California State University, Northridge

APPLIED FITNESS TRAINING: A PRACTICAL APPROACH TO LEARNING AND INSTRUCTING KINESIOLOGY

A Thesis Submitted in Partial Fulfillment of the Requirements

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in Kinesiology

By

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PREFACE

We have reached an epidemic of mass proportions (no pun intended). Obesity related diseases are the leading cause of deaths among U.S adults. We are not just talking death, but preventable death. It is more likely for the average American adult to die from obesity than from involvement in a traffic collision. Think about this carefully: accidental deaths are *secondary*, the runner-up, to the amount of *preventable* deaths occurring in this country.

This is where you come in and you couldn't have come at a better time. With the growing obese population, there has been an increased demand for fitness-based programs. In order to do provide effective programs, one must have a foundational knowledge in kinesiology principles, theories, and assessments. Therefore, this thesis is designed as an *essentials text* that exposes the reader to the fundamental principles that must be understood in order to succeed in the field of personal training. This text was formatted in such a manner that each chapter lays the foundation for the next, providing more detail and complex application as it progresses. This curriculum is designed to develop sound fitness professionals through the use of traditional scientific principles and modern fitness approaches not often addressed in an academic setting. It should be noted that all of the non-public domain images utilized in this text have been properly referenced and are imperative to help illustrate a more modern approach to training. Though they all claim to be reprinted with permission, consent for use of publication is warranted at a later date. The intention of this thesis is to provide an abbreviated version of a completed textbook that presents all of this information in greater detail where in which proper authorization will be obtained. Therefore, it is necessary to utilize these

supporting materials now in order to provide a brief introduction to the theories that will be examined in the full manuscript.

The particular methodology emphasized in this text protects the learner from incorporating techniques and exercises that may be potentially dangerous or counterproductive. There lies great importance in truly comprehending a scientific concept before implementing the theory into practice. One should not devalue the role of this specific sequence, as it directly affects progressive results. All too often we see people jumping before they've mastered proper landing techniques or running long distances without conquering repetitive, short-distances. Building power and skill on top of a shallow foundation of principles, methods, or techniques will not yield the long-term results that are required or desired for optimal performance.

This essentials text is not only designed to help students create a balanced approach to coaching and programming, but also provides a realistic framework to address the obesity epidemic. Universities that utilize this modern text will develop kinesiology students with exceptional skill in program implementation and professional etiquette. Higher learning institutions that provide kinesiology as an academic option have an opportunity to deliver affordable and accessible obesity prevention programs to their local community members. Thus student success will be limited if students are unable to provide varying populations with fitness programs and other preventative initiatives. It is imperative that these approaches are practiced in the field. By empowering kinesiologists to develop and implement health prevention programs throughout their communities, they establish themselves as **a force for change**:

something that is desperately needed in the public health field. As preventative healthcare providers, kinesiologists *should* have the power to influence public health policy.

If kinesiologists are to ever have the power to influence policy, we must show the world what we can do, starting with improving health behaviors within one community at a time. Only through a concerted effort will we have the ability to change the world. Thank you, for being the force for change.

ACKNOWLEDGEMENTS

I would first like to express my sincere appreciation for my thesis advisor, Dr. Steven Loy, without whom this thesis would not have been possible. I thank you for your unconditional patience, unwavering determination, and endless generosity throughout my entire graduate experience. Through you, I have learned what it truly means to "make my world bigger." We have battled many obstacles, and together we have overcome them. I thank you for never giving up on me, even through the most trying and difficult times. I will always be thankful for you. To my thesis committee members, Dr. Gretta Madzjoob and Dr. Kimberly Henige, I am thankful for your time, advice, and constructive recommendations that were helpful and very much appreciated.

I am particularly grateful to Robert Dos Remedios who opened so many doors and opportunities for me in the fitness industry. I am proud to call you a friend, a mentor, and a colleague. A special thank you to Dr. Ed Thomas, Dr. Stuart McGill, Gray Cook, and Dan John, all of whom willingly spent many hours in communication with me over the years to help me develop my work and my professional experience. I am so thankful.

To all the CSUN students, faculty, and staff who have taken Applied Fitness (Kin336/L) as either a student trainer or as a client while I continued to develop the curriculum, I thank you. Without all of you, this opportunity would not have been possible. Because of your participation, willingness to learn and to experiment, we are able to make a difference within our own community. I have the utmost gratitude for my coworkers, Erin Calderone, Liane Fujita, and Jamie Phillips, who were instrumental in the development of this program. Your time and friendship means the world to me.

DEDICATION

I would like to dedicate this work to my family. I am particularly grateful for my parents, Dr.'s Shaheen and Quazi Islam for being a constant element of love and support through this process. I'd like to acknowledge my brother, Dr. Tanim Islam, who is my idol and has always shown me what "hard work" really means. To my dear sister-in-law, Mithi, I love you like my own sister. Last, but definitely not least, to my dear husband, Peter, you have been my rock, my muse, and my light. It is true when I say from the bottom of my heart, that my family has been my greatest inspiration. Thank you for leading me in this life.

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ABSTRACT

APPLIED FITNESS TRAINING: A PRACTICAL APPROACH TO LEARNING AND INSTRUCTING KINESIOLOGY

By

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Master of Science in Kinesiology

Applied Fitness Training (KIN336/L) is a course that has been formally offered since its development in 2013 to Kinesiology undergraduate students through the California State University, Northridge Kinesiology department. Classified as a core requisite for Kinesiology students with an emphasis in Applied Fitness and labeled as an elective for Exercise Science majors, this course is ideal for students interested in employment in fitness centers, community fitness and wellness agencies, fitness assessment labs, and within the public health arena. This course is designed to prepare the student with the necessary knowledge and skills to analyze movement and to conduct and administer physical fitness programs.

Theory and application of exercise program design and instruction to both individuals and groups within the general population are discussed in great detail in this course. Therefore a variety of textbooks, research studies, and other training resources are utilized to provide the student with a comprehensive approach to understanding fitness assessments, exercise training, program design, and various communication techniques

necessary for building a successful career and/or experience in personal training. Thus, this text was designed to serve as a single source that provides a summarized version of essential theories and applications that are considered fundamental to personal training. In addition, students gain field experience though practical application in leadership of a semester-long staff/faculty wellness program conducted during lab.

CHAPTER I

The ABC Fundamentals: Always Be Communicating

Introduction

How you communicate matters. *What* you say matters and more importantly, *how you say it* matters. Having an educational foundation in Kinesiology means nothing if what has been learned can't be communicated to the target audience. In order to ensure your ability to successfully implement fitness programs, some fundamental communication principles and techniques need to be addressed.

Speech Acts

Language has many dimensions and is the root of all civilized cultures. Specific to the realm of personal training, proper use of language can have significant impact on a client's success or failure. For example, you ask your client to pick a kettlebell off the floor. Your client than proceeds to bend down with a rounded spine, keeping the legs locked and lifts the load up from the floor. You are surprised that they did not execute proper squat form when picking up the weight, but yet proper technique was *never communicated* to the client and yet you expected it in their performance. Therefore, it is imperative that you be very clear and concise when communicating with others because communication can be confusing.

Having a shared sense of language allows for good communication exchange between involved parties. Philosophers, John L. Austin (1962) and John R. Searle (1969, 1975, 1996) believed that language is comprised of a dimension of acts—there is the act of saying something, the way in which one says it, and how one is trying to affect the receiver of the message thereby, defining **speech acts** as an utterance that has

performative function in language and communication (Bach, 2014; Smith, 2003).

Speech acts can be analyzed on two distinct levels: as a locutionary act or as an illocutionary act (Littlejohn, 2009). A **locutionary act** is the performance of an utterance: the actual utterance and its ostensible meaning. For example, instructing someone to "pick up the barbell" is a simple statement with no underlying intention, strictly meaning only to pick up the barbell. An **illocutionary act** is the pragmatic illocutionary force of the utterance, thus its intended significance as a socially valid verbal action. The concept of the illocutionary act is fundamental to the theory of speech acts. The idea of the illocutionary act, according to Austin indicates by "saying something, you did something," for example, ordering someone to *'Go'* and they start running. Searle (1969) further defined illocutionary acts by distinguishing five distinct categories:

1. **Assertives:** Speech acts that commit a speaker to the truth of the expressed proposition. Ex: Reading and reciting the HIPAA guidelines.
2. **Directives:** Speech acts that attempt to prompt the person being spoken to perform some action. Ex: Requesting or commanding someone to pick the weights off the floor or advising someone to flex their hips and keep a neutral spine when picking weights off the floor.
3. **Commissives:** Speech acts that commit a speaker to some future action. Ex: Promising to provide your client with a new weight-training program every four weeks.
4. **Declarations:** Speech acts that change the reality in accord with the proposition of the declaration. Ex: Pronouncing a specific student as the group exercise leader for today's lab session.

5. **Expressives:** Speech acts that express the speaker's attitudes and emotions towards the proposition. Ex: Your client either makes excuses for why they keep missing exercise sessions or they thank you for the great success they have experienced with their individualized program.

All too-often verbal communication is muddled with personal interpretations and this could be quite challenging in the field of personal training. Fernando Flores, Chilean engineer, politician, and entrepreneur, developed a theory of management *based on communication* that shows how certain speech acts, particularly requests, promises, offers, and declarations, serve as building blocks for activating commitments in organizations (Letelier, 2012). More importantly, this model addresses that effective communication exchange amongst all parties is the foundation for a strong organization. So if you are not getting the answer you want, ask for clarification or reconsider how you ask your question. If you desire a specific response, you must provide a specific question, stimulus, or statement. Table 1.1 on the next page serves to provide examples of a distinct set of speech acts that serve as a "periodic table" of elements that coordinate a simple, but powerful foundation for communication design, no matter how simple or complex the business process (Letelier, 2012).

Table 1.1 The Five Categories of Speech Acts			
Speech Act	**What is the Action**	**For example. . .**	**What does it produce?**
Declare	A speaker declares a new world of possibilities for action in a community	"We are creating a new class called Applied Fitness Training that will provide free personal training to University staff and faculty who are applicable."	Leadership and a new context for action for taking care of the concerns of the community that listens to the declaration and makes it effective
Request	A speaker asks a listener to take care of something that the speaker is concerned about.	"Can you complete the required paper work (health history, PARQ) prior to beginning the fitness program?"	Commitment to action.
Promise	A speaker offers or promises to take care of something that a listener is concerned about.	**Your client is concerned about their weight gain and needs dietary guidance:** "I'll prepare specific nutritional guidelines for you to follow by next Wednesday."	Commitment to action.
Assert	A speaker asserts (i.e., reports) facts pertinent to the concern at hand.	"Your BMI is calculated as 25"	Confidence that we share a reliable and observable basis for our interpretation of the situation.
Assess	A speaker assesses how some action or thing relates to specific concerns or commitments.	"Increasing physical activity can help fight the obesity epidemic."	Preparation for Action: orientation, interpretations, and attitudes towards actions or situations.

Table 1.1: *The five categories of speech acts*
Note. Adapted from *Conversations for action and collected essays. Instilling a culture of commitment in working relationships* by M.F. Letelier, 2012. Copyright 2012 by Fernando Flores. Reprinted with permission.

Remember, in this field *you* are the expert. A seasoned practitioner is aware that their personal behavior and communication style can influence the client's behavior and self-efficacy. Therefore, if you can communicate clearly with confidence, your business as a personal trainer will have a greater chance of success.

Communication Techniques

The role of the personal trainer can be quite complex at times. As a personal trainer, you become the expert in all health-related matters and you also serve as a confidant, friend, and motivational coach (Desimone, 2012). To be successful in all roles, you must also be an effective communicator. Being an effective communicator allows you to empower positive behavior change in others. To do so, one must have strong **verbal** and **nonverbal communication** abilities.

Verbal and Nonverbal Communication

We have established that *what we say* (verbal communication) versus *how we say something* (nonverbal communication) are important elements to delivering a clear message. According to the **7%-38%-55% rule**: when sending a message: 7% is the actual content of the words, 38% relates to voice tone, and the remaining 55% relies on body language (Desimone, 2012).

Figure 1.1: The 7%-38%-55% Rule of Verbal and Nonverbal Communication

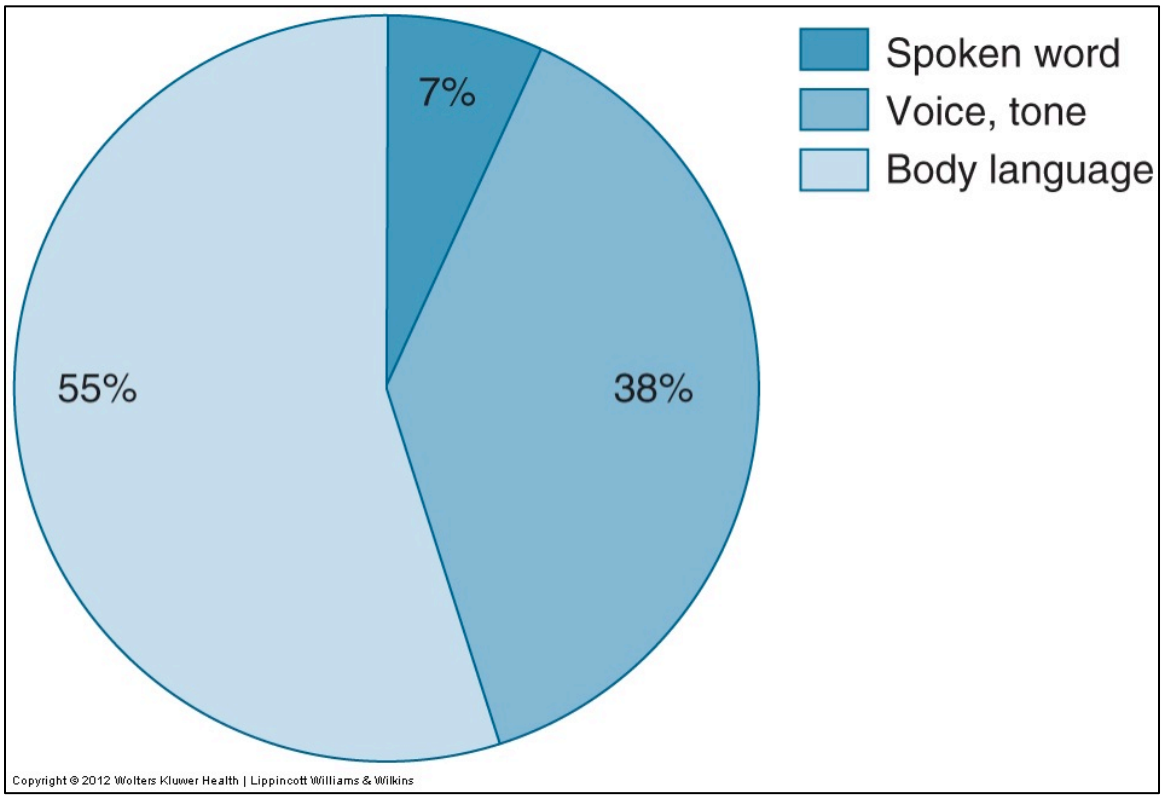


Figure 1.1: *Verbal and nonverbal communication; the 7%-38%-55% rule.*
Note. Adapted from "Communication skills: Adherence and motivation," by B.A. Bushman & R. Battista (eds.), 2012, *ACSM's Resources for the Group Exercise Instructor,* 4th ed., p.52. Copyright 2012 by American College of Sports Medicine.

Nonverbal Communication

As depicted above, body language plays a large role in communication and Table 1.2 illustrates specific nonverbal techniques used in the training profession (Desimone, 2012). As a personal trainer, clients will evaluate your nonverbal cues and it will influence their perception on the type of instructor you are (i.e.: kind, stern, attentive, or careless) and the type of workout to expect (i.e.: easy, challenging, boring, or exciting). Particularly in semi-private and group training settings, client motivation is often

influenced by the instructor's enthusiasm and willingness to establish rapport, thus suggesting that participants clearly observe nonverbal cues.

Table 1.2: Components of Body Language	
Component	**Possible Perception / Interpretation**
Facial Expression	Does your face express enthusiasm or disinterest? Key Factor: Smile.
Eye Contact	Are you able to make direct eye contact with participants & smile? This expresses interest, sincerity, & trust.
Tactile / Touch	(Always ask permission first!) This shows genuine interest in helping clients succeed & safely perform the skill at hand.
Respect of Personal Space	A general rule is to be at least one arm's length in distance, unless you are using tactile cueing.
Hand Gestures	Are your hands open or closed during instruction? Open hand (with palms up) invokes trust & is client-centered. A closed hand or downward facing is commanding & is considered instructor-oriented.
Posture	Does your posture convey enthusiasm, relaxation, or stress? Your posture can convey confidence or disinterest. Avoid slouching, crossing arms, & looking down.

Table 1.2: *Components of Body Language.*
Note. Adapted from "Communication skills: Adherence and motivation," by B.A. Bushman & R. Battista (eds.), 2012, *ACSM's Resources for the Group Exercise Instructor,* 4th ed., p.54. Copyright 2012 by American College of Sports Medicine.

Verbal Communication

Verbal communication is not only the spoken word, but includes voice tone and rhythm of speech (Desimone, 2012). More importantly, the tone and rhythm of the sender's voice influences the way the spoken word is interpreted by the recipient. The tone of voice refers to the variety of inflections used that shows the instructor's genuine excitement or disinterest. The rhythm of speech refers to how quickly, slowly, and clearly the instructor speaks. This directly impacts the participant's motivation and ability to understand and follow directions (Desimone, 2012).

Feedback between the professional and the participant is fundamentally the most important type of verbal communication within fields of fitness and health promotion[9]. Feedback should always be positive and growth-oriented so that participants understand the correct way to perform exercises safely and effectively, without drawing attention to their inabilities or weaknesses. For example, if a client continually performs the pushup incorrectly (by sticking their hips high into the air), it is important to provide cues that are positively framed. Positive feedback utilizes cues that reinforce how to do the pushup correctly versus highlighting what they are doing incorrectly. Instead of telling your client to "stop sticking their butt out into the air," it is better to suggest them to "maintain their hips in a neutral position." The key to providing appropriate feedback as an instructor is to constantly watch the participants and provide them immediate responses based on their performances. The five important elements to providing positive feedback that can enhance participant motivation are:

I. **Provide feedback immediately**

II. **Be specific with comments**

III. **Make comments growth oriented**

IV. **Make comments that are relevant and relatable to their lives**

V. **Use analogies they understand**

Figure 1.2 below describes a series of both nonverbal and verbal communication characteristics that influence participant motivation[9].

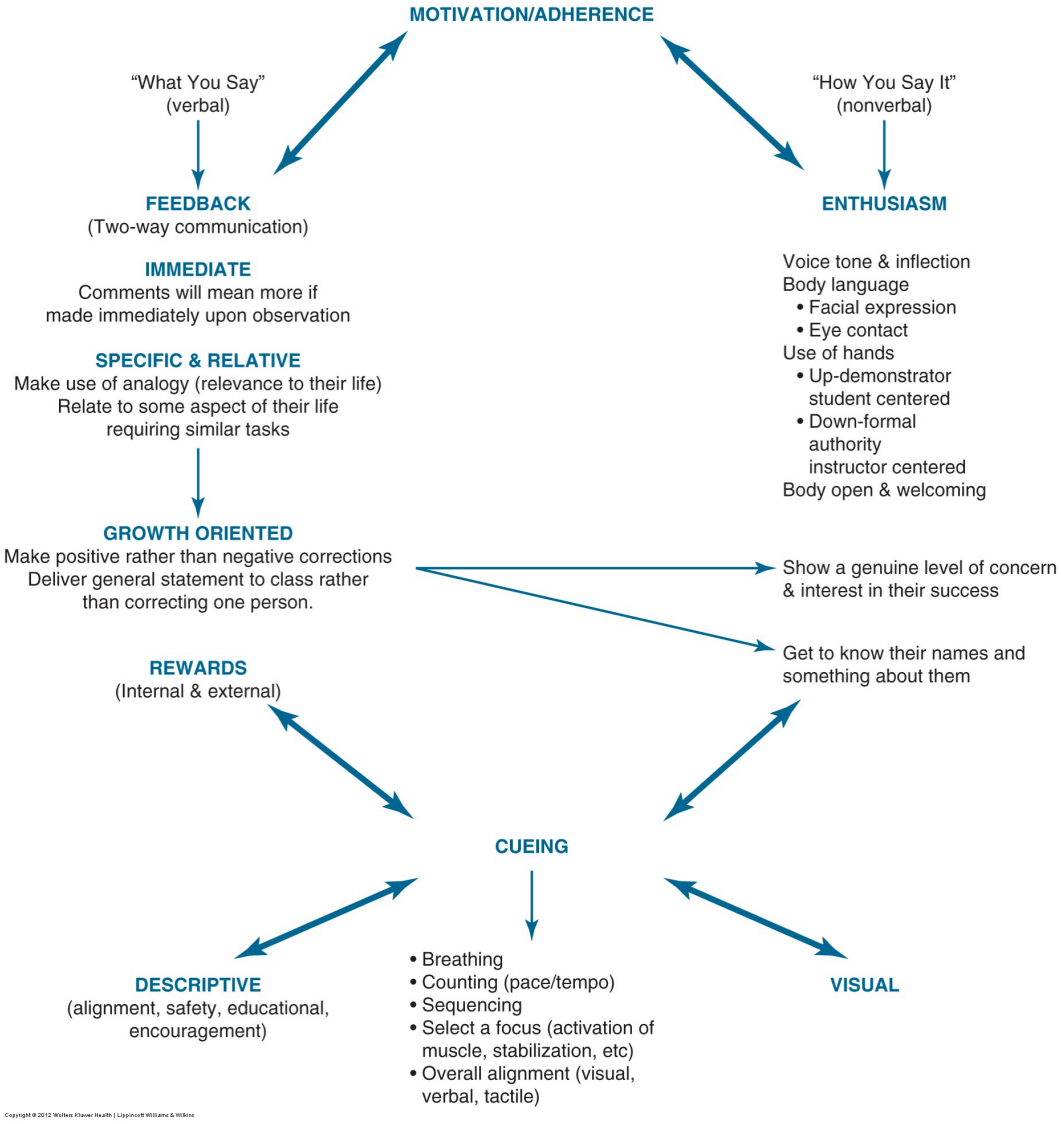


Figure 1.2: *Motivation and Adherence Chart.*
Note. Adapted from "Communication skills: Adherence and motivation," by B.A. Bushman & R. Battista (eds.), 2012, *ACSM's Resources for the Group Exercise Instructor,* 4th ed., p.56. Copyright 2012 by American College of Sports Medicine.

Active Listening

Active listening is a skillset that combines both verbal and nonverbal communication needed for successful relations. Active listening can consist of making eye contact, nodding the head, clarifying, summarizing, and/or restating pertinent information (Cornelius, Alessi, & Shorey, 2007; Corner, & Drollinger, 1999; Desimone, 2012; Fassert, van Duleman, Schellevis, & Bensing, 2007. Those who effectively demonstrate active communication skills possess the ability to unconditionally accept others views and provide unbiased reflection when listening to the client's experience (Desimone, 2012). The health professional who is able to practice successful active listening will avoid infusing personal interpretations and assumptions when communicating with others and instead will ask specific questions for clarity (Desimone, 2012, Weger, Castle & Emmett, 2010). Davidson and Versluys (1999) identified four distinct elements of active listening as listed in Table 1.3 below:

Table 1.3 The Four Elements of Active Listening
1. Listening to spoken statements
2. Observing nonverbal cues
3. Understanding contextual anxiety
4. Identifying statements that indicate teaching and learning opportunities

Table 1.3: *The four elements of active listening*
Note. Adapted from "Counseling and coaching techniques," by B.A. Bushman & R. Battista (eds.), 2014, *ACSM's Resources for the Personal Trainer,* 4th ed., p.246. Copyright 2014 by American College of Sports Medicine. Reprinted with permission.

The first element, listening to spoken statements, requires the personal trainer to reflect openly on the statements made by the client. **Reflection** involves carefully restating or paraphrasing what the client has said without confusing or misinterpreting its intended meaning. The second element revolves around the trainer observing nonverbal cues, such as body movements and vocal inflections that may allow for greater insight to the context of the message. Research has indicated that some clients feel more positive about their associated personal trainer when he or she appears to be interested, concerned, or excited (Desimone, 2012; Haase & Tepper, 1972; Sharpley, Faimie, Tabary-Collins, Bates, & Lee, 2000). The third element of active listening requires understanding the context of the client's apprehensions. Most verbal communication can be broken into two components. The first being the actual meaning of the words in the message and the second is the clients' attitudes or personal feelings that lie beneath the content of the message (Desimone, 2012; Rogers & Farson, 1979). Understanding the client's point of view is most important when deciphering context. The last element of active listening is being able to determine which statements made by the clientele need to be challenged. For example, you have a new female client and she addresses in her initial consultation that her goals are to lose weight, gain some muscle tone, but not get "bulky," so she does not want to lift heavy weight. It is important for the personal trainer to appreciate when the client is willing to share their concerns, but it is imperative for the trainer to address misinformation or common myths that are communicated to them. The female client who indicates they want to lose weight presents an opportunity for the personal trainer to educate them that lifting heavier loads will increase lean muscle mass that will facilitate weight loss. In addition, it will not elicit "bulking" because the female client does not

have (enough of) the proper hormone secretion (testosterone) for that response to occur, though it should be acknowledged that levels of testosterone do vary from individual to individual in *both* populations and will result in some being more muscular than others. Research indicates that clients appreciate health and fitness practitioners who maintain a current education and robust knowledge base, while communicating with language that is nonjudgmental and easy to understand (Desimone, 2012; Harris & Templeton, 2001). Active listening helps establish a base of trust between the client and the personal trainer, so clear communication that respects the clients' knowledge and interest is highly appreciated by the clientele[9].

Appreciative Inquiry

Appreciative inquiry (AI) is a skillset traditionally used in organizations and businesses to increase employee cooperation, satisfaction, morale, productivity and effectiveness (Cooperrider, & Srivastva, 1987). This methodology could also be successfully utilized in health coaching and training sessions. The AI framework is based upon the belief that individuals and organizations are driven by a universally agreed upon set of core values, whereas their personal goals rely upon the possibility of success and positive outcomes (Desimone, 2012). Appreciative inquiry is a process of five separate stages of development that are classified by a specific task and outcome that can then be measured by the clientele's response. The five phases of development are **define, discover, dream, design,** and **deliver** (Cooperrider & Whitney, 2005)**.**

Defining a change process requires that the professional and client previously identified goals, both short-term and long-term, so that a written set of mutually agreed-upon rules and goals are defined to encourage adherence to the change process (Whitney,

Troston-Bloom, & Cooperrider, 2010). *Discovery* involves helping the client identify the positive aspects in his or her life, and which particular characteristics can assist with the client achieving new personal goals (Whitney et al., 2010). What is considered a goal to some clients may seem like a *Dream* to others. For example, you have a 40-year old client who dreams about fitting into her favorite pair of jeans from her college years. As a professional, it is your job to encourage clients to express their beliefs in the context of the current situation and use positive words to promote a positive outcome. This is not to imply that one should not dream, but emphasizes the role of a fitness professional is to encourage the client to see that the dream is an actual possibility, not *just* a dream. Together, you and the client will *Design* a realistic plan that will support the steps needed to achieve the client's dream. *Delivery* is the last component of appreciative inquiry and it is viewed as when the client has achieved their set goals. It is important to not regard this as the last stage of the AI process, because it is possible for the client to relapse or become complacent. Further planning should occur to help the client maintain the achieved goal and seek for further improvements (Whitney et al., 2010). It is the trainer's responsibility to practice not only the skillset of appreciative inquiry, but all facets of communication until they become inherent, they are how you consistently think and act in all you do.

Motivational Interviewing

Motivational Interviewing (MI) is defined as being direct, client-centered counseling that elicits behavior change by helping the client discover and distinguish uncertainty (Miller & Rollnick, 2009). This process helps clients commit to a positive behavior change by using a more direct approach of client-centered counseling. Client-

centered counseling is based on the understanding that the power to change is all within the client's control and the client is not influenced or coerced by an outside influence in order to make changes. In MI, external motivation from the professional is only used to inspire the client's intrinsic motivation (Desimone, 2012). More importantly, MI is most appropriate when the client has a desire to plan a specific change. Research indicates that successful motivational interviewing strategies involve helping the client identify barriers that make it difficult for behavior change and specific ways to make those changes (Miller & Rollnick, 2009). Refer to Box 1.1 for a real-life example of motivational interviewing.

BOX 1.1: For Example: Motivational Interviewing
Your client, Josh, was a collegiate football player three years ago. He took a job in sports marketing and is finding that he has less time and energy to exercise. Josh who was a consistent client 4 days/week at 5:30pm has started to miss his training sessions. Josh says to you, "My job is causing me to miss my workouts and I'm frustrated." A professional response would be to rephrase saying, "Let me clearly understand what you are telling me. You are missing your workouts and that's causing you frustration or are you working long hours at your job and that is causing you frustration?" *Thought Questions:* What other questions could you ask Josh to help him find some answers to his dilemmas? How would you ask him to see if there is another time of day for him to exercise?

Motivational interviewing involves working with the client to explore different motivations and values that the client holds in high regard. MI allows for the professional to guide the client in choosing how, when, or whether (or not) to change, but is limited to only identifying strategies that implore behavior change and must be used in conjunction with the previous strategies proposed in this text (Desimone, 2012; Miller & Rollnick, 2009). Referring to the example proposed in Box 1.1, one can see that motivational

interviewing also required elements of active listening (clarifying and restating important information) and appreciate inquiry (defining a new set of rules to help support Josh's goals). This reinforces the notion that as a trainer you should get comfortable with using a variety of communication techniques to aid in the success of your practice.

The 5 A's Model of Behavior Change Counseling

The 5 A's model of behavior change is a particular strategy that can accompany Motivational Interviewing (Glasgow, Goldstein, Ockene, & Pronk, 2004). This methodology was designed to change poor health behaviors, specifically within primary care settings, but has been proven useful in most health promotion environments (Glasgow et al., 2004).

The 5 A's model include **assessing, advising, agreeing, assisting,** and **arranging** and is often used in the personal training environment. In the initial consultation, a personal trainer will *assess* the client's motivations and verbal and nonverbal behaviors when discussing goals, both short-term and long-term (Desimone, 2012). The professional should than *advise* the client based on health risks and limitations. The personal trainer and the client will *agree* upon specific and realistic goals to achieve in timely fashion. The next step is for the personal trainer to *assist* the client in developing a specific plan to reach goals and overcome barriers. Assisting may involve designing a fitness program for the client or referring them to an outside physician or professional resource, like a chiropractor or dietician. Lastly, the personal trainer is responsible for *arranging* subsequent sessions with the client as a source of continuous support (Desimone, 2012).

Frequent and continuous follow-up contact is required to encourage positive behavior change using the 5 A's method (Desimone, 2012). With the increasing amount of technological advancements available to us, follow-up contact can be provided through a variety of channels: telephone counseling, texting, emailing, online support groups, social networking sites, and as always preferred, in-person meetings. Follow-up contact is dependent upon the client and this method is intended to strengthen the client's self-management abilities. It is under the discretion of the personal trainer to determine whether the client requires short-term contact (1-2 weeks after establishing goals) or long-term contact (minimally twice a month) to maintain behavior change (Desimone, 2012). The ultimate goal is for the client to become empowered to independently maintain the positive behavior change.

Understanding Self-esteem, Self-concept, and Self-efficacy

It is very important to remember that when communicating with others, many interpersonal factors have an effect on the message that is being received. When coaching others, it is important to be mindful of the client's **self-esteem, self-concept,** and **self-efficacy** (Desimone, 2012). The term *self-esteem* reflects a person's overall emotional evaluation of his or her own self (Judge & Bono, 2001). Self-esteem is an evaluation or opinion of oneself. *Self-concept* is also known as self-identity and is used to refer to the collections of beliefs about oneself and relates to one's perceived skillset (Pajares & Miller, 1994). These usually include elements such as career status, academic performance, and racial identity. Self-concept is a cognitive description of oneself, for example, "I am a personal trainer." This is how you define yourself. *Self-efficacy* is a particular judgment of one's ability to perform a particular activity. Do you consider

yourself to be a great personal trainer? Do you feel like a "great personal trainer" with every client you train or does this vary on an individual basis? The primary difference between self-efficacy and self-concept is that self-efficacy is specifically situational whereas self-concept is broad and general. Refer to Box 1.2 to ensure you understand these concepts.

BOX 1.2: For Example: Self-efficacy, self-concept, and self-esteem

Your client, Mary, is a collegiate volleyball setter for a Division I school. She has been a starting setter for the last two seasons, but is now as Junior she is getting less time on the court. Mary is very positive, works very hard, and has been training with you 3 days a week for the last two years. Finally, during yesterday's training session she says "I'm really bummed out about my last few games (*self-esteem)*." She expresses that she knows that she is a valuable member of the team, whether she is playing or sitting sideline (*self-concept)*. Mary acknowledges that she is the team leader because she is a setter (*self-efficacy),* but is beginning to doubt herself now that the coach is playing her less and less (low self-esteem).

Thought Questions:
As Mary's personal trainer, what questions could you ask to find out why Mary is playing less? Did Mary injure herself? Is she on academic probation? Are the substitute setters graduating seniors and the coach is giving them seniority?

How are some ways you can convince Mary that playing less time on the court is not reflective of her emotional self-worth?

Self-esteem, self-concept, and self-efficacy are interrelated but yet very different concepts. It is of most importance for the personal trainer to understand that these constructs are very closely related to body image and are easily influenced by both positive and negative changes in physique. Therefore, it is the responsibility of the

professional to address all potential concerns and obstacles that are applicable to the client. By identifying specific barriers, together the personal trainer and client can create an action plan to enhance positive change (Desimone, 2012).

CHAPTER II

Cueing For Safety and Technique

Introduction

Ensuring client safety is paramount. Safety is defined as the condition of being safe from undergoing or causing hurt, injury, or loss (Merriam-Webster, 2014). A variety of factors can affect a client's safety including environmental variables (temperature, surface), client movement technique, and professional negligence. Surprisingly enough, you can (and should) have control over all of these factors. It is your professional obligation to limit as many potential risks as possible. Relative to your clients, you must be able to properly cue and perform the exercise technique. This chapter discusses in detail the practical methods of cueing to ensure client safety and progress.

Safety

To reiterate, ensuring a client's safety does one specific thing: minimizes risk of injury, harm, or *loss*. I highlight loss because it is an important element to address. Risk is undeniably present in almost every task we undertake, whether we are crossing the street, driving a car, or lifting a weight off the ground. All situations are risky if we are careless and not paying attention to detail. *Loss* is quite obvious when we consider traffic-related accidents, but how is loss possible in professional fitness settings? Consider the situation addressed in Box 2.1:

BOX 2.1: For Example: Gym Safety
Your client Sam has been training with you twice a week for the last month. You introduce a new exercise to Sam today, the TRX row. Sam has never worked with the TRX before and is anxious to learn. You properly teach Sam the exercise and as he begins his first few repetitions, another gym member approaches you with some exercise-related questions. You are eager to help the member and engage in conversation. In a matter of an instant you hear Sam cry out in pain and he is lying on the floor next to you, holding his wrist. What happened? What do you do? Consider now what types of loss occur in this situation? The client may have lost temporary use of a limb (through a break or sprain) and you may have lost a client due to professional negligence. Are you at risk for other professional-related losses?

To ensure client safety and minimize risk in a fitness setting, there are **four fundamental rules** to follow:

1. Always watch your clients.
2. If pain is present, you must STOP.
3. Technique before load.
4. Be able to do it before you cue it.

Technique using the 5 Kinetic Checkpoints

To truly understand proper exercise technique, we need to review the concepts of the **kinetic chain** and **joint-by-joint approach**. The kinetic chain is a series of mobile and stable joints that include the foot, ankle, knee, hip, lumbar spine, thoracic spine, scapula, shoulder, and cervical spine, which all allow for successful movement and stabilization (Clark & Lucette, 2011). Cook and Boyle (2010) coined the term *joint-by-joint approach* to address the philosophy that each joint is specifically created to be either

stable or mobile and that our structural design alternates mobile joints with stable joints, respectively from the ground up. More importantly, the joint-by-joint approach is a simple method used to analyze proper joint mechanics along the kinetic chain using the five specific kinetic checkpoints as shown in Table 2.1. Each joint complex is specifically designed to be either primarily mobile or stable. By observing the quality of movements that occur at these specific joints during exercise, you will garner a greater understanding of how well or poorly the client moves in specific movement patterns.

Table 2.1	**Joint Classification by Primary Needs**	**Joint Movement**
Kinetic Checkpoint	**Primary Needs**	**Primary Movements**
Ankle/foot complex	Mobility	Dorsiflexion/ Plantarflexion
Knee	Stability	Flexion/ Extension
Lumbopelvic hip complex	Primary Mobility (secondary stability)	Flexion / Extension / Rotation / Add/Abd
Scapulae/Shoulders	Primary Stability (and secondary mobility)	Flexion / Extension/ Protraction / Retraction / Elevation/ Depression/ Fixation
Head/ Neck/Cervical Spine	Mobility	Flexion / Extension / Rotation / Protraction / Retraction

According to this approach, loss of function in a particular joint, say the ankle, will seemingly affect that joint or the one above. So if a mobile joint like the ankle becomes immobile, it will compensate for its lack of mobility within the knee joint and likely cause pain. Thus in an effort to keep the body balanced and injury-free, the body must work as it is intended or structurally designed to do. Therefore, when you design

exercise programs for individuals it is imperative that you have a strong base of knowledge in anatomical design and proper joint function.

As a personal trainer, you are responsible for knowing the proper and improper form of every exercise you prescribe and as mentioned, be able to execute the exercises correctly as well. Below is a set of common exercises utilized in the gym setting. Carefully observe the photos to determine proper exercise form based on the primary function of each joint.

1. The Front Squat (Illustration 2.1)

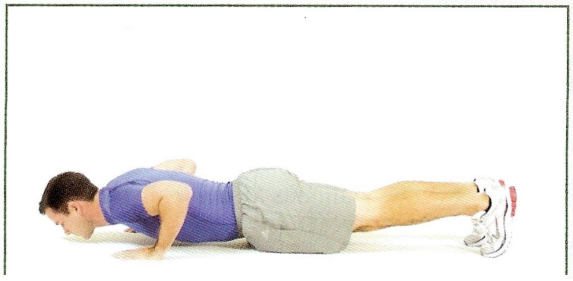
GOOD FORM: START | GOOD FORM: FINISH

FRONT SQUAT

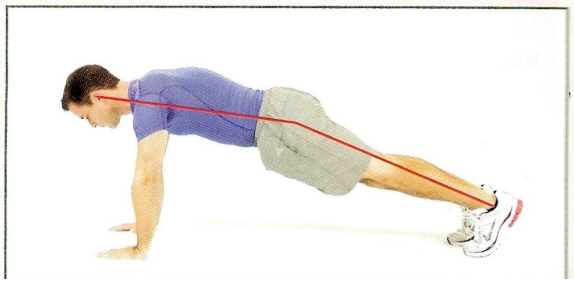
As you can see, when a front squat is properly performed the elbows remain in-line with the shoulders and the head and spine stay neutral. This particular hand positioning (with the fingertips resting underneath the bar) allows for the bar to rest properly on the anterior portion of the shoulders, but requires the individual to have a

great deal of shoulder and wrist mobility in order to perform the *loaded* movement correctly. In order to initiate the movement, the hips flex first before the knees, shifting the weight back into the heels while the tibia moves forward, allowing the knees to track directly over the feet.

2. The Push Up (Illustration 2.2)



GOOD FORM: START



GOOD FORM: FINISH

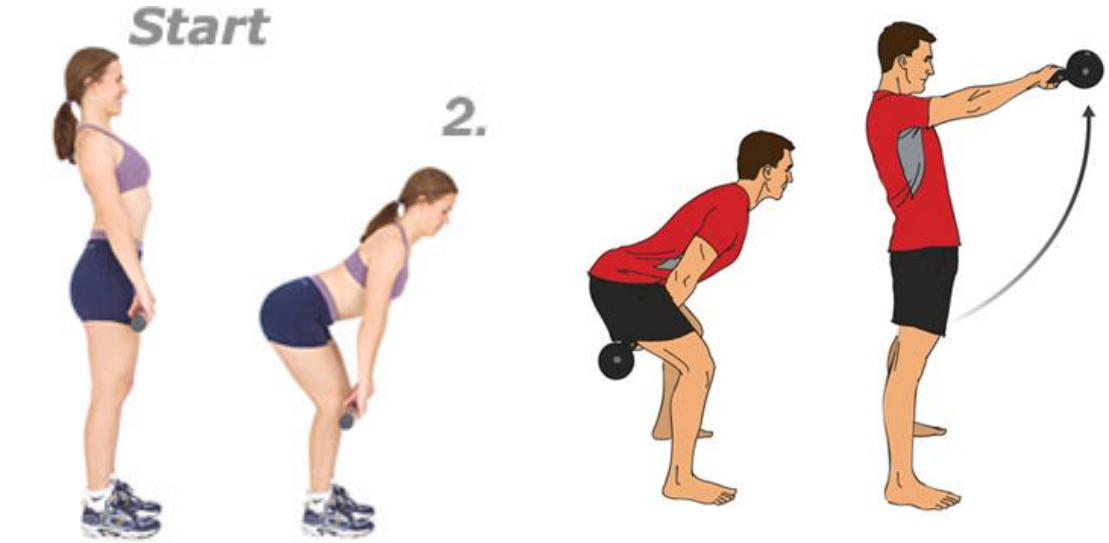
The pushup is one of the most fundamental exercises to master and is also very challenging for most. A proper pushup requires the individuals to maintain a natural line with the ankles, knees, hips, and spine throughout the entire movement from start to finish. It is important to remember to keep the knees, hips, and spine fully extended and to avoid any flexion or hyperextension of these joints when performing this exercise.

3. The Pull up (Illustration 2.3)

GOOD FORM: Assisted from start to finish	GOOD FORM: MODIFIED Pull up Inverted Row from Start to Finish

Pulling patterns are essential movements to program into our exercise routine. The most commonly known pulling exercise is the pull up, yet it is the not most commonly used exercise, possibly due to its level of difficulty. Often when individuals perform a pull up, they fail to utilize a complete range of motion or use momentum (ex: kipping or swinging) to vertically propel themselves toward the bar. When performing the pull up correctly, it is important to keep the ankle, knees, hips and spine full extended from start to finish. It is important to remember that movement is initiated by depressing the scapulae first, than flexing the elbow to vertically raise the resistance (bodyweight) towards the bar.

4. The Deadlift (Illustration 2.4)



GOOD FORM: From start to finish	GOOD FORM: Kettlebell Swing from start to finish

The deadlift and the kettlebell swing are complex exercises and require a great deal of kinesthetic awareness. Both exercises are considered a loaded hip hinge, therefore it is important to master the hip hinge first before adding resistance to the movement. Individuals that execute proper flexion and extension of the hips while maintaining a neutral spine, significantly reduce the amount of force applied directly upon the spine and can reduce one's risk for back injury (McGill, 2009). When a loaded hinge is properly executed, the bar is placed directly above the shoelaces and in line with the shoulder blades allowing for optimal transfer of power from the hips to the bar. The back remains flat with a slight lordotic curve and the head is aligned with the torso, keeping the hips high. Hands firmly grip the bar, keeping the elbows extended, generate movement from the hips and stand to full extension. It is important to avoid hyperextension of the hips with executing the deadlift.

If a client exhibits any dysfunctional movement patterns while they exercise, we as professionals should be able to decipher the dysfunctions specific to the joint in which it occurs. When these inappropriate movement adjustments are exposed, we should be able to properly apply specific cueing techniques to help the client achieve a state of movement efficiency.

Movement and Coaching Cues

Before you come to the conclusion that a client is exhibiting a movement dysfunction because they are weak or "under active" in a particular muscle group, first consider *how* you are communicating. What many have deemed as an "art," communication is actually quite scientific. As explained in Chapter 1, powerful communication can have powerful effects, whereas poor communication from fitness professionals can result in poor performance from an athlete or client. Being aware that your communication style can have novel effects on the motor outcomes of your clients puts you at a great advantage. To be truly able to help those in need, you must be able to coach effectively and the following key concepts can help you do so.

Attentional Focus of Cues

The Oxford Dictionary of Sports Science and Medicine defines **attentional focus** as having "the ability to focus attention on cues in the environment that are relevant to the task at hand and maintain concentration over the course of a game or event." Particularly within the field of fitness and sports, two particular attentional focus strategies are utilized to help clients and athletes learn a new skill and/or reinforce a previously learned movement pattern. These strategies are known as **internal** and **external focus** of attention (Leahey, 2012; Wulf, 2007). An **internal** focus of attention refers to a

performers ability to focus on their body movements during the execution of a specific task or the use of specific body parts to perform the movement (Ex: Drive your knees high into your chest when you jump). An **external** focus of attention occurs when the performer focuses on the effect of the movement while executing the task at hand (Ex: Jump as far as you can past the 10 foot line). Both strategies have been proven to produce successful results, though external focus of attention is considered the superior approach in many studies (Marchant, Greig, & Scott, 2009: Porter, Nolan, Ostrowski, & Wulf, 2010; Wu, Porter, & Brown, 2011; Wulf, McNevin, & Shea, 2001; Wulf, 2007; Wulf, 2008; Wulf, Chiviacowsky, Schiller, & Avila, 2010). Since both methods are considered valid approaches, Table 2.2 on the following page examines specific exercises commonly used in training and compares the cueing style for each technical application. You should develop both internal and external focus cues for the variety of exercises you will teach.

Table 2.2: Cueing specific exercises using internal and external focus		
Exercise / Movement	**Internal Focus**	**External Focus**
Front Squat	"Extend your hips fully at the top"	"Explode at the top"
Pushup	"Push your hands into the ground, keeping your hips and spine in neutral."	"Push away from the floor and keep your body stiff as a plank."
Hip Hinge	"Flex at your hips"	"Get into a huddle position" or "bow to your sensei"
Deadlift Finish	"Retract your shoulders, squeeze your glutes and fully extend your hips at the top."	"Try to rip the bar apart with your hands as you thrust up to the top."
Standing Cable Row	"Retract and depress your shoulder blades and pull the weight in towards you."	"Stand tall with a proud chest."
Neck Packing (to maintain a neutral spine)	"Retract your head." or "Tuck your chin."	"Make a surprised look!"
Spreading the Floor (often used when cueing the squat or deadlift)	"Shift the weight of your body to outside your feet" or "Spread the floor apart with all your toes"	"Rip the floor apart underneath you"

The goal of successful coaching is to allow for our cueing to guide movements that ensure a proficient and positive motor outcome (Leahey, 2012). Client success is heavily influenced by the coach's attentional focus approach, therefore even the smallest changes in cueing style can make a world of difference in a clients motor behavior. By utilizing an external focus of attention one allows the motor system to naturally organize itself, whereas an internal focus approach may interfere with the autonomic control

processes (Wulf et al., 2001). Let's think about this: If we are going to cue someone to balance on one leg, should we instruct them A) to focus on pressing their whole foot into the floor and maintain a tall spine and a fully extended leg position (internal) or B) to stand tall on one leg and focus on a point directly ahead of them (external)? Which do you think will produce the superior result? Research would suggest the answer is B), but both techniques do prove to generate positive results. It is suggested to get comfortable with both styles because the client's understanding of the cue evidenced by proper execution will guide you what focus is most effective for that individual. The client may also let you know which attentional focus approach garners the most successful motor pattern efficiency. Your job is to both listen and observe very attentively.

Cueing Protocol and Feedback

These are placed in the same category because they both have great impact on one another. First and foremost, movement cues should be both verbal and visual. This reinforces the rule that you must be able to do it, before you cue it! For the client to succeed in learning or refining the movement task at hand, you must be able to not only verbally instruct the exercise, but also give an appropriate demonstration of the movement. Therefore, the order of operations should be to:

1. Verbally cue before beginning the movement
2. Demonstrate the movement
3. Allow the client to perform the movement unloaded
4. Provide feedback

When individuals perform a novel task or refine a movement pattern, we as coaches are receiving information (feedback) about the client's abilities based on their movement quality. Some coaches suggest that cueing should be done as frequently as possible, whereas others suggest a schedule as stated above (Leahey, 2012)**.** Two studies conducted by Wulf et al. (2002, 2010) suggested that giving external coaching cues immediately after every single task produced the greatest improvements in learning a movement task. The studies suggest that more external cueing is actually better. Does this mean that you *should* cue more often and more frequently? No. What this does mean is that you should *only cue* when it is needed: when someone is learning a new movement pattern and if the movement may result in harm or danger.

Fitness professionals can provide feedback in four distinct ways: verbal, modeling, tactile, and visual. When providing **verbal** feedback, it is important to remember to describe the technique positively: encourage the participants to "do this" versus saying, "don't do this." It is suggested that professionals should only describe unwanted form if participants repeatedly perform a movement task incorrectly putting themselves at risk of injury or harm from performing the task incorrectly. **Modeling** allows the professional to direct the client's attention to the form correction they are modeling for them. It is suggested that you model the movement yourself if possible. You may use another client to do so, but avoid comparing them to one another. A **tactile** approach is usually the last approach used because it requires that you gain permission from the client to touch them. Professionally, it is more tactful to touch a client with the fingertips or with the back of the hand rather than the palm in appropriate areas. With the advent of smart phones and tablets, providing **visual** feedback is easy and almost

instantaneous. Clients have the ability to observe their exercise form through the use of still picture images or videos you take on your smartphone or tablet. In addition, smartphone and tablet applications such as Spark Lite, created by Spark Motion, are downloadable motion analysis tools that allow you to record video and than instantly analyze it. These applications do have an additional cost and due to the novelty of these applications, supportive research that validates the use of these innovative practices is extremely limited.

The field of fitness is constantly changing and as professionals we are always seeking ways to improve our methods and reach for optimal results. In order to do so, it is important to remember that our first priority is to ensure client safety. If a client is able and free from injury, they are capable to perform astonishing tasks. The key to success lies in adhering to the major principles of motor learning and find creativity in our personal approach and communication.

CHAPTER III

Movement Screening

Introduction

Every form of movement has purpose. Whether you are reaching for the telephone, carrying groceries, or jumping for a rebound, we move for purposeful reasons. What I would like for you to consider is do you and those you coach move purposefully? Do you set or follow specific standards to execute tasks? Is your approach to movement progressive in nature?

Movement screening is imperative. It helps to identify weak links that have the likely potential of increasing risk of injury. According to Gray Cook (2003), weak links do not necessarily signify muscle weakness, they can recognize any physical limitation, whether it be strength, endurance, movement efficiency, power, flexibility, or skill. Thus screening for dysfunction in movement may help identify target areas of focus in order to keep the body balanced (McGill, 2009).

Various forms of screening tools are available, but it is important to stay within your scope of practice when screening clients. Further, not all the screening tools have been thoroughly evaluated, so proceed with caution. No matter the tool or theory used, movement screening is never intended to diagnose or treat a medical condition. It should simply facilitate in the creation and implementation of a training program to improve upon target areas of focus.

Assessments designed to test the quality of postural structure and movement function have been given greater credence in mainstream fitness. However, there has been limited clinical research to properly evaluate these methodologies, so it should be

noted there are limitations to the information proposed in this chapter. That being said, it is important for the reader to be aware and evaluate the efficacy and importance of the screening tools currently being utilized. What will be discussed below are two of the current movement screening programs being used in many sports and fitness development settings. As you read the material, think critically about the value each method provides. As a professional, you will be responsible for evaluating new tools and techniques as they become available and this may be before valid research has substantiated their claims.

Posture

The term, "posture," usually refers to the manner in which a body is positioned when an individual is sitting or standing. Posture, for the sake of this text, can be divided into two facets: static and dynamic. **Static posture** can be defined as the way individuals physically carry themselves in stance *without movement*, whereas **dynamic posture** reflects how an individual maintains body positioning during functional tasks *with movement* (Clark & Lucett, 2011), Dynamic postural assessments (also known as *movement screens*) will be discussed in further detail as the chapter progresses.

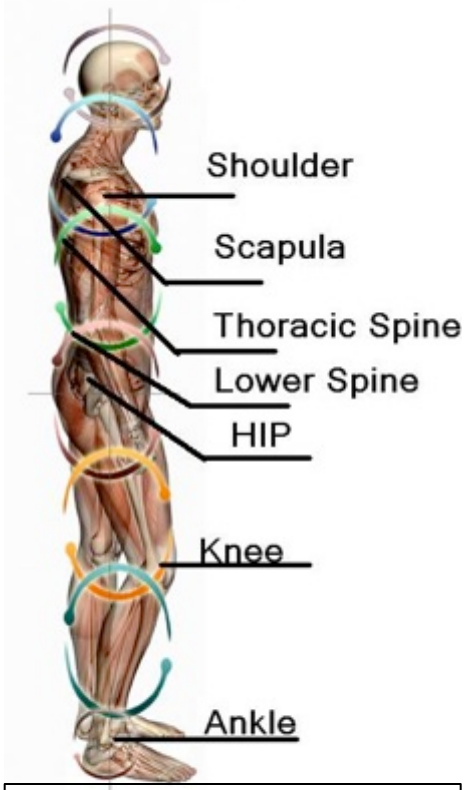


Figure 3.1:*Kinetic Checkpoints*
Note. From "Your body: The joint stack," by J. Saunders, 2011, *B.E. Fitness,* Copyright image: Public Domain: http://www.bootcampeffect.com/your-body-the- joint-stack

How To Assess Posture

Postural assessments require great skill in visual observation from the practitioner (Clark & Lucett, 2011). Though this can be developed with practice, it is important to understand that most postural assessments follow a systematic approach using detailed observation of the kinetic chain. As discussed in the previous chapter, the kinetic chain is comprised of a *sequence* of primary joints, responsible for human movement and includes the ankle, knee, hip, lumbar spine, thoracic spine, cervical spine, scapula, and glenohumeral joint. The **five primary kinetic checkpoints** that are considered as joint markers to help identify proper joint mechanics are: the **ankle/foot complex, knee joint, lumbopelvic hip complex (LPHC), shoulder/scapulae,** and **cervical spine** (Bushman et al., 2014)**.**

According to the concept of the joint-by-joint approach**,** *most* joints in the human body are designed either for stability or mobility, not to exceptionally perform in both parameters (Boyle, 2010; Cook, 2003; Cook, 2010; Whiting & Rugg, 2006). A **stable** joint is one that is readily able to resist movement whereas a **mobile** joint moves more freely and can dislocate quite easily (Boyle, 2010; Buckley, Thigpen, Joyce, Bohres, & Padua, 2007; Bushman et al., 2014; Chorba, Chorba, Bouillon, Overmyer, & Landis, 2010, Cook, 2013). Unlike the hip joint that is both stable (because of the supporting articular tissues and large muscle mass) and mobile (due to the ball and socket construction)**,** joints that are built for stability are considerably less mobile, whereas those designed for mobility are usually less stable (Whiting & Rugg, 2006). You can refer back to Table 2.1 in Chapter 2 to see a list of the five primary kinetic checkpoints classified by joint action and their primary needs.

You must consider the primary needs of the five kinetic checkpoints when conducting static postural assessments. The most common method is to assess starting with the foot/ankle complex moving superiorly through the major joint complexes as the assessment progresses. Often, dysfunctions observed in the lower part of the kinetic chain are reflected as compensations higher up the kinetic ladder. Therefore, your order of operations for the static assessment is to observe the following points sequentially:

1. Foot and ankle
2. Knee
3. LPHC
4. Shoulders/Scapulae
5. Head/Cervical Spine

Ask yourself the following questions as you observe the client in a stance position from an anterior, lateral, and posterior view, respectively.

1. **Foot and ankle**: A) Do they remain straight and parallel? B) Is the tibia vertical to the sole of the foot? C) Is there excessive pronation?
2. **Knee:** A) Do they track in line with the toes? Do they remain in neutral position? Do they abduct or adduct?
3. **LPHC:** Does the pelvis remain neutral? Is there excessive lumbar extension or flexion?
4. **Shoulders/Scapulae:** Are the shoulders in a neutral, relaxed position? Is there excessive elevation? Kyphosis?
5. **Head/Cervical Spine:** Is the head in neutral position? Is it tilted or rotated? Does the head jut forward into excessive extension?

Common Static Postural Distortions

It is rare these days to see the average individual exhibit optimal posture. Research has proposed a multitude of possible causes for changes in static posture including muscle imbalances, injury, surgery, and the overuse of repetitive movement patterns and muscles (Clark & Lucett, 2011; Cook, 2003; Janda, 1987). The source of movement dysfunction is often the combined effect of multiple events and factors and can be discussed at great length, but this section will focus on the three common postural distortion syndromes identified by Janda (2002). This is not to assume other static postural compensations do not occur, but the three most common deviations likely to present themselves in the average population are lower crossed syndrome, upper cross syndrome, and pronation syndrome (Janda, 2002).

An individual who exhibits **lower cross syndrome (LCS)** as depicted in Illustration 3.1, is often characterized by excessive lumbar lordosis caused by an anterior pelvic tilt. Often if someone expresses LCS in static posture, the individual exhibits an inability to stabilize the pelvis during functional tasks, like squatting and pressing overhead (Clark & Lucett, 2011). Table 3.1 below lists common muscles that may be the possible cause of LCS because they are either too short and tight or too weak and lengthened (Clark & Lucett, 2011; Janda, 1987; Janda, 1993).

Illustration 3.1*: Lower Cross Syndrome*

Table 3.1:*Lower Cross Syndrome Summary*	
Possible Shortened Muscles	Possible Lengthened Muscles
Gastrocnemius	Anterior Tibialis
Soleus	Posterior Tibialis
Hip Flexor Complex	Gluteus Medius/Maximus
Adductors	Transverse Abdominis
Erector Spinae	Internal Oblique

Table 3.1: *Lower Cross Syndrome Summary*
Note. Adapted from "Static Postural Assessments" by Clark & Lucett, 2011, *NASM Essentials of Corrective Exercise Testing,* p.99. Copyright 2011 by Lippincott Williams & Wilkins. Reprinted with permission.

Individuals with **upper cross syndrome (UCS)** are often characterized by protracted shoulders and the head protruding forward, as illustrated in Figure 5.3. This static postural compensation is often exhibited in individuals who sit for a majority of their waking hours and develop muscle imbalances due to one-dimensional pattern overload. Table 3.2 lists common muscles that may be the possible cause of UCS because they are either too short and tight or too weak and lengthened (Clark & Lucett, 2011; Janda, 1987; Janda, 1993).

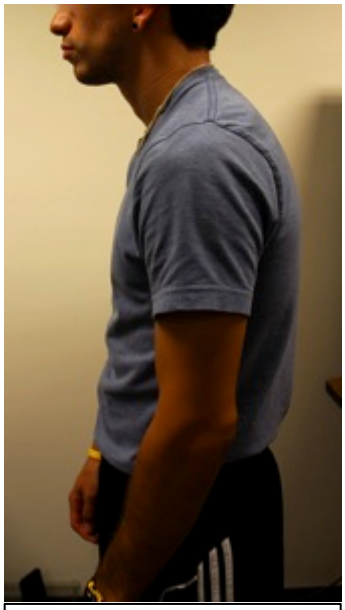


Illustration 3.2*: Upper Cross Syndrome*

Table 3.2*: Upper Cross Syndrome Summary*	
Possible Shortened Muscles	Possible Lengthened Muscles
Upper Trapezius	Deep Cervical Flexors
Levator Scapulae	Serratus Anterior
Sternocleidomastoid	Rhomboid
Scalenes	Mid-Trapezius
Latissimus Dorsi	Lower Trapezius
Teres Major	Teres Minor
Subscapularis	Infraspinatus

Table 3.2: *Lower Cross Syndrome Summary*
Note. Adapted from "Static Postural Assessments" by Clark & Lucett, 2011, *NASM Essentials of Corrective Exercise Testing,* p.100. Copyright 2011 by Lippincott Williams & Wilkins. Reprinted with permission.

Illustration 3.3: *Pronation Distortion Syndrome*

Individuals with **pronation distortion syndrome (PDS)** are characterized by excessive foot pronation, also observed as flat feet, and excessive knee flexion and adduction which is known as "knock-kneed" or valgus. Those who exhibit PDS, as shown in Illustration 3.3, often develop predictable patterns of injury in the ankle, knees, and hips/low back. Table 3.3 lists common muscles that may be the possible cause of PDS because they are either too short and tight or too weak and lengthened (Clark & Lucett, 2011).

Table 3.3*: Pronation Distortion Syndrome Summary*	
Possible Shortened Muscles	Possible Lengthened Muscles
Gastrocnemius	Anterior Tibialis
Soleus	
Peroneals	Posterior Tibialis
Adductors	
Illiotibial Head	Gluteus Medius / Maximus
Hip Flexor Complex	
Biceps Femoris (short head)	Vastus Medialis

Table 3.3: *Pronation Distortion Syndrome Summary*
Note. Adapted from "Static Postural Assessments" by Clark & Lucett, 2011, *NASM Essentials of Corrective Exercise Testing,* p.101. Copyright 2011 by Lippincott Williams & Wilkins. Reprinted with permission.

Energy Leaks and the Optimum Performance Pyramid

Energy Leaks

The purpose of performing a dynamic postural assessment (movement screen) is to assess for any risk factors or weak links that may be present along the kinetic chain. The term "kinetic" signifies the force transference from the nervous system to the skeletal, articular, and muscular systems, whereas "chain" refers to the interconnected system of joints in the body (Clark & Lucett, 2011, p. 106). Weak leaks are an indicator that some type of human movement impairment is observed along the kinetic chain. So called "*energy leaks"* can result from these weak links. According to Cook (2003; 2006; 2013), energy leaks indicate poor movement efficiency and occur when all of the energy

generated to perform a movement does not fully go into executing that task. The rules of science tell us that this energy must go somewhere. The law of conservation of energy in physics states "energy can be neither created or destroyed," thereby implying that there is undoubtedly a transference of energy, but the question asked is, "is it being efficiently directed to the task or is there energy being wasted by the movement being inefficient? For example, observation of a skilled runner reflects a "smoother and more efficient" movement pattern than the average runner who appears to have extraneous movements not directed specifically and the task of running. These two different runners look different when running because the more skilled runner has a greater economy of movement, resulting in less wasted energy.

These energy leaks are exhibited as **stress**, particularly when muscle imbalances are present and altered recruitment strategies are utilized (Clark & Lucett, 2011; Liebenson, 1996; McGill, 2009). In the profession of personal training, you will observe that poor form is always a result of some form of an energy leak. This may cause excess movement of other limbs when performing a task or may create an unnatural motion of the spine or other body parts, leading to an increased stress on the associated tissues at risk (Clark & Lucett, 2011; Liebenson, 1996)**.** Cook (2003) claims that constant doses of small amounts of stress imposed on the body can result in microtrauma, therefore if testing reveals weaknesses or energy leaks, that area must be immediately trained**.** Cook (2003; 2013) recommends testing for weak leaks in phases:

1) Test for weak links in fundamental movement patterns

2) Test for weak links in physical conditioning

3) Test for weak links in skill.

Optimum Performance Pyramid

Optimal performance is dependent upon building a human movement system that is well balanced in functional movement, performance, and skill. The **optimum performance pyramid** model (Figure 3.2) was developed by physical therapist, Gray Cook, and displays a system where functional movement is the foundation, movement efficiency is the body, and specific skill is the apex of the pyramid (Cook, 2003; Cook, 2013)**.**

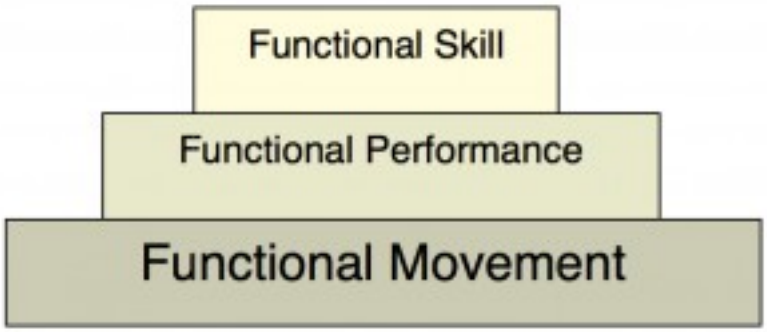


Figure 3.2: *Optimum Performance Pyramid.*
Note. Adapted from "Analyzing Movement" by Cook, G., 2003, *Athletic Body in Balance,* p.13. Copyright 2003 by Gray Cook. Reprinted with permission.

The optimum performance pyramid demonstrates an athlete that possesses a strong base in functional movement by exhibiting an exceptional amount of muscular balance, coordination, and mobility. This individual has great kinesthetic awareness and has an ability to move, balance, and stabilize themselves in a multitude of body positions **Cook2003.** The athlete also demonstrates a substantial amount of functional performance when executing tasks requiring strength, endurance, and power. This level of gross athleticism displays a proficiency in movement and minimizes energy losses through an efficient transmission of force throughout the body (Cook, 2003; McGill, 2009, p. 287). The last element portrays functional skill, whether it's a sport specific skill or specific to

a particular activity. The client exhibits a high level of athleticism in this stage. Exercise programming for a well-balanced athlete should remain progressive, promoting improvements where they are needed.

The **overpowered performance pyramid** illustrated in Figure 3.3 describes an athlete who is deficient in fundamental movement and skill performance, but exhibits a high level of power development (Cook, 2003; 2010)**.** Even with adequate levels of strength, an overpowered athlete's lack of flexibility and balance limits their ability to perform basic movement patterns and stabilize in certain postures. For example, an individual who develops a strong and powerful bench press may also have developed a level of upper-cross syndrome due to a training imbalance between muscular pushing and pulling power. This may cause the athlete to exhibit a suboptimal functional movement score, which appears as a small foundation in the performance pyramid (Cook, 2003)**.** Here, the base and the peak are approximately the same size and the ability to generate power overcompensates the inability to be mobile, stable, and/or balanced. Therefore, the overpowered athlete should engage in an exercise program that increases flexibility or stability.

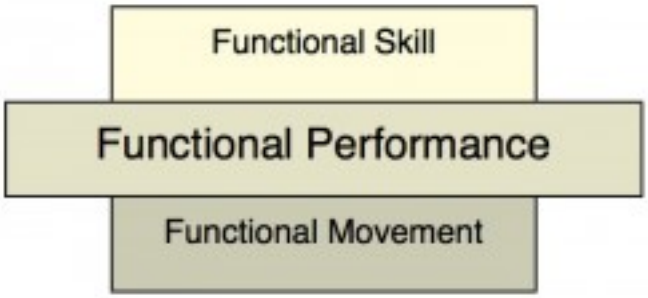


Figure 3.3: *Overpowered Performance Pyramid.*
Note. Adapted from "Analyzing Movement" by Cook, G., 2003, *Athletic Body in Balance,* p.14. Copyright 2003 by Gray Cook. Reprinted with permission.

The **underpowered performance pyramid** (Figure 3.4) illustrates an athlete that moves freely, exhibiting excellent balance and flexibility, but lacks in overall power production and motor coordination (Cook, 2003). This is an athlete, when provided with the right program could develop optimal strength, power, agility, and speed. Therefore, a program that incorporates weight training, endurance training, and plyometric training could deem extremely beneficial.

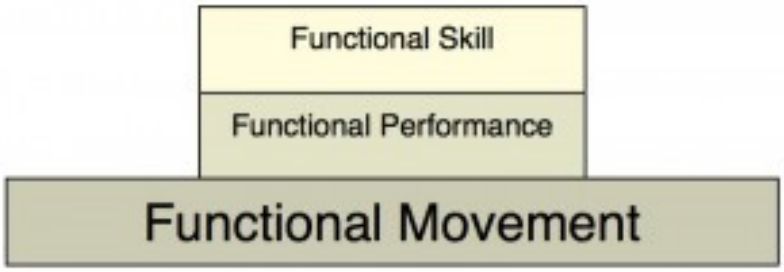


Figure 3.4: *Underpowered Performance Pyramid.*
Note. Adapted from "Analyzing Movement" by Cook, G., 2003, *Athletic Body in Balance,* p.15. Copyright 2003 by Gray Cook. Reprinted with permission.

The **underskilled performance pyramid** (Figure 3.5) represents an athlete that has developed an optimal level of functional movement and power, but is severely lacking in sport-specific skill (Cook, 2003). These athletes often exhibit a high level of physical dexterity. In order to progress skill, it is recommended for the athlete to practice the skills that need strengthening. If the goal is to be a better volleyball setter, the athlete must practice setting the ball. Skill development is imperative to physical performance.

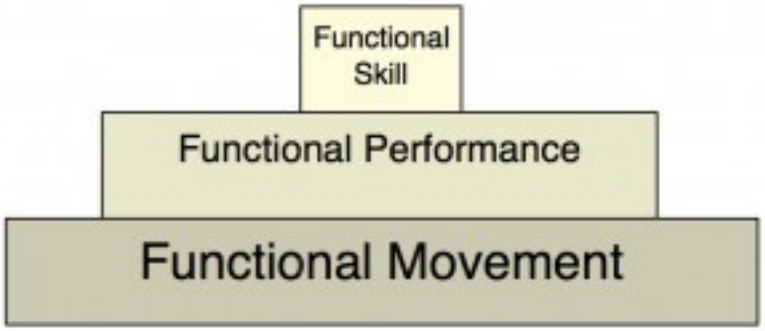


Figure 3.5: *Underskilled Performance Pyramid.*
Note. Adapted from "Analyzing Movement" by Cook, G., 2003, *Athletic Body in Balance,* p.15. Copyright 2003 by Gray Cook. Reprinted with permission.

The performance pyramid model provides a simple illustration to help you garner a deeper understanding to human movement. The three areas of focus- functional movement, performance, and skill- are distinguished into three different levels that build onto one another. Fully developing each facet of human movement is imperative to living a healthy, fit lifestyle while minimizing inherent musculoskeletal injury risk.

The Importance of Dynamic Posture Assessments

When analyzing the human body, it is important to remember that the body is simply a series of interchangeable mobile and stable joints that allow for successful locomotion and stabilization. Therefore, examining the kinetic checkpoints for proper joint function during task performance can divulge a great deal about the client's predisposition for injury. The joint-by-joint approach**,** a concept previously addressed, emphasizes the notion that movement quality is closely related to joint function, whereas dysfunction in a joint complex increases one's risk of injury (Boyle, 2010). Loss of function in a particular joint, say the hip, will seemingly affect that joint or the one above. In other words, if a mobile joint like the hip becomes immobile, it will compensate for its

lack of mobility within the lumbar spine. In an effort to keep the body balanced the body must find mobility somewhere. When the intended stable lumbar spine joint complex becomes more flexible in an effort to offset the stiffness in the hips, the lumbopelvic hip complex (LPHC) can subsequently experience pain. According to Boyle (2010), "the process is simple:"

- *Lose ankle mobility, get knee pain.*
- *Lose hip mobility, get low back pain.*
- *Lose thoracic mobility, get neck and shoulder pain, or low back pain.*

Therefore, when utilizing dynamic postural assessments, one must look for energy leaks exhibited throughout the kinetic chain. Any dysfunction in movement patterning indicates that some movement compensation is occurring throughout the kinetic chain that may result in injury. Both the National Academy of Sports Medicine (NASM) and Functional Movement Systems (FMS) provide functional tools and in-depth practical training that allow you as the professional to conduct and analyze movement screens using their respective standards, therefore if you wish to use their protocol, it is highly recommended for you to continue your professional development by completing a movement screening certification from one or both of these organizations. Though both organizations utilize a multitude of tests to analyze movement, in this text only one specific test, a squat assessment, will be compared and contrasted in detail in the following sections.

NASM Movement Screening

The National Academy of Sports Medicine (2011) believes the movement

assessment process allows the health and fitness professional to discover movement impairments and attempt to correct them using appropriate exercise strategies. There are two categories of movement assessments: **transitional** and **dynamic assessments**. Transitional movement assessments do not require a change in the client's base of support (BOS) and include activities like pushing, pulling, squatting, and balancing. Dynamic assessments are a bit more complex and involve movement of the BOS; these include assessments like walking, running, jumping, and landing (Clark & Lucett, 2011). Due to the complexity of movement screening, this section will focus on only one out of the seven primary NASM transitional assessments:

1. Overhead squat
2. Single-leg squat
3. Push-up
4. Standing cable row
5. Standing overhead dumbbell press
6. Star Balance excursion
7. Upper extremity assessments

The goal is to observe for any movement compensations that may occur within the major kinetic checkpoints during these transitional assessments. The NASM screening procedure recommends the professional to view the client perform the assessment from an anterior, lateral, and posterior position(Clark & Lucett, 2011). One should consider as you review the material whether the NASM movement assessments lean towards a diagnosis. NASM suggests that a possible cause for the observed movement disruptions is due to an overactivation or underactivation of specific

musculature, which is caused by altered length-tension relationships or altered reciprocal inhibition (Clark & Lucett, 2011; Janda, 1987; Janda, 1993). To make the practical assumption that a movement dysfunction is caused by a specific muscle or muscle group is simply out of your professional scope of practice as a personal trainer. It is highly suggested to **only observe** the transitional assessments and make note of any abnormal movement patterns that occur along the kinetic chain. Leave the diagnosing for the medical professionals.

NASM Overhead Squat Assessment

The NASM overhead squat assessment is designed to test dynamic flexibility, balance, core strength, and general neuromuscular control (Clark & Lucette, 2011). Use of the overhead squat assessment is supported in research literature to be a valid and reliable measurement tool when appropriate protocols are in place (Bell & Padua, 2007; Buckley et al., 2007; Clark & Lucett, 2011; Ireland, Wilson, Ballantyne, & Davis, 2003; Vesci, Padua, Bell, Strickland, Guskiewicz, & Hirth, 2007; Zeller, McCrory, Kibler, & Uhl, 2003). Below lists the overhead squat assessment procedure and the proper cueing protocol.

OH Squat Cueing Procedure

1. Cue the individual to stand with the feet shoulder-distance apart with the toes pointing directly ahead. (The foot/ankle complex should be in neutral position).
2. Instruct the individual to raise their arms overhead, keeping the arms fully extended.

3. Cue the individual to squat back into a position about chair's height and return to starting position.
4. Cue them to continue to repeat the movement for 5 repetitions as you observe them from an anterior, posterior, and lateral view.

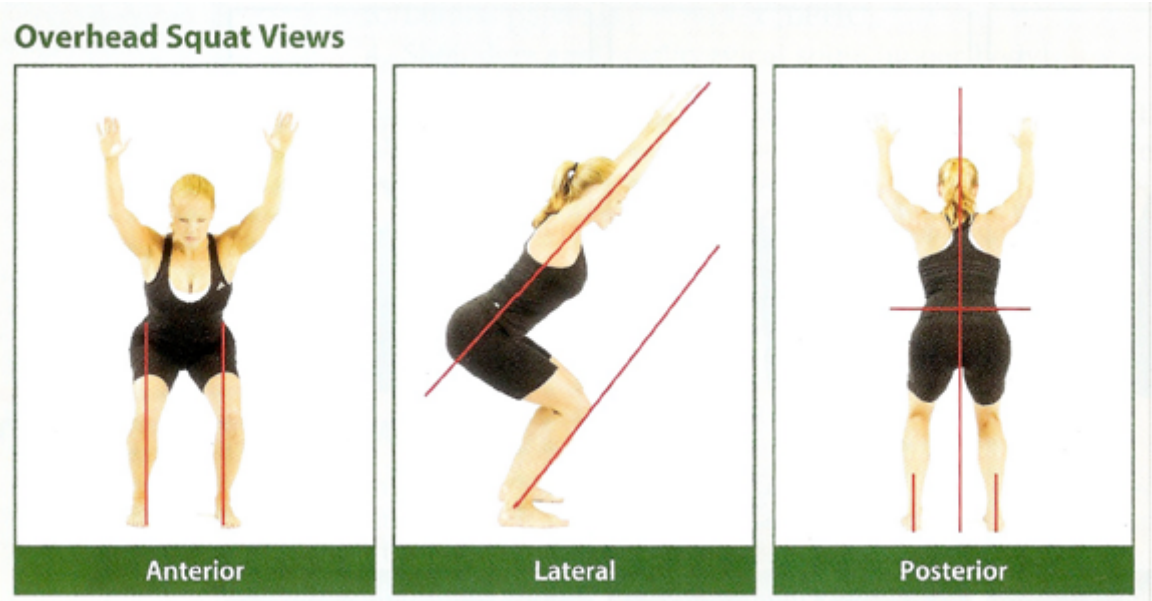


Illustration 3.4 *Overhead Squat Position-Anterior, Lateral, & Posterior View.* Note. Adapted from "Movement Assessments" by Clark, M., & Lucett, S., 2011, *NASM Essentials of Corrective Exercise Training,* p.109. Copyright 2011 by Lippincott Williams and Wilkins. Reprinted with permission.

NASM OH Squat Assessment Results

When you are examining the client perform the OH assessment you are observing the 5 kinetic checkpoints to see if they are maintaining their joint integrity and allowing for purposeful movement. Ask yourself the following questions:

1. Is the movement initiating from the hips?
2. Are the feet, ankles, and knees remaining in-line with one another? Is the whole foot remaining on the ground? Is the knee tracking directly over the foot?

3. Do you observe any odd compensations in the lumbopelvic hip complex, shoulder, or cervical spine? Do you see a rounding of the low back or an excessive arch?

NASM recognizes the most common movement compensations observed in this transitional assessment. The following compensations observed throughout the kinetic checkpoints can be seen from an anterior, lateral, and posterior view, respectively (Clark & Lucett, 2011).

Anterior View Kinetic Checkpoints and Compensations:

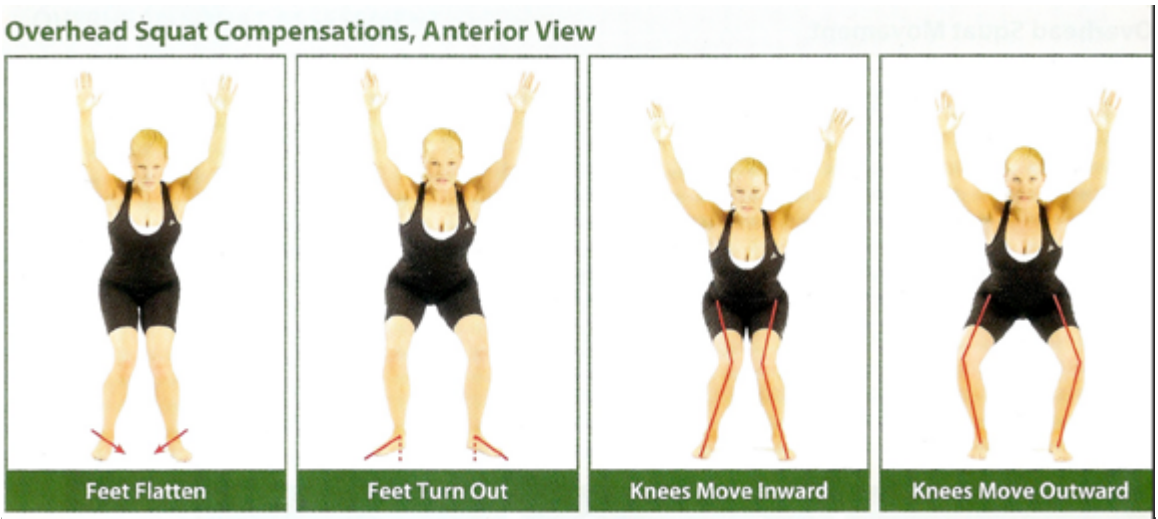


Illustration 3.5 *Overhead Squat Common Movement Compensations-Anterior View.* Note. Adapted from "Movement Assessments" by Clark, M., & Lucett, S., 2011, *NASM Essentials of Corrective Exercise Training,* p.110. Copyright 2011 by Lippincott Williams and Wilkins. Reprinted with permission.

1. **Ankle/foot complex**: Do the feet flatten or rotate outwards?
2. **Knee complex:** Do the knees adduct or fall into valgus? Or do they abduct, moving outward (varus)?

Lateral View Kinetic Checkpoints and Compensations:

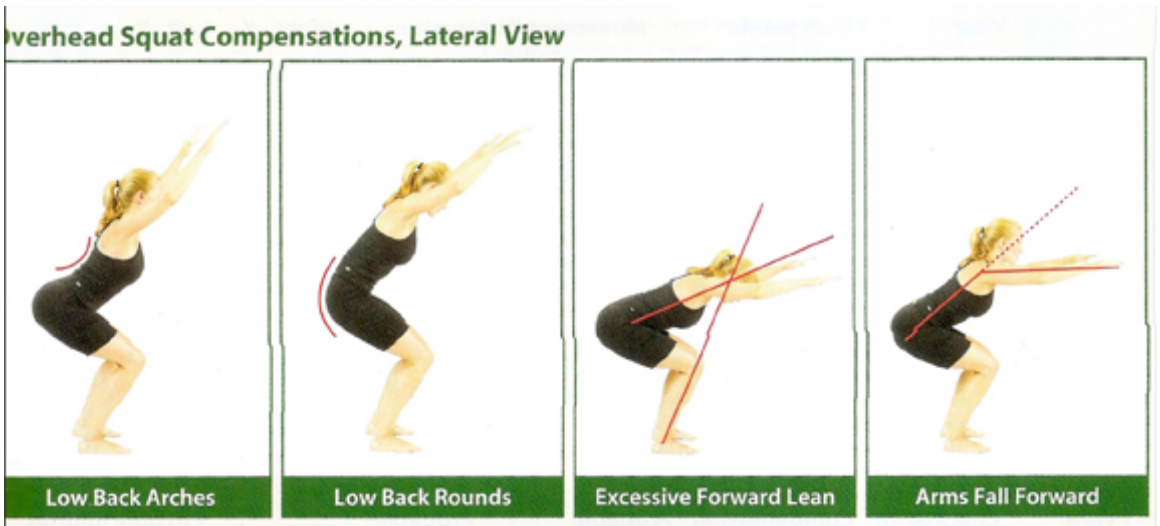


Illustration 3.6 *Overhead Squat Common Movement Compensations-Lateral View.* Note. Adapted from "Movement Assessments" by Clark, M., & Lucett, S., 2011, *NASM Essentials of Corrective Exercise Training,* p.111. Copyright 2011 by Lippincott Williams and Wilkins. Reprinted with permission.

1. **Lumbopelvic hip complex (LPHC):** Is there excess arching (lordosis) or rounding (kyphosis) of the lower back? Does the client lean forward excessively?
2. **Shoulder/Scapulae complex:** Does the client have the ability to hold the arms up overhead or do they fall forward?

Posterior View Kinetic Checkpoints and Compensations:

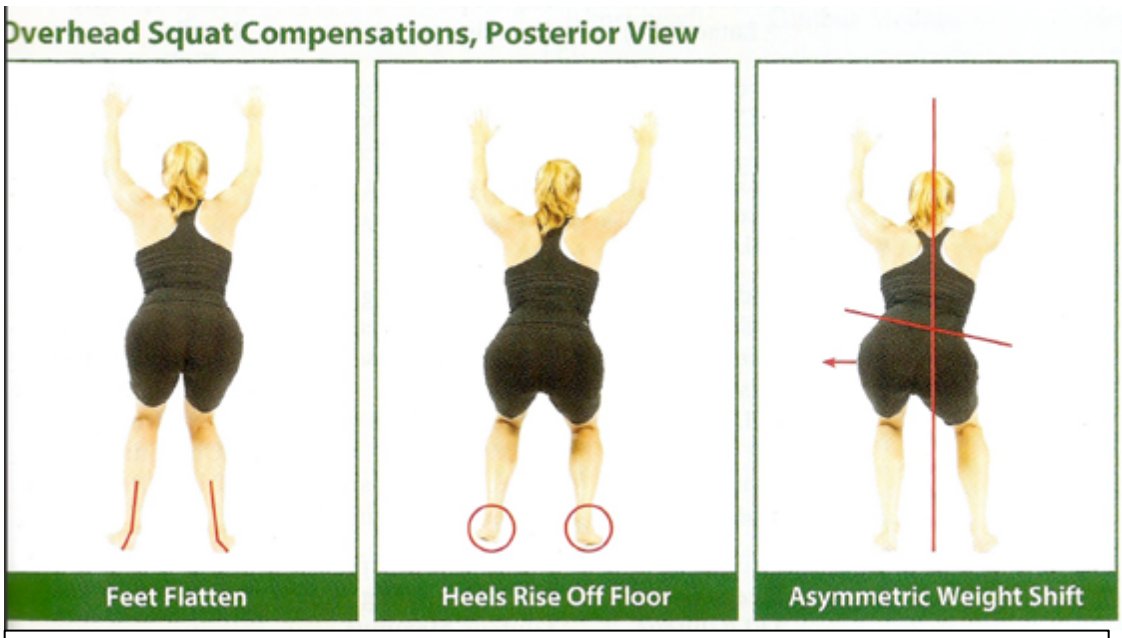


Illustration 3.7 *OH Squat Common Movement Compensations-Posterior View.* Note. Adapted from "Movement Assessments" by Clark, M., & Lucett, S., 2011, *NASM Essentials of Corrective Exercise Training,* p.111. Copyright 2011 by Lippincott Williams and Wilkins. Reprinted with permission.

1. **Ankle/foot complex:** Do the feet flatten or do the heels come up off the floor?
2. **LPHC:** Does the body shift to one side during the movement? (asymmetric weight shift)
3. **Shoulder/Scapulae:** Do the arms fall forward?'

NASM Results and Interpretations

Table 3.5 in Appendix A gives a detailed breakdown of the NASM overhead squat assessment movement compensations (Clark & Lucett, 2011). In the table, a variety of muscles and muscle groups are named as probable overactive and underactive muscles. NASM assumes that this will help the health and fitness professional create an individualized exercise program to correct the notable imbalances. It should be noted that movement dysfunction may not always be corrected through exercise programming that

assumes dysfunction is caused by specific muscle weakness. Diagnosing the cause may pose to be troublesome in the future if you are not 100% certain, therefore one should proceed with caution when utilizing this form of assessment tool.

The Functional Movement Screen (FMS)

The Functional Movement Screen (FMS) was originally developed by a physical therapist (Gray Cook) and an athletic trainer (Lee Burton) who shared a common insight to human movement. Though Cook and Lee were in differing professions, they both understood that an individual's quality of movement could influence rate of injury risk. Therefore, they developed the FMS as a comprehensive ranking and grading system that assesses the quality of fundamental movement patterns imperative to normal function (Kiesel, Plisky, & Butler, 2009). The FMS claims to be able to identify an individual's asymmetries or weaknesses by screening these specific movement patterns (Cook, 2006). Though there may be a bit of controversy regarding the reliability of the Functional Movement Screen, many studies support the use of the FMS as a reliable assessment tool (Gribble, Brigle, Pietrosimone, Pfil, & Webster, 2012; Minick, Kiesel, Burton, Taylor, Plisky, & Butler, 2010; Smith, Chimera, Wright, & Warren, 2013). Both Chorba et al. (2010) and Kiesel et al. (2009) produced results that support the FMS as a tool that is able to predict risk of injury with a cumulative score of less than 14. Investigations conducted by Gribble et al. (2012) and Smith et al. (2013) reported a good level of inter-rater reliability for FMS raters of differing levels of training and experience, emphasizing that educational background or professional experience did not limit one's ability to score movement patterns. The results indicated that the FMS is a reliable screening tool when used by 'untrained' practitioners in determining faulty movement patterns and that clinical

experience level does not affect the reliability, and can therefore be a useful tool in the screening of athletic populations (Gribble et al., 2013).

Despite research into the FMS's predictive value and inter-rater reliability, little evidence supports the validity of the effectiveness of the Functional Movement Screen. Kazman et al. (2014) produced results that indicated there is a lack of internal consistency in FMS sum scores. Research conducted by Frost et al. (2012), were unable to demonstrate significant changes in the movement quality of the testing group when compared to the control group. In addition, Parchmann and McBride (2011) provided only limited support for the effectiveness of the FMS for assessing athletic performance, indicating no direct link between FMS score and jumping, agility, or sprinting performance. However, McGill, Anderson, and Horne (2012) concluded that further research is warranted to determine whether movement scores and fitness scores predict injury resilience.

The FMS includes seven movement-based tests which are scored on a ranking scale of 0–3, indicating that an optimal movement score is achieved with a total score of 21.

- A score of 0 is assigned if the subject experiences pain with any portion of the movement.
- A score of 1 indicates the subject could not complete the movement as instructed.
- A score of 2 indicates the subject completed the movement with some level of compensation and completely pain-free

- A score of 3 indicates the movement was completed as instructed and is free of compensation and pain.

The seven tests of the FMS are as follows:

1. Overhead Squat
2. Hurdle Step
3. Lunge
4. Shoulder Mobility
5. Active Straight Leg Raise
6. Push up
7. Rotary Stability.

Overall the FMS provides a method to assess movement quality as optimal, passing, or failing. It is not intended to be diagnostic in nature, therefore testing does not result in a prescription of certain muscles to train, but instead emphasizes *movements* that need training. In a study conducted by Kiesel et al. (2009), FMS scores for professional football players were improved after a 7-week off-season corrective exercise intervention. The results of this study indicate that with proper movement training, observable asymmetries can be reduced and injury threshold scores can be improved (Kiesel et al., 2009). Though there were many limitations to this study, one fact remains certain: the quality of movement improvement was significant. Therefore, the FMS seems to be a tool that can be utilized to help professionals prescribe exercises that can eventually improve someone's quality of movement. If you have the ability to improve someone's life by helping them live with less pain or discomfort by increasing flexibility,

balance, strength, power, or endurance, then it is your professional duty to learn how to do so.

Scoring the FMS

This section is not intended to fully detail the FMS; it is simply an overview of one of the fundamental movement patterns used in the screen. Remember, the FMS is not intended to be diagnostic in its approach. You are simply to score each movement as 3) optimal, 2) passing with some modifications, 1) unable to perform the movement, or 0) experiencing pain throughout the movement. A score of 14 is considered the "threshold" for injury risk, whereas a score of 21 is considered ideal (Kiesel, Plisky, & Voight, 2007). The following sections will illustrate each movement pattern and common compensations.

FMS Overhead Squat

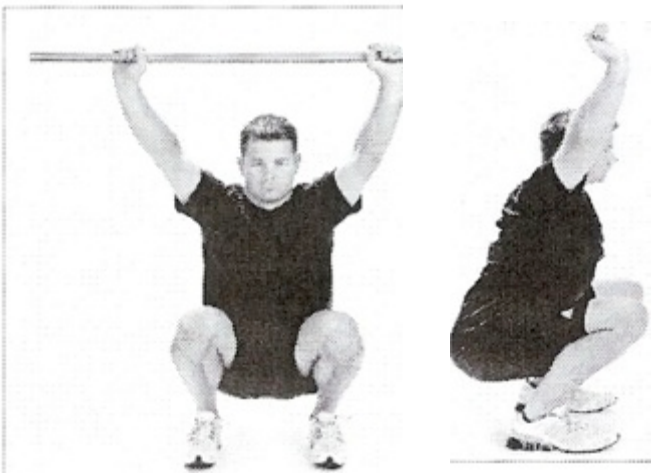


Illustration 3.8: *FMS Overhead Squat Score 3 Position.*
Note. Adapted from "Functional movement screendescriptions" by Cook, G., 2010, *Movement,* p.91. Copyright 2011 by E. Grayson Cook. Reprinted with permission.

The overhead squat pattern is meant to assess coordinated mobility amongst the extremities, core stability, and postural control (Cook, 2013). The client is instructed to

start with the feet wider than shoulder width, toes pointing forward, and the dowel pressed directly overhead. The individual is then cued to squat as deep as possible and return to standing position. This should be repeated for a total of 3 repetitions and observed from an anterior, lateral, and posterior view.

A SCORE OF 3:

1. Upper torso remains parallel with the tibia.
2. Femur is below horizontal
3. Knees are aligned over feet
4. Dowel is aligned over feet

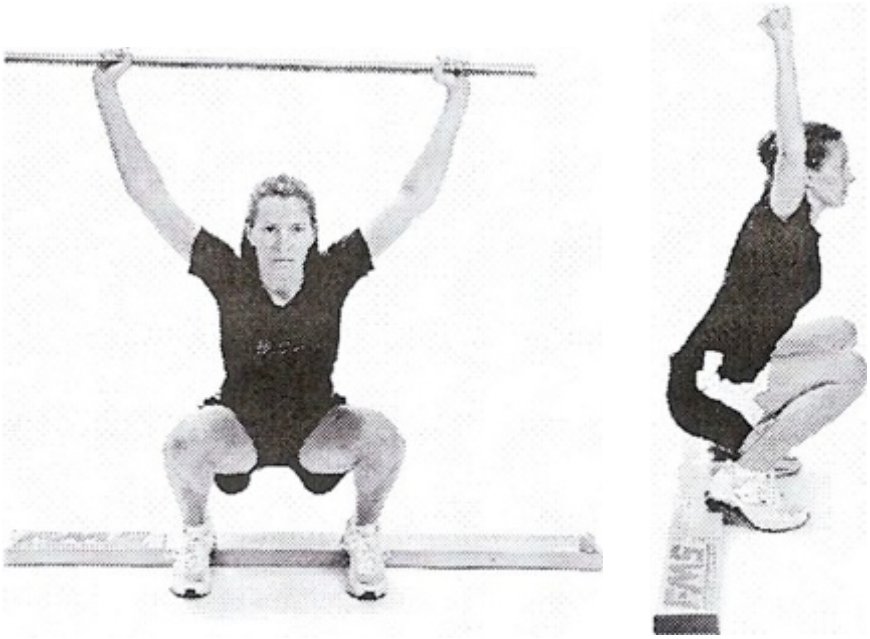


Illustration 3.9: *FMS Overhead Squat Score 2 Position.*
Note. Adapted from "Functional movement screen descriptions" by Cook, G., 2010, *Movement,* p.91. Copyright 2011 by E. Grayson Cook. Reprinted with permission.

A SCORE OF 2:

1. Upper torso remains parallel with the tibia.
2. Femur is below horizontal
3. Knees are aligned over feet
4. Dowel is aligned over feet
5. Heels are elevated

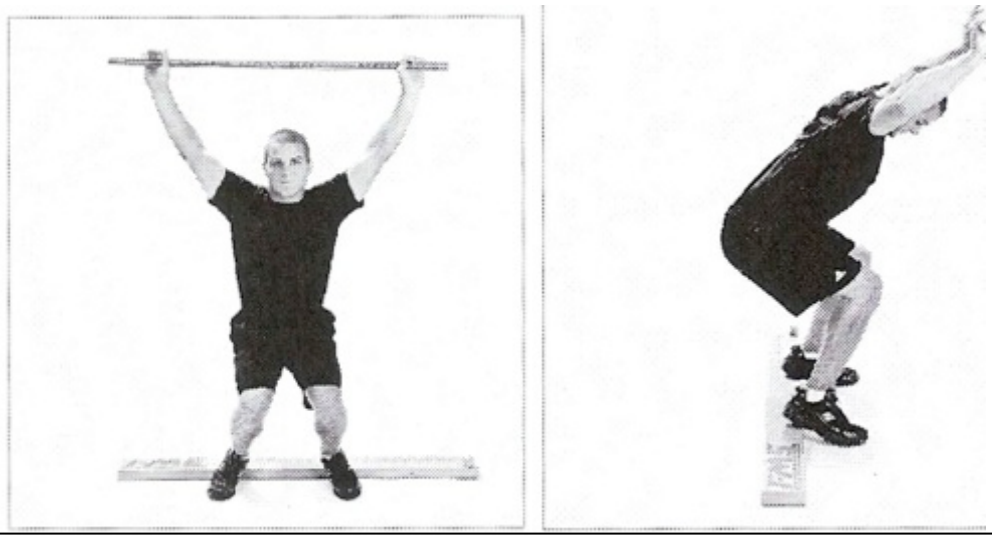


Illustration 3.10: *FMS Overhead Squat Score 1 Position.*
Note. Adapted from "Functional movement screen descriptions" by Cook, G., 2010, *Movement,* p.91. Copyright 2011 by E. Grayson Cook. Reprinted with permission.

A SCORE OF 1:

1. Tibia and upper torso are not parallel
2. Femur is not below horizontal
3. Knees are not tracking in line with the feet
4. Lumbar flexion is noted

A SCORE OF 0:

1. The client only receives a score of zero if pain is present with any portion of the screening assessment. If pain is present, the client must be referred to a medical professional.

FMS Results and Interpretations

It is suggested that when utilizing the FMS that you can only make assumptions about any observable weaknesses once you have completed the entire screen. Energy leaks may be observed in more than one of the seven tested movements and only one of the screening tests have been shown, therefore if it is your wish to utilize these tests, it is recommended that you further your learning with a weekend certification in the Functional Movement Screen. There are no prerequisites necessary to attend an FMS-Level One Certification and you can register for the closest seminar near you at www.functionalmovement.com.

First and foremost, if a subject has received a zero on any of the proposed tests, they need to have that area examined by a sports medicine professional whom is able to discover *the cause of pain* associated with that specific movement pattern. Next would be to assess if the client has any scores of one, which would indicate that the individual exhibits obvious mobility and stability issues. Anyone scoring a one on any test will likely need additional hands-on therapeutic techniques from a licensed professional, such as a manual (massage) therapist, chiropractor, or physical therapist, in conjunction with a corrective exercise program in order to see larger improvements. A licensed medical professional has legal right to diagnose and use manual techniques to correct the movement issue at hand, whereas a certified personal trainer only has legal domain to

provide exercise training programs that are designed to address a clients needs and goals. Therefore, creating a professional network comprised of movement specialists from a variety of backgrounds is recommended. If you were to become FMS certified, you would have access to a database on the FMS website that lists all FMS certified practitioners, including licensed medical health professionals nearest you. These FMS-certified licensed professionals have the ability to assist you with the development of a comprehensive training approach for any client exhibiting movement dysfunctions that can improved with hands-on techniques.

It should be noted that clients with a cumulative score of *less than* 14 pose themselves at a greater risk of injury when participating in fitness programs (Kiesel et al., 2007) and are not required to see a licensed professional for manual therapy, though it comes highly recommended (Cook, 2013). For these client's exhibiting movement patterns that score dominantly as either a one (cannot perform the movement) or a two (performs the movement with a compensation), they are recommended to also work on grooving movement patterns that focus on mobility and stability. By choosing from a specific subset of exercises *provided in the FMS manual* that are designed to activate the body's natural process of sequencing fundamental movement and stabilizing patterns, clients are able to build a stronger foundation that allows for a higher level of movement quality. For individuals exhibiting a perfect score of 3 (optimal functional movement patterning is achieved), they must continue to work to maintain their level of movement quality. It is suggested to continue to re-test to ensure that the associated exercise program continues to produces optimal results and progressed movement patterning.

A Concluding Thought to Movement Screening

Movement screening is intended to facilitate you in your profession. It is designed to help you discover energy leaks and movement compensations that may be corrected through proper exercise training. No matter the screening method utilized, the importance is placed upon examining proper joint function. Is the assessment method allowing you to decipher whether joint kinematics are functioning efficiently or is it resulting in you trying to determine what is causing the problem? As a personal trainer, it is out of your scope of practice to determine the actual source of the issue. Refer the client to a doctor if they complain about nagging and reoccurring joint pain, stiffness, muscular pain or injury. What you can determine is 1) that there is a movement issue that needs to be addressed and 2) there are specific joints within the kinetic chain that are exhibiting inefficient movement execution. Those two variables alone will be enough to help you create a solid program.

CHAPTER IV

Human Movement

Introduction

No matter your profession, race, creed, color, or socioeconomic status, we are all alike in human design. Though our human design may minutely differ from one individual to another, due to the obvious gender differences and individual genetic predispositions for disease or athleticism, there are noticeable differences in *how people move*. If we were all created with the same human design, than *we should* be designed to perform the same *type* of movement patterns. This is not implying that movement quality will be similar, but if proper joint function allows for standing from a seated position, opening doors, and carrying groceries, than everyone reading this text utilizes *similar movement patterns*. Therefore this chapter will focus on teaching movement patterns that certain movement experts consider as *essential* for developing an effective strength-training program.

It *should not* to be assumed that the implementation of these specific movement patterns will 1) define a program as good/bad or successful/unsuccessful, 2) guarantee decreased risk from injury or harm, or 3) be physically possible to perform by all populations. You should understand that certain movement restrictions, whether incurred from injury or disease, limit an individual's ability to optimally execute any fundamental movement. Further research is warranted to support whether training specific human motions versus muscle groups elicit greater improvements for all populations that partake in this style of training. Though there may not be one ideal way to train for strength and mobility improvements, this style of training proposes a method that aims to induce

improvements in both parameters. Therefore, this chapter will focus on teaching the fundamental movement patterns essential for developing a sound program. Developing a sound athlete will depend on your ability to improve any movement dysfunctions exhibited (if any) in the essential movement patterns with the use of a specialized exercise program, which will be addressed in detail in the last chapter.

Training Movement Not Muscles

The human body is a fascinating organism. Consider all of the varying "compartments" of the human body and their varying responsibilities, yet it still functions as a single unit. Could you imagine having a muscular system or skeletal system that did not work while the digestive system processed your last meal? Thankfully, the physiological body systems work synergistically together allowing for basic human function. The same theory should apply to our exercise training methods, yet we are predominated with a training culture that is fixated on training muscles or groupings of muscles (bodybuilding), not coordinated movements. Training for a chiseled six-pack has its physical limitations. Newer research has published findings stating that those who focus on enhancing a single muscle, like the transverse abdominals are exhibiting dysfunction in their spines (Cholewicki J., Greene, H., Polzhofer, G., Galloway, M., Shah, R., & Radebold, A., 2002; McGill, 2003; McGill, 2009)**.** This is demonstrated in both the athletic and working population. In a nutshell, the data suggests that focusing on one muscle does not enhance health improvements. Muscles work synergistically to perform optimally, therefore movement must be trained, not a specific muscle.

Thomas Meyers, most notably known for his work *Anatomy Trains,* suggests that people should think of their bodies as not as having over 600 muscles, but as having

one muscle that is divided into over 600 myofascial pockets (Meyers, 2009). Though the present text does not divulge deeply into the importance of the myofascial network, it remains to be an integral *link* of the human movement system (Schleip, Findley, Chaitow, & Huijing, 2012). The fascial network is an uninterrupted, singular body system that connects muscles together from head to toe, thereby becoming *one muscle.* Thus, if you still plan to train muscle-specific, focus on this one: the human movement system.

Changing the Current Gym Standard

Transforming the standard of training from muscle specificity to movement specificity is essential to developing a healthier, stronger, and more functional population. Consider that there are only 168 hours in a week. The current guidelines recommend adults to spend 75 to 150 minutes performing high to moderately-intense exercise per week: that averages to about only 2 hours a week (Bushman et al., 2014). The average American works 40 hours a week, most of which is spent sitting. Let's also assume there is a commute to this place of employment and no matter the mode of the two-way commute, the stance assumed is in a sitting position (driving a car, riding a bus, train, or bike). Don't forget that everyone has to eat (all work requires energy) and when they do, they are *usually* sitting. Our lifestyle packs a lot of sitting into our waking hours. So why is it that when we enter a traditional gym, it's loaded with assisted machines that force us to assume a sitting posture in order to do the work? A plethora of research has been conducted to examine a variety of postures and its effects on spinal loading, particularly lumbar disc pressure and its associations with back pain (Cholewicki et al., 2002; McGill, 2003, Nachemson, 1964). The most important in vivo data are from pioneering intradiscal pressure measurements recorded by Nachemson (1964) during the

1960s (illustrated in Figure 4.1) that shows sitting in a slouched, seated posture creates the greatest amount of pressure in the lumbar spine.

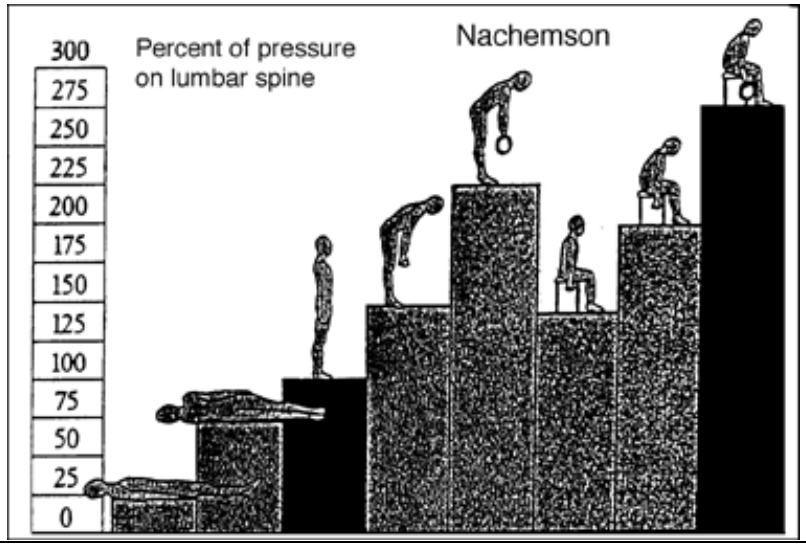


Figure 4.1*: Varying postures and the percent of pressure on the lumbar spine*
Note. From "The lumber spine - And orthopedic challenge" by A. Nachemson, 1976. *Spine*, *1,* 59 – 71. Reprinted with permission.

According to McGill's (2009, p. 11) all tissues, particularly the spine, have a specific tolerance and capacity to do work. If the load tolerance is exceeded, the tissues will break. Particularly in a seated, slouched, and kyphotic posture, the spine's tolerance to load is minimized as indicated in Nachemson's (1964) findings in Figure 4.1. There has been an effort to dispute Nachemson's (1964) results as illustrated in a comparative review shown in Figure 4.2, though little evidence exists to refute these findings (Claus, Hides, Moseley, & Hodge, 2008).

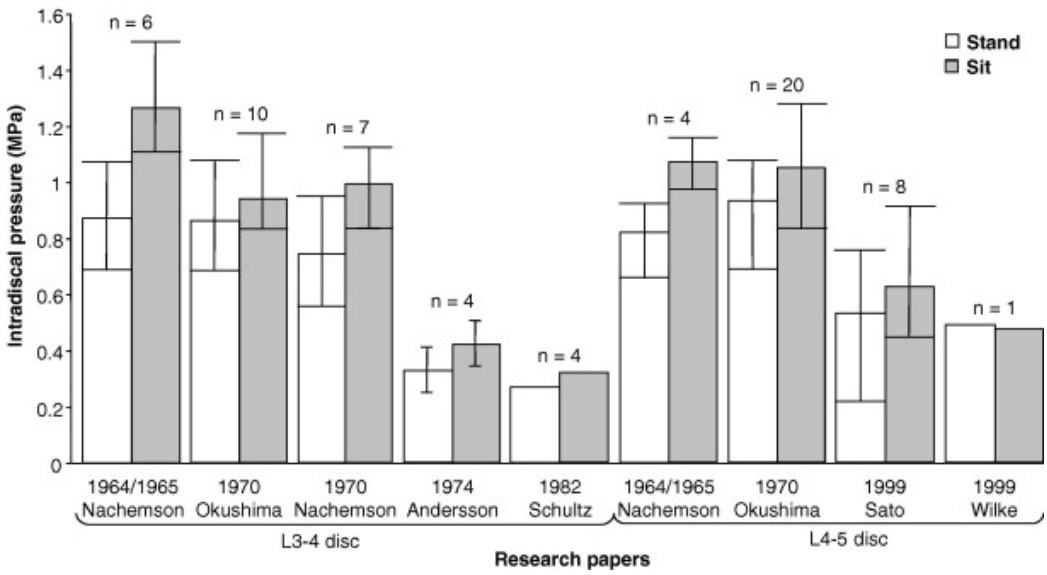


Figure 4.2*:* A Comparative review of postures and pressure on the lumbar spine. Note. From "Sitting versus standing: Does the intradiscal pressure cause disc degeneration or low back pain?" by A. Claus et al, 2008. *Journal of Electromyography and Kinesiology, 18*(4), 550-558." by A. Claus et al, 1976. *Spine*, *1,* 59 – 71. Reprinted with permission.

The current gym standard promotes a world full of movement compensations made possible through the use of machines. Fundamental movement patterns like pushing can be done with the seated chest press, pulling can be performed on the seated machine row, and squatting patterns can be mimicked on the leg press machine. It should be noted that machines have their limitations. According to ACSM, assisted machines have three fundamental drawbacks (Bushman et al., 2014):

1. They are not designed to fit all individuals proportionately, such as those who are obese or disabled.
2. They use a fixed range of motion (ROM) that requires the individual to conform to the movement limitations of the machine.

3. They focus on individual muscle groups, neglecting the need for other muscles as assisting stabilizers or movers.

There is another fundamental limitation to the use of assisted machines that allow for an unnatural seated posture during exercise. Consider the individual that uses the assisted machines in the gym. Imagine their workout: They warm-up with a brisk walk or jog on the treadmill, followed by performing a systematic circuit of seated machine exercises, all the while not forgetting to allow for plenty of rest between sets. Warm-ups and rest periods have a significant effect on spine mechanics. A study conducted on varsity volleyball players documented an increased spine compliance following a warm-up. However, all compliance was lost after sitting on a bench in a flexed position for 20 minutes (Green, Grenier, & McGill, 2002). Results indicate that the effect of the warm-up is brief if activity is interrupted, particularly with *seated* rest (McGill, 2009). Therefore, it seems reasonable to assume that by utilizing exercise machines that compromise form and promote prolonged sitting in a flexed position after a warm-up, the increased risk for injury is significant. Another factor to consider with the machine emphasis on sitting is the lower contribution to energy usage during the actual workout. If the goal is expend more calories than incorporating exercises that require more movement, joint action, and muscle recruitment will be the best option.

I cannot emphasize enough that human beings were intended to move, therefore if an individual only has three hours out of 168 hours a week dedicated to exercising, I suggest that they get up (not sit down) and move! There is significant scientific rationale to performing full body exercises that incorporate multiple joints, multiple muscle groups, variation in direction, and utilize full range of motion. This stimulates optimal

neural, metabolic, circulatory, and endocrine responses that have a significant on effect on energy utilization (Bushman et al., 2014). The greater amount of energy used to perform work, the greater amount of calories that are expended. It's really that simple.

The Fundamental Human Movement Patterns

How is it that we distinguish which movements are the ones we consider fundamental? In the realm of athletic development, one would need to assess the required movements of the sport and break them down into the basic moves that form that the initial stages of training (McGill, 2009). For example, if you were to train a baseball pitcher you would need to break down the elements of a pitching motion. You would observe a step, lunge, twist, reach, and push, all while maintaining balance. But in the realm of personal training we are not always training the athletic population. One must really consider what movements are fundamental to human development. Observing the first 18 months of a child's life can tell you a great deal about the essential movements necessary to developing an optimal human movement system. In infancy and childhood is where we built our movement foundation with patterns like crawling, rolling, balancing, and climbing. Once we could walk, we only had one purpose: MOVE (and move fast we did, indeed)!

Somewhere between then and now, we have lost some speed, flexibility, stability, and overall vitality. In an effort to return to the strong, powerful, and graceful beings we were intended to be, one must train like a kid again! Be task specific not muscle specific: Climb the gym rope as fast as you can, race to the last cone and back, or just play Frisbee with a friend! A training protocol based on task completion allows for a utilization of movements that incorporate the use of *multiple* joints, muscle groups, planes of motion,

and directions of force, thereby providing results that can truly transfer to one's activities of daily life. Doing standing bicep curls in front of the gym mirror *will not* assist in one's ability to carry a heavy suitcase through the airport, or help someone climb out of a burning building, nor will it necessary translate to increasing overall strength in that particular muscle group. Therefore, your role as a personal training professional is to ensure and educate your clients that multi-joint movements that incorporate multiple muscle groups will elicit a greater physiological response and hopefully quicker improvements than focusing on singular muscles and joint actions.

An Expert Comparison of Fundamental Movement Patterns

Three internationally recognized movement specialists have spoken a great deal regarding the importance of training motion, not muscles. The movement strategies addressed by Dr. Stuart McGill, Gray Cook, and Dan John have received a great deal of attention in mainstream fitness, but further research is warranted on the use of fundamental movement patterns in exercise training as a strategy to improve health outcomes and reduce injury risk when compared to training muscle-specific. What follows is a brief comparison of each expert's views on fundamental movement patterns.

McGill's Fundamental Patterns

Dr. Stuart McGill is a Professor of Spine Biomechanics in the Department of Kinesiology at the University of Waterloo in Canada. He is an international lecturer and author of hundreds of scientific publications addressing the issues of low back health, injury prevention, and improving performance. McGill breaks human movement into six fundamental movement patterns:

1. Squat / Lift
2. Lunge
3. Twist
4. Push / Pull
5. Gait
6. Maintaining Balance

McGill (2009) argues that no matter the sport or task at hand, an athlete will exhibit all of these patterns, but movement will be specific to the nature of the sport. Compare the movements required in pole vaulting and bowling. They both require an approach to a target while carrying an object. Preparation for a lift (of an object or body) occurs by executing a lunge and squatting sequence. One obviously requires a greater amount of power, speed, range of motion and strength to execute, but they both implement facets of lunging, squatting, lifting, twisting, pushing, gait, and maintaining balance. In order to optimize performance McGill (2009) suggests applying a multitude of principles including the summation of segment velocities, production of linear impulses, direction of force application and the production of angular impulses. Though these principles will not be addressed in this text, you may refer to *The Ultimate Back Fitness and Performance* (4th ed., p. 126-134) to further your understanding of how these principles may help with correcting the observed movement errors.

Cook's Fundamental Patterns

Gray Cook is a physical therapist, certified strength coach, international lecturer, and consultant to major organizations including the NBA, NFL, NHL, and WNBA. Board certified in orthopedics, Cook has co-developed the Functional Movement

Systems often used as screening tools in the fitness field. The FMS (Functional Movement Screen) was created to assess for dysfunctions in the seven basic movement patterns:

1. Squatting
2. Stepping
3. Lunging
4. Reaching
5. Leg Raising
6. Pushing (Push-up)
7. Rotary Stability

Cook (2010) insists that these seven patterns set the foundation for the underlying properties of exercise and all athletic movements. These foundational patterns are divided into two distinct categories: **primitive** and **higher-level** movements. Primitive movement patterns require basic mobility and stability skills, whereas higher-level patterns are considered progressive components. The screen correction hierarchy model adapted from *Movement: Functional Movement Systems* (2010, p.81) is illustrated in Table 4.1 and is a constant reminder to work on the basics first. Therefore, one could assume the order of screening should proceed in that very order (Table 4.1) with the screening of basic movements before complex patterns. Cook (2010) does not define a specific methodological approach in the sequential ordering of movement screens, though he encourages professionals to focus on "the little four" (primitive patterns) first before screening the "big three" (higher-level) movements (p. 80).

TABLE 4.1: Primitive Movement Patterns Screening Hierarchy Model	
PRIMITIVE MOVEMENTS	Reciprocal Reaching
	Supine Alternate Leg Raising
A subset of primitive patterns termed ***transitional movement patterns*** *which require a higher level of coordinated effort in stabilization and control*	Trunk Stability Pushup
	Quadruped Rotary Stability
HIGHER LEVEL MOVEMENTS	Squatting
	Stepping
	Lunging

Table 4.1*: Primitive Movement Patterns Screening Hierarchy Model*
Note. Adapted From "The FMS Design," by G. Cook, 2010, *Movement: Functional Movement Systems,* pg. 81.Copyright 2010 by E. Grayson Cook. Reprinted with permission.

John's Fundamental Patterns

Dan John is an All-American discus thrower, weightlifter, and highly sought-after coach. John's no-nonsense banter and ability to make complex concepts seem simple makes him one of the most relatable and well-understood international lecturers in the field of strength training and program design. His practical experience on the field and in the weight room creates the following six core elements of his program design methods:

1. Push
2. Pull
3. Hinge
4. Squat
5. Loaded Carries
6. *The sixth move:* Get-Ups

In terms of ease, John (2013) recommends to implement the movement patterns in the following order: push, pull, hinge, squat, and carry. However, programming the order of exercises as a carry, squat, hinge, pull, and push, respectively, is considered a "game changer" because the most tasking exercises are placed first (p.225). A "*game changer"* according to John (2013) is a fitness standard that is far from what is expected. For example, John *expects* every healthy male to be able to perform 8-10 bodyweight pull-ups, regardless of age, whereas the *game changer* is to be able to perform 15 bodyweight pull-ups. Notice that the sixth move, the get-up, is not mentioned. This is because the get-up is considered a combination of all five other movements, which requires the individual to move from the ground up and will be discussed further in detail in the subsequent chapter.

No matter the goal in training, John (2013) clings to five fundamental principles that are applicable to any athlete or client with which you work. First and foremost, fundamental human movements are considered fundamental! Secondly, strength training for an increase in lean body mass and joint mobility trumps all. Third, in consensus with Cook (2010) and McGill (2009), there is a constant need to assess and reassess for gaps and weaknesses. The fourth principle is to always strive for mastery and grace. John emphasizes this because he believes it truly addresses the concept that movement *quality,* not *quantity,* is key. The last principle states that in order to create a balanced approach to training, one must incorporate "bus bench" and "park bench" workouts, a concept that deserves a little more explanation. (p.201). Consider the fundamental difference between a bus bench and a park bench. On the bus bench, we have a specific mission: we are waiting for something to take us somewhere at a very specific point in time. However on

the park bench, we have an ability to enjoy our time, the birds, and the sunshine. Who wouldn't want to spend more time on the park bench? A plethora of scientific evidence suggests that bus bench workouts work because they utilize fundamental scientific training principles of programming to produce results (ACSM, 2013; Bushman et al., 2014). Bus bench workouts are specific exercise programs geared to achieving a specific goal in mind: Whether it's a 12-week hypertrophy program or a 6-week fat loss diet consuming a 25/35/45 ratio of fats, proteins, and carbohydrates, the concept is alike. The approach that most people take to training 52 weeks out of the year is this bus-bench method. Though the bus bench method produces validated results, life, like you, is far from perfect and does not always follow a detailed plan. Though it is important to attempt to schedule and prepare for every element in the weight room, it may be impossible to do *all* the time. An effective fitness professional has to be able and willing to adjust the training program for a client if it is warranted. To gain a park-bench mentality, one must realize that life is unexpected and planning for a general improvement in overall health will provide you with lasting and transferrable results.

A Concluding Thought to Fundamental Human Movements

Though each expert opinion addressed a different subset of human movement patterns that are considered fundamental, the movement selections were all similar. It was agreed upon by all that the squat, push, and pull are considered primary movement variables. However, what John (2013) classifies as a loaded carry is defined as a walk, run, or sprint performed under load. Therefore, the concept of "loaded carry" could theoretically be categorized as a gait pattern by McGill (2009), or as a method of stepping as addressed by Cook (2010). Another imperative movement that deserves mentioning is

rotation. McGill (2009) classifies the twist as a fundamental movement, whereas Cook (2003) emphasizes the rotary stability pattern as paramount, and Dan John (2013) promotes the get-up. No matter which pattern of movement is implemented, they all incorporate one major theme: ground-based rotation. Thus, it is important to distinguish which six movement patterns are considered fundamental for the sake of this course. Having taken into account the three perspectives, it is in my opinion that the following six movements are *essential* to developing a quality strength-training program. They have been classified in order of importance:

1. Groundwork
2. Hinge
3. Squat
4. Pull
5. Push
6. Loaded Carry

Groundwork can be classified as anything that requires the individual to make floor contact using a coordinated effort with the limbs, such as crawling, rolling, twisting, and kneeling. This process creates a foundation in strength and mobility that is expressed during childhood development, therefore it should seemingly have a similar effect when used as a training strategy for adult-fitness development. Groundwork often incorporates a multitude of essential movement patterns, thereby utilizing a variety of muscle groups, joint complexes, and planes of motion. It is often considered a very tasking and tiring exercise component, therefore it ranks number one on my assessment and programming protocol.

The hip hinge is a precursor to the squat. In order to squat (and deadlift) effectively, one must be able to able to hinge (flex) at the hips first. Picking items off the floor like books, groceries, or children, is a real-life activity. It is recommended to observe the client's hip and spine motion while they demonstrate similar tasks, such as sitting, standing, and rising from a seated position (McGill, 2009). Any "energy leaks" or "spine hinges" (Cook, 2003; McGill, 2009) exhibited in these basic movements warrants your attention. Grooving the hip hinge motion with exercises like the glute bridge is important to help teach optimal hip flexion and extension, which helps minimize energy leaks in the spine and reduce risk of injury (McGill, 2009). For those individuals who experience difficulty with gluteal activation (sometimes referred to as glute amnesia) when performing a bridge, implementing an easier variation, such as the static glute bridge can help with gluteal stimulation, teaching full range of motion of the hip joint, and building up a base of strength without compromising associated tissues in the lumbopelvic hip complex (LPHC).

The squat is a movement pattern essential to performing functional tasks in daily life. To perform the squat properly and to minimize risk of back injury, one must develop an exceptionally strong gluteal complex (McGill, 2009). Those who exhibit poor gluteal activation, run a higher risk of incurring a back injury. In contrast to a traditional squat that is performed bilaterally with both feet, research indicates that a single-leg squat has been shown to activate the gluteal complex immediately to assist with hip drive (McGill, 2009). Thus for the sake of this text, movements like the lunge, step-up, or single-leg squat are all considered squat patterns and are not separated into different movement

categories as McGIll (2009) and Cook (2013) do. Therefore, your utilization of a specific squat pattern or progression is dependent upon your client's goals, needs, and abilities.

Both the pull and push movement patterns are performed by the use of the upper extremities. I'm sure you can think of some common pull movements like the pull-up and cable row, but what exercises do you think of when you consider pushing? The common answers are push-ups, bench press, military press, and dumbbell shoulder press, but the fundamental pushing pattern is *missing*: the plank. A plank is considered the essential push pattern because it helps "groove" all upper-body pushing movements. Through an isometric holding pattern, proper plank execution requires a strong, coordinated effort between the upper limbs, shoulder girdle, and the trunk to maintain a stable position-everything that is required in a push pattern, but *without movement.* The plank exercise enforces a posture that depends on a foundation built on ankle, knee, hip, spine, and shoulder stability, strength, and endurance. The whole body is supported by one's ability to actively push against an inanimate object and resist the force of gravity, while maintaining all five kinetic checkpoints in a neutral position. The plank is challenging and considered a valid assessment of one's muscular endurance and core stabilization (McGill, 2009).

I saved the best for last: loaded carries. Carrying an additional load for any distance, whether one is walking, hiking uphill, or running, will undoubtedly stimulate the heart rate, increase respiration, and increase energy utilization. Increased caloric burn is a secondary benefit to performing a loaded carry, whereas creating a foundation in grip strength is primary. An increase in grip strength can translate to greater efficiency in the shoulder/scapulae complex through a direction of neuron flow (Cook, 2013; McGill,

2009). Science details that the brain dedicates a large neural network to the proper management of the hand, more than is dedicated to the entire arm or scapula. Clinicians in the rehabilitation setting use the phenomenon of directing neuronal overflow to enhance strength at a compromised joint by attempting to create joint stiffness (McGill, 2009, p.286). Theoretically, contraction at other joints initiates a process of "squeezing" the neural drive back to the joint where improvement is needed. So if weakness or dysfunction is exhibited at the shoulder or scapulae for example, than gripping or squeezing an immovable bar or heavy load can train the whole body to create stiffness. It is the ability to maintain stiffness that ensures an efficient transfer of energy through the kinetic chain producing optimal performance.

When looking to find ways to improve the human system, you must first change the way you think about the human system. Though the human body is constructed of a multitude of systems, the systems always work synergistically together to complete tasks. One may engage in a running program to improve their cardiovascular endurance but with prolonged training, improvements are also seen in lower-leg muscular endurance and fat mobilization and utilization. No matter the stimulus provided, it will have an effect over the entire human system. Therefore, to instill improvements in the human system, one must focus on the body's intended purpose: to move.

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APPENDIX A

Table 3.5: Movement Compensations and Possible Causes for the Overhead Squat Assessment				
View	Checkpoint	Compensation	Probable Overactive Muscles	Probable Underactive Muscles
Lateral	LPHC	Excessive forward lean	Soleus Gastorcnemius Hip flexors Abdominals	Anterior tibialis Gluteus maximus Erector spinae
		Low back arches	Hip flexors Erector spinae Latissimus dorsi	Gluteus maximus Hamstrings Intrinsic core stabilizers
	Shoulders	Arms fall forward	Latissimus dorsi Teres major Pectoralis major/minor	Mid/lower trapezius Rhomboids Rotator cuff
Anterior	Feet	Turn Out	Soleus Lateral Gastrocnemius. Biceps femoris (short head)	Medial gastroc. Medial hamstring Gracilis Sartorius Popliteus
	Knees	Move Inward	Adductor complex Biceps femoris (short head) TFL/Vastus Lateralis	Gluteus Medius Vastus Medialis Oblique (VMO)
Posterior	Feet	Heel Rises	Soleus	Anterior Tibialis

Table 3.5: Movement compensations and causes for the overhead squat assessment.Note. Adapted from "Movement Assessments" by Clark, M., & Lucett, S., 2011, *NASM Essentials of Corrective Exercise Training*, p.112-113. Copyright 2011 by Lippincott Williams & Wilkins