Research Paper

Evaluation of a Modified Yoga Program for Persons with Spinal Cord Injury

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Abstract: Yoga is a promising mind-body intervention for improving health and well-being in a number of clinical populations. At this time, there is no evidence on the benefits of yoga for persons with spinal cord injury (SCI). Twelve participants with SCI were recruited into a mixed-methods program evaluation of an eight-week modified yoga program. At baseline and exit, participants were evaluated on pain, fatigue, psychological factors, and mindfulness with self-report questionnaires and semi-structured interviews. Five participants completed the baseline and exit assessments. Significant changes were not found on any of the outcome scores. Qualitative analysis revealed main themes regarding expectations, benefits along emotional, mental, and physical domains, program satisfaction and recommendations. Participants reported highly enjoying the yoga intervention and the qualitative data indicated a number of therapeutic benefits (i.e., decreased stress, pain relief). Yoga appears to be a promising therapeutic recreation intervention post-SCI and a larger clinical trial is recommended to conclusively investigate both its objectively and subjectively measured benefits.

Keywords: *spinal cord injuries, yoga, therapeutic recreation, program evaluation, pain, fatigue, mindfulness, self-efficacy, affect*

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Introduction

Sustaining a spinal cord injury (SCI) creates major challenges for maintaining physical and mental health and for community participation (Carpenter, Forwell, Jongbloed, & Backman, 2007). The injury typically results in motor, sensory, and autonomic impairments leading to significant changes in physical functioning (Kirshblum, 2005). These changes include altered mobility, bladder and bowel dysfunction, changes in body temperature and blood pressure regulation, and altered or absent cutaneous sensation below the level of the injury. As a result, individuals with SCI are highly susceptible to develop secondary health conditions, such as pressure ulcers, spasticity, and chronic pain (Hitzig, Campbell, McGillivray, Boschen, & Craven, 2010). The occurrence of both primary (i.e., paralysis) and secondary impairments (i.e., pain) impedes an individual's ability to fully participate in his or her community or in leisure activities that may contribute to a meaningful quality of life (QoL).

In addition, individuals with SCI experience higher levels of pain than normative samples, which can impact social and psychological functioning, as well as activities of daily living (Jensen, Hoffman, & Cardenas, 2005). Pain related cognitions such as pain catastrophizing are recognized as negatively impacting experiences with pain and functional ability in individuals with SCI and other disability groups (Jensen, Moore, Bockow, Ehde, & Engel, 2011). With respect to mood and psychological well-being, persons with SCI have lower positive affect and greater levels of depression when compared to age matched controls (Salter, Smith, & Ethans, 2013). Physical and mental health experiences intersect in individuals with SCI; those who experience higher levels of fatigue also experience higher levels of depression, anxiety, and lower levels of self-efficacy and QoL (Craig, Tran, Wijesuriya, & Middleton, 2012; Wijesuriya, Tran, Middleton, & Craig, 2012).

Engaging in leisure activities after SCI is a considerable challenge (Kennedy & Rogers, 2000; Scelza, Kalpakjian, Zemper, & Tate, 2005). This is reflected in high rates of boredom and sedentary lifestyles reported by this population (Caldwell & Weissinger, 1994; Kleiber, Brock, Lee, Datillo, & Caldwell, 1995; Lee & Mittelstaedt, 2004; Lee, Mittelstaedt, & Askins, 1999). Barriers to leisure activities such as physical activity post-SCI can be intrapersonal (physical and psychological), systemic (accessibility, financial cost) or informational (lack of knowledge, lack of awareness) (Martin Ginis, Jorgensen, & Stapleton, 2012). With regard to psychological barriers, emotional and mental health issues that might arise early post-injury, such as altered body image and depression (Loy, Dattilo, & Kleiber, 2003), can impede engagement in physical activities after initial SCI rehabilitation (Vissers et al., 2008). Further, there is evidence to show that poor adjustment early after SCI leads to long-term difficulties, whereas those who cope well following their injury tend to continue to cope well over time (Pollard & Kennedy, 2007). On the other hand, general self-efficacy has been identified as a potentially useful target to increase participation after SCI (Peter et al., 2014). There is a need for therapeutic interventions that are easily adaptable for people wiht a SCI and can be introduced early post-injury in order to help maximize physical and mental health.

Yoga is a promising mind-body intervention for improving health and well-being in a number of able-bodied and clinical populations (Wren, Wright, Carson, & Keefe, 2011). The word yoga comes from the Sanskrit term "yug" which is

commonly translated as a state of union; however, it is also defined as cultivating deep concentrative awareness (Bechsgaard, 2013). Yoga is a comprehensive system that uses physical postures (*asana*), breathing exercises (*pranayama*), concentration and meditation (*dharana* and *dhyana*) and contemplative practice. Through the repeated practice of these yogic techniques, the student of yoga may experience improvements along physical, mental and emotional dimensions of self. A multitude of schools of yoga can be found in contemporary practice, but a common thread is a focus on the development of strength and mobility through practice of the asanas.

In various disability groups or compromised populations with mobility impairments and/or chronic pain (i.e., osteoarthritis, rheumatoid arthritis, stroke, multiple sclerosis, fibromyalgia, chronic low back pain, AIDS, chronic pancreatitis), yoga interventions have been shown to reduce pain, stress and fatigue, increase functional strength, and improve mood, cognition, balance, and QoL (Boehm, Ostermann, Milazzo, & Bussing, 2012; Bonadies, 2004; Bussing, Ostermann, Ludtke, & Michalsen, 2012; DeMayo, Singh, Duryea, & Riley, 2004; Harper, 2013; Lazaridou, Philbrook, & Tzika, 2013; Oken et al., 2004; Salgado et al., 2013; Sareen, Kumari, Gajebasia, & Gajebasia, 2007; Ward, Stebbings, Cherkin, & Baxter, 2013; Wren et al., 2011). Yoga also positively impacts psychological experiences, such as pain catastrophizing, mood, anxiety, self-efficacy, positive and negative affect, social function, and mindfulness in clinical and nonclinical populations (Balasubramaniam, Telles, & Doraiswamy, 2013; Bonura & Tenenbaum, 2013; Bussing, Michalsen, Khalsa, Telles, & Sherman, 2012; Curtis, Osadchuk, & Katz, 2011; Vadiraja et al., 2009). Furthermore, there is qualitative evidence for the positive impact of yoga on belongingness, sense of connectedness, self-transformation, sense of purpose, and acceptance of changes to one's body, which may be relevant to individuals with SCI (Garrett, Immink, & Hillier, 2011). Yoga may serve to broaden an individual's repertoire of available resources in terms of open mindedness, creativity, curiosity, and acceptance of one's body, and therefore reduce constraints to participation and physical activity engagement and increase QoL and leisure (Van Puymbroeck, Schmid, Shinew, & Hsieh, 2011; Van Puymbroeck, Smith, & Schmid, 2011). Pain, health, and QoL in individuals with SCI are related to caregiver satisfaction with life and mental health and it is recommended that SCI rehabilitation interventions target caregiver well-being (Coleman et al., 2013). Yoga has been shown to increase coping ability and to improve endurance, flexibility, and strength in informal caregivers; it is possible that yoga could be used as a recreational activity to simultaneously address the well-being of both individuals with SCI and their caregivers (Van Puymbroeck, Payne, & Hsieh, 2007). Although research trials have yet to evaluate the impact of yoga on individuals with SCI, it has been recommended that Iyengar yoga be integrated into SCI rehabilitation therapies to increase physical functioning and to cultivate a positive mind-body experience (Zwick, 2006).

An important facet of yoga that may contribute to change processes is mindfulness, which has been recognized for gains in a variety of physical and mental health conditions. Mindfulness is rooted in Buddhist and contemplative philosophies and is characterized by paying total attention in the present moment with a nonjudgmental awareness of, and open-

ness to, inner and outer experiences (Kabat-Zinn, 1994). Elements of mindfulness are inherent in many schools of yoga through the cultivation of an internal witness. The practice of observing one's experience without fully identifying with it is utilized during the practice of physical postures as well as in daily life throughout the yoga tradition. Mindfulness has been proposed as a mechanism of yoga-induced improvements in pain catastrophizing in women with fibromyalgia (Curtis et al., 2011). Other possible mechanisms of yoga's effects include self-efficacy and exercise, both of which have been shown to be mediators of improvements in back pain-related disability in the context of a yoga intervention (Sherman, Wellman, Cook, Cherkin, & Ceballos, 2013).

Independent of yoga, mindfulness has been found to negatively predict pain intensity, pain catastrophizing, pain-related fear, pain hypervigilence, negative affect and functional disability in chronic pain patients (Schutze, Rees, Preece, & Schutze, 2010). Furthermore, meditation is considered almost as effective as tricyclic antidepressants and anticonvulsant agents in the treatment of pain post-SCI (Cardenas & Felix, 2009). In other disability populations, such as mild traumatic brain injury, a standardized but uncontrolled mindfulness-based stress reduction (MBSR) intervention resulted in clinically significant improvements in self-efficacy and QoL from pre- to postintervention (Azulay, Smart, Mott, & Cicerone, 2013). A randomized controlled trial evaluating cancer related fatigue found that individuals randomized to an MBSR program reported significantly lower fatigue and depression from pre- to postintervention than wait-list controls (Johns et al., 2014). Mindfulness is purported to be useful in a wide range of chronic conditions and a meta-analysis reported that MBSR programs consistently result in improvements in QoL, psychological factors (depression, anxiety, coping style), affective elements of disability, and physical health (Grossman, Niemann, Schmidt, & Walach, 2004). Furthermore, MBSR programs may offer protective properties for caregivers in terms of the mental health challenges, such as depression and anxiety, which often emerge over time (Van Puymbroeck & Hsieh, 2010). Given its emphasis on mindfulness concepts, such as present-mindedness and acceptance, yoga may be a well-suited mind-body intervention for individuals with SCI. Yoga programs may be easily modified for varying degrees of impairment and mobility, making it a highly accessible intervention for individuals with SCI.

The purpose of this pilot study was to conduct an evaluation of an eight-week, modified yoga program for individuals with SCI, in terms of both participant experiences and also with respect to program satisfaction. The primary hypothesis of the present study is that participation in an eight-week yoga program would lead to improvements in the following measures from pre- to postintervention: pain, pain catastrophizing, fatigue, psychological factors (self-efficacy, positive and negative affect), and mindfulness. The results of this evaluation may provide insight into the benefits of yoga for individuals with SCI, point to suggestions for implementation of yoga into clinical practice, and guide future research.

Methods

Yoga Program

The Therapeutic Recreation (TR) department at the Toronto Rehabilitation Institute's Brain and Spinal Cord

Rehabilitation Program (Lyndhurst Centre) conducted the eight-week yoga program. The program consisted of one 45- to 60-minute class per week, and was taught by a certified yoga teacher with 500 hours of training. The dosage of one class a week was decided in alignment with the yoga literature and participants were not given homework in order to prevent possibly unsafe practice of yoga in an unsupervised environment (Ward, Stebbings, Sherman, Cherkin, & Baxter, 2014). A TR staff member designed the program length and duration of classes, and the yoga instructor designed the content of the classes with input from the first author (KJBC), herself a certified yoga instructor. As such, the program was designed in accordance with the literature and also with a clinical perspective of participants' unique needs. A TR staff member and the first author assisted the instructor when teaching the classes. The classes were offered at no cost to the participants. Both in- and out-patients with SCI were provided the opportunity to participate in this comprehensive program, which focused on breath awareness, nonjudgmental attention to present experience, mindful movement, and a supportive environment.

This program drew elements from Hatha yoga, Iyengar yoga, and Vinyasa yoga. The word Hatha is composed of the Sanskrit terms "Ha" and "Tha," which refer to the sun, or heating and activating properties, and to the moon, or cooling or calming properties, respectively. By balancing these opposing qualities, physical and mental health are fostered and the development of self-awareness and mind-body unity are cultivated (Raub, 2002). Iyengar yoga emphasizes careful alignment of the muscles and bones in each posture in order to execute each pose with optimum safety and awareness, and to minimize the risk of injury or strain (Ward et al., 2014; Zwick, 2006). Although Iyengar yoga typically uses a variety of props as aids in performing asanas (postures), this program did not have access to props and so only principles of right action and alignment were used. Vinyasa yoga focuses on the synchronization of breath with movement to create a seamless sequence of postures. In this form of yoga, the inhalation and exhalation of the breath are coordinated with stages of awareness or physical movement.

The sessions began with the instructor facilitating a mindful check-in or brief meditation. At this stage, participants were directed to focus and bring awareness to their breathing. Succinct teachings on mindfulness concepts such as letting be and acceptance of physical and mental states in the present moment were provided. These opening exercises lasted approximately 5 to 10 minutes. The majority of the class centered on seated asanas, with a focus on upper body movement and action. The asanas performed in class included urdhva hastasana and related variations, neck rolls, garudasana preparation and garudasana, uttanasana variation, marjaryasana variation, bitilasana variation, thoracic extension variation, and general arm stretch and shoulder openers. The postures were sequenced in a purposeful way to build on awarenesses and actions learned in previous poses. In addition, breath movement coordination (Vinyasa yoga) was used in order to transition between poses and to encourage a sustained inward focus. In order to create an environment of practice that was accessible to all participants regardless of their mobility, instructions focused on awareness, sensations, and stages of movement. For example, participants were encouraged to first bring

awareness to a part of the body, to cultivate awareness of initiating movement, and finally to move that part of the body if possible. If a participant did not have sensation or motor control over a body part, they were encouraged to return to breath awareness. Participants who required hands-on assistance were attended to by a clinical staff member. Participants were encouraged to gently push to the edge of comfort and actively engage their muscles in order to build strength and flexibility, while also practicing safely within personal limits with respect to pain and fatigue. The asana portion of the class was followed by a meditation and breathing exercise and then closed with a mindful check-in.

Participants

Staff at Toronto Rehabilitation Institute's (TRI) Brain and Spinal Cord Rehabilitation Program (Lyndhurst Centre) circulated flyers to in- and out-patients. A member of the care team asked persons who expressed an interest in participating if a member of the research team could discuss the yoga study with them. Inclusion criteria for participation were as follows: participants must be able to understand instructions in English, participants must be 18 years of age or older, participants must be able to do 45 minutes of physical activity at a time, and participants must attend the program willingly. Twelve potential participants provided informed consent to participate in the study. One person withdrew from the yoga program prior to starting the first yoga class. The remaining sample consisted of 10 women and one man, five of whom were in-patients and six from the community (see Table 1). Nine participants reported sociodemographic and injury characteristic data and two participants did not provide this information. Demographic information was reported for all recruited participants who provided this information, regardless of whether they completed the yoga intervention and postintervention measures.

Self-Report Measures

In order to evaluate program satisfaction, the Yoga Satisfaction Scale was administered at the end of each session. As part of routine program evaluation of yoga programs at TRI, the Toronto Mindfulness Scale (TMS) was also administered after every class. In order to test the hypothesis that the yoga program would result in improvements in participant experiences with pain and related constructs, fatigue and psychological factors, the following measures were administered; Brief Pain Inventory-Short Form: BPI-SF, Pain Catastrophizing Scale: PCS, Fatigue Severity Scale: FSS, Positive and Negative Affect Scale: PANAS, General Self-Efficacy Scale: GSES, and the Cognitive and Affective Mindfulness Scale-Revised: CAMS-R.

Yoga Satisfaction Scale (YSS). The YSS is a nonstandardized measure designed by the authors and developed for the present study to capture participants' perceived satisfaction with the yoga program. The scale also contains questions regarding sociodemographic status and injury information (gender, age, months postinjury/onset, cause of SCI/lesion, severity of SCI/lesion [complete, incomplete], and level of injury/lesion [paraplegia, tetraplegia]). The demographic portion of the scale was administered only at the first class, while the three items regarding satisfaction were administered after every class. The three-item survey asked participants to rate 1) their enjoyment of the class, 2) if the class made them feel relaxed, and 3) if they would participate in more classes. They responded using a 10-point scale ranging

Table 1

Demographic and Impairment Characteristics

	All Participants (n = 11) Number	Completers (n = 5) Number
Sex		
Men	1	1
Women	10	4
Etiology		
Traumatic	6	3
Non-traumatic	3	2
Not reported	2	-
Impairment		
Complete[1]	3	2
Incomplete[2]	6	2
Unknown	1	1
Not reported	1	-
Tetraplegia	2	2
Paraplegia	6	1
Unknown	1	1
Not reported	2	-
Status		
In-patient	5	0
Community-dwelling	6	5
Mean Age in yrs (*SD*)[3]	48.4 (15.0)	44.6 (13.9)
Mean Months Post-Injury *(SD)* [3]	157.4 (191.8)	276.4 (178.7)

Note 1 – complete injuries are those with no motor and/or sensory function below the level of lesion.
Note 2 – incomplete injuries are those with some motor and/or sensory function below the level of lesion.
Note 3 – Two participants declined providing data on age or injury duration.

from: 1 (*Strongly Disagree*) to 10 (*Strongly Agree*). The YSS also has open-ended items requesting feedback on what participants enjoyed and what suggestions they had for future classes.

Brief Pain Inventory (BPI)–Short-Form (Cleeland & Ryan, 1994; Daut, Cleeland, & Flanery, 1983). The BPI-SF is a 9-item self-report questionnaire that measures various aspects of pain and pain interference with daily activities using 11-point scales. The BPI has strong internal consistency (Cronbach's α = .85 and .88 for the Intensity and Interference scales) and adequate construct validity. The pain interference subscale has been used in many studies of pain in people with SCI (Jensen et al., 2005; Stroud, Turner, Jensen, & Cardenas, 2006), and has excellent reliability (Cronbach's α > .90), and validity for SCI (Raichle, Osborne, Jensen, & Cardenas, 2006).

Pain Catastrophizing Scale (PCS) (Sullivan, Bishop, & Pivik, 1995). The PCS is a 13-item self-report scale that measures catastrophic thinking in rela-

tion to how individuals experience or anticipate pain. Items are scored on a 5-point scale: 0 (not at all) to 4 (all the time). Scores range from 0-52 and higher scores reflect higher levels of pain catastrophizing. The PCS has high internal consistency (coefficient α = .87). Pain catastrophizing is related to pain, and physical and psychological disability in clinical and nonclinical populations (Crombez, Eccleston, Baeyens, & Eelen, 1998; Sullivan, Tripp, Rodgers, & Stanish, 2000), including in SCI (Giardino, Jensen, Turner, Ehde, & Cardenas, 2003; Turner, Jensen, Warms, & Cardenas, 2002).

Fatigue Severity Scale (FSS) (Krupp, LaRocca, Muir-Nash, & Steinberg, 1989). The FSS is a 9-item self-report questionnaire that evaluates the severity of fatigue and the impact on lifestyle and activities. Responders indicate the degree to which they agree with each item according to a 7-point scale: 1 (*strongly disagree*) to 7 (*strongly agree*). The maximum score is 63, where higher scores reflect higher levels of fatigue. The FSS has been shown to be a valid and reliable (Cronbach α = .89, intraclass correlation coefficient, .84; 95% confidence interval, .74 – .90) measure for SCI (Anton, Miller, & Townson, 2008).

General Self-Efficacy Scale (GSES) (Schwarzer & Jerusalem, 1995). The GSES is a 10-item scale that is designed to assess optimistic self-beliefs regarding one's perceived ability to cope with a variety of daily hassles and stressful life events. Items are scored using a 4-point scale: 1 (*not at all true*) to 4 (*exactly true*). The GSES has a maximum total score of 40 with higher scores reflecting higher perceived self-efficacy. The scale has been widely used and demonstrates high internal consistency (α = .86), unidimensionality and construct validity (Scholz, Gutiérrez Doña, Sud, & Schwarzer, 2002). The GSES has been used in the SCI population, and the construct of self-efficacy has been tied to a number of favorable outcomes post-SCI (Hampton, 2011; Kennedy, Taylor, & Hindson, 2006; Mortenson, Noreau, & Miller, 2010; Nicholson Perry, Nicholas, & Middleton, 2009).

The Positive Affect and Negative Affect Scale (PANAS) (Watson, Clark, & Tellegen, 1988). The PANAS is a 20-item self-report questionnaire that measures positive and negative constructs as both states and traits. Ten descriptors are used for each affect scale: 1) positive affect (PA) and 2) negative affect (NA). Items are scored using a 5-point scale: 1 (*very slightly or not at all*) to 5 (*extremely*). The highest score for each subscale is 50 and higher scores reflect higher levels of affect. The internal consistency coefficient for PA is .89 and for NA is .85, and has good convergent validity with measures of depression (Crawford & Henry, 2004). The PANAS was selected as it was thought to be a sensitive tool for detecting any immediate changes in participants' moods that they may experience due to their participation in the yoga program.

Toronto Mindfulness Scale (TMS) (Lau et al., 2006). The TMS is a 13-item, self-report questionnaire used to assess how an individual experiences and reacts to thoughts, feelings and sensations they experience in daily life. Responders are asked to indicate the degree to which they agree with an item according to a 5-point scale: 0 (*not at all*) to 4 (*very much*). The highest possible total score is 52, with higher scores indicating higher levels of mindfulness. The TMS has two subscales, curiosity (6 items; highest score of 24) which measures present moment awareness with an attitude of curiosity,

and decentering (7 items; high score of 28), which measures the extent to which an individual has the ability to distance or disidentify with thoughts or feelings. Both subscales have moderate inter-item correlations: curiosity, $r = .50$, and decentering, $r = .39$ (Lau et al., 2006). The two-factor structured scale has high internal consistency ($\alpha = .95$), moderate correlations between each item and the total items ($r = .53$) and is predictive of treatment outcome (Lau et al., 2006).

Cognitive and Affective Mindfulness Scale-Revised (CAMS-R) (Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007). The CAMS-R is a 12-item scale that measures elements of everyday mindfulness, such as regulation of attention, awareness of present experience and an attitude of acceptance. Items are rated on a 4-point scale: 1 (*rarely/not at all*) to 4 (*almost always*). Ratings on the items are summed and the highest possible score is 48; higher scores reflect greater mindfulness. The total score has acceptable internal consistency (Cronbach $\alpha = .74 - .77$) and good convergent validity with other measures of mindfulness. Scores on this measure are also correlated with measures of distress, emotional regulation and well-being.

Semi-Structured Interviews. After the last class attended (prior discharge from TRI or postintervention), participants were asked to partake in a brief semistructured interview to obtain their perceptions and feedback of the yoga program. Participants were asked the following open-ended questions: 1) "What were your expectations of the program?" 2) "What aspects of the program did you find enjoyable?" 3) "What aspects of the program did you not like or thought could be improved?" 4) "What were some of the changes (e.g. emotional, physical), if any, you noticed about yourself during or after the program?" and 5) "Overall, how satisfied were you with the program?" Prompts and points of clarification were asked to explore answers in-depth and to ensure the interviewer's proper understanding of the responses (Creswell, 2003).

Procedure

This study was approved by the Research Ethics Board of the Toronto Rehabilitation Institute; all applicable institutional and governmental regulations concerning the ethical use of human volunteers were followed. After obtaining informed consent, participants were asked to complete the questionnaire package prior to attending the yoga program (prior to class 1) and at the end of the program (after class 8). This included the BPI-SF, FSS, GSES, PCS, PANAS, and CAMS-R. All participants were asked to complete the YSS and TMS at the end of every class. The qualitative interviews occurred in a private room and the duration of the interviews was approximately 10-20 minutes. Interviews were recorded with participant consent and were later transcribed. Staff members helped some participants to fill out the questionnaires.

Analysis

Survey data from the YSS was used to generate descriptive statistics and frequencies regarding demographics. Means (SD) were generated for each of the three questions on the YSS (Enjoyment, Relaxation, Would Come Again) to determine satisfaction with the program. Wilcoxin signed-rank tests were used to evaluate changes in pain, fatigue, psychological factors and mindfulness from pre- to post-intervention. Fisher's exact test was used to compare differences between participants who completed and did not complete the program on gender (male vs. female), etiology (traumatic vs. non-

traumatic), level (tetraplegia vs. paraplegia), and patient status (in-patient vs. out-patient). Mann-Whitney U test was used to compare completers and non-completers on age and all baseline variables.

For qualitative content analysis and interpretation, fundamental qualitative description methodology as described by Creswell (2003) and Sandelowski (2000) was used to provide a comprehensive summary of the information conveyed by the participants during the interviews. This method of analysis seeks to provide descriptive validity, or an accurate description of the participants' responses during the interviews, and interpretive validity, an accurate accounting of the meanings that participants attribute to their responses. This methodological approach has been successfully used in other SCI studies to obtain the perspectives of this population on different issues (Hammel et al., 2008; Norman et al., 2010). The first step in the analysis involved reading (by a research investigator) the transcript of the interview as a whole, in order to obtain a general sense of the information provided by the participant. The second step involved line-by-line re-readings of the transcript and initial clustering of concepts according to units of meaning for each question. Through the process of distillation/condensation, passages were identified and shortened while preserving the core meaning; and through the process of aggregation/abstraction, codes, themes, and categories were created on various levels (Graneheim & Lundman, 2004). Two members of the investigation team independently read and coded each transcript and then resolved any points of disagreement in coding through discussion. Instances of disagreement were few and minor in nature. Codes were sorted into thematic categories based on similarity. As scoring progressed, some codes were merged together to avoid redundancy in the coding framework, and other codes were added as new insights emerged. The transcripts were re-read and re-coded several times each in order to ensure that the coding framework captured the content expressed in the interviews and to determine whether saturation had been achieved (Creswell, 2003).

Results

Of the 11 participants who did the baseline assessment, five completed four sessions or more (see Table 2). The remaining sample consisted of four females and one male, all of whom were living in the community (see Table 1). Fisher's exact test confirmed that participants who were outpatients were more likely ($p < .05$) to complete the program than participants who were in-patients. Table 2 presents the satisfaction ratings for each of the eight classes and scores for the TMS collected after each session. Table 3 presents the scores for all outcome measures. Wilcoxin signed-rank tests did not reveal statistically significant differences between baseline and exit scores on any measure (all $p > .05$).

Qualitative Reports

Through the qualitative analysis of participant interviews (n=6; five participants who completed four-eight classes and one participant completed three classes), and a variety of themes emerged. Although the authors had decided, a priori, to use four sessions as the cut-off for being a "completer," due to the exploratory nature of this study, the authors believe that it is meaningful to include the data from a sixth participant who was available for interview and who only completed three classes.

Table 2

Yoga Class Atteendance, Class Perceptions, and Toronto Mindfulness Scale (TMS) Scores

Class #	# Attendees	# Completed Post-Class Assessment	Enjoyable (M; SD)	Relaxing (M; SD)	Would Come again (M; SD)	TMS Curiosity (M; SD)	TMS Decentering (M; SD)
1	9	7	8.0 (2.3)	8.3 (2.1)	9.0 (1.3)	15.8 (3.2)[a]	15.8 (2.2)[a]
2	8	8	8.3 (1.0)	8.0 (0.9)	8.6 (1.3)	10.8 (3.3)	12.8 (4.2)
3	8	7	7.7 (1.3)	8.1 (1.3)	8.4 (1.5)	13.6 (6.1)	14.4 (3.4)
4	8	7	9.0 (1.4)	8.4 (1.1)	9.0 (1.4)	13.4 (5.7)	14.0 (6.2)
5	5	4	9.0 (2.0)	9.0 (2.0)	9.0 (2.0)	7.0 (8.8)	16.8 (3.4)
6	4	4	8.5 (0.6)	8.5 (0.6)	8.5 (0.6)	13.0 (7.6)	17.3 (7.3)
7	5	5	8.8 (0.8)	9.0 (0.7)	9.4 (0.9)	14.4 (7.8)	17.0 (7.3)
8	4	4	9.3 (1.0)	9.5 (0.6)	9.8 (0.5)	9.0 (4.2)	12.5 (3.0)

Note: a = n of 5

Table 3

Participant (n = 5) Scores on Health, Coping/Cognitions, and Mood

Scale	Baseline (M; SD)	Exit (M; SD)
GSES	32.0 (4.9)	33.4 (3.3)
TMS – Total	30.0 (6.5)	19.0 (6.8)
PANAS – Positive Sub-scale	34.6 (8.4)	34.6 (10.1)
PANAS – Negative Sub-scale	21.0 (5.4)	22.8 (8.6)
PCS	12.6 (10.8)	23.6 (5.9)
FSS	38.0 (18.7)	37.4 (12.3)
CAMS-R – Total	32.8 (6.1)	30.8 (7.8)
CAMS-R – Attention	8.8 (1.3)	8.2 (1.5)
CAMS-R – Present Focus	8.6 (2.6)	8.6 (3.0)
CAMS-R – Awareness	7.2 (1.6)	7.4 (1.8)
CAMS-R – Acceptance	8.2 (1.8)	6.8 (2.2)
BPI – Worst Pain	5.4 (2.1)	6.8 (1.3)
BPI - Least Pain	1.8 (1.9)	3.2 (1.9)
BPI - Average Pain	4.2 (0.8)	5.2 (1.8)
BPI – Current Pain	3.2 (2.4)	5.4 (3.1)
BPI – General Activity	3.4 (3.9)	5.8 (2.9)
BPI – Mood	3.6 (3.9)	5.8 (1.8)
BPI – Mobility	4.8 (3.1)	6.0 (1.9)
BPI – Normal Work	4.6 (3.8)	7.3 (1.5)
BPI – Relations	3.6 (4.0)	4.8 (2.7)
BPI – Sleep	4.2 (4.1)	4.4 (3.8)
BPI – Enjoyment of Life	5.0 (3.5)	6.6 (2.6)

GSES = General Self-Efficacy Scale; PANAS = Positive Affect and Negative Affect Scale; PCS = Pain Catastrophizing Scale; FSS = Fatigue Severity Scale; CAMS-R = Cognitive and Affective Mindfulness Scale-Revised; BPI = Brief Pain Inventory

In response to Question One, participants reported a variety of expectations for the program: novel experience of self (n = 3; challenge to self, mind-body integration, meditation, and different kinds of experience), activity engagement (n = 3; new activity, having fun, and moving physically in new ways), stress relief (n = 5; relaxation, calming, outlet for stress), social support (n = 1; being with other people), and pain relief (n = 1; takes one's mind off the pain). Some of these themes are present in one participant's answer:

> Doing something new, something different, to move me in new ways and challenge me and doing something different and fresh. Being with other people…and I liked the idea of yoga, mind and body working in tandem, it really appeals to me, this kind of interaction. (ID#3)

Themes for Question Two (enjoyable aspects of the program) and Four (changes noticed during or after the program) were gleaned across the two questions due to considerable overlap in participant responses. The main themes to emerge included: present mindedness (n = 4 for Question Two and n = 4 for Question Four; increased focus, increased awareness, being in the moment, letting go, new way of being in old experience, increased awareness of body, increased

concentration), freedom from regular experience (n = 3 for Question Two and n = 0 for Question Four; maintain inward focus, refreshing, emotional relief, free from mental baggage, release from day-to-day stress, new lease on life), physical awareness or changes (n = 4 for Question Two and n = 2 for Question Four; intensity of physical experience, new postures, stretching, new sensations, strength building, focus on body parts, awareness of muscles, flexibility, new ways of moving, mobility), relaxation (n = 4 for Question Two and n = 3 for Question Four; calmness, breathing, feeling good, stress relief), investing in the self or achievement (n = 2 for Question Two and n = 2 for Question Four; doing the right thing for myself, time spent concentrating on self, looking forward to participating), environment (n = 2 for Question Two and n = 0 for Question Four; instructor, style of instructor, quiet, group membership, inclusive approach to yoga), taking the practice to everyday life (n = 0 for Question Two and n = 2 for Question Four; conscious of breathing, practicing at home, dealing with stress better), and pain relief (n = 0 for Question Two and n = 2 for Question 4; relief from overwhelming aspect of pain, release chronic pain).

With regard to changes in experiences of self and relaxation, one participant noted:

> It was a discovery for me…I had this ability to go to this spot where I was cut off from everyday hassles, troubles and mental baggage…I find that really exciting and new and something that has positive effects for myself. The meditation aspect, I'm talking about…I was really surprised at how, um how calm I was able to become in a short period of time, and as a complete novice, and how calm and relaxed and cut off from everything from the outside, I was able to become. And I find it really refreshing valuable and positive. (ID#3).

In addition, one person reported on the benefits of yoga in terms of pain relief:

> I think it just kind of made me more aware of my body and different aches and pains. I would say like even today for instance, I was in a lot of pain when I first came and now I feel a little bit better and it kind of just helps you kind of focus on an area and then kind of release the pain a little bit in that. So it's hard to do sometimes because sometimes pain can be very overwhelming. So its like you can somehow find a release. (ID#13)

In addition to the described therapeutic benefits, the group reported high levels of satisfaction with the program (n = 5) and that yoga was a positive therapeutic tool (n = 3), especially when the classes had more participants and were in depth. Furthermore, participants would recommend yoga for individuals with disabilities or would participate in a yoga program again (n = 5). Participants also felt that there were ways the program could be improved. In response to Question three, the five main themes regarding possible improvements included duration/frequency of class (n = 4; classes were too short, slow, infrequent), increased variety of postures (n = 3; a need for more stretching, a need for a slower pace, a need for a more in-depth approach), need for greater specialization (n = 2; greater specialization of postures), need for greater commitment of partici-

pants ($n = 2$; issues with late comers, attrition and a need to screen for participant commitment), and reduced distractions ($n = 3$; interruptions, posters, bright lights, noise).

Discussion

Although significant changes in health and well-being were not found on the surveys from baseline to exit, participants reported enjoying the yoga intervention, and the qualitative data indicated a number of therapeutic benefits (i.e., decreased stress, general pain relief). Despite our hypothesis not being confirmed by concrete changes in the quantitative data, the qualitative data provides preliminary evidence that the yoga program was well received and it supported personal growth beyond symptom reduction in individuals with SCI. Participants reported changes in physical functioning (e.g. strength building, stretching, decrease of pain, etc.) and an awakening of a deeper sense of self (e.g., increased self-awareness, having a new lease on life and being aware of things spiritually). The identified themes suggest that well-being improved from pre- to postintervention across several domains of functioning, including relaxation (e.g., calmness, breathing), achievement (e.g., eagerness to participate) and freedom from regular experience (e.g., new ways of being in old experience, letting go). The tools, resources, and support provided by the yoga program supported participants to overcome personal barriers in finding a greater connection to the self, sense of meaning, and present-minded experience. Not one participant reported feeling unsafe in the program or reported adverse physical effects such as pain, injury, or muscular strain. Yoga is an accessible and safe intervention post-SCI that warrants investigation through larger clinical trials to clarify the specific benefits it confers for individuals with SCI.

Limitations and Future Research

There are several factors that should be considered in the interpretation of these results. First, the program had a high rate of attrition, with six participants not completing the majority of sessions. Future studies should document reasons for attrition and provide strategies for minimizing its occurrence. The resulting sample size was small and it is possible that with larger numbers, changes would have been observed in the quantitative measures. Given the small sample size, it is also likely that saturation of themes was not achieved. Future work examining facilitators/barriers to engaging in these types of programs is warranted to best maximize program implementation and to increase participant satisfaction.

Second, because this pilot study was not controlled or randomized, it cannot be concluded that the self-reported changes resulted from the yoga, other aspects of the intervention (e.g. social factors, mindfulness, etc.), or undetermined factors. Adequately powered, randomized, controlled trials are needed to evaluate the impact of yoga programs for individuals with SCI. High-quality research trials will not only provide greater understanding on the efficacy and mechanisms of yoga, but they will also contribute to the literature and provide evidence for the usefulness of yoga programs in hospital and rehabilitation settings. Additionally, it is important to consider that the final assessment was made immediately after class 8, which have resulted in an acute effect lingering from the last class rather than a cumulative effect of changes resulting from training over the eight weeks. Future research may benefit from using a post-test design with a lapse of 48

hours between the final session and the posttreatment assessment.

Participants' qualitative reports suggest that the design of future yoga programs may benefit from applying principles of yogic philosophy to personal growth, as this was a primary benefit of the program identified in the analysis. Elements of the traditional eight limb yogic path (ashtanga yoga) have been incorporated into various research protocols to address both physical and mental health conditions; such philosophical principles offer tools that one can use to make meaning of, cope with and cultivate personal growth in the face of adversity (Balasubramaniam et al., 2013; Telles & Singh, 2013). For example, as participants begin to experience new ways of being or freedom from regular "mental baggage," as was reported in the present study, yogic concepts centering on self-study or introspection (*svadyaya*) and non-harming approach to practice and life (*ahimsa*) could be introduced as a springboard for further intrapersonal change. Investigating the impact of yoga interventions on constructs such as growth in the face of adversity, spiritual well-being, life satisfaction and QoL should also be pursued.

Therapeutic Recreation Considerations

All TR activities at the Toronto Rehabilitation Institute, including the yoga program, are guided by the Leisure Ability Model, which was designed with the belief that the end goal of TR services for clients is improved independence and satisfying leisure functioning, or a *leisure lifestyle* (Stumbo & Peterson, 2009). The term leisure lifestyle implies that the individual has the necessary skills, knowledge, attitudes, and abilities to participate successfully in and be satisfied with leisure experiences that are incorporated into his or her individual life pattern (Stumbo & Peterson, 2009). With regard to the yoga program, TR staff worked to implement this activity since it could easily be adapted for SCI for in-patients and for people living in the community. For in-patients, yoga was viewed as a safe and feasible leisure pursuit that people could potentially follow-up with once discharged into the community. Similarly, the program served as an introduction to community-dwelling persons with SCI to a leisure activity that provided both physical and psychological benefits.

The implementation of the program yielded a number of important insights for TR practice. In-patients were found to be less likely to complete the yoga program than people in the community due to discharge from the hospital during the program. Some participants stated that while they would have liked to continue with the program, their priorities were on settling back into the community. It is possible that out-patients may have made an initial commitment to complete the program despite transportation challenges, whereas in-patients may not have had to make this initial commitment. This finding highlights the need to optimize the timing of interventions in treatment planning and consider the program structure that most effectively facilitates the rehabilitation process. Introducing leisure options early post-injury/onset may contribute to better adjustment post-discharge, and subsequently, better long-term outcomes. In addition, short-term yoga interventions may improve attrition rates or providing participants with materials (e.g. videos, cds, handouts) to take home with them may support continued practice.

Conclusions

Overall, the findings of this pilot yoga intervention for SCI suggest that yoga practice may be associated with pos-

itive experiences for individuals with SCI along emotional (e.g. increased feelings of calmness and relaxation), mental (e.g. reduced levels of stress and freedom from "mental baggage"), and physical (e.g. strength building and increased physical awareness) dimensions. Many of the personal benefits participants identified in this study serve to ameliorate the multidimensional barriers to physical activity identified in the literature for individuals post-SCI including physical, psychological and social factors (Martin Ginis, Jorgensen, & Stapleton, 2012; (Martin Ginis et al., 2012; Vissers et al., 2008). Improvements in subjective well-being were gauged by indicators such as self-reported stress relief, freedom from regular experience and ability to be in the present moment, which all constitute changes in perspective and experience, and support the continued pursuit of health and personal growth. Since mental health obstacles can be a deterrent for individuals with SCI to engage in recreational activities (Loy, Dattilo, & Kleiber, 2003; Vissers, et al., 2008), it is imperative that post-SCI interventions target this barrier to rehabilitiation. It is possible that yoga interventions may simultanesouly address mutiple facets of experience (mental, emotional and physical experience) in a way that builds on current leisure activities. Many leisure activities focus on physical engagement (e.g. sports modified for accessiblity), novel experiences (e.g. camping experiences) or social support (e.g. peer groups) and in doing so, offer specialized programs that provide an opportunity for growth in one dimension of being.

The early post-SCI phase is a critical time in the rehabilitation process that shapes an individual's rehabilitation trajectory either positively or negatively (Pollard & Kennedy, 2007). This emphasizes the need for post-SCI interventions to be offered early in the recovery process and to be structured to respond to the unique needs of this population. For example, given the challenges with attrition in the context of a yoga intervention during the acute stages of care, future research should evaluate brief interventions in-hospital coupled with extensive guidance for home practice. In addition, future studies may consider taking preventative measures against attrition such as planning the intervention early in treatment or speaking with participants prior to commencing the protocol to identify possible barriers to continue attendance and corresponding solutions.

The present study offered a unique opportunity to provide a voice to members from the SCI community to describe what a desirable yoga program would consist of for them. Participants requested longer and more frequent classes as well programs with increased depth and specificity for this population. Future interventions should aim to be highly adaptable to the various needs of individuals with SCI and should address multiple dimensions of experience in order to build on programs that are traditionally offered in the leisure model. A large-scale, randomized controlled trial is recommended to yield empirical evidence for the efficacy of yoga post-SCI Considering the findings of the present study, future studies should respond to the specific concerns of this population such as attrition for longer-term interventions, the need to bridge concepts learned in class into daily life and adaptability to different individuals.

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