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Participation in a 10-week course of yoga improves behavioural control and decreases psychological distress in a prison population☆

Amy C. Bilderbeck [a,1], Miguel Farias [b,*,1], Inti A. Brazil [c,d], Sharon Jakobowitz [e], Catherine Wikholm [f]

[a] Department of Psychiatry, Oxford University, United Kingdom
[b] Department of Experimental Psychology, Oxford University, United Kingdom
[c] Donders Institute for Brain, Cognition and Behaviour, Radboud University Nijmegen, The Netherlands
[d] Pompestichting, Nijmegen, The Netherlands
[e] Institute of Psychiatry, King's College, University of London, United Kingdom
[f] Department of Psychology, University of Surrey, United Kingdom

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ABSTRACT

Background: Yoga and meditation have been shown to be effective in alleviating symptoms of depression and anxiety in healthy volunteers and psychiatric populations. Recent work has also indicated that yoga can improve cognitive-behavioural performance and control. Although there have been no controlled studies of the effects of yoga in a prison population, we reasoned that yoga could have beneficial effects in a setting where psychosocial functioning is often low, and the frequency of impulsive behaviours is high.

Methods: Participants were recruited from 7 British prisons and randomly allocated to either a 10-week yoga programme (yoga group; 1 class per week; $N = 45$) or a control group ($N = 55$). Self-report measures of mood, stress, and psychological distress were collected before and after the intervention period. Participants completed a cognitive-behavioural task (Go/No-Go) at the end of the study, which assessed behavioural response inhibition and sustained attention.

Results: Participants in the yoga group showed increased self-reported positive affect, and reduced stress and psychological distress, compared to participants in the control group. Participants who completed the yoga course also showed better performance in the cognitive-behavioural task, making significantly fewer errors of omission in Go trials and fewer errors of commission on No-Go trials, compared to control participants.

Conclusions: Yoga may be effective in improving subjective wellbeing, mental health, and executive functioning within prison populations. This is an important consideration given the consistently high rates of psychological morbidity in this group and the need for effective and economical intervention programmes.

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1. Introduction

Being in prison is a form of punishment with far reaching implications for one's physical and psychological functioning. Heightened levels of personal distress, aggression, antisocial behaviour, and substance abuse are commonly reported amongst incarcerated prisoners (Haney, 2002; Hawkins, 2003). Within the United Kingdom, there is an increasing recognition of the need for interventions that address the high rates of psychological problems and reduced wellbeing experienced by prisoners (Department of Health, 2001).

With the growing popularity of practises like meditation and yoga, policy makers, prison governors, and scientists have considered the effectiveness of applying these techniques to prisons. Thus far, the studies that have focused on meditation with this population have shown encouraging results, including reports of improved psychosocial function (Chandiramani et al., 1998;

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* Corresponding author. Wolfson College, Linton Road, Oxford OX2 6UD, United Kingdom. Tel.: +44 1865 271337.
E-mail addresses: Miguel.farias@wolfson.ox.ac.uk, miguel.farias@psy.ox.ac.uk (M. Farias).

[1] Joint first authors.

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Samuelson et al., 2007), reduced rates of recidivism (Alexander et al., 2003; Bleick and Abrams, 1987; Rainforth et al., 2003), and reduction in substance use (Bowen et al., 2006). Together, these findings suggest that transposing these techniques, which were originally devised as ascetic-spiritual practices, into prisons might help in the management of disinhibited and criminal behaviours (Walton and Levitsky, 2003).

Research on the benefits of yoga, on the other hand, is considerably thinner. That yoga has overall received less scientific attention is probably in part because it is a multifaceted and complex intervention, involving poses (*asanas*; physical movement and postures), breathing techniques, as well as relaxation and meditation. Such complexity makes it challenging when attempting to pin or break down the specific components of this practice which effect the individual's wellbeing. Nevertheless, there has recently been significant growth in the study of yoga in healthy populations. This body of research suggests that yoga is associated with improvements in mood (Shapiro and Cline, 2008), emotional function and life satisfaction (Hartfiel et al., 2011), reductions in anxiety, anger and aggression (Nagendra et al., 2008; Yoshihara et al., 2011), as well as significant reductions in perceived stress (Granath et al., 2006; Kirkwood et al., 2005; Rocha et al., 2012; Smith et al., 2007). In vulnerable and clinical samples, yoga has proved to be an effective method of reducing negative affect, depression, and anxiety (Banerjee et al., 2007; Michalsen et al., 2005; Vadiraja and Raghavendra, 2009; Woolery et al., 2004), and of improving emotional wellbeing (Moadel et al., 2007).

Yoga's potential application to a prison population is more specifically demonstrated by a number of studies showing that its practice is associated with reduced levels of state anxiety (for a review, see Sharma and Haider; Streeter et al., 2010; Vadiraja and Raghavendra, 2009) which, in turn, has been suggested to be linked to lower levels of aggression (Bekiari et al., 2006). Although most of the research thus far has focused on the health benefits of yoga, rather than the psychological processes that it stimulates, there is some indication of its underlying effects on cognition, including improved spatial recall (Manjunath and Telles, 2004), memory (Rocha et al. 2012) and sustained attention (Rangan et al., 2009), enhanced selective attention (Velikonja et al., 2010) and various improvements in cognitive functioning in patients with major depression (Sharma et al., 2006). Furthermore, a recent exploration of the neural underpinnings of the effects of yoga on cognition and emotion reported that yoga practitioners exhibited less reactivity in the right dorsolateral prefrontal cortex when presented with negative affective stimuli, compared to a control group (Froeliger et al., 2012). This last study suggests that yoga, besides having a range of psychological benefits, may specifically recruit frontal executive strategies that are implicated in the regulation of behavioural control. If this is true, then yoga could have a privileged role in a prison setting by enhancing executive functioning skills, including impulsivity, inhibition and attentional capacity, amongst prisoners. This is especially important since previous research has highlighted that this population presents deficits in executive functioning (Syngelaki et al., 2009).

Here, we aimed to extend the current literature on the psychological benefits and processes underpinning yoga practice by investigating the effects of a 10-week course of yoga in a sample of prisoners. More specifically, we combined self-report measures and a cognitive-behavioural task in a population randomly allocated to a yoga or a control group. Self-report measures of mood, stress, and mental health were administered at two time-points, before and after the 10-week course period, and scores provided by participants in the yoga and control groups were compared. We hypothesized that, similar to previous observations in healthy volunteers and patient groups, yoga would be associated with improved mood and psychological wellbeing. Secondly, participants completed a computerized Go/No-Go task after the 10-week yoga period. In this task participants are asked to respond when presented with one cue (in a "Go" trial) but must withhold that response when presented with a second cue (in a "No-Go" trial). By requiring individuals to inhibit pre-potent responses, this task has been used to tap aspects of executive function, and in particular those related to impulsivity (Band and van Boxtel, 1999). There is evidence that deficits in performance are related to difficulties in controlling violent behaviour; for example, violent offenders have been shown to make more errors of commission on No-Go trials, i.e. making a motor response when signalled to inhibit that response (Munro et al., 2007). Although there is considerable evidence that some types of meditation may confer benefits in cognitive tasks that require response inhibition and sustained attention (for a review, see Chiesa et al., 2011), there is no research addressing how yoga might enhance cognitive-behavioural control in prisoners.

2. Methods

2.1. Participants

A total of 173 participants were recruited from prisons in the West Midlands. Of these, 4 participants were excluded as they had experience of practising yoga, and 2 withdrew consent after being informed more extensively. The final cohort therefore consisted of 167 prisoner participants (155 male, 12 female), with ages ranging from 21–68; mean 36.08; and standard deviation 12.14 years. Seven prisons took part in the study,[2] including a young offenders' institution (aged 21–25) and a women's prison. The imprisonment conditions, as well as the crimes committed by participants, varied considerably. For example, one of the prisons (HMP Hewell) functioned on an open regime, allowing participants to go out and take part in educational courses. Another institution (HMP Shrewsbury) had a very high proportion of sex offenders. The study was approved by ethics committees of the British National Health Services and the Ministry of Justice, and all participants provided written informed consent to take part. Individuals assigned to the control group were informed that they would be given priority places in future yoga courses to be run shortly after the completion of the study. Exclusion criteria were the presence of psychiatric illness or a major medical condition, and current alcohol or drug abuse.

Of the 167 participants, 30.5% (51 individuals) were not present at the post-intervention assessment session, and a further 9.5% (16 individuals) attended less than half of the yoga sessions (<5). All these participants were excluded from the analysis. The final sample included 100 participants, 45 of which were in the yoga group (95.5% male; mean age 37.38 years, standard error 1.77 years), and 55 in the control group (90.9% male; mean age 39.42 years, standard error 1.89 years). There was no significant difference between groups in the proportion of participants that were lost at the post-intervention follow-up visit, $\chi(1) = 0.037$, $p = 0.848$. There were also no significant differences in age or gender composition between groups ($t[98] = 1.95$, $p = 0.45$ and $\chi[1] = 0.82$, $p = 0.31$, respectively).

2.2. Procedure

The study was planned and conducted as an exploratory trial, without sample size calculation or a predefined primary endpoint. After consenting to taking part in the research, prisoners were

[2] Participating prisons were: HMP – YOI Drake Hall; HMP Dovegate; HMP Hewell; HMP Featherstone; HMP Stafford; HMP Shrewsbury; and HMP – YOI Swinfen Hall. HMP = Her Majesty's Prison. YOI = Young Offenders' Institution.

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