

Children's Play Advisory Service

OVERHEAD LADDERS (MONKEY BARS)

SUGGESTIONS FOR REDUCING RISK



Overhead ladders (monkey bars) are the highest risk item on children's playgrounds.

The causes of accidents have been misunderstood therefore no measures have been taken to reduce the numbers of accidents.

This report gives background information and makes suggestions for modifications which would reduce the injury rate.

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OVERHEAD LADDERS (MONKEY BARS) Suggestions for Reducing Risk

- Overhead ladders appear safe. The distance from the child's feet to the ground when they use the equipment is often less than 1m. If they fall in a controlled feet first manner, then the risk of injury is low. However, we know from research that they are the item which has the highest risk of serious injury.
- **The accident is when the child's hand(s) become(s) detached from the overhead bars and they fall.** The accident is **NOT** the fall height nor the type/condition of the surfacing underneath.
- The surfacing under the overhead bars and the fall height have been well-researched but the deficiencies in this regard do not cause accidents merely reduce the severity of the injuries.
- When there are accidents the child appears to be rotating rather than just landing on their feet. This explains why the largest proportion of injuries are to the wrist, forearm, elbow, etc.
- The failure to understand the cause of the accidents means that very few attempts have been made to reduce the injuries on this item. This contrasts with much of the guidance in the Standard EN 1176 which covers many other issues in great detail, even though they are of much less risk than overhead bars.

Introduction

Overhead ladders (or monkey bars) have been known for many years to cause more accidents than the average piece of playground equipment. They are, however, very popular with children and give opportunities not offered by other equipment.

In 1994 Professor Joe Sibert *et al* of University of Wales carried out research into accidents at 85 children's playgrounds in Cardiff. His research was detailed in The Lancet of June 1997 when he found that *"injury risk due to falls from monkey bars ... was twice that for climbing frames and seven times that for swings or slides. The height of the equipment correlated significantly with the number of fractures from falls."*ⁱ

It also stated, *"we believe that playing on monkey bars increases the risk of injury in playgrounds and that they should generally not be installed."*

At that time, those of us with long backgrounds in children's play argued that monkey bars were popular with children and gave very good upper body exercise as well as the challenge which children appreciate. We said that they should be retained.

At the time, the late Peter Heseltine, the country's leading inspector of children's playgrounds, together with colleagues including myself, gave some guidance on the ways the risks could be reduced to an acceptable level. We were keen that overhead ladders should continue to be installed in UK playgrounds as has been the case.

The issue has recently been raised by a widely circulated newspaper article about Professor Eager of the University of Technology, Sydney, Australia. He was wrongly reported as saying that monkey bars should be banned. He did say that they were the most dangerous piece of equipment on playgrounds "by a country mile" and was in favour of them being removed and replaced with spatial nets (spacenets). He has in fact carried out considerable research into accident statistics and found that monkey bars are the top contributor to injuries and has recommended reducing the fall heights to 1800mm. ⁱⁱ

There is a weakness in both Sibert's and Eager's research in that they have really only considered height and surfacing (IAS) as determining factors in the severity of injuries. If children are traversing monkey bars in the usual way the distance between their feet and the ground is relatively small. The large numbers of long bone injuries strongly suggests that children are falling and rotating at the same time. They therefore land awkwardly and the result is broken legs and arms.

This paper therefore looks at factors which probably increase the possibility of children falling awkwardly from monkey bars and makes suggestions for reducing the risks of falling awkwardly.

Background

I have been inspecting hundreds of playgrounds each year for over 25 years and have carried out much observational and interview research of children at play in the outdoor environment and in playgrounds. See "*Child's Play: Facilitating Play on Housing Estates*" ⁱⁱⁱ which is free-to-download from our website.

http://www.childrensplayadvisoryservice.org.uk/publications/publications_linkpage.html#ChldsPlay

I have also carried out numerous consultations with children and parents when new playgrounds are to be installed or existing playgrounds developed or improved.

I have often observed children playing on monkey bars and seen occasional falls. I have also tested the equipment and found that it is sometimes quite difficult to get to the launch point in a controlled and safe manner.

When carrying out Post Installation Inspections of new playgrounds or Annual Inspections (EN 1176) it is not unusual to find designs of overhead bars which are difficult or awkward to use – design faults. The recommendations below build on the advice I have given to playground managers where there is unnecessary difficulty or awkwardness which only adds to the risk without additional play benefit.

Why Have Monkey Bars?

Monkey bars are very popular with children. When carrying out consultations on new playgrounds, I have found that monkey bars are amongst the most requested pieces of equipment. Swings and slides are still the favourite equipment but monkey bars are up there in the top few of children's preferences.

Monkey bars give a challenge and sense of achievement for children as well as good upper body exercise. In particular, monkey bars are very popular with girls around 8-13 years old. I have observed that they can often outperform the boys on these items. It really is good to see girls beating boys on a challenging item.

Professor Eager found that on monkey bars girls have more accidents than boys. This is not surprising; my observations are that girls use overhead bars more than boys do. In consultation research I have found that girls are more likely to desire playground equipment whereas boys are more likely to desire football and/or basketball areas. This is a tendency only; there are girls who play football/basketball and boys who like playground equipment.

Monkey bars are a relatively inexpensive piece of equipment and so are within the budgets of the small local playgrounds which constitute the majority of playgrounds in housing areas or small parks. Having a spacenet (as Professor Eager recommends) or a similar expensive alternative would mean that there would be no money left for other items. The variety of play experiences would therefore be severely limited.

We do know that monkey bars have a higher level of risk than other items. There are, however, a number of measures which could be taken (see below) which are likely to reduce the risk by avoiding uneven and sideways travel.

Risk Reduction

The following suggestions are designed to make monkey bars of an acceptable risk for children's playgrounds. They are all simple to achieve. I am not suggesting they should all be followed slavishly (there must be room for innovation) but avoiding one or a combination of a few is likely to reduce the risk.

It might be that a manufacturer does provide monkey bars which are not straight (see 4, 5 and 6 below). This may be judged desirable in terms of increased challenge. If this is done, then it should be as the result of a deliberative process of risk assessment where the cumulative effects of other risk factors are avoided. "Challenge" or "desirable risk" should not be an excuse made with hindsight for poor design causing which has caused accidents.

My experience is that some manufacturers add monkey bars to a multi-play with little thought as to the dynamics of how they will be used. They are an inexpensive add-on which is often just plonked on the end of a multi-play to make it look more exciting. The suggestions below should assist them in working out how the children will use the monkey bars.

Importantly the recommendations can all be achieved for less or little additional cost if they are tackled at design stage, ie before installation.

1.	It should be equally easy/difficult to get on/off the overhead bars at each end	This to avoid a child getting on easily at one end, getting tired as they traverse the item and then finding it very difficult to get off in a controlled manner. It is also very difficult to turn back to their original starting point.
2.	Getting on the overhead bars should be straight-forwards, ie not off-set from the launch point	This to avoid children swinging sideways as they get on. If they swing sideways their body exerts leverage on their hands, opening them up and making them more likely to fall.
3.	Children should be able to steady themselves at the launch point(s) so they can start the traverse in a controlled manner	This to prevent them having to grab for the bars in an uncontrolled manner which increases the risk of a fall. This also applies to cableways (zip glides).
4.	The rungs should be straight in the horizontal plane	This for the same reason of leverage as in 2 above.
5.	The bars should be level	Bars which rise up or undulate are much more difficult to use than is generally realised. A proportion of children find that they do not have the strength to cope with this type of design and so are more likely to fall off.
6.	The rungs should be evenly spaced and non-rotating	An unexpected difference in spacing is likely to lead to a child missing their handhold and falling off. Children using them get into a rhythm and so an unexpected distance destroys that rhythm making a fall more likely.
7.	The height should not be excessive for the age of the children likely to use it	We know children are likely to fall off overhead bars so there is no reason they should fall further than necessary. It is difficult to give a precise height because the height of a 7-8 year old child is significantly different to a 12-13 year old. In a playground open to children of all ages a fall height from the bars of 2m-2.25m is probably sufficient. In a school where the equipment is only for the use of 7-8 year olds this height could be reduced to 1.8m. The majority of children using it should not touch the ground with their feet when suspended from the bars. If the bars are too low then children may use them with their legs

		bending backwards from the knee which would mean, if they did fall, they would fall onto their knees which is more risky than if they fall on their feet.
8.	The part from which the child launches themselves, including any steps to the launch point, should be broad (such as a wooden step, a rubber stepping log, etc) with rounded edges. Thin metal edges or rails in the falling space should be avoided.	This to reduce the possibility of serious injury if a child falls onto narrow metal parts or ones with sharp edges.
9.	The impact absorbing surface underneath should be kept in good condition	<p>Contrary to popular belief, the impact absorbing surfaces are likely to reduce the risk of long bone injury even though they are primarily designed to reduce the risk of head injury.</p> <p>My publication "<i>Grass and Impact Absorbing Surfaces in Children's Playgrounds</i>"^{iv} has further discussion on this (under Experimental Falling). This document is free-to-download from our website: www.childrensplayadvisoryservice.org.uk</p>

Accidents will happen

I do not expect that application of the above suggestions will prevent all or even the majority of accidents on monkey bars, but a significant reduction is desirable.

Accidents will still happen on monkey bars which meet some or all the above suggestions. If one hand lets go then it is likely to create a twisting motion to the falling body. However understanding the causes of the accidents could lead to improvements in design.

For too long those carrying out Expert Witness, Post Installation and Annual Inspections of playground equipment have merely noted that monkey bars do not fail EN 1176. On this basis they have assumed the bars are acceptable for children's play.

Inspectors should consider how other factors such as mounting/dismounting, regularity of the bars, sideways movement etc contribute to the likelihood of accidents occurring. It is hoped that the measure in the boxes above will assist them in identifying likely causes of accidents.

Conclusions

Overhead ladders (monkey bars) make a significant contribution to play opportunities in children's playgrounds. They give challenge, excitement and a sense of achievement. They are particularly popular with girls.

They are associated with many more accidents than the average piece of playground equipment. They are often installed as add-ons to multi-plays with little thought to the dynamics of how children will use them.

The suggestions in this report should help to identify the causes of accidents. They should also assist manufacturers think through the dynamics of using the equipment when designing playground equipment so unnecessary risks with little or no play value are avoided.

I see no reason why monkey bars should be banned but there is significant room for improvement in their design.

Research into children's playground accidents has tended to concentrate on fall heights and surfaces under the equipment. Research into why the accidents (detachment of the hands and rotating fall) happen is more difficult to carry out but would give a clearer picture on which to base risk assessments.

Future Action

Children's Play Advisory Service would welcome photos and descriptions of how accidents on monkey bars have happened so that it can build a better picture of why accidents occur and how they can be reduced. Confidentiality would be respected.

Rob Wheway, MSc, MEd, MCIMSPA, MCMI, FRSA
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Children's Play Advisory Service
8 Carthusian Road, Coventry, CV3 6HA
t 024 7650 3540 e whewayr@gmail.com w www.childrensplayadvisoryservice.org.uk

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