

## Experiences of trauma-sensitive yoga among inner city youth: A mixed-methods feasibility study



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## 1. Introduction

### 1.1. Background

Persons aged 15–24 years are more likely to experience mental and/or substance use disorders than any other age group [1]. While depression and anxiety are widely recognized, post-traumatic stress disorder (PTSD) is common and often underdiagnosed in at-risk young adults [2]. Adverse childhood experiences, such as abuse, neglect and household dysfunction, increase the risk for both mental and physical illnesses. Complex trauma has been described as the experience of multiple, chronic, developmentally adverse traumatic events, most often of an interpersonal nature [3]. While not all young adults with experiences of complex trauma will meet the diagnostic criteria for PTSD, providing this population with appropriate treatment and support is critical.

Historically, research and treatment for mental disorders has been largely focused on pharmacotherapy and cognitive-based therapies [4,5]. However, the body of research on the physiological and psychological effects of mind-body interventions, such as yoga, is expanding [6–9]. As Emerson [10] points out, physiological symptoms, somatic complaints, and a lack of interoceptive awareness may be more difficult to treat with cognitively-oriented treatments. Yoga may have a

role as a strengths-based adjunct treatment to support health outcomes of young adults experiencing mental illness and substance use disorders.

To date, the evidence supporting yoga as an intervention for mental illness is promising. Studies have demonstrated positive effects of yoga on depression, anxiety and PTSD in adults [11–17]. One landmark randomized control trial involving 64 adult women with chronic, treatment-resistant PTSD showed that after 10 sessions of yoga, participants exhibited statistically significant decreases in PTSD symptom severity and greater likelihood of loss of PTSD diagnosis, significant decreases in engagement in negative tension reduction activities (e.g., self-injury), and greater reductions in dissociative and depressive symptoms when compared with the control (a seminar in women's health) [18].

### 1.2. About this study

The primary purpose of this study was to understand the feasibility of conducting an 8-week trauma-sensitive yoga intervention (“the TSY Program”) for inner city youth. The setting is an integrated youth health centre called Foundry that provides a “one-stop shop” for young people to have their health and social needs met in one location (foundrybc.ca). Our secondary aims were to understand the experiences

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among inner-city youth with diagnoses of anxiety, depression, and/or PTSD who participate in the TSY Program. More specifically, the research team sought to a) understand if participants perceived any meaningful benefits from attending the TSY Program; b) identify motivating factors for attending yoga classes; c) identify barriers to attending yoga classes (within the 8-week TSY Program and afterwards); and d) how the delivery of TSY can be improved to better meet the needs of this particular population.

### 1.3. The trauma-sensitive yoga model

The yoga intervention integrated physical postures (*asanas*), breathing practices (*pranayamas*), relaxation and mindfulness. Its design was based on a trauma-sensitive yoga (TSY) model developed at the Trauma Centre at Justice Resource Institute in Brooklyn, Massachusetts, as an adjunct treatment for complex trauma. The TSY model provides a structured approach that helps participants foster an internal sense of safety and personal agency and serves to cultivate greater capacity for self-awareness and self-regulation [19]. Three key themes include (1) experiencing the present moment, (2) making choices, and (3) taking effective action. The physical practice is focused on helping persons with complex trauma and related symptoms to be present in their bodies and is not concerned with aesthetic alignment in the yoga postures [20].

## 2. Methods

### 2.1. Research design

We used a mixed-methods approach to capture implementation feasibility of and the participants' experiences in the TSY Program. The primary mode of data collection was qualitative, involving semi-structured interviews conducted by a trained researcher upon completion of the TSY Program. We complimented the qualitative analysis with quantitative pre- and post-intervention questionnaires and scales. The details of the measures are described in section 2.6.

### 2.2. Recruitment and selection

We recruited participants through purposive, convenience, and network sampling. We displayed posters advertising the study in clinical rooms and common areas at the study site. Clinicians participated in the referral process by informing eligible clients about the research opportunity and providing the contact information of the research assistant. Clinicians were trained in the study procedures to ensure that the referred clients did have a confirmed mental health diagnosis and met the eligibility criteria. Recruitment for the first and second cohorts was conducted in April and August of 2017, respectively. The target sample size was eight participants per cohort, based on room size and appropriate teacher to participant ratio for a trauma-sensitive class. We considered recruitment to be complete when the target sample size per cohort was achieved.

### 2.3. Participants and setting

In order to be eligible for inclusion in the study, participants needed to be between the ages of 19 and 29 at the time of enrollment with a clinical diagnosis of any form of anxiety, depression, and/or PTSD. Additional inclusion criteria involved the participants' ability to attend a yoga class in a group setting at the youth health centre once a week for 8 consecutive weeks, and to complete questionnaires and interviews in English. Exclusion criteria included substance use that would interfere with participation in the yoga classes, active psychosis, and concerns that participation could introduce a safety risk to the individual or others attending class. We also excluded young adults < 19 years in order to keep our exploratory study developmentally fit for purpose to

optimize group cohesion and dynamics.

### 2.4. Consent and ethics

A research coordinator met with clients who expressed interest in participating to explain the study and review consent. Once written informed consent was obtained, participants were eligible to start the intervention. The research protocol was approved by Providence Health Research Ethics Board (#H16-03396).

### 2.5. The intervention

The intervention was delivered in two cohorts in May–June and August–September of 2017. A certified, 200-h yoga instructor with additional training in trauma-informed yoga classes (18 h Yoga Outreach<sup>1</sup> Core Training) planned and delivered the yoga classes. Classes were 45 min long, held once a week at Foundry Vancouver Granville, with all mats and supportive props provided. The TSY Program was structured sequentially, so that each subsequent class built on the previous. The format of each individual class was informed by the TSY model, as outlined by Emerson [20]. The application of the framework for the TSY Program is detailed in Appendix A. One of the core components is 'body as a resource', which helps participants identify yoga practices or tools, such as *pranayama* or breathing practices and grounding techniques, they can use outside of the yoga class to help regulate their own bodies and emotions.

A research team member was present at the beginning of each class to track attendance and provide participants with a \$10 honorarium to cover travel costs. Additionally, at the beginning of the first class and at the end of the last class of each cohort, the research team member was present to administer the pre- and post-questionnaires described below. The yoga instructor was not involved in administering the questionnaires.

### 2.6. Measures

Prior to starting the TSY intervention, participants completed five questionnaires to describe the population sample and establish a baseline for comparison post-intervention. First, a demographic questionnaire was used to identify their age, gender, ethnicity, housing status, educational attainment, mental illness diagnoses, and any previous experience with yoga. The following four questionnaires/scales were provided to the participants for completion both pre- and post-intervention: 1) The Canadian Personal Recovery Outcome Measure (C-PROM) is a 30-item self-reported questionnaire scored on a Likert scale to evaluate an individual's current status in terms of health, recovery, and community outcomes. The C-PROM was developed using Rasch measurement methods for people with mental illness and has strong evidence as a reliable and valid measure of recovery in the community context [21,22]. 2) The Analytical Rumination Questionnaire (ARQ) is a 20-item questionnaire scored on a Likert scale to measure analytical rumination in depression in a clinical setting. Using the Rasch measurement method, the ARQ has been validated in a young adult population to assess a person's awareness of problems and problem-solving analysis [23]. 3) The Hospital Anxiety and Depression Scale (HADS) is a 14-item self-assessment used to measure anxiety and depression symptoms. The scale has been validated in patients in primary care and community settings, and in populations ranging from adolescence to the elderly [24]. 4) The PTSD Checklist – Civilian Version (PCL-C) is a self-report questionnaire, with each item being on a 5-point Likert scale,

<sup>1</sup> Yoga Outreach is a non-profit organization based in Vancouver, British Columbia that has been supporting adults and youth through trauma-informed yoga programming within community service facilities, across the province since 1996.

with a total of 17-items to measure PTSD symptoms. The scale has been validated with DSM-IV diagnostic criteria [25].

### 2.7. Interviews

We invited participants for an interview following the completion of the 8-week TSY Program. The qualitative interviews were semi-structured and conducted by two research team members with individual participants. These research team members were not clinicians at the study site and were not involved in the delivery of the intervention. Each question created was linked to answer at least one of the research questions. A list of the core interview questions is included in Appendix B. Interviews were audiotaped and transcribed verbatim.

### 2.8. Quantitative analysis

We used paired-samples t-tests and within-group effect sizes (Cohen's *d*) to explore changes between: 1) baseline and post-intervention. As this was a pre-post study, in order to correct for dependence among means, we calculated effect sizes using Morris and DeShon's [26] equation 8, to account for repeated measures. Effect size was given priority in the interpretation of findings given the small sample, with the caveat that future work employing randomization and larger samples will be needed to assist in validating these findings [27,28].

### 2.9. Qualitative thematic analysis

We conducted a thematic analysis based on guidelines by Braun and Clarke [29]. Six research team members, including a peer researcher, read through all transcripts and produced an initial list of codes. Using these priori codes, transcripts were then read and analyzed independently by three of the researchers. After becoming familiar with the transcripts, these researchers coded all the data and organized the codes into themes and subthemes. The researchers compared themes for consistency and further refined the themes. The data set was re-read in order to code any additional data within themes that may have been missed in earlier coding stages. We reviewed all themes and subthemes with the peer researcher.

### 2.10. Knowledge translation

Once the results were analyzed, we worked with our youth partner and team to identify a mechanism to share results. We identified key stakeholders to target our findings. We identified and prioritized ideas for sharing results within the study parameters and budget.

## 3. Results

### 3.1. Participation

Fourteen participants enrolled in the study. All clients who contacted the research coordinator and expressed interest in the study met eligibility criteria. Formal enrollment in the study was completed on the day of the first yoga class. In the first cohort, six out of the eight clients recruited for the study attended the first class and formally enrolled in the study. All eight clients recruited for the second cohort enrolled and participated in the study.

### 3.2. Demographic profile

The average age of all participants was 23 years (SD = 1.6). There was no age difference between the two cohorts (F = 0.45, df = 1, p = 0.51). Combined, 78% of participants identified as female. Seven (50%) participants reported being white, five (36%) as Indigenous, and one (7%) identified as Middle Eastern. One person did not report their ethnicity. Regarding education, most participants (n = 11) reported

having a high school diploma or less. Three participants reported either having “some university” or “some college”. Eleven (79%) participants reported that depression was their primary diagnosis, followed by anxiety and bipolar disorder. Nine (64%) participants reported having all three diagnoses of depression, anxiety and PTSD. The referring clinicians confirmed these diagnoses.

In regards to housing, five (36%) participants reported being homeless, seven (50%) reported living in supported or marginalized housing, and two reported living on their own in their own apartment. Eleven participants reported being unemployed or not in school. All but one participant had tried yoga at least once in their past.

### 3.3. Feasibility of the group intervention (primary outcome)

All participants from the first cohort completed the intervention. Two participants in the second cohort dropped out of the study early during the yoga intervention and multiple attempts by the research coordinator to regain contact with them to schedule an exit interview were unsuccessful.

### 3.4. Patient reported outcome measures (PROMs) (secondary outcomes)

Eleven of the 14 participants enrolled completed the post-intervention questionnaires/scales. Pre-post changes were observed on all four PROMs: 1) The Canadian Personal Recovery Outcome Measure (C-PROM); 2) The Analytical Rumination Questionnaire (ARQ); 3) The Hospital Anxiety and Depression Scale (HADS); and 4) The PTSD Checklist – Civilian Version (PCL-C). As shown in Table 1, the correlations between PROMs were low to high (r = 0.132–0.70).

We found significant pre-post differences on three of four of the PROMs: C-PROM (F = 4.21, df = 1, p = 0.05), HADS (F = 6.84, df = 1, p = 0.02), and PCL-CV (F = 6.84, df = 1, p = 0.02). Fig. 1 shows difference in adjusted total scores of the C-PROM pre (blue) and post (green) intervention.

We found no significant differences on the ARQ (F = 0.48, df = 1, p = 0.50). The means and standard deviations can be found in Table 2. We also found no interaction between these results and each cohort. These results reflect a main effect of the intervention and not the cohort.

### 3.5. Qualitative results

Twelve out of the 14 participants enrolled completed the post-intervention semi-structured interview. The average length of the interviews was 18 min (range: 9.7–27.0 min).

#### 3.5.1. Perceived effects of trauma-sensitive yoga

All participants interviewed described positive effects from engaging in the TSY Program and no negative effects were reported. Four main themes emerged from the data from the semi-structured interviews with study participants: (1) *mindful awareness*; (2) *mental health and physical benefits*; (3) *breath as a resource*; and (4) *structure and routine*. A summary of the themes and corresponding participant comments

**Table 1**  
Spearman correlations of patient reported outcome measures.

	C-PROM	PLC-CV	ARQ	HADS
C-PROM	1	-.572	.132	-.283
PLC-CV		1	.288	.703
ARQ			1	-.132
HADS				1

Note: C-PROM = Canadian Personal Recovery Outcome Measure; PLC-CV = The PTSD Checklist – Civilian Version; ARQ = The Analytical Rumination Questionnaire; HADS = The Hospital Anxiety and Depression Scale.

\* = p < 0.008.

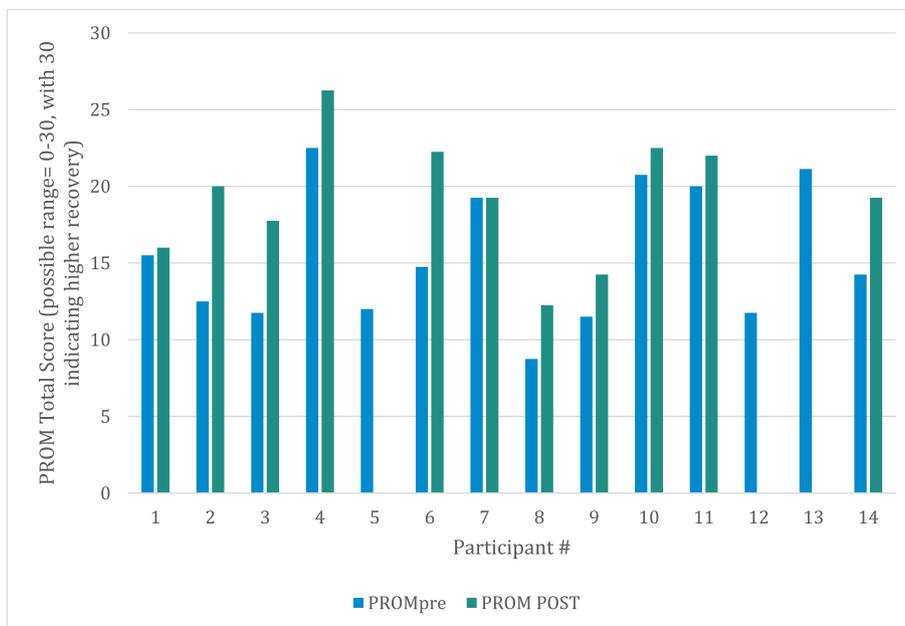


Fig. 1. Pre-post scores on the Canadian Personal Recovery Measure (C-PROM).

**Table 2**  
Means and SD of participants before and after intervention.

Measure	Mean PRE	SD PRE	Mean Post	Sp post	F ±	P
C-PROM TOT	61.62	17.86	78.13	17.25	4.206	.054*
C-PROM ADJ <sup>a</sup>	15.40	4.46	19.53	4.31	4.206	.054*
PLC-CV	60.95	12.73	46.75	12.84	5.933	.025*
ARQ	72.00	13.15	68.25	8.61	0.480	.5497
HADS	23.67	5.50	16.50	6.71	6.841	.018*

**Note:** C-PROM TOT is the total score of Canadian Personal Recovery Outcome Measure without adjustment. C-PROM\_ADJ<sup>a</sup> is the adjusted score calculated by dividing the total by 4. For the C-PROM, a higher score indicates a higher sense of perceived recovery. For the PLC-CV, a higher score indicates worse PTSD symptoms. For the ARQ, a higher score indicates more rumination. For the HADS, a higher score indicates greater depression and anxiety ( ± ) = one degree of freedom; (\*) = significant difference observed for P < 0.05.

is shown in Table 3.

**3.5.1.1. Mindful awareness.** The majority of participants (n = 10) described some type of increase in awareness, including being more aware of their body and mental state, noticing, being more mindful, and being in the present moment. Participants described noticing sensations in their bodies and having more awareness of their bodies in general. One participant described being “more in tune” with their body:

I noticed that I'm more aware of my body. Before, due to my trauma and stuff, I was like—I don't know how to explain it. I'm just more in tune with my body and how I am right now. Like before, I kind of wanted to escape my body and—obviously there's other things I've been doing, but this has really helped me pay attention to my body more ... before ... I was kind of numb and running away from my body. It made realize that this is your body and this is how it is and you can't run away from it. This is who you are (p6c2).

Some participants described taking action after noticing what they were feeling in their bodies. For example, one participant explained, “like when I'm in pain, I notice that yoga brings awareness to your body. So when I notice parts of my body that are in pain, I'll work on that certain area” (p5c2).

Some participants described being more aware of themselves when interacting with others, as well as being more aware of the state of the

other person. With this increased awareness, one participant describes a transformation in the way they handle their emotions and respond in interactions:

It's allowed me to process my emotions more consciously and less reactively, and having a regular practice helped me to step outside myself while I'm experiencing internal emotions coming up. And being able to process them in a way that's more communicative with people and transform into a more healthy reaction instead of being more volatile (p1c2).

Participants reported that practicing yoga helped them to be more focused and “in the present moment”. As one participant stated:

During yoga, it's helped me think of one thing at a time so my brain's not rushing and going 10 steps ahead. It's allowed me to just think more clearly and observe the room and to just take everything in, and not to be accelerated or thinking too fast or being restless. So it just helped me ease into my body and relax (p3c2).

**3.5.1.2. Mental health and physical benefits.** Participants reported yoga had positive effects on their mental and physical health including improving their ability to calm down and relax, reduce and manage anxiety, and improve chronic pain. All interviewed participants reported feeling calmer and/or more relaxed. One participant with anxiety and PTSD stated:

I'm always stressed and my mind is always wandering, and this has just made me more relaxed and I've never been able to relax to the point where my mind wasn't racing. With yoga, it helped me to not have these racing thoughts and taught me to be in the physical moment (p5c2).

It is important to note participants conveyed that their ability to calm down and relax translated to their daily life outside of the yoga class. For example, one participant noted, “it's helped me relax a little bit in day to day life, and handle situations a little bit better because I'm not blowing up as much” (p6c1). Participants also reported that yoga helped “set them up” for the day or week ahead. One participant commented, “even if I have a stressful day or week, I could come in here and then that hour would set me up. It would calm me” (p2c2). Another participant stated:

**Table 3**  
Themes and sub-themes describing the trauma-informed yoga experience for young people.

Themes	Sub-themes	Representative participant quotes
<b>Mindful awareness</b>	Interoceptive	“Being able to notice when I start to like tense up when my shoulders go up towards my ears ... being aware of my body. It's definitely helped in that way” (p1c1) “I noticed how tense I was ... I notice that yoga brings awareness to your body” (p5c2)
	Interpersonal	“I'm more, again, mindful of ... the physical cues that I'm giving to someone else when I'm interacting with them” (p1c1) “I'm more aware of their mental state and how they handle situations versus how I would handle situations. I guess I'm more understanding” (p2c2)
	Present moment	“I think it helped like me be able [to be] with my anxiety and like staying focused on the present moment” (p5c1) “I mean yoga in general is a mindfulness practice so that helps a lot so like being present with what's going on” (p1c2)
<b>Mental health and physical benefits</b>	Ability to calm down and relax	“Helps me calm down” (p5c1) “Helped me to calm down my body and to see the meditative stillness I have within myself” (p3c2) “Really helped my mind to just calm down ... It helped my brain relax and not be overwhelmed” (p3c2)
	Reduced and helped manage anxiety	“Reduced my anxiety a lot” (p1c1) “Helped anxiety and heart rate” (p3c1) “Especially with my anxiety it's helped a lot” (p5c1) “Helped my anxiety to calm down” (p3c2) “Helped with anger and stress and anxiety” (p5c2)
	Helped with pain	“Really helped my back ... I don't feel as much back pain as I used to” (p4c2) “Helps with my physical pain. I always feel better afterwards” (p5c2)
	Other	“I liked ... feeling like I was taking care of my body” (p3c1) “Really helpful for loosening some of the tension in my neck” (p1c2) “I think I did get more fit during these 8 sessions. I feel more flexible” (p3c2) “I'm starting to like exercise in general” (p3c2) “Big impact on my flexibility, inflammation in my muscles” (p5c2)
<b>Breath as a resource</b>		“I actually go to breathing exercises first” (p1c1) “When I'm feeling anxious, my mind might go back to when our teacher was talking to us about like inhaling and exhaling” (p3c1) “Breathing really helped a lot” (p4c1) “I use a lot of the breathing techniques that they teach at yoga and it helps a lot with anger and sadness” (p4c2) “Learning the breathing technique was wonderful, and I just focus on that when I'm out and I'm panicking” (p4c2)
<b>Structure and routine</b>		“Definitely helped to have a schedule and have a time to come in” (p4c1) “Helped routine-wise” (p5c2)

[Yoga] would just help me calm down and then prepare for the days to come. So in that way, it kind of helped me relieve stress from the last week and then go into the week with clear mind and clear emotions. So I would always come in with new stress, decompress, and then go out better (p4c1).

Participants consistently reported that yoga had positive effects on their mental health, particularly anxiety, as described by one participant, “[yoga] allows me to consciously process my anxiety well and experiencing it instead of going into a full panic attack or something ... It definitely helps retain a certain kind of baseline for anxiety that's better than me reacting to everything”. Three participants reported experiencing fewer panic attacks or gaining tools to use when they are out and “panicking”. Two participants noted that yoga had a positive effect on the perception of their heart rate; for example, one participant stated: “I got less [panic] attacks. My heart doesn't race as much anymore” (p2c2).

Five participants reported experiencing pain, mainly chronic in nature, and four out of these five participants reported that yoga improved their pain. One participant that had back problems after being homeless for a long time reported yoga helped their back and that they had “way less pain; less frequent too” (p4c2). Another participant stated:

Because I have a physical pain condition so when I do the stretches, it helps relieve the tension that it causes in my lower back that goes throughout my entire body. So when I do the yoga, it helps and I'm not in pain after I do yoga. I feel better. I feel normal (p5c2).

Other physical benefits reported by participants included increased flexibility, feeling more fit, and loosening tension. When participants

did not identify direct physical benefits from the yoga, they described, for example, becoming “mindful of [their] physical health, also kind of in a less medical way” (p1c1) and thinking “more about like wanting to take care of [their] physical health” (p4c1).

**3.5.1.3. Breath as a resource.** Participants repeatedly mentioned the breath and using the breathing techniques learned in yoga to help them cope in daily life, as described by one participant:

I think it's affected my mental health greatly because I use the breathing technique when I'm out and about and it helps my anxiety. It's helped my depression. When I'm upset, I will do the same thing. I will sit in a seated position and breathe. I mainly use the breathing technique and the seating position. It's just affected me very positively (p4c2).

Another participant stated “the breathing exercises have been really helpful if I can manage to take the space during something that is stressful for me and, like, go back to that cultivated space that you have for yourself internally” (p1c2).

**3.5.1.4. Structure and routine.** Participants mentioned benefiting from having something structured in their week. As one participant explained:

Having something rigid to go to was, like, or any sort of structure in my life, was useful ... It made me dedicate to doing other things as well. I started doing other classes in order to have something that's a bit structured in my life, so it kind of set a foundation for me a bit by having something to show up for (p1c2).

### 3.5.2. Motivations for attending yoga

Motivations for attending the yoga classes varied among participants. Examples include: the classes being free, connecting with others who are also accessing mental health support, having something in common with other participants, becoming more mentally stable, committing to something, feeling calm, feeling better after each class, feeling refreshed, learning new strategies, having a place where they could come and relax or “escape to”, improving flexibility and fitness, helping ease physical pain, losing weight, and investing in and nurturing themselves. As one participant stated, “I just wanted to invest in myself a little bit and, like, cultivate some sort of space for myself that I’ve been neglecting to nurture myself for a while” (p1c2).

Participants reported wanting to continue practicing yoga because it helps emotional and mental health, to be more calm or to calm down their mind, be more conscious, feel better with less stress and anxiety, be flexible, and help their pain and muscles. One participant stated, “I just think it’s a good tool or foundation to be able to have as a way of processing life as you go along it if you can maintain a relationship practicing”.

### 3.5.3. Barriers to accessing and practicing yoga

The main barriers to accessing and practicing yoga identified by participants included financial constraints as well as challenges with mental health and addictions. Another barrier identified was the participants’ living situation, including being homeless, not having anyone to care for a pet during a yoga class, and living in too small of space without room to practice yoga. One participant, who described multiple barriers, suggested youth workers might have a useful role in helping participants attend:

The youth workers can help them get here on time and with transportation and if they have animals—I know friends with animals—and huge luggage that have to come all the way from the park too. They also don’t have alarm clocks. I guess getting workers to help support them emotionally and getting them here on time until they get a schedule going (p5c2).

One participant described how adjusting to new settings would be a “hurdle” for them:

I would probably want to keep practicing yoga. But it’s also that I’d have to get adjusted to new people and the new teacher and the new place, so that’s the part that’s like a hurdle for me, getting adjusted to new places and having that continuity (p4c1).

### 3.5.4. Delivery of TSY

Three themes regarding the TSY program delivery emerged from the interview data: (1) *qualities of the teacher*, (2) *group characteristics*, and (3) *the space*.

**3.5.4.1. Qualities of the teacher.** The data suggested that participants had a positive connection with the yoga teacher and that this factor was important for participants attending the classes. The teacher was described by participants as calm, caring, compassionate, supportive, down-to-earth and “in-tuned”. One participant described qualities they would want their yoga teachers in the future to have by providing examples of what the yoga teacher said during the classes, such as, “‘yeah I have flaws’ ... ‘yeah I have a hard time with this one’ or ‘this pose gave me difficulty when I was first doing it’ or ‘yeah I have a hard time centering my breath sometimes’, those things kind of humanizing her made it easier” (p1c1). Another participant stated, “well the yoga teacher was pretty kind and caring ... and reminded us that we don’t have to like push ourselves; we don’t have to do it in the way she does, like we breathe at our own pace so she would remind us about that” (p4c1).

**3.5.4.2. Group characteristics.** Important group characteristics included having a small, closed group for people with similar backgrounds and

diagnoses. Participants reported having a positive experience from participating in the program with others with similar mental health experiences and who were also accessing mental health support. One participant stated, “we all kind of got to know each other and kind of connected because we’re all accessing mental health support here so we all have something in common” (p1c1). Another participant stated, “I felt already comfortable in the environment because it was for people with depression and mental illness” (p5c2). Another participant shared that having an established group of “like-minded” people each class made them feel more comfortable (p4c1). Other participants echoed this comfort in having a small, closed group, providing comments such as, “I always felt comfortable when the same people showed up” (p2c2); “the familiar faces made [us] feel very safe” (p4c1); and “it was nice that it was a smaller group and everything because all my mental illnesses it’s hard for me to be in big groups” (p5c1).

The data also suggested that the trauma-sensitive foundation of the TSY Program may have made it more accessible. As one participant commented:

Because it was trauma-sensitive, I was more eager to do it because I knew ... the [people] in the room would have a common background, and we would be able to share that with each other and to do things and experiences together. It’s good” (p3c2).

Similarly, the qualitative analysis indicated that subjects found solace in a shared commonality of trauma amongst the group. Participants repeatedly identified that the group provided a place of understanding, where young people could be themselves in a safe space- but didn’t have to talk about mental health or trauma. It was highlighted that yoga was both a vehicle to improved mental health and a way of connecting with others. One participant stated:

I guess this program is for trauma people, so I guess being around people who have [gone through similar situations]—I don’t even know what they’ve been through—comforts me a little bit to feel like, ‘oh we’ve all been kind of through sh\*\*\*’. Even thinking about that is calming (p2c2).

**3.5.4.3. The space.** Participants reported a positive experience attending the TSY Program at the same location they were already accessing health services. Participants described the space as “safe” and “calming”. Participants found the props available increased comfort. One participant stated, “the room that we were in with all the [yoga] equipment was a really good environment. It made a lot of us want to show up, myself included”. Some participants mentioned liking the soft lighting in general and others particularly liked that the lights were dimmed toward the end of each class. Some participants mentioned liking the music and no one mentioned disliking music during the classes.

Areas for improvement identified by participants related to the space and length of program. Participants indicated they would prefer a larger space for the same amount of participants and that the background noise from the gym below the health centre was distracting at times. Lastly, some participants reported wanting to attend yoga more than once a week and to continue the program for more than 8 weeks. One participant stated:

I would like to do it more than once a week, because the once a week is nice but I feel like by the end of the week before the next practice I kind of start declining in my mindfulness of my anxiety levels and whatnot. So I think like maybe at least two or three times [per week], possibly more (p1c1).

## 3.6. Knowledge translation

Key stakeholders included young adults receiving services at Foundry, key decision makers (i.e., executive leadership, directors,

management, and policy makers), funders, and integrated youth health services. The final product was a 2 min open access video available at <https://www.youtube.com/watch?v=PFmnyHI8LTk&t=67s>.

## 4. Discussion

### 4.1. Impact

This study evaluated the perceived effects among participants who completed an 8-week trauma-sensitive yoga program. Overall, the results indicated that participants' perceptions of the TSY Program were unequivocally positive. We observed statistically significant changes in three out of four PROMs indicating reductions in severity of anxiety/depression and PTSD symptoms and a higher sense of perceived recovery following the TSY intervention. The qualitative data affirmed that participants perceived meaningful benefits from attending the TSY Program. More specifically, the reported benefits among participants were grouped into four main themes: (1) *mindful awareness*—including interoceptive awareness, interpersonal awareness, and ability to experience the present moment; (2) *mental health and physical benefits*—including the ability to calm down and relax the body and mind, reduce and manage anxiety, and manage pain; (3) *breath as a resource*—meaning the breathing techniques were used to cope with daily stress and anxiety; and (4) *structure and routine*. Our data collectively suggested that the perceived benefits extended beyond the yoga session and modified participants' experiences throughout their daily living. Some of the benefits noted by participants were not attributable to yoga specifically, but rather from attending a structured activity each week along with peers who had shared experiences of mental illness and accessing mental health services.

The perceived benefits reinforce the aims of the TSY model. For example, one core component of the TSY model is to establish greater connection between mind and body. The interconnection between perceived mental and physical benefits was strong to the extent that it was challenging to mutually exclude the two categories of benefits. Participants' reports of increased awareness and ability to “calm down” demonstrate yoga may be effective for improving self-regulation. In traditional yoga practice there is strong emphasis on respiration and respiratory control to influence the mental state [30]. The breathing practices learned in the TSY Program were used as a tool in daily life and, reportedly, helped with anxiety and panic. TSY also serves to foster a sense of personal agency; not only did participants have greater awareness to their experiences, but they also reported taking effective action based on what they noticed in their bodies. There were no negative effects reported by participants, which is particularly noteworthy, when comparing TSY as a treatment option to other first line treatments. Yoga may provide an important adjunct therapeutic option to optimize how young adults engage in care, learn self-management skills, and develop communities that value wellness.

### 4.2. The yoga model and program

Participants spoke positively about various aspects of the TSY Program including the qualities of the teacher, the group, and the space in which it was delivered. Qualities of the teacher and the space are consistent with two of the five domains, as identified by Emerson et al. [20]; requiring modification to ensure a yoga class is trauma sensitive, which include environment, teacher qualities, exercises, assists (verbal assists rather than physical adjustments), and language. While participants did not explicitly mention the language used, the nature of invitational language and language of inquiry, using phrases such as “as you are ready”, “if you like”, “you're welcome”, “notice”, “feel”, and “investigate”, likely influenced their positive perception of the teacher's approach.

Health care practitioners who may be planning for similar initiatives should carefully select the teacher not only based on their credentials

but in the teacher's ability to deliver the classes in a caring and compassionate way. The host staff should endeavor to target participation so that classes may be grouped according to persons identified as having shared experiences, (such as those related to mental health and trauma). Class sizes should remain small and encourage regular membership to maintain a sense of familiarity and predictability among the students.

The areas for improvement identified by participants were to reduce the background noise (which came from the gym below the health centre), hold classes in a larger room, offer classes more than once per week and continue the program beyond 8 weeks. One way to improve future iterations may be to promote more regular practice between yoga classes and following completion of the program. This could be facilitated by supplementing the formal delivery of TSY with instructional resources for participants to use on their own outside of the classes offered at the health centre.

### 4.3. Youth-centered integrated care

Our study demonstrates the feasibility of the TSY Program, and supports the integration of TSY within health centres. Youth-centered integrated models of care that include primary care, mental health and social services are increasingly being recognized globally as an effective approach to improve mental health outcomes [31]. For example, in British Columbia (BC), Foundry is a network of integrated health and social service centres that provide a “one-stop shop” for young people to access mental health care, substance use services, primary care, social services and youth and family peer supports. Offering TSY within such a model reduces barriers such as cost, provides clients with a support network of other people with shared experiences, offers a space already familiar to them, and has the benefit of availability of staff, such as peer support workers, to support attendance.

The location of this study was the Foundry Vancouver Granville Centre. At this time, six other Foundry centres are open across the province (North Vancouver, Abbotsford, Kelowna, Prince George, Victoria, and Campbell River) and four more are scheduled to open by 2021 (Maple Ridge, Richmond, Penticton, and Terrace). As a result, this program has the potential to be rolled out to other Foundry centres in the near future. In this study, we gained valuable information about feasibility, youth engagement, sample size estimates for future research, and the selection of outcome measures for evaluation and quality improvement.

### 4.4. Limitations

As this was a feasibility study, our sample size was small. Participants were receiving other treatments and therapies concurrently. The research design did not allow us to control for these confounding variables. While this intervention was offered to young adults of any gender, the study included mostly women in both cohorts. There was only one male-identifying participant who enrolled in the study and he was one of the participants lost to follow-up.

Standardizing the intervention by way of class structure and verbiage between the two cohorts as well as in comparison to other yoga-based intervention studies was challenging. While the instructor followed the framework outlined in Appendix A for each class, it was not possible to replicate the exact way in which it was delivered between the cohorts, nor would it have been necessarily appropriate to do so. By offering a welcoming and adaptive environment, this means that the instructor needed to change the sequencing to match the students' abilities and dispositions on a given day. This amount of flexibility for the delivery of the intervention limits the degree to which we were able to report on the reliability.

#### 4.5. Suggestions for further research

While this study demonstrates the feasibility of TSY as an intervention for this population and positively reinforces the evidence to incorporate TSY as an adjunct treatment, further research using a randomized controlled design, with long-term follow-up, is needed. Longitudinal follow-up of subjects using the intervention may also reveal important information about secondary benefits of the group such as maintaining social connections, routine, and participation in meaningful activities.

#### 5. Conclusions

The results from this mixed methods feasibility study support the use of trauma-sensitive yoga as an adjunct therapy for youth with depression, anxiety and/or PTSD, to be offered at the same location they are already accessing health care services. The perceived benefits identified by participants included increased mindful awareness, mental health and physical benefits, using the breath as a resource, and having structure and routine in their life. These perceived benefits were

reported to have lasting impacts beyond the duration of the weekly yoga sessions.

#### Conflicts of interest

The authors have no conflict of interest to declare with respect to the research, authorship or publication of this article.

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#### Appendix C. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ctcp.2019.01.010>.

#### Appendix A

##### Framework for 8-Week TSY Program

The structure of the TSY Program used in this intervention was informed by the Trauma Centre TSY model and from Yoga Outreach teacher training.

Each class integrates three pillars:

1. *Having a body*—using foundational postures for the student to establish connection with the physicality of their body and experience a sense of safety through feelings of embodiment. This approach is brought into practice by using simple cues to teach the mechanics of postures without asking for interpretation of the experiences.
2. *Befriending the body*—using a strengths-based practice to focus on students' capabilities and opportunities for growth, rather than any experiences of feeling broken or harmed. This approach is facilitated through invitational language for students to choose how and when they engage with postures and inquiry-based language for students to bring awareness to whatever is arising, without attaching notions of experiences being positive or negative.
3. *Body as a resource*—identifying tools and practicing techniques that enable students to regulate their own bodies and systems. *Pranayama* or breathing exercises serve as the primary tool to establish the body as a resource, which can be practiced nearly anywhere, anytime, with no equipment required.

##### The basics

Each class resembles a similar sequence, with a beginning, middle and end, to develop a pattern of predictability for the students. Variations and points of focus evolve over the course of the 8 weeks. The first [1–2] weeks focus on the first pillar of *having a body*; the middle [3–5] weeks focus on the second pillar of *befriending the body*; and the latter [6–8] weeks focus the third pillar of *body as a resource*. Examples of how these foci evolve are outlined in the chart below. Modifications are always offered in order to help the posture better fit the student rather than the student trying to fit the posture. No hands-on assists are ever provided. The instructor uses verbal cues to assist the student to determine how they can make the structure of the posture more supportive if it appears to be unsafe. However, unlike many public studio classes, the emphasis in TSY classes is not around the aesthetics of alignment but rather safety, awareness, and staying present in the body. Yoga props are available to support the students with such modifications and provide more restorative expressions as well. Postures are guided to be held anywhere from 3 to 8 cycles of breath. When postures may be held longer, the instructor verbally counts down so that students can gauge how long they feel they can stay in the posture, deciding to release out of the posture as needed. Students are continuously reminded that they have control over what, when, and how they choose to participate in the yoga postures or *asanas*.

##### Examples of language

“You are the expert of your own experiences. You have the control to decide when to enter and exit a posture and how far to go.”

“Every time your mind starts to wander, know that this is normal and I invite you to bring your awareness back to the breath.”

“If you feel disconnected from your body, you can bring your awareness to your physical body making contact with the ground, your hands on your thighs, or having feet on the earth.”

“Know that you can decide to take a more restful posture at any time and that this is a safe space to experience whatever you are experiencing.”

## Opening

1. Introductions and brief check-in.
2. Ground rules: The instructor acknowledges the space such that there may be other staff entering or exiting nearby rooms; that the door is not locked and washrooms are nearby; and that it is the instructor's responsibility to create a safe space which means in relation to the room, students practicing together, and suggesting alternatives for safer individual alignment.
3. Grounding technique: Students begin in a seated posture, either supported up on a block or with the back next to a wall. The instructor guides a pattern of awareness of the rooted nature of the body in relation to the floor, bringing awareness to all of the points of contact that the body makes with the floor, and encourages the students to bring the mind into the physical space, onto their mats, and into their bodies.
4. Basic breathing technique: The instructor invites students to begin noticing the breath enter and exit the body, and noticing where the shape change of breath is felt most in the body. After a few cycles, the instructor invites a 3-count breath in through the nose and out through the nose or mouth and builds up to 5 counts.

## Middle

Posture ( <i>asana</i> )	Purpose
5. <i>Vinyasa</i> inspired breathing (matching movement with breath from <i>Sukhasana</i> , (easy cross-legged pose)	To help develop a mind-body connection to the breath.
6. Head/neck rolls (in <i>Sukhasana</i> )	To release the tendency to unconsciously hold stress or tension around the areas of the neck and jaw. To practice letting go. To decrease hyperarousal.
7. Table top/cat-cow ( <i>Marjaryasana</i> - <i>Bitilasana</i> )	To release some rigidity of the muscles that surround the length of the spine and the intercostal muscles. Sending more oxygen to these muscle groups can provide increased feeling of energy and greater capacity for deeper breaths.
8. Child's pose ( <i>Balasana</i> )	To regulate the breath and stimulate the parasympathetic nervous system. This posture is also considered a "home base" that students can return to at any point.
9. Gentle standing forward fold ( <i>Uttanasana</i> )	To bring some strength into the lower half of the body and provide a grounding transition before coming up to stand.
10. Mountain ( <i>Tadasana</i> )	A grounding technique where the lower half of the body is grounded, upper half of the body is lifting, and a strong centre point in between.
11. Half sun salutations/full sun salutations ( <i>Ardha/Surya Namaskara A</i> )	To invite a flowing movement into the body which may help with any tendencies of feeling frozen or stuck in any way.
12. High lunge ( <i>Anjaneyasana</i> )	To introduce a sense of empowerment, tapping into the strength of the legs. To stretch the psoas muscle that can help to de-constrict its attachment of the diaphragm and therefore free the breath. This posture eventually prepares the body for stronger postures such as warrior ( <i>virbhadrasana</i> )
13. Tree ( <i>Vriksasana</i> )	To practice balance and accept imbalance.
14. Bridge ( <i>Setu Bandhasana</i> )	To ground the body again. To release the psoas muscles and promote circulation.
15. Waterfall ( <i>Vaparita Karani</i> )	To invite increased circulation. To ground the lumbar spine which can sometimes experience more strain in the physical practice when the core muscles have not yet been integrated.
16. Spinal twist ( <i>Supta Matsyendrasana</i> )	To massage the organs that assist with digestion and to release the muscles around the thoracic spine for more easeful breath.
17. Hug	To practice an expression of self-gratitude, self-compassion. To balance out the asymmetrical poses, and to activate as many muscles in the body as possible before releasing into relaxation.

## Closing

18. Relaxation/(*Shivasana*): The instructor guides a full-body scan while students are lying on the ground, and reminds them that this is a safe space to bring relaxation into the body and into the mind. (2–5 min)
19. Acknowledgement and inviting gratitude: Once in seated, the instructor encourages each student to acknowledge their own ability to show up, to be present, and to try something new. The students are invited to bring to mind an image of someone or somewhere they are grateful for and that makes them feel supported. The positive imagery is followed by an exaggerated exhale to bow the head towards the heart.

## Appendix B

### Semi-Structured Interview Guide

#### Interview Questions:

Part 1: Now we would like to ask you questions specific to your experience in the yoga program:

1. Tell me about your experience with the yoga program
2. Has attending this yoga program helped you in any way? If so, in what ways?
3. How has yoga impacted the way you handle your emotions?
4. What strategies, if any, did you learn to help manage your emotions?
5. How has practicing yoga affected the way you handle stress?
6. How has practicing yoga helped you cope with day-to-day life?
7. How do you feel the yoga program affected your physical health?
8. How do you feel the yoga program affected your mental health?
9. How did the program environment make you feel supported? (the room, staff, equipment)
10. Has practicing yoga in this program had any effect on the way you interact with others? How so?

Part 2: We would now like to ask you questions about improving the program:

11. What parts of the yoga class/program did you like best?
12. What parts of the yoga class/program did you dislike?
13. What kept you coming to these yoga classes? (besides \$)
14. If you were unable to attend every class, were there specific reasons why that you would like to share?
15. What would you change to improve this yoga program?
16. Do you have any interest in continuing to practice yoga? – Why, why not?
17. If you would like to continue practicing yoga, how would you go about doing so?
18. What would be/are some of the barriers to practicing yoga in general?

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