

# Circus 101: Features and Feats of Circus Bodies

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## ABSTRACT

This monograph will introduce clinicians to the rapidly growing circus arts population, from the recreational to the professional level. It will review what makes these artistic athletes unique and how they relate to other athletic and artistic populations. Next, it discusses the epidemiology of circus injuries and common injury types. Then, it will cover how these artists perceive injury and how they care for their bodies. Finally, it will cover considerations when working with circus artists, including extrinsic risks for injury. To conclude the monograph, 3 case studies demonstrate the unique challenges facing circus artists that must be considered during injury management. The first case study is about a 35-year-old male professional performer whose injury was caused by a costuming issue during a performance. The second case study is about a 19-year-old female pre-professional student who was injured landing on a safety mat while tumbling. The third case study describes a 22-year-old female bungee trapeze artist who was injured by her harness.

**Key words:** artist perspective, circus arts, epidemiology, risk factors

## LEARNING OBJECTIVES

Upon completion of this monograph, the course participant will be able to:

1. Describe the history of circus arts within the United States.
2. Discuss demographic and epidemiological trends of circus artist participation and injury.
3. Understand musculoskeletal demands and typical physical modifications associated with participation in circus arts.
4. List commonly injured body regions and musculoskeletal conditions associated with participation in circus arts.
5. Recognize risk factors associated with typical circus artist injuries.

6. Explain key components of the pre-participation screening process for circus artists.
7. Integrate circus artists' perceptions and needs into their injury management.

## INTRODUCTION

### CIRCUS ARTS IN THE UNITED STATES

#### Growth of the Circus in the United States

In 2007, circus artists were unlikely to be seen in your local healthcare clinic; there were just a handful of circus schools and few touring circus companies. However, in the last 15 years, participation in circus arts at all levels has increased significantly, especially through recreational classes and schools. In 2008, in a European Federation of Professional Circus Schools (FEDEC) survey, only 6 circus schools were listed in the United States.<sup>1</sup> Similarly, an aerial dance reference book published in 2007 listed 8 circus schools in the United States.<sup>2</sup> Eleven years later, in 2018, American Circus Educators sent out an industry-wide demographic survey with 165 respondents.<sup>3</sup> Of those, 74% reported a founding date of 2000 or later.<sup>3</sup> While we do not have data on the current number of programs across the country, anecdotally, we do know that training programs have opened as independent entities inside dance studios, yoga studios, or gymnastics gyms. This growth seems to have been spurred by sharing information through video and social media platforms, which has increased the awareness and knowledge of circus arts in the United States. More likely than ever, there is a circus school in your community and a population of artist athletes who need physical therapy care.

While the public view of the circus has been focused on the struggles and bankruptcies of large companies like Ringling Bros. and Barnum & Bailey, the Big Apple Circus, and Cirque du Soleil, the past few years have seen new growth of touring shows<sup>4</sup> and smaller regional companies. As of 2020, just in Seattle, Washington, 3 resident circus companies perform complete shows at least once a year and many entertainment companies provide circus entertainment for corporate and party events.

#### Demographics

Circus activity as recreation has grown exponentially in the United States over the last decade,<sup>3</sup> with recreational artists comprising the majority of the circus population. These are the artists who will most likely be seeking care in physical therapy clinics across the country. As circus activity has grown in the United States, the demographics of both the programs and the participants have changed. On average, the circus programs founded before 1999 in the United States tended to be non-profits with more apparatus and larger staffs and budgets.<sup>3</sup> In youth programs, the students were more equally split between the sexes, while adult programs had a female bias.<sup>3</sup> The youth-focused programs were more reliable for income because

students were usually willing to sign up for recurring classes throughout a session or season. In contrast, adult classes were more likely to be drop-in. Reliable income from the youth programs helped non-profit schools to maintain a budget for social and adaptive circus programs.

Schools founded in the last decade tend to be smaller, focus on teaching adults, and primarily teach aerial disciplines.<sup>3</sup> These schools have lower overhead costs by having less equipment or only a single type of apparatus available and fewer full-time staff and instructors,<sup>3</sup> often only the owner.

## Challenges

With the rapid growth of recreational circus activity over the last two decades comes the challenges of a growing sport. There is no accredited program or certification body for circus instruction in the United States. Without such standardization, there is little consistency in instructors' circus pedagogy, knowledge, or skill level; even the names of skills are different across the country. The lack of consistent standards for coaching circus arts can lead to increased injury risk, as has been the case in other sports.<sup>5</sup>

## Circus Arts Participation and Performance

We may think of a circus as something that happens only under the big top or with stage lights, but circus arts can be so much more. Circus performances happen in theaters, street festivals, corporate events, tents, outdoors, or wherever people gather. Circus education occurs in gym classes, circus schools, after work, or as a therapy tool.

## Social and accessible circus

The circus arts offer myriad ways to participate as a movement form. Circus activities may be a health intervention or a tool for physical and psychosocial therapeutic interventions. There are movement-focused programs for specific populations, such as children with cerebral palsy or adults with Parkinson disease. There are social-focused circus programs for youth with autism or attention-deficit hyperactivity disorder and for adults with a history of trauma, or they can be used as a means of social connection.

## Social circus

Social circus is a term that was developed to include the applications of circus in community development and individual biopsychosocial growth. Social circus has mainly been studied in the youth and young adult populations.<sup>6</sup> It has been used as an interventional tool for change to improve the self-empowerment, efficacy, and resilience of youth refugees.<sup>7</sup> It has also been used to improve communication, mobility, and interpersonal relationships in young adults living with disabilities as they transition to adulthood.<sup>8</sup> In 2019, a study estimated the "social return of investment" in a circus training program on the mental and social wellbeing of 9- to 14-year-

olds. The determined financial return of funds spent on the 6-month youth social circus program was that for every \$1 of investment, there was a \$7 return in decreased healthcare and social costs due to mental and physical health issues.<sup>9</sup> Two prominent organizations are the Prescott Circus in the Bay Area, California, and Circus Harmony in St. Louis, Missouri. Both offer training in circus arts to urban youth populations and give them the opportunity to perform with professional circuses: Circus Bella and Circus Flora.

## Circus as a health intervention

Trampoline is one of the few disciplines that has been studied for its efficacy as a therapy tool for changes in physical mobility and quality of life. Trampoline training improves motor control and psychosocial skills for children with autism or sensory integration and processing challenges.<sup>10</sup> For children with cerebral palsy, there is limited published evidence, but in a case study by Germain et al,<sup>11</sup> using a trampoline improved strength, balance, and mobility.

Dance therapy for Parkinson disease improves functional mobility and motor impairments.<sup>12</sup> Though there has been no research on using circus activities as movement therapy for this population, there is a program at the School of Acrobatics and New Circus Arts (SANCA) in Seattle, Washington, for adults with Parkinson disease. Anecdotally, the participants have enjoyed the activity and demonstrated improved motor function with cross-body reaching and improved balance.<sup>13</sup>

## Adaptive circus

Many circus apparatuses or activities can be adapted to be accessible to participants of all abilities. There are juggling apparatuses that involve rolling instead of throwing balls for increased control, or the participant can juggle lightweight scarves that fall more slowly. For aerial equipment, silks can be tied at the bottom to create a sling or hammock, allowing students to be off the ground with their body supported on the knot without having to rely on their grip. This will give students benefit from swinging and compression for sensory stimulation. Overall, youth circus arts therapy participants show improvements in physical and emotional domains when engaged in a structured program.<sup>14</sup>

## Recreational Circus Activities

### Circus as exercise

At the recreational level, students are learning to move their bodies in new ways and are using circus activities for exercise. The stresses on the student's body are enough to stimulate changes in strength and motor control. Adult female recreational pole dancers have improvements in grip strength and postural stability that correlate with their years of training.<sup>15</sup> Both of these measures may indicate that pole training can have a positive impact on improving the recruitment and performance of stabilizing musculature in women. Though this

has not yet been studied in other circus artists, the similarities in movements like pulling and inverting the body suggest that similar physical adaptation would be found with other circus training.

Pole dancing involves learning codified skills, strength-based movements, and often moving through a large range of motion (ROM) in time to music, similar to other athletic activities like dance-based workout classes. In a small study (n=14) of the physiologic effects of pole dancing, Nicholas et al<sup>16</sup> found pole dancing to be a moderate-intensity workout. Over the 60-minute class, the students reported an average of 6.3 for rating of perceived exertion (RPE) on the modified Borg scale with an average metabolic equivalent (MET) of 4.6.<sup>16</sup> For skill-based learning with breaks between skills, the students averaged 4.3 METS, and with choreography or performing routines, 5.2 METs. These MET values are similar to aerobic dance and gymnastics activities.<sup>16</sup>

Exercise improves body image and physical efficacy.<sup>17</sup> Circus may be a potent tool for these changes in efficacy. In the studies of pole dancing by Dimler et al<sup>18</sup> and Nicholas,<sup>19</sup> body acceptance, confidence, and appreciation were all shown to increase with participation. Skill acquisition and focusing on the body's functionality improved participants' confidence in movement and performing physical activities. This self-efficacy and intrinsic motivation also lead to high rates of continued participation by a recreational population.<sup>19</sup> Though these are pole-specific studies, other circus disciplines may produce similar results due to the comparable class structure focused on skill building at all levels.

At the youth level, circus as recreation and sport has been brought into the classroom as a physical education activity. In school-age children, circus activities have been shown to improve physical literacy.<sup>20</sup> The students in grades 4 and 5 showed improvements in motor competencies, and notably, there was less of a sex gap in those skills than in traditional physical education classes.<sup>20</sup>

### **Circus recreational performance**

Recreational circus is an opportunity to participate in circus arts and athletics at all levels. Some circus athletes may be looking for conditioning and strength; others may be looking for an artistic outlet. Participation can range from a one-off drop-in class to a weekly commitment or a dedicated practice of multiple hours a week. Recreational circus artists have the flexibility to choose what circus means to them.

As discussed in the demographics section, youth recreational circus tends to be more session- or season-based. In contrast, adult classes are more often on a drop-in basis or with a shorter session duration. This allows circus students to participate at many different levels of commitment. An adult who has been training in circus arts may have just begun their journey and had their arms overhead at 180° while hanging or done a handstand for the first time in their lives, or they may

be training 8 hours a week and performing in student shows a few times a year. It is essential to talk to the circus artist and understand what circus means to them and the importance it has in their life.

### **Performance groups**

Performance groups within recreational schools are common, especially for youth performers. A few well-known youth companies in the United States perform on a regular basis and their graduates frequently continue on to professional performance careers. Two specific examples are Circus Smirkus and Circus Juventas. Circus Smirkus is an audition-based circus camp that puts together a tent-based show and tours around New England over the course of a summer. Circus Juventas is based in St. Paul, Minnesota, and guides and trains youth artists to create performances 3 times a year.

### **Pre-professional and Professional Circus Training Programs**

Pre-professional circus programs provide a transitional environment for recreational artists to progress to professional circus schools and performing. Though many of these artists may not have professional circus careers, they still gain the discipline, self-confidence, community, and stress management skills that come with focused training. Pre-professional programs probably have the largest variety of structures compared to the other types of circus training. While some are full-time immersive experiences during which artists dedicate a year or two of their lives to training, others are after-school or work, part-time programs.

What most pre-professional and professional training programs have in common is that they require auditioning. For many circus students, this is their first time experiencing this process. They often are asked to perform specific strength and flexibility skills to demonstrate that they have the background to learn and withstand the demands of a more intense training program. Pre-professional programs generally focus more on the building blocks of performance: strength and mobility fundamentals, working in groups, and general circus skills, often across multiple disciplines. Professional programs add a more rigorous audition process and a focus on specialization.

Most professional schools aim for graduating students to have a marketable act by the end of their programs. In these professional programs, circus students learn about their discipline, collaboration in the act and show creation, caring for their bodies, and the circus business. Circadium, the only circus degree-granting school in the United States, graduated its first class of performers in May 2020.

Professional circus students have both academic and circus training requirements.<sup>21</sup> At École Nationale de Cirque, a professional, full-time, 3-year circus school in Canada, the students spend about 40-49 hours per week training and an additional 10 hours on their academic activities.<sup>21</sup>

## Professional Circus

Professional circus artists can pursue various types of performances and jobs. Each has its unique lifestyle and demands on the performers' time and bodies. Circus artists are often contracted for a specific show or performance, which can mean a commitment to something as short as one night or a year-long contract with larger companies.

Gig work for circus artists is a common way to stay employed anywhere where events are frequent enough to support the performer or where they can supplement their performing income by teaching at a circus studio or school. These performers may perform multiple times a week during a busy holiday season, as little as once a month, or have a standing performance at a venue such as a nightclub or a restaurant. A typical week for an artist who does gig work can vary significantly throughout the year. They may spend time training, developing acts, keeping skills honed, and possibly teaching. These performers generally can live and work in the same city.

"Resident" circus shows are permanent or semi-permanent in a city. Some examples of this include the Cirque du Soleil shows in Las Vegas, Nevada, Teatro Zinzanni in Chicago, Illinois, or The 7 Fingers in San Francisco, California. These shows tend to be put on by larger companies that are able to support an ongoing production financially. Artists in these shows may be local or brought in from around the world. Once they arrive, the artists usually have a stable schedule and can settle into a routine in their work life. They will often be performing 5 or 6 days a week and may perform 5 to 10 shows during that time.<sup>22</sup> Depending on their performance schedule and the demands of their act, artists may not have much free time or availability of training beyond what is needed to maintain the skills in their act.

Touring circus shows move from city to city to perform for audiences instead of relying on the audiences to come to them. Touring companies can range from small groups to huge traveling companies. Performances can occur at circus schools, theaters, tents, or large arenas. In smaller companies, performers may need to drive themselves between locations and be responsible for setting up and taking down sets, equipment and rigging, or the tent itself. Larger companies who perform in arenas generally provide transportation for their artists and have employees to assist with the setup and breakdown of the show equipment.

Due to the nature of touring, training routines are hard to keep. The artists are often on the move and adjusting to staying in a new place, travel demands, and then performing their act. Depending on the length of the show's tour and the company's needs, artists may work straight through a tour with no days off. Larger companies, like Cirque du Soleil, try to ensure that their artists get days off and rest to encourage the artists to stay healthy while on tour.<sup>22</sup> These artists often struggle to maintain their fitness and training routines due to the demands of touring.

Circus arts is an intensive sport; in a study of elite athletes training to transition to a career with Cirque du Soleil, the artists trained 8.5 hours per day, 5 days a week, for 16 weeks.<sup>23</sup> Once performing, artists may perform in 350 or more performances a year, sometimes with multiple performances in a day.<sup>21,22</sup> Having a healthcare provider who is well versed in the physical and psychological demands of professional performance is a critical component of the care of these artistic athletes.

## CIRCUS DISCIPLINES AND APPARATUS

Circus is a performance art that can encompass the full range of human movements and skills. Often in a circus performance, an audience may find artists ranging from clowns and jugglers to musicians and acrobats moving on the ground and in the air. Defining what a circus is and establishing categories to classify these artists to enable effective studies has been challenging for researchers.<sup>24</sup> Shrier et al<sup>25</sup> began the conversation in 2009 by attempting to divide artists into 2 categories: "acrobat," like an aerialist or tumbler, and "non-acrobat," like a clown or musician. This was further developed by Hamilton et al,<sup>26</sup> who added the distinctions between those acrobats who experience "sudden load" and others who are categorized as "non-sudden load." However, these distinctions do not consider the great variation in movements and loads that these artists experience. Acrobats who flip through the air and land on their feet on a partner's shoulders have very different loads going through their body than aerialists on the flying trapeze who flip through the air and are caught by a partner gripping their forearms. Both are experiencing sudden load, but the first is compression, the other primarily traction. These considerations may result in significant differences in interventions to help these artists prepare for their sport, anticipate and prevent injury, and return to activity.

Greenspan<sup>24</sup> proposes a new classification system of circus disciplines that considers the variable physical demands and types of apparatus circus artists use "so related injury patterns and later injury prevention strategies would be linked to the group of artists most likely to benefit."<sup>24</sup> Those categories are aerial acrobatics, aerial acrobatics with ground elements, ground acrobatics (human propulsion), ground acrobatics (apparatus propulsion), ground acrobatics (balance and control), manipulation, and character (**Table 1**).

Aerial acrobatics includes "circus disciplines in which the artist is often suspended from an apparatus by various body parts, and commonly uses pulling movements, and inverts on or climbs the apparatus."<sup>24</sup> Examples of common aerial apparatuses include aerial hoop (lyra), trapeze, and aerial silks.<sup>27</sup>

Aerial acrobatics (with ground elements) are those in which the artist experiences "impact or pushing movements in contact with the floor or apparatus."<sup>24</sup> Common examples are Chinese pole and dance pole, where the apparatus allows the artist to interact more readily with the floor.



**Table 1.** Acrobatic Circus Discipline Classifications<sup>a</sup>

Circus Discipline Sub-Groups	Definition	Examples of Disciplines
Aerial acrobatics	Circus disciplines in which the artist is often suspended from an apparatus by various body parts, and commonly uses pulling movements, inverts on or climbs the apparatus.	<b>Silks (aka Tissue/Fabric)*</b> <b>Rope (aka Corde Lisse)*</b> /Spanish Web <b>Trapeze (Static, Dance, Flying)*</b> <b>Aerial hoop (aka Lyra)*</b> <b>Sling/Hammock*</b> /Cloud Swing/ <b>Straps*</b> /Loop Straps Rings (Russian or Gymnastic) Aerial Pole
Aerial acrobatics (with ground elements)	A subset of aerial acrobatics which often also includes impact and/or pushing movements in contact with the floor or apparatus.	<b>Chinese pole*</b> /Dance Pole/Lollipop Russian Cradle Base High Bar
Ground acrobatics (human propulsion)	Disciplines that involve repetitive skills such as jumping, diving, and rotational or other gymnastics type movements where height from the ground is due to human propulsion or impact forces are partially absorbed by apparatus.	<b>Tumbling/Parkour*</b> <b>Icarian Games*</b> Banquine Hoop Diving Cyr/German Wheel <b>Dance*</b>
Ground acrobatics (apparatus propulsion)	Similar to above except that repetitive movements are performed on an apparatus or with a device that imparts acceleration of the artists' movement that often results in landing from significant height.	Teeterboard Russian Swing <b>Trampoline*</b> /Tramp Wall Wheel of Death <b>Bungee/Harness*</b> Trick Riding (bicycle, motorcycle)
Ground acrobatics (balance/control)	Includes disciplines where the artist is typically weight bearing on a stable or unstable surface (apparatus or human) with the focus on creating postures or shapes with control and balance. May involve some impact transitioning into and out of postures or on and off base/apparatus.	<b>Contortion*</b> <b>Handbalancing*</b> <b>Hand to Hand/Adagio/Acrodance*</b> <b>Human Stacking*</b> /Pyramid Rola Bola/Rolling Globe Wire (tight, slack, high) <b>Stilts*</b>
Manipulation	These disciplines involve the artist creating repetitive movements with an object and often requires significant use of fine motor skills and/or coordination.	<b>Juggling*</b> Diabolo/Poi Hooping Knife Throwing
Character	Disciplines that often include significant acting and theatrics. It may also include some acrobatic skills but typically with low physical demand.	<b>Clown*</b> Ringmaster Mime

\*Disciplines trained by the study participants during the study period.

<sup>a</sup>Reprinted with permission from the Academy of Orthopaedic Physical Therapy, APTA, Inc.<sup>24</sup>

The next 3 categories can all be grouped under ground acrobatics.<sup>24</sup> This includes those who have a moderate impact with acrobatic movement “where the height from the ground is due to human propulsion.”<sup>24</sup> These are disciplines such as

tumbling and hoop diving, where artists push and jump off the ground to execute their skills. In contrast, high-impact acrobatics involves a “device that imparts acceleration that often results in landing from a significant height,”<sup>24</sup> like using a

trampoline or teeterboard to propel the artist into the air. The last ground acrobatics category involves balance and control, either independently on the hands or on an apparatus, such as hand balancing, contortion, and tightwire, or with other humans with hand-to-hand and other partner acrobatics.

Manipulation artists control and coordinate their fine motor skills to move their apparatus or object.<sup>24</sup> The most common example is juggling, but can be hooping, knife throwing, diabolo, and devil sticks, among others.

Last on the list are character artists.<sup>24</sup> These artists usually require considerable theatrical skills and, depending on the artist, may crossover other disciplines, such as a clowning trampoline act. Some may have lower physical demands, such as a ringmaster or mime.

A description of many circus disciplines and roles can be found in the included vocabulary list (**Appendix**).

## **CONCEPTIONS AND BELIEFS OF CIRCUS PERFORMERS**

Most professional performers have a routine and often a ritual to maintain their bodies, but many do not have easy access to healthcare or are afraid to seek care.<sup>28</sup> Professional artists have their own culture and perspectives on training and how to maintain their bodies in peak condition for performing. In a 2019 interview-based study, Cayrol et al<sup>28</sup> found that professional artists are hesitant to reach out for care for several reasons. One of the primary driving factors is that circus artists identify as performers and view their body as their instrument; they fear any injury being career-ending and healthcare providers telling them to stop training. This fear can prevent artists from seeking care for what could be minor issues until injuries are more debilitating. They are much more willing to take other artists' advice or to reach out to mentors or coaches for help or guidance. Even though they were covered by the United Kingdom's nationalized healthcare system, the artists in Cayrol's study were hesitant to seek free in-network care, thinking that the practitioners would not understand their needs. Instead, they were willing to spend their limited finances on the few out-of-network providers their peers recommended.<sup>28</sup> This finding emphasizes how important it is for clinicians to understand circus artists' specific demands and stressors and help them feel comfortable seeking out and trusting their care providers.

With the number of schools rapidly expanding, there are now schools with small performance companies across the United States in cities and towns of all sizes. Though we are yet to see research on the recreational population, the growing number of amateur artists may have challenges similar to those of professional artists, such as being hesitant to seek care, and may be looking for healthcare providers who understand their unique challenges.<sup>28</sup> Circus artists have a strong sense of community and word of mouth is one of the most trusted sources of information regarding healthcare, above and beyond that in the medical profession.<sup>28</sup> There is a fear and a belief in

the circus that healthcare providers will tell artists to stop doing what they love.<sup>22,28</sup> No athlete wants to hear that they have to stop what they love doing, and it is especially concerning for professional artist-athletes when it could also mean the end of a contract or their career. It is one of the reasons they avoid care for injuries or symptoms that might be relatively easy to resolve.<sup>22,28</sup> Another proposed reason for the failure of artists to seek care is the normalization of pain in the circus and circus training from the recreational to the professional level.<sup>22,29</sup> These artists may not know how to differentiate normal training aches from injury or may be hiding behind the "circus hurts" mindset to avoid seeking care.

Recreational artists may fear that their providers will not recognize them as athletes, the importance of the circus in their lives, and the loss to their circus community if they cannot train. Though they are not fearful of losing a career, a circus for many is a hobby and a passion that can give them a sense of community and may keep them physically and mentally fit. Recreational circus performers are of all body types and abilities, and anything we can do as clinicians to keep them active and healthy in their community and preferred sport as an adult is essential. The medical community generally lacks knowledge about circus arts and recreational participation, which may lead to bias in healthcare providers against continuing training.<sup>28</sup> Providers often view circus activities as dangerous or extreme and may not recognize the benefits to the general public or how the activity can be scaled to all levels. In the Seattle, Washington, circus community, there are artists ranging in age from 6 to 80 with bodies of all sizes, abilities, and mobilities. There are almost always strategies to prepare the artist-patient to return to activity or to adapt the activity to the artist-patient.

As circus arts have gained popularity, so has the normalization of increased strength and muscle mass in female circus bodies.<sup>18,30</sup> Women are finding community and empowerment in learning skills and gaining prowess in their discipline. That sense of belonging and self-efficacy has also improved these artists' body image, which correlates with how long they have been training.<sup>15,18,19</sup>

## **COMMON CHARACTERISTICS OF CIRCUS ARTISTS**

### **Mental Health**

While the full range of mental health concerns in the general population can be found in athletes, the additional stressors of performance and visibility can increase the mental load of circus artists.<sup>31</sup> Consequently, mental health issues are common in performing and circus artists.<sup>32,33</sup> Stress and depression scores are higher in circus artists compared to the general population, and students or younger artists have higher anxiety scores than older artists.<sup>32,33</sup> In a study of 500 circus artists, of whom roughly 50% were recreational artists, the highest anxiety scores were in jugglers and object manipulators, followed by aerialists, with ground acrobats having lower rates.<sup>32</sup> The gender identity