

# A Pilot Study of the Efficacy of a Transdiagnostic Single-Session Circus-Based Mindfulness Programme in Rural North Borneo

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## Keywords:

mindfulness; circus; psychological flexibility; fear of Covid-19; transdiagnostic; intervention.

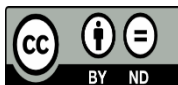
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## ABSTRACT

Child and adolescent mental health is a pertinent issue that would benefit from creative and gamified new approaches. Circus skills and mindfulness methods are transdiagnostic interventions that have additive effects in synergy. This article focuses on the pilot testing and preliminary efficacy analysis of a novel circus-based mindfulness intervention. 50 participants were randomized into intervention and control groups. Intervention groups received a combined circus and mindfulness intervention; control groups only received a mindfulness intervention of comparable duration. Multiple analysis MANOVA was employed to identify differences between intervention and control groups on measures of depression, anxiety, stress, mindfulness, psychological flexibility, and fear of Covid-19. Upon Wilcoxon signed rank tests, there were significant differences for the pre- and post-intervention scores for fear of Covid-19 and psychological flexibility. There was no significant difference in the intervention group for depression, anxiety, stress and mindfulness. Upon multiple analysis MANOVA, there was a significant difference between the scores for fear of Covid-19 between the control and the intervention group. There was no significant difference between the control and intervention group for depression, anxiety, stress, mindfulness and psychological flexibility. In conclusion, it is observed that psychological flexibility and fear of Covid-19 are two construct that have the potential to be influenced by interventions combining circus and mindfulness interventions. Further larger-scale research is essential in replicating these pilot findings.

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## 1. Introduction

Child and adolescent mental health is an increasingly pressing and urgent trend, as the rates for suicide and mental health issues increases in adolescents [1]. This has led the WHO to identify it as a major point of concern for the future. Other than the increasing stressors in modern society, the rise of digital devices and the increasing sense of physical isolation may contribute to an increasing sense of chronic emptiness [2].

Teenagers are increasingly unable to access safe forms of physical activities that promote a sense of connectedness and belonging [3], and their parental role models are increasingly unable to provide the mentoring that they need due to life pressures. This is especially so in light of the Covid-19 pandemic, which has further exacerbated the existing pressures of adolescence [4]. Due to repeated lockdowns, quarantines, and fear, anxiety and stress associated with the physical and psychological consequences of Covid-19 [5- 7], teenagers have been increasingly alienated from society as their devices become the focal point of education, socialising and connection with the outer world [2]. This has resulted in greater levels of disconnect and precipitated multiple mental health difficulties as a population, especially in a student population [8].

On top of many other more conventional activities that have been shown to provide a better sense of belonging and connection, circus skills are a novel method to do so that works transdiagnostically and across the spectrum of socio-emotional skillsets. Circus-based activities have a plethora of evidence in promoting multiple positive qualities in young people [9], including vital soft skills like discipline, perseverance, personal responsibility, the ability to work well with others, self-confidence, creativity, and appreciation for life [10]. Crucially too, from a sociological perspective it can boost connectedness and combat feelings of alienation and isolation [11].

At the same time, mindfulness is another widely accepted and strongly evidence-based transdiagnostic intervention that has demonstrated efficacy in treating depression and anxiety [12]. Mindfulness based exercises can also be used, even more critically, as a form of primary prevention [13], which from a public health economics point of view makes better sense than merely focusing on tertiary prevention of mental health issues [14]. By using mindfulness exercises as a lifestyle psychiatry intervention to promote mental wellness [15] rather than merely treating mental illness when detected, it can significantly prevent or delay onset of common mental disorders, and reduce the burden of care of diagnosable mental illnesses. At the same time, innovation in research is required if efficacy of intervention is to be maximised. Delivering traditional mindfulness-based classes and workshops to young people is at best a replica of what already happens in school-based didactic classroom teaching, and has the potential to disinterest or alienate young people from very efficacious mindfulness-based interventions [16], [17]. Hence, there is utility in “gamifying” or concealing evidence-based intervention classes in the midst of activities that young people enjoy and regard as socially desirable [18]. Circus skills could potentially fill that gamification gap.

Circus skills are also inextricably tied in with mindfulness in a transdiagnostic fashion – to be a good circus practitioner you need to be mindful, and when one is increasingly mindful one will increasingly enjoy circus skills [19]. Hence, it will form a virtuous cycle resulting in one improving the other in a negative feedback loop. As there is no evidence in the literature examining the efficacy of an intervention that combined both circus skills and mindfulness exercises, we constructed a research project that aimed to assess whether a combination circus and mindfulness intervention that was transdiagnostic in nature would be able to demonstrate these synergistic properties, using pre- and post-intervention metrics of psychological distress (depression, anxiety and stress) and psychological process variables (mindfulness and psychological flexibility). As this research project was carried out within the Covid-19 pandemic, it was also decided to examine pre- and post-intervention changes on metrics of fear of Covid-19. The objective of this study was to pilot a circus-based mindfulness intervention and assess its efficacy above and beyond traditional mindfulness techniques. Also this study aims to develop a pilot module for a mindfulness module that combines circus techniques so that it can be translatable to other settings.

## **2. Materials and Methods**

This was a two-arm quasi-experimental study. An intervention group with circus and mindfulness skills combined was compared statistically against a control group only performing mindfulness. It was decided not to have a control group with no intervention, as it would be impossible to disentangle whether the accretion of benefits was due to the circus or the mindfulness skills, or both working in synchrony. This was opened up to groups of adolescents aged between 16 and 18 years old, which was the age group in which teenagers were taking major public examinations in Malaysia. They were randomized into an intervention and a control group.

The intervention group was enrolled in a circus combined with mindfulness group. Firstly, they were taught a mindfulness intervention adopted from Acceptance and Commitment Therapy interventions with known efficacy [20], which involved a body scan and a mindful walking exercise. Subsequently they were divided into three groups and were rotated between groups after thirty minutes. The first group involved a plank walking exercise, the second group involved a juggling exercise, and the third group involved a stilt walking exercise. Each group was asked to perform the exercises, while at the same time mindfulness skills were reinforced while performing each activity. Hence they participated in a total of 1 hour 30 minutes of circus based mindfulness exercises

The control group only performed a mindfulness-based intervention, which was delivered similar to the mindfulness component in the intervention group, and over the same 1 hour 30 minute time frame as the intervention group. This was to prevent any potential bias from higher contact time with the intervention group. They hence only received the mindfulness-based intervention without the circus skills augmentation. Due to logistics, Covid-19 lockdowns precluding high number of circus-based participants, and lack of sufficient manpower to perform the circus interventions, they did not crossover to receive the intervention subsequently.

Both groups filled in a set of questionnaires an hour before and an hour after the intervention or the mindfulness-only control group. These questionnaires included the DASS-21 Malay version to measure depression, anxiety and stress [21] the AAQ-II Malay version to measure psychological flexibility [22] the MAAS Malay version to measure state mindfulness [23] and the Fear of Covid-19 scale Malay version to measure the fear of Covid-19 [24], [25]. All questionnaires were measured as continuous data and validated Malay questionnaires were used for all.

Skewness and kurtosis were calculated as a normality assumption. Subsequently, a one-way repeated measures multivariate analysis of variance (MANOVA) was used to determine whether there are any differences in the dependent variables between treatments. All independent and dependent variables were measured as continuous variables in this study. Post-test measurements for depression, anxiety, stress, mindfulness, psychological flexibility, and fear of Covid-19 were used as the dependent variable, and significant interactions for the group suggested that there was a significant difference between the intervention and control groups.

### **3. Results**

A total of 20 individuals were enrolled in the intervention group and 30 were enrolled in the control group. Descriptive statistics suggested that all variables had acceptable skewness and kurtosis (below +/-2). However, non-parametric tests were employed as the sample size for the intervention group was below 30. Upon Wilcoxon signed rank tests, there were significant differences for the pre- and post-intervention scores for fear of Covid-19 and psychological flexibility. There was no significant difference in the intervention group for depression, anxiety, stress and mindfulness.

Figure 1 Wilcoxon signed ranks test for study variables

Test Statistics <sup>a,b</sup>					
	POST Fear of COVID – PRE Fear of COVID	POST Psych Flexibility – PRE Psych Flexibility	POST Depression – PRE Depression	POST Anxiety – PRE Anxiety	POST STRESS – PRE STRESS
Z	-3.053 <sup>c</sup>	-2.772 <sup>c</sup>	-1.671 <sup>c</sup>	-.715 <sup>c</sup>	-.723 <sup>c</sup>
Asymp. Sig. (2-tailed)	.002	.006	.095	.474	.470

- a. Group = 1
- b. Wilcoxon Signed Ranks Test
- c. Based on positive ranks.

Upon multiple analysis MANOVA, as per Figure 2, there was a significant difference between the scores for fear of Covid-19 between the control and the intervention group. There was no significant difference between the control and intervention group for depression, anxiety, stress, mindfulness and psychological flexibility.

Figure 2 MANOVA with fear of Covid-19 (post) as dependent variable

Error Variances

Dependent Variable: Fear of Covid-19 (post)

F	df1	df2	Sig.
6.479	1	48	.014

Tests the null hypothesis that the error variance of the dependent variable is equal across groups

Tests of Between-Subjects Effects

Dependent Variable: Fear of Covid (post)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	189.901 <sup>a</sup>	3	63.300	2.441	.076	.137
Intercept	4000.097	1	4000.097	154.278	<.001	.770
Group	143.718	1	143.718	5.543	.023	.108
Fear of Covid (Pre)	20.075	1	20.075	.774	.383	.017
Group * Fear of Covid (Pre)	15.020	1	15.020	.579	.450	.012
Error	1192.679	46	25.928			
Total	8321.000	50				
Corrected Total	1382.580	49				

- a. R squared = .137 (Adjusted R squared = .081)

#### 4. Discussion

This study demonstrates that circus-based mindfulness skills are two transdiagnostic skills that demonstrate significant effects on two constructs, namely fear of Covid-19 and psychological flexibility. The intervention did not have any effects on depression, anxiety and stress. This may be explained as the measurements were merely pre- and post-test, as there were difficulties within the pandemic to get data after a suitable duration. Hence it was difficult to ascertain if the intervention had sustained effects on

participants' psychological distress as it was unlikely to change within one intervention. However, it was encouraging to observe that there were effects on fear of Covid-19, a reasonably recent and emerging construct in analysis [26]. Fear of Covid-19 has been demonstrated cross-sectionally to have significant relationships with depression, anxiety and stress at meta-analytic level [27]. In terms of psychological process variables, there have been structured equation analyses mediation studies demonstrating inverse relationships between fear of Covid-19 and mindfulness [28]. There have been parallel Greek studies as well in two separate groups (a general public group and a police officer group) demonstrating reductions in fear of Covid-19 in online interventions [29], [30]. However, this is the first in the literature to use fear of Covid-19 in a physical face to face intervention, and the first to demonstrate significant changes in fear of Covid-19 in a quasi-experimental study design involving mindfulness-based practises, albeit with small sample sizes.

Psychological flexibility on the other hand is a key construct that can be targeted by mindfulness activities especially those that teach according to the principles of mindfulness, namely being open to experience, flexible, kind to oneself, and conscious to oneself [31], rather than merely teaching mindfulness skills as a form of relaxation or to avoid difficult emotions. This is the first study that observes psychological flexibility changes pre- and post-circus based interventions; previous studies in circus-based interventions examine more measures of social and emotional functioning in school settings [9], [32], [33]. Compared to those who did both circus skills and mindfulness, those who only did mindfulness were able to learn the skills, but were not immediately able to see how their skills were relevant in a real life scenario, as it was done within a "classroom" or "clinic" setting with no immediate threat or danger. Hence, the synergistic effect of both circus and mindfulness skills being taught at the same time was evident, as the circus exercises performed immediately after the mindfulness exercises created context and reinforcement, allowing participants to translate theoretical skills exercises into an intense real world setting.

There are a few limitations inherent to this project. Due to the ongoing Covid-19 pandemic it was difficult to organize the circus skills workshops due to the high level of physical contact necessitated. Hence, the workshops were only able to be held during a very small window of opportunity, with highly restricted numbers. It was thus decided to do very small intervention groups numbering only 10 people at a time. The same format was employed for the mindfulness groups too to ensure cross validity. This would have led to smaller sample sizes than desired, as there were only 20 people who could ultimately participate in the intervention group. Moreover, the circus based module was newly constructed so has not been formally validated, thus this project can be considered more of a pilot study.

## **5. Conclusions**

Circus skills are an age-old technique that may find increasing utility in an increasingly digitalized age. The judicious use of circus skills in order to augment the efficacy of mindfulness skills has not been tested in a formalized intervention prior to this, and this is an opportunity to do a pilot study focusing on its efficacy. With ANOVA showing improvements in psychological flexibility and fear of Covid-19, and as the world gradually moves towards the endemic phase of Covid-19, it is essential that we begin to diversify and gamify teaching of core psychological skills to help our adolescent population cope better with the difficulties that a post-pandemic world will inevitably reveal.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study. Written informed consent has been obtained from the patient(s) to publish this paper.

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