



Metacognitive beliefs mediate the relationship between mind wandering and negative affect



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ABSTRACT

Two studies ($N_s = 254$ and 130 , aged 18 – 28) aimed to investigate associations between mind wandering and metacognitive beliefs, and whether these beliefs are involved in the relationship between mind wandering and negative affect. Participants completed questionnaire measures of metacognitive beliefs, mind wandering, daydreaming, negative affect, mindfulness, and sleep quality. Study 2 also included the Sustained Attention to Response Task, with thought-probe assessment of task-unrelated thought (mind wandering/daydreaming). The frequency of mind wandering/daydreaming/task-unrelated thought was found to positively correlate with the metacognitive dimensions of less cognitive confidence, more endorsement of belief in the uncontrollability/danger of thoughts, and more endorsement of belief in the need to control thoughts. Multiple-mediator analysis was undertaken with three main models where either mind wandering, daydreaming frequency, or task-unrelated thought was the predictor for negative affect. Metacognitive beliefs, mindfulness and sleep quality were simultaneously entered as potential mediators. Results showed that metacognitive belief in the uncontrollability/danger of thoughts was a consistently significant mediator, while mindfulness and sleep quality were less consistent. Overall, the current research indicates that metacognitive beliefs are an important consideration in the study of mind wandering/daydreaming, and a possibly key factor in understanding the association with negative affect.

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1. Introduction

Mind wandering, or daydreaming, involves attention becoming focused on mentation unrelated to the external environment or to any ongoing task (Schooler et al., 2011; Singer, 1966). There are wide individual differences, but mind wandering/daydreaming seems to occur frequently: thought-sampling of participants engaged in daily activities has found mind wandering occurring in around 20–50% of samples (e.g., Killingsworth & Gilbert, 2010; McVay, Kane, & Kwapil, 2009; Song & Wang, 2012). Mind wandering/daydreaming can occur with meta-consciousness/self-awareness (involving explicit awareness of the ongoing conscious experience), but may also occur without meta-consciousness (Schooler et al., 2011; Smallwood & Schooler, 2006).

Meta-consciousness is a core aspect of mindfulness. Although there remains some disagreement about how to define mindfulness (Grossman & Van Dam, 2011), a central aspect is "... being attentive to and aware of what is taking place in the present" (Brown & Ryan, 2003, p.822). Mindfulness negatively correlates with the frequency of

mind wandering/daydreaming (r_s ranging -0.24 to -0.46 : Carciofo, Du, Song, & Zhang, 2014a; Mrazek, Smallwood, & Schooler, 2012; Stawarczyk, Majerus, Van der Linden, & D'Argembeau 2012), and they have been seen as opposing concepts, at least in relation to attentional control (Mrazek et al., 2012).

Mindfulness is associated with better sleep quality (Howell, Digdon, Buro, & Sheptycki, 2008). In contrast, the frequency of mind wandering/daydreaming is related to difficulty in sleep initiation (Ottaviani & Couyoumdjian, 2013), and other aspects of poor sleep quality, including more reported sleep disturbances, lower ratings of subjective sleep quality, and more daytime dysfunction (Carciofo, Du, Song, & Zhang, 2014b). Also, while mindfulness is associated with positive affect and well-being (Brown & Ryan, 2003; Giluk, 2009), mind wandering and daydreaming frequency are associated with negative affect and depression (e.g., Giambra & Traynor, 1978; Killingsworth & Gilbert, 2010; Smallwood, Fitzgerald, Miles, & Phillips, 2009). For example, in an experience sampling study with >2000 participants, the experience of mind wandering was a significant predictor of later negative mood (Killingsworth & Gilbert, 2010).

The attention of many recent studies has focused on this relationship between mind wandering/daydreaming and negative affect (e.g., Marchetti, Koster, & De Raedt, 2012; Mason, Brown, Mar, &

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Smallwood, 2013; McMillan, Kaufman, & Singer, 2013; Ottaviani & Couyoumdjian, 2013; Ottaviani, Shapiro, & Couyoumdjian, 2013; Stawarczyk, Majerus, & D'Argembeau, 2013), and it may involve a wide range of influences, both contextual and temporal (Smallwood & Andrews-Hanna, 2013). Stawarczyk et al. (2012) found that mindfulness and encoding style (internal versus external focus of attention) mediated the association between daydreaming frequency (predictor) and psychological distress (criterion). Furthermore, poor sleep quality has also been found to be a mediator between mind wandering/daydreaming frequency and negative affect (Carciofo et al., 2014b).

However, a further possible influence on this relationship between mind wandering/daydreaming and psychological distress/negative affect could be metacognition, which refers to "... knowledge and cognition about cognitive phenomena ..." (Flavell, 1979, p.906), including the processes, knowledge, and beliefs involved in the regulation of thought (Wells & Cartwright-Hatton, 2004). Thus, while metacognition includes meta-consciousness, it also includes metacognitive knowledge/beliefs about cognitive functioning, such as regarding intra-individual and inter-individual differences, and how these are related to goal-setting and strategy use (Flavell, 1979).

The metacognitive approach to psychological disorder (e.g., Wells & Matthews, 1996; Wells, 2007) argues that metacognitive beliefs can produce maladaptive self-regulation (coping or response styles), such as frequent/extended worry or rumination. These maladaptive metacognitive beliefs and response styles/strategies are important in the development and maintenance of many psychological disorders, including anxiety, depression, and obsessions (Cartwright-Hatton & Wells, 1997; Wells, 2007; Wells & Cartwright-Hatton, 2004), and may also be involved in insomnia (Harvey, Tang, & Browning, 2005; Waine, Broomfield, Banham, & Espie, 2009). To assess individual differences in aspects of metacognition associated with psychological distress/disorder, Cartwright-Hatton and Wells (1997) developed the MetaCognitions Questionnaire (MCQ), with items related to, for example, confidence in cognitive functions (such as memory), beliefs that worry might be a helpful strategy in some situations, and beliefs that worry might be uncontrollable or dangerous.

The success of the metacognitive approach developed by Wells and colleagues suggests that metacognitive beliefs are an important consideration for understanding many types of psychological distress. Although maladaptive daydreaming can occur when excessive fantasising limits social interaction and/or otherwise impairs daily functioning (Somer, 2002), mind wandering/daydreaming is not typically indicative of clinical disorder (Klinger, Henning, & Janssen, 2009; Singer, 1966). However, metacognitive beliefs might be involved in the widely reported relationship between mind wandering/daydreaming and the experience of negative affect. Thus, the current research aimed to investigate how metacognitive beliefs, as identified in the metacognitive approach to psychological disorder (Wells & Matthews, 1996; Wells, 2007), are related to mind wandering/daydreaming. In addition, it was investigated whether metacognitive beliefs mediate the relationship between mind wandering/daydreaming frequency and negative affect.

2. Method

2.1. Materials

Metacognitive beliefs were assessed with the 30-item version of the MetaCognitions Questionnaire (MCQ-30; Wells & Cartwright-Hatton, 2004). This has the same five-factor structure as the 65-item MCQ, and shows the same positive correlations with measures of anxiety, worry and obsessive symptoms. The MCQ-30 has six items for each of the following dimensions of metacognition: *MCQ1 - Cognitive Confidence* (e.g., "I have a poor memory"); *MCQ2 - Positive Beliefs about Worry* (e.g., "Worrying helps me cope"); *MCQ3 - Cognitive Self-consciousness* (e.g., "I monitor my thoughts"); *MCQ4 - Negative Beliefs*

about Uncontrollable Thoughts and associated Danger (e.g., "When I start worrying I cannot stop"); *MCQ5 - the Need to Control Thoughts and Negative Beliefs about the Consequences of Thoughts* (e.g., "I should be in control of my thoughts all of the time"). The order of the 30 items was randomised on the final questionnaire. Items are rated on a scale of: (1) do not agree; (2) agree slightly; (3) agree moderately; (4) agree very much. Higher scores for each dimension represent more maladaptive metacognitions (range = 6–24 for each dimension). The current Chinese version of the MCQ-30 was developed by back-translation: a native Chinese-speaker translated the original English scale, and another native Chinese-speaker back-translated it; a native English-speaker checked the back-translation and discrepancies were resolved with the translators. The construct validity was assessed with Confirmatory Factor Analysis (CFA); test-retest (7–8 week interval) was also undertaken with a sub-sample from Study 1 ($N = 114$).

Mind wandering and daydreaming were assessed with the following scales from the Imaginal Processes Inventory (Singer & Antrobus, 1972; Chinese versions: Carciofo et al., 2014a, 2014b): the Daydreaming Frequency scale (DF; e.g., "I lose myself in active daydreaming"), the Mind Wandering scale (MW; e.g., "I am the kind of person whose thoughts often wander"), and the Problem-Solving Daydreams scale (e.g., "My daydreams offer me useful clues to tricky situations I face"). Each scale has 12 items (6 reverse-scored on the MW scale; 3 reverse-scored for Problem-Solving Daydreams), each scored on 5-point Likert scales, giving scores ranging 12–60, with higher scores indicating more daydreaming frequency/mind wandering/problem-solving daydreams. While the DF and MW scales are associated with negative affect and depression, the Problem-Solving Daydreams scale has not shown such correlations (Carciofo et al., 2014b; Giambra & Traynor, 1978), so it was investigated whether this form of daydreaming is also differentially associated with metacognitive beliefs.

Mindfulness was assessed with the 12-item Mindful Attention Awareness Scale-Lapses Only (MLO; e.g., "I find myself doing things without paying attention"). This is a shortened version of the 15-item Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003), which omits one item related to driving (and so less relevant to students) and two items not related to lapses (Carriere, Cheyne, & Smilek, 2008; Chinese version: Carciofo et al., 2014a). Each item is scored on a 6-point Likert scale; total scores range 12–72, with higher scores indicating more frequent mindful states. The 12-item MLO scale correlates strongly with the 15-item MAAS ($r = 0.961$; Mrazek et al., 2012).

Sleep quality was assessed with the Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989; Chinese version: Liu, Tang, Hu, et al., 1996), with components of: Subjective Sleep Quality, Sleep Latency, Sleep Duration, Sleep Efficiency, Sleep Disturbances, Use of Medication, and Daytime Dysfunction. Scale items are used to calculate a score (ranging 0–3) for each component, with higher scores indicating poorer quality sleep. Summing the seven components gives a global score (ranging 0–21). Participants completed the PSQI for their sleep over the preceding month.

Affect was assessed with the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988; Chinese version: Huang, Yang, & Ji, 2003); 10 items assess positive affect, with higher scores indicating more energy and 'pleasurable engagement', and 10 items assess negative affect, with higher scores indicating more general distress and 'unpleasant engagement'. Negative affect has shown moderate/strong positive correlations with measures of general psychological distress, depression and anxiety (Crawford & Henry, 2004; Watson et al., 1988). Each PANAS item is scored on a 5-point Likert scale, giving a range of 10–50 for each subscale. In Study 1, participants were instructed to complete the PANAS according to how they had felt over the preceding 3–4 weeks. In Study 2, participants were instructed to complete the PANAS according to how they felt "now"/at this moment.

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