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Citation: Neave, Nick, Johnson, Angie, Whelan, Kathryn and McKenzie, Karen (2020) The psychological benefits of Circus Skills Training (CST) in schoolchildren. *Theatre, Dance and Performance Training*, 11 (4). pp. 488-497. ISSN 1944-3927

Published by: Taylor & Francis

URL: <https://doi.org/10.1080/19443927.2019.1666027>
<<https://doi.org/10.1080/19443927.2019.1666027>>

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The psychological benefits of Circus Skills Training (CST) in schoolchildren

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Running title: Benefits of Circus Skills Training

Abstract.

Physical exercise can enhance various aspects of character and education, but children may not engage due to a variety of barriers. Circus Skills Training (CST) is a novel approach to encourage participation in exercise and develop physical literacy. It delivers circus skills in a positive, non-competitive and supportive social atmosphere, making it particularly appealing to those who avoid traditional competitive team sports. In a between-subjects design we compared 2 groups of children (aged 9-12) on various measures of physical and psychological wellbeing at baseline, and again after one group had received 6 months of CST training as part of their school's physical education classes. Significant differences between CST and non-CST children were found for teacher ratings of emotional problems, with the CST-group showing fewer such problems. CST could offer an innovative means of encouraging children to engage with exercise and provide wider benefits in terms of psychological wellbeing.

Keywords: Circus Skills, physical exercise, physical literacy, optimism, emotional problems, wellbeing.

It is often reported that adolescents partake in suboptimal levels of physical activity, spending most of their leisure time engaged in sedentary activities, such as viewing television, or playing computer games (e.g. Eisenmann, Bartee & Wang, 1999). Research studies have shown that physical activity and participation in sports is negatively associated with risky behaviours such as cigarette smoking, drug use, and sexual promiscuity (Pate, Trost, Levin & Dowda, 2000; Kulig, Brener & McManus, 2003). Conversely, positive associations have been reported for regular engagement with physical activity and self-esteem and educational performance; with reductions in negative behaviours (Steptoe & Butler, 1996; Nelson & Gordon-Larsen, 2006). Exercise has also been associated with improvements in mood and psychological well-being (Berger, 1996; Shepherd, 1996), with submaximal aerobic exercise for up to 60 minutes, being particularly associated with improvements in information processing abilities (Tomprowski, 2003). In school-age children, physical activity is associated with improved cognitive performance, with 11-13 year olds showing the largest effect (Sibley & Etnier, 2003). It has been speculated that the nature of the physical activity is important, in that much of children's exercise is in the context of team games and sports. These activities require complex cognition in the form of social cooperation, strategy development and implementation, anticipation and awareness, and understanding of rules. The high-level of cognitive engagement in such activities may explain how physical exercise can enhance cognition (Best, 2010).

It appears that interests, skills and confidence in relation to physical activity are established within school and family settings (Brustad 1996), but not all children participate willingly in team sports. A key research focus has thus been on barriers to engagement in physical activity. One factor is social class. Studies in Holland and Australia demonstrated that children from lower socio-economic groups engaged in less family-oriented physical activities, and parents of lower economic status were less able to provide emotional and financial support, or transport

to leisure activities, (Kirk, Carlson, O'Connor, Burke, Davis & Glover, 1997; Zeijl, te Poel, Du Bois-Raymond, Ravestloot & Meulman, 2000). Another factor is gender; while reduced engagement with physical activity is typically seen between the ages of 9 to 15, boys partake in such activities significantly more than girls (Riddoch, Andersen, Wedderkopp et al., 2004); indeed, adolescent girls are at particular risk for reduced physical activity (Sanchez, Norman, Sallis, et al., 2007).

Researchers have thus focussed on children's attitudes and motivations towards engagement with physical exercise. One such study found that motivation towards engagement was improved when opportunities for students to progress at their own rate were provided (Bryan & Solomon, 2012). Individuals tend to seek out activities in which they feel competent and can experience success (Harter, 1978), but traditional sports-based activities in school are often narrowly focussed on a few team games, and may not provide the appropriate motivational stimulus for individuals who are less athletic, less physically fit, or who do not like team games (Ennis, 1999; Santana, Solomon, Cothran et al., 1998). Bryan and Solomon (2012) suggested that the best strategy to ensure a high level of engagement was to provide a variety of physical activities and allow the students to make choices regarding which activities they can pursue.

One innovative approach which has sought to combine the psychological and physical benefits of engaging in a fun, positive activity within an inclusive environment where mistakes are expected to be made is the 'Social Circus', pioneered by Bolton (1982, 2004). The focus in this non-professional training is on personal development, social inclusion and self-expression, whilst at the same time providing physical education and fitness development (Cadwell, 2018). Unlike traditional sports which have winners and losers, circus is about what the person can do on their own, whilst in cooperation with others. Circus has a wide variety of techniques, meaning that a person, irrespective of their level of expertise or fitness, can find

something to challenge them, in which a key element is the development of trust in themselves and their teacher, and learning how to cope with failure (Cadwell, 2018).

In Finland the ‘Social Circus Project’ (2009-2011) and the ‘Effective Circus Project’ (2011-2014) have sought to establish the positive benefits of circus training programmes in various participant groups. Here, engaging in circus skills training (CST) led to clear improvements in self-perceived, and observer-rated assessments of self-esteem, self-confidence, wellbeing, and community engagement in children and adults from various backgrounds, though the benefits appeared to be particularly salient for individuals from disadvantaged backgrounds (Kekäläinen, & Kakko, 2013). Similarly, large-scale social circus programs in Ecuador target around 25,000 socially disadvantaged people annually with the aim of promoting social inclusion and self-development. Spiegel, Breilh, Campaña et al., (2015) revealed that such efforts result in clear improvements in social isolation and the social determinants of health; similar effects being noted for marginalized Canadian youths aged 18-23 (Spiegel & Parent, 2017).

It has been suggested that circus skills training can be particularly effective in a therapeutic context, with goals being to develop problem-solving and communication skills and emotional control. The *Circus Arts Therapy® fitness and play therapy program* (Heller and Tagliatela, 2018) combines structured and nondirective approaches all delivered within a circus-based context assessed the effects of circus therapy in youngsters aged 4-18. Participation in the program produced significant benefits in physicality, teamwork and following instructions, with some improvements also seen in sociability and emotional control. In autistic children circus training has also been shown to deliver key improvements. In a review of the methods for using circus skills as therapy, Seymour and Wise (2017) note that autistic children can develop greater strength, coordination, physical awareness, confidence, creative expression and a sense of ‘fitting in’.

The development of circus skills requires dedication, concentration, learning of new and challenging skills, balance, new ways of moving, and physical exercise, all in a positive and supportive social atmosphere. An additional benefit of CST is that it enables physical engagement without a competitive element, a potential draw for many young people who avoid competition (Stevens, McGrath & Ward, 2019). It is argued that these core skills are generalised into the participants' wider lives, impacting positively on confidence, self-esteem, self-expression, team work, willingness to try new activities, and dealing with failure (Cadwell, 2018; Kekäläinen, & Kakko, 2013). The kinds of coordination skills typically developed in CST might also be particularly beneficial in improving attentional performance (Budde, Voelcker-Rehage, Pietraßyk-Kendzioora, et al., 2008). These skills can be conceptualised within the framework of physical literacy, and especially the development of proficiency in Fundamental Movement Skills (FMS) which comprise locomotor skills (e.g. running, jumping, hopping), manipulative skills (e.g. catching and throwing) and stability skills (e.g. dynamic and static balance). Mastery of such skills is associated with physical, health, social and cognitive development (Malina, 2009; Barnett, Van Beurden, Morgan et al., 2008).

In addition to developing fundamental movement skills, CST also targets a range of non-cognitive factors and character traits including focus, grit, conscientiousness, perseverance, motivation, respect for others, integrity, self-expression, and dealing with failure, many of which have previously been found to be associated with educational attainment (Durlak, Weissberg, Dymnicki, Taylor & Schellinger, 2011); Snyder, Vuchinich, Acock, Washburn & Flay, 2012; Weber & Rauch, 2012). Research with school children in Australia suggests that CST has a range of such benefits, including increasing positive risk taking, self-confidence, self-efficacy, social connectedness, teamwork, leadership skills, and sense of belonging (Maglio & McKinstry, 2008).

There has however, to date, been little independent evaluation of Circus Skills Training' (CST) which utilises a quantitative methodology. As two of the members of the research team (NN and KM) are members of the Circus Research Network, we were particularly interested to evaluate the possible wider benefits of CST. In this current study we thus assessed the effectiveness of engaging in CST for up to 6 months on the development and enhancement of a range of physical, psychological and emotional measures in children aged 9-12.

Method.

Sample.

In total, 89 children (aged 9-12) from three different schools in the north-east of England, United Kingdom, took part in the study. The schools were in the same geographical region and contained children from the same socioeconomic background. 27 children from one school (11 males, 16 females aged 9-10) acted as controls; while 67 children recruited from 2 other schools (23 males, 44 females, aged 9-12) received the CST training. Of the children receiving CST, 16 reported that English was not the main language spoken at home, the corresponding number for the non-CST children was 2. None of the children had received CST prior to taking part in this study.

Design.

In a repeated-measures design, all children received an initial baseline assessment comprising self-report and teacher ratings. Children in the two schools where the CST was to be delivered then received weekly sessions of training as part of a physical education lesson. After the final session all children and their teachers were asked to complete the questionnaires once more, approximately 6 months later.

Procedure.

Following institutional ethical approval and informed consent from parents and schools, children were recruited to take part in the study. At the baseline session the children were asked to complete the following standardised questionnaires.

To assess optimism and pessimism we used the 'Youth Life Orientation Test' (YLOT), a 16-item self-report measure. In a sample of 204 3rd-6th graders, the mean score on optimism was 14.40 (SD=3.59) with an alpha of .79, the mean pessimism score was 5.87 (SD=4.48) alpha = .78, combined alpha for all items was .83. Subsequent test-retest reliability was confirmed at $r = .70$. Optimism predicted fewer child-reported depressive symptoms and parent-reported behaviour problems, while pessimism was associated with more child-rated anxiety and parent-rated social and academic problems (Ey, Hadley, Allen et al., 2005).

To measure emotional and psychological wellbeing we used the Stirling Children's Wellbeing Scale (SCWS). This was devised by Liddle & Carter (2010) for Stirling Council Educational services in order to measure emotional and psychological wellbeing in children aged 8-16. It is a 12-item scale with 6 items measuring positive emotional state and 6 items assessing positive outlook. In a sample of 701 children the average score was found to be 43.51 (SD=6.66), with alpha at 0.80, the scale was also found to be reliable and stable over time.

To measure physical activity we used the 'Physical Activity Questionnaire' (PAQ-C) which provides a general measure of moderate to vigorous physical activity for youngsters aged 8-14. This comprises a short, self-administered 7-day recall of physical activity that is well-suited for longitudinal research, and has been shown to be reliable and valid (Kowalski, Crocker & Faulkner., 1997).

To assess a range of emotional, conduct and peer relationship problems and prosocial behaviours we used the 'Strengths and Difficulties Questionnaire' (SDQ) appropriate for

children aged 4-16 (Goodman, 1997). It comprises 25 items with 5 subscales of 5 items each: conduct problems, emotional symptoms, hyperactivity, peer relationships, prosocial behaviour. The items from 'conduct problems', 'emotional symptoms', 'hyperactivity', and 'peer relationships' can be summed to form a 'total difficulties score' (maximum = 40). This questionnaire was completed by the child's class teacher.

The structured program of CST was delivered by highly-experienced mentors from Circus Central (North East Circus Development Trust, www.circuscentral.co.uk). These specially designed programs cover 5 standardized core elements: acrobatics skills (e.g. human pyramid), aerial skills (e.g. high ropes), equilibristic skills (e.g. unicycling), performance skills (e.g. presentation, costume-making) and manipulation skills (e.g. juggling). In total, 18 hour-long sessions were delivered over the course of 6 months during the school term, a final session comprised a performance to the school. Shortly after the final session all children and their teachers completed the same questionnaire battery again.

Data analysis

Data were analysed within the statistics package SPSS version 22, using a split plot ANOVA, controlling for age, gender and school. The between factor comparison was 'group' i.e. whether the children were in the CST intervention or control group, the within factor was 'time' i.e. changes in the outcome measures over time, and the interaction was 'time' by 'group'.

Results.

Table 1 illustrates the mean scores at baseline and follow-up for the CST and control group for each measure used. A significant interaction effect was found in relation to the Emotional Problems subscale of the Strengths and Difficulties Questionnaire, with the CST group decreasing and the control group increasing in their scores between baseline and follow-up ($F=$

5.348, $df = 1$, $p = .024$, $\eta^2 = .07$, medium effect size). No significant interaction effects were found for any of the other measures.

Table 1

The mean scores (with standard deviations in parentheses) at baseline and follow-up for the Circus Skills Training and control group for each measure.

Measure	Circus Skills Training Group		Control Group	
	Pre	Post	Pre	Post
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
YLOT Pessimism	6.5 (4.2)	5.8 (3.8)	5.6(3.3)	6 (4.5)
YLOT Optimism	12.4 (4.1)	12.5 (3.8)	14.1 (2.9)	14.3 (2.9)
SCWB Positive Emotional State	17.1 (4.4)	16.0 (4.1)	17.6 (4.4)	18.2 (3.7)
SCWB Outlook	17.7 (5.1)	16.6 (3.8)	18.5 (3.6)	18.2 (4.1)
PAQ	9.3 (2.2)	8.9 (1.8)	9.4 (2.3)	9.5 (2.1)
SD hyper	2.7 (1.6)	3.9 (2.4)	1.5 (1.1)	1.9 (1.7)
SD Emotional symptoms	1.28 (1.6)	1.05 (1.8)	0.73 (1.3)	1.1 (1.7)
SD Conduct	1.0 (1.8)	1.0 (1.8)	0.27 (0.61)	1.1 (1.7)
SD peer problems	1.3 (1.6)	1.5 (1.4)	0.88 (1.2)	1.4 (0.8)
SD prosocial	5.3 (2.4)	5.4 (2.6)	9.0 (1.5)	8.9 (1.7)
SD total	6.4 (5.6)	7.5 (5.8)	3.3 (2.9)	4.9 (3.3)

Discussion

Barriers are known to exist which prevent young people engaging with physical exercise in school settings. One motivational barrier appears to be the kinds of physical exercise provided in schools, with an over-emphasis on competitive team games and sports. These may not allow the individual to progress at their own rate and can be off-putting for individuals who lack physical fitness, or do not enjoy team games (Ennis, 1999; Santina et al., 1998). A possible solution to this problem has been the recent innovation of providing circus skills training which provides a range of non-traditional physical and psychological challenges all within a supportive social setting. Some evidence suggests that engagement with CST enhances a range of physical and psychological characteristics, which are assumed to generalise into everyday life (Cadwell, 2018; Kekäläinen, & Kakko, 2013; Maglio & McKinstry, 2008; Stevens et al., 2019).

In this exploratory study of a relatively small sample of children, we found that engagement with just 18 hours of CST over a 6 month period led to a significant reduction in teacher-ratings of emotional problems as assessed via the Strengths and Difficulties Questionnaire. The items relating to this subscale comprise issues with psychosomatic illness, worries, unhappiness, nervousness, lack of confidence and fearfulness. The reduction in emotional problems, even after such a short intervention period, is encouraging, as elements of positive psychological wellbeing are thought to provide a strong basis for resilience and resistance to psychopathology (Campbell-Sills, Cohan & Stein, 2006). School-based approaches are being commonly used to assess the effectiveness of various interventions on character strength, positive emotions and resilience, with significant effects being reported for student wellbeing, peer-relationships and educational performance (Waters, 2011). Our innovative approach may form an additional intervention strategy for developing key aspects of character and wellbeing.

None of the other measures revealed significant differences between the children receiving CST and the control group over time. One reason may be because these were self-report measures which were completed by the children. This may have impacted on the results in a number of ways. Firstly, our sample comprised 16 children for whom English was not the main language spoken in their home, and these children possibly may have experienced more difficulty in completing the self-report measures accurately. Future research, which controls for potential differences in reading/educational/language ability between the different cohorts would help to address this potential issue. Secondly, the self-report measures may not have been perceived by the children as asking questions which related to their experience of CST. For example, while the children in the CST group were clearly engaging in more physical activity than before the intervention, this was not reflected in changes in PAQ scores over time. This may be because the PAQ does not list the kinds of physical activities conducted as part of the CST, and indeed the children in the CST group may not even have considered the CST activities as 'physical exercise'. In order to adequately capture changes that are predicted to result from CST, future research could include more focused measures. For example, as it is known that acute coordinative exercise, such as CST, can improve attentional performance (Budde et al., 2008), future studies could include elements of attention in their assessments.

While the standardized measures used in the current study were appropriate for the age-range studied, were short, and provided validated assessments of some of the key aspects we were interested in (emotional problems, physical activity etc), they could have lacked the sensitivity to pick up changes in attitudes and emotions over such a short time. Future studies should broaden the scope to cover specific aspects of self-confidence, wellbeing, resilience, and character strengths known to be associated with academic outcomes (Guttman & Schoon, 2013) and also conduct qualitative analyses to determine how the participants feel about taking part.

Previous studies which have assessed the effectiveness of circus skills training have noted that the largest effects appear to be in individuals from disadvantaged backgrounds (Kekäläinen, & Kakko, 2013; Spiegel et al., 2015; Spiegel & Parent, 2017). Our participants were not from a ‘disadvantaged’ background, and so the differences between CST and non-CST may not have been appreciable. We are currently refining our methodology to incorporate comparisons of children from various disadvantaged backgrounds to explore whether CST brings particular benefits to such children.

Conclusion

In summary, in this exploratory study of a new type of intervention to encourage children’s engagement with physical activity, we did find evidence of a positive benefit with regard to teacher ratings of emotional problems. Future research which studies the effects of CST over a longer time period, using a more focused set of measures designed to assess key aspects of emotional and psychological wellbeing, and educational attainment, and which takes account of the socio-economic and cultural backgrounds of the children will help to further clarify the children for whom such interventions might be most effective.

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