Piloting yoga and assessing outcomes in a residential behavioural health unit

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Accessible summary

- This study examined if adolescents on a residential behavioural health unit would participate in a yoga intervention. Yoga has been used as a mind–body practice for more than 2000 years; however, studies are limited regarding its effects on adolescents with mental illness on an inpatient unit.
- Yoga was added, twice weekly, to the program schedule. Trait Emotional Intelligence Questionnaire-Adolescent Short Form (TEIQue-ASF) scores were measured over 8 weeks. Additional measures included daily numbers of quiet times, time outs, and point card scores.
- Twenty-two adolescents completed the study. The TEIQue-ASF assessment was able to detect changes in total scores over 8 weeks. Increased yoga participation was related to higher values of the TEIQue-ASF subdomain of sociability, increase in weekly point card totals, a decrease in behavioural time outs, and a decrease in combined behavioural interventions at various time points throughout the programme.
- This study was relevant because it was conducted on an adolescent inpatient unit. It provides support that yoga, as part of a residential programme, is a feasible intervention for adolescents with mental illness. Changes in the various measures cannot be directly linked to yoga because of lack of a comparison group. Additional studies with a larger sample, and randomization, are needed to evaluate the potential benefits of yoga and to determine if changes to the TEIQue-ASF can be attributed to yoga or other behavioural-based interventions.

Abstract

Little is known about how yoga will impact behavioural health outcomes for adolescents with mental illness in an inpatient setting. This study examined if adolescents on a residential behavioural health unit would participate in a yoga intervention to address emotional regulation. A single cohort study design was used. Yoga was added to the programme schedule twice weekly. Trait Emotional Intelligence Questionnaire-Adolescent Short Form (TEIQue-ASF) scores and additional behavioural measures were tracked over 8 weeks. Adolescents participated in yoga, with a higher participation rate for girls compared with boys. The TEIQue-ASF assessment detected changes in total score over 8 weeks. Increased yoga participation was related to higher values of the TEIQue-ASF subdomain of sociability, increase in weekly point card totals, and a decrease in combined behavioural interventions at various time points throughout the programme. This study was relevant because it was conducted on an

adolescent inpatient unit. Further studies are needed to determine if changes can be attributed to yoga or other behavioural-based interventions. If supported by further studies, yoga has the potential to be a complimentary therapy that can be integrated into the multidisciplinary treatment approach for mental health patients.

Introduction

Yoga has been used as a mind–body practice for more than 2000 years. In 200 A.D. Patanjali wrote the *Yoga-Sutra*, with instruction on the disciplines of yoga. Disciplines of yoga were aimed at transforming the mind and the body. Patanjali's work describes the psycho-physiological processes governing human behaviour. Patanjali provides an outline of psychiatric related symptoms and diagnoses similar to those found in the contemporary *Diagnostic and Statistical Manual of Mental Disorders* (Slede & Pomerantz 2001). To control and modify these pathological states, Patanjali suggests eight steps: restraint, discipline, postures, breath control, withdrawal of the senses, concentration, absorption, and trance. Yoga was intended to be an integrated and comprehensive way of living, optimally balancing internal and external forces. In the past few decades, popular yoga has been simplified from Patanjali's eight steps to a combination of postures, breath, and meditation. Forms of yoga range from restorative and relaxing to highly strenuous (Slede & Pomerantz 2001).

Yoga is growing in popularity. A 2007 survey of US households reported that approximately 38% of US adults aged 18 years and over and approximately 12% of children used some form of complementary or alternative medicine (CAM) over the previous 12 months (Barnes *et al.* 2008). Approximately 2% of children used yoga. Mind–body therapies – yoga, breathing, and meditation – are among the fastest growing CAM methods (Barnes *et al.* 2008).

Mental illness is on the rise, with one in five adolescents having a diagnosable mental health disorder, yet funds for behavioural health services are dwindling (Honberg *et al.* 2011, NIH 2010). Healthcare providers and caregivers are challenged to look for evidence-based and innovative, yet cost-effective, ways to help adolescents manage stress. While yoga is an effective intervention in some adult behavioural health conditions (Duraiswamy *et al.* 2007, Streeter *et al.* 2010), yoga studies including adolescents with diagnosed mental illness receiving inpatient treatment are very limited. Evidence suggests that yoga may increase the ability of adolescents to self-regulate (manage their emotions) and cope with stress; however, prior research is primarily focused on healthy adolescents in the outpatient

arena. Public schools are integrating the practice of yoga to help students manage stress, influence well-being, and improve desired behaviour (Santangelo White 2009). A study by Khalsa *et al.* (2012) examined the effects of yoga on the mental health of adolescents in a secondary school. Results showed statistically significant improvements among yoga participants, vs. controls, in the areas of anger, resilience, and fatigue/inertia. Average yoga attendance for the study started at over 80% and ended at less than 70%. Attendance at yoga sessions made a positive difference for these students, but it was unknown if adolescents with diagnosed mental illness in an inpatient setting would attend yoga groups and receive similar benefits.

A systematic review of 24 articles published over the last three decades provides support that yoga may be beneficial for improving physical and cognitive abilities in children and adolescents (Galantino *et al.* 2008). The studies related to mental health focused on a very narrow diagnostic population, primarily children with attention deficit hyperactivity disorder (ADHD) or symptoms of ADHD. Outcome measures were focused on targeted symptoms, such as spatial and verbal memory, time on task, planning, and execution time. The studies imply that yoga may have merit as a complementary treatment for children with ADHD, who are stabilized on medication (Galantino *et al.* 2008). Results support the need for further study into the use of yoga to address behavioural challenges for this population (Galantino *et al.* 2008). Birdee and colleagues reviewed 34 trials of yoga interventions in paediatrics, including 18 studies that were not reviewed by Galantino and colleagues. Birdee and colleagues examined the effect of yoga on mental health. However, the participants were primarily limited to healthy children and adolescents. There are substantial differences between adolescents with behavioural health diagnoses in the outpatient versus inpatient environments. Treatment setting, acuity, and chronicity of illness may affect the willingness of adolescents to participate in a yoga intervention and result in different outcomes. Both systematic reviews reported on a single non-randomized control trial (NRCT) linked to an adolescent inpatient population. The NRCT studied the effects of a relaxation intervention on the anxiety of children and

adolescents with adjustment disorder and depression. The study intervention was a relaxation group that included yoga, as well as massage therapy and progressive muscle relaxation. Outcome measures were focused on anxiety and cortisol levels, and did not examine yoga as an independent variable (Galantino *et al.* 2008, Birdee *et al.* 2009). The systematic reviews revealed outcome measures of a specific focus, mainly anxiety and ADHD symptoms. Because there has only been one study reported in the literature, further studies need to be done to explore if adolescents on an inpatient unit will participate in a yoga intervention and to explore other behavioural outcomes.

Objective measurements for changes in one's capacity to cope or to self-regulate emotions and behaviours are limited. Trait emotional intelligence is a pertinent outcome to study because it emphasizes behavioural responses to emotional situations. Emotional intelligence (*EI*) refers to individual differences in identifying, processing, expressing, and regulating emotions. Past debates on *EI* as an intelligence/ability or trait/disposition have given rise to a model of emotional intelligence with three levels: knowledge, abilities, and traits. Knowledge level refers to what a person knows about management of emotions. Ability level refers to the ability to apply that knowledge to emotionally charged situations. Trait level refers to the propensity to behave in a certain way in emotional situations. Focus for trait emotional intelligence is on what a person does, not on what a person knows. Knowledge does not always translate into abilities. Abilities do not always translate into behaviour (Nelis *et al.* 2011). Previous research suggests that some interventions, particularly interventions affecting emotional regulation, may affect a moderate increase in trait *EI* (Petrides *et al.* 2004).

Aim

This pilot study was designed to examine:
1. If adolescents on an inpatient behavioural health unit would participate in yoga as an intervention to address emotional regulation.
2. Assess the changes in behavioural and emotional outcomes over an 8-week period and determine if yoga participation was related to the outcomes over time.

Methods

A single cohort study design with convenience sampling was used for this study. The TEIQue was used to measure trait emotional intelligence at baseline and every 2 weeks throughout the study. Additional behavioural measures were tracked weekly as part of the normal programming.

Participants

Considering the TEIQue as the primary outcome measurement, it was determined a priori that a sample size of 26 participants would be sufficient to detect a significant small effect ($d = 0.20$), assuming $\alpha = 0.05$ and $\beta = 0.20$ (power 80%) for an analysis of variance with repeated measures. Participants were recruited from a 36-bed adolescent residential behavioural health unit located in the United States. Twenty-two adolescents completed the study, including eight males (36%) and 14 females (64%) with a mean age of 15 years old [13–18: standard deviation (SD) 1.47]. The leading admitting psychiatric diagnoses included bipolar disorder ($n = 10$), depression ($n = 5$), oppositional defiant disorder ($n = 3$), and schizophrenia ($n = 2$). The mean hospital length of stay was 132 days (with a range of 70–238 days: SD 42).

Adolescents admitted to this locked residential unit did not meet criteria for an acute psychiatric hospitalization, but were unable to maintain stability in an outpatient programme. Many had a history of repeated psychiatric hospitalizations, legal problems, and failed attempts at outpatient behavioural programs. Adolescents were referred from a variety of sources, including acute inpatient programmes, less restrictive residential settings, and legal systems. Highly structured, multidisciplinary interventions were individually designed, targeting each adolescent's specific treatment rehabilitation goals. Individual goals were monitored in all groups and activities from the time each adolescent woke up until each adolescent went to bed. Adolescents received individual, family, and group therapy throughout their stay and were discharged to a home setting or back to a less restrictive residential setting.

All adolescents were offered the yoga intervention. A single cohort study design was chosen rather than a randomized trial with control group, ensuring that no adolescent was excluded from the potential benefits of yoga and also to avoid potential disruption to the unit milieu if certain residents were excluded from yoga. Participants served as their own control with pre- and post-testing.

Materials

The research team was interested in providing yoga that incorporated breathing and postures but did not promote any specific spiritual discipline. Without access to a certified yoga instructor, videos were explored. The researchers were not yoga experts, yet researchers sought to find a way to implement a time honoured health modality that may have benefit, in a cost-effective and consistent manner. Many behavioural health settings do not have access to an expert yoga instructor, yet a video can be implemented in

any setting, and could be easily replicated across settings in future studies. The researchers consulted a mental health nurse/yoga instructor for input regarding appropriateness of the video. Gender neutrality, instruction quality, and range of fitness ability were considered in the selection process. Therefore, *Yoga for Beginners* (Wohl 2008) was chosen, providing an exploration of the physical and mental aspects of yoga. For consistency, two of the eight yoga routines ('Letting Go of the Day' and 'Gentle Unwind'), offered in the video, were selected. Two 45-min yoga sessions were available to participants, offering a total of 90 min per week. Both routines were primarily relaxing and restorative rather than strenuous. 'Letting Go of the Day' consisted of approximately 80% floor poses, sitting, or lying, and 20% standing poses. 'Gentle Unwind' was a floor routine consisting of 25% breathing exercises. The video instructor is a master yoga teacher with over 35 years of experience and a frequent contributor to Yoga Journal (The Yoga Studio website).

Measures

The Trait Emotional Intelligence Questionnaire-Adolescent Short Form (TEIQue-ASF) (Petrides *et al.* 2006, 2007) was selected for the study as it most closely met the measurement needs. The TEIQue-ASF, developed for adolescents in 2006, is a 30-item self-report questionnaire. It measures global trait emotional intelligence with domains that include: (1) well-being (e.g. I'm happy with my life); (2) self-control (e.g. I can control my anger when I want to); (3) emotionality (e.g. I'm able to get into 'someone else's shoes' and feel their emotions); and (4) sociability (e.g. I'm good at getting along with my classmates). Questions are scored using a seven-point Likert scale ranging from 1 (*disagree*) to 7 (*agree*). Scores were totalled by staff, and certain questions required reverse scoring. The value range for global trait emotional intelligence is 30–210. A higher score indicates improvement in global trait emotional intelligence and in each of the domains. Validity and reliability for the TEIQue have been tested, with internal consistency and test–retest scale reliabilities of 0.85 and 0.78, respectively (Pérez *et al.* 2005). Internal consistency of the TEIQue-ASF was 0.83 in a 2009 study, of 490 adolescents from eight British schools, examining coping styles and self-harm behaviours in adolescents (Mikolajczak *et al.* 2009).

A point card system was in use on the residential unit as part of a cognitive behavioural approach, providing feedback and evaluating changes in behaviour. The point cards were designed to measure: treatment investment, individual goal progress, and appropriate social skill use. Adolescents earned points in each group throughout the day. Points were given by staff, providing feedback, according to defined guidelines. Points were totalled at the end of each day and at the end of each week. The potential value range for the weekly point card scores was 0–518. As a surrogate measure of desired behaviour, point card scores were tracked for this study. Aggregate and individual scores, measured by staff using standard unit processes, were recorded weekly.

Separate from the point card system, the frequency of the following restrictive behavioural interventions were tracked (aggregate and individual):
1. Quiet time: intervention initiated by staff in which the adolescent is separated from the group for 5 min – but not isolated.
2. Personal: intervention initiated by resident in which the adolescent is separated from the group for 5 min – but not isolated.
3. Time out: intervention initiated by staff in which the adolescent is separated from the group for 15 min – but not isolated.
4. Holds: intervention initiated by staff requiring brief physical hold by staff to immobilize an adolescent, in emergencies, when an adolescent is at imminent risk to harm self or others.
5. Focused therapeutic intervention: intervention initiated by staff, requiring adolescent's time away from the milieu and groups to work on assignments related to specific therapeutic issues.

Procedures

Yoga was added to the residential programme schedule twice weekly using the pre-selected video. It was facilitated and monitored by a qualified recreation therapist, trained in the research protocol. All youth were expected to attend yoga, following physician medical clearance. As with any programming group/activity, adolescents had the option to refuse participation.

Target enrolment was not more than 60 adolescents, and data were collected for 8 weeks after the last enrolee. Lengths of stay varied, based on individual progress, and were unknown on admission. To account for the variance, and to ensure that adequate sample size was reached, the goal was to consent at least twice the needed sample size (52). Eight weeks of yoga was chosen as a dose expected to achieve measurable changes, taking into consideration the average length of stay in the programme.

After receiving approval from the study site Institutional Review Board, consent for data collection was obtained from the parent/guardian and from the adolescent. Adolescents who did not provide consent ($n = 1$) still received yoga as part of their treatment plan. However, non-consenting individuals' data were not used for this study.

Each participant was pre-tested using the TEIQue-ASF, before the yoga intervention, and post-tested every 2 weeks for the duration of the study, or the duration of the participant's stay on the unit, whichever occurred first. Measurements were collected every 2 weeks to increase the confidence in trends and decrease the possibility that a single measure, pre and post, would be influenced by one bad day. The TEIQue-ASF was handed out to participants and collected by a therapist trained in the research protocol. Data were collected on attendance in yoga group, including duration of time in class (15-min intervals) and reason for leaving class early, if applicable. Participants could attend up to 90 min of yoga per week. Total yoga time is calculated from the sum minutes of yoga participation over 8 weeks.

Potential risks were identified on the informed consent form and reviewed during the consent process. Identified risks included: dizziness, shortness of breath, fainting, muscle soreness, fatigue, musculoskeletal strains or sprains, increased blood pressure, and fractures in patients with bone disease. Risks were minimized by excluding residents who did not receive full medical clearance for normal programme activities and by having qualified recreation therapists supervise all yoga sessions.

Data analysis

Between September 2010 and September 2011, 56 participants were initially found eligible and consented to participate in the research study. The original protocol called for 8 weeks of yoga intervention resulting in 22 participants eligible for analysis. Because of shorter lengths of stay, 33 participants did not have 8 weeks of yoga intervention. One subject was removed from the analysis because of unreliability on self-report measures, stemming from very low cognitive functioning.

Descriptive statistics (mean and SD) were used to describe yoga participation for the total sample, and an independent-samples *t*-test was conducted to examine differences in males and females. A repeated-measures analysis of variance (ANOVA) with post hoc tests (using the Bonferroni correction) was used to assess changes in TEIQue-ASF total and domain scores. In order to determine if yoga participation was related to TEIQue-ASF (total and domain scores), weekly point cards, and restrictive interventions over an 8-week period, simple linear regressions were used for each of the 8 weeks separately. While correlational analyses could have been used to examine bivariate relationships among the variables (a correlation coefficient has the same value as the standardized slope in a simple linear regression), our aim was to determine if yoga participation predicted TEIQue-ASF scores, weekly point cards, and restrictive interventions at each of the eight time points; thus, a series of simple linear regressions was the most appropriate statistic to use.

Results

The first aim of this study was to determine if adolescents would participate in yoga. Compared with 90 min of yoga offered, the mean yoga time was 60 min per week (SD = 20.2). Participants (n = 22) were engaged in yoga, following the directions of the video, without disruptive behaviours. On average, females spent 65.4 min (SD = 15.3) in yoga sessions weekly compared with 50.5 min (SD = 15.0) for males. This was a statistically significant difference using independent-samples *t*-test (t (1) = −2.212, P = 0.03). There was no significant association (Pearson's r) between the number of hospital days and participation in yoga.

The second aim of this study was to assess the change in outcomes over an eight week period. The TEIQue-ASF scores were examined for changes over time. Missing data were handled using last observation carried forward in the case (n = 1) where TEIQue was not completed at the 2-week interval. A repeated-measures ANOVA using a Greenhouse-Geisser correction detected a significant change in the TEIQue-ASF score during the 8 weeks, $F(2.48, 52.08) = 4.83$, $P < 0.05$. Post hoc tests using the Bonferroni correction revealed a statistically significant increase in TEIQue-ASF from baseline scores (i.e. pre-yoga) to post yoga, after 8 weeks of yoga intervention [mean difference −20.56 (standard error (SE) 6.43), P = 0.04]. There were no statistically significant changes between the other weeks of yoga. There were no statistically significant changes between any of the subdomains of the TEIQue-ASF scores over 8 weeks. Please refer to Table 1 for TEIQue-ASF total and subdomain means across the 8-week time frame, noting the statistically significant difference between baseline and week 8.

Additionally, the TEIQue-ASF was evaluated in relation to yoga participation. Linear regressions were used to regress TEIQue-ASF total scores and domain scores at weeks 2, 4, 6, and 8 on yoga participation time. No other variables were included in the regression models. Note that time was handled by utilizing separate regression models for each week as linear change over the course of the study was not expected. Regression results are reported in Table 2.

For the TEIQue-ASF total score, results indicated that yoga participation time was not related to TEIQue-ASF total scores at any time during the programme. However, yoga participation time was related to the sociability subdomain at week 2 (β = 0.54, $P < 0.05$) and at week 4 (β = 0.56, $P < 0.05$). The other subdomains of the

Table 1
Mean and standard deviation TEIQue scores and subscales over time (N = 22)

	Baseline Mean (SD)	Week 2 Mean (SD)	Week 4 Mean (SD)	Week 6 Mean (SD)	Week 8 Mean (SD)
Well-being	27.55 (11.14)	30.73 (8.58) $P = 0.37$	31.14 (9.33) $P = 0.74$	29.50 (7.89) $P = 1.0$	31.55 (6.26) $P = 1.0$
Emotionality	34.64 (8.70)	36.59 (9.45) $P = 1.0$	36.95 (8.20) $P = 0.67$	35.73 (7.94) $P = 1.0$	36.59 (8.62) $P = 1.0$
Sociability	27.82 (5.99)	29.14 (6.48) $P = 1.0$	28.41 (6.12) $P = 1.0$	27.77 (5.77) $P = 1.0$	28.18 (6.62) $P = 1.0$
Self-control	25.77 (6.73)	27.86 (5.45) $P = 1.0$	28.05 (5.02) $P = 0.46$	28.36 (5.70) $P = 0.74$	29.86 (5.25) $P = 0.12$
TEIQue-ASF total	130.18 (28.71)	140.00 (28.73) $P = 0.29$	141.86 (27.84) $P = 0.29$	140.77 (24.57) $P = 0.25$	150.73* (25.44) $P = 0.04$

*$P < 0.05$ compared with baseline.
SD, standard deviation; TEIQue-ASF, Trait Emotional Intelligence Questionnaire-Adolescent Short Form.

Table 2
Regression models of yoga participation predicting TEIQue-ASF and behavioural measures

	Unstandardized coefficients (standard error)	Standardized regression coefficient	P-value
Week 2			
Well-being	−0.01(0.01)	−0.02	0.92
Emotionality	0.01 (0.01)	0.23	0.32
Sociability	0.02 (0.01)*	0.54	0.01
Self-control	0.004 (0.01)	0.14	0.53
TEIQue-ASF total	0.03 (0.04)	0.15	0.51
Week 4			
Well-being	0.003 (.01)	0.05	0.82
Emotionality	0.003 (.01)	0.07	0.75
Sociability	0.02 (.01)*	0.52	0.01
Self-control	0.004 (.01)	0.14	0.52
TEIQue-ASF total	0.001 (.36)	0.01	0.97
Week 6			
Well-being	−0.01 (.01)	−0.13	0.57
Emotionality	0.003 (.01)	0.07	0.75
Sociability	0.01 (.01)	0.23	0.30
Self-control	−0.004 (.01)	−0.13	0.57
TEIQue-ASF total	−0.01 (.03)	−0.07	0.77
Week 8			
Well-being	−0.01(.01)	−0.24	0.29
Emotionality	−0.01 (.01)	−0.13	0.56
Sociability	0.01 (.01)	0.19	0.41
Self-control	−0.01 (.01)	−0.29	0.19
TEIQue-ASF total	0.00 (.03)	0.003	0.99

*$P \leq 0.05$.
TEIQue-ASF, Trait Emotional Intelligence Questionnaire-Adolescent Short Form.

TEIQue-ASF did not have a significant association with yoga participation time.

Weekly point card scores were evaluated in relation to yoga participation time. Linear regressions were used to regress weekly point card scores at weeks 1–8 on yoga participation time. Point card totals were used as a surrogate marker for positive behavioural outcomes. Higher weekly point totals are an affirmation of positive behaviours.

Yoga participation was assessed in relation to total restrictive interventions within the inpatient unit. Linear regressions were used to regress total number of all restrictive interventions (personals, quiet times, time outs, holds, and focused therapeutic interventions) on yoga participation time, and results indicated that total yoga participation was related to fewer restrictive behaviour modifications in week 1 ($\beta = 0.44$, $P < 0.05$), in week 3 ($\beta = -0.49$, $P < 0.05$), and in week 4 ($\beta = -0.43$, $P = 0.05$). Regression results are reported in Table 3.

Results indicated that total yoga participation was related to the weekly point totals for week 4 ($\beta = 0.50$, $P < 0.05$) but not significantly related at the other weeks of yoga. Table 4 reflects the means of weekly point cards over weeks 1–8, noting which week was significantly related to yoga via the regression model.

Table 5 reflects the means of each restrictive behavioural intervention over weeks 1–8, noting which weeks the total number of restrictive behavioural interventions were significantly related to yoga via the regression model.

Discussion

This study adds to the growing body of evidence on the acceptability of yoga for children and adolescents and suggests that yoga might provide a positive benefit for this population. Some of the measures detected significant change, although at varying time frames. Over 8 weeks of time in yoga, total TEIQue-ASF scores demonstrated a statistically significant increase, demonstrating that the measurement tool was sensitive to changes over time. Our regression model suggests that this increase was not related to time spent in yoga. However, scores for the subdomain of sociability improved at 2 and 4 weeks in relation to time spent in yoga, with no association at other weeks. Changes in the subdomain scores of well-being, emotionality, sociability, and self-control did not meet statistical significance.

Table 3
Regression models of yoga participation predicting point card scores and restrictive interventions

	Unstandardized coefficients (standard error)	Standardized regression coefficient	P-value
Week 1			
Point card scores	0.04 (.03)	0.28	0.21
All restrictive interventions	−0.01 (.01)*	−0.44	0.04
Week 2			
Point card scores	0.03 (.03)	0.21	0.34
All restrictive interventions	−0.01 (.01)	−0.28	0.21
Week 3			
Point card scores	−0.01 (.04)	−0.07	0.75
All restrictive interventions	−0.01 (.00)*	−0.49	0.02
Week 4			
Point card scores	0.06 (.02)*	0.50	0.02
All restrictive interventions	−0.01 (.01)*	−0.43	0.05
Week 5			
Point card scores	0.03 (.02)	0.35	0.12
All restrictive interventions	−0.01(.01)	−0.34	0.12
Week 6			
Point card scores	0.05 (.03)	0.31	0.17
All restrictive interventions	−0.004 (.01)	−0.16	0.48
Week 7			
Point card scores	0.01 (.05)	0.06	0.81
All restrictive interventions	0.00 (.00)	−0.02	0.92
Week 8			
Point card scores	0.07 (.04)	0.40	0.07
All restrictive interventions	0.001 (.01)	0.03	0.89

*$P \leq 0.05$.

Point card totals increased at week 4 in relation to time spent in yoga, with no association at other weeks. Time spent in yoga was associated with a reduction in total restrictive therapeutic behavioural interventions at weeks 1, 3, and 4, with no association at other weeks. Improvements in TEIQue scores indicate an increase in global trait emotional intelligence. Improvements in point card scores, with reductions in total restrictive interventions, indicate that participants had an improvement in desired behaviours and their ability to self-regulate. It is unknown if these improvements were directly related to yoga or to other interventions.

Yoga studies have been previously conducted in school and community settings, mostly in healthy adolescents, examining effects on physical and cognitive function (Santangelo White 2009, Khalsa *et al.* 2012). This study was unique in the utilization of an adolescent population, diagnosed with mental illness, in a residential setting, and did demonstrate that adolescents will participate in yoga. Girls spent more time in yoga than boys. This is in line with the national health statistics report of 2008 that indicated that girls (4.9%) were more likely than boys (3.8%) to use mind-body therapies (Barnes *et al.* 2008). No adverse effects were reported.

The TEIQue-ASF demonstrated changes in global trait emotional intelligence over 8 weeks. It was low burden for administration, as it was self-administered, and was available for research at no cost to the investigators or institution. A gold-standard comparator of emotional intelligence was not given so a sensitivity analysis could not be conducted.

Table 4
Weekly point card scores

	Week 1 Mean (SD)	Week 2 Mean (SD)	Week 3 Mean (SD)	Week 4 Mean (SD)	Week 5 Mean (SD)	Week 6 Mean (SD)	Week 7 Mean (SD)	Week 8 Mean (SD)
Weekly points	256.9 (24.6)	262.7 (24.6)	263.1 (29.1)	271.2 (21.0)*	272.4 (17.3)	262.6 (27.4)	272.4 (35.3)	260.9 (29.0)

*$P < 0.05$.
SD, standard deviation.

Table 5
Weekly totals for restrictive behavioural interventions

	Week 1 Mean (SD)	Week 2 Mean (SD)	Week 3 Mean (SD)	Week 4 Mean (SD)	Week 5 Mean (SD)	Week 6 Mean (SD)	Week 7 Mean (SD)	Week 8 Mean (SD)
Quiet time	1.0 (1.8)	0.86 (1.6)	0.86 (1.6)	0.91 (2.3)	0.64 (1.5)	0.50 (0.9)	0.59 (1.2)	0.64 (1.9)
Personals	1.91 (3.902)	1.55 (4.480)	1.09 (3.006)	1.32 (3.257)	1.70 (3.763)	1.95 (4.192)	0.86 (2.054)	1.23 (3.337)
Time out	0.05 (0.2)	0.14 (0.5)	0.05 (0.2)	0.0 (0)	0.09 (0.4)	0.00 (0)	0.05 (0.2)	0.00 (0)
Focused therapeutic interventions	0.09 (0.3)	0.14 (0.4)	0.00 (0)	0.05 (0.2)	0.14 (0.4)	0.05 (0.2)	0.09 (0.3)	0.00 (0)
Total restrictive interventions	3.05 (5.6)*	2.68 (5.0)	2.0 (3.9)*	2.27 (4.2)*	2.57 (4.5)	2.5 (4.6)	1.59 (2.9)	1.86 (4.3)

*$P < 0.05$.
SD, standard deviation.

Limitations of this study include the design and the small sample size. The lack of a non-yoga comparison group limits the conclusions. Without a comparison group, statistically significant changes in the various measures cannot be directly linked to yoga. Other therapeutic interventions create confounding variables. For example, residents received individual, family, and group therapy, as well as education about coping, social, and life skills. The residents were on various medications. Medications and medication changes were not tracked. All of these interventions can contribute to improved outcomes. Individuals vary in their motivation for change and receptiveness to exploring different avenues of treatment. These differences in investment can affect progression and outcomes, as well. It is possible that participants with higher levels of investment in treatment participated more in yoga and had the most benefit. Residents were informed about the research trial, contributing to the possibility of a placebo effect. The census on the residential unit was low, with decreased lengths of stay, limiting our ability to enrol participants for an 8-week intervention, and extending the time of the study to 1 year.

This study was limited to the use of a twice weekly yoga video. There was no access to a live instructor. Authors of a recent article on training issues in yoga and mental health treatment assert that mental health professionals utilizing yoga as a therapeutic modality must have specialized education (Forbes *et al.* 2011). It is unknown if an instructor with formalized yoga training, or a more frequent intervention, would have had a different outcome. This is an area that needs testing in future studies.

Implications for practice

This study was relevant because it was conducted on an adolescent inpatient unit. The findings of this study demonstrate that adolescents with mental illness may be receptive to yoga as a behavioural intervention. Additionally, a limited impact on trait emotional intelligence was shown. This study provides the preliminary work needed for a future randomized control trial. Randomization would help to determine if particular yoga practices, and doses, contribute to improved outcomes for adolescents with mental health disorders. Further studies are needed to evaluate if changes in trait emotional intelligence scores can be attributed to yoga or other behavioural interventions, as well as which subscales are most affected by specific behavioural interventions. Consumers are seeking alternative and adjunctive therapies for the complex care of this population. If supported by further studies, yoga has the potential to be a complimentary therapy that can be integrated into the multidisciplinary treatment approach for mental health patients. Psychiatric nurses have an opportunity to thoughtfully consider the evidence of complimentary therapies and how they may be implemented across the continuum of care.

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