

Mindful yoga as an adjunct treatment for forensic inpatients: a preliminary evaluation

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Although emerging evidence of yoga interventions shows benefits for people with schizophrenia, research is lacking regarding yoga interventions among forensic inpatients. This pilot study investigated the acceptability and effectiveness of an eight-week mindful yoga programme in improving psychological outcomes in 26 forensic inpatients. Outcome measures included the Five Facet Mindfulness Questionnaire, the Perceived Stress Scale, the Hospital Anxiety and Depression Scale and the Clinical Outcomes in Routine Evaluation – Outcome Measure as well as a qualitative component post-intervention and at two-month follow-up. Trends in the predicted direction suggested reductions in clinical symptoms over time, specifically anxiety. Key themes revealed increased body awareness, relaxation and self-directed yoga practices and breathing techniques for anxiety management. Ninety-two percent reported acceptance of the programme. Preliminary findings are encouraging and warrant further research into the application of mindful yoga in the management of distress and risk with forensic inpatients.

Keywords: forensic psychiatry and psychology; forensic mental health; schizophrenia; psychosis; mindful yoga; programme evaluation

Introduction

Most forensic mental health patients have a diagnosis of a mental illness, predominantly schizophrenia, personality disorder and often a coexisting substance use disorder (Brinded, Simpson, Laidlaw, Fairley, & Malcolm, 2001). Mental health issues are often compounded in offenders because of multiple factors that contribute to the complexities of managing mental health issues whilst managing risk of re-offending, criminogenic needs or crime-producing factors that are strongly correlated with risk to self or others (Latessa & Lowenkamp, 2005). While antipsychotic agents are a mainstay of treatment for forensic

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inpatients, up to 25% of patients prescribed antipsychotic medication respond poorly (Chakos, Lieberman, Hoffman, Bradford, & Sheitman, 2004), with consequent poor adherence (Valenstein et al., 2004). Relapse is not uncommon and residual symptoms can impact physical and emotional health of individuals with schizophrenia as well as the occupational, vocational and social aspects of patients' lives. Consequently, many forensic inpatients are regarded as 'treatment-resistant', requiring the provision of long-term psychiatric care, including security provision and continuous engagement in treatment. Yet, service provision is increasingly framed within a recovery paradigm (Drennan & Alred, 2012) whereby treatment occurs in collaboration with patients. Balancing the apparent paradox of security and therapy enhances the working alliance, strengthens protective factors (Davidson, O'Connell, Tondora, Styron, & Kangas, 2006) and generally contributes to a 'life worth living' (Simpson & Penney, 2011).

Adjunct treatments

Numerous commentators have identified the need for supplementary treatment options in forensic mental health (Duncan, Nicol, Ager, & Dalglish, 2006; Tapp, Perkins, Warren, Fife-Schaw, & Moore, 2013). Although widely used with schizophrenia (Jones, Hacker, Cormac, Meaden, & Irving, 2012), Cognitive Behavioural Therapy (CBT) may not be effective when treating chronically psychotic offenders (Hornsveld & Nijman, 2005). Conversely, early evidence suggests that physical activity (Holley, Crone, Tyson, & Lovell, 2011) and exercise (Gorczynski & Faulkner, 2010) have beneficial effects on physical and psychological well-being in people with schizophrenia. The importance of relaxation in schizophrenia is increasingly recognised, e.g. muscle relaxation decreases anxiety in schizophrenia (Chen et al., 2009; Vancampfort, Vancampfort, De Hert, Knapen, Maurissen, et al., 2011).

Mindfulness

Mindfulness is widely recognised as a way of paying attention to the present moment experience. It is characterised by witnessing one's inner responses with a non-judgemental attitude (Kabat-Zinn, 1994). Both Buddhist philosophy and Western psychology suggest that the development of mindfulness is associated with psychological well-being (Goldstein, 2002; Kabat-Zinn, 1994; Williams & Kabat-Zinn, 2011). When engaging in the practice of mindfulness, clinically distressed persons are encouraged to acknowledge thoughts that arise, and to direct the mind to, i.e. the natural breathing rhythm (Kabat-Zinn, 1994). The practice of mindfulness appears to alleviate feelings of being overwhelmed by connecting with the present moment, assisting a shift towards acceptance of the inner experience. This, in turn, has been found to e.g. increase the capacity to observe one's thoughts and feelings as passing experiences, without identifying with them (decentering) (Mace, 2008). Dispositional mindfulness

(Brown & Ryan, 2003; Lakey, Campbell, Brown, & Goodie, 2007) describes the relationship between mindfulness, or the capacity to become aware or observant of, i.e. internal processes or responses, and psychological outcomes, such as anxiety, depression, and rumination (Brown, Ryan, & Creswell, 2007). Studies on the impact of mindfulness on psychosis indicate a reduction in the experience of distressing voices, paranoia and anxiety (Brown, Davis, LaRocco, & Strasburger, 2010; Chadwick, Hughes, Russell, Russell, & Dagnan, 2009).

A growing interest in cultivating mindfulness among forensic mental health populations is emerging (Howells, Tennant, Day, & Elmer, 2010; Witharana & Adshead, 2013). Howells and colleagues conclude:

... many of the needs identified as important to any assessment of risk in offender populations (negative affective states, anger, deficiencies in emotional regulation, borderline features and impulsivity) can be understood as psychological states, which can be addressed by mindfulness interventions. (Howells et al., 2010, pp. 7–8)

Initial studies in compassion-focused therapy in forensic settings have been explored (Laithwaite et al., 2009). However, research also shows that being physically still while seated in meditation could generate feelings of distress (Finucane & Mercer, 2006; Kabat-Zinn, Chapman, & Salmon, 1997), thus signalling the necessity for other ways of learning mindfulness (e.g. yoga).

Yoga

Yoga, a practice comprised of both exercise and physical/mental relaxation, may be an effective adjunct treatment for persons with psychotic and non-psychotic mental illness (Becker, 2000). Modern *Hatha* yoga is a comprehensive system of practices that includes body postures (*asanas*) designed to strengthen the body and mind (Iyengar, 2001), breathing exercises (*pranayama*) intended to enhance respiration and the flow of ‘vital energy’ or ‘life force’ (*prana*), relaxation (*yoga nidra*) and meditation (*dharana*). The possible health effects of yoga are numerous because the practices involve the body, breath and mind, thus affecting multiple systems simultaneously. Foremost, yoga practices may impact on the regulation of the Autonomic Nervous System (Streeter et al., 2010; Van der Kolk, 2006), enhancing parasympathetic responsiveness by influence on the vagal nerve (Porges, 1995, 2003). Indeed, yoga reduces blood pressure among people with mild hypertension in non-mental health settings (Hagins, Rundle, Consedine, & Khalsa, 2014), predicts greater heart rate variability (Friis & Sollers, 2013; Telles, Nilkamal, & Acharya, 2011) and improves Type 2 diabetes outcomes (Innes & Vincent, 2007) – all risks associated with common complications of antipsychotic medication treatment (De Hert, Schreurs, Vancampfort, & Van Winkel, 2009).

In mental health, Iyengar yoga has consistently shown positive effects on depression (Shapiro et al., 2007; Uebelacker et al., 2010), leading to improved autonomic responses to stress and self-regulating coping behaviours (Kinser, Goehler, & Taylor, 2012; Streeter, Gerbarg, Saper, Ciraulo, & Brown, 2012). Yoga breathing exercises and gentle yoga postures lessen anxiety (Li & Goldsmith, 2012), resulting in reduced state anxiety, psychological stress and greater positive well-being among individuals with schizophrenia and schizoaffective disorder, even after a single 30-min yoga session (Vancampfort et al., 2009). Recent Cochrane reviews found that two of three randomised studies reported improvements in psychological, social and occupational outcomes in schizophrenia in response to yoga therapy compared to physical exercise alone or a waitlist control (Gorczyński & Faulkner, 2010; Vancampfort et al., 2012).

Mindful yoga is a modified *Hatha* yoga practice first introduced by Kabat-Zinn (2003b) in Mindfulness-Based Stress Reduction (MBSR) programmes. When practising mindful yoga, awareness of physical sensations is fostered, accessing present moment attention with more ease than with unstructured meditation (Salmon, Lush, Jablonski, & Sephton, 2009). Body awareness, a fundamental aspect of emotion regulation, connects the practitioner to their physiological and psychological states (e.g. emotion of fear corresponding with sweating and increased heart rate). Learning to notice, tolerate and manage somatic experiences in schizophrenia (Khoury & Lecomte, 2012) assists with managing arousal (Nuechterlein & Dawson, 1984). A recent RCT found that yoga reduced Post Traumatic Stress Disorder (PTSD) symptoms, often present in schizophrenia (van der Kolk et al., 2014). Early explorations of mindful yoga with psychiatric inpatients ($N = 113$) showed improvements in tension-anxiety, negative mood and reductions in confusion (Profile of Mood States) (Lavey et al., 2005). Another study found temporary decreases in auditory hallucinations, increased relaxation and greater focus and motivation to engage in daily activities among people with psychosis ($N = 10$) (Sistig, Lambrecht, & Friedman, 2015).

Limited research is available on the effects of yoga amongst prison populations (Bilderbeck, Farias, Brazil, Jakobowitz, & Wikholm, 2013; Landau & Gross, 2008; Rucker, 2005). A small yoga study with female prisoners ($N = 6$) found reductions in symptoms of depression and anxiety but no impact on perceived stress over time (Harner, Hanlon, & Garfinkel, 2010). Notably, research into yoga, specifically mindful yoga among forensic inpatients is lacking.

Aims

The aim of this study was to preliminarily evaluate the acceptability and efficacy of an eight-week mindful yoga programme as an adjunct intervention to routine psychiatric care among forensic inpatients with schizophrenia. Specifically, we

assessed participants' experienced effects of the yoga programme. We also sought to ascertain whether the intervention would decrease anxiety, depression, perceived stress, problems, risk to self and others and increase life functioning and subjective well-being.

Methods

Setting

Participants were recruited from the Mason Clinic, the inpatient services of the Auckland Regional Forensic Psychiatry Service in New Zealand. Ethical approval was obtained from Northern X Health and Disability Ethics Committee of the Ministry of Health (NTX/12/04/037), and from the Research Committee Te Awhina Waitemata District Health Board (WDHB) (RM12192).

Participants

Forensic psychiatric inpatients of any age and both genders, with an established DSM-IV-TR (American Psychiatric Association, 2000) Axis I or Axis II diagnosis, yet clinically well enough to participate and able to provide informed consent (as determined by their psychiatrist) were considered, excluding Intellectual Disability (ID) Service users. Participation was based on self-selection. Thirty-eight (40%) out of 94 inpatients expressed interest in the study. Four were deemed by their clinical Multi-disciplinary Teams to be too unwell to participate and two were discharged from the clinic during the recruitment process. Thirty-two (34%) started the intervention and 26 ($N = 26$) completed the project (28% of the total invited population). Attrition rate was small ($N = 6/32$), with six not completing the study for the following reasons: feeling uncomfortable in an unfamiliar group (2), feeling 'too unfit' (1), discharged to community services (1) and other programme commitments (1).

Three mindful yoga groups of 10–15 participants were undertaken. One group took place in a secure culturally specific unit for Māori (the indigenous people of New Zealand). One was a cross-service group of acute and subacute units; and the other took place in a long-term psychiatric rehabilitation unit. A small number of beds for female inpatients are integrated into most units. Most study participants were advanced in their rehabilitation through the service, with the exception of four participants being in acute units.

Procedure

Allocated clinic staff facilitated study enrolment, and conducted baseline, post-intervention and two-month follow-up assessments. Randomisation and control group were not possible due to resource restrictions.

Design

This study employed a mixed-methods design (Creswell & Plano Clark, 2011) using primarily quantitative methods, but including a qualitative strand, addressing the question of acceptability of the mindful yoga intervention. The basic design was a pre- and post-intervention with a two-month follow-up. The mindful yoga programme was developed and delivered by the principal investigator, a registered psychotherapist and yoga teacher. The programme was adapted from the principles of the Mindfulness-Based Stress Reduction (MBSR) programme yoga component (Kabat-Zinn, 2003a, 2003b; Salmon et al., 2009), considered trauma-sensitive yoga guidelines (Hopper, Emerson, Levine, Cope, & Van der Kolk, 2011) and simple *Hatha Yoga* practices. The programme included modified chair-based yoga, standing postures and breathing exercises. (Yoga programme curriculum and session plan are available upon request.) The intervention entailed eight weekly 60-min mindful yoga classes, and was taught in parallel to three groups with 6–11 participants in each. A 30-min guided homework practice was provided in MP3 or content-identical CD format. Each participant received a two-page A4 poster of yoga poses (which participants kept after the programme). Practising between classes was optional, and participants reported weekly regarding practice. Participants received psychiatric treatment as usual.

Measures

Acceptability of intervention

Four qualitative questions were included at post-intervention and follow-up. Questions asked whether participants had experienced benefits from the mindful yoga practice, noticed increased body awareness or their breathing patterns (Yes/No), applied the practices in day-to-day life (Yes/No) or had suggestions for programme improvement. All questions invited contributions of personal examples.

The *Hospital Anxiety and Depression Scale* (HADS) (Zigmond & Snaith, 1983) was used to assess symptoms relevant to generalised anxiety (seven items) and depression (seven items) based on the past week. The HADS is a good predictor of outcome, such as symptom severity, is valid (Spinhoven et al., 1997), has good internal reliability and is acceptable to patients (Bjelland, Dahl, Haug, & Neckelmann, 2002), including psychotic outpatients (Chadwick, Williams, & Mackenzie, 2003). Reliabilities for the HADS and its subscales in the current study were good (Cronbach's $\alpha = .83-.86$), with the exception of the HADS-D (*depression*) only at baseline ($\alpha = .54$). However, data were included.

The *Perceived Stress Scale* (PSS) (Cohen, Kamarck, & Mermelstein, 1983) is a well-validated and widely used 10-item scale. It measures to what extent over the past month common life situations were perceived as being

overwhelming, unpredictable or uncontrollable. The PSS has been used in psychiatric populations, including persons with schizophrenia (Hewitt, Flett, & Mosher, 1992). Internal reliability of the PSS is reported at $\alpha = .78$ (Cohen & Williamson, 1988). In this sample, internal reliability was good (Cronbach's $\alpha = .81-.83$).

The *Clinical Outcomes in Routine Evaluation – Outcome Measure* (CORE-OM) (Barkham et al., 2010; Evans et al., 2002) is designed to measure, monitor and manage quality evaluation in the psychological therapies, covering four domains over 34 items: problems (12), risk to self and to others (6), life functioning (12) and subjective well-being (4). Higher scores correspond with greater symptoms in that domain. Therefore, for positive outcomes, such as life functioning and well-being, a decrease in scores means improvement in these outcomes. Reliability for the CORE-OM in forensic settings suggest all subscales, except well-being ($\alpha = .62$), are reliable in clinical samples ($\alpha = .80-.95$) (McCloskey, 2001). In this study, at all three time measure points, all subscales of the CORE-OM had good internal consistency (Cronbach's $\alpha = .80-.95$), except well-being at post-intervention ($\alpha = .42$), which was however included in the final analysis.

The *Five Facet Mindfulness Questionnaire* (FFMQ) is a 39-item self-report measure, assessing mindfulness facets of observing, describing, acting with awareness, non-judging of inner experience, and non-reactivity to inner experience. Higher scores correspond to higher levels of trait mindfulness. The FFMQ has not previously been used with forensic inpatients, but has been used in clinical populations experiencing depression, anxiety or stress (Cash & Whittingham, 2010). In the current study, all FFMQ subscales had adequate-to-good internal consistency (Cronbach's $\alpha = .63-.89$), with the exception of the describe subscale at baseline with $\alpha = .39$ which was excluded from the final analysis.

Data analysis

Thematic analysis of descriptive qualitative data collected at post-intervention and at two months follow-up was performed, following a general inductive approach (Thomas, 2006). Text from the raw data was included in the form of quotes to illustrate perceptions, meaning and associations within each theme.

One-way repeated measures ANOVAs were used to examine whether the mindful yoga intervention improved levels of mindfulness and psychological outcomes. Dependent *t*-tests contrasting specific time points: baseline, post and follow-up, were performed for subscales. Effect sizes (Cohen's *d*) for group mean differences over time were calculated for all subscales (Cohen, 1988). Analysis was completed using SPSS Version 20.0 (SPSS, Armonk, NY, 2012).

Given the small sample size, the difficulty of working with a treatment-resistant population and the nature of a small exploratory study, change over time was difficult to assess. Therefore, a priori, results with a *p*-value of .10 or

less ($p < .10$) are interpreted as marginally significant, and results with a p -value up to $.20$ ($p < .20$) as revealing a non-significant trend in the predicted direction.

Results

Demographics

Demographic data were collated at baseline by self-report. However, preliminary analysis showed inconsistencies in reporting. Consequently, additional ethics approval to access participants' demographic data from files was sought. Detail is outlined in Table 1. The sample was predominantly male, ranging in age from 19 to 57 years ($M = 37.8$, $SD = 10.4$). Half of the sample were Māori (the indigenous people of New Zealand), and New Zealand European was the next largest ethnic group. The majority had a primary psychiatric diagnosis of schizophrenia. Comorbidity with personality disorder and/or coexisting substance-use disorder was diagnosed for a substantial number of participants. Average length of psychiatric diagnosis was 15 years (Range: 3 months–31 years) ($M = 15.1$, $SD = 10.7$). Clozapine ($n = 17$, 65%) was the most frequently prescribed antipsychotic medication. Most participants had committed a violent index offence with the majority being found not guilty by reason of insanity, or unfit to stand trial. The mean length of stay at the service at the time of the study ranged from .25 to 16 years ($M = 4.70$, $SD: 4.32$). Overall, this sample reflected the Mason Clinic forensic mental health population in the distribution of age, gender, ethnicity and psychiatric diagnoses (Easden & Sakdalan, 2014; Ministry of Health, 2007).

Acceptability and experience of the mindful yoga intervention

Participation in the mindful yoga programme was generally described as beneficial, enhancing participants' capacity to connect with their body and helping them to regulate breathing, deepen relaxation and generally increase their level of mindful awareness. Increased body awareness was identified by more than half of the participants ($n = 16$, 61%) immediately following completion of the programme, which was maintained at Follow-up. Participants described being able to 'notice changes and sensations in my body', 'awareness of mind/body relationship', and 'finding limits to movements and working with those limits'. Increased relaxation was described by eleven (42%) at Post and eight (31%) at Follow-up. 'It relaxes me a lot.', 'Helps with stress and anxiety', 'Relaxation, physical and mental (occurs) at the end of the practice'. Two participants (8%) described involvement resulting in 'Good sleep (and feeling) relaxed and motivated'. Breath-awareness was identified by nine (35%) at Post, which increased to eleven (42%) at Follow-up. Participants described 'Better, deeper breathing',

Table 1. Study participants' demographic characteristics at baseline ($N = 26$).

Criteria	M (SD) +/- range, % (n)	
Age (years)	37.81 ± 10.35 (19–57)	
Gender		
Male	73	19
Female	27	7
Ethnicity		
Māori	50	13
NZ European/Pakeha	27	7
Pacific Island	12	3
Other	12	3
Forensic inpatient category		
Special Māori unit	31	8
Sub-acute	27	7
Long-term	27	7
Acute	15	4
Psychiatric diagnosis, primary		
Schizophrenia	77	20
Bipolar disorder	8	2
PTSD	4	1
Other diagnosis	4	1
Personality disorder	4	2
Comorbidity (additional diagnosis)		
Personality disorder	46	12
Substance use disorder	35	9
Education		
Incomplete secondary school	42	11
Educational status not known	23	6
Completed higher education	15	4
High school incomplete	12	3
Secondary school incomplete	4	1
Special education	4	1
Offence, primary		
Violent index offence (High severity)	77	20
Sexual offence	15	4
Property	8	2
Legal status		
Mental Health Act	46	12
Not guilty by reason of insanity	35	9
Unfit to stand trial	19	5

Note: 4% = ($n = 1$).

‘Improved awareness of breathing’, a better ‘Flow of breath, concentrating on my inhaling and exhaling in order to calm myself and alleviate any worries before they can form’. It is of note that the levels of increased body awareness, relaxation and improved breathing capacity were maintained or increased at two-month follow-up. A single participant reported experiencing no benefits. Although adverse effects were not specifically queried, no adverse effects were reported.

Application of mindful yoga in day-to-day life

Approximately three quarters of participants ($n = 20$, 77% at Post; $n = 19$, 73% at Follow-up) reported applying the practices in their day-to-day lives and reported experiencing positive personal results. Participants' feedback indicated that increased body awareness led to using the learned techniques as a self-soothing tool. Examples included 'Being able to use the shoulder movements to relieve the built up stress in the shoulders' and 'My back was a bit stiff and yoga helped me feel at ease'. Equally, approaches learned were described as being used as emotional self-regulation strategies. 'I used breathing techniques to calm me down' and 'I find it easier breathing, coping with things'.

Acceptability of the mindful yoga programme

Overall, the programme was described as acceptable in the form it was delivered ($n = 24$, 92%) at both measure times. Suggestions for improvement included: 'More sessions each week', '... even for at least 30 min.', and 'Increase degree of difficulty gradually (beyond the existing programme)'.

*Effects of intervention on dispositional mindfulness**Five-Facet Mindfulness Questionnaire (FFMQ)*

Overall, one-way repeated measures ANOVA showed no main effect of the intervention on the level of mindfulness in all FFMQ subscales analysed (Table 2). However, further t -tests revealed one marginally significant change, which occurred in the FFMQ facet *observe* between baseline and follow-up ($p = .06$), with a large effect size ($r = .36$, $d = .80$) also, and medium effect size ($r = .25$, $d = .50$) between baseline and post measurement. Cohen's d effect sizes (J. Cohen, 1988) were found to be of small effect for the remaining three analysed FFMQ subscales (Figure 1).

*Preliminary data regarding treatment efficacy**Effect of the intervention on psychological outcomes*

Figure 2 depicts a summary across means of psychological outcomes as measured by the PSS, subscales of the HADS and the CORE-OM at baseline (BL), post-intervention (Post) and two month follow-up (Follow-up). One-way repeated measures ANOVAs and follow-up t -tests showed no significant main effect of the intervention in any psychological outcome. However, psychological outcomes changed in the predicted direction across time. Although there was no change in the HADS-Total (T), there was a marginally significant decrease in anxiety levels (HADS-A), but not in depression (HADS-D). HADS-T and HADS-A ($r = .28$, $d = .60$) showed a medium effect size from

Table 2. Statistics of one-way repeated measures ANOVA tests for mindfulness, including Follow-up *t*-tests across the three time points: baseline, post intervention and two-month follow-up.

		ANOVA										<i>t</i> -tests and Cohen's <i>d</i>								
		Follow-up					BL, post, follow-up					BL to follow-up			BL to post			Post to follow-up		
		BL		Post		Follow-up		BL, post, follow-up		BL to follow-up		BL to follow-up		BL to post		Post to follow-up				
		<i>M</i>	<i>(SD)</i>	<i>M</i>	<i>(SD)</i>	<i>M</i>	<i>(SD)</i>	<i>F</i> (2, 24)	<i>p</i>	η^2_p	<i>t</i>	<i>p</i>	<i>d</i>	<i>t</i>	<i>p</i>	<i>d</i>	<i>t</i>	<i>p</i>	<i>d</i>	
Mindfulness																				
FFMQ																				
Observe		24.31	(5.11)	25.69	(6.29)	26.17	(5.72)	1.87	.18	.14	-1.97	.06 [‡]	.80	-1.30	.21	.50	-.58	.57	.20	
Aware		28.81	(5.16)	28.56	(6.82)	28.20	(5.99)	.23	.80	.02	.68	.50	.30	.33	.74	.10	.39	.70	.20	
Non-judge		27.31	(5.94)	26.67	(8.03)	27.25	(7.29)	.16	.86	.01	.04	.97	.00	.48	.64	.20	-.47	.64	.20	
Non-react		20.65	(5.48)	20.56	(6.21)	20.10	(4.43)	.21	.81	.02	.56	.58	.20	.09	.93	.00	.53	.60	.20	

Notes: Baseline (BL), post intervention (Post) and two-month follow-up (Follow-up).
 The FFMQ *describe* subscale showed unreliability at baseline ($\alpha = .39$); therefore, the FFMQ *describe* and the FFMQ *total* analysis were not performed.
[‡] $p < .10$; $p < .05$; $p < .01$.

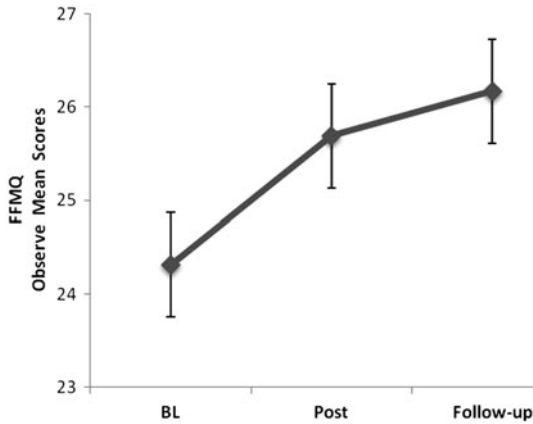


Figure 1. *FFMQ* Observe scores over time from baseline (BL) to post-intervention (Post) to two-month follow-up (Follow-up). Error Bars represent standard error of the mean.

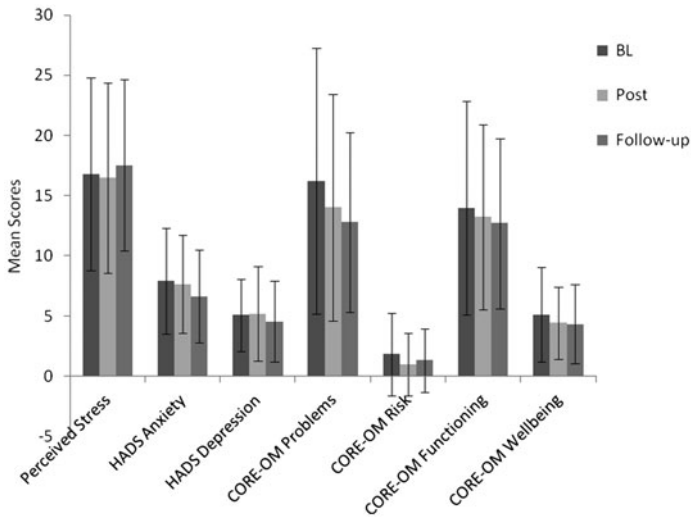


Figure 2. Stress, anxiety, depression and psychological problems, risk, functioning and well-being over time from baseline (BL) to post-intervention (Post) to two-month follow-up (Follow-up).

baseline to Follow-up, which slightly increased from Post to Follow-up to HADS-T ($r = .30$, $d = .60$) and HADS-A ($r = .35$, $d = .70$). HADS-D showed small effect sizes, only (Table 3).

Table 3. Statistics of one-way repeated measures ANOVA for psychological outcome measures PSS, HADS and CORE-OM with respective subscales and follow-up *t*-tests across the three time points: baseline, post-intervention and two-month follow-up.

Measure	ANOVA										<i>t</i> -tests								
	BL			Post			Follow-up				BL to follow-up			BL to post			Post to follow-up		
	<i>M</i> (<i>SD</i>)			<i>M</i> (<i>SD</i>)			<i>M</i> (<i>SD</i>)				<i>F</i> (2, 24)			<i>F</i> (25)			<i>F</i> (25)		
	<i>p</i>			<i>p</i>			<i>p</i>				<i>p</i>			<i>p</i>			<i>p</i>		
PSS	16.80 (7.98)	16.46 (7.89)	17.51 (7.13)	.56	.58	.04	-.55	.59	.2	.24	.81	.1	-1.03	.31	.4				
HADS-T	13.04 (6.57)	12.90 (7.16)	11.25 (6.44)	1.56	.23	.12	1.33	.20	.5	.10	.92	.0	1.54	.14	.6				
Anxiety	7.92 (4.39)	7.66 (4.03)	6.67 (3.83)	2.52	.10*	.18	1.48	.15	.6	.27	.79	.1	1.85	.08**	.7				
Depression	5.12 (3.00)	5.23 (3.90)	4.58 (3.35)	.53	.60	.04	.79	.44	.3	-.18	.86	.1	1.00	.33	.4				
CORE-OM-T	37.18 (24.59)	32.71 (20.14)	31.25 (17.69)	1.29	.29	.10	1.55	.14	.6	1.1	.29	.4	.71	.49	.3				
Problems	16.23 (11.00)	14.01 (9.40)	12.82 (7.44)	1.93	.17	.14	1.81	.08*	.7	1.13	.27	.5	1.15	.26	.5				
Functioning	13.98 (8.87)	13.24 (7.67)	12.72 (7.05)	.44	.65	.04	.84	.41	.3	.43	.68	.2	.49	.62	.2				
Well-being	5.12 (3.90)	4.46 (2.98)	4.37 (3.27)	.80	.46	.06	1.24	.23	.5	1.11	.28	.4	.20	.84	.1				
Non-risk-T	35.33 (22.46)	31.70 (18.78)	29.90 (15.93)	1.38	.27	.10	1.54	.14	.6	.93	.36	.4	.85	.40	.3				
Risk	1.85 (3.45)	1.00 (2.61)	1.35 (2.64)	.97	.39	.08	.92	.36	.4	1.34	.19	.5	-1.09	.29	.4				

Note: Baseline (BL), Post-intervention (Post) and two-month follow-up (Follow-up).

p* < .10; *p* < .01.

Perceived stress scores did not show significant change over time and only small effect sizes.

The CORE-OM total and the non-risk total showed no change, however, a marginally significant change was evident in scores of problems (CORE-OM subscale) between baseline and Follow-up with medium effect size for all time measure points with Cohen's d ($r = .34$, $d = .70$) from baseline to Follow-up, and for both the other two time points ($r = .22$, $d = .50$) as illustrated in Table 3. Effect size for the CORE-OM total was of medium size between baseline and Follow-up ($r = .31$, $d = .60$), showing small effect sizes at the other time points. Small effect sizes were shown in CORE-OM functioning. However, both CORE-OM subscales well-being ($r = .24$, $d = .50$) and non-risk total only showed medium effect size ($r = .30$, $d = .60$) between baseline and Follow-up, and risk ($r = .26$, $d = .50$) showed medium effect sizes between baseline and Post measurements.

Discussion

To our knowledge, this is the first study to examine the potential acceptability and efficacy of a mindful yoga programme among forensic inpatients. This study thus adds substance to the identified need for the integration of mindfulness-based interventions into forensic mental health service delivery (Howells et al., 2010). Overall, acceptability of the programme was high (92%), with most participants reporting increased body awareness and breathing capacity, alleviating physical tension and mental distress, resulting in less anxiety and improved relaxation. Although there were no statistically significant results over time, there were benefit-consistent trends in self-reported scores on anxiety, depression, problems, risk to self and others, life functioning and subjective well-being, except perceived stress. Dispositional mindfulness did not significantly improve over time, other than a trend in the mindfulness observe facet. The marginal improvement in this characteristic provides some evidence consistent with the notion that characterising the intervention as mindful yoga (rather than yoga) is warranted and that mindfulness-type interventions may be viable in forensic settings.

Participants reported benefits from applying learned techniques in their daily lives, which may indicate accessibility and suitability of the mindful yoga programme for forensic inpatients. Specifically, self-directed day-to-day application of mindful yoga skills, used when noticing physical tension or feelings of anxiety, was described as contributing to stress and anxiety management and better relaxation, inducing calmness. This study's qualitative findings resonate with the aforementioned yoga study with non-psychotic incarcerated women, where they found increased knowledge of the body and consequent capacity to take care of it (Harner et al., 2010). Similarly, the aforementioned mindful yoga study with psychotic inpatients found decreased stress, increased relaxation and focus, and motivation to engage in daily activities (Sistig et al.,

2015). Overall, themes identified in the current study fall under categories of physical, emotional and social benefits experienced by participants, which are in keeping with psychosocial interventions for schizophrenia and other psychosis (Mueser, Deavers, Penn, & Cassisi, 2013).

Considering the interest of forensic inpatients in being involved in this study (40% of the total number of eligible clinic patients) and high programme acceptability, this study demonstrates that yoga is a palatable adjunct treatment option. Despite being time-demanding, attrition rate was low ($N = 6/32$) contrary to time demands seen as a barrier in undertaking yoga research with schizophrenia inpatients and outpatients (Baspure et al., 2012; Duraiswamy, Thirthalli, Nagendra, & Gangadhar, 2007). Low attrition rate in this study may partially be attributable to the accessibility of the venue (close proximity) and participants' enjoyment in attending this programme.

Reinforcing the potential of yoga-based interventions, analyses showed a marginal reduction over time in HADS anxiety symptoms, yet no significant change in PSS stress. Participants reported utilising mindful yoga practices regularly to reduce stress and anxiety in their day-to-day life, a finding that is consistent with earlier work in a prison with female offenders of unknown diagnoses. Harner et al. (2010) also showed marginal reductions over time in Beck Anxiety Inventory (BAI) anxiety symptoms, but no significant change in PSS stress scores as well as descriptive accounts highlighting increases in the subjective capacity to cope with stress. The discrepancy between results of measuring anxiety and stress and the accounts of participants may be due to difficulties with comprehension and focused attention while completing measures.

In our study, depression (HADS-D) did not improve over time, despite qualitative feedback suggesting participants' perceived increase in their ability to manage motivation and emotional distress. Yoga studies in non-psychotic depressed patients have noted that yoga may help with the lethargy and agitation experienced frequently in depression (Shapiro et al., 2007; Uebelacker et al., 2010). The lack of impact on depressive features in forensic inpatients in our study may be due to the complexity of psychological issues in this population, or the modified lower impact style of yoga taught.

In the current study, marginally significant trends in the expected direction were found on problem scores (CORE-OM subscale) with medium effect sizes, notably at Follow-up. Similarly, favourable trends of increased life functioning (CORE-OM) were evident, including scores on relationship management and less risk to self and others (CORE-OM), key aspects of forensic presentation. However, there was no change in the total CORE-OM scores, non-risk total scores and no change in well-being. A lack of significant findings in CORE-OM items with forensic inpatients – following a psycho-educational group work intervention – has been attributed to the complexity surrounding the functioning of people with criminogenic and mental health needs (Vallentine, Tapp, Dudley, Wilson, & Moore, 2010).

Finally, FFMQ mindfulness results were non-significant in our study, except a trend in the observe facet. This finding is in keeping with previous research, suggesting that skills of observation and awareness develop in the earlier phases of mindfulness practice (Baer, 2011). Indeed, qualitative feedback captured participants' increased capacity of these two facets. Interestingly, a qualitative mindfulness-based study with people with schizophrenia showed improvement in anxiety management, with relaxation being reported most frequently (Brown et al., 2010). The current study offers an exploration into the suitability of the FFMQ, measuring a mindful yoga intervention among forensic inpatient populations. However, research into mindfulness-based interventions with forensic is in its early development, although viewed as potentially contributing to reducing risk, relieving distress and enhancing coping (Howells et al., 2010).

Our findings are important, given the potential utility of gentle body–mind interventions for people with schizophrenia in forensic mental health settings. Persons with schizophrenia often report lacking self-confidence in physical fitness (Vancampfort, De Hert, Maurissen, et al. 2011), and frequently suffer from the physical side effects of psychotropic medications (metabolic syndrome) (De Hert et al., 2009). Yoga may have physical health benefits for individuals with schizophrenia, as shown in mentally healthy populations with mild hypertension (Hagins et al., 2014) and type 2 diabetes (Innes & Vincent, 2007). Considering that forensic inpatients generally lead a sedentary lifestyle and experience high levels of distress due to their severe mental health symptoms and court-related issues, qualitative feedback from participants indicates that the modified mindful yoga intervention and the didactic introductory teaching design to yoga and mindfulness in the current study was gauged at the appropriate level. Thus, this mindful yoga programme offers an accessible and achievable form of exercise, and concurrently invites increased mindfulness.

Limitations

Although the intervention assessed here seems acceptable, the small sample size and the single-centre nature of the study limit overall conclusions regarding its efficacy and external validity. The lack of a waitlist control group did not allow confidence in a cause-and-effect nature of the intervention measured. However, despite the lack of statistical power, effect sizes for anxiety were large to medium, perhaps indicating that a larger sample might return significant results.

Our ability to uncover possible benefits may have been further reduced because of poor psychometric performance of some measures. Internal inconsistency in CORE-OM *well-being* and the FFMQ *describe* subscales, both containing reverse items, could possibly indicate literacy difficulty or a lack of comprehension. Lack of significant change for the CORE-OM in forensic

inpatients has previously been interpreted as suggesting possible bias in measurement error (Vallentine et al., 2010). Alternately, unlike another yoga study (Duraismwamy et al., 2007), the minimal support for homework in the current study may be relevant. The focus of this study was on the impact of the intervention on the individual, and did not consider the impact on the social environment, risk and prosocial outcomes.

These limitations noted, the current study also had multiple strengths, including a three time-point repeated measures (within subjects) design with measures taken at baseline, post-intervention and at two-month follow-up, thus allowing for tentative insight into the long-term effects of the intervention. As some yoga research with people with schizophrenia suggests, assessing immediately after the intervention tends to show significant effects of improved mood and decreased anxiety (Lavey et al., 2005; Vancampfort, De Hert, Knapen, Wampers, et al., 2011). Measuring follow-up intervention effects may produce different results because the person's functioning may revert to baseline after the intervention is completed. Data from this study revealed post-intervention (8/52) and long-term (2/12) effects experienced. We also acknowledge that the strengths of the individual yoga teacher/psychotherapist are pivotal in the delivery of any therapeutic programme. However, a structured mindful yoga programme was developed for this research, which allows for reproducibility and mitigates the risk of improvement being related to the personal attributes of the specific teacher.

Future research

In terms of future development, an RCT study design would allow testing the programme against another intervention or waitlist group. Larger studies of this kind could control for a range of confounding socio-demographic and clinical variables, including the effect of support between-session practice (homework). Future research could investigate specific patient groups, socially and ethnically diverse populations, different environmental settings, and the impact such factors may have on responsiveness. Measuring changes in medication and administered Pro Re Nata (PRN) medication, as well as unit placement during or post-intervention, could provide information on higher safety needs or periods of increased stability. Measuring impulsivity, aggression and hostility as well as the impact of the group as a prosocial activity would offer insight into the utility of mindfulness-based interventions on risk factors important to forensic inpatient management. A cost-benefit analysis of mindful yoga as an adjunctive psychosocial intervention could potentially be included in future study design.

Conclusion

The current study offers preliminary evidence for the acceptability and value of mindful yoga groups for people with treatment-resistant forensic mental

health issues. Mindful yoga was readily accepted by clients as an adjunct treatment modality, and attendance rate was very high. Mindful yoga was associated with a number of potential benefits, indicative of subjective increases in body and breath awareness, greater relaxation as well as a trend towards lessening anxiety.

In accordance with emerging evidence of the effectiveness of adjunct yoga- and mindfulness-based interventions for people with schizophrenia, mindful yoga can potentially yield improvement in a range of clinical outcomes in forensic inpatients. The easily accessible physically based intervention encourages self-directed learning in a supportive group setting, and in this way contributes to recovery.

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Disclosure statement

No potential conflict of interest were reported by the authors.

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