The Truth on Fitness:
BALANCE (Part 1)

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In our last segment we explored the concept of "functional training," the predominant theme in fitness today. Seemingly, one can't have a conversation about function without discussing another popular topic—balance. In fact, balance has become such a principle consideration of functional training—one can rarely enter a gym without noticing someone performing exercises on balls, inflated pads, and wobbling boards.

But before running out to commit to circus style balancing acts, one should ask oneself: are these the best ways to promote balance? In this multi-part series, we'll explore the basic biomechanics of balance, the different types of balance conditions, its control systems, and the various training methods that contribute to improving balance.

Balance is a biomechanical construct that is often easier to visualize than understand. If one is standing upright, for example, then one is in balance; if one is out of balance, then one is falling. So essentially, balance is a "yes" or "no" proposition. But to determine which exercises best promote balance, it is necessary to understand its nature, which involves an exploration that is a bit deeper than casual observation.

Balance, or to be more technically accurate, equilibrium, is the product of the interaction between the center of gravity and the base of support. Let's begin with the center of gravity—a term fairly familiar to most. The center of gravity of a body is the point of the greatest average concentration of mass, and the point around which the body balances.

Consider a see-saw. If you place an object on one end and a heavier object at the opposite end, the board will tilt towards the heavier side. To create balance on the board, you'd move the heavier object in towards the center of the see-saw until the average weight of the two masses was positioned in the middle of the board.

One's body isn't all that different. Each segment of the body—whether the trunk and pelvis, arms, head, or legs—has its own mass and its own balance point. If we attach the head to the trunk, then the balance point will shift slightly in the direction of the added mass. The heavier the new weight, the more the balance point will shift in its direction. Add the arms and legs, and the balance point will settle at the position of average weight distribution, thus creating the overall center of gravity. In a normal standing posture, the center of gravity is positioned approximately at the navel.

An important consideration about the center of gravity is that it is not a fixed position—it can move. If a body part is displaced, say for example, an arm is raised to the side, the center of gravity will move in the direction of the displaced segment. The extent to which it moves is determined by the mass of the segment and the magnitude of the displacement. So, for example, bending four inches forward from the waist will probably move the center of gravity farther than raising an arm forward until it is parallel to the ground. This is simply because the trunk has significantly more mass than the arm, so it will have a greater effect on the displacement of the center of gravity.

Lastly, the center of gravity does not have to remain inside the body. This is a bit more difficult to wrap one's head around. Think about a donut, where is its center of gravity? The answer is, in the hole. That's right; the balance point of a donut is in the space outside of the donut itself. Envision a platform diver executing a rotating dive in the "pike" position, with her body folded nearly in half. In this position, her center of gravity is in the space between her torso and legs, and it is around this point that her body will rotate. If you stand up and lean forward, eventually you will displace your center of gravity outside of your body, and at some point, you will lose your balance. The point at which you lose your balance is determined by the size of the supporting base.

The supporting base may be relatively large. If you lay on the floor on your back, for example, your base of support would be the entire perimeter around your body. It would decrease, somewhat, if you then rolled onto one side, reducing the area of your body in contact with the ground. The base of support may be relatively small when you're standing on two feet, but even smaller if you stand on a single foot. Grabbing a handle, or placing a hand on a wall, would re-establish a relatively larger support base (note, the base of support is not restricted to the floor).

Balance, as mentioned previously, results from the interaction between the center of gravity and the supporting base. As long as the vertical position of the center of gravity remains within the perimeter of the base of support, balance is maintained. Once the center of gravity moves beyond the edge of the support base, balance is lost.

Consider a book resting on a table. Push the book slightly over the edge of the table, and two things happen. First, the base of support is reduced, and second, the center of gravity moves closer to the table's edge, which is the leading edge of the supporting surface. If you nudge the book further, it may hang precipitously over the table's edge, but as long as the book's center of gravity remains over the table, it will remain in balance. But the instant you push the center of gravity beyond the edge of the table, the book will lose equilibrium and fall.

The truth is, that in all of our actions, there is to some degree, a need to maintain our balance if we are to successfully complete the task. Sitting and lying, obviously, are less challenging, as the center of gravity remains relatively fixed over a fairly large supporting surface. But in most other tasks there is relative motion occurring between the center of gravity and the base. Sometimes that motion is very subtle, and other times it is quite dynamic, but in either case, the process of controlling equilibrium is integral to the movement task.

Having a moving center of gravity influences one's stability, which is a reflection of the proximity of the center of gravity to the center of the supporting base. The closer the center of gravity is to the middle of the support base, the more stable the position. As the center of gravity moves towards any edge of the base, the degree of stability in the direction of that edge decreases. Conversely, stability will have increased in the direction of the opposing edge. Thus, being very stable means attaining a position from which it is difficult to lose balance. In an unstable environment, one's center of gravity is close to an edge of the support base, making a loss of balance more likely, if further movement occurs in that direction.

Sometimes having high stability is useful, if our goal is to remain in a fixed position. Other times, less stability is preferred, if the objective is to move from one place to another. These different conditions present alternative challenges that reflect the relative difficulty of each movement task. **In our next segment we'll more closely examine the static and dynamic nature of equilibrium and stability, and discuss the challenges that those conditions impose on the performer.**

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