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Dispositional mindfulness and the wandering mind: Implications for attentional control in older adults



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ABSTRACT

Age-related cognitive decline brings decreases in functional status. Dispositional mindfulness, the tendency towards present-moment attention, is hypothesized to correspond with enhanced attention, whereas mind-wandering may be detrimental to cognition. The relationships among mindfulness, task-related and task-unrelated thought, and attentional control performance on Go/No-Go and Continuous Performance tasks were examined in older adults. Dispositional mindfulness was negatively associated with task-unrelated thought and was positively associated with reactive control, but not proactive control or Go/No-Go performance. Although mind-wandering was not directly associated with performance, task-unrelated thought mediated the mindfulness-proactive control relation. Fewer task-unrelated thoughts were associated with lower proactive control. Interestingly, this effect was moderated by working memory such that it was present for those with low-average, but not high, working memory. This study highlights the importance of dispositional mindfulness and mind-wandering propensity in accounting for individual differences in attentional control in older adults, providing important targets for future cognitive remediation interventions.

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1. Introduction

Dispositional mindfulness is defined as the tendency to engage in receptive attention to and awareness of current experiences with non-judgment and acceptance (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; Brown & Ryan, 2003; Kabat-Zinn, 2003). Theoretical models of mindfulness propose that the ability to attend to events as they occur, and the resulting increased attentional control, are important components of the mindfulness construct (Dreyfus, 2011; Hölzel et al., 2011). As such, there has been a burgeoning interest in examining the relationship between mindfulness and attentional control across various populations including adolescents (Oberle, Schonert-Reichl, Lawlor, & Thomson, 2011), college undergraduates (Ainsworth, Eddershaw, Meron, Baldwin, & Garner, 2013; Anicha, Ode, Moeller, & Robinson, 2012; Cheyne, Carriere, & Smilek, 2006; Quaglia, Goodman, & Brown, 2015; Quickel, Johnson, & David, 2014; Schmertz, Anderson, & Robins, 2009), community adults (Galla, Hale, Shrestha, Loo, & Smalley, 2012; Moore & Malinowski, 2009; Rosenberg, Noonan, DeGutis, & Esterman, 2013; Ruocco & Direkoglou, 2013), older adults (Fiocco & Mallya, 2015; Prakash, Hussain, & Schirda, 2015), and clinical populations with attentional deficits (e.g., Tabak, Horan, & Green, 2015; Zylowska et al., 2008). Aging

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samples are ideal for studying this link between mindfulness and cognition as these individuals exhibit well-characterized deficits in attentional control that are implicated in critical functions such as comprehending medical information (Park, 1999; Zwahr, Park, Eaton, & Larson, 1997), emotion regulation abilities (Mather & Carstensen, 2005; Mather & Knight, 2005), and overall well-being (Kryla-Lighthall & Mather, 2009). Further, given the aging of the baby boomer generation, this information has the potential to characterize probable risk and protective factors contributing to individual differences in cognitive decline across development as well as identify targets for the use of mindfulness as a cognitive remediation intervention. Thus, the present study was designed to examine whether mindfulness relates to individual differences in attentional control in this population.

Although the use of mindfulness training to augment attention has shown promise (see Chiesa, Calati, & Serretti, 2011 for review), investigations into the relationship between trait mindfulness and attentional control are only beginning to emerge in older-adult samples, with inconsistent findings between the two existing studies (Fiocco & Mallya, 2015; Prakash et al., 2015). Prakash et al. (2015) assessed attentional control by employing higher-order executive functioning tasks of working memory, inhibitory control, and task-switching. Examining the associations among interference measures on these tasks and dispositional mindfulness assessed using the Mindful Attention and Awareness Scale (MAAS; Brown & Ryan, 2003), this study failed to find support for a positive link between dispositional mindfulness and metrics of attentional control in either young or older adults. In contrast, Fiocco and Mallya (2015) found a positive association in older adults between scores on the MAAS and set-shifting on Trail Making Test B as well as marginal associations with simple attention and processing speed on Trail Making Test A and shifting cost calculated by subtracting performance on the two tasks (Fiocco & Mallya, 2015). Potential sources of these discrepancies include the lengthier task duration and computerized administration in the study by Prakash et al. (2015) as compared to the brief, paper-and-pencil measures employed by Fiocco and Mallya (2015). In the context of this limited, mixed literature the present study will provide further insight into whether and how mindfulness is related to attention in an aging sample.

Interestingly, there is emerging evidence that mind-wandering (MW), a shift in attention away from external tasks and towards internal thought (Smallwood & Schooler, 2006), mediates the relation between mindfulness and attentional control (Cheyne, Solman, Carriere, & Smilek, 2009; Mrazek, Franklin, Phillips, Baird, & Schooler, 2013; Mrazek, Smallwood, & Schooler, 2012). Mrazek et al. (2012), embedded MW probes within a Sustained Attention to Response Task (SART; Robertson, Manly, Andrade, Baddeley, & Yiend, 1997) and found evidence for a negative association between dispositional mindfulness and MW in college undergraduates. Further, a subsequent study found that MW mediated the effect of brief mindfulness training on SART performance (Mrazek et al., 2013). Extending these findings to an aging sample, Frank, Nara, Zavagnin, Touron, and Kane (2015) recently examined the links among mindfulness and different types of MW in older adults. Categorizing MW into task-unrelated thoughts (TUT) and task-related interference (TRI), they found evidence for differential associations among various facets of mindfulness and the two functionally distinct types of MW. Specifically, employing the Five Facet Mindfulness Questionnaire (Baer et al., 2006), this study found that the Describing Facet was negatively associated with TUT, whereas the Observing Facet was positively associated with TRI. Interestingly, Observing mediated the relationship between age and TRI, suggesting that the higher levels of TRI reported by older adults were partially explained by an increased tendency to observe their surroundings. These findings suggest that TRI and TUT may have unique relations with mindfulness within older adults, although the ramifications of MW for performance were not examined in that study. The present study will build upon the existing literature by examining whether the tendency to engage with internal mentation accounts for the link between mindfulness and attentional control in older adults.

The present study evaluated attentional control using a Go/No-Go task and a Continuous Performance Task (CPT) that allowed for assessment of proactive (i.e., preparatory attention) and reactive (i.e., post-stimulus correction) control. We were particularly interested in these specific strategies given that there is evidence of an age-related shift from reliance on proactive to reactive strategies (Braver, Satpute, Rush, Racine, & Barch, 2005; Braver et al., 2001; Bugg, 2014). Self-reported MW probes were embedded within each task. Although previous examinations of trait mindfulness and attentional control are mixed, we hypothesized that mindfulness would be negatively associated with TUT and TRI and positively associated with performance on both tasks. We also predicted that TUT and TRI would be negatively associated with performance on both tasks. Extending previous findings from young adults (Mrazek et al., 2013), we hypothesized that MW would mediate the association between mindfulness and attentional control on both tasks. Of note, this study used cross-sectional data from a larger randomized controlled trial in which working memory was examined as a moderator of mindfulness training's effects. The present study examined the exploratory hypothesis that individual differences in working memory would moderate the relationship between MW and attentional control. This prediction was based on evidence that working memory predicts errors, reaction time variability, and TUT during a Go/No-Go task (McVay & Kane, 2009), as well as meta-analytic evidence that individuals with fewer cognitive resources are more likely to engage in TUT, while those with more resources engage in more TRI (Randall, Oswald, & Beier, 2014). Notably, this meta-analysis did not include studies of older-adult samples, a population with marked declines in working memory abilities. We hypothesized that individuals with high working memory would show a stronger negative relationship between MW and performance than those with lower working memory.

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