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Joint Gray and White Matter Networks Predict Mindfulness and Mind Wandering Traits:

A Data Fusion Machine Learning Approach

Minah Chang[1], Sara Sorella[3], Cristiano Crescentini[3], and Alessandro Grecucci[1,2]

[1]Clinical and Affective Neuroscience Lab, Department of Psychology and Cognitive Sciences,

University of Trento, Italy

[2]Centre for Medical Sciences, University of Trento, Italy

[3]Department of Language and Literature,

University of Udine, Italy

Correspondence concerning this article should be addressed to Alessandro Grecucci, Corso Bettini, 31, 38068, Rovereto (TN), Italy. Telephone: +39 347 595 6454. Email: alessandro.grecucci@unitn.it

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Abstract

Mind wandering is a ubiquitous part of our normal cognition and daily lives, with people reporting that their mind wanders during 25-50% of their waking hours. Studies suggest that mind wandering shares an inverse relationship with mindfulness skills. Our aim was to expand this evidence directly by investigating the mediating effect among mindfulness, mind wandering, and brain features. The main goal of our study in particular was to find out which morphometric brain features are associated with mindfulness and mind wandering, and to investigate how mindfulness mediates deliberate and spontaneous mind wandering in terms of these associated brain components. GM and WM MRI scans of 76 individuals and self-reported questionnaires were included in the analysis. We predicted that specific gray matter (GM) and white matter (WM) networks would also influence deliberate and spontaneous mind wandering tendencies with mindfulness as a mediator. We found that GM and WM networks including structures that have been consistently linked to mindfulness, such as the cingulate, the insula, the basal ganglia and fronto-parietal attentive regions, exert direct effects on mindfulness, and deliberate and spontaneous mind wandering. We also found an indirect mediating effect of the FFMQ facet *acting with awareness* on spontaneous mind wandering in terms of increased and decreased GM volume concentrations. This study elicited the link between mind wandering and mindfulness and expands our knowledge on the neural bases of these two psychological constructs.

Keywords: mindfulness, deliberate and spontaneous mind wandering, five facet mindfulness questionnaire (FFMQ), acting with awareness, data fusion, gray matter and white matter structural networks, machine learning, parallel independent component analysis, mediation analysis

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1. Introduction

1.1 Background

Our attention is engaged in the present moment by immediate environmental stimuli that we perceive through the senses, or by interoceptive cues such as hunger, pain, sleepiness, and sexual desire. On the other hand, our neurocognitive processes are not restricted to such immediacy (Mooneyham & Schooler, 2013; Smallwood & Schooler, 2015). Rather, the mind wandering away from conspicuous sensations and perceptions is considered the normal psychological baseline (Mason et al., 2007) during 25 to 50 percent of our waking hours (Kane et al., 2007; Killingsworth & Gilbert, 2010), especially when resting or sleeping, working, using a home computer, and commuting or traveling (Killingsworth & Gilbert, 2010). It's apparent that "unconstrained mental processes are the norm rather than the exception for our species, and mind wandering provides a clear paradigm through which to understand their psychological features" (Smallwood & Schooler, 2015, p. 489). The self-generated thoughts of mind wandering that arise intrinsically within an individual can be either deliberate (intentional) or spontaneous (unintentional), and they can also be characterized as adaptive or maladaptive (Ottaviani & Couyoumdjian, 2013; Seli et al., 2016b).

Since the executive components of attention shift away when the mind wanders from the current environment, the mind wandering shares many similarities with traditional executive models of attention (Smallwood & Schooler, 2006; Smallwood & Schooler, 2015). According to control failure hypothesis, the mind wandering away from task-related thoughts could be a result of failure of executive control to keep on the current task (Kane & McVay, 2012; McVay & Kane, 2010). In support of this theory, the self-generation and disengagement of mind wandering are influenced by individual differences in executive control (Kane et al., 2007; Kane & McVay, 2012).

Mindfulness is largely comprised of two different components: self-regulation of attention, and adopting a particular orientation toward one's experience in the present moment as characterized by curiosity, openness, and acceptance (Bishop et al., 2004; Messina et al., 2023; Monachesi et al., 2023). Therefore, mindfulness is associated with attention and executive control

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similar to mind wandering, though with the opposite direction of influence. Indeed, structural evidence suggests that mindfulness training results in plasticity of brain mechanisms involved in emotional regulation through cognitive top-down emotion regulation (i.e., through the control of prefrontal cortex (PFC) to inhibit the influence of limbic areas, such as amygdala) in short-term training, but with perceptual bottom-up emotion regulation with long-term training (Brefczynski-Lewis et al., 2007; Chiesa et al., 2013; Taylor et al., 2011). The top-down emotion regulation in short-term training might be characterized as more deliberate cognitive control at a conscious level, and the bottom-up emotion regulation in long-term training might be characterized as more automatic control occurring below the level of conscious control. The latter would translate into a more stable trait that persists over time. Future studies may explore the parallelism between top-down processes of mindful emotion regulation and deliberate mind wandering on the one hand, and bottom-up mindful emotion regulation and spontaneous mind wandering on the other.

Studies that examined the effects of short-term mindfulness training found that mind wandering tendencies can be significantly reduced even in as short as a two-week period (Feruglio et al., 2021; Mrazek et al., 2013a). Structural evidence shows that just 2 to 4 weeks of mindfulness training result in increased myelin and other axonal changes in white matters surrounding the anterior cingulate cortex (ACC) and posterior cingulate cortex (PCC) (Posner et al., 2014; Tang et al., 2010; Tang et al., 2012), and GM plasticity in the ventral PCC, the issue of permanence for these changes aside (Tang et al., 2020). In a meta-analysis study, Melis et al. (2022) reported that mindfulness training of over 6 weeks alters functional connectivity (FC) between networks involved in attention, executive function, emotional reactivity, and mind wandering. One study found that mindfulness training reduces default mode network (DMN) hyperconnectivity even after just one session (Zhang et al., 2023). These studies demonstrate brain plasticity that begins to occur in the early stages of mindfulness training, and raises the question of its link to the change in one's mindfulness and mind wandering tendencies.

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As for studies involving long-term mindfulness training, long-term meditators were compared to meditation-naïve controls. Across these studies, the ACC has been most consistently linked to mindful training, which is a region that has been found to be largely involved in mind wandering tendencies (Tang et al., 2015). Other regions consistently affected by mindfulness training across studies are involved in meta-awareness (frontopolar cortex), body awareness (sensory cortices and insula), memory processes (hippocampus), self and emotion regulation (mid-cingulate cortex and orbitofrontal cortex along with ACC), and intra- and inter-hemispherical communication (superior longitudinal fasciculus and corpus callosum; Tang et al., 2015).

Other studies have examined mindfulness and mind wandering tendencies through functional brain imaging studies using fMRI. Default mode of brain function (functionally organized intrinsic neural activity; Greicius et al., 2003; Raichle et al., 2001) is recorded with MRI while a subject is awake and not involved in any exogenous activities (i.e., in resting state). The recorded patterns of default neural activities in this resting state represent spontaneous and on-going brain activity that occurs in the absence of sensory stimuli. DMN is a subset of these networks, and is comprised of anatomically connected and functionally correlated brain regions that are activated only during the resting state. DMN serves as an important biomarker in brain research, as its alteration marks various neurological and psychiatric conditions (Mak et al., 2017; Raichle & Snyder, 2007). Studies have shown that there is a large number of parallels between DMN and mind wandering states, suggesting that they represent similar states of opposition to external perception and having anticorrelation to brain regions that engage in external sensory processes (Smallwood & Schooler, 2015). Meta-analysis of functional neuroimaging studies found that key DMN areas are consistently involved in mind wandering, including: medial PFC, PCC, medial temporal lobe, and bilateral inferior parietal lobule (Fox et al., 2015). Notably, a study by Mason et al. (2007) demonstrated that DMN recruitment is even greater during high-incidence mind wandering periods. It has also been shown that medial PFC and PCC of DMN are relatively deactivated in experienced meditators. However, stronger connectivity has been found in mediators both at baseline and during

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meditation among the dorsolateral PFCs, dorsal ACC, and PCC, which are regions related to self-monitoring and cognitive control (Brewer et al., 2011).

Interestingly, the anterior PFC, the dorsal ACC, and the parahippocampal cortex were found to be more active during mind wandering when participants were unaware of their thoughts rather than aware (Christoff et al., 2009; Christoff et al., 2016). The evidence showing stronger recruitment of default and executive network regions in mind wandering outside of meta-awareness further suggests that spontaneous and deliberate mind wandering should be considered to be separate variables that engage different brain structures and functions. Previous findings also suggest that mindfulness traits should be treated as possible mediator in studies investigating mind wandering traits, and vice versa, as they share strong causal relations.

Most of the studies mentioned so far investigated mind wandering and mindfulness by comparing groups involved in different variations of mindfulness training that could have affected the subjects in different ways. The frequency of mind wandering in the lab and in daily life also have been found to share a positive correlation, indicating that the mind wandering tendency is a relatively stable individual trait (Hölzel et al., 2011; Murakami et al., 2012; Ottaviani & Couyoumdjian, 2013; Seli et al., 2016b; Taren et al., 2013; Zhuang et al., 2017). Indeed, it has been found that an eight-week mindfulness training induces significant positive change in three of the five individual traits associated with mindfulness that were defined in the Five Facets Mindfulness Questionnaire (FFMQ; Baer et al., 2006): *acting with awareness*, *nonjudging of inner experience,* and *observing* (Hozel et al., 2011). In addition, mindfulness traits have been also associated with brain features. From a structural point of view, the FFMQ facet *describing* is associated with the right anterior insula (Brodmann area, or BA 13), the right parahippocampal gyrus/amygdala (BA 28), the right dorsolateral PFC (BA 46), the right inferior parietal lobule (BA 40), and left superior PFC (BA 9) (Murakami et al., 2012; Zhuang et al., 2017). The FFMQ *nonjudging of inner experience* facet was positively correlated with the surface area of the right superior PFC (BA 10), and the *nonreactivity to inner experience* facet was negatively correlated with the thickness of the right superior PFC (BA 8) and middle

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occipital cortex (Zhuang et al., 2017). From a functional point of view, Mindfulness traits as measured by FFMQ were linked to increased FC among neural regions associated with attentional control, interoception, and executive function, and decreased FC among neural regions associated with self-referential processing and mind wandering (Parkinson et al., 2019). In addition, Individual dispositional mindfulness has also been found to be positively correlated with enhanced PFC and attenuated amygdala in the regulation of affect, with the implication that dorsomedial PFC regions are associated with mindfulness skills (Creswell et al., 2007; Modinos et al., 2010).

1.2 Current Study

The aim of this study was to model the associations among mindfulness, mind wandering, and morphometric features of the brain through a data fusion machine learning approach. In particular, we investigated whether or not deliberate and spontaneous mind wandering are mediated by one's mindfulness characteristics. Many studies have so far put in much effort towards better understanding of different types of mind wandering and their neurological attributes. However, there has been no study up to date that has directed the investigation towards the mediating effect of mindfulness on mind wandering. The results of our study could also elucidate their possible inverse relationship, which has been a recurring question raised in previous studies. A clear implication from existing evidence is that mind wandering is influenced by DMN connectivity, and that the regions involved in these networks are susceptible to plastic change through mindfulness training that alters one's mindfulness trait over time. In order to test the effect of mindfulness on mind wandering characteristics beyond existing inferences, we performed a mediation analysis of the trait variables and brain structure covariates composed of GM and WM networks.

In order to quantify and investigate the empirical relationship among mind wandering and mindfulness traits with associated brain regions, we obtained trait scores through respective self-report questionnaires along with structural brain data of our participants. For mind wandering, the

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scores for deliberate and spontaneous mind wandering were treated as separate variables as they engage different brain regions (Christoff et al., 2009; Christoff et al., 2016).

In the recent years, we have witnessed the development and surge of machine learning, a computational intelligence model that builds algorithms to solve a specific task through exploration of patterns and reasoning. In cognitive science, machine learning algorithms are used in analyses such as neural decoding, neural response prediction, and hierarchical modeling (Fong et al., 2018). Computational approaches based on machine learning can quantify and decode brain network organization using pattern recognition, as well as perform predictive encoding of brain activities based on supervising metrics. Unlike previous structural studies that examined GM and WM alterations separately, we applied a data fusion approach to include both modalities in one model under the reasonable assumption that both GM and WM play important roles in mind wandering and mindfulness. The combinations of linked data points can capture patterns of high-dimensional dataset that univariate approach can miss that convey significant findings (Calhoun & Sui, 2016). We applied unsupervised machine learning algorithms to the brain imaging data of our participants to decompose the fused GM and WM into naturally grouping covarying networks. We then conducted a mediation analysis to assess the influence of mindfulness on deliberate and spontaneous mind wandering based on this data fusion and network decomposition.

1.3 Aim and Hypothesis

The main aim of our study was to find out which GM and WM brain features are associated with mindfulness and mind wandering, and to investigate how mindfulness mediates deliberate and spontaneous mind wandering in terms of these associated brain components. To this end, after decomposing the brain into GM and WM networks, we performed a mediation analysis to see if there are mediating effects of mindfulness characteristics on mind wandering traits. Additionally, we investigated if certain mindfulness facets mediate the two forms of mind wandering traits. We predicted that specific GM and WM networks consisting of structures that have been consistently linked to mindfulness and mind wandering such as the insula, the cingulate, the basal ganglia, and

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fronto-parietal attentive regions, would assert influence on mindfulness, which in turn would mediate deliberate and spontaneous mind wandering tendencies. We also predicted that some of the GM and WM networks would exert direct effects on mindfulness, and deliberate and spontaneous mind wandering.

2. Materials and Method

2.1 Participants

The data used in this study was entirely acquired from the MPI-Leipzig Mind-Brain-Body open-access database (Babayan et al., 2018), a project conducted by the Max Planck Institute of Human Cognitive and Brain Sciences in Leipzig, Germany, and approved by the ethics committee of the University of Leipzig. The project comprises of publicly available behavioral and brain imaging datasets of 318 participants with at least a structural quantitative T1-weighted image and a 15-minute resting-state fMRI data (for details of all available data, see Babayan et al., 2019 and also Mendes et al., 2019). All participants underwent medical screening to be eligible for MRI sessions, and also were screened for any past and present neuropsychological issues. From the database, we selected 76 participants (33 females, 43 males) for this study based on the inclusion criteria of age (between 20-45 years old, *m* = 27.1, *SD* = 5.08), right-handedness, negative drug test screening result, not having any history of neurological or psychiatric diagnosis, and availability of scores for the questionnaires (FFMQ and MW-D/MW-S scales). The entire study was conducted in German.

2.2 Mind Wandering and Mindfulness Questionnaires

Deliberate Mind Wandering (MW-D) and Spontaneous Mind Wandering (MW-S) Scales. Deliberate and spontaneous mind wandering scales are self-reported questionnaires that ask the subjects to assess their mind wandering tendencies in everyday life. A German adapted version of MW-D and MW-S scales (Carriere et al., 2013) were used to quantify the subjects' deliberate and spontaneous mind wandering traits. MW-D and MW-S are separate and distinct traits that involve different degree of control and mechanisms (Seli et al., 2014). For instance, MW-D is positively

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associated with *non-reactivity to inner experience* category of FFMQ, while MW-S is negatively associated with this facet (Seli et al., 2014). The original MW-D and MW-S scales are 4-item self-report questionnaires using Likert-scale of 1 to 7 (1: not at all true; 7: very true), and they were tested and validated in previous studies (Mrazek et al., 2013b; Seli et al., 2014; Seli et al., 2016a). The MW-D scale includes items that are related to intentional mind wandering: “I allow my thoughts to wander on purpose”, "I enjoy mind wandering", "I find mind wandering is a good way to cope with boredom", and "I allow myself to get absorbed in pleasant fantasy". The MW-S scale includes items that are related to unintentional mind wandering: “I find my thoughts wandering spontaneously”, "When I mind-wander, my thoughts tend to be pulled from topic to topic", "It feels like I don’t have control over when my mind wanders", and "I mind-wander even when I’m supposed to be doing something else" (Carriere et al., 2013). The scales in this study were adopted to a 5 Likert-scale (1: almost never; 5: very often).

Five Facet Mindfulness Questionnaire (FFMQ). A German translated version of the original English FFMQ was used to measure the subjects’ mindfulness traits. The questionnaire had been developed based on previously existing mindfulness questionnaires, and empirically tested and validated (see Baer et al., 2006). The FFMQ is based on conceptualization of mindfulness as a multifaceted construct with five distinct facets represented by five categories: *acting with awareness* (8 items, 40 points), *describing* (8 items, 40 points), *nonjudging of inner experience* (8 items, 40 points), *nonreactivity to inner experience* (7 items, 35 points), and *observing* (8 items, 40 points), with a total of 39 items and 195 points using a Likert-scale of 1 to 5 (1: never or very rarely true; 5: very often or always true). The *acting with awareness* category of the FFMQ (*act_awareness*) measures one’s attentiveness traits with questions such as “When I do things, my mind wanders off and I’m easily distracted.” The *describing* category (*describe*) assesses one’s ability to describe and label one’s sensations, perceptions, thoughts, and feelings with statements such as “I am good at finding words to describe my feelings”. The *nonjudging of inner experience* category (*nonjudge*) measures the one’s tendency to judge one’s own inner experience with questions such as “I criticize

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myself for having irrational or inappropriate emotions". The *nonreactivity to inner experience* category (*nonreact*) assesses the level of one's reactive tendency with questions such as "I perceive my feelings and emotions without having to react to them". Lastly, the *observing* category of the FFMQ (*observe*) measures one's self-reported propensity to observe, notice, and attend to sensations, perceptions, thoughts, and feelings by answering statements such as "When I am walking, I deliberately notice the sensations of my body moving".

Behavioral Data Analysis. The behavioral data was analyzed with JASP (JASP Team, 2023), a platform based on R (R Core Team, 2021) programming language for statistical computing and graphics. Pearson's correlation coefficients were calculated to evaluate correlations among the mind wandering (MW-D and MW-S) and mindfulness facet (*act_awareness*, *describe*, *nonjudge*, *nonreact*, and *observe*) scores. Demographic variables age and gender were entered as covariates to remove their confounding effects.

2.3 MRI Data Acquisition/Pre-processing

The T1-weighted images were acquired on a 3T Siemens Magnetom Verio Scanner equipped with a 32-channel head coil using a MP2RAGE sequence (TR = 5,000 ms, TE = 2.92 ms, TI1 = 700 ms, TI2 = 2,500 ms, flip angle 1 = 4°, flip angle 2 = 5°, voxel size = 1.0 mm isotropic, duration = 8.22 min). The images were pre-processed with SPM12 (Statistical Parametric Mapping; Penny et al., 2011) and CAT12 (Computational Anatomy Toolbox; Gaser et al., 2022) in the MATLAB (The MathWorks Inc., 2022) environment. A visual check of data quality was performed in order to identify any distortion, such as head motion and other artifacts. The images were oriented to anterior commissure as the origin, and segmented into gray matter (GM), white matter (WM), and cerebrospinal fluid. The processed images were registered with Diffeomorphic Anatomical Registration Through Exponentiated Lie algebra (DARTEL; Ashburner, 2007) toolbox for SPM12 and normalized to the MNI (Montreal Neurological Institute) space with a spatial Gaussian smoothing with 12-mm, full-width at half-maximum (FWHM) Gassian kernel.

2.4 Data Fusion and Network Decomposition Using Unsupervised Machine Learning

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Pre-processed MRI images were decomposed into covarying networks using data-driven parallel independent component analysis (PICA; Liu & Calhoun, 2007), an unsupervised machine learning approach. PICA is a modified ICA that applies dynamic constraints to both GM and WM modalities simultaneously to assess their interrelationships, and decompose the brain into meaningful networks that share the same response pattern with improved reliability compared to ICA estimates (with tighter clusters and differently bootstrapped data sets) with lower dimensionality. PICA was conducted with Fusion ICA Toolbox (FIT; http://trendscenter.org/software/fit) to fuse GM and WM to find covariate matrix, and decompose the brain into independent networks. This multi-model fusion technique identifies brain regions that covary in their properties under the reasonable assumption that they belong to networks involved in carrying out similar psychological functions. To assess the algorithmic reliability of estimated independent components, Icasso (see Himberg & Hyvärinen, 2003; Himberg et al., 2004) was run 10 times.

2.5 Mediation Analysis

We conducted mediation analysis to examine the causal relationship among mindfulness and mind wandering (MW-D and MW-S) facets, with dependency on the covarying GM-WM networks. We assigned the GM-WM networks as the predictor variable, and tested the mind wandering and mindfulness facets as either mediator variable or outcome variable. The analysis was performed with JASP.

3. Results

3.1. Behavioral Data Analysis

The mean and standard deviation of the FFMQ scores were: *act_awareness* (M = 16.7 $\pm$ 2.82), *describe* (M = 28.8 $\pm$ 5.82), *nonjudge* (M = 20.8 $\pm$ 4.59), *nonreact* (M = 18.9 $\pm$ 3.54), and *observe* (M = 22.2 $\pm$ 3.41). For mind wandering scales, the scores were: MW-D (M = 3.5 $\pm$ 1.05), and MW-S (M = 3.2 $\pm$ 1.01). Correlations among the behavioral data obtained from the questionnaires were calculated with Spearman's partial correlation coefficients after controlling for age and gender

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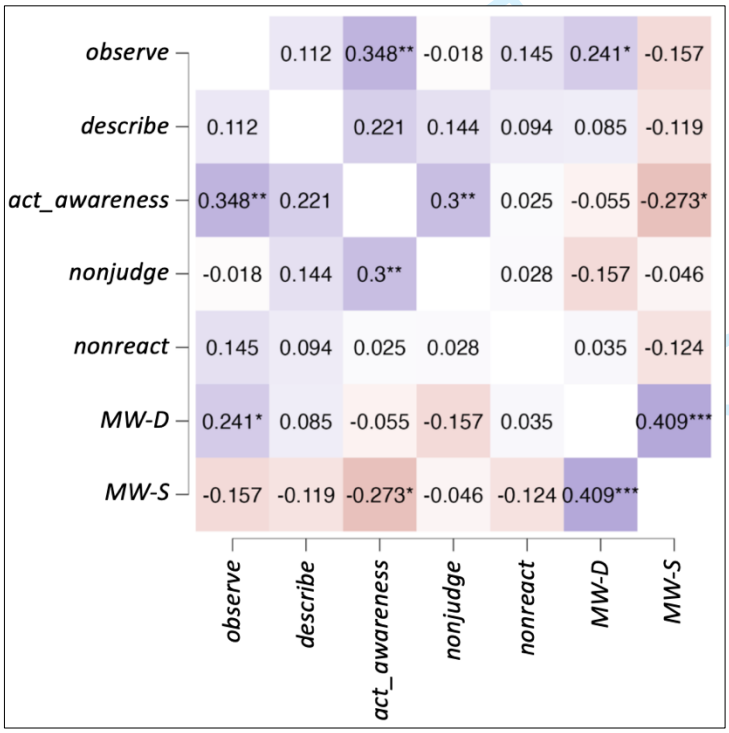
differences to remove their confounding effects. All correlations among the five variables from the FFMQ, MW-D, and MW-S are shown in Figure 1. Significant positive correlations were found between: *act_awareness* and nonjudge (r_s = 0.300, p = .009), *act_awareness* and *observe* (r_s = 0.348, p = .002), *observe* and MW-D (r_s = 0.241, p = .039), and MW-D and MW-S (r_s = 0.409, p < .001). Marginally significant positive correlation was also found between *act_awareness* and MW-S (r_s = 0.221, p = .059). A significant negative correlation was found between *act_awareness* and MW-S (r_s = -0.237, p = .019).

Figure 1

Spearman's Partial Correlations Heatmap



Note. Significant values are denoted by * for p < .06, ** for p < .01, and *** for p < .001.

3.2 Data Fusion and Network Decomposition Using Unsupervised Machine Learning

The information theoretic criteria (see Wax & Kailath, 1985) estimated the presence of 18 independent covarying GM and WM networks in our data. The output from PICA consists of a matrix

with the number of subjects (rows) and the loading coefficients for each PICA component (columns). Positive values indicate increased GM or WM concentration, and negative values indicate decreased concentration. The correlations between covarying GM and WM components are listed on Table 1. The brain plots of all independent component estimates with their positive and negative values are shown in Figure 2 for the GM networks, and Figure 3 for the WM networks.

Table 1

PICA Fusion GM-WM Structural Data Correlations

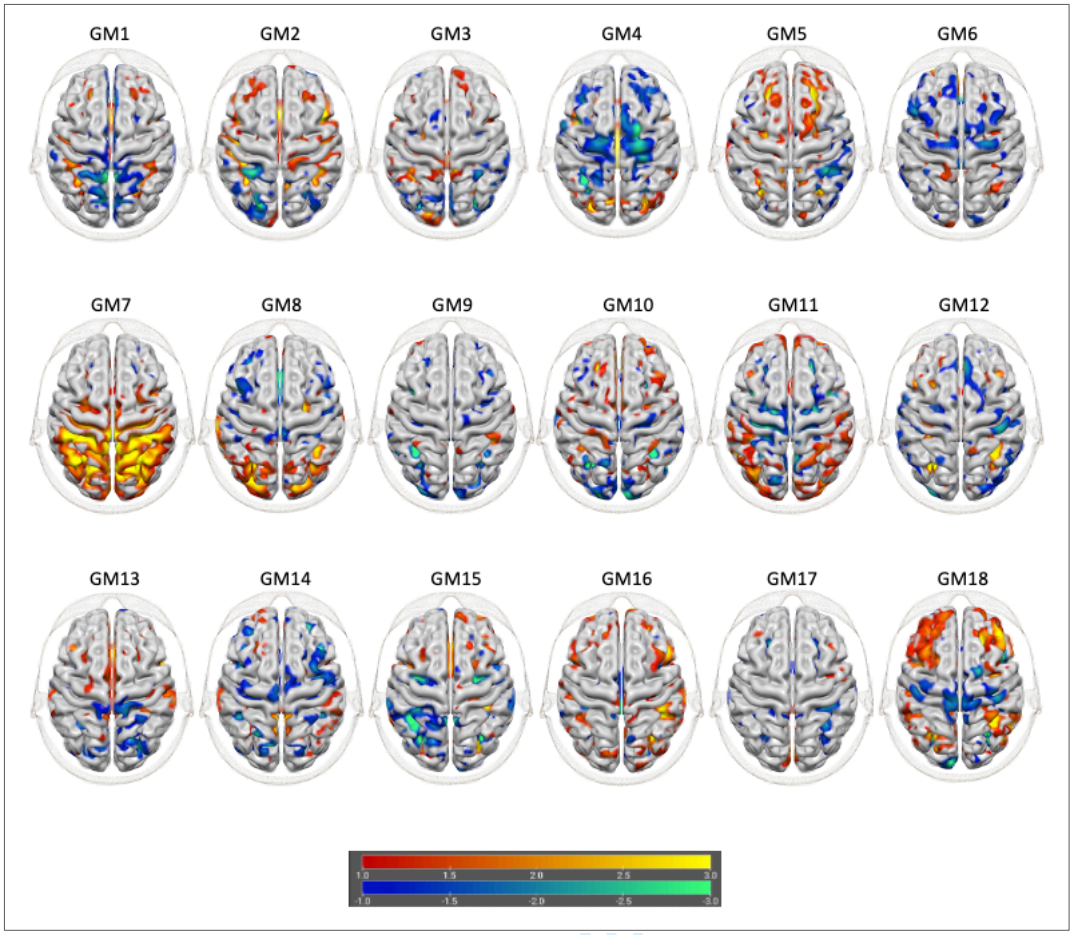
Network ID	GM network	WM network	Correlation	*t*	*p*
1	3	14	-0.662	-7.598	<. 001
2	1	5	-0.542	-5.552	<. 002
3	5	9	-0.471	-4.590	<. 003
4	18	10	-0.448	-4.307	<. 004
5	17	11	-0.424	-4.032	<. 005
6	11	12	0.423	4.013	<. 006
7	6	7	-0.402	-3.772	<. 007
8	4	10	-0.367	-3.398	.001
9	7	16	-0.329	-3.001	.004
10	16	5	-0.329	-2.995	.004
11	13	6	-0.322	-2.921	.005
12	10	14	-0.315	-2.853	.006
13	15	14	-0.311	-2.811	.006
14	2	16	-0.309	-2.794	.007
15	12	8	-0.309	-2.792	.007
16	9	10	-0.303	-2.737	.008
17	14	14	0.277	2.475	.016
18	8	6	0.271	2.422	.018

Note. The correlational value between components indicates how statistically similar the patterns are between GM and WM networks.

Figure 2

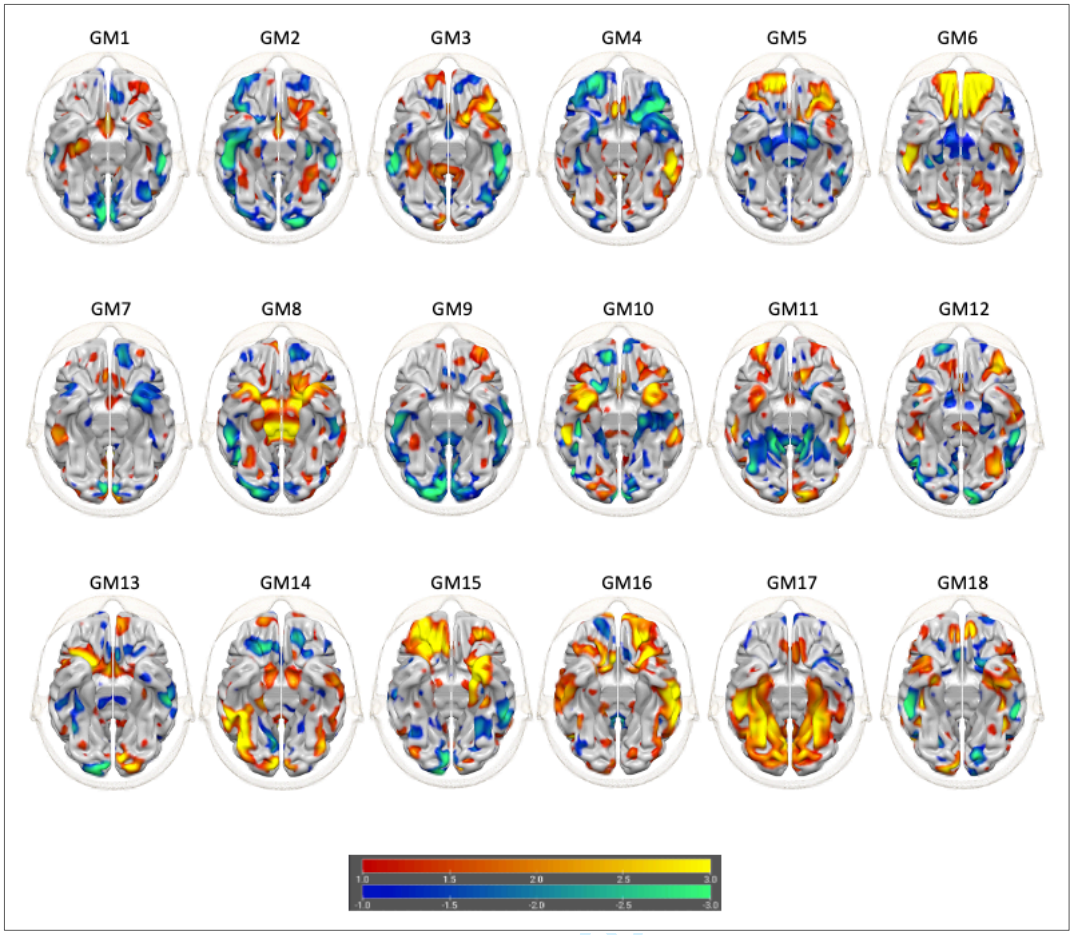
Plots of PICA GM Brain Networks

2A. Superior View



Note. Positive values indicate increased GM concentration (red-yellow scale) and negative values indicate decreased GM concentration (blue-green scale).

2B. Inferior View

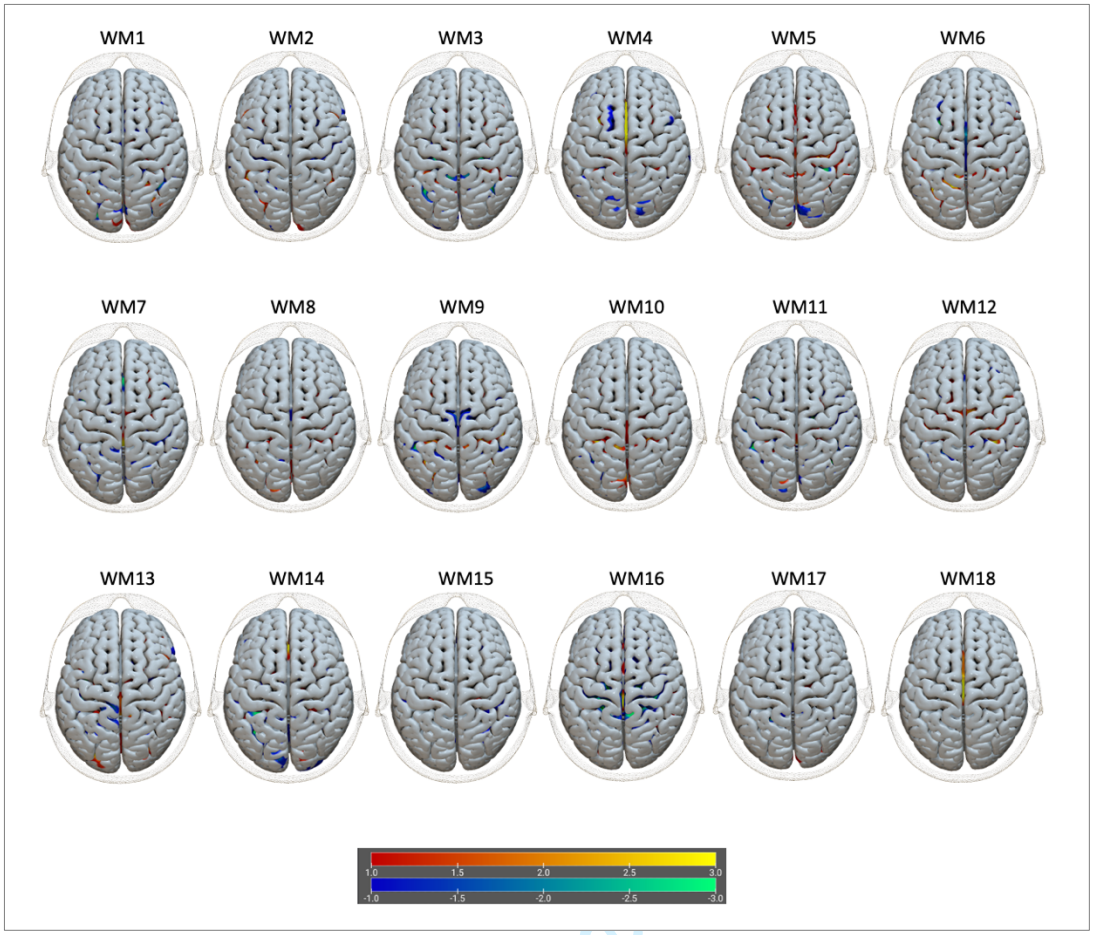


Note. Positive values indicate increased GM concentration (red-yellow scale) and negative values indicate decreased GM concentration (blue-green scale).

Figure 3

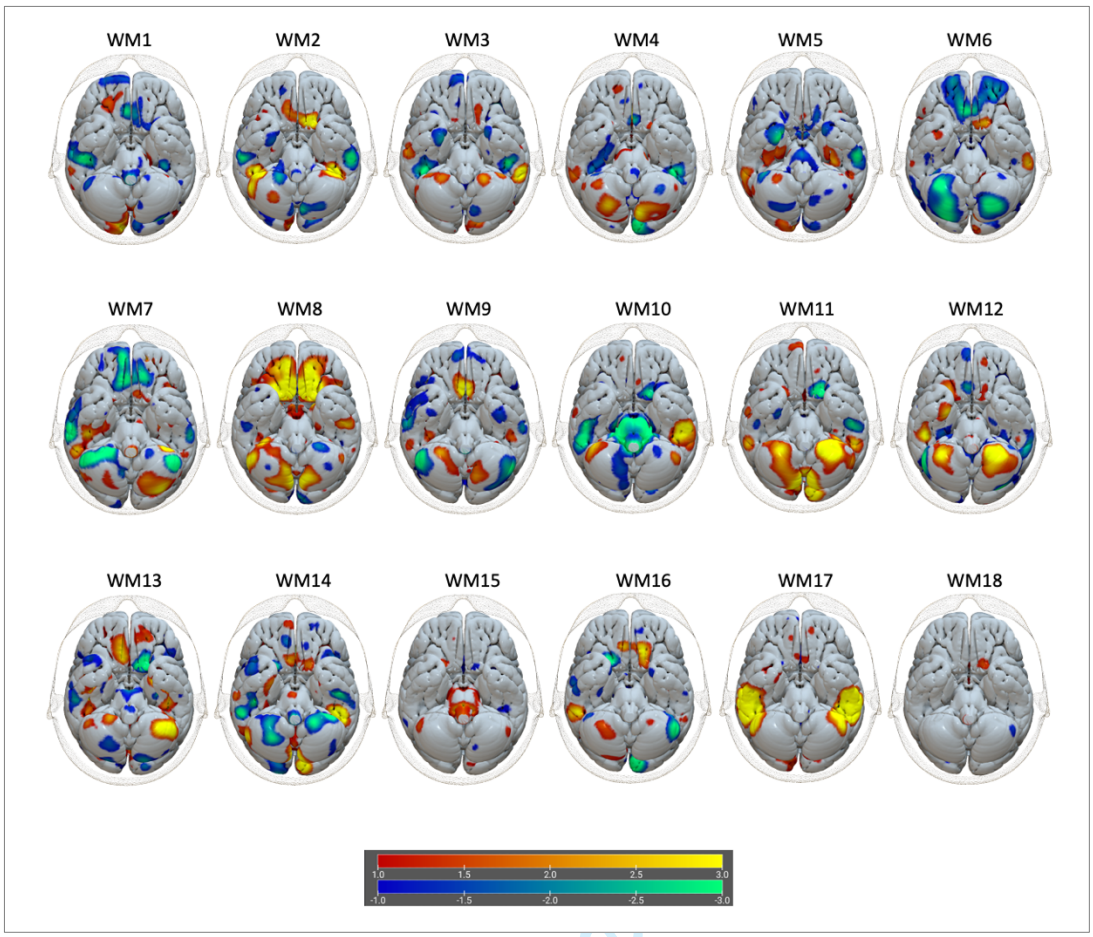
Plots of PICA WM Brain Networks

3A. Superior View



Note. Positive values indicate increased WM concentration (red-yellow scale) and negative values indicate decreased WM concentration (blue-green scale).

3A. Inferior View



Note. Positive values indicate increased WM concentration (red-yellow scale) and negative values indicate decreased WM concentration (blue-green scale).

3.3. Mediation Analysis

We conducted a mediation analysis to reveal which GM and WM networks are associated with the two forms of mind wandering (MW-D and MW-S), and if mindfulness plays a mediating role. In this analysis, the effect strength of the mediating variable (i.e., mindfulness measured with FFMQ scores) indicated the strength of its mediating influence among the predictor (i.e., GM and WM networks) and the outcome variables (i.e., MW-D and MW-S). Delta method approximation of standard errors was used to calculate the confidence interval with normal theory of confidence intervals and maximum likelihood estimator. Significant indirect effect indicates that there is an intervening variable that mediates the independent variable's influence on the dependent variable

(Biesanz et al., 2010). The summary of the significant findings reported in the following subsections are also summarized in Figure 4 with direct effects among the GM and WM networks, mindfulness, and mind wandering. Detailed morphometric features of the significant PICA networks are shown in the figures with lists of their positive and negative GM or WM concentrations in the corresponding tables beneath (Table 2, 3, 4, and 5). PICA components with a bilateral volume equal to or below 0.3 cc were removed from the tables in order to focus on more significant components that make up these networks.

Mediation Effect of Mindfulness on MW-D. No indirect effect of mindfulness on MW-D was found. However, significant direct effect parameter estimates were found for GM1 → MW-D (β = 11.299, *SE* = 5.576, *z* = 2.026, *p* = .043, 95% CI [0.37, 22.228]) and the path coefficient for GM1 → Mindfulness was significant (β = 160.347, *SE* = 60.405, *z* = 2.655, *p* = .008, 95% CI [41.955, 278.739]). The residual covariance for MW-D ↔ MW-S was also significant (β = 0.241, *SE* = 0.085, *z* = 2.844, *p* = .004, 95% CI [0.075, 0.407]).

Mediation Effect of Mindfulness on MW-S. No indirect effect of mindfulness (as measured by the sum of FFMQ scores) on MW-S was found. However, significant direct effect parameter estimates were found for GM12 → MW-S (β = -27.702, *SE* = 7.29, *z* = -3.8, *p* < .001, 95% CI [-41.99, -13.414]) and WM2 → MW-S (β = -19.695, *SE* = 8.611, *z* = -2.287, *p* = .022, 95% CI [-36.574, -2.817]). There was also a significant total effect for WM3 → MW-S (β = -19.158, *SE* = 8.716, *z* = -2.198, *p* = .028, 95% CI [-36.241, -2.075]) with significant path coefficient for WM3 → mindfulness (β = 226.594, *SE* = 99.469, *z* = 2.278, *p* = .023, 95% CI [31.638, 421.549]). The residual covariance for MW-D ↔ MW-S was also significant (β = 0.336, *SE* = 0.105, *z* = 3.2, *p* = .001, 95% CI [0.13, 0.542])

Mediation Effect of Individual Mindfulness Facets on Mind Wandering. In analyzing the effects of individual mindfulness facets on mind wandering, we found a significant indirect mediating effect for the FFMQ facet *acting with awareness*. The indirect effects involved the effect of GM1 on MW-S with *acting with awareness* trait as the moderator (GM1 → *acting with awareness* → MW-S; β = -6.050, *SE* = 2.538, *z* = -2.384, *p* = .017, 95% CI [-11.024, -1.076]). Significant path coefficients for

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this moderating relationship are illustrated in Figure 5 between GM1 and *acting with awareness* (β = 39.047, *SE* = 14.034, *z* = 2.782, *p* = .005, 95% CI [11.54, 66.553]), and between *acting with awareness* and MW-S (β = -0.155, *SE* = 0.034, *z* = -4.624, *p* < .001, 95% CI [-0.221, -0.089]). Meanwhile, the direct effect of GM1 → MW-S was not significant (β = 6.970, *SE* = 4.299, *z* = 1.621, *p* = .105, 95% CI [-1.456, 15.397]). See Figures 6, 7, 8, and 9 for the relative brain plots.

Figure 4

Direct Effects among GM and WM Networks, Mindfulness, and Mind Wandering

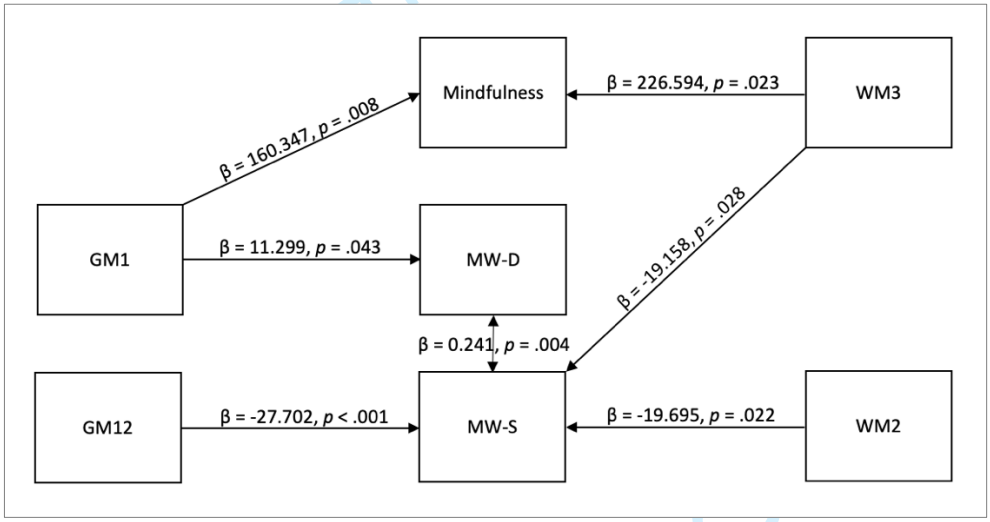


Figure 5

Mediation Model for the Indirect Effect of Acting with Awareness on MW-S

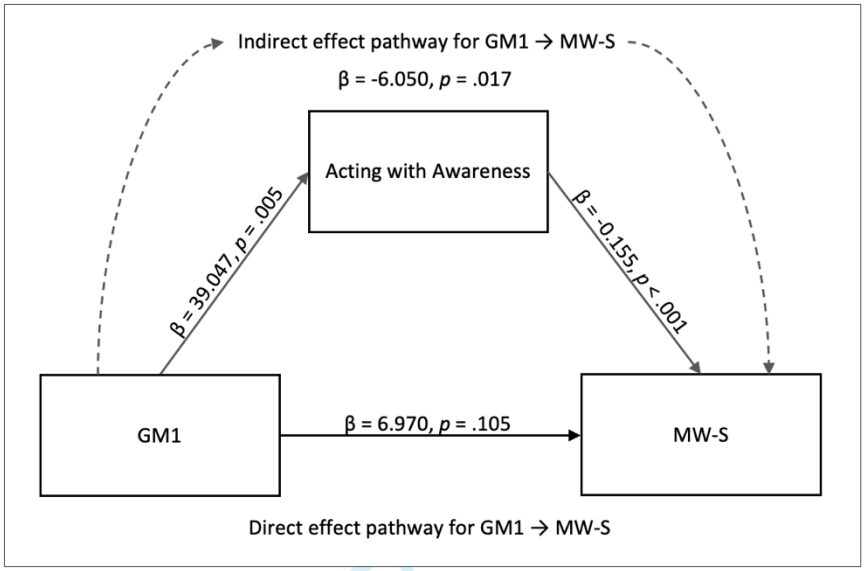
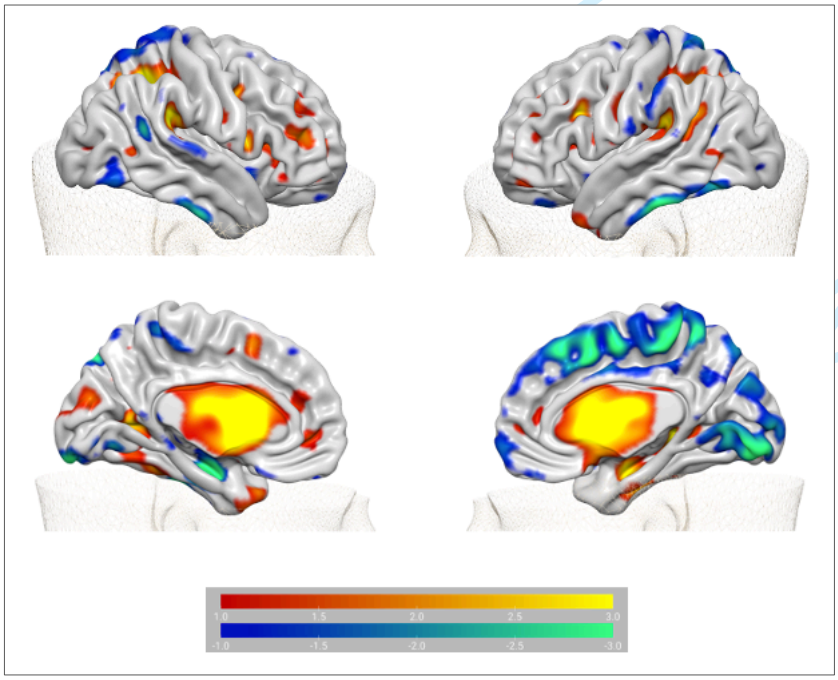


Figure 6

Morphometric Features of GM1



Note. Positive values indicate increased GM concentration (red-yellow scale) and negative values indicate decreased GM concentration (blue-green scale).

Table 2

The Brain Areas for GM1

A. GM1 Increased Gray Matter Concentration

Area	Brodmann Area	Volume (cc)	Random Effects: Max Value (x, y, z)
Caudate	*	3.8/2.8	7.9 (-9, 12, 10)/6.4 (10, 8, 15)
Thalamus	*	1.5/1.5	6.9 (-10, -21, 16)/6.1 (13, -24, 15)
Caudate	*	4.4/3.7	6.7 (-3, 10, 5)/6.0 (12, 4, 18)
Thalamus	*	2.4/2.0	6.2 (-15, -28, 14)/5.6 (21, -35, 9)
Parahippocampal Gyrus	30	0.3/0.1	5.6 (-24, -38, 5)/4.8 (24, -39, 3)
Hippocampus/Caudate	*	0.4/0.6	4.7 (-27, -38, 2)/4.4 (30, -36, 1)
Precuneus	7	0.0/0.4	0 (0, 0, 0)/4.3 (18, -60, 43)

B. GM1 Decreased Gray Matter Concentration

Area	Brodmann Area	Volume (cc)	Random Effects: Max Value (x, y, z)
Secondary Visual	18	0.3/0.4	6.1 (-1, -78, -10)/6.3 (4, -87, -12)
Declive	18	0.3/0.6	4.6 (-4, -78, -13)/6.8 (4, -81, -12)
Lingual Gyrus	18	1.0/1.1	6.8 (-1, -84, -10)/6.6 (1, -86, -10)
Medial Frontal Gyrus	6, 8, 32	0.2/0.4	5.7 (0, 11, 45)/4.7 (3, 14, 45)
Paracentral Lobule	4, 5, 6, 31	0.9/0.8	5.6 (0, -37, 54)/5.5 (1, -34, 51)
Superior Frontal Gyrus	6	0.4/0.3	5.1 (0, 8, 49)/4.8 (3, 11, 48)
Cingulate Gyrus	8, 24, 32	0.2/0.4	4.1 (-1, 5, 41)/4.2 (3, 17, 42)
Culmen	37	0.3/0.1	4.0 (-48, -44, -26)/3.7 (4, -69, -8)

Note. The first column indicates the name of the brain area, the second column indicates the name according to the Brodmann classification, the third column indicates the volume of gray or white matter concentration, and the fourth column indicates the coordinates of the peak for the area. The * symbol indicates that no Brodmann area was detected by the system.

Figure 7

The Brain Areas for GM12

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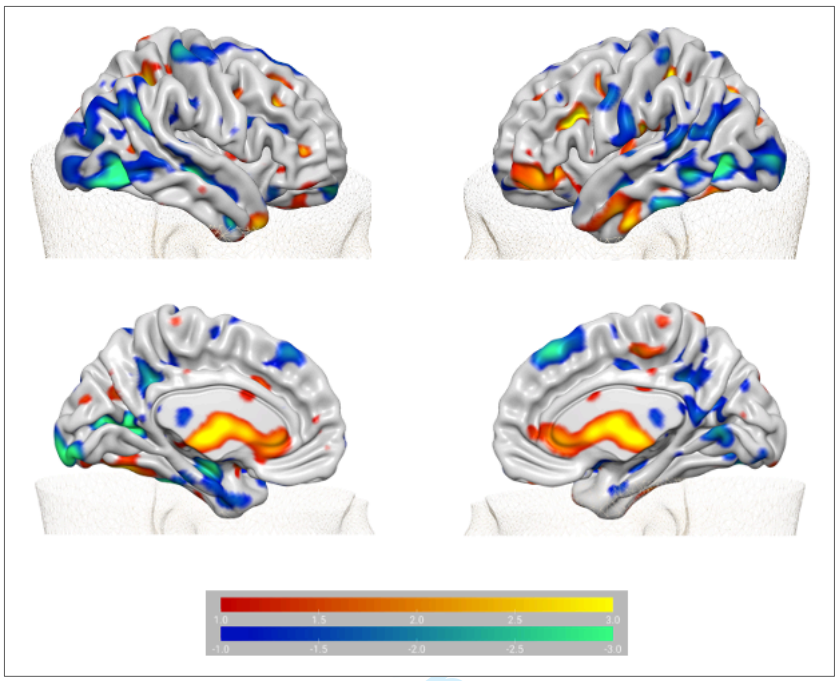


Note. Positive values indicate increased GM concentration (red-yellow scale) and negative values indicate decreased GM concentration (blue-green scale).

Table 3

The Brain Areas for GM12

A. GM12 Increased Gray Matter Concentration

Area	Brodmann Area	Volume (cc)	Random Effects: Max Value (x, y, z)
Cerebellar Tonsil	*	0.5/3.3	4.9 (-37, -38, -38)/9.2 (49, -50, -40)
Broca/Visual Motor	7, 44	1.5/1.0	6.2 (-37, 20, 21)/8.0 (31, -52, 39)
Inferior Parietal Lobule	7, 39, 40	0.0/0.7	0 (0, 0, 0)/6.2 (36, -53, 39)
Precuneus	19, 39	0.8/0.1	6.1 (-28, -62, 36)/4.2 (25, -50, 44)
Tuber	20	0.4/1.0	4.1 (-46, -74, -25)/5.9 (55, -47, -29)
Fusiform Gyrus	18, 19	0.0/0.4	0 (0, 0, 0)/5.3 (27, -87, -18)
Inferior Semi-Lunar Lobule	*	0.0/0.4	0 (0, 0, 0)/5.3 (53, -60, -35)
Culmen	20	0.0/0.4	0 (0, 0, 0)/5.0 (50, -44, -29)
Declive	19	0.1/0.6	3.8 (-46, -74, -22)/4.8 (31, -85, -18)

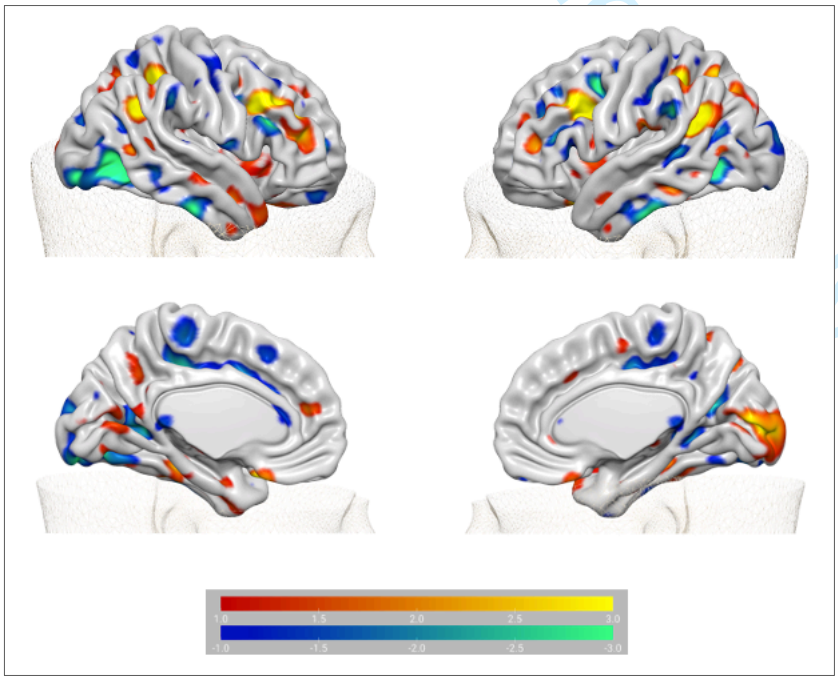
B. GM12 Decreased Gray Matter Concentration

Area	Brodmann Area	Volume (cc)	Random Effects: Max Value (x, y, z)
Lingual Gyrus	17, 18	2.2/0.0	6.9 (-6, -95, -9)/0 (0, 0, 0)
Fusiform	37	0.6/0.6	5.9 (-42, -60, 2)/5.9 (46, -60, -2)
Cuneus	17, 18, 30	1.2/0.0	5.7 (-19, -69, 9)/0 (0, 0, 0)
Posterior Cingulate	17, 30	0.6/0.0	5.5 (-22, -67, 9)/0 (0, 0, 0)
Middle Temporal Gyrus	19, 37	0.3/0.1	5.4 (-45, -63, 2)/3.9 (49, -60, 0)
Ventral Posterior Cingulate/Caudate	23	0.4/0.1	5.3 (-24, -59, 8)/3.8 (18, 23, 0)
Middle Occipital Gyrus	19, 37	0.4/0.1	4.9 (-42, -65, 3)/4.8 (46, -63, -4)
Inferior Temporal Gyrus	19, 37	0.3/0.2	4.6 (-48, -63, -1)/4.3 (49, -63, -2)

Note. The first column indicates the name of the brain area, the second column indicates the name according to the Brodmann classification, the third column indicates the volume of gray or white matter concentration, and the fourth column indicates the coordinates of the peak for the area. The * symbol indicates that no Brodmann area was detected by the system.

Figure 8

The Brain Areas for WM2



Note. Positive values indicate increased WM concentration (red-yellow scale) and negative values indicate decreased WM concentration (blue-green scale).

Table 4

The Brain Areas for WM2

A. WM2 Increased White Matter Concentration

Area	Brodmann Area	Volume (cc)	Random Effects: Max Value (x, y, z)
Middle Frontal Gyrus	9, 44	1.7/2.0	9.1 (-37, 17, 28)/8.6 (37, 18, 31)
Superior Temporal Gyrus	13, 39	1.1/0.1	8.6 (-42, -51, 25)/3.6 (48, -55, 29)
Supramarginal Gyrus	39, 40	1.5/0.8	8.0 (-45, -51, 27)/5.0 (48, -52, 32)
Supramarginal Gyrus	40	1.7/2.6	7.4 (-39, -48, 25)/7.8 (34, -40, 39)
Inferior Parietal Lobule	7, 39, 40	0.9/1.2	7.8 (-45, -48, 25)/7.4 (37, -42, 42)
Culmen	20, 37	0.8/0.2	7.1 (-46, -39, -28)/4.4 (45, -41, -27)
Cerebellar Tonsil	*	0.6/0.8	6.9 (-43, -40, -35)/6.4 (43, -40, -37)
Precentral Gyrus	8, 9	0.1/0.3	4.1 (-43, 19, 35)/6.3 (37, 21, 34)

B. WM2 Decreased White Matter Concentration

Area	Brodmann Area	Volume (cc)	Random Effects: Max Value (x, y, z)
Fusiform/Visual Association	19, 37	0.8/1.7	5.4 (-40, -57, -1)/6.5 (42, -66, -1)
Inferior Temporal Gyrus	19, 37	0.0/0.5	0 (0, 0, 0)/5.8 (42, -68, 2)
Middle Occipital Gyrus	19, 37	0.1/0.6	3.6 (-46, -61, -3)/5.4 (45, -66, -3)
Superior Frontal Gyrus	10	0.0/0.4	0 (0, 0, 0)/4.1 (25, 51, 2)

Note. The first column indicates the name of the brain area, the second column indicates the name according to the Brodmann classification, the third column indicates the volume of gray or white matter concentration, and the fourth column indicates the coordinates of the peak for the area. The * symbol indicates that no Brodmann area was detected by the system.

Figure 9

The Brain Areas for WM3

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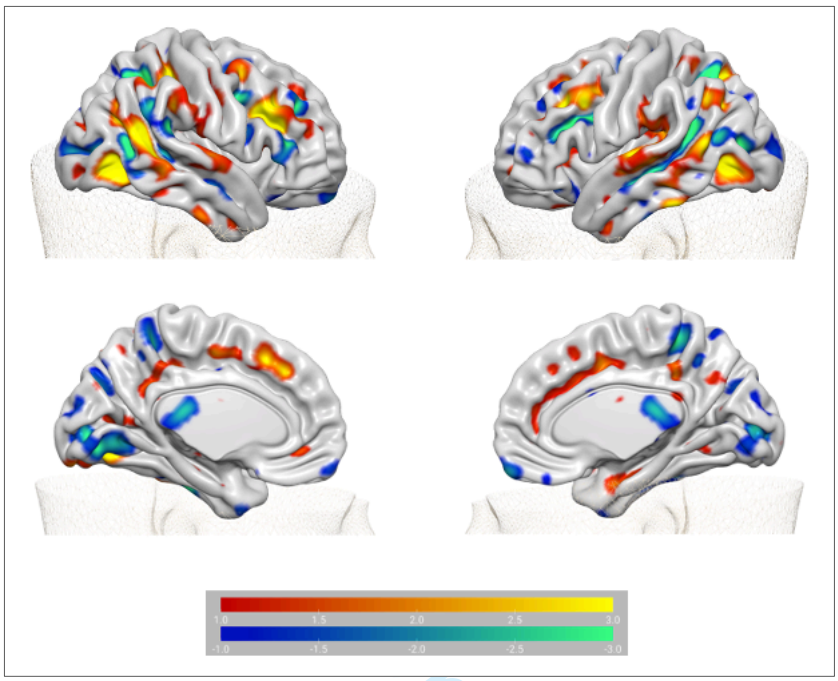

Note. Positive values indicate increased WM concentration (red-yellow scale) and negative values indicate decreased WM concentration (blue-green scale).

Table 5

The Brain Areas for WM3

A. WM3 Increased White Matter Concentration

Area	Brodmann Area	Volume (cc)	Random Effects: Max Value (x, y, z)
Middle Frontal Gyrus	9	1.9/1.5	9.5 (-37, 19, 32)/5.7 (40, 25, 25)
Precentral Gyrus	8, 9	0.6/0.1	8.1 (-37, 16, 35)/4.0 (36, 19, 34)
Visual Association/Insula	13, 19	1.2/2.6	5.7 (-27, -70, -2)/6.3 (37, 22, 25)
Inferior Temporal Gyrus	19, 37	0.2/0.4	4.8 (-42, -67, 2)/6.3 (43, -67, 1)
Superior Temporal Gyrus	22, 39	0.7/1.3	4.5 (-56, -13, 1)/6.3 (50, -50, 16)
Middle Occipital Gyrus	19, 37	0.2/0.4	4.6 (-37, -65, 3)/5.8 (40, -65, 3)
Inferior Parietal Lobule	5, 40	0.1/0.3	4.0 (-30, -42, 55)/5.1 (36, -34, 42)
Middle Temporal Gyrus	21, 39	0.1/0.3	3.5 (-55, -53, 11)/4.6 (43, -61, 27)

B. WM3 Decreased White Matter Concentration

Area	Brodmann Area	Volume (cc)	Random Effects: Max Value (x, y, z)
Angular Gyrus/Visual Motor	7, 39	1.5/1.7	8.2 (-30, -55, 41)/10.8 (31, -49, 41)
Inferior Parietal Lobule	7, 39, 40	0.6/1.9	6.2 (-34, -56, 42)/9.7 (33, -52, 44)
Superior Parietal Lobule	7, 39	1.3/0.6	7.7 (-30, -55, 46)/9.0 (28, -52, 43)
Supramarginal Gyrus	7, 39	0.1/0.6	3.5 (-33, -52, 34)/6.7 (36, -49, 37)
Precuneus	7, 19	0.5/0.4	6.3 (-27, -54, 48)/6.1 (30, -51, 48)
Insula	13, 22	0.0/0.4	0 (0, 0, 0)/6.2 (46, -38, 21)
Superior Temporal Gyrus	13, 22, 39	0.3/0.4	4.6 (-45, -46, 20)/5.0 (45, -38, 17)
Middle Temporal Gyrus	19, 39	0.3/0.4	4.2 (-37, -68, 16)/4.2 (42, -58, 13)

Note. The first column indicates the name of the brain area, the second column indicates the name according to the Brodmann classification, the third column indicates the volume of gray or white matter concentration, and the fourth column indicates the coordinates of the peak for the area.

4. Discussion

The aim of our study was to find morphometric brain features associated with mindfulness and mind wandering, and to investigate whether mindfulness mediates deliberate and spontaneous mind wandering in terms of these associated brain components. We found effective relationships among mindfulness, deliberate and spontaneous mind wandering, and PICA networks GM1, GM12, WM2, and WM3. In summary, PICA network GM1 was found to have a positive effect on deliberate mind wandering, GM12, WM2, and WM3 were found to have a negative effect on spontaneous mind wandering, and GM1 and WM3 were found to have a positive effect on mindfulness. In addition, WM1 had a positive relationship with the *acting with awareness* component of mindfulness, which was found to mediate spontaneous mind wandering. Deliberate and spontaneous mind wandering were also found to share a positive relationship. Of note GM1 was correlated with WM5 and GM12 with WM8 in the PICA fusion results. However, these WM counterparts were not significantly associated with the effects of interest in the mediation analysis. Although counterintuitive, this result may be interpreted in light of the fact that the correlations between GM1 and WM5, and GM12 and WM8 had a negative direction. WM2 and WM3 were not correlated with any GM component. The relationships among the significant PICA components are summarized as follows in Figure 10.

Figure 10

Effective Relationship among GM and WM Networks, Mindfulness, and Mind Wandering

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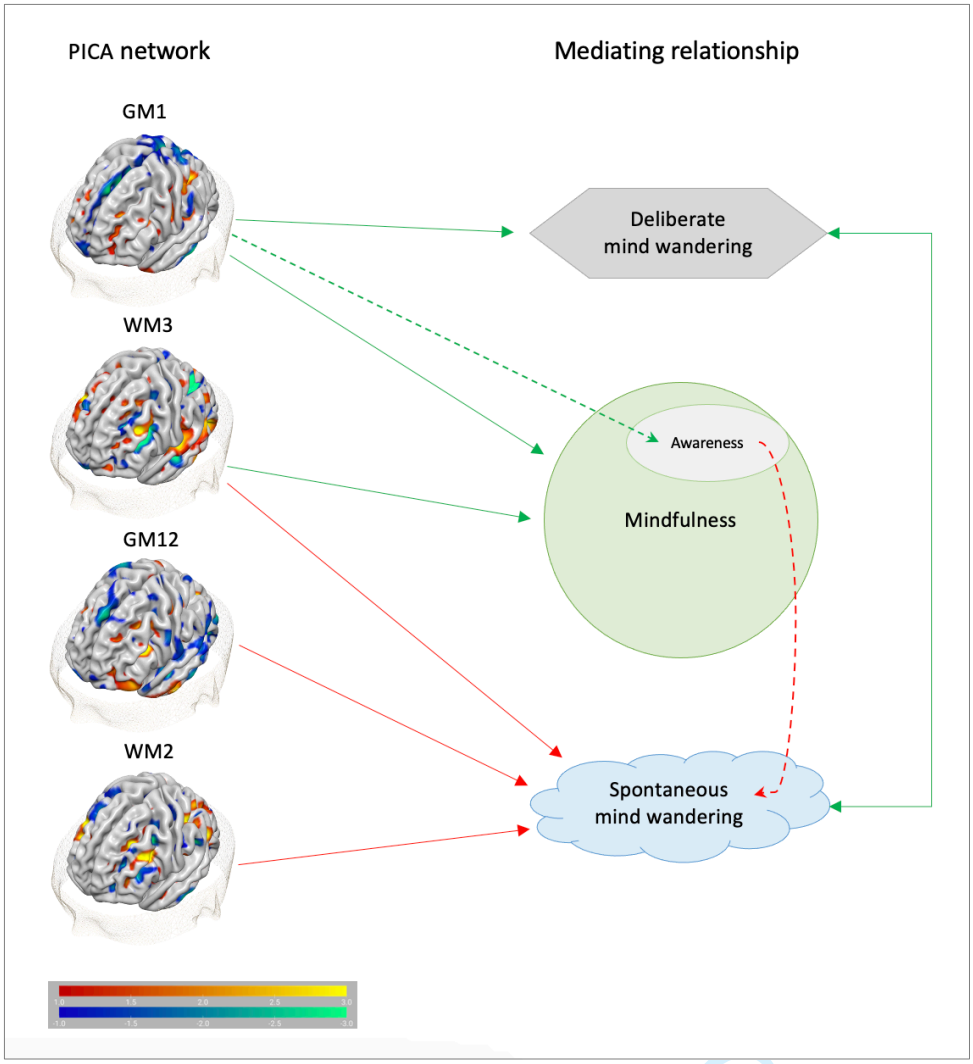

Note. Positive mediation effects are indicated by green arrows, and negative mediation effects are indicated by red arrows.

Our results show the important role of mindfulness (*acting with awareness*) in mediating the relationship between GM1 and spontaneous mind wandering. Interestingly, this network mainly involves increased gray matter in subcortical areas, such as the thalamus and the caudate. This is in line with the possible top-down or bottom-up mindful emotion regulation of limbic areas suggested in previous research (Brefczynski-Lewis et al., 2007; Chiesa et al., 2013; Taylor et al., 2011) through which mindfulness could regulate spontaneous mind wandering. Our finding is also consistent with previous findings on the effects of mindfulness training on gray matter changes in the hippocampus (Grant et al., 2010; Hölzel et al., 2008; Hölzel et al., 2011; Lu et al., 2014; Luders et al., 2009;

Murakami et al., 2012), PCC (Hölzel et al., 2011; Lu et al., 2014), temporo-parietal junction (Hölzel et al., 2011), and cerebellum (Hölzel et al., 2011; Vestergaard-Poulsen et al., 2009). Previous studies also found that the volume of the caudate is negatively associated with dispositional mindfulness measured through the MAAS (Mindful Attention Awareness Scale; Brown and Ryan, 2003; Taren et al. 2013), and it was shown to be reduced through a 5-week mindfulness training in risky drivers (Mas-Cuesta et al., 2024). It has also been found that there is a negative relationship in terms of FC between the thalamus and PCC (measured through the MAAS scores), suggesting that these brain areas are involved in switching between mind wandering and mindfulness (Wang et al., 2014). The GM1 network also includes reduced gray matter volume in the cingulate. However, we found a positive, rather than a negative relationship between the GM1 network and mindfulness scores. This could be explained by the fact that the mindfulness factor in our study is based on the FFMQ rather than the MAAS scores. Our results are also consistent with the findings of a meta-analysis study that show increased volume and activation of the thalamus, as well as increased brain activation of the caudate and in long-term meditators (Boccia et al. 2015). Results from other studies also support that mindfulness training results in increased volume of the caudate (Fahmy et al., 2018; Farb et al., 2012). The caudate is suggested to be involved in the alteration of habitual direction of attention (Baxter et al., 1992; Farb et al., 2012; McNab & Klingberg, 2008; Packard & Knowlton, 2002), while the thalamus is suggested to be involved in the orientation of attention and conscious awareness (Ward, 2013). These findings are coherent with our results showing positive relationship between GM1 and mindfulness. Furthermore, our mediation analysis shows that this network mainly involving the caudate and the thalamus is associated with *acting with awareness*, which can alter the process of mind wandering by influencing attentional processes.

The maladaptive form of mind wandering can manifest as a cumbersome symptom in psychiatric diseases, and also exacerbated by factors such as aging, hyperactivity, time of the day, and depression (Giambra, 1995). Some studies even found negative correlation between mind wandering and happiness (Killingsworth & Gilbert, 2010; Grecucci et al., 2015; Mrazek et al., 2013b; Smallwood

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et al., 2004; Smallwood et al., 2007). Seneca expressed this notion in Letter to Lucilius (78, 14): "To be happy, two elements must be rooted out – the fear of future suffering, and the recollection of past suffering." In this vein, studies suggest that the frequency of mind wandering in daily life might have an inverse relationship with mindfulness (Ottaviani & Couyoumdjian, 2013). Aforementioned studies have shown that mindfulness is positively linked to awareness (e.g., towards interoceptive and exteroceptive cues) and emotion regulation skills. We also mentioned that mindfulness training can improve a person's mindfulness abilities after only a short session. Our study demonstrates that these changes can be represented by morphometric features of the brain to support behavioral reports, which can be useful in a clinical setting to measure short- and long-term results of a psychological intervention. For instance, a recent study showed that reduced activation of left cuneus is linked to positive outcome of cognitive behavior therapy across many studies along with decreased activity in medial PFC and ACC, which are nodes involved in DMN, central executive network, and salient network (Yuan et al., 2022). Because our study was only based on structural brain data, a future study based on functional brain data could elucidate the association among mindfulness, deliberate mind wandering, and spontaneous mind wandering in terms of brain's FC in addition to morphometric features.

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Conclusion

Our study found for the first time the morphometric brain features that are associated with mindfulness, deliberate mind wandering, and spontaneous mind wandering, and the mediating effects of the FFMQ facet *acting with awareness* on spontaneous mind wandering. The covarying GM and WM networks consisted of many brain structures that were linked to mindfulness and mind wandering in previous studies, but it is unclear how and which of these structural components exert influence on one's mindfulness and mind wandering traits. Our study also showed for the first time how mindfulness affects spontaneous mind wandering in a sample of a general population. This is in par with whole-brain level data-driven predictive modeling network analysis generally conducted at

group level without considering individual differences in brain mechanism (Kucyi et al., 2023). Future studies should consider conducting studies at an individual level with the purpose of establishing a biomarker of brain mechanism change in therapy sessions in order to aid efficacy studies of clinical interventions on psychiatric or psychological conditions. Future studies should also further shed light on the mediating effect of spontaneous mind wandering on mindfulness in experienced meditators, and also through a longitudinal clinical study involving meditation training sessions.

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Declaration

Funding

The authors did not receive any funding for the submitted work.

Competing Interests

We have no conflicts of interests to disclose.

Ethics Approval

The project was approved by the ethics committee of the University of Leipzig.

Consent to Participate

Informed consent was obtained from all individual participants in the study.

Data and/or Code Availability

The data used in this study was entirely acquired from the MPI-Leipzig Mind-Brain-Body open-access database (Babayan et al., 2018; https://openneuro.org/datasets/ds000221/versions/1.0.0).

Authors' Contribution Statements

All authors equally contributed to this paper.

ORCID

Cristiano Crescentini https://orcid.org/0000-0002-3154-3687

Alessandro Grecucci https://orcid.org/0000-0001-6043-2196

Sara Sorella https://orcid.org/0000-0001-6080-9467

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Appendix

Mediation Analysis Results

A. Gray Matter: Mindfulness → Mind Wandering (MW-S/MW-D)

Direct effects

							95% Confidence Interval	
			Estimate	Std. Error	z-value	p	Lower	Upper
PICAGM1	→	S-D-MW_spont_mean	3.264	4.791	0.681	0.496	−6.125	12.654
PICAGM2	→	S-D-MW_spont_mean	9.231	7.009	1.317	0.188	−4.506	22.969
PICAGM3	→	S-D-MW_spont_mean	5.038	9.714	0.519	0.604	−14.001	24.077
PICAGM4	→	S-D-MW_spont_mean	−10.339	6.928	−1.492	0.136	−23.918	3.240
PICAGM5	→	S-D-MW_spont_mean	18.993	24.673	0.770	0.441	−29.366	67.352
PICAGM6	→	S-D-MW_spont_mean	2.015	8.119	0.248	0.804	−13.897	17.928
PICAGM7	→	S-D-MW_spont_mean	13.026	33.853	0.385	0.700	−53.325	79.376
PICAGM8	→	S-D-MW_spont_mean	22.230	21.612	1.029	0.304	−20.129	64.589
PICAGM9	→	S-D-MW_spont_mean	−6.021	8.933	−0.674	0.500	−23.529	11.487
PICAGM10	→	S-D-MW_spont_mean	21.984	15.348	1.432	0.152	−8.097	52.066
PICAGM11	→	S-D-MW_spont_mean	−0.336	10.844	−0.031	0.975	−21.590	20.918
PICAGM12	→	S-D-MW_spont_mean	−27.702	7.290	−3.800	< .001	−41.990	−13.414
PICAGM13	→	S-D-MW_spont_mean	30.174	30.210	0.999	0.318	−29.036	89.384
PICAGM14	→	S-D-MW_spont_mean	19.485	22.954	0.849	0.396	−25.504	64.475
PICAGM15	→	S-D-MW_spont_mean	10.767	13.066	0.824	0.410	−14.842	36.376
PICAGM16	→	S-D-MW_spont_mean	0.994	42.368	0.023	0.981	−82.045	84.034
PICAGM17	→	S-D-MW_spont_mean	45.639	72.722	0.628	0.530	−96.894	188.173
PICAGM18	→	S-D-MW_spont_mean	17.405	36.704	0.474	0.635	−54.533	89.343
PICAGM1	→	S-D-MW_delib_mean	11.299	5.576	2.026	0.043	0.370	22.228
PICAGM2	→	S-D-MW_delib_mean	−5.912	8.157	−0.725	0.469	−21.899	10.075
PICAGM3	→	S-D-MW_delib_mean	−1.019	11.293	−0.090	0.928	−23.153	21.115
PICAGM4	→	S-D-MW_delib_mean	−2.293	8.064	−0.284	0.776	−18.099	13.512
PICAGM5	→	S-D-MW_delib_mean	2.445	28.660	0.085	0.932	−53.727	58.617
PICAGM6	→	S-D-MW_delib_mean	−10.740	9.438	−1.138	0.255	−29.238	7.759
PICAGM7	→	S-D-MW_delib_mean	1.255	39.320	0.032	0.975	−75.812	78.321
PICAGM8	→	S-D-MW_delib_mean	0.073	25.105	0.003	0.998	−49.132	49.278
PICAGM9	→	S-D-MW_delib_mean	9.833	10.385	0.947	0.344	−10.521	30.187
PICAGM10	→	S-D-MW_delib_mean	15.530	17.836	0.871	0.384	−19.427	50.488
PICAGM11	→	S-D-MW_delib_mean	10.834	12.602	0.860	0.390	−13.865	35.534
PICAGM12	→	S-D-MW_delib_mean	−10.819	8.485	−1.275	0.202	−27.449	5.811
PICAGM13	→	S-D-MW_delib_mean	9.467	35.091	0.270	0.787	−59.310	78.244
PICAGM14	→	S-D-MW_delib_mean	1.336	26.667	0.050	0.960	−50.930	53.602
PICAGM15	→	S-D-MW_delib_mean	−3.866	15.185	−0.255	0.799	−33.627	25.895
PICAGM16	→	S-D-MW_delib_mean	−23.350	49.209	−0.475	0.635	−119.798	73.097
PICAGM17	→	S-D-MW_delib_mean	3.757	84.464	0.044	0.965	−161.789	169.303
PICAGM18	→	S-D-MW_delib_mean	8.407	42.634	0.197	0.844	−75.154	91.969

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Indirect effects

									95% Confidence Interval	
					Estimate	Std. Error	z-value	p	Lower	Upper
PICAGM1	→	FFMQsum	→	S-D-MW_spont_mean	−2.280	1.637	−1.393	0.164	−5.488	0.928
PICAGM2	→	FFMQsum	→	S-D-MW_spont_mean	−0.578	1.362	−0.424	0.672	−3.247	2.092
PICAGM3	→	FFMQsum	→	S-D-MW_spont_mean	−1.361	1.997	−0.681	0.496	−5.274	2.553
PICAGM4	→	FFMQsum	→	S-D-MW_spont_mean	2.065	1.803	1.146	0.252	−1.468	5.598
PICAGM5	→	FFMQsum	→	S-D-MW_spont_mean	−1.317	4.685	−0.281	0.779	−10.500	7.866
PICAGM6	→	FFMQsum	→	S-D-MW_spont_mean	−0.168	1.526	−0.110	0.912	−3.159	2.823
PICAGM7	→	FFMQsum	→	S-D-MW_spont_mean	−1.461	6.397	−0.228	0.819	−13.999	11.077
PICAGM8	→	FFMQsum	→	S-D-MW_spont_mean	0.360	4.055	0.089	0.929	−7.588	8.308
PICAGM9	→	FFMQsum	→	S-D-MW_spont_mean	1.260	1.837	0.686	0.493	−2.340	4.860
PICAGM10	→	FFMQsum	→	S-D-MW_spont_mean	−1.337	2.984	−0.448	0.654	−7.186	4.513
PICAGM11	→	FFMQsum	→	S-D-MW_spont_mean	2.220	2.429	0.914	0.361	−2.540	6.979
PICAGM12	→	FFMQsum	→	S-D-MW_spont_mean	0.123	1.373	0.089	0.929	−2.568	2.814
PICAGM13	→	FFMQsum	→	S-D-MW_spont_mean	1.519	5.736	0.265	0.791	−9.724	12.762
PICAGM14	→	FFMQsum	→	S-D-MW_spont_mean	−0.351	4.305	−0.081	0.935	−8.789	8.087
PICAGM15	→	FFMQsum	→	S-D-MW_spont_mean	0.818	2.501	0.327	0.744	−4.085	5.721
PICAGM16	→	FFMQsum	→	S-D-MW_spont_mean	−1.535	7.984	−0.192	0.848	−17.184	14.114
PICAGM17	→	FFMQsum	→	S-D-MW_spont_mean	−3.084	13.736	−0.224	0.822	−30.006	23.839
PICAGM18	→	FFMQsum	→	S-D-MW_spont_mean	−1.750	6.950	−0.252	0.801	−15.373	11.873
PICAGM1	→	FFMQsum	→	S-D-MW_delib_mean	−0.364	1.627	−0.223	0.823	−3.553	2.826
PICAGM2	→	FFMQsum	→	S-D-MW_delib_mean	−0.092	0.461	−0.200	0.842	−0.996	0.812
PICAGM3	→	FFMQsum	→	S-D-MW_delib_mean	−0.217	1.010	−0.215	0.830	−2.197	1.763
PICAGM4	→	FFMQsum	→	S-D-MW_delib_mean	0.329	1.483	0.222	0.824	−2.577	3.236
PICAGM5	→	FFMQsum	→	S-D-MW_delib_mean	−0.210	1.191	−0.176	0.860	−2.544	2.124
PICAGM6	→	FFMQsum	→	S-D-MW_delib_mean	−0.027	0.271	−0.099	0.921	−0.557	0.504
PICAGM7	→	FFMQsum	→	S-D-MW_delib_mean	−0.233	1.449	−0.161	0.872	−3.073	2.607
PICAGM8	→	FFMQsum	→	S-D-MW_delib_mean	0.057	0.694	0.083	0.934	−1.304	1.419
PICAGM9	→	FFMQsum	→	S-D-MW_delib_mean	0.201	0.935	0.215	0.830	−1.631	2.033
PICAGM10	→	FFMQsum	→	S-D-MW_delib_mean	−0.213	1.055	−0.202	0.840	−2.281	1.855
PICAGM11	→	FFMQsum	→	S-D-MW_delib_mean	0.354	1.611	0.220	0.826	−2.803	3.511
PICAGM12	→	FFMQsum	→	S-D-MW_delib_mean	0.020	0.235	0.083	0.934	−0.442	0.481
PICAGM13	→	FFMQsum	→	S-D-MW_delib_mean	0.242	1.408	0.172	0.863	−2.517	3.001
PICAGM14	→	FFMQsum	→	S-D-MW_delib_mean	−0.056	0.730	−0.077	0.939	−1.486	1.374
PICAGM15	→	FFMQsum	→	S-D-MW_delib_mean	0.130	0.701	0.186	0.852	−1.243	1.504
PICAGM16	→	FFMQsum	→	S-D-MW_delib_mean	−0.245	1.670	−0.147	0.884	−3.518	3.029
PICAGM17	→	FFMQsum	→	S-D-MW_delib_mean	−0.492	3.085	−0.159	0.873	−6.538	5.554
PICAGM18	→	FFMQsum	→	S-D-MW_delib_mean	−0.279	1.658	−0.168	0.866	−3.528	2.970

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Total effects

							95% Confidence Interval	
			Estimate	Std. Error	z-value	p	Lower	Upper
PICAGM1	→	S-D-MW_spont_mean	0.984	4.647	0.212	0.832	−8.124	10.092
PICAGM2	→	S-D-MW_spont_mean	8.654	7.117	1.216	0.224	−5.295	22.602
PICAGM3	→	S-D-MW_spont_mean	3.677	9.846	0.373	0.709	−15.620	22.975
PICAGM4	→	S-D-MW_spont_mean	−8.274	6.963	−1.188	0.235	−21.921	5.372
PICAGM5	→	S-D-MW_spont_mean	17.676	25.068	0.705	0.481	−31.456	66.809
PICAGM6	→	S-D-MW_spont_mean	1.847	8.258	0.224	0.823	−14.339	18.034
PICAGM7	→	S-D-MW_spont_mean	11.565	34.406	0.336	0.737	−55.870	79.000
PICAGM8	→	S-D-MW_spont_mean	22.590	21.991	1.027	0.304	−20.512	65.693
PICAGM9	→	S-D-MW_spont_mean	−4.761	9.042	−0.527	0.599	−22.484	12.962
PICAGM10	→	S-D-MW_spont_mean	20.648	15.576	1.326	0.185	−9.881	51.177
PICAGM11	→	S-D-MW_spont_mean	1.884	10.933	0.172	0.863	−19.545	23.313
PICAGM12	→	S-D-MW_spont_mean	−27.579	7.416	−3.719	< .001	−42.115	−13.044
PICAGM13	→	S-D-MW_spont_mean	31.693	30.745	1.031	0.303	−28.565	91.951
PICAGM14	→	S-D-MW_spont_mean	19.135	23.348	0.820	0.412	−26.627	64.897
PICAGM15	→	S-D-MW_spont_mean	11.585	13.298	0.871	0.384	−14.478	37.649
PICAGM16	→	S-D-MW_spont_mean	−0.540	43.068	−0.013	0.990	−84.953	83.872
PICAGM17	→	S-D-MW_spont_mean	42.556	73.915	0.576	0.565	−102.316	187.427
PICAGM18	→	S-D-MW_spont_mean	15.655	37.300	0.420	0.675	−57.451	88.761

PICAGM1	→	S-D-MW_delib_mean	10.935	5.317	2.057	0.040	0.513	21.357
PICAGM2	→	S-D-MW_delib_mean	−6.004	8.142	−0.737	0.461	−21.963	9.955
PICAGM3	→	S-D-MW_delib_mean	−1.236	11.254	−0.110	0.913	−23.293	20.821
PICAGM4	→	S-D-MW_delib_mean	−1.964	7.967	−0.247	0.805	−17.580	13.651
PICAGM5	→	S-D-MW_delib_mean	2.235	28.630	0.078	0.938	−53.878	58.349
PICAGM6	→	S-D-MW_delib_mean	−10.767	9.439	−1.141	0.254	−29.267	7.734
PICAGM7	→	S-D-MW_delib_mean	1.022	39.293	0.026	0.979	−75.991	78.034
PICAGM8	→	S-D-MW_delib_mean	0.130	25.117	0.005	0.996	−49.098	49.359
PICAGM9	→	S-D-MW_delib_mean	10.034	10.335	0.971	0.332	−10.223	30.291
PICAGM10	→	S-D-MW_delib_mean	15.317	17.797	0.861	0.389	−19.564	50.199
PICAGM11	→	S-D-MW_delib_mean	11.188	12.492	0.896	0.370	−13.296	35.672
PICAGM12	→	S-D-MW_delib_mean	−10.800	8.486	−1.273	0.203	−27.431	5.832
PICAGM13	→	S-D-MW_delib_mean	9.709	35.113	0.277	0.782	−59.112	78.530
PICAGM14	→	S-D-MW_delib_mean	1.280	26.670	0.048	0.962	−50.991	53.552
PICAGM15	→	S-D-MW_delib_mean	−3.736	15.194	−0.246	0.806	−33.516	26.045
PICAGM16	→	S-D-MW_delib_mean	−23.595	49.184	−0.480	0.631	−119.994	72.804
PICAGM17	→	S-D-MW_delib_mean	3.265	84.410	0.039	0.969	−162.176	168.706
PICAGM18	→	S-D-MW_delib_mean	8.128	42.600	0.191	0.849	−75.366	91.622

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Residual covariances

							95% Confidence Interval	
			Estimate	Std. Error	z-value	p	Lower	Upper
S-D-MW_spont_mean	↔	S-D-MW_delib_mean	0.241	0.085	2.844	0.004	0.075	0.407

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Path coefficients

							95% Confidence Interval	
			Estimate	Std. Error	z-value	p	Lower	Upper
FFMQsum	→	S-D-MW_spont_mean	−0.014	0.009	−1.637	0.102	−0.031	0.003
PICAGM1	→	S-D-MW_spont_mean	3.264	4.791	0.681	0.496	−6.125	12.654
PICAGM2	→	S-D-MW_spont_mean	9.231	7.009	1.317	0.188	−4.506	22.969
PICAGM3	→	S-D-MW_spont_mean	5.038	9.714	0.519	0.604	−14.001	24.077
PICAGM4	→	S-D-MW_spont_mean	−10.339	6.928	−1.492	0.136	−23.918	3.240
PICAGM5	→	S-D-MW_spont_mean	18.993	24.673	0.770	0.441	−29.366	67.352
PICAGM6	→	S-D-MW_spont_mean	2.015	8.119	0.248	0.804	−13.897	17.928
PICAGM7	→	S-D-MW_spont_mean	13.026	33.853	0.385	0.700	−53.325	79.376
PICAGM8	→	S-D-MW_spont_mean	22.230	21.612	1.029	0.304	−20.129	64.589
PICAGM9	→	S-D-MW_spont_mean	−6.021	8.933	−0.674	0.500	−23.529	11.487
PICAGM10	→	S-D-MW_spont_mean	21.984	15.348	1.432	0.152	−8.097	52.066
PICAGM11	→	S-D-MW_spont_mean	−0.336	10.844	−0.031	0.975	−21.590	20.918
PICAGM12	→	S-D-MW_spont_mean	−27.702	7.290	−3.800	< .001	−41.990	−13.414
PICAGM13	→	S-D-MW_spont_mean	30.174	30.210	0.999	0.318	−29.036	89.384
PICAGM14	→	S-D-MW_spont_mean	19.485	22.954	0.849	0.396	−25.504	64.475
PICAGM15	→	S-D-MW_spont_mean	10.767	13.066	0.824	0.410	−14.842	36.376
PICAGM16	→	S-D-MW_spont_mean	0.994	42.368	0.023	0.981	−82.045	84.034
PICAGM17	→	S-D-MW_spont_mean	45.639	72.722	0.628	0.530	−96.894	188.173
PICAGM18	→	S-D-MW_spont_mean	17.405	36.704	0.474	0.635	−54.533	89.343

FFMQsum	→	S-D-MW_delib_mean	−0.002	0.010	−0.224	0.823	−0.022	0.018
PICAGM1	→	S-D-MW_delib_mean	11.299	5.576	2.026	0.043	0.370	22.228
PICAGM2	→	S-D-MW_delib_mean	−5.912	8.157	−0.725	0.469	−21.899	10.075
PICAGM3	→	S-D-MW_delib_mean	−1.019	11.293	−0.090	0.928	−23.153	21.115
PICAGM4	→	S-D-MW_delib_mean	−2.293	8.064	−0.284	0.776	−18.099	13.512
PICAGM5	→	S-D-MW_delib_mean	2.445	28.660	0.085	0.932	−53.727	58.617
PICAGM6	→	S-D-MW_delib_mean	−10.740	9.438	−1.138	0.255	−29.238	7.759
PICAGM7	→	S-D-MW_delib_mean	1.255	39.320	0.032	0.975	−75.812	78.321
PICAGM8	→	S-D-MW_delib_mean	0.073	25.105	0.003	0.998	−49.132	49.278
PICAGM9	→	S-D-MW_delib_mean	9.833	10.385	0.947	0.344	−10.521	30.187
PICAGM10	→	S-D-MW_delib_mean	15.530	17.836	0.871	0.384	−19.427	50.488
PICAGM11	→	S-D-MW_delib_mean	10.834	12.602	0.860	0.390	−13.865	35.534
PICAGM12	→	S-D-MW_delib_mean	−10.819	8.485	−1.275	0.202	−27.449	5.811
PICAGM13	→	S-D-MW_delib_mean	9.467	35.091	0.270	0.787	−59.310	78.244
PICAGM14	→	S-D-MW_delib_mean	1.336	26.667	0.050	0.960	−50.930	53.602
PICAGM15	→	S-D-MW_delib_mean	−3.866	15.185	−0.255	0.799	−33.627	25.895
PICAGM16	→	S-D-MW_delib_mean	−23.350	49.209	−0.475	0.635	−119.798	73.097
PICAGM17	→	S-D-MW_delib_mean	3.757	84.464	0.044	0.965	−161.789	169.303
PICAGM18	→	S-D-MW_delib_mean	8.407	42.634	0.197	0.844	−75.154	91.969
PICAGM1	→	FFMQsum	160.347	60.405	2.655	0.008	41.955	278.739
PICAGM2	→	FFMQsum	40.609	92.488	0.439	0.661	−140.664	221.882
PICAGM3	→	FFMQsum	95.678	127.664	0.749	0.454	−154.539	345.895
PICAGM4	→	FFMQsum	−145.202	90.526	−1.604	0.109	−322.631	32.226
PICAGM5	→	FFMQsum	92.585	324.563	0.285	0.775	−543.547	728.717
PICAGM6	→	FFMQsum	11.812	107.076	0.110	0.912	−198.053	221.677
PICAGM7	→	FFMQsum	102.733	445.420	0.231	0.818	−770.275	975.741
PICAGM8	→	FFMQsum	−25.310	284.722	−0.089	0.929	−583.355	532.734
PICAGM9	→	FFMQsum	−88.605	117.251	−0.756	0.450	−318.414	141.203
PICAGM10	→	FFMQsum	93.988	201.842	0.466	0.641	−301.614	489.591
PICAGM11	→	FFMQsum	−156.084	141.657	−1.102	0.271	−433.727	121.559
PICAGM12	→	FFMQsum	−8.631	96.393	−0.090	0.929	−197.558	180.296
PICAGM13	→	FFMQsum	−106.801	398.062	−0.268	0.788	−886.988	673.386
PICAGM14	→	FFMQsum	24.667	302.349	0.082	0.935	−567.927	617.261
PICAGM15	→	FFMQsum	−57.541	172.350	−0.334	0.738	−395.341	280.259
PICAGM16	→	FFMQsum	107.927	557.545	0.194	0.847	−984.842	1200.695
PICAGM17	→	FFMQsum	216.831	956.788	0.227	0.821	−1658.438	2092.100
PICAGM18	→	FFMQsum	123.060	482.923	0.255	0.799	−823.451	1069.572

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

B. White Matter: Mindfulness → Mind Wandering (MW-S/MW-D)

Direct effects

							95% Confidence Interval	
			Estimate	Std. Error	z-value	p	Lower	Upper
PICAWM1	→	S-D-MW_spont_mean	−2.882	9.048	−0.319	0.750	−20.616	14.852
PICAWM2	→	S-D-MW_spont_mean	−19.695	8.611	−2.287	0.022	−36.574	−2.817
PICAWM3	→	S-D-MW_spont_mean	−16.472	8.855	−1.860	0.063	−33.827	0.884
PICAWM4	→	S-D-MW_spont_mean	1.741	24.320	0.072	0.943	−45.924	49.407
PICAWM5	→	S-D-MW_spont_mean	−5.817	13.041	−0.446	0.656	−31.377	19.742
PICAWM6	→	S-D-MW_spont_mean	−6.182	24.896	−0.248	0.804	−54.978	42.613
PICAWM7	→	S-D-MW_spont_mean	2.067	11.678	0.177	0.860	−20.821	24.954
PICAWM8	→	S-D-MW_spont_mean	8.537	18.067	0.473	0.637	−26.874	43.948
PICAWM9	→	S-D-MW_spont_mean	5.369	30.351	0.177	0.860	−54.118	64.855
PICAWM10	→	S-D-MW_spont_mean	−5.818	17.350	−0.335	0.737	−39.824	28.188
PICAWM11	→	S-D-MW_spont_mean	−2.242	19.450	−0.115	0.908	−40.363	35.879
PICAWM12	→	S-D-MW_spont_mean	0.800	12.316	0.065	0.948	−23.340	24.940
PICAWM13	→	S-D-MW_spont_mean	−11.993	12.659	−0.947	0.343	−36.803	12.817
PICAWM14	→	S-D-MW_spont_mean	−6.877	20.744	−0.332	0.740	−47.534	33.780
PICAWM15	→	S-D-MW_spont_mean	−0.430	84.525	−0.005	0.996	−166.095	165.235
PICAWM16	→	S-D-MW_spont_mean	13.911	16.771	0.829	0.407	−18.960	46.782
PICAWM17	→	S-D-MW_spont_mean	−0.210	8.992	−0.023	0.981	−17.834	17.415
PICAWM18	→	S-D-MW_spont_mean	−0.375	22.433	−0.017	0.987	−44.344	43.594
PICAWM1	→	S-D-MW_delib_mean	8.162	10.104	0.808	0.419	−11.641	27.966
PICAWM2	→	S-D-MW_delib_mean	−7.761	9.616	−0.807	0.420	−26.609	11.086
PICAWM3	→	S-D-MW_delib_mean	−16.232	9.888	−1.642	0.101	−35.612	3.149
PICAWM4	→	S-D-MW_delib_mean	−4.232	27.158	−0.156	0.876	−57.460	48.996
PICAWM5	→	S-D-MW_delib_mean	−12.284	14.563	−0.844	0.399	−40.827	16.258
PICAWM6	→	S-D-MW_delib_mean	6.550	27.801	0.236	0.814	−47.940	61.040
PICAWM7	→	S-D-MW_delib_mean	11.895	13.040	0.912	0.362	−13.664	37.453
PICAWM8	→	S-D-MW_delib_mean	6.964	20.176	0.345	0.730	−32.580	46.507
PICAWM9	→	S-D-MW_delib_mean	8.348	33.893	0.246	0.805	−58.080	74.776
PICAWM10	→	S-D-MW_delib_mean	−1.896	19.375	−0.098	0.922	−39.870	36.078
PICAWM11	→	S-D-MW_delib_mean	1.379	21.720	0.063	0.949	−41.191	43.949
PICAWM12	→	S-D-MW_delib_mean	−0.440	13.754	−0.032	0.974	−27.397	26.516
PICAWM13	→	S-D-MW_delib_mean	−4.100	14.136	−0.290	0.772	−31.805	23.606
PICAWM14	→	S-D-MW_delib_mean	−0.402	23.165	−0.017	0.986	−45.804	44.999
PICAWM15	→	S-D-MW_delib_mean	2.567	94.389	0.027	0.978	−182.432	187.565
PICAWM16	→	S-D-MW_delib_mean	9.147	18.728	0.488	0.625	−27.560	45.854
PICAWM17	→	S-D-MW_delib_mean	3.843	10.041	0.383	0.702	−15.838	23.524
PICAWM18	→	S-D-MW_delib_mean	0.846	25.051	0.034	0.973	−48.254	49.946

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Indirect effects

									95% Confidence Interval	
					Estimate	Std. Error	z-value	p	Lower	Upper
PICAWM1	→	FFMQsum	→	S-D-MW_spont_mean	−0.572	1.328	−0.431	0.667	−3.176	2.032
PICAWM2	→	FFMQsum	→	S-D-MW_spont_mean	−0.891	1.393	−0.640	0.522	−3.621	1.839
PICAWM3	→	FFMQsum	→	S-D-MW_spont_mean	−2.686	2.563	−1.048	0.295	−7.709	2.336
PICAWM4	→	FFMQsum	→	S-D-MW_spont_mean	1.088	3.445	0.316	0.752	−5.665	7.840
PICAWM5	→	FFMQsum	→	S-D-MW_spont_mean	1.852	2.354	0.787	0.431	−2.762	6.466
PICAWM6	→	FFMQsum	→	S-D-MW_spont_mean	3.052	4.240	0.720	0.472	−5.259	11.362
PICAWM7	→	FFMQsum	→	S-D-MW_spont_mean	2.627	2.708	0.970	0.332	−2.680	7.935
PICAWM8	→	FFMQsum	→	S-D-MW_spont_mean	−3.194	3.626	−0.881	0.378	−10.301	3.913
PICAWM9	→	FFMQsum	→	S-D-MW_spont_mean	3.385	5.007	0.676	0.499	−6.429	13.199
PICAWM10	→	FFMQsum	→	S-D-MW_spont_mean	2.109	2.946	0.716	0.474	−3.665	7.884
PICAWM11	→	FFMQsum	→	S-D-MW_spont_mean	−2.567	3.406	−0.754	0.451	−9.243	4.108
PICAWM12	→	FFMQsum	→	S-D-MW_spont_mean	2.502	2.678	0.934	0.350	−2.747	7.750
PICAWM13	→	FFMQsum	→	S-D-MW_spont_mean	−0.165	1.741	−0.094	0.925	−3.577	3.248
PICAWM14	→	FFMQsum	→	S-D-MW_spont_mean	2.242	3.389	0.661	0.508	−4.401	8.884
PICAWM15	→	FFMQsum	→	S-D-MW_spont_mean	10.102	14.268	0.708	0.479	−17.862	38.067
PICAWM16	→	FFMQsum	→	S-D-MW_spont_mean	1.497	2.606	0.574	0.566	−3.610	6.603
PICAWM17	→	FFMQsum	→	S-D-MW_spont_mean	−0.364	1.266	−0.288	0.774	−2.845	2.117
PICAWM18	→	FFMQsum	→	S-D-MW_spont_mean	2.969	3.932	0.755	0.450	−4.738	10.676
PICAWM1	→	FFMQsum	→	S-D-MW_delib_mean	0.138	0.618	0.224	0.823	−1.074	1.350
PICAWM2	→	FFMQsum	→	S-D-MW_delib_mean	0.215	0.889	0.242	0.809	−1.527	1.958
PICAWM3	→	FFMQsum	→	S-D-MW_delib_mean	0.649	2.557	0.254	0.800	−4.362	5.660
PICAWM4	→	FFMQsum	→	S-D-MW_delib_mean	−0.263	1.304	−0.201	0.840	−2.820	2.294
PICAWM5	→	FFMQsum	→	S-D-MW_delib_mean	−0.448	1.802	−0.248	0.804	−3.980	3.085
PICAWM6	→	FFMQsum	→	S-D-MW_delib_mean	−0.737	2.998	−0.246	0.806	−6.614	5.139
PICAWM7	→	FFMQsum	→	S-D-MW_delib_mean	−0.635	2.513	−0.253	0.801	−5.560	4.290
PICAWM8	→	FFMQsum	→	S-D-MW_delib_mean	0.772	3.077	0.251	0.802	−5.258	6.802
PICAWM9	→	FFMQsum	→	S-D-MW_delib_mean	−0.818	3.352	−0.244	0.807	−7.387	5.751
PICAWM10	→	FFMQsum	→	S-D-MW_delib_mean	−0.510	2.074	−0.246	0.806	−4.574	3.555
PICAWM11	→	FFMQsum	→	S-D-MW_delib_mean	0.620	2.509	0.247	0.805	−4.298	5.539
PICAWM12	→	FFMQsum	→	S-D-MW_delib_mean	−0.604	2.399	−0.252	0.801	−5.306	4.097
PICAWM13	→	FFMQsum	→	S-D-MW_delib_mean	0.040	0.447	0.089	0.929	−0.837	0.916
PICAWM14	→	FFMQsum	→	S-D-MW_delib_mean	−0.542	2.226	−0.243	0.808	−4.905	3.821
PICAWM15	→	FFMQsum	→	S-D-MW_delib_mean	−2.441	9.945	−0.245	0.806	−21.933	17.051
PICAWM16	→	FFMQsum	→	S-D-MW_delib_mean	−0.362	1.519	−0.238	0.812	−3.338	2.615
PICAWM17	→	FFMQsum	→	S-D-MW_delib_mean	0.088	0.454	0.194	0.847	−0.803	0.979
PICAWM18	→	FFMQsum	→	S-D-MW_delib_mean	−0.717	2.901	−0.247	0.805	−6.404	4.969

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Total effects

							95% Confidence Interval	
			Estimate	Std. Error	z-value	p	Lower	Upper
PICAWM1	→	S-D-MW_spont_mean	−3.454	9.140	−0.378	0.705	−21.368	14.460
PICAWM2	→	S-D-MW_spont_mean	−20.587	8.657	−2.378	0.017	−37.554	−3.619
PICAWM3	→	S-D-MW_spont_mean	−19.158	8.716	−2.198	0.028	−36.241	−2.075
PICAWM4	→	S-D-MW_spont_mean	2.829	24.440	0.116	0.908	−45.073	50.731
PICAWM5	→	S-D-MW_spont_mean	−3.965	12.944	−0.306	0.759	−29.336	21.405
PICAWM6	→	S-D-MW_spont_mean	−3.131	24.736	−0.127	0.899	−51.613	45.352
PICAWM7	→	S-D-MW_spont_mean	4.694	11.359	0.413	0.679	−17.569	26.957
PICAWM8	→	S-D-MW_spont_mean	5.343	17.788	0.300	0.764	−29.522	40.208
PICAWM9	→	S-D-MW_spont_mean	8.754	30.205	0.290	0.772	−50.446	67.954
PICAWM10	→	S-D-MW_spont_mean	−3.709	17.258	−0.215	0.830	−37.535	30.117
PICAWM11	→	S-D-MW_spont_mean	−4.809	19.296	−0.249	0.803	−42.628	33.009
PICAWM12	→	S-D-MW_spont_mean	3.301	12.072	0.273	0.784	−20.360	26.963
PICAWM13	→	S-D-MW_spont_mean	−12.157	12.788	−0.951	0.342	−37.221	12.906
PICAWM14	→	S-D-MW_spont_mean	−4.635	20.668	−0.224	0.823	−45.144	35.874
PICAWM15	→	S-D-MW_spont_mean	9.672	83.952	0.115	0.908	−154.870	174.215
PICAWM16	→	S-D-MW_spont_mean	15.408	16.752	0.920	0.358	−17.425	48.240
PICAWM17	→	S-D-MW_spont_mean	−0.574	9.043	−0.063	0.949	−18.298	17.151
PICAWM18	→	S-D-MW_spont_mean	2.594	22.235	0.117	0.907	−40.985	46.173

PICAWM1	→	S-D-MW_delib_mean	8.301	10.117	0.820	0.412	−11.528	28.130
PICAWM2	→	S-D-MW_delib_mean	−7.546	9.583	−0.787	0.431	−26.328	11.235
PICAWM3	→	S-D-MW_delib_mean	−15.583	9.648	−1.615	0.106	−34.492	3.327
PICAWM4	→	S-D-MW_delib_mean	−4.495	27.051	−0.166	0.868	−57.515	48.524
PICAWM5	→	S-D-MW_delib_mean	−12.732	14.328	−0.889	0.374	−40.814	15.350
PICAWM6	→	S-D-MW_delib_mean	5.812	27.379	0.212	0.832	−47.849	59.474
PICAWM7	→	S-D-MW_delib_mean	11.260	12.573	0.896	0.370	−13.382	35.902
PICAWM8	→	S-D-MW_delib_mean	7.736	19.689	0.393	0.694	−30.854	46.326
PICAWM9	→	S-D-MW_delib_mean	7.530	33.431	0.225	0.822	−57.994	73.054
PICAWM10	→	S-D-MW_delib_mean	−2.406	19.102	−0.126	0.900	−39.846	35.034
PICAWM11	→	S-D-MW_delib_mean	1.999	21.357	0.094	0.925	−39.859	43.858
PICAWM12	→	S-D-MW_delib_mean	−1.045	13.363	−0.078	0.938	−27.235	25.145
PICAWM13	→	S-D-MW_delib_mean	−4.060	14.154	−0.287	0.774	−31.802	23.682
PICAWM14	→	S-D-MW_delib_mean	−0.944	22.877	−0.041	0.967	−45.781	43.893
PICAWM15	→	S-D-MW_delib_mean	0.125	92.919	0.001	0.999	−181.992	182.243
PICAWM16	→	S-D-MW_delib_mean	8.785	18.541	0.474	0.636	−27.555	45.125
PICAWM17	→	S-D-MW_delib_mean	3.931	10.010	0.393	0.695	−15.687	23.550
PICAWM18	→	S-D-MW_delib_mean	0.128	24.610	0.005	0.996	−48.106	48.363

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Residual covariances

							95% Confidence Interval	
			Estimate	Std. Error	z-value	p	Lower	Upper
S-D-MW_spont_mean	↔	S-D-MW_delib_mean	0.336	0.105	3.200	0.001	0.130	0.542

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Path coefficients

							95% Confidence Interval	
			Estimate	Std. Error	z-value	p	Lower	Upper
FFMQsum	→	S-D-MW_spont_mean	−0.012	0.010	−1.181	0.238	−0.032	0.008
PICAWM1	→	S-D-MW_spont_mean	−2.882	9.048	−0.319	0.750	−20.616	14.852
PICAWM2	→	S-D-MW_spont_mean	−19.695	8.611	−2.287	0.022	−36.574	−2.817
PICAWM3	→	S-D-MW_spont_mean	−16.472	8.855	−1.860	0.063	−33.827	0.884
PICAWM4	→	S-D-MW_spont_mean	1.741	24.320	0.072	0.943	−45.924	49.407
PICAWM5	→	S-D-MW_spont_mean	−5.817	13.041	−0.446	0.656	−31.377	19.742
PICAWM6	→	S-D-MW_spont_mean	−6.182	24.896	−0.248	0.804	−54.978	42.613
PICAWM7	→	S-D-MW_spont_mean	2.067	11.678	0.177	0.860	−20.821	24.954
PICAWM8	→	S-D-MW_spont_mean	8.537	18.067	0.473	0.637	−26.874	43.948
PICAWM9	→	S-D-MW_spont_mean	5.369	30.351	0.177	0.860	−54.118	64.855
PICAWM10	→	S-D-MW_spont_mean	−5.818	17.350	−0.335	0.737	−39.824	28.188
PICAWM11	→	S-D-MW_spont_mean	−2.242	19.450	−0.115	0.908	−40.363	35.879
PICAWM12	→	S-D-MW_spont_mean	0.800	12.316	0.065	0.948	−23.340	24.940
PICAWM13	→	S-D-MW_spont_mean	−11.993	12.659	−0.947	0.343	−36.803	12.817
PICAWM14	→	S-D-MW_spont_mean	−6.877	20.744	−0.332	0.740	−47.534	33.780
PICAWM15	→	S-D-MW_spont_mean	−0.430	84.525	−0.005	0.996	−166.095	165.235
PICAWM16	→	S-D-MW_spont_mean	13.911	16.771	0.829	0.407	−18.960	46.782
PICAWM17	→	S-D-MW_spont_mean	−0.210	8.992	−0.023	0.981	−17.834	17.415
PICAWM18	→	S-D-MW_spont_mean	−0.375	22.433	−0.017	0.987	−44.344	43.594

FFMQsum	→	S-D-MW_delib_mean	0.003	0.011	0.255	0.798	−0.019	0.025
PICAWM1	→	S-D-MW_delib_mean	8.162	10.104	0.808	0.419	−11.641	27.966
PICAWM2	→	S-D-MW_delib_mean	−7.761	9.616	−0.807	0.420	−26.609	11.086
PICAWM3	→	S-D-MW_delib_mean	−16.232	9.888	−1.642	0.101	−35.612	3.149
PICAWM4	→	S-D-MW_delib_mean	−4.232	27.158	−0.156	0.876	−57.460	48.996
PICAWM5	→	S-D-MW_delib_mean	−12.284	14.563	−0.844	0.399	−40.827	16.258
PICAWM6	→	S-D-MW_delib_mean	6.550	27.801	0.236	0.814	−47.940	61.040
PICAWM7	→	S-D-MW_delib_mean	11.895	13.040	0.912	0.362	−13.664	37.453
PICAWM8	→	S-D-MW_delib_mean	6.964	20.176	0.345	0.730	−32.580	46.507
PICAWM9	→	S-D-MW_delib_mean	8.348	33.893	0.246	0.805	−58.080	74.776
PICAWM10	→	S-D-MW_delib_mean	−1.896	19.375	−0.098	0.922	−39.870	36.078
PICAWM11	→	S-D-MW_delib_mean	1.379	21.720	0.063	0.949	−41.191	43.949
PICAWM12	→	S-D-MW_delib_mean	−0.440	13.754	−0.032	0.974	−27.397	26.516
PICAWM13	→	S-D-MW_delib_mean	−4.100	14.136	−0.290	0.772	−31.805	23.606
PICAWM14	→	S-D-MW_delib_mean	−0.402	23.165	−0.017	0.986	−45.804	44.999
PICAWM15	→	S-D-MW_delib_mean	2.567	94.389	0.027	0.978	−182.432	187.565
PICAWM16	→	S-D-MW_delib_mean	9.147	18.728	0.488	0.625	−27.560	45.854
PICAWM17	→	S-D-MW_delib_mean	3.843	10.041	0.383	0.702	−15.838	23.524
PICAWM18	→	S-D-MW_delib_mean	0.846	25.051	0.034	0.973	−48.254	49.946
PICAWM1	→	FFMQsum	48.274	104.341	0.463	0.644	−156.231	252.780
PICAWM2	→	FFMQsum	75.173	98.736	0.761	0.446	−118.346	268.691
PICAWM3	→	FFMQsum	226.594	99.469	2.278	0.023	31.638	421.549
PICAWM4	→	FFMQsum	−91.743	280.055	−0.328	0.743	−640.641	457.155
PICAWM5	→	FFMQsum	−156.220	148.087	−1.055	0.291	−446.466	134.026
PICAWM6	→	FFMQsum	−257.413	283.530	−0.908	0.364	−813.122	298.295
PICAWM7	→	FFMQsum	−221.632	130.148	−1.703	0.089	−476.718	33.454
PICAWM8	→	FFMQsum	269.426	203.701	1.323	0.186	−129.820	668.673
PICAWM9	→	FFMQsum	−285.542	346.305	−0.825	0.410	−964.287	393.204
PICAWM10	→	FFMQsum	−177.926	197.640	−0.900	0.368	−565.294	209.442
PICAWM11	→	FFMQsum	216.564	221.136	0.979	0.327	−216.854	649.982
PICAWM12	→	FFMQsum	−211.018	138.158	−1.527	0.127	−481.803	59.766
PICAWM13	→	FFMQsum	13.877	146.382	0.095	0.924	−273.027	300.781
PICAWM14	→	FFMQsum	−189.102	236.811	−0.799	0.425	−653.242	275.039
PICAWM15	→	FFMQsum	−852.189	963.150	−0.885	0.376	−2739.928	1035.550
PICAWM16	→	FFMQsum	−126.243	192.037	−0.657	0.511	−502.629	250.143
PICAWM17	→	FFMQsum	30.700	103.550	0.296	0.767	−172.255	233.655
PICAWM18	→	FFMQsum	−250.429	255.025	−0.982	0.326	−750.269	249.411

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Only

C. Gray Matter: Mindfulness (Awareness) → Mind Wandering (MW-S/MW-D)

Direct effects

							95% Confidence Interval	
			Estimate	Std. Error	z-value	p	Lower	Upper
PICAGM1	→	S-D-MW_spont_mean	6.970	4.299	1.621	0.105	−1.456	15.397
PICAGM2	→	S-D-MW_spont_mean	11.104	6.286	1.766	0.077	−1.216	23.425
PICAGM3	→	S-D-MW_spont_mean	0.918	8.781	0.105	0.917	−16.292	18.128
PICAGM4	→	S-D-MW_spont_mean	−12.236	6.189	−1.977	0.048	−24.365	−0.106
PICAGM5	→	S-D-MW_spont_mean	25.434	22.033	1.154	0.248	−17.750	68.618
PICAGM6	→	S-D-MW_spont_mean	6.530	7.275	0.898	0.369	−7.729	20.790
PICAGM7	→	S-D-MW_spont_mean	28.586	30.215	0.946	0.344	−30.634	87.805
PICAGM8	→	S-D-MW_spont_mean	33.153	19.318	1.716	0.086	−4.710	71.016
PICAGM9	→	S-D-MW_spont_mean	−10.858	7.979	−1.361	0.174	−26.497	4.781
PICAGM10	→	S-D-MW_spont_mean	32.207	13.738	2.344	0.019	5.282	59.133
PICAGM11	→	S-D-MW_spont_mean	−6.175	9.640	−0.641	0.522	−25.070	12.719
PICAGM12	→	S-D-MW_spont_mean	−27.469	6.542	−4.199	< .001	−40.291	−14.646
PICAGM13	→	S-D-MW_spont_mean	45.441	27.003	1.683	0.092	−7.483	98.365
PICAGM14	→	S-D-MW_spont_mean	27.000	20.524	1.316	0.188	−13.226	67.226
PICAGM15	→	S-D-MW_spont_mean	15.573	11.694	1.332	0.183	−7.346	38.492
PICAGM16	→	S-D-MW_spont_mean	19.269	37.818	0.510	0.610	−54.853	93.392
PICAGM17	→	S-D-MW_spont_mean	81.017	64.909	1.248	0.212	−46.203	208.237
PICAGM18	→	S-D-MW_spont_mean	37.916	32.776	1.157	0.247	−26.325	102.156
PICAGM1	→	S-D-MW_delib_mean	14.291	5.430	2.632	0.008	3.649	24.933
PICAGM2	→	S-D-MW_delib_mean	−5.188	7.939	−0.653	0.513	−20.747	10.372
PICAGM3	→	S-D-MW_delib_mean	−5.519	11.090	−0.498	0.619	−27.254	16.216
PICAGM4	→	S-D-MW_delib_mean	−3.873	7.816	−0.495	0.620	−19.191	11.446
PICAGM5	→	S-D-MW_delib_mean	−2.205	27.827	−0.079	0.937	−56.744	52.335
PICAGM6	→	S-D-MW_delib_mean	−10.539	9.188	−1.147	0.251	−28.548	7.469
PICAGM7	→	S-D-MW_delib_mean	−1.581	38.159	−0.041	0.967	−76.372	73.210
PICAGM8	→	S-D-MW_delib_mean	−1.545	24.398	−0.063	0.950	−49.364	46.275
PICAGM9	→	S-D-MW_delib_mean	9.163	10.077	0.909	0.363	−10.588	28.913
PICAGM10	→	S-D-MW_delib_mean	17.196	17.350	0.991	0.322	−16.809	51.202
PICAGM11	→	S-D-MW_delib_mean	9.912	12.175	0.814	0.416	−13.951	33.775
PICAGM12	→	S-D-MW_delib_mean	−10.189	8.262	−1.233	0.218	−26.382	6.005
PICAGM13	→	S-D-MW_delib_mean	6.473	34.103	0.190	0.849	−60.367	73.313
PICAGM14	→	S-D-MW_delib_mean	−2.602	25.921	−0.100	0.920	−53.405	48.202
PICAGM15	→	S-D-MW_delib_mean	−5.490	14.768	−0.372	0.710	−34.436	23.455
PICAGM16	→	S-D-MW_delib_mean	−27.617	47.762	−0.578	0.563	−121.230	65.996
PICAGM17	→	S-D-MW_delib_mean	−1.624	81.977	−0.020	0.984	−162.296	159.047
PICAGM18	→	S-D-MW_delib_mean	7.402	41.395	0.179	0.858	−73.731	88.534

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Indirect effects

									95% Confidence Interval	
					Estimate	Std. Error	z-value	p	Lower	Upper
PICAGM1	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	−6.050	2.538	−2.384	0.017	−11.024	−1.076
PICAGM2	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	−1.710	3.349	−0.510	0.610	−8.274	4.855
PICAGM3	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	6.512	4.807	1.355	0.176	−2.910	15.934
PICAGM4	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	3.559	3.347	1.063	0.288	−3.001	10.120
PICAGM5	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	3.904	11.708	0.333	0.739	−19.043	26.851
PICAGM6	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	−1.585	3.870	−0.410	0.682	−9.170	5.999
PICAGM7	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	−0.926	16.027	−0.058	0.954	−32.338	30.487
PICAGM8	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	−0.038	10.247	−0.004	0.997	−20.121	20.045
PICAGM9	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	2.829	4.264	0.663	0.507	−5.529	11.187
PICAGM10	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	−5.119	7.348	−0.697	0.486	−19.521	9.282
PICAGM11	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	3.271	5.148	0.635	0.525	−6.820	13.362
PICAGM12	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	−0.573	3.472	−0.165	0.869	−7.377	6.231
PICAGM13	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	0.510	14.323	0.036	0.972	−27.562	28.582
PICAGM14	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	2.667	10.896	0.245	0.807	−18.689	24.024
PICAGM15	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	1.281	6.207	0.206	0.837	−10.884	13.446
PICAGM16	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	0.522	20.059	0.026	0.979	−38.794	39.837
PICAGM17	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	−3.218	34.434	−0.093	0.926	−70.707	64.271
PICAGM18	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	−4.930	17.409	−0.283	0.777	−39.051	29.190

PICAGM1	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	−3.387	2.052	−1.650	0.099	−7.409	0.636
PICAGM2	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	−0.957	1.921	−0.498	0.618	−4.722	2.808
PICAGM3	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	3.645	3.128	1.165	0.244	−2.485	9.776
PICAGM4	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	1.993	2.066	0.964	0.335	−2.058	6.043
PICAGM5	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	2.185	6.623	0.330	0.741	−10.796	15.167
PICAGM6	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	−0.887	2.201	−0.403	0.687	−5.201	3.426
PICAGM7	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	−0.518	8.975	−0.058	0.954	−18.109	17.072
PICAGM8	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	−0.021	5.736	−0.004	0.997	−11.264	11.221
PICAGM9	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	1.584	2.486	0.637	0.524	−3.288	6.455
PICAGM10	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	−2.866	4.300	−0.666	0.505	−11.294	5.562
PICAGM11	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	1.831	2.991	0.612	0.540	−4.032	7.694
PICAGM12	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	−0.321	1.949	−0.165	0.869	−4.140	3.498
PICAGM13	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	0.286	8.019	0.036	0.972	−15.431	16.002
PICAGM14	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	1.493	6.135	0.243	0.808	−10.531	13.517
PICAGM15	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	0.717	3.489	0.205	0.837	−6.121	7.555
PICAGM16	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	0.292	11.230	0.026	0.979	−21.718	22.303
PICAGM17	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	−1.802	19.292	−0.093	0.926	−39.614	36.011
PICAGM18	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	−2.760	9.820	−0.281	0.779	−22.007	16.487

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Total effects

							95% Confidence Interval	
			Estimate	Std. Error	z-value	p	Lower	Upper
PICAGM1	→	S-D-MW_spont_mean	0.920	4.640	0.198	0.843	−8.175	10.015
PICAGM2	→	S-D-MW_spont_mean	9.395	7.104	1.322	0.186	−4.529	23.318
PICAGM3	→	S-D-MW_spont_mean	7.430	9.809	0.757	0.449	−11.795	26.655
PICAGM4	→	S-D-MW_spont_mean	−8.676	6.951	−1.248	0.212	−22.300	4.948
PICAGM5	→	S-D-MW_spont_mean	29.338	24.921	1.177	0.239	−19.507	78.183
PICAGM6	→	S-D-MW_spont_mean	4.945	8.226	0.601	0.548	−11.178	21.068
PICAGM7	→	S-D-MW_spont_mean	27.660	34.201	0.809	0.419	−39.373	94.694
PICAGM8	→	S-D-MW_spont_mean	33.115	21.868	1.514	0.130	−9.745	75.975
PICAGM9	→	S-D-MW_spont_mean	−8.029	9.007	−0.892	0.373	−25.682	9.623
PICAGM10	→	S-D-MW_spont_mean	27.088	15.502	1.747	0.081	−3.295	57.471
PICAGM11	→	S-D-MW_spont_mean	−2.904	10.883	−0.267	0.790	−24.235	18.426
PICAGM12	→	S-D-MW_spont_mean	−28.042	7.404	−3.787	< .001	−42.554	−13.530
PICAGM13	→	S-D-MW_spont_mean	45.951	30.566	1.503	0.133	−13.956	105.859
PICAGM14	→	S-D-MW_spont_mean	29.667	23.222	1.278	0.201	−15.847	75.181
PICAGM15	→	S-D-MW_spont_mean	16.854	13.233	1.274	0.203	−9.082	42.789
PICAGM16	→	S-D-MW_spont_mean	19.791	42.809	0.462	0.644	−64.112	103.694
PICAGM17	→	S-D-MW_spont_mean	77.799	73.472	1.059	0.290	−66.203	221.801
PICAGM18	→	S-D-MW_spont_mean	32.985	37.083	0.889	0.374	−39.696	105.667
PICAGM1	→	S-D-MW_delib_mean	10.904	5.318	2.050	0.040	0.480	21.327
PICAGM2	→	S-D-MW_delib_mean	−6.145	8.142	−0.755	0.450	−22.102	9.813
PICAGM3	→	S-D-MW_delib_mean	−1.873	11.242	−0.167	0.868	−23.908	20.161
PICAGM4	→	S-D-MW_delib_mean	−1.880	7.967	−0.236	0.813	−17.495	13.735
PICAGM5	→	S-D-MW_delib_mean	−0.019	28.563	-6.744×10^{-4}	0.999	−56.002	55.964
PICAGM6	→	S-D-MW_delib_mean	−11.427	9.428	−1.212	0.226	−29.905	7.052
PICAGM7	→	S-D-MW_delib_mean	−2.099	39.200	−0.054	0.957	−78.929	74.730
PICAGM8	→	S-D-MW_delib_mean	−1.566	25.063	−0.062	0.950	−50.689	47.557
PICAGM9	→	S-D-MW_delib_mean	10.746	10.323	1.041	0.298	−9.486	30.978
PICAGM10	→	S-D-MW_delib_mean	14.331	17.767	0.807	0.420	−20.492	49.153
PICAGM11	→	S-D-MW_delib_mean	11.743	12.473	0.941	0.346	−12.704	36.190
PICAGM12	→	S-D-MW_delib_mean	−10.509	8.486	−1.238	0.216	−27.141	6.123
PICAGM13	→	S-D-MW_delib_mean	6.758	35.032	0.193	0.847	−61.903	75.420
PICAGM14	→	S-D-MW_delib_mean	−1.109	26.616	−0.042	0.967	−53.274	51.057
PICAGM15	→	S-D-MW_delib_mean	−4.774	15.166	−0.315	0.753	−34.498	24.951
PICAGM16	→	S-D-MW_delib_mean	−27.325	49.064	−0.557	0.578	−123.489	68.839
PICAGM17	→	S-D-MW_delib_mean	−3.426	84.208	−0.041	0.968	−168.472	161.620
PICAGM18	→	S-D-MW_delib_mean	4.642	42.502	0.109	0.913	−78.662	87.945

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Residual covariances

							95% Confidence Interval	
			Estimate	Std. Error	z-value	p	Lower	Upper
S-D-MW_spont_mean	↔	S-D-MW_delib_mean	0.169	0.073	2.328	0.020	0.027	0.311

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Path coefficients

							95% Confidence Interval	
			Estimate	Std. Error	z-value	p	Lower	Upper
FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	−0.155	0.034	−4.624	< .001	−0.221	−0.089
PICAGM1	→	S-D-MW_spont_mean	6.970	4.299	1.621	0.105	−1.456	15.397
PICAGM2	→	S-D-MW_spont_mean	11.104	6.286	1.766	0.077	−1.216	23.425
PICAGM3	→	S-D-MW_spont_mean	0.918	8.781	0.105	0.917	−16.292	18.128
PICAGM4	→	S-D-MW_spont_mean	−12.236	6.189	−1.977	0.048	−24.365	−0.106
PICAGM5	→	S-D-MW_spont_mean	25.434	22.033	1.154	0.248	−17.750	68.618
PICAGM6	→	S-D-MW_spont_mean	6.530	7.275	0.898	0.369	−7.729	20.790
PICAGM7	→	S-D-MW_spont_mean	28.586	30.215	0.946	0.344	−30.634	87.805
PICAGM8	→	S-D-MW_spont_mean	33.153	19.318	1.716	0.086	−4.710	71.016
PICAGM9	→	S-D-MW_spont_mean	−10.858	7.979	−1.361	0.174	−26.497	4.781
PICAGM10	→	S-D-MW_spont_mean	32.207	13.738	2.344	0.019	5.282	59.133
PICAGM11	→	S-D-MW_spont_mean	−6.175	9.640	−0.641	0.522	−25.070	12.719
PICAGM12	→	S-D-MW_spont_mean	−27.469	6.542	−4.199	< .001	−40.291	−14.646
PICAGM13	→	S-D-MW_spont_mean	45.441	27.003	1.683	0.092	−7.483	98.365
PICAGM14	→	S-D-MW_spont_mean	27.000	20.524	1.316	0.188	−13.226	67.226
PICAGM15	→	S-D-MW_spont_mean	15.573	11.694	1.332	0.183	−7.346	38.492
PICAGM16	→	S-D-MW_spont_mean	19.269	37.818	0.510	0.610	−54.853	93.392
PICAGM17	→	S-D-MW_spont_mean	81.017	64.909	1.248	0.212	−46.203	208.237
PICAGM18	→	S-D-MW_spont_mean	37.916	32.776	1.157	0.247	−26.325	102.156
FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	−0.087	0.042	−2.050	0.040	−0.170	−0.004
PICAGM1	→	S-D-MW_delib_mean	14.291	5.430	2.632	0.008	3.649	24.933
PICAGM2	→	S-D-MW_delib_mean	−5.188	7.939	−0.653	0.513	−20.747	10.372
PICAGM3	→	S-D-MW_delib_mean	−5.519	11.090	−0.498	0.619	−27.254	16.216
PICAGM4	→	S-D-MW_delib_mean	−3.873	7.816	−0.495	0.620	−19.191	11.446
PICAGM5	→	S-D-MW_delib_mean	−2.205	27.827	−0.079	0.937	−56.744	52.335
PICAGM6	→	S-D-MW_delib_mean	−10.539	9.188	−1.147	0.251	−28.548	7.469
PICAGM7	→	S-D-MW_delib_mean	−1.581	38.159	−0.041	0.967	−76.372	73.210
PICAGM8	→	S-D-MW_delib_mean	−1.545	24.398	−0.063	0.950	−49.364	46.275
PICAGM9	→	S-D-MW_delib_mean	9.163	10.077	0.909	0.363	−10.588	28.913
PICAGM10	→	S-D-MW_delib_mean	17.196	17.350	0.991	0.322	−16.809	51.202
PICAGM11	→	S-D-MW_delib_mean	9.912	12.175	0.814	0.416	−13.951	33.775
PICAGM12	→	S-D-MW_delib_mean	−10.189	8.262	−1.233	0.218	−26.382	6.005
PICAGM13	→	S-D-MW_delib_mean	6.473	34.103	0.190	0.849	−60.367	73.313
PICAGM14	→	S-D-MW_delib_mean	−2.602	25.921	−0.100	0.920	−53.405	48.202
PICAGM15	→	S-D-MW_delib_mean	−5.490	14.768	−0.372	0.710	−34.436	23.455
PICAGM16	→	S-D-MW_delib_mean	−27.617	47.762	−0.578	0.563	−121.230	65.996
PICAGM17	→	S-D-MW_delib_mean	−1.624	81.977	−0.020	0.984	−162.296	159.047
PICAGM18	→	S-D-MW_delib_mean	7.402	41.395	0.179	0.858	−73.731	88.534
PICAGM1	→	FFMQ_act_awareness_sum	39.047	14.034	2.782	0.005	11.540	66.553
PICAGM2	→	FFMQ_act_awareness_sum	11.034	21.485	0.514	0.608	−31.076	53.145
PICAGM3	→	FFMQ_act_awareness_sum	−42.028	29.665	−1.417	0.157	−100.170	16.114
PICAGM4	→	FFMQ_act_awareness_sum	−22.973	21.023	−1.093	0.275	−64.178	18.232
PICAGM5	→	FFMQ_act_awareness_sum	−25.196	75.368	−0.334	0.738	−172.914	122.522
PICAGM6	→	FFMQ_act_awareness_sum	10.232	24.878	0.411	0.681	−38.528	58.991
PICAGM7	→	FFMQ_act_awareness_sum	5.976	103.433	0.058	0.954	−196.749	208.700
PICAGM8	→	FFMQ_act_awareness_sum	0.247	66.133	0.004	0.997	−129.371	129.866
PICAGM9	→	FFMQ_act_awareness_sum	−18.257	27.238	−0.670	0.503	−71.644	35.129
PICAGM10	→	FFMQ_act_awareness_sum	33.041	46.882	0.705	0.481	−58.846	124.927
PICAGM11	→	FFMQ_act_awareness_sum	−21.113	32.914	−0.641	0.521	−85.622	43.397
PICAGM12	→	FFMQ_act_awareness_sum	3.698	22.393	0.165	0.869	−40.191	47.587
PICAGM13	→	FFMQ_act_awareness_sum	−3.293	92.437	−0.036	0.972	−184.467	177.881
PICAGM14	→	FFMQ_act_awareness_sum	−17.216	70.228	−0.245	0.806	−154.860	120.429
PICAGM15	→	FFMQ_act_awareness_sum	−8.265	40.019	−0.207	0.836	−86.701	70.171
PICAGM16	→	FFMQ_act_awareness_sum	−3.368	129.463	−0.026	0.979	−257.111	250.375
PICAGM17	→	FFMQ_act_awareness_sum	20.770	222.195	0.093	0.926	−414.725	456.265
PICAGM18	→	FFMQ_act_awareness_sum	31.821	112.148	0.284	0.777	−187.985	251.627

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

D. White Matter: Mindfulness (Awareness) → Mind Wandering (MW-S/MW-D)

Direct effects

							95% Confidence Interval	
			Estimate	Std. Error	z-value	p	Lower	Upper
PICAWM1	→	S-D-MW_spont_mean	−2.746	8.764	−0.313	0.754	−19.923	14.430
PICAWM2	→	S-D-MW_spont_mean	−19.746	8.310	−2.376	0.017	−36.033	−3.458
PICAWM3	→	S-D-MW_spont_mean	−12.008	8.765	−1.370	0.171	−29.187	5.172
PICAWM4	→	S-D-MW_spont_mean	3.916	23.349	0.168	0.867	−41.846	49.679
PICAWM5	→	S-D-MW_spont_mean	−7.221	12.511	−0.577	0.564	−31.742	17.301
PICAWM6	→	S-D-MW_spont_mean	−6.947	23.750	−0.293	0.770	−53.497	39.603
PICAWM7	→	S-D-MW_spont_mean	0.073	11.082	0.007	0.995	−21.647	21.793
PICAWM8	→	S-D-MW_spont_mean	9.638	17.177	0.561	0.575	−24.029	43.304
PICAWM9	→	S-D-MW_spont_mean	11.997	28.828	0.416	0.677	−44.506	68.500
PICAWM10	→	S-D-MW_spont_mean	−2.624	16.494	−0.159	0.874	−34.952	29.705
PICAWM11	→	S-D-MW_spont_mean	−5.527	18.435	−0.300	0.764	−41.659	30.605
PICAWM12	→	S-D-MW_spont_mean	−2.182	11.818	−0.185	0.854	−25.345	20.982
PICAWM13	→	S-D-MW_spont_mean	−9.513	12.234	−0.778	0.437	−33.491	14.465
PICAWM14	→	S-D-MW_spont_mean	−1.438	19.743	−0.073	0.942	−40.133	37.258
PICAWM15	→	S-D-MW_spont_mean	6.400	80.257	0.080	0.936	−150.900	163.700
PICAWM16	→	S-D-MW_spont_mean	12.070	16.111	0.749	0.454	−19.507	43.647
PICAWM17	→	S-D-MW_spont_mean	−0.953	8.645	−0.110	0.912	−17.897	15.990
PICAWM18	→	S-D-MW_spont_mean	2.305	21.246	0.108	0.914	−39.336	43.946
PICAWM1	→	S-D-MW_delib_mean	8.314	10.044	0.828	0.408	−11.371	27.999
PICAWM2	→	S-D-MW_delib_mean	−7.028	9.524	−0.738	0.461	−25.694	11.639
PICAWM3	→	S-D-MW_delib_mean	−12.199	10.045	−1.214	0.225	−31.887	7.489
PICAWM4	→	S-D-MW_delib_mean	−4.967	26.759	−0.186	0.853	−57.413	47.479
PICAWM5	→	S-D-MW_delib_mean	−14.601	14.338	−1.018	0.309	−42.704	13.502
PICAWM6	→	S-D-MW_delib_mean	2.868	27.219	0.105	0.916	−50.480	56.216
PICAWM7	→	S-D-MW_delib_mean	8.424	12.700	0.663	0.507	−16.468	33.316
PICAWM8	→	S-D-MW_delib_mean	10.075	19.686	0.512	0.609	−28.509	48.658
PICAWM9	→	S-D-MW_delib_mean	7.806	33.039	0.236	0.813	−56.949	72.560
PICAWM10	→	S-D-MW_delib_mean	−2.706	18.903	−0.143	0.886	−39.756	34.344
PICAWM11	→	S-D-MW_delib_mean	2.285	21.127	0.108	0.914	−39.123	43.693
PICAWM12	→	S-D-MW_delib_mean	−4.011	13.544	−0.296	0.767	−30.558	22.535
PICAWM13	→	S-D-MW_delib_mean	−3.060	14.021	−0.218	0.827	−30.540	24.420
PICAWM14	→	S-D-MW_delib_mean	−0.022	22.626	-9.647×10^{-4}	0.999	−44.369	44.325
PICAWM15	→	S-D-MW_delib_mean	−5.135	91.977	−0.056	0.955	−185.407	175.137
PICAWM16	→	S-D-MW_delib_mean	6.240	18.464	0.338	0.735	−29.948	42.429
PICAWM17	→	S-D-MW_delib_mean	4.052	9.907	0.409	0.683	−15.366	23.470
PICAWM18	→	S-D-MW_delib_mean	−1.000	24.349	−0.041	0.967	−48.723	46.722

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Indirect effects

									95% Confidence Interval	
					Estimate	Std. Error	z-value	p	Lower	Upper
PICAWM1	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	−0.514	2.578	−0.199	0.842	−5.566	4.539
PICAWM2	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	−0.628	2.449	−0.256	0.798	−5.428	4.172
PICAWM3	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	−6.750	3.603	−1.874	0.061	−13.812	0.311
PICAWM4	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	1.596	6.875	0.232	0.816	−11.879	15.072
PICAWM5	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	4.577	4.049	1.130	0.258	−3.359	12.513
PICAWM6	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	6.416	7.368	0.871	0.384	−8.025	20.857
PICAWM7	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	5.772	3.902	1.479	0.139	−1.875	13.419
PICAWM8	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	−6.301	5.562	−1.133	0.257	−17.202	4.601
PICAWM9	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	0.428	8.458	0.051	0.960	−16.150	17.005
PICAWM10	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	0.741	4.846	0.153	0.879	−8.758	10.240
PICAWM11	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	−1.596	5.441	−0.293	0.769	−12.260	9.067
PICAWM12	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	6.461	4.225	1.529	0.126	−1.820	14.743
PICAWM13	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	−1.203	3.617	−0.333	0.739	−8.292	5.886
PICAWM14	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	−0.937	5.802	−0.161	0.872	−12.309	10.435
PICAWM15	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	13.768	24.098	0.571	0.568	−33.464	61.000
PICAWM16	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	5.016	5.084	0.987	0.324	−4.949	14.982
PICAWM17	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	−0.476	2.542	−0.187	0.852	−5.458	4.507
PICAWM18	→	FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	2.988	6.332	0.472	0.637	−9.422	15.398

PICAWM1	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	−0.230	1.174	−0.196	0.845	−2.530	2.071
PICAWM2	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	−0.281	1.127	−0.250	0.803	−2.490	1.927
PICAWM3	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	−3.023	3.218	−0.939	0.348	−9.330	3.285
PICAWM4	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	0.715	3.148	0.227	0.820	−5.456	6.886
PICAWM5	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	2.050	2.618	0.783	0.434	−3.081	7.180
PICAWM6	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	2.873	4.230	0.679	0.497	−5.417	11.164
PICAWM7	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	2.585	2.953	0.875	0.381	−3.203	8.373
PICAWM8	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	−2.822	3.600	−0.784	0.433	−9.877	4.234
PICAWM9	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	0.191	3.792	0.050	0.960	−7.240	7.623
PICAWM10	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	0.332	2.192	0.151	0.880	−3.964	4.627
PICAWM11	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	−0.715	2.524	−0.283	0.777	−5.661	4.232
PICAWM12	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	2.893	3.269	0.885	0.376	−3.513	9.300
PICAWM13	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	−0.539	1.694	−0.318	0.750	−3.859	2.781
PICAWM14	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	−0.419	2.627	−0.160	0.873	−5.568	4.729
PICAWM15	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	6.166	12.195	0.506	0.613	−17.736	30.067
PICAWM16	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	2.246	3.077	0.730	0.465	−3.784	8.277
PICAWM17	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	−0.213	1.155	−0.184	0.854	−2.477	2.051
PICAWM18	→	FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	1.338	3.092	0.433	0.665	−4.721	7.398

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Total effects

							95% Confidence Interval	
			Estimate	Std. Error	z-value	p	Lower	Upper
PICAWM1	→	S-D-MW_spont_mean	−3.260	9.131	−0.357	0.721	−21.156	14.636
PICAWM2	→	S-D-MW_spont_mean	−20.374	8.656	−2.354	0.019	−37.340	−3.407
PICAWM3	→	S-D-MW_spont_mean	−18.758	8.710	−2.154	0.031	−35.830	−1.686
PICAWM4	→	S-D-MW_spont_mean	5.513	24.324	0.227	0.821	−42.161	53.186
PICAWM5	→	S-D-MW_spont_mean	−2.644	12.904	−0.205	0.838	−27.935	22.647
PICAWM6	→	S-D-MW_spont_mean	−0.531	24.611	−0.022	0.983	−48.768	47.707
PICAWM7	→	S-D-MW_spont_mean	5.845	11.306	0.517	0.605	−16.315	28.004
PICAWM8	→	S-D-MW_spont_mean	3.337	17.715	0.188	0.851	−31.384	38.058
PICAWM9	→	S-D-MW_spont_mean	12.424	30.043	0.414	0.679	−46.458	71.307
PICAWM10	→	S-D-MW_spont_mean	−1.883	17.187	−0.110	0.913	−35.568	31.802
PICAWM11	→	S-D-MW_spont_mean	−7.123	19.200	−0.371	0.711	−44.755	30.509
PICAWM12	→	S-D-MW_spont_mean	4.280	12.031	0.356	0.722	−19.300	27.859
PICAWM13	→	S-D-MW_spont_mean	−10.716	12.740	−0.841	0.400	−35.686	14.254
PICAWM14	→	S-D-MW_spont_mean	−2.374	20.572	−0.115	0.908	−42.694	37.945
PICAWM15	→	S-D-MW_spont_mean	20.168	83.447	0.242	0.809	−143.385	183.721
PICAWM16	→	S-D-MW_spont_mean	17.086	16.664	1.025	0.305	−15.575	49.748
PICAWM17	→	S-D-MW_spont_mean	−1.429	9.007	−0.159	0.874	−19.082	16.224
PICAWM18	→	S-D-MW_spont_mean	5.293	22.107	0.239	0.811	−38.036	48.622
PICAWM1	→	S-D-MW_delib_mean	8.084	10.107	0.800	0.424	−11.725	27.893
PICAWM2	→	S-D-MW_delib_mean	−7.309	9.582	−0.763	0.446	−26.089	11.471
PICAWM3	→	S-D-MW_delib_mean	−15.222	9.641	−1.579	0.114	−34.119	3.675
PICAWM4	→	S-D-MW_delib_mean	−4.252	26.924	−0.158	0.875	−57.021	48.518
PICAWM5	→	S-D-MW_delib_mean	−12.552	14.283	−0.879	0.380	−40.546	15.443
PICAWM6	→	S-D-MW_delib_mean	5.741	27.242	0.211	0.833	−47.653	59.135
PICAWM7	→	S-D-MW_delib_mean	11.009	12.515	0.880	0.379	−13.519	35.537
PICAWM8	→	S-D-MW_delib_mean	7.253	19.609	0.370	0.711	−31.180	45.686
PICAWM9	→	S-D-MW_delib_mean	7.997	33.254	0.240	0.810	−57.180	73.174
PICAWM10	→	S-D-MW_delib_mean	−2.374	19.024	−0.125	0.901	−39.660	34.912
PICAWM11	→	S-D-MW_delib_mean	1.570	21.253	0.074	0.941	−40.085	43.225
PICAWM12	→	S-D-MW_delib_mean	−1.118	13.317	−0.084	0.933	−27.218	24.983
PICAWM13	→	S-D-MW_delib_mean	−3.598	14.102	−0.255	0.799	−31.238	24.041
PICAWM14	→	S-D-MW_delib_mean	−0.441	22.771	−0.019	0.985	−45.071	44.189
PICAWM15	→	S-D-MW_delib_mean	1.030	92.368	0.011	0.991	−180.007	182.068
PICAWM16	→	S-D-MW_delib_mean	8.486	18.446	0.460	0.645	−27.666	44.639
PICAWM17	→	S-D-MW_delib_mean	3.839	9.970	0.385	0.700	−15.702	23.379
PICAWM18	→	S-D-MW_delib_mean	0.338	24.470	0.014	0.989	−47.623	48.298

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Residual covariances

							95% Confidence Interval	
			Estimate	Std. Error	z-value	p	Lower	Upper
S-D-MW_spont_mean	↔	S-D-MW_delib_mean	0.305	0.100	3.042	0.002	0.109	0.502

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Path coefficients

							95% Confidence Interval	
			Estimate	Std. Error	z-value	p	Lower	Upper
FFMQ_act_awareness_sum	→	S-D-MW_spont_mean	−0.105	0.041	−2.557	0.011	−0.186	−0.025
PICAWM1	→	S-D-MW_spont_mean	−2.746	8.764	−0.313	0.754	−19.923	14.430
PICAWM2	→	S-D-MW_spont_mean	−19.746	8.310	−2.376	0.017	−36.033	−3.458
PICAWM3	→	S-D-MW_spont_mean	−12.008	8.765	−1.370	0.171	−29.187	5.172
PICAWM4	→	S-D-MW_spont_mean	3.916	23.349	0.168	0.867	−41.846	49.679
PICAWM5	→	S-D-MW_spont_mean	−7.221	12.511	−0.577	0.564	−31.742	17.301
PICAWM6	→	S-D-MW_spont_mean	−6.947	23.750	−0.293	0.770	−53.497	39.603
PICAWM7	→	S-D-MW_spont_mean	0.073	11.082	0.007	0.995	−21.647	21.793
PICAWM8	→	S-D-MW_spont_mean	9.638	17.177	0.561	0.575	−24.029	43.304
PICAWM9	→	S-D-MW_spont_mean	11.997	28.828	0.416	0.677	−44.506	68.500
PICAWM10	→	S-D-MW_spont_mean	−2.624	16.494	−0.159	0.874	−34.952	29.705
PICAWM11	→	S-D-MW_spont_mean	−5.527	18.435	−0.300	0.764	−41.659	30.605
PICAWM12	→	S-D-MW_spont_mean	−2.182	11.818	−0.185	0.854	−25.345	20.982
PICAWM13	→	S-D-MW_spont_mean	−9.513	12.234	−0.778	0.437	−33.491	14.465
PICAWM14	→	S-D-MW_spont_mean	−1.438	19.743	−0.073	0.942	−40.133	37.258
PICAWM15	→	S-D-MW_spont_mean	6.400	80.257	0.080	0.936	−150.900	163.700
PICAWM16	→	S-D-MW_spont_mean	12.070	16.111	0.749	0.454	−19.507	43.647
PICAWM17	→	S-D-MW_spont_mean	−0.953	8.645	−0.110	0.912	−17.897	15.990
PICAWM18	→	S-D-MW_spont_mean	2.305	21.246	0.108	0.914	−39.336	43.946
FFMQ_act_awareness_sum	→	S-D-MW_delib_mean	−0.047	0.047	−0.999	0.318	−0.140	0.045
PICAWM1	→	S-D-MW_delib_mean	8.314	10.044	0.828	0.408	−11.371	27.999
PICAWM2	→	S-D-MW_delib_mean	−7.028	9.524	−0.738	0.461	−25.694	11.639
PICAWM3	→	S-D-MW_delib_mean	−12.199	10.045	−1.214	0.225	−31.887	7.489
PICAWM4	→	S-D-MW_delib_mean	−4.967	26.759	−0.186	0.853	−57.413	47.479
PICAWM5	→	S-D-MW_delib_mean	−14.601	14.338	−1.018	0.309	−42.704	13.502
PICAWM6	→	S-D-MW_delib_mean	2.868	27.219	0.105	0.916	−50.480	56.216
PICAWM7	→	S-D-MW_delib_mean	8.424	12.700	0.663	0.507	−16.468	33.316
PICAWM8	→	S-D-MW_delib_mean	10.075	19.686	0.512	0.609	−28.509	48.658
PICAWM9	→	S-D-MW_delib_mean	7.806	33.039	0.236	0.813	−56.949	72.560
PICAWM10	→	S-D-MW_delib_mean	−2.706	18.903	−0.143	0.886	−39.756	34.344
PICAWM11	→	S-D-MW_delib_mean	2.285	21.127	0.108	0.914	−39.123	43.693
PICAWM12	→	S-D-MW_delib_mean	−4.011	13.544	−0.296	0.767	−30.558	22.535
PICAWM13	→	S-D-MW_delib_mean	−3.060	14.021	−0.218	0.827	−30.540	24.420
PICAWM14	→	S-D-MW_delib_mean	−0.022	22.626	-9.647×10^{-4}	0.999	−44.369	44.325
PICAWM15	→	S-D-MW_delib_mean	−5.135	91.977	−0.056	0.955	−185.407	175.137
PICAWM16	→	S-D-MW_delib_mean	6.240	18.464	0.338	0.735	−29.948	42.429
PICAWM17	→	S-D-MW_delib_mean	4.052	9.907	0.409	0.683	−15.366	23.470
PICAWM18	→	S-D-MW_delib_mean	−1.000	24.349	−0.041	0.967	−48.723	46.722
PICAWM1	→	FFMQ_act_awareness_sum	4.873	24.392	0.200	0.842	−42.933	52.680
PICAWM2	→	FFMQ_act_awareness_sum	5.959	23.124	0.258	0.797	−39.364	51.281
PICAWM3	→	FFMQ_act_awareness_sum	64.062	23.268	2.753	0.006	18.458	109.667
PICAWM4	→	FFMQ_act_awareness_sum	−15.151	64.976	−0.233	0.816	−142.501	112.200
PICAWM5	→	FFMQ_act_awareness_sum	−43.435	34.470	−1.260	0.208	−110.994	24.125
PICAWM6	→	FFMQ_act_awareness_sum	−60.890	65.745	−0.926	0.354	−189.747	67.967
PICAWM7	→	FFMQ_act_awareness_sum	−54.774	30.202	−1.814	0.070	−113.968	4.421
PICAWM8	→	FFMQ_act_awareness_sum	59.794	47.323	1.264	0.206	−32.957	152.545
PICAWM9	→	FFMQ_act_awareness_sum	−4.057	80.254	−0.051	0.960	−161.352	153.237
PICAWM10	→	FFMQ_act_awareness_sum	−7.031	45.911	−0.153	0.878	−97.015	82.953
PICAWM11	→	FFMQ_act_awareness_sum	15.149	51.290	0.295	0.768	−85.379	115.676
PICAWM12	→	FFMQ_act_awareness_sum	−61.319	32.138	−1.908	0.056	−124.307	1.670
PICAWM13	→	FFMQ_act_awareness_sum	11.416	34.033	0.335	0.737	−55.286	78.119
PICAWM14	→	FFMQ_act_awareness_sum	8.890	54.954	0.162	0.871	−98.818	116.597
PICAWM15	→	FFMQ_act_awareness_sum	−130.662	222.914	−0.586	0.558	−567.564	306.241
PICAWM16	→	FFMQ_act_awareness_sum	−47.605	44.515	−1.069	0.285	−134.854	39.643
PICAWM17	→	FFMQ_act_awareness_sum	4.516	24.060	0.188	0.851	−42.641	51.673
PICAWM18	→	FFMQ_act_awareness_sum	−28.356	59.055	−0.480	0.631	−144.101	87.388

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.