groups were first compared on the personal decision scenarios. A series of independent samples *t*-test was conducted with decision-writing time, positive affect, negative affect, regret expectation, and best-interest ratings as the dependent variables. High and low dysphoric participants did not differ in the amount of time taken to complete the task,  $t(48) = -0.25, p = .80$ . However, as expected, high dysphoric participants reported more negative affect,  $t(41.14) = -5.50, p < .001, d = 1.56$ , and less positive affect during the decision-making process,  $t(48) = 6.70, p < .001, d = 1.87$ , as well as a greater expectation that they would regret their decision,  $t(48) = -4.61, p < .001, d = 1.29$ . The high dysphoric group also reported lower ratings in their belief that the decision that they made was in their best interest,  $t(48) = 5.59, p < .001, d = 1.57$ .

**Table 3**

Means and standard deviations for decision-making time and post-decision ratings averaged across personal and hypothetical decision scenarios.

	Personal decision scenarios				Hypothetical decision scenarios			
	High dysphoric		Low dysphoric		High dysphoric		Low dysphoric	
	(n = 24)		(n = 26)		(n = 24)		(n = 26)	
	M	SD	M	SD	M	SD	M	SD
Time (secs)	407.21	128.40	397.51	145.34	288.55	87.88	284.58	117.03
Capable	3.04	0.97	4.37	0.59	3.35	0.96	4.08	1.35
Stress	3.81	1.12	2.54	0.96	3.50	0.97	2.06	1.13
Indecision	4.21	0.94	2.87	0.86	3.46	1.22	2.00	0.88
Confidence	2.73	0.85	4.06	0.74	3.17	0.96	4.04	1.36
Regret	3.04	0.97	1.94	0.71	3.42	1.02	1.79	0.94
Uncertainty	3.83	1.17	2.33	0.95	3.17	1.07	1.90	0.94
Satisfaction	2.77	0.91	4.00	0.72	3.04	0.95	3.79	1.31
Best interest	3.25	0.86	4.40	0.58	4.38	0.59	4.10	1.35
Negative affect	3.95	1.01	2.58	0.72	3.38	1.01	1.99	0.85
Positive affect	2.85	0.77	4.14	0.60	3.19	0.86	3.97	1.31

Note. Negative affect score is the average of scores on indecision, stress, and uncertainty. Positive affect score is the average of scores on decisional confidence, satisfaction, and capability. Scores for the ratings items can range from 1 to 5, with higher ratings indicating greater levels of the indexed variable.

The high and low dysphoric groups were then compared on the hypothetical decision scenarios. Independent samples *t*-tests revealed a pattern of results that were largely similar to those observed for the personal decision scenarios. High and low dysphoric participants spent a comparable amount of time completing the decision-making tasks,  $t(48) = -0.14$ ,  $p = .89$ . Yet, participants in the high dysphoric group reported more negative affect,  $t(48) = -5.26$ ,  $p < .001$ ,  $d = 0.70$ , less positive affect,  $t(48) = 2.47$ ,  $p = .02$ ,  $d = 1.48$ , and a greater expectation that they would regret their decision,  $t(48) = -5.88$ ,  $p < .001$ ,  $d = 1.66$ . Interestingly, however, there was no significant difference between the groups in ratings of belief that the decision that they made was in their best interest,  $t(48) = -0.93$ ,  $p = .36$ .

#### 4.5. Levels of naturally occurring abstract versus concrete thinking

Two coders who had been trained in the coding scheme developed by [Stober, Tepperwien, and Staak \(2000\)](#) each coded all 200 written responses. Interrater reliability between the raters who were blind to dysphoric status was high, with an intraclass correlation of 0.87 for the personal decision reflections and 0.90 for the hypothetical decision reflections. The ratings provided by the two raters were averaged to compute a mean score of abstract versus concrete thinking for each of the four decision scenarios. Lower numbers on the scale indicate more abstract thinking. The mean rating of abstract thinking across the four scenarios was 2.23 ( $SD = 0.49$ ) for the high dysphoric group and 3.50 ( $SD = 0.75$ ) for the low dysphoric group. This between-group difference was significant,  $t(48) = 7.08$ ,  $p < .001$ ,  $d = 2.00$ , indicating that participants in the high dysphoric group engaged in more abstract thinking than the low dysphoric group. This between-condition difference remained consistent across both the personal  $t(48) = 7.08$ ,  $p < .001$ , and hypothetical scenarios  $t(41.98) = 6.12$ ,  $p < .001$ .

## 5. Discussion

The primary goals of Study 1 were to test the predictions that, relative to low dysphoric individuals, high dysphoric individuals report more decision-making problems and more abstract thinking during decision-making. The findings yielded support for both predictions. On the decision-making subscales, personally-relevant and hypothetical decision-making tasks, high dysphoric participants provided less favorable ratings of their decision-making experience than did low dysphoric participants. High dysphoric individuals were also more likely than low dysphoric individuals to naturally adopt a more abstract than concrete style of thinking during decision-making.

To our knowledge, our study is the first in the depression literature to demonstrate that high dysphoric individuals demonstrate more abstract than concrete thinking for both personal and hypothetical decision scenarios. The pervasiveness of abstract thinking in high dysphoric individuals highlights the need to conduct further research on the downstream consequences of this style of habitual thinking in depression. Researchers should also investigate whether an increased focus on the self in personal decision scenarios (as compared to the hypothetical scenarios) may consequently lead to worsened mood and in turn potentially exacerbate the negative effects of abstract thinking in depression. Given that we did not index mood following the completion of each decision scenario, we are unable to draw such inferences from our study but consider this an interesting avenue for future research.

It is also important to point out that we did not counterbalance the presentation of the personal and hypothetical scenarios. Given that we instructed participants to come to their scheduled lab session having identified two real-life decision-making scenarios that they were currently facing in their personal life, we designed the study so that participants first reflected on these personal decision scenarios before presenting them with the instructions pertaining to the hypothetical scenarios. It is possible however that first completing the personally-relevant scenarios encouraged a focus on the self that may have inadvertently served as a negative mood induction for the high dysphoric group ([Sloan, 2005](#)), potentially producing carry-on effects to their decision-making performance on the hypothetical scenarios. A future replication study should consider counterbalancing the order of personal and hypothetical scenarios.

Our finding that high dysphoric individuals naturally engaged in more abstract than concrete thinking during decision-making, in conjunction with the finding that they reported more decision-making problems, lends support to the proposal that abstract thinking may be contributing to at least some of the decision-making problems observed in depression. Due to the correlational nature of Study 1, however, we cannot conclude that engaging in abstract thinking produces decision-making deficits. The alternative possibility is that decision-making deficits lead to an increased tendency to engage in abstract thinking during decision-making, potentially as an attempt to better understand the decision scenario. For example, perhaps experiencing difficulties with decision-making leads one to think in a more abstract high-level manner (e.g., to think “*why am I finding it so difficult to make this decision?*”). Given evidence of the downstream consequences of adopting abstract thinking (e.g., increasing negative future thinking, worsening social problem solving) in depression, we predict that the former possibility is more likely; that is, that abstract thinking leads to decision-

making deficits. To test this prediction, we conducted an experimental study to compare the relative effects of abstract and concrete thinking on decision-making. In addition, we employed a task with ‘real world’ consequences in order to maximize ecological validity. We focused on a specific step in the decision-making process, namely decision latency.

## 6. Study 2

Study 2 sought to extend three studies conducted by McCrea, Liberman, Trope, and Sherman (2008) in which they investigated the impact of abstract versus concrete thinking on decision latency in unselected samples of participants. Specifically, we aimed to extend this research to the depression literature and to replicate McCrea et al.’s finding that abstract thinking has a negative impact on decision latency, or more specifically, on the length of time it takes to make a decision. Whilst taking longer to make some decisions (e.g., whom to marry or where to purchase a home) may not be indicative of poor decision-making, there are a number of scenarios in which longer decision-making times are likely to be problematic; for example, tasks with deadlines or incentives for early completion. Features of depression such as rumination, passivity, and poor concentration (Ward, Lyubomirsky, Sousa, & Nolen-Hoeksema, 2003; Watkins, 2016) may make depressed individuals particularly susceptible to taking longer to arrive at a decision in these scenarios. Therefore, we considered it both theoretically and clinically meaningfully to investigate whether abstract thinking may be contributing to poor decision latency outcomes in depression, and whether concrete thinking may help to alleviate this problem.

As stated above, in a set of three studies outside of the depression literature McCrea et al. (2008) examined the relative effects of abstract versus concrete thinking on decision latency. In each study, they asked participants to complete a questionnaire in which they needed to write about ten listed activities (e.g., writing in a diary). The questionnaire was presented in either an abstract format (e.g., *for each activity write two sentences describing what characteristics are implied by the activity*) or a concrete format (e.g., *write two sentences describing how one would go about completing each activity*). All participants were asked to complete the questionnaire within three weeks in order to receive compensation for participating in the study. In all three studies, there were no between-condition differences in participants’ ratings of the extent to which they predicted that the questionnaire would be difficult, pleasant, convenient, and important to complete. Nonetheless, in all three studies participants in the abstract condition took longer to return their completed questionnaire than did participants in the concrete condition, suggesting that abstract thinking may interfere with completing a course of action.

Whilst the findings of McCrea et al. (2008) yield support for the notion that abstract thinking has more of a negative impact on decision latency than concrete thinking, their studies were conducted with unselected samples of participants whose depression symptoms were not indexed. In order to increase the clinical utility of these findings, Study 2 aimed to replicate the findings in a sample of participants who reported high levels of depressive symptoms. Specifically, we predicted that in a sample of high dysphoric participants, those who were instructed to engage in abstract thinking would take longer to complete a task than those who were instructed to engage in concrete thinking.

Study 2 therefore sought to continue the clinically relevant line of work by Schiena et al. (2013). As noted above, to our knowledge the study by Schiena et al. (2013) is the only one in the published literature to have tested the prediction that abstract (relative to concrete) thinking impairs decision-making in the context of depression. They found that high dysphoric participants took longer to arrive at a decision for a set of decision scenarios when engaging in abstract thinking than when engaging in concrete thinking. Whilst an important preliminary study, a noteworthy limitation of their design was that the decision scenarios they employed were entirely hypothetical.

Accordingly, it seems reasonable to question the ecological validity of the findings, as presumably participants were unlikely to have believed that the decision scenarios had any real-life consequences. Hence, we aimed to continue Schiena et al. (2013) line of research whilst adopting the more ecologically valid design of McCrea et al. (2008).

One issue regarding McCrea et al. (2008) studies that is relevant to consider is that the authors regarded participants who took longer to complete the questionnaires as having ‘procrastinated more’ in completing the task. However, we note that participants were informed at the outset that so long as they returned the questionnaire within the three-week timeframe they would be compensated for participating in the study. As such, there was no reason for participants to believe that returning the questionnaire earlier would in fact be a ‘better’ decision. Furthermore, it is possible that those participants who returned the questionnaire towards the end of the three-week timeframe may have done so simply because their schedule was less busy that week – rather than due to the fact that they had procrastinated. In fact, in such an instance, returning the questionnaire during a less busy week would reflect good, rather than poor, decision-making skills.

In order to address this limitation, in Study 2 we employed a reward scheme such that earlier completion of the writing task could unequivocally represent better decision-making. That is, for a decision-making task with a time limit *and* an incentive for early completion, we considered it reasonable to conceptualise longer task completion times as indicative of poorer decision-making. To create an incentivised reward scheme, participants were informed that the experimenter needed to present the findings of the study at an upcoming conference, and thus needed the data (i.e., the study to be completed) as quickly as possible. They were notified that they had nine days to complete the study, and owing to this time pressure, that in addition to their research credit they would receive \$5 if they completed the study within the first three days of receiving access to the study, \$2.50 if they completed the study between days 4–6 days, or no money if they completed the study in the last three days. A 9-day timeframe was used instead of the three-week one employed by McCrea et al. (2008) in order to increase the urgency with which participants would respond to the reward scheme.

The other key difference between our study and McCrea et al. (2008) was that we also asked participants at the outset to indicate the date and time by which they intended to complete the writing task. The rationale for this was to create a more accurate index of procrastination by operationalising the construct to be the difference in the time between when participants stated that they would complete the task (e.g., 6:00pm on the 24th) and when they actually completed the task (e.g., 11:12pm on the 24th). We used this measure alongside our other key index of decision latency: the length of time it took participants to complete the writing task. As our study was delivered through the online survey platform Qualtrics, we were able to record the exact time that participants opened and closed different parts of the study, and as a result we were able to precisely calculate these time measures. We predicted that participants in the abstract condition would take longer to complete the task and would demonstrate more procrastination (i.e., there would be a longer delay between the time they indicated that they would complete the task and the time that they actually did), relative to participants in the concrete condition.

## 7. Method

### 7.1. Participants and design

99 first-year psychology students from The University of New South Wales (UNSW Sydney) completed the online study in return for course credit.<sup>2</sup> At the outset of testing we intended that the final sample would

<sup>2</sup> The study received ethical approval from the UNSW Human Research Ethics Advisory Panel- Panel C (HREAP – Behavioural Sciences; approval number

consist of 50 high dysphoric participants, similar to the sample size tested in Study 1. However, in the initial weeks of experimental testing most of the participants did not meet the criterion used to identify high dysphoric participants in Study 1. We decided to continue testing up to 99 participants with the hope that in the final sample there would be at least 25 high dysphoric participants in each condition. After testing 99 participants, the data of 9 participants was excluded from the analyses due to problems in recording their data in Qualtrics. The data of a further 3 participants was excluded due to the fact that they completed the writing task before they completed the pre-task ratings. The final sample consisted of 87 participants (66 females, mean age = 19.71;  $SD = 4.21$ ) who were randomly assigned to either the abstract ( $n = 43$ ) or concrete ( $n = 44$ ) condition. When the criterion used to identify high dysphoric participants in Study 1 was applied for this study, only 20 (10 in the abstract condition, 10 in the concrete condition) of the 87 participants remained. Due to the insufficient number of high dysphoric participants in each condition, DASS-21 depression scores of all 87 participants were entered in the data analysis as a continuous measure. In keeping with the hypotheses of the study, the aim was to assess whether depression scores would more strongly predict longer task completion times and procrastination times in the abstract condition as compared to the concrete condition.

## 7.2. Measures

### 7.2.1. Study sign-up email

Participants received an email on the day that they signed up to take part in the study which outlined preliminary study instructions. In the email participants were informed that they had nine days to complete the study, and that the earlier they completed the study, the better. As a cover story, the email stated that the experimenter needed data to present at an upcoming conference, and that participants would be rewarded \$5 if they completed the study within the first 3 days, \$2.50 if they completed it within 4–6 days, and no monetary compensation if they completed it within the last 3 days. The email provided two links that participants would need to click in order to access the study. The email explained that the second link would direct participants to the main task of the study, but that they should only click the second link after following the instructions and answering the pre-task questions enclosed in the first link. Finally, participants were informed that the experimenter would email them after they completed the study to arrange a 10-min debriefing session at the lab, during which (if eligible), they would also be paid for completing the study early.

### 7.2.2. Pre-task measures

Participants were presented with the question they needed to answer for their assigned writing task, and then with a series of items that indexed their expectations of the task (replicating [McCrea et al., 2008](#)). First, they were instructed to rate on a 7-point scale (where 1 = *not at all*, and 7 = *very*) the extent to which they expected the writing task to be: (i) easy, (ii) difficult, (iii) pleasant, (iv) convenient, and (v) interesting to complete. Participants were then asked to estimate the length of time (in minutes) that they expected it would take them to complete the writing task, and to provide the date and time (e.g., 14/05/2014, 3:00pm) within the 9-day deadline that they intended to complete the task. These pre-task measures were administered to assess whether participants in the abstract and concrete conditions differed in their initial expectations of the writing task.

### 7.2.3. Abstract versus concrete thinking task

Participants were randomly assigned a writing task that was designed to induce either abstract or concrete thinking. Participants in the

abstract condition were instructed to describe 5 reasons why it was important for them to do well in university. They were instructed to write 5–6 sentences on each reason, explaining what the reason was, why it was personally important to them, and its implications and consequences. Conversely, participants in the concrete condition were instructed to describe 5 steps that they would take in order to do well in university, and for each step, to write 5–6 sentences on the specific actions that they would take to complete that step. These instructions were based on those used in previous studies that employed abstract versus concrete thinking inductions (e.g., [McCrea et al., 2008](#); [Schiena et al., 2013](#); [Watkins & Baracacia, 2002](#)).

### 7.2.4. Post-task measures

Participants were presented with the first 5 rating items that they completed in the pre-task measures to index their actual experience of task completion. That is, participants were instructed to rate on a 7-point scale (where 1 = *not at all*, and 7 = *very*) the extent to which they found the writing task to be: (i) easy, (ii) difficult, (iii) pleasant, (iv) convenient, and (v) interesting to complete. Participants were also asked to indicate the number of attempts they made to complete the task, with a new attempt described as a re-commencing the task after taking a break of minimum 15 minutes.

### 7.2.5. Time measures

Two time measures were indexed by using the timestamps captured by Qualtrics. The first measure was the time taken for participants to complete the task, calculated as the difference between the time that they opened the task and the time that they submitted their response. The second was our measure of procrastination, calculated as the time difference between participants' intended completion time and the time that they actually completed the task.

### 7.2.6. Trait measures

The DASS-21 and RRS (as described in Study 1) were administered to rule out the possibility that any difference between conditions on pre-task, post-task, or time measures were due to a pre-existing difference between conditions on symptoms of depression, anxiety, and stress or in their tendency to ruminate in response to sad mood. In this study, Cronbach's alpha was .90, .84, and .91 for the DASS-21 depression, anxiety, and stress subscales, respectively, and .96 for RRS.

### 7.2.7. Manipulation check

To supplement the coding of abstractness versus concreteness in participants written descriptions, we administered the Behavioural Identification Form (BIF; [Vallacher & Wegner, 1989](#)) following the completion of the post-task measures. The BIF lists 25 behaviours (e.g., making a list) accompanied by 2 descriptors of the behaviour: an abstract descriptor (e.g., getting organized) and a concrete descriptor (e.g., writing things down). Participants were asked to identify which option best describes the behaviour. The proportion of abstract (relative to concrete) preferences chosen by each participant was taken to reflect their degree of abstract thinking.

## 7.3. Procedure

On the day of signing up to take part in the study, participants received an email with two links that they needed to access in order to complete the study, as well as information about the importance of and incentives for completing the study as early as possible. Upon opening the first link enclosed in the email, participants were given instructions as to how to provide informed consent. Next, they were presented with the abstract or concrete question that they needed to answer for the writing task, and were then administered the pre-task measures. Participants were informed to open the second link when they were ready to begin their writing task. They were also informed that once they began the writing task, they would not be able to save their

(footnote continued)  
2281).

response and return to it at a later time, and hence should try to complete the writing task in one sitting. When ready, participants clicked on the second link, completed the writing task, the post-task measures, and then the BIF. Finally, participants completed the DASS-21 and RRS. These trait measures were administered as part of the second link (as opposed to the first link) in order to index their depressive and ruminative symptoms as close to the time of the task completion as possible. After the completion of the study, the experimenter emailed the participants to arrange a debriefing session in the lab during which eligible participants were also paid the relevant amount of compensation.

## 8. Results

For all statistical analyses an alpha level of 0.05 was used.

### 8.1. Sample characteristics

The final sample had a mean DASS-21 depression subscale score of 8.87 ( $SD = 9.56$ ), indicating that on average participants had a 'normal' level of depressive symptoms (Lovibond & Lovibond, 1995). An independent samples *t*-test demonstrated that there was no difference between participants in the abstract and concrete conditions in DASS-21 depression subscale scores,  $t(85) = 0.28$ ,  $p = .78$ .

### 8.2. Trait measures

Hierarchical multiple regressions were conducted to assess whether there was a difference between conditions in the extent to which depression scores predicted anxiety scores, stress scores, and RRS. DASS-21 depression scores and experimental condition were entered in the first step, with the interaction term between depression score and condition added to the second step to assess for whether there was an increase in variation explained by the addition of the interaction term. As anticipated, experimental condition did not moderate the effect of DASS-depression on DASS-anxiety, DASS-stress, or RRS. Table 4 reports the results of each separate regression analysis for each dependent variable.

### 8.3. Pre-task measures

Further hierarchical multiple regressions were conducted to determine whether there was an increase in variation in each of the pre-

**Table 4**

Hierarchical regression analyses: depression and condition predicting anxiety, stress, and rumination.

Variable	<i>B</i>	<i>SE B</i>	$\beta$	$R^2$ Change
<b>DASS-21 anxiety</b>				
Step 1 $F(2, 84) = 44.24^{**}$				.51
DASS-21 depression**	.55	.06	.72	
Condition	.44	1.11	.03	
Step 2 $F(1, 83) = 1.93$				.01
DASS-21 depression x condition	.17	.12	.20	
<b>DASS-21 stress</b>				
Step 1 $F(2, 84) = 70.68^{**}$				.63
DASS-21 depression**	.77	.07	.79	
Condition	-.96	1.23	-.05	
Step 2 $F(1, 83) = .02$				.00
DASS-21 depression x condition	-.02	.13	-.02	
<b>RRS</b>				
Step 1 $F(2, 84) = 32.88^{**}$				.44
DASS-21 depression**	1.07	.13	.66	
Condition	2.43	2.53	.08	
Step 2 $F(1, 83) = .29$				.00
DASS-21 depression x condition	.15	.27	.08	

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

**Table 5**

Hierarchical regression analyses: depression and condition predicting pre-task measures.

Variable	<i>B</i>	<i>SE B</i>	$\beta$	$R^2$ Change
<b>Expected difficulty<sup>a</sup></b>				
Step 1 $F(2, 84) = 5.06^{**}$				.11
DASS-21 depression**	.04	.02	.28	
Condition	.48	.28	.18	
Step 2 $F(1, 83) = .54$				.01
DASS-21 depression x condition	.02	.03	.12	
<b>Expected pleasantness</b>				
Step 1 $F(2, 84) = 7.57^{**}$				.15
DASS-21 depression**	-.05	.01	-.32	
Condition*	.65	.28	.24	
Step 2 $F(1, 83) = .01$				.00
DASS-21 depression x condition	.003	.03	.02	
<b>Expected convenience</b>				
Step 1 $F(2, 84) = .31$				.01
DASS-21 depression	-.02	.02	-.09	
Condition	.001	.38	.00	
Step 2 $F(1, 83) = .003$				.00
DASS-21 depression x condition	-.002	.04	-.01	
<b>Expected interestingness</b>				
Step 1 $F(2, 84) = 1.54$				.04
DASS-21 depression	-.01	.02	-.05	
Condition	.64	.38	.18	
Step 2 $F(1, 83) = .56$				.01
DASS-21 depression x condition	.03	.04	.15	
<b>Expected completion time</b>				
Step 1 $F(2, 84) = .36$				.01
DASS-21 depression	-.14	.20	-.08	
Condition	-1.82	3.81	-.05	
Step 2 $F(1, 83) = .17$				.002
DASS-21 depression x condition	.17	.41	.08	

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

<sup>a</sup> Ratings of task ease (reversed) and task difficulty were averaged to produce a composite task difficulty score. Ratings had a bivariate correlation of  $-0.71$  ( $p < .01$ ) on the items indexing expected ease and difficulty and of  $-0.78$  on the items indexing actual ease and difficulty.

task measures due to the addition of an interaction term between depression score and condition. Again, condition did not moderate the effect of depression scores on participants' estimates of task difficulty, pleasantness, convenience, or interestingness, nor on the length of time that they estimated the task would take to complete. Hence, any interactive effect of condition and depressive symptoms on the main time measures is unlikely to be due to pre-existing differences between the two conditions in the extent to which depressive symptoms influenced participants' perceptions of the task. Table 5 reports the results of each regression analysis for each dependent variable.

### 8.4. Manipulation checks

In order to check that the manipulations were successful, an independent samples *t*-test compared ratings of levels of abstractness versus concreteness of the written responses. Two independent raters blind to condition coded the written responses, one of whom had also coded the written responses from Study 1. Interrater reliability was high, with an intraclass correlation of 0.93. As anticipated, the written responses of participants in the abstract condition were rated as significantly more abstract ( $M = 1.36$ ,  $SD = 0.25$ ) than those of participants in the concrete condition ( $M = 4.50$ ,  $SD = 0.42$ ),  $t(69.76) = -42.21$ ,  $p < .001$ ,  $d = 9.09$ . The BIF produced evidence consistent with the results of the coding. Specifically, participants in the abstract condition endorsed more abstract than concrete descriptors ( $M = 16.53$ ,  $SD = 4.42$ ) relative to participants in the concrete condition ( $M = 14.20$ ,  $SD = 5.63$ ),  $t(85) = 2.14$ ,  $p = .04$ ,  $d = 0.46$ .

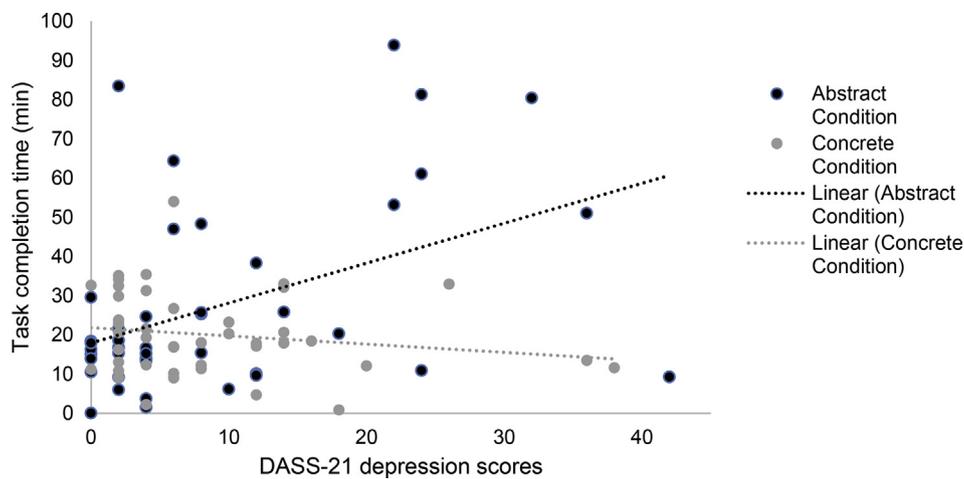


Fig. 1. Relationship between depressive symptoms and task completion time within each condition.

8.5. Time measures

A hierarchical multiple regression was conducted to assess whether there was a between-condition difference in the extent to which depression scores predicted the length of time participants took to complete the writing task (i.e., from when they started the task to when they finished it). We expected that depression scores would more strongly predict longer task completion time in the abstract condition compared to the concrete condition. DASS-21 depression scores and condition were entered in the first step, with the interaction term between depression score and condition added to the second step. As expected, condition moderated the effect of depression scores on task completion time; the addition of the interaction term led to a statistically significant increase in total variance explained of 9.3%,  $F(1, 83) = 9.63, p = .003$ . Simple slopes analysis revealed that there was a statistically significant positive linear relationship between depression scores and writing completion time in the abstract condition, ( $b = 1.02, SE = 0.25, p < .001$ , but not in the concrete condition ( $b = -0.21, SE = 0.31, p = .50$ ). See Fig. 1 for a scatterplot depicting the relationship between depressive symptoms and task completion time within each experimental condition.

We intended to run a second hierarchical multiple regression to assess whether condition similarly moderated the effect of depression scores on the length of time that participants procrastinated in completing the writing task. However, only 16 out of 87 participants actually procrastinated in completing the task; that is, only 16 participants (8 in each condition) completed the task after their intended completion time. Accordingly, due to insufficient data we were unable to run the regression as planned. 71 participants completed the task within the first 3 days and hence received the maximum reward of \$5.00. 12 participants received \$2.50, and 4 participants received no monetary compensation.

8.6. Post-task measures

Hierarchical multiple regressions were conducted to assess for an increase in the variance of post-task measures explained by the addition of an interaction term between depression score and experimental condition. Interestingly, condition did not moderate the effect of depression scores on the extent to which participants rated the task to be difficult, pleasant, convenient, and interesting to complete. Table 6 reports the results of each separate regression analysis for each dependent variable.

Table 6

Hierarchical regression analyses: depression and condition predicting post-task measures.

Variable	B	SE B	$\beta$	R <sup>2</sup> Change
<b>Actual difficulty</b>				
Step 1 $F(2, 84) = 2.48$				.06
DASS-21 depression*	.04	.02	.21	
Condition	-.33	.35	-.10	
Step 2 $F(1, 83) = 1.56$				.02
DASS-21 depression x condition	-.05	.04	-.21	
<b>Actual pleasantness</b>				
Step 1 $F(2, 84) = 6.40^{**}$				.13
DASS-21 depression**	-.05	.02	-.31	
Condition	.62	.32	.20	
Step 2 $F(1, 83) = .01$				.00
DASS-21 depression x condition	.003	.03	.02	
<b>Actual convenience</b>				
Step 1 $F(2, 84) = 3.65^*$				.08
DASS-21 depression*	-.05	.02	-.28	
Condition	-.18	.37	-.05	
Step 2 $F(1, 83) = .23$				.003
DASS-21 depression x condition	-.02	.04	-.10	
<b>Actual interestingness</b>				
Step 1 $F(2, 84) = 3.27^*$				.07
DASS-21 depression	-.04	.02	-.19	
Condition	.73	.39	.20	
Step 2 $F(1, 83) = .55$				.01
DASS-21 depression x condition	.03	.04	.15	

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

9. Discussion

The goal of Study 2 was to test the prediction that in the context of depressive symptoms, abstract (relative to concrete) thinking increases the length of time that participants would take to complete a task that they were encouraged to complete as early as possible. As expected, depression scores predicted longer task completion times when participants engaged in abstract thinking, but not when they engaged in concrete thinking. Due to the small proportion of participants who actually procrastinated in completing the writing task, we were unable to test whether condition similarly moderated the association between depression scores and procrastination time.

The finding that depressive symptoms were associated with longer task completion times in the abstract but not the concrete condition is congruent with Watkins (2004) processing mode theory. Watkins (2004) stated that a high-level processing mode (i.e., abstract processing) that is congruent with the thinking style observed in depressive rumination leads to worse outcomes than a low-level concrete processing mode. Our findings also add to evidence that in the context of

depressive symptoms, abstract thinking produces harmful consequences relative to concrete thinking (e.g., Lavender & Watkins, 2004; Watkins & Moulds, 2005; Watkins & Teasdale, 2001, 2004).

One potential account for the key finding of Study 2 is that higher levels of depressive symptoms may be more likely to lead to ongoing subsequent processing in the abstract condition (compared to the concrete condition) and, as a result, longer task completion times. That is, higher levels of depressive symptoms may have increased participants' likelihood of ruminating on the significance, implications, and potential consequences of their university performance, thereby increasing the length of time it took for them to complete the task. A large number of studies have shown that rumination is closely linked to depressive symptoms, is abstract and repetitive in nature, and difficult to disengage from (Davis & Nolen-Hoeksema, 2000; Nolen-Hoeksema et al., 2008; Watkins, 2008, 2016).

Another possible explanation as to why depressive symptoms were associated with longer task completion times in only the abstract condition is that the thought content elicited by the abstract thinking induction is potentially more emotionally and/or cognitively burdensome. The abstract thinking induction may have elicited thoughts such as 'Why do I have to do this?' 'Why can't I ever do things as quickly as I would like?' 'There is actually a lot that depends on how well I do at university'. These types of thoughts may have produced in the more dysphoric participants a 'paralysis by analysis' effect, thereby increasing their task completion time. This proposal accords with evidence that abstract thinking promotes negative self-evaluations (Rimes & Watkins, 2005) and negative future thinking in depression (Lavender & Watkins, 2004), and reduces one's ability to ignore thoughts of irrelevant information during mental activities that require strategic thinking (Philippot & Brutoux, 2008; Watkins & Brown, 2002). We acknowledge however that if burdensome thoughts were more likely to emerge for participants in the abstract condition than for participants in the concrete condition, it is interesting that condition did not moderate the effect of depression scores on any of the ratings of task experience such as task difficulty and task pleasantness.

Based on the findings of McCrea et al. (2008), our second primary hypothesis was that in addition to longer task completion times, abstract thinking would lead to longer procrastination times than concrete thinking. We were however unable to statistically test this prediction as only a very small number of participants actually procrastinated in our study. That is, only 16 out of 87 completed the task after their intended completion time. It is possible that our use of incentives for early task completion reduced the likelihood of detecting the procrastination effects that were reported by McCrea et al. (2008), who did not offer their participants any incentivised-reward scheme. Consistent with this possibility, the large majority of students (71 out of 87) in our study completed the task within the first 3 days, and thus received the maximum reward of \$5.00. It is possible that had we not offered a monetary incentive and simply informed participants that the experimenter needed the data as early as possible within the 9-day timeframe, a larger proportion of participants may have actually procrastinated. Another possibility is instructing participants to write about how/why they want to do well in university was too simple a task, and thus unlikely to be one that participants would procrastinate in completing. Indeed, participants on average rated the task as moderate in ease, interestingness, pleasantness, and convenience (mean rating on these items was 3.66,  $SD = 1.7$ ; where 1 = not at all, 7 = very). We cannot rule out the possibility that had participants been given a more laborious or aversive task (e.g., a task in which they needed to conduct research online), they would have been more likely to have procrastinated, and differential effects of the inductions may have emerged.

It also important to point out that McCrea et al. (2008) operationalised procrastination as the time between participants having received the task, and the time that they completed it. On the other hand, we defined procrastination as the time difference between when participants indicated that they intended to complete the task and when

they actually completed it (i.e., the time delay). We considered this difference to be a more accurate index of procrastination that is in line with the way in which procrastination is typically defined in the literature (Steel, 2007). It is interesting to note that the way in which McCrea et al. (2008) defined procrastination is equivalent to the way in which we defined task completion time, for which we did observe an effect of condition that was in line with the effect observed by McCrea et al. (2008). In this sense, our findings are consistent with those of McCrea et al. (2008); however, the way in which we conceptualized our time measures differs across the studies.

Overall, the findings of Study 2 suggest that for depressed individuals, completing a task with a concrete mindset, compared to an abstract one, may lead to more efficient task completion, and more generally, greater proactive behaviour. This could have important implications given that withdrawal, inactivity, and low levels of motivation are key features of depression and that a depressed individual's decision to partake in adaptive activities (e.g., to complete treatment) are critical for their recovery from the disorder. The findings also speak to the clinical value of Rumination-focused CBT (RFCBT), an intervention in which reducing abstract ruminative thinking and increasing concrete thinking are key components. Indeed, there is evidence that RFCBT improves depression and reduces rumination (e.g., Watkins et al., 2007; see Watkins, 2016, for a review). The results of Study 2 raise the possibility that such a treatment approach may also lead to positive outcomes in the domain of decision-making; e.g., in reducing decision latency for tasks that need to be completed as early as possible. The findings of Study 2 also further highlight the utility of problem-solving therapy which include strategies that encourage concrete planning (e.g., goal setting, activity scheduling) as a means to increase productive behaviour. It is also worth noting that promoting concreteness of thought is likely to be beneficial in increasing the effectiveness of other, well-established components of CBT, including problem-solving, and monitoring of behaviours and cognitions (e.g., using thought records). However, we acknowledge that until the current study is replicated with a clinically depressed sample, these suggestions of clinical implications remain speculative.

Due to the insufficient number of high dysphoric participants in Study 2 we were unable to compare the effects of thinking style on high dysphoric participants versus low dysphoric participants. On the one hand, utilizing a continuous measure of depressive symptoms as a key predictor is more in line with the growing movement to conceptualise psychological disorders on a continuum. However, we note that a substantial proportion of participants in Study 2 reported low depressive scores, and hence it is questionable as to whether the findings would generalise to individuals with high or clinical levels of depressive symptoms. As stated previously, replication of this study with clinically depressed individuals will be an important next step.

In the absence of a no-instruction comparison condition, we are also unable to draw conclusions about the direction of the differential effects (if any) between engaging in each of the two experimental conditions and not receiving any instructions. That said, it is unclear as to what might constitute a suitable reference condition. A no-instruction condition in which participants are asked to freely think about the idea of doing well in university might appear to be a neutral reference point. However, without any specific instructions as to what to write about, participants may inadvertently default to abstract thinking. Indeed, a study conducted by Watkins, Moberly, and Moulds (2008) that also examined a non-clinical sample of participants found that there was no difference in the level of abstractness present in the written responses of participants in a no-instruction control condition compared to those in an experimental condition in which participants underwent an abstract thinking induction.

Another limitation of the study was that mood was not indexed before and after the thinking inductions. It is possible, therefore, that abstract thinking worsened mood and as a result, individuals with higher levels of depressive symptoms simply took longer to complete

the task due to potential downstream consequences of worsened mood such as lower levels of task motivation or interest. We consider this unlikely, however, given that experimental condition did not moderate the effect of depression scores on post-task ratings of the extent to which participants found the task to be difficult, pleasant, interesting, and convenient to complete. Furthermore, previous research (e.g., Moberly & Watkins, 2006; Watkins et al., 2008; Watkins & Teasdale, 2001, 2004) has shown that abstract versus concrete thinking inductions do not have a differential impact upon mood. In future studies researchers should nonetheless include mood measures in order to rule out the possibility that differential mood effects account for any observed between-condition differences.

Similar to the way in which Study 2 examined one aspect of decision-making, namely the act of completing a task in a timely manner, we also consider it important for future studies to examine the effects of abstract versus concrete thinking on other steps of the decision-making process, particularly steps known to be challenging for depressed individuals. Relative to concrete thinking, abstract thinking may yield negative effects for example on their experience of stress during the actual decision-making process, or on their retrospective beliefs and feelings about past decisions. For example, abstract thinking might lead to higher levels of decisional regret in comparison to thinking more concretely about the past decision, especially considering that depressed individuals who ruminate on past decisions are likely to frequently entertain abstract thoughts about the decision, such as the implications, consequences, and meanings of one's past actions. Indeed, recent research has demonstrated that thinking about a past decision in an abstract way led higher levels of post-decisional regret than thinking about it in a concrete way (Dey, Joormann, Moulds, & Newell, 2018).

We also acknowledge that there are no doubt other clinical features of depression besides abstract thinking that potentially contribute to decision-making deficits in the disorder. For example, we would expect that in decision-making contexts, impaired concentration may contribute to problems with indecisiveness, and vice versa. To our knowledge, we are not aware of any study that has examined concentration problems in depression which has included measures of decision-making. Interestingly, there is some evidence that abstract thinking and impaired concentration may interact to exacerbate decision-making problems in depression. For example, Philippot and Brutoux (2008) found that in dysphoric individuals, abstract thinking impaired one's ability to ignore irrelevant information during mental activities that require strategic thinking. In future decision-making research investigators could consider including measures of concentration following an abstract thinking induction to investigate whether reduced concentration is one mechanism by which abstract thinking worsens decision-making abilities.

### 9.1. Concluding remarks

The present research has taken one of the first steps to examine the role of abstract thinking versus concrete thinking in decision-making problems in depression. Study 1 demonstrated that high dysphoric individuals naturally engage in more abstract than concrete thinking during decision-making and report more decision-making problems than do low dysphoric individuals. Study 2 demonstrated that abstract thinking contributed to a particular decision-making problem that depressed individuals are likely to struggle with, namely, the length of time it takes for them to complete a task that is required to be completed as early as possible. The findings of Study 2 suggest that inducing a converse style of concrete thinking may be effective in remediating this decision-making problem. Future studies are needed which extend this line of research to assess other facets of the decision-making process and to replicate findings with clinically depressed individuals. Given the daily occurrence of decision-making, and the significant impact that decisions can have on one's life, research which identifies factors that can reduce the decision-making problems that depressed

individuals face is imperative.

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### References

- American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.
- Ashiq, S., Majeed, S., & Malik, F. (2016). Psychological predictors of cyber bullying in early adulthood. *Health Science Journal*, 10, 1–9.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Davis, R. N., & Nolen-Hoeksema, S. (2000). Cognitive inflexibility among ruminators and nonruminators. *Cognitive Therapy and Research*, 24, 699–711.
- Dey, S., Joormann, J., Moulds, M., & Newell, B. R. (2018). The relative effects of abstract versus concrete rumination on the experience of post-decisional regret. *Behaviour Research and Therapy*, 108, 18–28.
- Lavender, A., & Watkins, E. (2004). Rumination and future thinking in depression. *British Journal of Clinical Psychology*, 43, 129–142.
- Leykin, Y., Roberts, C. S., & DeRubeis, R. J. (2011). Decision-making and depressive symptomatology. *Cognitive Therapy and Research*, 35, 333–341.
- Lovibond, S. H., & Lovibond, P. F. (1995). *Manual for the depression anxiety stress scales* (2nd ed.). Sydney: Psychology Foundation.
- McCrea, S. M., Liberman, N., Trope, Y., & Sherman, S. J. (2008). Construal level and procrastination. *Psychological Science*, 19, 1308–1314.
- Moberly, N. J., & Watkins, E. (2006). Processing mode influences the relationship between trait rumination and emotional vulnerability. *Behavior Therapy*, 37, 281–291.
- Monroe, M. R., Skowronski, J. J., MacDonald, W., & Wood, S. E. (2005). The mildly depressed experience more post-decisional regret than the non-depressed. *Journal of Social and Clinical Psychology*, 24, 665–690.
- Nolen-Hoeksema, S., & Morrow, J. (1991). A prospective study of depression and posttraumatic stress symptoms after a natural disaster: The 1989 Loma Prieta earthquake. *Journal of Personality and Social Psychology*, 61, 115–121.
- Nolen-Hoeksema, S., Wisco, B. E., & Lyubomirsky, S. (2008). Rethinking rumination. *Perspectives on Psychological Science*, 3, 400–424.
- Philippot, P., & Brutoux, F. (2008). Induced rumination dampens executive processes in dysphoric young adults. *Journal of Behavior Therapy and Experimental Psychiatry*, 39, 219–227.
- Radford, M. H., Mann, L., & Kalucy, R. S. (1986). Psychiatric disturbance and decision-making. *Australian and New Zealand Journal of Psychiatry*, 20, 210–217.
- Radford, M. H. B., Mann, L., Ohta, Y., & Nakane, Y. (1993). Differences between Australian and Japanese students in decisional self-esteem, decisional stress, and coping styles. *Journal of Cross-Cultural Psychology*, 24, 284–297.
- Rimes, K. A., & Watkins, E. (2005). The effects of self-focused rumination on global negative self-judgments in depression. *Behavior Research and Therapy*, 43, 1673–1281.
- Schiens, R. D., Luminet, O., Chang, B., & Philippot, P. (2013). Why are depressive individuals indecisive? Different modes of rumination account for indecision in non-clinical depression. *Cognitive Therapy and Research*, 37, 713–724.
- Sloan, D. M. (2005). It's all about me: Self-focused attention and depressed mood. *Cognitive Therapy and Research*, 29, 279–288.
- Steel, P. (2007). The nature of procrastination: A meta-analytic and theoretical review of quintessential self-regulatory failure. *Psychological Bulletin*, 133, 65–94.
- Stöber, J., Tepperwien, S., & Staak, M. (2000). Worrying leads to reduced concreteness of problem elaborations: Evidence for the avoidance theory of worry. *Anxiety, Stress & Coping*, 13, 217–227.
- Vallacher, R. R., & Wegner, D. M. (1989). Levels of personal agency: Individual variation in action identification. *Journal of Personality and Social Psychology*, 57, 660–671.
- Ward, A., Lyubomirsky, S., Sousa, L., & Nolen-Hoeksema, S. (2003). Can't quite commit: Rumination and uncertainty. *Personality and Social Psychology Bulletin*, 29, 96–107.
- Watkins, E. R. (2004). Adaptive and maladaptive ruminative self-focus during emotional processing. *Behaviour Research and Therapy*, 42, 1037–1952.
- Watkins, E. R. (2008). Constructive and unconstructive repetitive thought. *Psychological Bulletin*, 134, 163–206.
- Watkins, E. R. (2016). *Rumination-focused cognitive-behavioral therapy for depression*. New York: Guilford Press.
- Watkins, E. R., & Baracaia, S. (2002). Rumination and social problem solving in depression. *Behaviour Research and Therapy*, 40, 1179–1189.
- Watkins, E., & Brown, R. G. (2002). Rumination and executive function in depression: An experimental study. *Journal of Neurology Neurosurgery and Psychiatry*, 72, 400–402.
- Watkins, E., Moberly, N. J., & Moulds, M. L. (2008). Processing mode causally influences emotional reactivity: Distinct effects of abstract versus concrete construal on emotional response. *Emotion*, 8, 364–378.
- Watkins, E., & Moulds, M. (2005). Distinct modes of ruminative self-focus: Impact of abstract versus concrete rumination on problem solving in depression. *Emotion*, 5, 319–328.
- Watkins, E. R., Scott, J., Wingrove, J., Rimes, K. A., Bathurst, N., Steiner, H., et al. (2007). Rumination-focused cognitive behaviour therapy for residual depression: A case series. *Behaviour Research and Therapy*, 45, 2144–2154.
- Watkins, E., & Teasdale, J. D. (2001). Rumination and overgeneral memory in depression: Effects of self-focus and analytic thinking. *Journal of Abnormal Psychology*, 110, 353–357.
- Watkins, E., & Teasdale, J. D. (2004). Adaptive and maladaptive self-focus in depression. *Journal of Affective Disorders*, 82, 1–8.
- Yook, K., Kim, K. H., Suh, S. Y., & Lee, K. S. (2010). Intolerance of uncertainty, worry, and rumination in major depressive disorder and generalized anxiety disorder. *Journal of Anxiety Disorders*, 24, 623–628.