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Mindfulness meditation as a tool for increasing emotion regulation and reducing violence

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Introduction

Aggressive and violent behaviours are often thought of as either reactive or proactive. While reactive aggression usually follows a perceived insult or slight, and is driven by strong emotions including anger, proactive aggression refers to planned aggression for instrumental and personal gain.1 These contrasting forms of aggression may be commonly referred to as 'hot' and 'cold', reflecting the emotional nature of reactive aggression, and the cold and calculating nature of proactive, instrumental aggression. An appreciation of the different underlying motivations for these two forms of aggression is important to inform the development of treatment programs and interventions that aim to reduce violence. For example, interventions aiming to reduce aggression with a strong emotional component should have a focus on developing strategies for successful emotion regulation. These strategies, however, may enjoy relatively less success with instrumentally violent individuals. In this paper I will briefly outline the importance of emotion regulation abilities for keeping a check on impulsive and reactive aggression, and the potential for mindfulness meditation to improve emotion regulation among adult male, and female, offenders.

Emotions refer to spontaneously arising mental states, and can be either fleeting or long lasting, are linked to the goals of the perceiver of the emotion, and involve multisystem changes, including changes in physiological processes and behaviour. Although emotions can be experienced as weak or particularly strong and powerful, the intensity of emotional experience can be regulated. This process of emotion regulation broadly refers to the ability to influence which emotions are experienced, and when and how they are felt. Thus, one can upregulate an emotion making the emotional experience more intense, or down regulate an emotion, such that the emotional experience is reduced. Emotion regulation can be achieved using a variety of different strategies, including *situation selection*, whereby particular situations are sought out or avoided; *situation modification*, where active efforts are made to modify an emotionally unpleasant situation to make the experience more positive; changes in the deployment of attention such that the emotional situation becomes the focus of attention, or attention is distracted away from the situation; or *cognitive change*, including the effortful process of reappraisal.²

Mechanism of emotion regulation

The process of emotion regulation, and particularly that of reappraisal, relies heavily on cognitively taxing resources. The prefrontal cortex (PFC), a neural structure situated toward the front of the brain that is essential for carrying out tasks that require cognitive effort, is crucial for the process of emotion regulation. The PFC has reciprocal connections with deeper lying structures, including those in the limbic system, most notably the amygdala. The amygdala refers to a small, almond shaped structure found deep in the temporal lobes. It is responsible for the processing of emotion and emotional reactions, including aggression, fear and anxiety, as well as motivation, emotional learning, and fear conditioning. The reciprocal connections between the PFC and the amygdala mean that the PFC can modulate the amygdala response to emotional stimuli. Research has shown that the cognitive reappraisal of emotion is associated with increased activity in territories of PFC, and associated reductions in amygdala activity.³ Similar results have also been noted with respect to the regulation of positive emotion.⁴ Here, participants were instructed to either respond in a normal manner, or inhibit their arousal while viewing erotic film excerpts. This study showed increased PFC activity, and reduced amygdala responsivity, during the attempted inhibition of positive emotion, in this case sexual arousal.

^{1.} Crick, N. R., & Dodge, K. A. (1996). Social information processing mechanisms in reactive and proactive aggression. *Child development*, *67*(3), 993-1002.

^{2.} Gross, J. J. (1998a). The emerging field of emotion regulation: An integrative review. *Review of General Psychology, 2*, 271-299.

Ochsner, N., Bunge, S. A., Gross, J. J., & Gabrieli, J. D. E. (2002). Rethinking feelings: An fMRI study of the cognitive regulation of emotion. *Journal of Cognitive Neuroscience*, 14, 1215-1229.

^{4.} Beauregard, M., Levesque, J., & Bourgouin, P. (2001). Neural correlates of conscious self-regulation of emotion. *Journal of Neuroscience, 21*, RC165.

Impulsive aggression and the neural circuitry for emotion regulation

The systems outlined above that are involved in emotion regulation have also been linked with violence when these systems go wrong. A review of the literature on the neural mechanisms of emotion regulation concluded that impulsive aggression and violence arise as a consequence of dysfunction in neural circuits involving the PFC, amygdala, and the anterior cingulate cortex.⁵ Specifically, it was suggested that impulsive violence may reflect a greater propensity to experience negative affect, including anger, distress, and agitation, and an impaired ability to respond appropriately to the anticipated negative outcomes associated with violent and aggressive behaviour. However, it should also be noted that there are significant individual differences in the ability to regulate and suppress emotions.

Despite findings of emotion regulation difficulties among antisocial populations, treatment has typically focussed on other areas of criminogenic need, including pro-offending attitudes and empathic functioning. Typically, antisocial individuals are treated through the use of cognitive behavioural therapies. More recently it has been suggested that other modes of treatment might better target emotion regulation difficulties, with the ultimate aim of reducing violence. For example, it has been suggested that a 'third wave' of cognitive behavioural therapies that are influenced by Eastern philosophical and contemplative traditions may be of relevance in a forensic context.⁶ Such therapies, perhaps most notably mindfulness, have achieved growing attention in the clinical literature and their use is supported by various promising outcome studies.

Mindfulness

Increases in executive function, attention, and emotion regulation have been noted in relation to various meditative techniques. Although mindfulness is probably the most studied meditative practice in Western clinical, psychological and neuroscience disciplines, other meditative techniques have been studied (e.g., yoga, tai chi). Mindfulness meditation, adapted from Buddhist traditions and of growing influence in more Westernized countries, has been incorporated in to the treatment of various mental and physical health problems, including depression, anxiety, and chronic pain.

Although it is difficult to define mindfulness, most definitions recognise multiple components to the approach. For example, a two-component definition of mindfulness includes an attention regulation component, and an experiential component.⁷ The self-regulation of attention refers to the ability to focus attention on immediate experience — on changes in thoughts, feelings, and experiences, from moment-to-moment - without mind wandering or intrusive thoughts. This component requires skills in sustained attention, to focus attention on current experience, and skills in attention switching, to bring attention back to the present moment. The second component refers to an attitude of curiosity, openness, and acceptance. Here, the individual is challenged to be open to the stream of internal experience, to separate out different experiences, emotions and sensations, and to accept these experiences without judgment, and independent of valence. Mindful individuals are therefore less reactive and more accepting in coping with emotional experience.

Mindfulness techniques have been integrated into several therapy programs, for example, Mindfulness-Based Stress Reduction (MBSR)^a and Mindfulness-Based Cognitive Therapy (MBCT).⁹ MBSR is usually delivered in group sessions over an eight-week period. As well as guided weekly sessions lasting up to three hours and including mindfulness and yoga exercises, participants are also urged to self-practice, and often take part in a full day silent retreat. Mindfulness exercises may consist of body scan meditation, where attention is focussed in turn on different parts of the body, mindful stretching exercises, and sitting mindfulness meditations. MBSR outcome studies show decreased emotional reactivity and a shift away from the tendency to engage in harmful and ruminative thoughts following the program. This approach generally assumes that greater practicing of mindfulness will reduce negative affect and increase wellbeing and coping.

Although the findings form MBSR treatment outcome studies for psychological disorders are too numerous to review here, meta-analytical reviews of the literature have been conducted and support the therapeutic utility of MBSR for the treatment of various mental health problems. In a review of 20 reports of the health benefits associated with MBSR across clinical populations with pain, cancer, heart disease, depression and anxiety, it was concluded that MBSR helped a variety of populations to cope with their clinical and non-clinical problems.⁹ Similarly positive results have been reported for MBCT. In a review of the benefits associated with MBCT, it was found that across six separate studies

^{5.} Davidson, R. J., Putnam, K. M., & Larson, C. L. (2000). Dysfunction in the neural circuitry of emotion regulation—A possible prelude to violence. *Science*, *289*, 591–594.

^{6.} Howells, K. (2010). The 'third wave' of cognitive-behavioural therapy and forensic practise. Criminal Behaviour and Mental Health, 20, 251-256.

^{7.} Bishop, S. L., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., ... Devins, G. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice*, *11*, 230-241.

^{8.} Grossman, P., Niemann, L., Schmidt, S., & Walach, H. (2004). Mindfulness-based stress reduction and health benefits: A meta-analysis. *Journal of Psychosomatic Research*, *57*, 35–43.

Teasdale, J. D., Williams, J. M., Soulsby, J. M., Segal, Z. V., Ridgeway, V. A., & Lau, M. A. (2000). Prevention of relapse/recurrence in major depression by mindfulness-based cognitive therapy. *Journal of Consulting and Clinical Psychology*, 68, 615–623.

MBCT reduced the incidence of depressive relapse/recurrence, with a 43 per cent risk reduction in a subgroup of patients with three or more previous episodes.¹⁰ The results of such outcome studies are of relevance for the prison system, which houses a large number of individuals with mental health problems, including mood and anxiety disorders. However, as well as helping individuals in the prison system to feel better, mindfulness based therapies may also lead to reductions in aggressive behaviours. Such benefits may be mediated by improvements in mood, as well as improvements in self-regulation.

Mindfulness and emotion regulation

An extensive body of evidence suggests that the effects of mindfulness may reflect changes in attention regulation and emotion regulation processes. For example, the emotion regulation strategy of rumination, the repetitive rehearsal on something negative, may lead to increased levels of hostility, anger, and verbal aggression. In one study it was found that mindfulness was related to anger and hostility through a relationship with rumination, such that increased mindfulness was associated with lower levels of rumination, and lower levels of rumination were associated with reduced levels of anger and hostility.¹¹ These results are also consistent with the results of several other studies.

In further support of a relationship between mindfulness and emotion regulation, it has been suggested that experienced meditators may show a more flexible pattern of emotion regulation, whereby prefrontal circuits are engaged to regulate more automatic amygdala based responses.¹² Altered PFC and amygdala activation has also been reported for inexperienced meditators following the instruction to experience negative images without judgment.¹³ In particular, the neural circuits activated during mindfulness may be similar to those activated when using the cognitive reappraisal strategy for emotion regulation. Thus, overlap in areas of neural activation has been observed among inexperienced meditators when asked to experience images mindfully, or when asked to engage in a process of cognitive reappraisal.¹⁴ These results therefore suggest

considerable overlap in those regions underlying emotion regulation and mindfulness meditation.

As well as differences in brain structure and function, mindfulness has also been linked with changes in physiology, most notably in heart rate variability (HRV). HRV refers to differences in the inter-beat interval of the heart. More elevated levels of HRV have been linked with greater abilities for emotion regulation and more flexible physiological responding to emotional situations. Notably, increases in HRV have been observed among trained meditators during mindfulness meditation,¹⁵ and indicate increased autonomic regulation. However, other results suggest that the relationship between mindfulness and HRV may not be straight-forward, with a positive relationship between the two observed only for people with high levels of general anxiety.¹⁶ The precise relationships between mindfulness and autonomic indicators of emotion regulation are not well understood in relation to aggression and antisocial behaviour. However, the hypothesis that mindfulness meditation would be related to more flexible physiological responding could be easily tested in forensic settings with minimal intrusion. If confirmed, this work could have huge benefits for the treatment of aggressive and antisocial behaviour, and would represent a well understood mechanism of change for reducing violence.

Mindfulness in a forensic context

Although the use of mindfulness programs in forensic settings is still in its infancy, some studies have found benefits of meditation based programs among offending participants. One review identified eight studies of mindfulness and other Buddhist-derived interventions in correctional settings, and results suggested significant improvements across various factors including negative affect, substance use, and anger/hostility.¹⁷ Of those studies that used a mindfulness based intervention, the results of one study are of particular note, reporting that between 1992 and 1996, a sample of approximately 2,000 individuals in Massachusetts correctional institutions took part in a MBSR program lasting between six and eight weeks.¹⁸

^{10.} Piet, J., & Hougaard, E. (2011). The effect of mindfulness-based cognitive therapy for prevention of relapse in recurrent major depressive disorder: a systematic review and meta-analysis. *Clinical Psychology Review, 31*, 1032-1040.

^{11.} Borders, A., Earleywine, M., & Jajodia, A. (2010). Could mindfulness decrease anger, hostility, and aggression by decreasing rumination? *Aggressive Behavior, 36*, 28-44.

^{12.} Chiesa, A., Brambilla, P., & Serretti, A. (2010). Functional neural correlates of mindfulness meditations in comparison with psychotherapy, pharmacotherapy and placebo effect. Is there a link? *Acta Neuropsychiatrica, 22*, 104-117.

^{13.} Lutz, J., Herwig, U., Opialla, S., Hittmeyer, A., Jäncke, L., Rufer, M., ... & Brühl, A. B. (2014). Mindfulness and emotion regulation—An fMRI study. *Social Cognitive and Affective Neuroscience*, *9*(6), 776-785.

^{14.} Opialla, S., Lutz, J., Scherpiet, S., Hittmeyer, A., Jäncke, L., Rufer, M., ... & Brühl, A. B. (2014). Neural circuits of emotion regulation: a comparison of mindfulness-based and cognitive reappraisal strategies. *European Archives of Psychiatry and Clinical Neuroscience, 265*, 45-55.

^{15.} Delgado-Pastor, L. C., Perakakis, P., Subramanya, P., Telles, S., & Vila, J. (2013). Mindfulness (Vipassana) meditation: Effects on P3b event-related potential and heart rate variability. *International Journal of Psychophysiology, 90*, 207-214.

^{16.} Mankus, A. M., Aldao, A., Kerns, C., Mayville, E. W., & Mennin, D. S. (2013). Mindfulness and heart rate variability in individuals with high and low generalized anxiety symptoms. *Behaviour Research and Therapy*, *51*, 386-391.

^{17.} Shonin, E., Van Gordon, W., Slade, K., & Griffiths, M. D. (2013). Mindfulness and other Buddhist-derived interventions in correctional settings: a systematic review. *Aggression and Violent Behavior, 18*, 365-372.

^{18.} Samuelson, M., Carmody, J., Kabat-Zinn, J., & Bratt, M. A. (2007). Mindfulness-based stress reduction in Massachusetts correctional facilities. *The Prison Journal*, *87*, 254-268.

Sessions were typically of 60 to 90 minutes in duration, and involved guided meditation, mindful stretching, and yoga exercises. Benefits of mindfulness mediation included reduced hostility, and increases in self-esteem and mood states, although changes were typically greater for females compared to males. Although the authors do not report effects on the incidence of violent and aggressive behaviours, the results do suggest that mindfulness may be an effective intervention for individuals with convictions, helping them to handle the stress of incarceration and to better deal with emotional challenges.

The effects of mindfulness meditation have also been examined by Singh and colleagues who observed reduced signs of verbal and physical aggression among three individuals with a history of mental illness and hospitalization.¹⁹ Singh and colleagues have also evaluated the benefits of mindfulness in a sample of three adolescents with a diagnosis of conduct disorder.²⁰ Here, participants were instructed to focus attention on a particular part of the body, and away from anxiety provoking or emotionally challenging thoughts or situations. Participants received instructed training with a therapist three days a week for four weeks, and follow up was conducted over one school year. Mindfulness in this sample was associated with reductions in cruelty and non-compliance over a one year follow up period. Although promising, these studies are limited by small sample sizes. Furthermore, the methodology employed for analysis does not allow for the interpretation of effect sizes and significance levels in these data.

Mindfulness modules have also been successfully incorporated in to forensic therapeutic programs including Dialectical Behaviour Therapy [DBT] for the treatment of borderline personality disorder (BPD). The mindfulness component of DBT emphasizes the use of mindful observation, description and participation, and states that these actions should be performed nonjudgmentally, onemindfully, and effectively. However, unlike other mindfulness based practices, DBT does not require formal mindful meditation, such as sitting meditation. In a test of the therapeutic benefits of DBT for BPD, one study randomly assigned 58 women with BPD to either 12 months of DBT or 'treatment as usual' which involved not more than two sessions with a psychologist or psychiatrist.²¹ Retention rates were significantly higher among those attending DBT, while rates of self-mutilating and self-harming were reduced relative patients with 'treatment as usual'. Emerging evidence suggests that these components help individuals to develop more acceptance based techniques for emotion regulation. However, although this evidence supports the use of mindfulness in a forensic context, it should be noted that there is currently a lack of empirical research to support a conclusion that mindfulness represents an effective violence reduction strategy. Future research should seek to examine the benefits of mindfulness and other meditational practices on the incidence of violent and aggressive behaviours in prison populations.

Barriers to mindfulness in secure settings

The use of mindfulness in forensic settings requires careful consideration not only of the potential benefits of mediational training, but also potential negative effects. Adverse effects of meditative practice have been reported for non-mindfulness variants of mediation. These effects include panic attacks, despair, and uncomfortable kinaesthetic sensations.²² The extent to which negative effects are experienced following mindfulness based mediation should be carefully monitored. Furthermore, potential negative effects may apply in particular to individuals who show low trait mindfulness at the beginning of training. For example, it has been shown that mindfulness, compared to cognitive training, increased salivary cortisol reactivity to a social evaluative stress test, and this increase was particularly pronounced for low trait mindfulness participants.²³ This finding may reflect the cognitively demanding nature of initial mindfulness training and associated cognitive self-regulatory resource depletion.

Other potential barriers involve the measurement of mindfulness and assessment of change in mindfulness. Although self-report mindfulness measures exist, the psychophysiological and neural underpinnings of mindfulness remain poorly articulated, and such measures may not be practical in some forensic settings. Furthermore, cultural barriers to mindfulness training may also exist, and participants may be unwilling to engage in Buddhist spiritualist techniques, or find it difficult to understand these concepts. Despite these barriers, the evidence that mindfulness exerts beneficial effects on emotion selfregulatory abilities suggests that it may represent a useful therapeutic tool when working with violent populations. Furthermore, mindfulness may reduce violent and aggressive behaviours among individuals in highly emotionally charged including prisons and therapeutic environments, communities.

^{19.} Singh, N. N., Lancioni, G. E., Winton, A. S., Adkins, A. D., Wahler, R. G., Sabaawi, M., & Singh, J. (2007). Individuals with mental illness can control their aggressive behavior through mindfulness training. *Behavior Modification*, *31*, 313-328.

^{20.} Singh, N. N., Lancioni, G. E., Joy, S. D. S., Winton, A. S., Sabaawi, M., Wahler, R. G., & Singh, J. (2007). Adolescents with conduct disorder can be mindful of their aggressive behavior. *Journal of Emotional and Behavioral Disorders*, *15*, 56-63.

^{21.} Verheul, R., Van Den Bosch, L. M. C., Koeter, M. W., De Ridder, M. A., Stijnen, T., & Van Den Brink, W. (2003). Dialectical behaviour therapy for women with borderline personality disorder 12-month, randomised clinical trial in The Netherlands. *The British Journal of Psychiatry, 182*, 135-140.

^{22.} Shonin, E., Van Gordon, W., & Griffiths, M. D. (2014). Do mindfulness-based therapies have a role in the treatment of psychosis?. *Australian and New Zealand Journal of Psychiatry, 48*, 124-127.

^{23.} Creswell, J. D., Pacilio, L. E., Lindsay, E. K., & Brown, K. W. (2014). Brief mindfulness meditation training alters psychological and neuroendocrine responses to social evaluative stress. *Psychoneuroendocrinology*, 44, 1-12.