Yoga Pilot Project for Children and Youth with Autism Spectrum Disorder:

The Anecdotal Effects on Behaviour and Self-regulation

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Abstract

This article looks at the effects of yoga on behaviour and self-regulation in children and youth with Autism Spectrum Disorder (ASD) and Intellectual and Developmental Disability (IDD). This pilot project was inspired by the empirical and anecdotal evidence suggesting that yoga practice, including breathing techniques (pranayama), meditation and movement (asana), may reduce challenging behaviours, change the stress response and increase self-regulation in children with ASD. The objective of this pilot project was to look at the effects of yoga, which incorporates breathing, meditation and movement, on overt and measurable behaviours of students with ASD. In order to examine this relationship, yoga was offered by certified yoga teachers for 5 weeks in small group and in one-on-one sessions at a specialized day-treatment summer camp for children and youth with ASD.

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**Introduction**

Research supports the application of yoga and mindfulness-based interventions when it comes to developing emotional regulation, lowering stress and reducing undesirable behaviours in adolescents and children (Bögels, Lehtonen, Restifo, 2010; De Bruin et al., 2014; Ghosh, Koch, Kumar & Rao, 2009; Heifetz et al., 2015; Hooker and Fodor, 2008; Radhakrishna et al., 2010; Singh et al., 2011; Van De Weijer-bergsma et. al., 2012). Specifically, emerging literature has identified that mindfulness-based strategies may be effective in teaching individuals with Intellectual and Developmental Disabilities (IDD) and ASD to mitigate stressors and develop more efficient emotional regulation skills (De Bruin et al., 2014; Goldberg, 2013; Shanker, 2013; Singh et al., 2003; Sumar, 2013).

Research indicates that individuals with IDD can learn to identify their own emotional states and use effective coping strategies, particularly when taught using mindfulness exercises (Singh et al. 2003, 2011). Given recent research suggesting that those with IDD and ASD use emotional regulation strategies less than the typically developing population to mitigate their response to stressors, it is important to continue to explore effective interventions to teach these skills (Goldberg, 2004; Singh et al., 2003).

The yogic mind-body approach increases the sense of well-being and emotional regulation with the potential to decrease anxiety (Ghosh et al., 2009). Though behavioural interventions are currently best validated in treating most manifestations of ASD, no treatment fits all requirements. It is important to tailor every treatment regime to the individual (Radhakrishna et al., 2010). Engaging in repetitive mindful exercises such as body scans, yoga, and bringing awareness to the breath, is a powerful coping strategy that promotes internal awareness and emotional identification (Radhakrishna et al., 2010; Singh et al., 2011). Further, yoga goes beyond exercise, by teaching fundamental self-regulation skills, such as stress management and coping with anxiety (Bray et al., 2005).

The mindfulness state allows us to enter current awareness of our external environment. Additionally, it encourages internal awareness of our senses, biological and emotional states. For example, through regular mindfulness practice, the participant can learn to pause, calm down, focus the mind on the breath and then consciously make a choice as to how to appropriately respond to environmental and internal stressors.

**Method**

**Participants**

This pilot project offered yoga to children and youth in a specialized day-treatment summer camp to offer an alternative program to address their externalizing behaviour disorders for which they were referred for treatment. There were 10 students who participated in the yoga sessions with ages ranging from 8 to 14 years old. Eight boys and two girls participated. All the students had a diagnosis of ASD and IDD and had well documented histories relating to their behaviour disorder. Some students had fine motor and gross motor difficulties, sensory challenges and triggers, seizure disorders, difficulty with focusing and skill acquisition. There was one student with a diagnosis of Potocki Lupski Syndrome. Another student frequently engaged in severe self-injurious behaviours (SIB) to the head and wore a helmet.

**Information Gathering**

Prior to the yoga intervention, we, the yoga teachers employed the clinical team to help gather information on each participant. The clinical teams were made up of Instructor Therapists, Supervising Therapists and Clinical Supervisors. We asked them to share information regarding participant profiles including prerequisite skills such as the ability to follow 1-2 step instructions and gross motor imitation, their ability to attend in a group setting and tolerance for redirection and/or physical prompting. As well, an overview of challenging behaviour and specific antecedent strategies was requested to address any sensory differences and to reduce triggers for challenging behaviour. We also inquired about mobility issues to address the potential for those that may not be able to access a yoga mat on the floor. It is important to note that this information was gathered for the sole purpose of tailoring the yoga intervention to be as inclusive as possible. There were no exclusionary criteria and all participants were included in the yoga intervention. The yoga teachers and the clinical team were able to observe the participants prior to the start of the yoga intervention. This information was useful for the information gathering and preparation stage.

**Barriers to information gathering.** The clinical team was asked to provide information on at least one pre-existing target behaviour that could be measured throughout the day. The target behaviour data would help determine if there was any relationship between the yoga intervention and the potential reduction of observable, measurable behaviour. This proved to be a limitation in this study, given that the clinical team viewed the yoga intervention as an extracurricular activity and not an intervention requiring the time and effort to pursue data and engage in the additional meetings that we had anticipated. This perception prior to the start of the yoga intervention created a barrier, in that the clinical team and the yoga teachers were pursuing different outcomes. More specifically, we were pursuing the idea that yoga and mindfulness-based interventions may help to develop emotional regulation, lower stress responses and reduce undesirable behaviours in the participants. However, the clinical team was seeking extra-curricular program support for their day-treatment summer camp and had concerns regarding the perceived increase in their workload. As well, there was the legitimate concern from the clinical team that the participants would be resistant to the demands of novel people. In turn, this had potential to increase challenging behaviour, create safety concerns and increase their response effort to that challenging behaviour. In hindsight, additional information and open communication regarding goals and desired outcomes may have been useful to bring us and the clinical team together in advance of the yoga sessions.

**Supportive Materials**

We then set out to plan the intervention and create any visuals that were deemed useful for the participants and their learning style. To start, each mat was labelled with the participants name and picture to help solidify the concept of the mat being their own space. Then, a series of visuals were created that included simple black and white drawings of each asana (yoga pose) with the name of the pose below the picture. Each pose was on a separate card and adhered to a backboard using Velcro so that they can easily be manipulated into various sequences (see Appendix A). This allowed each participant to have some choice of pose or sequence of poses. As well, the removal of each asana from the backboard was a visual cue to indicate the passage of time, moving toward the completion of the yoga session. This system was already familiar to the participants. Many of the participants used visual schedules as part of navigating and understanding their environment whereby pictures and words of daily activities are presented to them in a sequential order and removed once completed. Additionally, soft music was prepared and brought to each session and was offered as a choice during the yoga intervention.

**Description of the Yoga Intervention**

Classes were offered in either 1:1 or group format depending on the clinical team’s daily recommendations. Factors such as the participant’s behaviour leading up to yoga, setting events and staff ratios contributed to the decision. Yoga was initially delivered for 10 minutes in duration, gradually increasing to 30 minutes in duration. For each session, it is important to note that each of the participants was accompanied by their instructor therapist, though the instruction was provided by the yoga teacher. The therapist was instructed, at our request, to refrain from physically and verbally prompting the participant as well as refrain from reinforcing appropriate behaviour. Essentially, the therapist was to remain neutral unless it was necessary to intervene for safety purposes.

The structure of each yoga session was based on yoga therapy principals. The sessions included core components of yoga including breathing exercises (pranayama), movement (asanas) and meditation. The three core components of yoga were included to varying degrees to engage the mind and body connection while at the same time targeting emotional regulation and stress reduction. Each yoga session consisted of the following phases:

**Phase 1: Relaxation Training (25% of the session).** Participants transitioned to a new environment within the same building using a visual schedule and for some, a “first/then” visual was used to indicate the expectation. This included transitioning the students into a quiet and calming space, often ensuring a dimly lit space with minimal noise and distractions. Participants were provided with a photo of themselves on the yoga mat to indicate their spots. At times, soft music was offered as an option. The session started with breathing techniques and stretching. Each participant responded to the verbal instructions of the yoga teacher and did not require any physical prompting from their therapist. Simple instructions were delivered with a calm voice. At this point, we used modelling to introduce and teach breathing exercises. Gentle movement followed by asanas were initiated in order to start connecting the body with the breath.

**Phase 2: Child Adapted Yoga Poses (50% of the session).** The participants followed a class sequence, ranging from 2 to 5 postures, with minimal to no prompting. Simple asanas were offered including seated with straight legs, arms up and down paired with breath, a growing tree and mountain pose (standing, arms above head). Approximations of each asana were always accepted so that participants were not corrected if they were attempting the posture. Approximations of postures were reinforced with social praise. Social praise could include statements, i.e. “good job!”, a smile toward the participant, a thumbs-up or a quiet encouraging comment such as, “nice copying me”. Further, the yoga instructors encouraged independence in each pose, as yoga teaches individual expression of asanas, pranayama and meditation; there is no wrong way to practice yoga. There was limited physical prompting to ensure the students were internalizing the asanas and using their own strength to move in and out of the asana. When physical prompting occurred, it was initiated by the participant by reaching out to the teacher. We always modelled the postures, as well as presented them visually, using pictures. In some sessions, participants were offered the choice of class sequence by choosing which posture they wanted next on the visual strip. Video modeling was also used in some 1:1 sessions and group sessions. The models in the videos used were the children of one of the yoga teachers and the video was created specifically for these sessions.

**Phase 3: Relaxation and Guided Meditation** **(25% of the session).** Finally, the participants were offered relaxation exercises by following actions or resting quietly on their mats and following a guided meditation. This included listening to the yoga teacher’s voice, soft music and little demand other than to relax on the mat. An example of an activity included, rubbing both hands together and placing them on their face to feel warmth, and placement of their hands on their chest and abdomen to help focus on their breath-body connection.

**Measures**

With the realization that data on an observable, measurable behaviour for each participant would not be taken throughout the day by the clinical team, with the rigour that was anticipated when designing this program, we developed a participation grid (see Appendix B). The grid determined some basic information on 3 levels of participation.

1. Participation (P) - the participant follows or attempts to follow yoga instruction
2. Non-participation (NP) - remain within 5 feet of the mat without attempting to leave and with no imitation
3. Escape (ESC) – attempts or successfully leaves the room

The grid was developed based on the clinical team’s expectation that the participants' ability to follow instructions, participate and imitate the yoga instructor would vary widely. As well, there were serious concerns about the potential for the participants to escape and/or engage in aggressive behaviour. The yoga teachers recruited their own colleagues to record data on the grid using a momentary time sampling method at 1-minute intervals. The recorder checked off whether the participant was participating, not-participating or escaping the session at each 1-minute interval, using a timer to ensure accuracy. Each session was videotaped and reviewed by additional team members to determine inter-observer reliability. This removed one of the limitations of this study, which included the preconceived notion that the study would create extra work for the front-line clinical team.

**Results**

**Quantitative results**

The main quantitative outcome, as captured by the participation grid, showed that the children and youth engaged mostly in participation, some non-participation and there we no attempts to escape the yoga sessions. All the participants either remained on or near their mats for the duration of the yoga session. The data collected during this study did not provide the information that we had initially intended to collect, specifically, whether yoga had any impact at all on the participants’ behaviour throughout the day. The issue of how best to measure the impact that yoga has on individuals with varying profiles Autism and ID is a major limitation with respect to this exploratory pilot project.

**Qualitative results and anecdotes**

Following the project, our primary discussion revolved around the secondary outcomes of the study. Observations to support these outcomes were captured on video, as well, anecdotal information was provided by the clinical team in the follow-up interviews. Both the yoga teachers and the clinical team noted that the participants responded positively during the yoga sessions. Gains included decreased proximity between participant and yoga teacher, increased independent imitation, increased tolerance for physical contact and increased tolerance for the duration of the yoga session. Other outcomes during the yoga session included increased focus on the yoga teacher as seen through more consistent eye contact and smiling, and increased compliance in attempting yoga poses and breath work.

It is believed that co-regulation played an important role and is a common element inherent in offering yoga to others and in group practice. To start, the yoga teachers offered a practice meeting each individual at their starting point and accepted their starting point without judgement or correction. Specifically, the yoga teachers approached each session with individual adaptations, offered calm spaces and a calm voice. For example, some participants responded more positively by having a teacher in close proximity, using exaggerated breathing and allowing them to feel the teacher’s chest expand and contract with breath. Others were more successful when the yoga teacher squeezed the participant’s hands, and then modelled squeezing her own hands to teach muscle tension and release. This approach helped with the down-regulation of some participants, allowing them to be calm and engaged during the yoga sessions. It became clear early in the exploration of the effects of yoga on this population of children and youth that measures would need to be more individualized. Measuring participation alone did not capture the outcomes seen by us and the clinical team.

**Participant anecdotes.** One teenage male participant who, in the day-treatment summer camp, engaged in frequent challenging behaviours, required 1:1 support and engaged in activities for a maximum of 5 minutes was offered five 1:1 yoga sessions over 3 weeks. The sessions were adapted to run in the hallway beside his classroom to minimize transitions. Lights were dimmed, soft music was played, and his mat was rolled out upon his entry into the hallway. Large gym mats created a physical barrier to emulate a closed, intimate space. The clinical team offered a break to this participant every 5 minutes, with the use of a first/then visual board, “first yoga, and then break”. A timer was employed to ensure his break was offered at regular intervals. At the first session, the participant sat willingly on the yoga mat, with his back turned away from the yoga teacher, a blanket wrapped around his body and did not attempt to imitate the yoga teacher, and all data indicated non-participation. Over the 5 sessions, this participant’s body language changed; he entered the yoga session with the blanket over his head and began removing it and turning his body toward the yoga teacher. His eye contact increased, and he moved closer to the teacher. These behaviours indicated his increased tolerance for yoga over time. Interestingly, he began to choose yoga over his earned break. This resulted in him remaining in the yoga session, uninterrupted for the full 15-minute duration. This was most significant given his history of only engaging in other programs in the summer camp for a maximum of 5 minutes at a time. While difficult to interpret without the participant’s ability to self-report, these changes were important to the yoga teachers for two reasons. First, without prior rapport, the participant displayed some trust or sense of security with the yoga teacher by turning toward her, moving closer to her and removing his blanket. Further, in his therapy program, the ‘then’ on the first/then board is used as a choice of reinforcer. That is, once a person completes the ‘first’ task that may be neutral or undesirable, they receive the ‘then,’ which is a preferred task. This participant consistently started choosing yoga as his preferred activity, indicating a preference for yoga. Further, the clinical team reported that he began requesting yoga throughout the day when the yoga teachers were not there. To collect empirical data on the behaviour change of this individual would have required more sensitive measures, given that the change was small and may be seen as insignificant to some. Should this participant engage in frequent and ongoing yoga sessions, it would be more important to measure his duration in yoga over time, body language including eye contact and proximity and potential increase in imitation skills with both breath work and/or movement.

In another anecdote, a teenage male participant began displaying participation and imitation behaviour within two 1:1 session. He was able to engage with breath work when the yoga teacher modelled inhaling and exhaling and offered the imagery to ‘smell the roses and blow out the candle’. He was a participant who required movement to engage in the yoga session. In most of the sessions, he was provided with a rocking chair. The yoga teacher adapted the sequence to ensure he was able to participate while on the chair. At the beginning of each session, the participant rocked vigorously back and forth. Given the criteria of little to no prompting, the yoga teacher experimented with different asanas and techniques to engage him. During the second session, he began imitating muscle tension and release. This became a large part of every yoga session with this participant. The yoga teacher noticed that once he engaged in muscle tension and release, his rocking would reduce in vigour. If given the opportunity to teach this participant again, it may be more descriptive to measure his compliance and imitations skills as well as looking more closely at his stereotypy of rocking and measuring whether yoga participation was a component in reducing his rocking behaviour.

**Discussion**

**Limitations**

There were many limitations to this study which contributed to the adaptation of the design and delivery of this study. Early on, in the information gathering phase, expectations differed between us and the clinical team. Initially, the front-line staff viewed the project as a recreational activity instead of the skill building intervention that we had intended. As well, though the target behaviour was identified for some participants, the baseline data was not provided for any. Overall, there was a lack of ‘buy in’ from the clinical team, both from supervisors and from the front-line staff. With that said, historically, the clinical team had not experienced demands placed on their clients by outside staff. The worry remained that an increase of demands may increase challenging behaviour, posing a safety risk. To address safety concerns, the clinical team provided adequate support through staff to client ratios and accommodated the yoga study into their program schedule at appropriate times of day for the participants. Another limitation is that of time constraints whereby the yoga teacher’s involvement was limited to 5 weeks, the length of the summer program. In addition, participants were not involved for 5 consecutive weeks but attended at various times throughout the 5 weeks. Therefore, there was limited time to develop innovative measures as the study progressed.

Developing and choosing the best measures for participants who cannot self-report remains the largest limitation of this study. Originally, the yoga teachers decided that measuring observable behaviour, first through the target behaviour then with the participation grid, was going to be the most concrete way to collect data on behaviour change across participants. The participation grid was developed based on the idea that most participants would attempt to escape, and therefore we may see escape behaviour reduce over time. The participation grid was not sensitive enough to measure participation given that most participants stayed on their mats and engaged in some form of participation throughout each session. It remains that that the measures that were chosen did not provide the outcomes that were expected. However, anecdotal secondary outcomes were discussed and identified as areas of future exploration.

**Follow-up with clinical staff**

A follow-up questionnaire for the front-line clinical staff collected information on their perception of the program. The clinical team noted that the lack of prompting from an adult worked positively for some of the participants. As well, most front-line staff noted that being in a different space, other than the participants’ classroom, seemed to support participation.The rooms that were most often used for yoga provided open, uncluttered space or a makeshift area was created outside the classroom in a dimly lit hallway. Namely, the staff liked the way the rooms were set up with natural lighting or adjusted lighting. As well, they felt that the soft music and calm voice used to instruct was a beneficial way to lead the yoga class. The staff noticed that, at times, the yoga teachers adapted the class structure to follow the lead of the participants in order to gain rapport, teach imitation and maintain interest. It was also noted that the use of the evidence-based strategy of video-modelling proved successful when used. Clinical staff noted that the participants responded well to watching and listening to other children on the screen.

It was the clinical team’s expectation that the participants may not have the ability to follow instructions, participate and imitate the yoga teachers. There was also legitimate concern about the potential for aggressive behaviour, either toward the yoga teacher or others in the room. What transpired, according to the clinical team, was that participants with the prerequisite attending skills did well in the yoga sessions and those that did not have the prerequisite skills appeared to enjoy the yoga sessions as indicated by the secondary outcomes as listed above.

**Conclusion**

This was a small pilot study and provides preliminary evidence to support the possible effectiveness of yoga intervention on children and youth with ASD. The results demonstrate the need for larger more focused yoga-based interventions and more precise measurement tools, especially for those that cannot self-report. Overall, the yoga team, as well as the clinical team’s qualitative and anecdotal reports support the hypothesis that the yoga sessions were beneficial to the participants as seen through the various social communication factors including body language and eye contact, to name a few. As well, positive outcomes were reached using a calm and positive environment during the yoga sessions that may have to do the uncluttered space, tone of voice and expectations. Future studies should include more of a focus on the gains made in the areas of social communication, imitation skills and the effects of co-regulation.

In general, the participants appeared to enjoy the yoga sessions during the pilot project. It can be said that the yoga itself and/or the environment in which it was learned may have transitioned from being a teacher planned activity to a reinforcer for some participants and should be further explored with this population. This project has begun to lay the foundational stones required to home in on precise measurement of what many in the yoga and special needs landscape have known for many years: yoga is for everyone and benefits can be vast and specific to each person’s practice and journey. We, as yoga teachers, see the ability and will continue to work with the individual to unlock the potential.

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Appendix A

Yoga Sequence Visual

Appendix B

Participation Grid

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Participant 1** | | | **Participant 2** | | | **Participant 3** | | | **Participant 4** | | |
| **Minutes** | **ESC** | **NP** | **P** | **ESC** | **NP** | **P** | **ESC** | **NP** | **P** | **ESC** | **NP** | **P** |
| **1** |  |  |  |  |  |  |  |  |  |  |  |  |
| **2** |  |  |  |  |  |  |  |  |  |  |  |  |
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| **4** |  |  |  |  |  |  |  |  |  |  |  |  |
| **5** |  |  |  |  |  |  |  |  |  |  |  |  |
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| **13** |  |  |  |  |  |  |  |  |  |  |  |  |
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| **15** |  |  |  |  |  |  |  |  |  |  |  |  |
| **16** |  |  |  |  |  |  |  |  |  |  |  |  |
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| **20** |  |  |  |  |  |  |  |  |  |  |  |  |
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| **26** |  |  |  |  |  |  |  |  |  |  |  |  |
| **27** |  |  |  |  |  |  |  |  |  |  |  |  |
| **28** |  |  |  |  |  |  |  |  |  |  |  |  |
| **29** |  |  |  |  |  |  |  |  |  |  |  |  |
| **30** |  |  |  |  |  |  |  |  |  |  |  |  |
| Total time on mat |  | | |  | | |  | | |  | | |

**ESC**: Escape - attempts or successfully leaves the room

**NP**: Non-participation - remains with 5 feet of mat without attempts to leave and with no imitation

**P**: Participation -follows or attempts to follow yoga instruction