Men developing emotional intelligence through meditation? Integrating narrative, EEG, and cognitive evidence

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Abstract

Traditional masculine norms around emotions (e.g., inexpressiveness) can mean men have difficulties managing their emotions, contributing to potential mental health problems. However, it is recognized that men and masculinities are diverse, and that some men can positively self-manage their mental health, although this has received little attention in the literature. Uniquely, we sought to find men who had discovered ways to engage constructively with their emotions, in this case through meditation. Thirty male meditators, recruited using a maximum variation sampling strategy, participated in a longitudinal mixed-method study in the UK. Participants undertook two cognitive neuroscience sessions – approximately one year apart – comprising cognitive assessments of attention, in combination with EEG measurement during task performance and meditation. In-depth narrative interviews exploring men's experiences of meditation were also conducted at both time-points, analyzed using a modified constant comparison approach. Taken together, the quantitative and qualitative results suggested men developed attention skills through meditation, although there were variations according to previous meditation experience (e.g., a sharper longitudinal increase in theta amplitude under meditation for novice practitioners). Moreover, development of attention appeared to enhance men's emotional intelligence, which in turn could be conducive to wellbeing. The paper has implications for psychologists working with men, pointing to the potential for teaching men about better regulating their emotions for improved wellbeing.

Key words: alexithymia, emotional intelligence, meditation, men, mental health

Men and Distress

It is commonly asserted that women are more prone to mental health disorders like depression (McManus, Meltzer, Brugha, Bebbington, & Jenkins, 2009). However, there is concern that men may express distress (mental suffering that falls short of clinical diagnoses for specific disorders) in less recognized ways (Addis, 2008). Whilst women are seen as more likely to ‘internalize’ distress, men are thought more likely to ‘externalize’ distress through risk-taking, substance use, and anger (Pollack, 1998), contributing to men being more likely to commit suicide than women (Office for National Statistics, 2011). Such externalization has been linked to ‘traditional’ forms of masculinity, to the extent that masculinity is frequently portrayed as a ‘risk factor’ for health in the media (Gough, 2006) and academic literature (Mac an Ghaill & Haywood, 2012), with men constructed as “damaged and damage doing” (p.483). Theorists seeking to account for links between masculinity and destructive ‘externalizing’ behaviors highlight the way emotionality is often feminized, whereas traditional forms of masculinity valorize suppression of emotional vulnerability. For example, Levant (1992) formulated the concept of ‘normative male alexithymia’ to describe how gender socialization can contribute to a pattern of ‘restrictive emotionality’ in men. Boys may be discouraged from, even punished for, expressing emotions (e.g., fear), leading to constrained emotional recognition and vocabulary.

Restrictive emotionality can contribute to mental health problems in men. Addis (2008) outlines various frameworks for conceptualizing masculinity, distress, and depression. The ‘masked depression framework’ (Pollack, 1998) suggests that although men may experience ‘prototypic’ depression (corresponding to conventional diagnostic criteria), this depression may be hidden from men themselves (due to inability to recognize it, reflecting the idea of alexithymia) and from others (due to proscriptions on how men should express emotions). Conversely, the ‘masculine depression framework’ (Pleck, 1995) views externalizing behaviors as a male-specific ‘phenotypic variant’ of depression, linked to masculine norms which encourage action and discourage introspection. Addis’ own ‘gendered responding framework’ proposes that gendered socialization encourages men to adopt ‘maladaptive’ stances toward emotions generally, e.g., suppressing negative feelings. Addis suggests such suppression contributes to mental health problems by engendering poor emotional management skills, a suggestion reinforced by work implicating emotional dysregulation as a trans-diagnostic factor underlying diverse psychiatric disorders (Aldao, Nolen-Hoeksema, & Schweizer, 2010).

However, as Addis (2008) acknowledges, recent theorizing in gender has led to recognition of variability within and across men, with more nuanced conceptions of relations between masculinity and emotionality. For example, studies show some men are willing to engage with and express emotions, including older males caring for spouses (Bennett, 2007). However, these men did not resist traditional norms, instead incorporating emotionality within more conventional masculine constructions, stressing the importance of control and responsibility. Researchers have also found men are able to find more constructive ways of relating to distress and disorder. For example, among Canadian men with depression, whereas many sought to alleviate emotional pain through emotional numbing, some negotiated a more useful response by repositioning help seeking as a rational way of regaining self-control (Oliffe et al., 2010).

Intriguingly, studies suggest emotional engagement can be developed in men. One prominent theory of such engagement is Mayer and Salovey's (1997) hierarchical model of emotional intelligence (EI), comprising four ‘branches:’ (i) emotional awareness/expression; (ii) emotional facilitation of thought (skill in generating emotions); (iii) understanding emotional patterns; and (iv) strategic emotional management (ability to moderate one’s emotions). Crombie, Lombard, and Noakes (2011) randomly assigned 24 South African cricketers to an EI intervention or a control group. The intervention consisted of ten 3-hour workshop sessions, which included introductions to EI theory, and experiential case studies. There was a significant post-test intervention increase of 14.5% on the Meyer-Salovey-Caruso Emotional Intelligence Test (Mayer, Caruso, & Salovey, 2000). Although such results are encouraging, the mechanisms by which EI may be developed are little understood. Men have long been overlooked and undertheorized in mental health research (Riska, 2009); there is scarce research examining men's strategies for engaging constructively with their emotions. However, men who meditate may be among those who have found ways to manage emotions more effectively (Lomas, Cartwright, Edginton, & Ridge, 2012). The present paper explores the possibility that meditation may help men with emotional intelligence – thus facilitating better mental health – by training attention and giving men more choice in how they approach their emotions.

Meditation, Attention, and Emotional Intelligence

Meditation is linked to positive outcomes on numerous mental health indicators, including depression and anxiety (Mars & Abbey, 2010). Although men have not been the specific focus of such research, men have been part of mixed-sex samples which have responded positively to meditation programs. For example, clinical interventions based on encouraging 'mindfulness' – a form of meditation involving non-judgmental awareness of present-moment experience – have successfully prevented relapse in recurrently depressed individuals (Teasdale et al., 2000). It is theorized that such positive mental health outcomes are linked to the development of attentional skills, which are central to contemporary definitions of meditation. Walsh and Shapiro (2006), for example, define meditation as "a family of self-regulation practices that focus on training attention and awareness in order to bring mental processes under greater voluntary control and thereby foster general mental well-being" (pp.228-229). Such attention development has been analyzed on various levels. In cognitive terms, attention is theorized as comprising interrelated subcomponents controlled by executive processes (Norman & Shallice, 1986). One prominent framework of attention proposes three overlapping, functionally distinct neural networks: Sustained attention (ongoing readiness for processing stimuli), selective attention (allocation of resources to specific stimuli), and executive attention (monitoring/selecting from competing stimuli) (Posner & Petersen, 1990). Randomized control-group studies link meditation to improvements in all three networks (Chiesa, Calati, & Serretti, 2011).

Attentional processing and meditative states can also be captured on a neurophysiological level with electroencephalography (EEG), a non-invasive technique that analyzes spatio-temporal aspects of underlying brain activity in terms of various parameters, particularly frequency and amplitude (Kaiser, 2005). Frequency is the number of oscillatory cycles per second, and is divided into bands: Delta (1-4 Hz); Theta (4-8 Hz); Alpha (8-13 Hz); Beta (13–30 Hz); and Gamma (36-44 Hz). Amplitude reflects the level of synchronized activity within each bandwidth, expressed in terms of microvolts. Much of the EEG research on attention has focused on theta activity, with increased amplitude linked to executive and selective attention (Dietl et al., 1999), and the processing of new/unknown information (Grunwald et al., 1999). Meditation is linked to increased theta amplitude, signifying a state of increased attentiveness (Josipovic, 2010). Particular attention has been paid to FM theta, oscillations originating in frontal-midline brain regions implicated in attention networks and higher level cognitive activities (e.g. planning and volition). Activation of these regions may constitute the neural basis for meditation, a contention suggested in theoretical models (Newberg & Iversen, 2003), and explored empirically using EEG (Aftanas & Golocheikine, 2001).

The significance of attention development with regard to wellbeing is that by training practitioners to attend to their interior world, meditation may help them increase emotional awareness, and develop emotional management skills (Chu, 2009). For example, meditation encourages a type of emotional awareness known as ‘decentering’ – a detached perspective towards one’s thoughts/feelings – which may help alter patterns of emotional responding, as people learn to refrain from reacting to negative qualia in unhelpful ways, e.g., suppression. Thus, meditation may facilitate emotional awareness, understanding, and management, which comprise three branches of Mayer and Salovey's (1997) EI model. Indeed, using both a cross-sectional and an experimental design, Chu (2009) found meditators had higher levels of EI than non-meditators, and also that participants on a mindfulness intervention significantly increased EI (including emotional appraisal, and mood regulation) from pre- to post-test compared to a control group, with corresponding improvements in mental health.

Given that Addis’ (2008) frameworks connected mental health problems in men to dysfunctional patterns of emotional management, the possibility that meditation enhances emotional intelligence in men specifically is worth investigating. However, this possibility has not been examined empirically. Thus, the current study explores three theoretically-driven, interrelated questions: (i) can meditation facilitate the development of attention skills in men?; (ii) can such skills enhance men’s emotional management capabilities?; and (iii) might such capabilities promote wellbeing? Although scholars have suggested that meditation may enhance wellbeing by improving EI (Schutte & Malouff, 2011), ours is the first study to explore this possibility specifically in men. Moreover, as far as we are aware, our study is the first to combine cognitive neuroscience with narrative data in studying men’s mental health.

Methods

Overview and Design

We employed a longitudinal mixed methods design. Thirty male meditators were recruited using a maximum variation sampling strategy. Twenty-nine of the participants completed a cognitive neuroscience test session on entry to the study (T1), and again after a year (T2), comprising EEG measurement across a battery of cognitive tasks and during meditation. (One participant declined to undertake the test sessions, only taking part in (both) interviews.) Semi-structured narrative interviews were also conducted at both time points with all participants to explore men's experiences of meditation. The project was approved by the University of Westminster Research Ethics Committee, and an ethics protocol was in place to ensure participants' wellbeing.

Participants

Inclusion criteria were that men must be over 18 and currently practicing meditation in some capacity, though not as part of a clinical intervention. Recruitment was mainly through a meditation center in London, UK, and also at other events in London attended by meditators, e.g., Buddhist talks. A purposive maximum variation sampling design was used, aiming for the widest practical range of life experiences, socio-demographic backgrounds and meditation experience (Marshall 1996). Recruitment ended once saturation was reached (additional interviews did not generate any new themes of interest). Sampling occurred concurrently with initial stages of qualitative data analysis, with the emerging analysis suggesting the inclusion of certain men to increase the robustness of the analysis (Cutcliffe, 2005), e.g., men unaffiliated with a particular meditation center. A diverse sample of participants was obtained, all of whom lived and/or worked in London. A table showing the demographic characteristics of the participants is available in the online version of this paper.

Experimental Session

An experimental session was used at two time points, about a year apart, to examine links between meditation and attention on two levels: Cognitive and neurophysiological. On a cognitive level, the Defined Intensity Stressor Simulation (DISS; www.stress-sim.co.uk) gauged executive attention. The session also featured an EI measure (Reading the Mind in the Eyes Test; RMET; Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001), and an index of intellectual functioning to contextualize task performance (National Adult Reading Test; NART; Nelson & Willison, 1991). Attention was also gauged by recording EEG signals during task performance, and during a 10-minute meditation (the 'mindfulness of breathing,' a concentrative exercise focusing on the breath). The experimental session lasted approximately an hour, involving the same sequence of tasks at both T1 and T2: RMET, DISS, NART (only examined at T2), and meditation.

Experimental tasks.

The *RMET* is used operationally to index EI (emotional perception/awareness; Harrison, Sullivan, Tchanturia, & Treasure, 2009) and alexithymia (inability to recognize/verbalize emotions; Honkalampi, Hintikka, Tanskanen, Lehtonen, & Viinamäki, 2000). The task features a sequence of 36 black and white photographs of the eye-region of actors and actresses. Participants were required to identify the emotion in the picture, selecting from four forced-choice response options, comprising the target word, plus three foil words of comparable emotional valence. The task possesses good internal reliability consistency (cronbach's alpha = .719) and test-retest reliability (intraclass correlation coefficient = .833) (Vellante et al., 2012). The dependent variable was the number of correct answers.

The *DISS* assesses executive attention and broader executive function (Kennedy, Little, & Scholey, 2004). The DISS involves four cognitive and psychomotor tasks, visually presented on a split-screen computer monitor, completed simultaneously, with responses made using a mouse. Details of these tasks, and their scoring protocols, are included in the appendices. Participants completed a two minute practice session, followed by the task itself lasting five minutes. The dependent variable was the overall score (all tasks combined), calculated by the program.

The *NART* (Nelson & Willison, 1991) examines pronunciation of 50 short irregular English words of graded difficulty. It has high test-retest reliability (r = .98) and construct validity as a measure of IQ (Crawford, Parker, Stewart, Besson, & De Lacey, 1989). The dependent variable was the number of errors (incorrectly pronounced words), converted into an IQ score using the test conversion table.

Finally, to facilitate between-participants analyses, participants were divided into two almost-equal groups (29 participants undertook the session) according to years of meditation experience. Division into categorical groups on the basis of a continuous variable, separated by the mean, is an established procedure in neurophysiological literature (Barry, Clarke, McCarthy, & Selikowitz, 2002). Here, the sample mean was 10.8 years. Those meditating for less than 10.8 years were categorized as 'novices' (n = 14), those meditating for longer were categorized as 'elders' (n = 15).

EEG recording.

Electrodes were placed at F3 and F4 (International 10-20 system), referenced to linked-mastoids (M1 and M2), and a ground electrode placed behind the left ear. The choice of F3 and F4 frontal leads was based on Newberg & Iversen's (2003) model suggesting that activation of frontal areas was the neural basis for meditation. EEG signals were acquired using a NeXus™ EEG amplifier with a 24 bit AD converter (see appendix for technical specification). Following activation of the recording, participants were instructed to remain inactive for five minutes to establish an EEG baseline. In the subsequent analysis, to ensure the sampled data were not contaminated by artifacts possibly caused by facial movement, segments with spikes exceeding μV50 were removed. A threshold was set where epochs with greater than 33% contamination would be excluded from the analysis. The data stream was then segmented into the session components. The RMET segment was not analyzed, as this invariably exceeded the 33% contamination threshold. The analysis focused on three segments: Baseline (five minutes); DISS (five minutes); and meditation (ten minutes). For each of these segments, mean theta amplitude was calculated for each group (novices and elders). Producing these mean values involved a number of steps, involving the sequential calculation of: mean peak-to-peak amplitude for each channel (left and right) across each segment, for each participant separately; mean trans-hemispheric amplitude for each segment, for each participant separately; and group means for each segment.

Qualitative Data Collection and Analysis

Men were interviewed twice, extensively at T1, with a follow-up at T2. Interviews were conducted by the first author, and lasted approximately two hours at T1, and one hour at T2. Men were interviewed in their own homes, at the University, or at the meditation center. A T1 interview guide was devised to elicit narratives concerning experiences of meditation. Narratives order events in time and reflect how people represent meanings about themselves and their lives (White, 1987). The first part of the interview focused on narratives regarding life leading up to, and following on from, engagement with meditation. The second part focused on specific areas of interest, including wellbeing, stress, coping, and masculinity. The T1 guide began with a set opening request: “Tell me a bit about life before meditation.” The guide also featured general probes to elicit relevant narratives, as outlined in a table available in the online version of this paper. T2 interviews were unstructured, apart from a set opening request: “Tell me a bit about how this year has been.”

Interviews were professionally transcribed, and identifying details redacted. Transcripts were sent to participants for approval, which all granted. NVivo software was used to help organize, search and analyze the data. The data were explored using a ‘modified’ constant comparison approach, focusing mainly on open and axial coding (Strauss & Corbin, 1990). Modified constant comparison follows the steps of modified grounded theory, and also involves linking back to existing literature to clarify the emerging analysis (Cutcliffe, 2005). However, constant comparison falls short of developing a theoretical framework, aiming more to articulate inter-relations between key themes.

In an initial coding phase, the first six T1 transcripts were examined line by line to identify emergent themes, producing 80 codes. The research term read a sample transcript and debated the codes, deeming them sufficiently exhaustive to account for the data in the transcript. Over subsequent months, the lead author – guided by ongoing discussions with the research term – searched incoming transcripts (from T1 and T2) paragraph by paragraph for additional codes, with a final figure of 105. Using NVivo, every segment of transcript relating to a particular code was moved into a data file. This paper concentrates on data pertaining to participants' experiences of meditation. Twenty codes were identified relating directly to meditation, including 'objectifying experience,' and 'moving attention around the body.' The next stage involved generation of a tentative conceptual framework: Codes were compared with each other, and grouped into four overarching categories according to conceptual similarity. For example, the segments for the theme mentioned above both contained ideas around men becoming skilled at managing mental activities; thus, these two themes were grouped under a category of 'working with the mind.' The other categories were: Developing awareness, cultivating helpful attitudes, and applying skills in life.

Results

Participant Descriptive Statistics

Differences between the two groups in terms of age, IQ, and meditation experience, are shown in table 1.

[Insert table 1 about here.]

Independent T-tests analyzed whether the groups differed in terms of age, IQ and meditation practice. Elders were older than novices, $t(27) = -2.62$, $p = .014$, and spent more hours per week meditating, $t(27) = -2.37$, $p = .025$. There was no difference in IQ between the groups, $t(27) = -0.38$, $p = .70$.

RMET

Performance on the RMET improved from T1 to T2, as shown in table 2. A review of the S-W test indicated that normality was a reasonable assumption.

[Insert table 2 about here]

A mixed-factorial ANOVA was conducted with a within-participants factor of time (T1, T2), a between-participants factor of experience (novices, elders), and RMET score as the DV. There was a main effect for time, $F(1, 27) = 4.26$, $p = .049$, $d = .79$, with higher scores at T2. There was no main effect for experience, $F(1, 27) = 1.94$, $p = .17$, $d = .54$, and no interaction, $F(1, 27) = 0.16$, $p = .69$, $d = .15$. Post-hoc power analyses were conducted using the program G*Power 3 (Faul, Erdfelder, Lang, & Buchner, 1996). Small, medium, and large values of *d* are considered to be 0.2, 0.5, and 0.8 respectively (Cohen, 1988). With an alpha level of 0.05 and a sample size of 29, this test had a power of 98% to detect a large effect of .79, and a power of 36% to detect a medium effect of .54.

DISS

Performance on the DISS improved from T1 to T2, as shown in table 3. A review of the S-W test indicated that normality was a reasonable assumption.

[Insert table 3 about here]

A mixed factorial ANOVA was conducted, with a within-participants factor of time (T1, T2), a between-participants factor of experience (novices, elders), and score as the DV. There was a main effect for time, $F(1, 27) = 7.02$, $p = .013$, $d = 1.02$, with higher scores at T2. There was no main effect for experience, $F(1, 27) = 0.24$, $p = .13$, $d = 0.60$, and no interaction, $F(1, 27) = 0.021$, $p = .89$, $d = 0.06$. Post-hoc power analysis indicated that the test had a power of 99% to detect a large effect of 1.02, and a power of 44% to detect a medium effect of 0.60.

EEG Analysis

The analysis focused on theta amplitude, as this is regarded as a ‘signature’ of meditation (Josipovic, 2010). For elders, at both T1 and T2, amplitude was higher for meditation than for baseline or the DISS. For novices, at T1, amplitude for meditation was higher than for baseline, but lower than for the DISS; at T2, amplitude for meditation was higher than for both baseline and DISS. Mean theta amplitude levels are shown in the table and line graphs below. A review of the S-W test indicated that normality was a reasonable assumption.

[Insert table 4 about here]

[Insert figure 1 about here]

Two mixed factorial ANOVAs were conducted – one for T1, one for T2 – comparing meditation against baseline; each had a within-participants factor of segment (baseline, meditation), a between-participants factor of experience (novices, elders), and mean theta amplitude as the DV. The first ANOVA examined T1. There was a main effect for segment, $F(1, 27) = 7.14$, $p = .013$, $d = 1.03$, with higher amplitude under meditation. There was no main effect for experience, $F(1, 27) = 0.019$, $p = .89$, $d = 0.06$, and no interaction, $F(1, 27) = 0.31$, $p = .084$, $d = 0.68$. Post-hoc power analyses indicated that this test had a power of 99% to detect a large effect of 1.03, and a power of 94% to detect a medium effect of 0.68. The second ANOVA analyzed T2. There was a main effect for segment, $F(1, 27) = 5.74$, $p = .024$, $d = 0.92$, with higher amplitude under meditation. There was no main effect for experience, $F(1, 27) = 0.29$, $p = .59$, $d = 0.21$, and no interaction, $F(1, 27) = 0.093$, $p = .76$, $d = 0.11$.

Post-hoc power analyses indicated that this test had a power of 99% to detect a large effect of 0.92, and a power of 10% to detect a small effect of 0.21.

Two further mixed factorial ANOVAs were conducted – one for T1, one for T2 – comparing meditation against DISS. Both ANOVAs had a within-participants factor of segment (DISS, meditation), a between-participants factor of experience (novices, elders), and mean theta amplitude as the DV. These ANOVAs produced no significant results. Additionally, dependent T-tests (split by groups) analyzed changes in amplitude from T1 to T2. For both baseline and DISS there were no increases for either novices or elders. For meditation, elders remained constant over time, $t(27) = -0.18$, $p = .86$, whereas novices had an increase in amplitude, $t(27) = -1.72$, $p = .050$, one-tailed, $d = .375$. Post-hoc power analysis indicated that this test had a power of 38% to detect a medium effect of .375.

Cognitive neuroscience interaction.

To explore the interaction of longitudinal changes in the cognitive and neuroscientific variables, a differential was produced for each variable by subtracting T1 scores from the T2 scores. There were positive differentials (i.e. longitudinal increases) for the RMET, DISS, baseline theta, and meditation theta, but a negative differential for DISS theta, as shown in table 5. Table 6 shows correlations between these differentials.

[Insert table 5 about here]

[Insert table 6 about here]

Qualitative Results

One overarching theme emerged from our analysis: Through practicing meditation, men reported learning to engage more constructively with their thoughts and feelings, which in turn helped facilitate wellbeing (this sequence cannot be substantiated in any causal experimental sense; however, participants made such links in their narratives). Under this broad theme, there were four interlinked themes, each with subthemes, as shown in table 7.

[Insert table 7 about here]

To simplify a complex picture, the themes and sub-themes are connected as follows (with numerical labels for subthemes, detailed in table 7, in parentheses). Before turning to meditation, participants described learning to suppress or distract themselves from difficult feelings (e.g., blunting with alcohol). Thus deliberately engaging with their mind through meditation was a radical shift (1.1.): ‘observing’ the mind was experienced as an unusual activity (1.2), and men often (especially initially) had difficulties paying attention (1.3). Turning attention inwards, men encountered troubling thoughts/feelings they had not necessarily realized they harbored (2.1). However, gradually, participants cultivated qualities to help moderate negative qualia, like acceptance (2.2), and compassion (2.3). As men became better at meditation, they began to develop some understanding of the dynamics of their mind (3.1), and acquired ‘tools’ to help manage difficult content, including decentering (3.2.), refocusing attention (3.3.), and reappraising problems (3.4.). Most men also reported deploying skills and qualities cultivated in meditation, e.g., mindfulness, in everyday life (4.1.). Consequently, men were better able to manage their problems through enhanced self-control in difficult situations (4.2.), a greater sense of freedom/choice (4.3.), and a capacity to choose from diverse coping strategies (4.4.).

Discussion

The results indicate meditation is a way men can explore their internal world and ameliorate dysfunctional patterns of emotional management, which are linked to mental health problems in men (Addis, 2008). The contention that meditation facilitated wellbeing by helping men better manage their emotions rests upon a three-part argument: (1) meditation helped men improve attention; (2) enhanced attentiveness to their inner world generated EI;(3) improved EI in turn engendered wellbeing. This argument can be articulated as a speculative model, presented below in Figure 2. The design of the study does not allow us to corroborate any of the assumptions of causality implied by the model; nevertheless, it is a useful way of tentatively accounting for patterns in all data collected.

[Insert figure 2 about here]

This model does not imply that this route (via attention, and subsequent EI) is the only way meditation can facilitate/impair wellbeing; for example, men suggested meditation could ‘spontaneously’ generate feelings of positive well-being, seemingly unrelated to the development of attention skills. Nor should the model suggest a linear progression, inexorably followed by all meditators, or even by all participants in our study. Although there was suggestive evidence here for the development of attention, EI, and wellbeing, these three strands of evidence were not connected experimentally. The methodological design did not allow any temporal relatedness between the strands to be ascertained, where change in one variable could be said to produce changes in another. That said, the sequentiality implied in the model was suggested by the qualitative data: In the narrative, themes around training attention tended to precede themes of EI development, which in turn usually preceded themes around ability to better manage wellbeing (e.g., men first described working on awareness, then subsequently feeling a greater sense of emotional control). Moreover, the model has credibility on the basis of previous research; for example, using regression analyses, Schutte and Malouff (2011) reported that EI ‘mediated’ the relationship between mindfulness and subjective wellbeing.

Attention Development

First, there was evidence for attention development, with longitudinal improvements in executive attention as indexed by the DISS. Without a control group, these improvements cannot be definitively attributed to meditation. However, using the principle of benchmarking (comparing effect sizes to previous trials; Minami, Serlin, Wampold, Kircher, & Brown, 2008), the suggestion is not untenable. For example, with a comparable measure of executive attention, Heeren, van Broeck, and Philippot (2009) found a mindfulness intervention had a large post-test effect size (d = .88), comparable to the present study, while matched controls had no such increase (d = .02). That said, there were no between-subjects differences on cognitive measures – in fact, novices scored non-significantly higher – seemingly contradicting the idea of meditation-related cognitive improvement. However, as aging is linked to cognitive decline (Singh-Manoux et al., 2012), elders' greater meditation experience possibly prevented a worse task performance (relative to novices), which might have been expected given their greater age. Supporting this argument are studies showing that compared to age-matched controls, meditators have greater cortical thickness in areas responsible for attention processing, suggesting meditation may ameliorate age-related cortical thinning and cognitive decline (Pagnoni & Cekic, 2007).

Evidence for meditation facilitating cognitive development becomes strengthened, yet more complicated, when the EEG results are considered. Elevated theta amplitude, particularly over frontal regions, signifies attention processing, and reflects an attentive meditative state (Josipovic, 2010). Here, theta amplitude was higher during meditation compared to baseline. However, there were interesting longitudinal trends. Elders showed greater amplitude than novices during meditation at T1. However, this differential reduced over time: Elders remained constant, whereas novices 'caught up,' suggesting an improvement gradient leveling off with experience. Comparable studies assessing longitudinal EEG change in healthy adults are rare – most assess cognitive decline associated with aging or psychiatric disorders. However, the idea of an improvement gradient accords with studies showing novice meditators improving attention abilities after just five days training (Tang et al., 2007). With such increases over a short period, it is unrealistic to expect improvements to continue in a *linear* fashion over time.

However, intriguing patterns in the data mean caution is needed in simply viewing theta as a marker of attentiveness. As theta synchronizes with increasing task demand (Grunwald et al., 1999), it may be better to interpret theta as indicating mental effort. Our study is unique in comparing meditation-related EEG profiles with profiles accompanying performances on cognitive tasks. For novices, at T1, theta levels were higher under the DISS than meditation, but at T2 this was reversed. However, while novices' amplitude under the DISS decreased longitudinally, their task score increased. It must be noted that this decline in amplitude under DISS over time was not significant, and so one must be cautious about attributing meaning to this finding. That said, when correlating changes over time in amplitude under DISS with changes in task score (table 6), the result was significant. Thus, it is possible that while novices managed a better task performance at T2, paradoxically they required less mental effort to do so. In contrast, longitudinal increases in amplitude under meditation suggest novices were more engaged during meditation at T2 than T1. This longitudinal pattern in novices – greater 'efficiency' during task performance (less task demand yet higher scores), but increased effort during meditation (greater task demand) – may reflect the type of neurological changes experienced by those newer to meditation. In contrast, elders' theta levels under DISS and meditation were stable over time.

As such, both novices and elders improved their performance on cognitive and affective tasks, but only for novices did these changes appear to be a function of altered patterns of theta amplitude. We reiterate that any interpretations of causality are speculative: Our design does not permit us to make causal links; moreover, some results underpinning these interpretations were non-significant. Nevertheless, one might conjecture that novices' improved task performance may have been linked to enhanced ability to sustain cognitive 'effort' in meditation, reflected in a positive correlation between changes task performance and in amplitude under meditation (table 6). In contrast, the stabilization in theta amplitude under both DISS and meditation for elders suggests that any critical period of alterations in theta activity took place earlier point in their meditation careers. Nevertheless, their ability to sustain cognitive effort in meditation – stable longitudinally – still enabled elders' to improve on cognitive tasks, as if reaping ongoing benefits in cognitive development from prior efforts in meditation. Future research on meditation with multiple longitudinal measurement points may help to explore this issue further.

EI Development and Wellbeing

The second strand of the argument linking meditation to wellbeing was that attention development enhanced EI. Here, the evidence is mainly qualitative: Emergent themes mapped onto Mayer and Salovey's (1997) hierarchical EI model. (This correspondence had not been predicted apriori.) First, learning to attend to their inner world, men developed awareness of emotional experience (first branch). Then, as men encountered negative thoughts/feelings, they cultivated attitudinal qualities to manage these, reflecting the second branch (skill in generating emotions). With repeated meditation, men gained understanding of mental patterns (third branch). Finally, men acquired tools to work with the mind, like 'decentering,' using these skills to defuse/alter negative emotions, reflecting the highest branch (emotional management). Narratives of EI development were mirrored in longitudinal increases on the RMET, which indexes the EI emotion recognition branch (Harrison et al., 2009). Thus, apropos recent debates, results suggest that rather than a stable trait (e.g. Petrides & Furnham, 2003), EI is an ability amenable to training (Mayer, Salovey, & Caruso, 2008), in this case through meditation. Although lack of a control group in our study means caution is required in making such assessments, this accords with recent control-group studies linking meditation to EI development (Chu, 2009).

Finally, the third strand of the central argument is that improved EI facilitated wellbeing. Evidence here was solely from the qualitative component. Being able to more constructively 'work' with their emotions, men could deal more effectively with distress, and were less likely to respond in maladaptive ways. Furthermore, EI skills learned in meditation extended beyond the practice session. Men deployed these skills to help cope with negative feelings '*in-situ*,' like trying to decenter during an argument. Furthermore, men described being able to relieve their distress and manage their emotions through various strategies – whether cognitive (e.g., decentering), behavioral (e.g., exercising), or interpersonal (e.g., talking with companions). This strategic management indicates self-regulatory competence, and further demonstrates the development of the fourth EI branch.

Given constructions of men as relatively emotionally restricted, the development of EI skills in men is noteworthy. Our study suggests men can address, and even ameliorate, the kind of normative male alexithymia which Levant (1992) suggests is common among men. As such, the present study aligns with an emergent vein of work acknowledging adaptability in men, and in how they engage with their emotions and broader wellbeing. However, our study extends this work. Although recent studies show men challenging traditional masculine norms around emotion – e.g., that men should be tough – this challenge often seems limited to men being willing/able to simply express emotion (Bennett, 2007), or admit to emotional problems and seek help (Oliffe et al., 2010). However, we go further in highlighting the development of complex emotional management skills in men, showing men as emotionally capable in ways hitherto not uncovered in depth. Through meditation, participants suggested they had become less susceptible to pitfalls covered by Addis' (2008) frameworks: Men were better able to recognize negative emotions (cf. the masked depression framework) and respond to distress in helpful ways (cf. the gendered responding framework), and were less likely to enact harmful 'externalizing' behaviors (cf. the masculine depression framework). Given the connections between poor emotional management skills and negative mental health outcomes (Aldao et al., 2010), our findings have important implications for men's well-being. Future work could explore ways to further understand and encourage EI development in men.

Limitations and Implications for Psychologists

Limitations of the study design means caution is needed in interpreting the results. Aside from the lack of controls, it is possible that men's improved performance over time on the cognitive tasks was due to practice effects; however, a meta-analysis of practice effects in cognitive testing suggested that a test-retest interval of a year – as here – was sufficient for effects to be minimal (Hausknecht, Halpert, Di Paulo, & Gerrard, 2007). Regarding EEG, its measurement poses challenges in terms of trying to analyze the functioning of a three-dimensional brain from a two-dimensional topographical representation generated by comparatively faint scalp potentials (Kaiser, 2005). Nevertheless, Kaiser argues that EEG can still reliably assess psychological conditions and states. Finally, reflexivity requires an acknowledgement that narratives produced in interviews are, to some extent, a performance, and research interactions can represent an opportunity for men to perform masculinity as they engage in 'identity work' (Allen, 2005). From this perspective, it could be asserted that men's narratives about acquiring emotional management skills were not indicative of cognitive change, but reflected modes of discourse common to men in meditation circles. However, without ignoring the potential for accounts to be influenced by discourses, the convergence of the narrative and cognitive neuroscience results suggests these accounts are not *merely* constructions, but reflect developments in men's inner lives. Findings here are likely to be of interest to psychologists exploring how men can be encouraged to do masculinity in ways more conducive to mental health. We found that there is a greater degree of flexibility in the way men can learn to manage their emotions than hitherto discussed in the literature. Meditation may be one way men can ameliorate unhelpful patterns of restrictive emotionality.

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Appendices

EEG recording

EEG signals were acquired using a NeXus™ EEG amplifier with 24 bit AD converter (Mind Media BV), a wireless two-channel recording system for bilateral monitoring, connected via bluetooth to a laptop (Acer Aspire; 5920G; 2GHz Processor; 4GB RAM), where signals were recorded, processed in real-time, and analyzed using BioTrace+ software. Oscillations were registered by Blue Disc Electrodes attached to the scalp. Participants' skin at the electrode sites was scrubbed with 'NuPrep skin prepping gel,' and Ten20 conductive paste applied to the electrode sites. Electrodes were connected to the bluetooth unit through the NeXus EXG sensor, a dual channel sensor using high-grade connectors (brushed aluminum with carbon coated cables and active shielding). Raw EEG signals were amplified, with band limits of .01 and 64 Hz, and stop-band filtering (48-52 Hz) used to eliminate mains interference. Amplified signals were sampled at a rate of 1024 per second; from this EEG channels were sampled at 256 samples per second, digitally filtered with a IIR Butterworth Bandpass 3rd order filter, and root mean squared in 1/8 second epochs in frequency bands: Theta (4-8Hz); Alpha (8-12Hz); SMR (12–15 Hz); Beta (15–21 Hz) and Gamma (34–45Hz).

DISS tasks

The details of the four tasks used, as shown in figure 3, are detailed below.

[Insert figure 3 about here]

- Visual warning (top left): Six bars rise up at different speeds; when one reaches the top, numbers appear on the bars reflecting relative position. Participants were required to click the bars in height order, tallest to shortest. Ten points awarded for successful de-activation (numbers clicked in correct order).
- 'Stroop' (top right): Participants were required to identify the font of the color-name word that appears to the left of the panel by clicking on the appropriate color block

(e.g., for ‘BLUE’ written in green font, as above, the correct answer is green). Ten points awarded for correct responses. Ten points subtracted for incorrect responses, and for failure to respond within 20 seconds.

- Number tap (bottom left): Each grid presentation features a different configuration of numbers. Participants were required to click on all the instances of the highest digit on any given configuration. Ten points awarded for grid completion. Ten points deducted for failure to respond within 40 seconds.
- Visual monitoring (bottom right)*:* A dot travels outward from the center. Participants were required to press reset before the dot left the outer-most circle, letting it travel as far as possible before doing so. Two points awarded for every circle passed through. Ten points deducted for every 0.5 second delay in pressing reset after the dot had left the outer-most circle.

Table 1

Demographic descriptive statistics of the sample of meditators

	Age		IQ		Years meditating		Hrs/week meditating	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Novices	38.36	9.39	114.07	6.85	5.14	2.54	3.32	1.51
Elders	46.40	7.03	115.00	6.38	16.13	5.58	4.83	1.89

Table 2

RMET task scores: Normality tests and mean +/- SD (novices and elders at T1 and T2)

	T1		T2	
	Mean	SD	Mean	SD
Novices	27.00	2.32	28.86	2.93
Elders	25.75	2.49	26.67	3.44
All	26.34*	2.45	27.41*	3.82

Note. RMET=Reading the Mind in the Eyes task. DV is the number of correct identifications of emotions in a series of 36 photos.

* ANOVA main effect for time, p = .049.

Table 3

DISS task scores: Normality tests and mean +/- SD (novices and elders at T1 and T2)

	T1		T2	
	Mean	SD	Mean	SD
Novices	1065.57	443.87	1277.86	441.49
Elders	883.60	441.93	1023.07	419.24
All	945.59*	502.23	1145.66*	441.65

Note. DISS=Defined Intensity Stressor Simulation. DV is calculated by the program, based on an aggregation of rewards and penalties accumulated across all four concurrent tasks.

* ANOVA main effect for time, p = .013.

Table 4

Theta amplitude: Normality and mean +/- SD during baseline, DISS and meditation (novices and elders at T1 and T2)

	T1		T2	
	Mean	SD	Mean	SD
Novices: Baseline	11.18	2.85	11.86	1.76
Elders: Baseline	10.17	2.17	11.01	2.09
All: Baseline	10.69*	2.55	11.45**	1.94
Novices: DISS	13.23	2.15	12.37	1.81
Elders: DISS	12.32	1.60	12.34	2.54
All: DISS	12.80	1.93	12.35	2.15
Novices: Meditation	11.76***	4.57	13.59***	5.17
Elders: Meditation	13.12	4.87	13.25	4.54
All: Meditation	12.41*	4.86	13.43**	4.79

* T1 ANOVA main effect for segment (baseline, meditation), $p = .013$

** T2 ANOVA main effect for segment (baseline, meditation), $p = .024$

*** Dependent T-Test, $p = .050$, one-tailed.

Table 5

Mean +/- SD of the longitudinal differential for the RMET, DISS, baseline theta, DISS theta and meditation theta (novices and elders)

	Novices		Elders	
	Mean	*SD*	Mean	*SD*
RMET	1.29	2.92	0.87	2.69
DISS	166.29	427.80	9.60	418.99
Baseline theta	0.88	2.40	0.65	1.93
DISS theta	-0.82	1.55	-0.09	3.15
Meditation theta	2.02	4.21	0.73	2.64

Note. The longitudinal differential was calculated by subtracting T1 measurements from T2 measurements.

Table 6

Pearson's product moment correlation of the change over time in cognitive task scores (T2 scores – T1 scores) and in theta amplitude (T2 amplitude – T1 amplitude) (all participants together, and split by group)

	RMET score change			DISS score change		
	Novices	Elders	All	Novices	Elders	All
Baseline Theta change	-.032	0.24	-.003	-.275	.167	.008
DISS Theta change	-.028	-.036	-.042	-.457	-.090	-.176
Meditation Theta change	.387	.423	.399*	.554**	-.196	.256

* *p* = .032

** *p* = .040

Table 7

Qualitative themes (with number of participants endorsing theme in brackets)

Theme	Sub-theme	Example quote
1. (n = 21) Learning to pay attention	1.1. (n = 8) Turning 'inward' an unfamiliar activity	*"I'd never done anything liking sitting doing nothing for 20 minutes."* (P27) *"Nobody ever taught me how to deal with my emotions"* (P28)
	1.2. (n = 9) Shock/surprise at observing mind	*"There's the shock… of really encountering your mind for the first time* (P12)
	1.3. (n = 14) Training awareness in meditation	*"I can drift away*, *get carried away by my thoughts*, *but it's just training… Meditation is about building awareness."* (P8)
2. (n = 24) Cultivating helpful attitudes	2.1. (n = 16) Encountering negativity (12)	*"A shock. I had this view of myself as helpful*, *but I [found I had] thoughts of violence*, *or irritability*, *or unkindness."* (P29)
	2.2. (n = 10) Developing self-acceptance	*"It's [about] trying… to be accepting and interested… because it does hurt when you exclude parts of yourself*." (P17)
	2.3. (n = 14) Developing self-compassion	*"[It felt] poignant... an eye opener... realizing that there was such a thing as self-regard*, *that you could actually practice being... kinder to yourself."* (P23)
3. (n = 18) Working with the mind	3.1. (n = 8) Understanding patterns of mind	*"You can sit with hate... fear*, *loneliness*, *longing*, *sadness. You know it will pass... Before I didn't have the awareness*, *I thought it would last forever."* (P12)
	3.2. (n = 12) Decentering	*"Rather than going off down some spiral into a pit of despair… now I just stop it there and go*, *'I'm doing that again.'"* (P7)
	3.3. (n = 8) Moving attention to the body	*"I just paid attention to the sensations in my chest... After a while I let go of my thoughts... giving rise to my suffering."* (P19)
	3.4. (n = 7) Contextualizing	*"I try to [keep] a sense of proportion… You're just another dot in the universe."* (P4)

	difficulties	
4. (n = 22) Managing wellbeing through mindfulness ‘in action’	4.1. (n = 17) Awareness in general life	*“Driving is good practice. Can you be compassionate with other road users?... Meditation is all the time”* (P12)
	4.2. (n = 9) Self-control	*“I used to shout a lot. [Then] I started getting this thinking pause where I’d think, ‘Last time… it didn’t do any good, so I won't shout.”* (P27)
	4.3. (n = 7) Freedom of choice	*“[I have] more choice to act and behave in certain ways. I can make lifestyle choices which have an impact on my health…habits that lead me away from well-being [are] less impulsive.*” (P17)
	4.4. (n = 6) Meta-coping ability	*I still get bad moods*, *but I’m much more able to know what to do. Before I wouldn’t do anything… just carry on getting upset… Now I know I’ve got ways to get out of it... It’s so easy to think one’s the victim of one’s own mind*, *but... we’re in the driving seat.”* (P18)

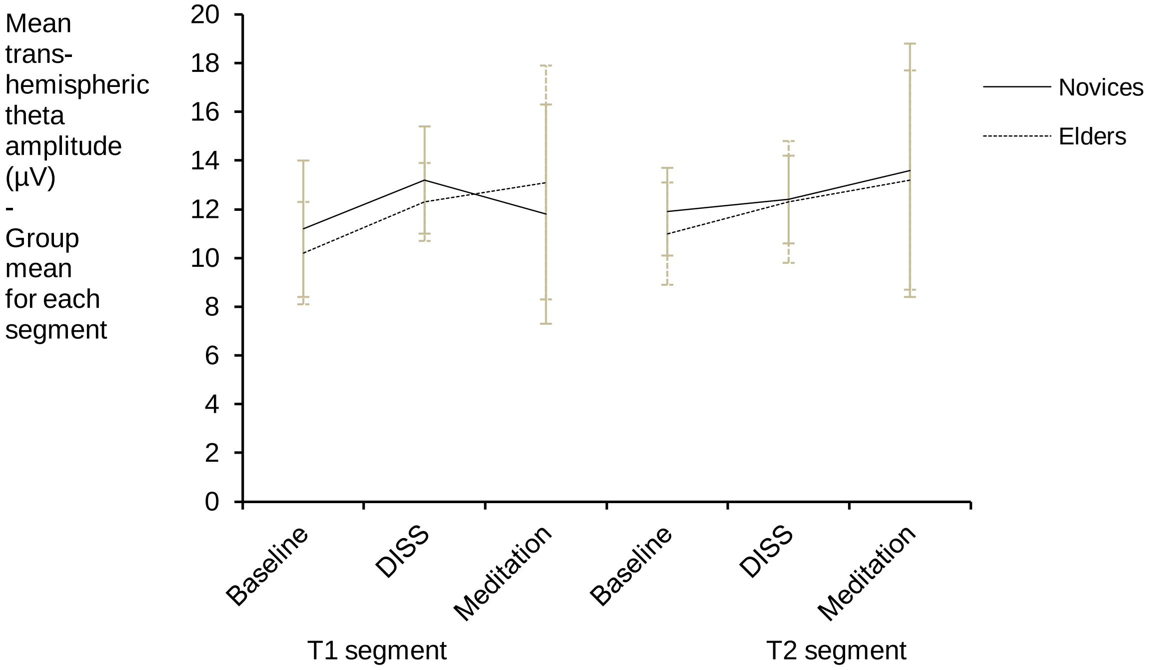

Figure 1

Mean +/- SD theta amplitude during baseline, DISS and meditation (novices and elders at T1 and T2)

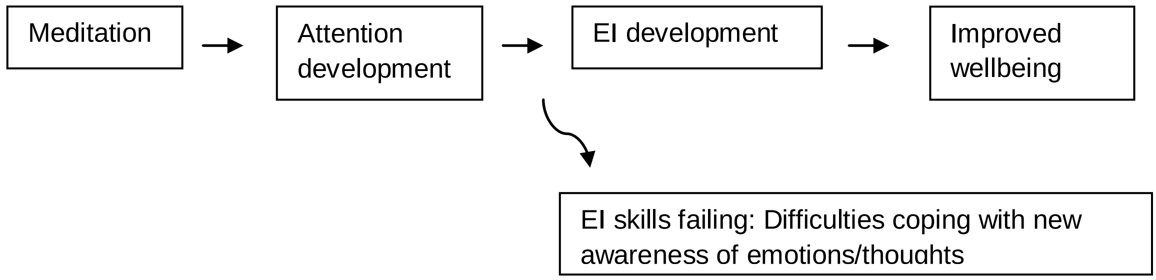

Figure 2

Model linking meditation and wellbeing

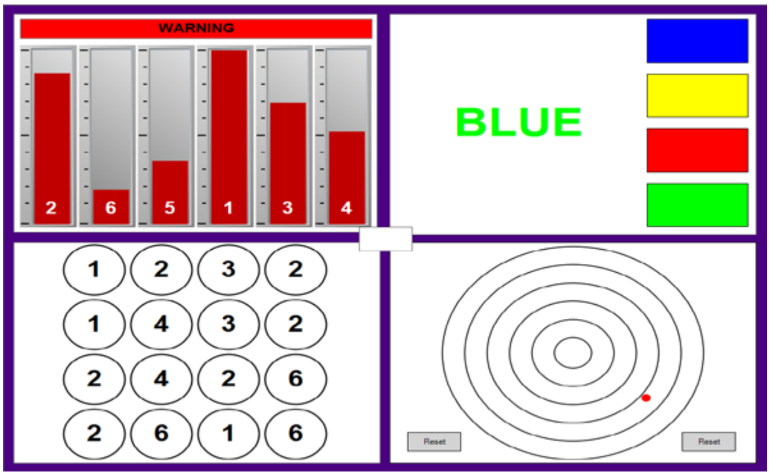

Figure 3

Screen-print of the four consecutive tasks used in the DISS task

Online Table 1

Sociodemographic characteristics of the sample of 30 male meditators

Age

Years	20 – 30	30 – 40	40 – 50	50 – 60	60 +
Participants	n = 4	7	14	4	1

Meditation experience

No. of years	0 – 5	5 – 10	10 – 15	15 – 20	20 +
Participants	7	8	7	4	4

Occupation

Category	Health	Community	Business	Education	Other
Participants	9	5	5	3	8

Education

Level	Secondary	College	University	Post-grad	Professional
Participants	2	2	8	6	12

Ethnicity

Category	White British	Mixed British	White other	Asian
Participants	21	1	6	2

Online Table 2

Main interview probes

Example question clause	Narrative prompts
e.g. "Say something about…"	"…life before meditation?" (set opening request)
"Can I ask you about…"	"…why you decided to begin meditating?"
	"…your first experience of meditation?"
	"… subsequent experiences of practicing meditation?"
	"…positive experiences in meditation?"
	"…negative experiences in meditation?"
	"…where do you see yourself going with meditation in the future?"

Note. These main prompts were often followed up by further prompts designed to draw out narratives, e.g., "Then what happened?", or, "Could you say a bit more about that?"