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Analyzing the Risk–Benefit Ratio of Weight-Training Exercises

Along with a good understanding of muscle biomechanics, knowing how muscles function in weight-training exercises is also important. This knowledge enables the selection of the optimal technique while decreasing the risk of injury.

Starting a weight-training program is similar to undertaking other types of physical fitness activities. All fitness activities carry a risk. The risk depends on the activity, the equipment, the environment, the athlete's level of expertise, focus, conditioning, level of fatigue, the state of the athlete's tissues, previous injuries, and biomechanical factors. A coding system should be created to indicate the level of difficulty relative to the person's experience and needs to avoid injuries.

Certain sports, such as downhill skiing, surfing, and boating, have an established system of coding the level of difficulty to allow people to decide the activity risk based on their self-assessed experience level. For example, in downhill skiing, ski trails or runs are marked with colors and shapes as follows: green circles indicate the easiest beginner trails that present a low difficulty level and risk of injury, blue squares mark intermediate trails with a medium difficulty level and risk of injury, and black-diamond runs are for advanced and expert skiers and present a high difficulty level and risk of injury.

Each level also offers a certain level of enjoyment, personal satisfaction, and accomplishment, known as the benefit of skiing. Black-diamond trails have the highest potential benefit, blue-square trails have a medium potential benefit, and

green-circle trails have low potential benefit for the skier to aspire to. A beginner skier belongs on the green runs. If he or she takes a black-diamond run, the risk of being injured is high. But an advanced skier can go down the same black-diamond run with minimal risk of injury because of his or her higher skill level and get the benefit of a sense of adventure and fun. The advanced skier may find a low-risk green run too easy and thus derive less benefit of excitement from it.

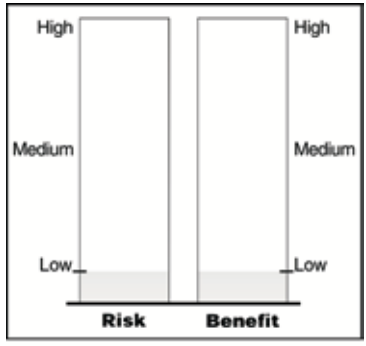
Risk–Benefit Coding System

A coding system for weight training allows the weightlifter to determine whether a certain volume, intensity, and technique will be of benefit and at what risk. Certain techniques offer a large benefit but also carry a large risk, but if the person's expertise is high enough, the trade-off may be worthwhile and can be done safely similar to the skiing example. **It is important to remember that high risk does not automatically mean that the person will be injured.** It means that the potential for injury may be higher due to specific techniques or training intensities needed for increased strength or development. A conditioned and experienced person with great technique and a properly functioning musculoskeletal system will lower this risk of injury. High-intensity training and volume always carry more risk than low intensity training and volume. The benefits gained from low-intensity training and volume is less for the experienced weight trainer.

The following coding system was developed to help individuals make decisions about the appropriate volume, intensity, and technique for weight-training programs.

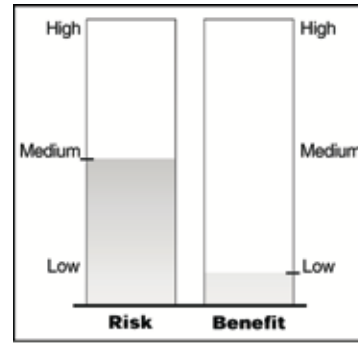
1. Low Risk, Low Benefit

This is a great level for a beginner but not for an advanced lifter, unless he or she is going through an active-rest phase of recovery.



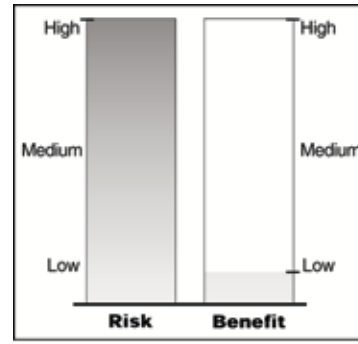
2. Medium Risk, Low Benefit

This level usually denotes a poor training technique or inappropriate training intensity with minimal benefit. It may not cause injury, but the benefits are minimal.



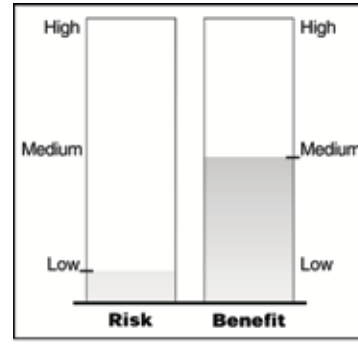
3. High Risk, Low Benefit

This level usually denotes a very poor training technique or inappropriate training intensity with minimal benefit. The potential of risk outweighs the benefit.



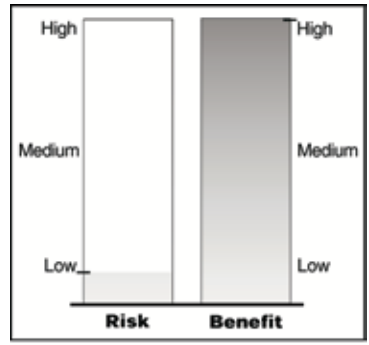
4. Low Risk, Medium Benefit

This is a great level for a beginner and possibly for an advanced lifter who is in an active-conditioning phase of training. This usually denotes good training technique with minimal potential risk.



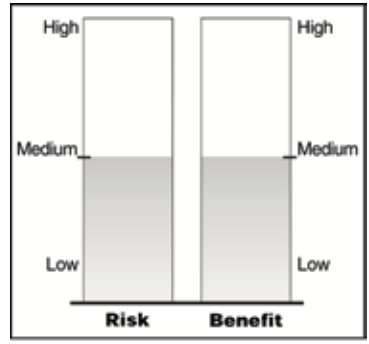
5. Low Risk, High Benefit

This is the best level to train at. It is great training technique and provides the highest benefits with minimal risk.



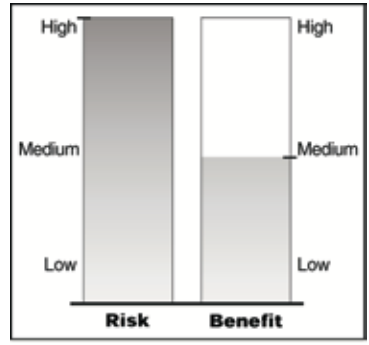
6. Medium Risk, Medium Benefit

This level usually denotes an increased training intensity and volume or using a more advanced technique which increases the benefits, but may also increase the risk of injury dependent on the experience and conditioning of the person. Proper monitoring of the body and recovery at this level is important to minimize risk.



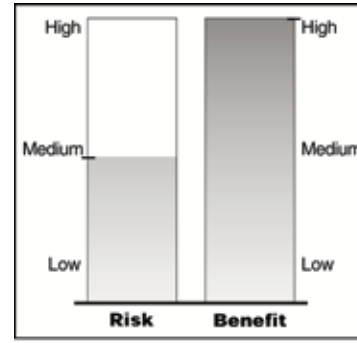
7. High Risk, Medium Benefit

This level usually denotes a poor training technique or inappropriate training intensity. The potential risk is high with only moderate benefit. Proper monitoring of the body and recovery at this level is important to minimize risk.



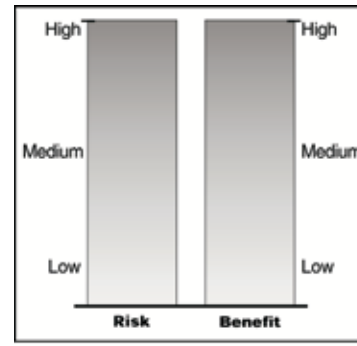
8. Medium Risk, High Benefit

This level usually denotes an increased training intensity and volume or using a more advanced technique at an appropriate experience level for maximum benefit with moderate risk. Proper monitoring of the body and recovery at this level is important to minimize risk.



9. High Risk, High Benefit

This level usually denotes an increased training intensity and volume or using a more advanced technique at an advanced experience level with near maximum effort. This level is usually seen at the end stage of training for competition and also competition lifting. Proper monitoring of the body and recovery at this level is very important to minimize risk.



Variables That Affect the Risk–Benefit Ratio

Many variables that determine the risk–benefit ratio of a weight-training program have to be considered. In general, the older the person, the higher the risk and the lower the benefit in strength and development due to decreased hormone levels and recuperation capabilities. Taller people with longer limbs and torsos have potentially higher risks due to poorer mechanical leverage which can increase the stress on the body. Movements further away from the body also can increase the stress on the joints and muscles.

Performing a Risk–Benefit Analysis

- **Step 1—Determine the person's experience:** beginner (0–3 months of training), intermediate (3–12 months), or advanced (over 12 months).

Less-experienced people should use low volume, intensity, and weight to allow body tissues such as ligaments and tendons to adapt to the stress of training. Experience also determines the speed of the exercise performed. The more experienced the person, the more explosive the lifting can be. Experience level also determines the volume of exercise for each body part and the amount of weight used.