

## The Chin-up

### A relic of the past or renewed challenge?

Has that poor, orphaned chin-up bar in the fitness centre been rightfully eclipsed or is it rather the gym-goer's poor level of ability that has led to its lack of use? How many people can actually manage a chin-up these days? Less and less people can answer this question with a "yes" in our ever more overweight society. The problem is that even thinner contemporaries can't offer much hope in this area either. Do we actually still need chin-ups to further our physical fitness or are the various "posture and stability programmes" sufficient? Will the chin-up eventually be banned from bodybuilding gyms and climbing halls? Before we discuss chin-ups in greater detail let's first talk about gravity.

When organisms on our planet left the water for the first time they were straight away forced to commence with a battle against gravity. Gravity has been acting on flora and fauna 24 hours a day for 400 million years and has had a major effect on the way plants and animals look. All forms of life that came out of the sea to live on land had to develop more stable structures as a result. Commensurate with this for example, the creature's skeletons, muscles and brain evolved so that they were able to move in this gravitational field and confer upon them the ability to resist these high stresses.

The force of gravity becomes immediately apparent when you fall or jump from a wall. Anyone who has perhaps fallen whilst running will probably well remember how quickly he came into contact with the ground and a fall of just a few metres can often lead to life-threatening injuries. If we look at the analogy of driving a car this fall would cause an enormous acceleration due to gravity from 0 to 100km/h in 2.8 seconds or from 0 to 200km/h in 5.7 seconds!

Whenever movement takes place gravity must first be overcome. Gravity must even be conquered just to stand still. Our organism, our muscles, our skeleton and our supply systems are affected by gravity and attuned to it – optimised through evolution and genetically anchored! We lift ourselves up against the force of gravity, stand up straight, lift loads high, run, jump, throw, pull objects towards us and must even pull ourselves up against the force of gravity. How easily, how economically and how quickly we are able to overcome gravity in all spatial directions already offers some conclusions about our ability to remain stable, our strength, our capacity for movement and therefore determines our physical independence and performance.

As confessed bipeds with running characteristics our leg bones are naturally the strongest and the knee/hip musculature can develop the greatest forces. It has after all to support the whole bodyweight together with any additional loads. In particular, the dynamics of fast running and of jumping requires the highest muscle strength and correspondingly, also produces the highest stresses.

Is therefore, the ability to perform chin-ups really relevant for us bipeds, or should chin-ups belong more to training programmes for gymnasts and climbers or for achieving that "v" shape in figure training? In this connection the following observations are interesting. From physical bone examinations we know that the femur and tibia are more tolerant to physical stress when under compression than when under tension. Anything else would be incredible anyway! In contrast, the tolerance to stress of the lower arm bones is amazing. It is a fact that these are much more tolerant to tension than they are to compression. This means that our evolutionary history as quadrupeds is far more distant but on the other hand, our time as "hanging beings" is still genetically mapped in our skeletons. The walking and hanging biped.

When performing chin-ups we are obviously pulling ourselves up against gravity in a free hanging position. With the narrow grip on the bar used for chin-ups this means the shoulders must exhibit an overall shoulder flexibility of 180°. The amplitude of the shoulder joint (glenoid joint) at approx. 90° arm abduction is fully expanded which means that from an evolution point of view a mobile shoulder blade is required. These expanded biomechanical abilities, the high tension capacity of the upper extremities and the increased shoulder mobility were already gained as hangers and climbers in the trees and confer upon us to the present day the advantages of an expanded reach and an upper extremity that is physically resilient over the full spatial range.

But let's take a look now at the muscle groups relevant to performing chin-ups. The latissimus dorsi is naturally the primary muscle to consider here. This is the main player of the movement, taking the upper arm and moving it towards the torso. But the latissimus dorsi also has a quite different but important function. Together with the deep, lateral abdominal muscles, the lumbar erector spinae muscles and the large surface gluteal muscles, they provide the muscular tension for the membrane-like lumbo dorsal muscles, the so-called thoracolumbar fascia. This thoracolumbar fascia is connected to all 24 mobile vertebrae and the pelvis on multiple levels and is the primary stabilising structure for our spine. The Latissimus dorsi tensions these diagonally making it one of the most important stabilising muscles of the spine (for a more detailed explanation see "Differential strength training with the focus on the spine", 4th edition, 2013, published by Elsevier). The multi-joint biceps – which is worked during chin-ups – also plays an important, shoulder-joint stabilising role as a transmitter of high biceps flexing forces directly to the shoulder blade.

Here is an overview of all muscles used during the chin-up exercise:

<u>Agonist muscle groups:</u>	<u>Synergetic muscle groups:</u>	<u>Stabilising muscle groups:</u>
<ul style="list-style-type: none"> <li>• Latissimus dorsi</li> <li>• Teres major</li> <li>• Posterior deltoid</li> <li>• Downward shoulder blade rotators (levator scapulae and rhomboid muscles)</li> <li>• All biceps muscles: biceps brachii, brachialis, brachioradialis</li> </ul>	<ul style="list-style-type: none"> <li>• Infraspinatus, Teres minor and Subscapularis (their primary function has an injury prevention profile: during abduction they pull the humeral head downwards thereby expanding the subacromial cavity)</li> <li>• Shoulder blade retractors (rhomboid muscles &amp; middle trapezius muscle)</li> <li>• Abdominal fibres of Pectoralis major</li> <li>• The lower arm muscles originating at the upper arm</li> </ul>	<ul style="list-style-type: none"> <li>• Abdominal muscles</li> <li>• Erector spinae muscles</li> <li>• Shoulder blade depressors (lower section of the trapezius and serratus anterior muscles together with the pectoralis minor)</li> <li>• Hand and lower arm muscles</li> </ul>

The chin-up offers the same benefits for the body's upper extremities as do squats and dead lifts, as a form of anti-gravitation training, for the knee and hip region. Flexibility and stability for the whole of the pectoral girdle are worked sufficiently thereby equipping the latissimus with sufficient strength for it to accomplish its spine-stabilising purpose. Furthermore, the chin-up is also a valuable exercise for teaching correct stabilisation of the torso under tensile loading. For these reasons, chin-ups are a health-relevant exercise that, with a suitable level of resistance, belong in every health-oriented fitness training program. The level of chin-up proficiency to be achieved must ultimately be seen as one important facet of overall physical fitness. If the participating muscles are strong enough to pull the body fully up against gravity then we can conclude that spinal stability is of a certain level and that the shoulder stabilising muscles can develop a good level of strength over a wide range of motion.

In this connection the ever decreasing ability of children to complete chin-ups is particularly concerning. Forty years ago it was a generally accepted exercise that children did as a matter of course. However, fifteen years ago only half of all children were able to complete a chin-up. Today, according to the Association of CHI Physicians in Bavaria, the figure just about reaches 20%! The above discussion clearly illustrates the importance of both horizontal, but most importantly vertical pulling exercise for spinal development in children. The aim here is to foster the contest with their own weight that begins at a young age and to gradually achieve a complete pull-up of the body by offering them thorough support. It does not matter whether chin-up bars, climbing frames in the playground or school competitions are used. Running is good; running and hanging is better!

It is interesting to note in this context, that doctors and teachers are often surprised at children's lack of ability to complete chin-ups, and it's even more interesting that they are themselves not able to do the same exercise!

Let's now pose the critical question: "Is it really necessary to be able to do a chin-up?" The answer, in the name of the human body, has to be a resounding "Yes!" Every inhabitant of this planet ought to be capable of correctly completing a chin-up (see the rules)! Pleasing would be 3 chin-ups for a woman and 8 for a man (depending upon body weight).

Whether an individual can do a chin-up or not is of course his/her own business! The same goes for whether he or she undertakes training for chin-ups! The same applies to whether an individual takes his or her school leaving examinations, goes jogging, cleans his or her teeth or eats healthily. It cannot and must not be a test by which people are perhaps assigned to certain classes. I'm not advocating issuing warnings and I'm certainly not talking about social exclusion here. It's all about creating awareness of the need for a healthy physical condition and motivating people to actually do something for their own wellbeing. It's also about understanding and self-appraisal.

But wait! Those employed in the fitness industry and in the therapy sector who issue statements, instruct and teach should also sometimes have to stand up to questioning about their physical condition by their students, graduates and patients. The ability to do chin-ups is certainly not compulsory – but it would certainly be a great way to boost credibility!

Now it may well appear that during the daily routine of an office worker, commuting between the office chair, driving seat and favourite TV armchair, the ability to pull his or her own bodyweight up is perhaps not a burning requirement. Several other basic physical activities are never really called upon either. It is easy therefore, to forget that we were not actually created for such an everyday life. Our body needs the stimulation of a physically challenging day-to-day life!

### Chin-up rules and variations

A short note on the rules: A chin-up exercise is considered to be completed when the athlete crosses the bar with his or her chin – or has at least touched it, has commenced the exercise from the stretched arm position and has returned to this position afterwards.

In the sense of an extended range of motion the rather more difficult sternal chin-ups can be performed, i.e. one pulls oneself up somewhat higher, raising the sternum to touch the bar. The position of the hands can normally be chosen at will. Chin-ups can there-fore be carried out with different distances between the grips. With the palms facing the body (supinated), facing away from the body (pronated) or facing each other (neutral grip). You can try one arm chin-ups (where one hand grips the bar and the other hand holds the wrist or forearm of the gripping arm) or pure one arm chin-ups from the word go; chin-ups using only three, two or just one finger per hand; chin-ups with grip bars or using moving grips.

We only become aware of the necessity of being able to do chin-ups when we are frolicking about with the children at the playground, climbing a tree, negotiating a via ferrata in the Alps or, if disaster strikes, being able to hold tight to a ledge of a burning house or saving ourselves in a storm or flash flood.

Let's go back and remind ourselves for a moment of the original question: What are we actually talking about here? Of course! It's whether we can complete one or more simple chin-ups! Isn't it incredible that such a basic physical ability has become the cause of so much discussion? Do we forever need new names for exercises and new exercise concepts to distract people from the poor physical ability of our community and give the few who are willing the feeling that they are doing something out of the ordinary? With respect to all forms and outlets for exercise. If it's fun then go for it! All forms of exercise are better than none. But let's talk straight now and tell those who want to trim their body to peak performance, improve their figure or correct a problem by just dabbling now and then what the situation really is! Just pulling the wool over their own eyes isn't going to help! Instead of dazzling, dumbing down or incompetently muddling along, we should really be selling serious training methods that provide rigorous stimulation, which motivate and inspire. There should be exercise goals that offer real advances. There should of course be a sound level of core competence, real knowledge and not some kind of trendy pseudo-science, a love of sport and a strong belief in what one is doing, credibility and a solid commitment to customer care.

### **How to perform chin-ups (some hints on training)**

It goes without saying that chin-ups themselves are the key exercise in chin-up training. But good preparation for carrying out chin-ups, irrespective of body weight and with reduced body stabilisation, is the lat pull exercise on a lat pull down machine. The user sets his or her current training weight on the machine and performs the exercises in the hypertrophic range. Vary the number of repetitions and try regularly to increase the number of weights.

Of course, there are also other back exercises that play an important role in improving pulling ability in all spatial directions. These could include free exercises such as the long pulley or free weight dumbbell rowing, but controlled machines such as the seated rowing or pullover machine also provide excellent training. Biceps training and training exercises targeted at the abdominal and erector spinae muscles round off the training program.

If you are finally able to pull 85 to 90% of your body weight on the lat pull down machine then you are well equipped to complete chin-ups – from purely a strength point of view. Athletes should sometimes swap to the assisted chin-up machine that has a counterweight so the user can reduce the pull up weight according to his requirements. This machine by the way, is also useful for top performance athletes, for example in the long

The question of whether chin-ups are really necessary is further put into perspective when we take a look at the performance of some top sportsmen. Take John Curd Edmunds for example. His body weight is 75kg and he can complete an incredible 117 chin-ups without stopping to rest. Not bad, I hear you say? Indeed at age 66 it's actually pretty unique! Weightlifter Ed Kreuzer can do 30 complete chin-ups at a weight of 106kg and ex bench press world record holder Pat Casey could still manage 10 chin-ups with a body weight of 135kg. Of course some athletes also use additional weights. Marvin Eder at 89kg body weight was able to do 7 chin-ups with additional weights of 90kg and Jaspas Benincasa, with a body weight of just under 60kg could still perform one clean chin-up with a massive additional weight of 120kg!

The records for 1 minute and 1 hour chin-ups are currently held by Englishmen. In 1 minute Sean Cole managed 47 correct repetitions and in one hour Stephen Hyland did an incredible 767! For the one hour record 13 repetitions per minute were performed on average – and this had to be repeated 60 times consecutively! Women athletes too have staged remarkable performances with 32 chin-ups per minute and 300 repetitions an hour.

Single-arm and finger chin-ups are primarily the domain of climbers. But other athletes also achieve some spectacular feats. German Reinhard Smolana, one-time European Body-building Champion, could do a very impressive single-arm chin-up with an additional load of 20kg which he carried in the form of a dumbbell in his other hand. And Russian Olympic Champion in weight lifting Yuri Vlasov could still complete a single-arm chin-up, even with a body weight of 126kg. A single-arm chin-up requires specialist training. During my active years in competition I never concentrated myself on this form of training. I was therefore, never able to do a single-arm chin-up despite being able to perform 42 chin-ups without pausing and 4 chin-ups with an additional weight of 55kg at a body weight of 82kg.

Ex world-class free climber Wolfgang Güllich was fascinating to watch when he performed a chin-up with just the small finger of his right hand and the oldest artist in the world, Konrad Thurner, puts on an impressive display at 96 years of age with chin-ups using both his middle fingers.

Clearly, age and body weight appear not to present a barrier for the chin-up enthusiast. So that no one has to despair underneath the chin-up bars and wish to be able to say "Beam me up, Scotty", here are some tips for training.

Chin-up training can and should of course, be fun. Intermediate goals and forming groups are ideal for this. Why not establish chin-up clubs? The collective goal could be: We will manage one or even several chin-ups! Intermediate goals could be 70 or 80% of body weight. In fitness clubs you can start age and weight-related "record holder" lists and put them on display. The Strenflex Fitness Sport Badge is also a good motivator. Try for Bronze! Because of its importance to physical fitness the chin-up discipline has been rightfully included in the requirements. And for the Gold Badge one should really push for the chin-ups to be completed in full (180 degrees) instead of the half chin-ups (90 degrees) that are currently required for all three badges.

term preparation for one arm chin-ups. It is also possible to carry out effective pull-up exercises without any equipment at all, e.g. by using a high stair rail or a chin-up bar but with its legs extended in order to reduce resistance.

For heavier men and women, the obstacles to doing chin-ups will surely be more difficult to overcome. More difficult perhaps, but they are by no means unreasonable or unattainable! Chin-ups are possible even with a high body weight – it just requires the corresponding level of strength.

A two-pronged approach offers the greatest advantages. In addition to building up strength, one should always systematically reduce body weight at the same time, through increased physical activity. A positive effect on the metabolism, blood vessels, the cardiovascular system and the figure are welcome additional benefits.

Now many of the posture and stability programs that are practised today offer very good body perception aspects and the program execution also feels very good. Great! But if you are more interested in a particular posture, one that must also be strong under stress and that must deliver stability at the time it is needed most – then that's not enough! Stability requires that the connective tissue exhibits structures that are adapted to strength under both tension and pressure. Sufficient strength capabilities. Optimised activation, etc. Without sufficient stresses and without dynamic coordinative challenges, that can simply not be achieved under the influence of gravity.

Physical fitness is something to strive for. It doesn't solve every problem, neither does it provide any guarantees – also not against falling ill. It does however, provide the best available alternative!

Should any of our readers have become hooked on the subject of chin-ups, on the pectoral girdle in general, its stabilisation, prevention of injury and performance enhancement, then I recommend attending our Master Workshop on the shoulder girdle system (M2). For further information please visit <http://www.dr-gottlob-institut.de/>

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Born in 1960, **Dr. Axel Gottlob** studied physics and law before graduating from the University of Stuttgart with a degree in mechanical engineering (majoring in biomedical technology and applied computer science).

After working in the areas of ergonomics and occupational physiology at the Fraunhofer Institute, he went on to specialise in biomechanics.

In 2002, Gottlob graduated magna cum laude from the University of Heidelberg with a doctorate degree in sports science (Dr. phil.). Having practically grown up in gyms (his father, Peter Gottlob, opened his first gym in 1959) he worked in the fitness industry as his main profession for 30 years and for many years as successful fitness trainer and gym manager. After 7 years in performance sports he became German Bodybuilding Champion in 1982; he won both his class and the overall title and at 22 years of age became the youngest ever title-holder in the men's rankings. Today he is still a regular sportsman with strength training and running as his primary activities.

Since 1982, Gottlob has been involved in the research and development of professional training machines (he has four patents in his name and is the inventor of multi-motion

technology) and differentiated exercise kinematics. Until the sale of his family business Galaxy Sport in 1992, Gottlob was one of the market leaders in the field of professional training equipment in Europe and Japan. Since 1997 he has been holding the position of associate professor at the Institute of Sports Sciences of the University of Heidelberg. Textbook author, columnist for trade magazine Fitness Tribune and tester of professional training equipment, he writes regular highly regarded articles for the fitness industry and for the therapy sector. With his specialist knowledge, critical questioning and new approaches he is now considered one of the leading strength training and back experts in Germany.

After several years as sales and general manager, studies in psychology in the United States and a one-year EU management training course in Japan, he then

specialised, alongside strength training, in motivational training as well as customer-oriented company management. Over recent years his expert knowledge in these areas has become sought after too.

Since 1993 he has been training trainers and therapists on the highest level at his Dr. Gottlob INSTITUT. He acts as consultant to companies, fitness centres, associations and therapeutic establishments. Furthermore, he advises elite athletes, managers, physical therapy groups and patients with back and other joint problems. For over 15 years he has become known at both national and international conventions as a highly motivating speaker and recognised expert in his field.

Holder of the internationally recognised Strenflex GOLD fitness test badge