

Multi SkillZ – FUNCTION

Function in Multi SkillZ

A. Overview of the development factors and their sub-factors

Fitness		Skills				Function				Speed			
Games	Training	Orientation	Eye-hand & Eye-foot	Moving & Jumping	Rhythm & Dissociation	Balance	Mobility & Stability	Techniques	Kinetic Energy	Reaction	Agility	Running & Moving	Speed Coordination

B. Development factor Function

Function Focus is on the improvement of the motion function. The exercises are designed to increase locomotor ability.

Following sub-factors are elaborated within Multi-SkillZ in various ways:

1. Balance & Equilibrium
2. Mobility & Stability
3. Technique
4. Kinetic chains & Kinetic energy

The 'Function' is mainly dependent on the capacities of the locomotor system (movement apparatus) and the postural control.

Movement Function

A. Health and performance of the movement apparatus

In our modern society where sitting is the smoking, pain is a common good. The figures below are at least alarming. One could ask how the prevent adults of feeling pain and movement discomfort and how to cure movement impairment syndromes. For adults it is said: 'Exercise doesn't just control your weight and protect your physical health. It also offers protective benefits to your mental health. Exercise can also help reduce muscle pain, making it an ideal choice for people who feel limited by pain or mobility challenges.'

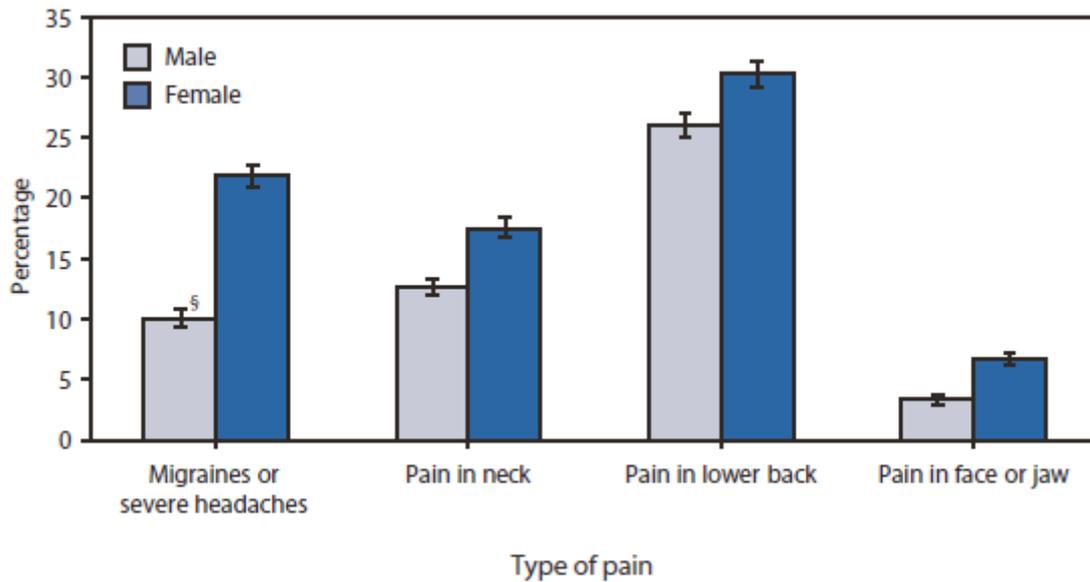
I believe many of the problems that occur during adulthood can be reduced or even avoided by doing Multi SkillZ during childhood. Through play Multi SkillZ stimulates the natural movement function in various ways. Besides focussing on the 4 sub-factors of 'Function' (Balance, Stability & Mobility, Techniques and Kinetic function) separately, the children are exposed to all elementary movement-actions (such as crawling, bending/extending,) and movement situations.

Multi SkillZ DrillZ



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For Sports Fun & Success



Source: Pleis JR, Ward BW, Lucas JW. Summary health statistics for U.S. adults: National Health Interview Survey, 2009 (provisional report). Vital Health Stat 2010;10(249).

A. Movement function in Sports

The movement apparatus, which is controlled by the neural system, is a determining constraint for the motor performance. It lies in the human being's ability to perform various movements with a high accuracy and precision, even under "extreme" conditions. However, the range of motion will always exist within the acceptable degrees of freedom of movement functions of the individual. Neglecting this individual 'range of function' (also called 'personal functional bubble'), leads to overuse injuries on the short/long term or even immediate trauma.

Given the growing importance of the offensive and defensive qualities in sports for both women and men, this 'range of function' becomes more and more important to perform in more extreme end positions. Despite the potential adjustment possibilities athletes have through a variety of technical skills, a sufficient functional movement range is an unmistakable source of adaptability. In addition, athletes seek more power in movement and displacement actions. To absorb the load that goes with this on the one hand and to enlarge the acceleration path on the other, movement is co-ordinated over all joints. Here, too, the range of function is an indispensable asset for receiving and generation kinetic energy.



The personal 'range of function' is depending on the coexistence of the 4 sub-factors of function

1. Balance & equilibrium
2. Mobility & Stability
3. Techniques
4. Kinetic Energy

B. Multi SkillZ and Functional Training

Multi SkillZ does not focus on analytic functional training for the children. Children between 8-12 years old that are competing and training on a regular basis (>4-5hrs specific training a week) benefit from a specially designed functional development program. The goal in such program is to prevent children of running into sport-specific overuse and trauma injuries on the one hand. On the other hand this program should focus on developing (1) key stabilizer groups and (2) multi-joint movement (see: Mobility & Stability further). In high performance tennis for example there is a need for such functional training session at least 2-4 times of 20-30 mins a week from the age of 8 to 12 years old.

Multi SkillZ contributes to the implicit development of the movement function through deliberate play. Meaning that games are intentionally constructed to let the children experience a wide variety of movements in a large 'range of function'. In general, all functions are intrinsically present from nature and it is just a matter of developing these abilities. However, due to a lack of movement activity and/or restrictive sport-specific exposure, the motor potential is curtailed.

At a very young age children are for example very flexible, and within in their congenital functional constraints they have a huge 'range of function'. In this stage it is of great importance that the child can experience various movements in the total range, so the brain can store the impressions to recall them in the future. However when the child experiences only a limited 'range of function', the movement comfort zone for the future is restricted to this. With regards to the principle 'Form follows function', the movement apparatus will adapt in accordance to the movement comfort zone that was established. One could say that a limited function in the later phases of the development is a result of a limited movement experience in childhood. In this matter the kick in of puberty is a crucial boundary as passive structures start to stiffen.

Multi SkillZ ensures an elaborated movement experience in this sense, leading to a healthy movement function for sports and life. Training function is retaining the natural mobility and gaining motor control within the 'range of function'.

C. Balance & Equilibrium

It goes without saying that dynamic balance is one of the performance factors in movement and therefore sports. In each movement action the dynamic equilibrium is put to the test. Maintaining balance is a key objective in the development of an efficient technical skill in game situations under high pressure. Balance is more than just the ability to not fall; it involves vision, coordination of actions in relation to circumstances, postural control and sense for equilibrium and at the end a "feel" for performance.

By nature, people look for a stable (sometimes forced) balance posture in situations that pose a major challenge. When children are in the early stages of learning a new action they tend to take a rather static posture. As the motor control develops the child displays & more dynamic, relaxed execution with more rhythm. It is important to develop the balance ability of children in all situations.

A successful strategy for developing balance is to:

A] create a reference for the child on how it feels to be in balance with the following key points:

- (1) a stable head position and focus on the main action
- (2) the horizontal control of the eyes, shoulders and pelvis,
- (3) rhythmical body alternation of the crossed kinetic chains around the centre of gravity,
- (4) feeling for balance control through ground contact

B] expose the children a wide range of challenging situations (both static and dynamic) where the focus is on keeping the balance. This include movements on instable, elevated and small support surfaces.

The balance control in movement actions in a wide range of motion depend strongly on the mobility & stability abilities.

D. Mobility & Stability

Movements are organised in kinetic chains (see below F.). In a movement the function varies from joint to joint. The primary function of certain muscles and muscle groups is stabilization. Functional training for those muscles involves training them to be better stabilizers, often by performing simple exercises through small ranges of motion and in 'closed-chain'. A good stabilisation enables the energy transfer over the joint and provides an anchor point for other related body actions. It is often said that the output of a kinetic chain (see below F.) is determined by its' weakest link. A lack of stability can cause dysfunction or a less optimal output of the kinetic chain.

A lack of mobility can be the culprit as well. Optimally the force/load is spread over multiple joints and the energy is absorbed in a movement range embraced by these joints. When one or several links are not able to provide the necessary amplitude to absorb the load, then this leads inevitably to compensational movements and possibly break the stability at a related level.

For competitive and high performance athletes, the mobility & stability training should go hand-in-hand from a functional perspective. In the long term athlete development plan of high performance, children at the age of 9/10 and 11/12 (entering the 'Learning To Train' phase) start-up a specific mobility & stability program that contains best:

- (1) *local stabilisation* of the shoulder (scapula setting, scapula slide, glenohumeral mobilisation of posterior capsule, rotator cuff), the trunk (co-contraction M. Transversus Abdominis and M. Multifidi, dissociation with diaphragm breathing, active stabilisation from neutral position to elastic zone) and hips (dominance glutes over hamstrings, dominance glutes over TFL, active stabilisation to align lower limb in function). And
- (2) *kinetic chain training* where the functioning of the myofascial lines and the integration of active local stability is taken into account for these multi-joint movements. In this way this part serves as a preparation for functional strength training and transfer to general and specific techniques in the later phases of the development.

Multi SkillZ does not offer such a specific program. In Multi SkillZ we assume a healthy function of the movement apparatus. To ensure a continued existence of the 'natural' good function we think it is important to keep on offering a variety of movement challenges that charge the mobility & stability ability on a regular basis. Such challenges include crawling, climbing, rolling, carrying, pushing, pulling and reaching. The principle idea is to maintain the natural 'range of function' when it comes to mobility & stability through deliberate play drills.

As explained in one of the videos before it is for example of great importance that children keep on moving on the ground. Here avoid classic trunk stability exercise which children find rather boring. In addition keeping a static position contributes very little to expanding the movement experience, and therefore to implicit learning, of the children. In Multi SkillZ we focus on developing the stability & mobility function through play.

E. Techniques

In Multi SkillZ technique is categorised in Function and not in Skills. The reason for this is that the movement function determines (constraints) the motion abilities, whereby we have to comprehend technique in the sense of movement function. It is only within the 'range of function' that a technique can be displayed. The movement capacity is the basis for the sport-specific movement quality, or in other words: the function constraints the technique.

- Movement amplitude is depending on movement freedom
- Kinetic energy output is depending on a proper loading, rhythm and timing
- Motor control is depending on movement action concepts and sensational regulation (see DrillZ #9: training Skills)

In Multi SkillZ we focus on the generic techniques for each and every sport. The major techniques that were selected are: running techniques, throwing techniques and elementary techniques for strength training.

In Multi SkillZ we create drills to stimulate the implicit movement experience to facilitate the action concepts in the mentioned techniques. At the same time we can help the children in developing the action concepts that cause an effective kinetic output with a healthy movement function. Here it is important as a coach to get clear on the intention on the movement. In interactive play this intention is tactically induced, the movement is a mean to solve a tactical problem. Based on insight in how techniques are stored in the long-term memory (see DrillZ #9 – Training Skills) and in a good movement function, we coach the children in acquiring good Basic Action Concepts through concrete tips. The tips are related to the goal (intention) of the movement and consist of biomechanical effect-oriented concepts.

The relevant basic action concepts for the 3 techniques are shortly explained in the general video.

F. Kinetic Energy

1. The formula which describes the kinetic energy

$$E_k = \frac{1}{2} \times m \cdot v^2$$

This formula implies that to transmit a high amount of energy to an object:

- as much as possible mass must be thrust against the object at impact
- with a highest possible speed (most decisive factor due to ²) at impact

Applied to displacement, the centre of gravity has to be set in motion:

- as a larger mass has to be moved more energy is needed
- the speed of the movement actions must be high

2. Kinetic Chains

The body organises itself as a whole across the joints in order to achieve the required kinetic output in function of the intention of the movement in the given situation. To do this effectively and efficiently, movement actions are orchestrated in a kinetic chain. In a kinetic chain several partial movement actions are coordinated sequentially in a synergistic action.

The following aspects are crucial to understand a good movement function:

- The body moves and reacts as a whole (spread of forces and energy)
- The body receives energy by contact with the ground or other object/person
- The body functions rhythmically through corresponding load-to-unload phase where the tissue is consecutively receiving (load=elastic energy storage) and releasing (unload) energy
- The body moves multidirectional

The output of the kinetic chain is greater than the sum of the output of the various sub-actions. The more experienced the athlete, the more joints he/she tend to use. These principles lead to a greater kinetic output:

- Stretch-shortening cycle on the level of each sub-action (cross-joint muscle power)
- Storage of kinetic energy in passive structures (loading in connective and passive tissue)
- Staircase-effect (passing on velocity from the one body part to the other)
- Reciprocal inhibition (muscles on one side of a joint relax to accommodate contraction on the other side of that joint)
- Enlarged acceleration range (more distance to accelerate towards point of impact what results in a higher velocity → remember formula Kinetic energy)

3. Key points for high quality movement

- Proper ground contact to receive energy
- Balanced movement execution
- Timing and rhythm
- Movement amplitude