CHAPTER 1
INTRODUCTION

Statement of Problem

Complications with posture and back pain are becoming a wide-spread medical issue throughout the world. More than 70% of people in developed countries will experience back pain. Back pain is most common between the ages of 35 and 55, and, every year, 15 to 45% of this population suffers from back pain. Moreover, about 2 to 7% of people with acute back pain develop chronic back pain (Anderson, 1997).

Those suffering from back pain often ignore the problem until it becomes unmanageable and interrupts daily life. At this point, they turn to medical professionals for help only to discover that little can be done. Though related treatments are available in the medical field, little has been done to address and prevent the problem. It is important to consider what physical aspects contribute to pain and misalignment, what behaviors cause the problem, and what can be done to modify these behaviors.

When it comes to medical issues with the body, one injury will often trigger other problems or injuries. Back problems are often connected with other physical issues. Problems can arise from any day-to-day activity: walking, standing, sitting for long periods of time; these all affect one’s back and possibly create or exacerbate pain and tension. Posture also plays a significant role in back pain. Improper support of the body results in painful consequences.
Research has shown a connection between back pain and posture. Several factors, unique to each patient, contribute to his or her pain; still, each individual may or may not be susceptible to back pain. Other factors include type of posture, comportment, and daily activity.

The purpose of this study is to identify whether a connection exists between posture and personality. This researcher has years of experience working with clients who suffer from back pain and posture-related deviation. Repeatedly, a relationship between the clients’ pain or deviation and their personality type has been observed. Demeanor and personality type often correlate with posture. The goal of the study is to find concrete evidence proving this presumption.

By finding a correlation between posture and personality, researchers will gain insight into the factors that contribute to back pain. If the research shows a pattern between certain types of personality and certain types of posture, they will have another important ingredient necessary to better understand the cause of back pain. With this insight, a doctor would be able to tell a patient if he or she is susceptible to back pain, giving the patient an advantage in prevention. That patient could then be aware of the need for cautious behavior and pay more attention to his or her posture.

To further explain the connection between physical health and personality type, we can compare this research with the research linking Type A Personality with heart attacks. Research on this topic has demonstrated that people with Type A Personality are more susceptible to heart attacks (Heilbrun, 1988). With this research in mind, people who are
Type A and are aware of the data can be careful about their temper and how they manage their lives. Similarly, this research on posture and personality will be beneficial to doctors in the field of posture, alignment, and biomechanics. It will add an additional dimension of data that will be useful in categorizing each individual patient’s susceptibility to back pain.

**Components of Posture**

Posture plays a significant role in back pain. To understand how back pain relates to posture, an overview of the biomechanical components of posture is necessary. This will help explain how the body functions and how individual body parts contribute to the whole.

Posture comprises several different segments of the body. Each of these segments has a center of mass (Harrison, 2006). What is a center of mass? If an object is placed on the tip of the finger, and the object remains on the tip of the finger without falling off, the center of mass of that object has been found. Now in the human body, the head is one segment, the trunk is another, the legs, the arms, and so on. Each of these segments has its own center of mass. Each segment is connected to the other, adjusting the center of mass of each segment. A person’s head and neck sit on the trunk, which in turn sit on the pelvis, which in turn sits on the feet. The feet create the base of support for all segments above. Combined, the segments form a center of mass that, in turn, creates a center of gravity. The center of gravity is projected to the floor inside of the base support.
When a person’s body is fully aligned with good posture, each segment has a perfect center of mass; the center of gravity falls exactly in the middle of the base support. When this happens, the body can maintain balance with little to no effort. On the other hand, when one or more of those segments are out of alignment, the other segments have to compensate to keep balance. This includes strain on muscles and the neurological system, which fulfills Newton's third law (1999): for every action there is an equal reaction of the same strength in the opposite direction. A postural deviation will negatively affect the body in order to equalize one’s strength.

*Biomechanics of Posture*

In biomechanics, the body is divided into six parts: right side, left side, anterior, posterior, upper and lower body, each of which plays an important role in analyzing postural deviation. For example, if a person’s head tends to lean toward the left, the muscles on the right side of the neck and shoulders have to compensate in order to support the head. As a result, those muscles are overexerted and form lactic acid. Over time, this deviation will lead to neck pain (Sarno, 1991).

Back pain is created in a similar manner, but with different segments involved. The source of back pain can be traced to the foundation of posture and alignment: prehistoric man. At some point in his evolutionary history, man discovered the ability to stand on two feet instead of four. In doing so, he challenged the laws of physics. By walking on two feet instead of four, the base of support became smaller, which required more effort on the part of our ancestors in order to maintain balance. The act of standing forever
changed the alignment of the human body. Over time, our bodies have adapted to the new positioning. For example, the pelvis was pulled forward, creating the first curve of the spine. From this curve, the thoracic and the cervical curves followed. Since these early changes, several complications of the spine, which affect people all over the world, have evolved. The modern world, with its need to force the human body into chairs, desks, cars, etc. in the name of productivity, has contributed to these complications and increased their prevalence.

**Personality Type**

Personality is a stable set of characteristics that appear in individuals in unique combinations and account for behavior. Based on psychological theories, multiple dimensions of personality exist and various assessments of these types have been developed. Based on typology, the Myers-Briggs Type Indicator (MBTI) is a forced choice, self-reporting instrument used to identify 16 personality types (Myers, Briggs Myers 1998). The test consists of a series of questions based on day-to-day activities that is used to assess the subject’s preferences in four dimensions: attitude, mental processes, and orientation to the outer world.

Personality describes demeanor, communication and interaction, and energy level. Personality is what distinguishes an individual from the rest of the population.

**Definitions**

*Kyphosis*: the extreme curvature of the upper back.

*Lordosis*: a forward curvature of the spine in the lumbar region.
Extraversion: directing energy mainly toward the outer world of people and objects.

Introversion: directing energy mainly toward the inner world of experiences and ideas.

Sensing: focusing mainly on what can be perceived by the five senses.

Intuition: focusing mainly on perceiving patterns and interrelationships.

Thinking: basing conclusions on logical analysis with a focus on objectivity and detachment.

Feeling: basing conclusions on personal or social values with a focus on understanding and harmony.

Judging: preferring the decisiveness and closure that result from dealing with the outer world using one of the Judging processes (Thinking or Feeling).

Perceiving: preferring the flexibility and spontaneity that results from dealing with the outer world using one of the Perceiving processes (Sensing or Intuition).

Personality type: one of 16 combinations of preferences expressed in the MBTI four-letter codes.

Hypothesis

A direct relationship exists between personality types and posture types.
CHAPTER 2

REVIEW OF LITERATURE

The History of Mind and Body

While the great philosophical distinction between mind and body in western thought can be traced to the Greeks, it is to the seminal work of René Descartes (1596-1650), French mathematician, philosopher, and physiologist, that we owe the first systematic account of the mind/body relationship.

Descartes wrote the world's first extended essay on physiological psychology. In Descartes' conception, the rational soul, an entity distinct from the body and making contact with the body at the pineal gland, might or might not become aware of the differential outflow of animal spirits brought about through the rearrangement of the interfibrillar spaces. When such awareness did occur, however, the result was conscious sensation, body affecting mind. In turn, in voluntary action, the soul might itself initiate a differential outflow of animal spirits. Mind, in other words, could also affect body.

By focusing on the problem of true and certain knowledge, Descartes had made epistemology, the question of the relationship between mind and world, the starting point of philosophy. By localizing the soul's contact with body in the pineal gland, Descartes had raised the question of how the mind relates to the brain and nervous system.
The 17th Century: Reaction to the Dualism of Mind and Body.

The history of philosophizing about the relationship between body and mind since Descartes is the history of attempts to escape the Cartesian impasse. Early maneuvers of this sort, such as those of Malebranche, Spinoza, Leibniz, and the French materialists La Mettrie and Cabanis, were formulated in the context of metaphysics, in direct response to Cartesian dualism. Later views that arose in the 19th century needed to reconcile evidence from studies on the localization of cerebral function and on functional nervous disorders with prevailing theory in biology and psychology. These discussions reflected the newly accepted view that the brain serves as the organ of the mind. Although these theories of mind/brain relations (e.g., epiphenomenalism, interactionism, dual-aspect monism, and mind-stuff theory) were formulated in the context of science, they too were oriented toward circumventing the Cartesian impasse.

The natural world is radically divided into the mental and the physical; the physical is extended in space and the mental is not. If the nature of causality is such that causes and effects must have a necessary connection and be of a similar type, then mind/body interactionism of the Cartesian sort is obviously untenable. The first important attempt to deal with this contradiction in Descartes is known as occasionalism. Although preceded and influenced by Le discernement du corps et de l’ame (1666) of Géraud de Cordemoy (d. 1684), the work of Nicolas Malebranche (1638) was probably the most influential purveyor of occasionalism. According to Wikipedia, occasionalism is a philosophical theory about causation, which states that created substances cannot be sufficient causes of events. Instead, all events are taken to be caused directly by God Himself.
The 19th Century: Mind and Brain.

As the 19th century progressed, the problem of the relationship of mind to brain became ever more pressing. Indeed, so deep was the concern with mind/brain relations that it is difficult to find a systematic text written after 1860 that does not contain a discussion of this issue. Unfortunately, in the 241 years separating Descartes' *De homine* from Carpenter's *Principles of Mental Physiology*, little progress had been made in removing the primary objection to interactionism. In the often quoted words of John Tyndall (1871):

> The passage from the physics of the brain to the corresponding facts of consciousness is unthinkable. Granted that a definite thought, and a definite molecular action in the brain occur simultaneously; we do not possess the intellectual organ, nor apparently any rudiment of the organ, which would enable us to pass, by a process of reasoning, from the one to the other. (pp. 119-120)

Since this is an objection that can be just as effectively urged against epiphenomenalism, which rids itself of only half of the problem of interactionism, other 19th-century thinkers turned, as had their predecessors, to monism as the view of last resort. Two of the most influential monisms of the period, both aspect theories, were dual-aspect monism and mind-stuff theory.

In *The Nature of Mind and Human Automatism* (1885), Morton Prince (1854-1929) concerned himself with justifying the intuitive belief that our thoughts have something to do with the production of our actions. "No amount of reasoning," he wrote, "can argue me out of the belief that I drink this water because I am thirsty". After rejecting parallelism as being at variance with this intuition, Prince presented the classic
formulation of the mind-stuff metaphysic: "instead of there being one substance with *two properties* or 'aspects'- mind and motion- *there is one substance, mind*; and the other *apparent* property, motion, is only the way in which this real substance, mind, is apprehended by a *second organism*: only the sensations of, or effect upon, the second organism, when acted upon (ideally) by the real substance, mind" (pp. 28-29). For Prince, in other words, the psychical monism of mind-stuff constituted a modern form of immaterialism.

In 1890, when *The Principles of Psychology (1890)* was finally published, James (1813-1885) devoted two chapters to the analysis and critique of contemporary mind/brain views: one to the automaton theory and another to the mind-stuff theory.

In the seminal work of Janet (1859-1947), in the critical transitional paper of Breuer (1842-1925), and in Freud (1856-1939), a culmination of developments that had begun with Puységur's elaboration of the doctrines of Mesmer (1734-1815) is apparent. In a little over a hundred years, a huge corpus of evidence and related neurological and psychological theory had irrevocably led to the belief that mental events (e.g., mesmeric trance states, rapport, the therapist's will to cure, the concentration of attention, mental suggestion, psychic trauma, the dissociation of consciousness, and catharsis) could affect radical alterations in the state of the body. No psychologist writing in the 1890s could afford to ignore this rich material and its implications for conceptualization of the nature of the mind/body relationship.
Typology has existed as a philosophical way to explain personality since ancient times. By the beginning of the 20th century, many disciplines and thinkers were discussing individual differences in terms of types (Kersey and Bates, p. 3). In 1921, Carl Jung published “Psychological Type” in which he introduced a theory that became the foundation of a powerful school of thought in personality studies.

After several decades of exponential growth in the field of personality studies, psychology’s allegiance to behaviorism and experimental methods led to a significant decline in both personality assessment and personality theory. Doubts about personality psychology’s viability were initially raised in Walter Mischel’s (1968) published findings, which argued that a person’s behaviors vary so much across situations that it is illogical and naïve to think of personality and personality stability in terms of broad trait theories. In the years immediately following this publication, interest in personality research significantly diminished (Reis, 1992).

Throughout the past two decades, however, personality psychology has enjoyed a rebirth (Swann, 2005). The resurgence of personality psychology is a large-scale sociological phenomenon. Like any such phenomenon, it is apt to have many causes that are difficult to document and impossible to quantify.

One possible cause mentioned frequently is the popularity of the MBTI. It originated outside of the psychology establishment, and introduced a theory-based sorting of individuals according to personality type.
Although several hypotheses have been generated in an attempt to explain the resurgence, the reasons are still largely unknown. Nevertheless, personality psychology has since merged with several areas of medicine and has attracted growing attention in identifying important risk-factors for effective and efficient prevention of disease.

Personality Assessment and the Myers-Briggs Type Indicator

_Carl G. Jung_

Personality type assessment roots date back more than sixty years, when the Swiss-born psychiatrist C. G. Jung suggested that human behavior was not random but was in fact predictable and, therefore, classifiable (Jung, 1923). At the start, Jung was out of step with many of his colleagues because he suggested that the categories he proposed, for which he coined some new words, were not based on psychological sicknesses, abnormalities, or disproportionate drives. Instead, Jung said, differences in behavior, which seem so obvious to the eye, are a result of preferences related to the basic functions that individual personalities perform throughout life. These preferences emerge early in life, forming the foundation of our personalities. Subsequent situations of life are translated through each of our basic personality preferences. Such preferences, said Jung, become the core of our attractions to and repulsions from people, tasks, and events over the course of our lives.
Katharine Briggs and Isabel Briggs Myers

Fortunately for Jung's work, two women, neither of whom were psychologists, became very interested in classifying people's observable behavior. One of them, Katharine Briggs, independently of Jung had begun as early as the turn of the century to classify the people around her based on their differences in living styles. Simply put, she came to the conclusion that different people approach life differently. When Jung's works appeared in English in 1923, Briggs set aside her own work and became an exhaustive student of Jung's. With her exceptionally gifted daughter, Isabel Briggs Myers, she spent the 1930s observing and developing better ways to measure these differences. Spurred by the onslaught of World War II and the observation that many people in the war effort were working in tasks unsuited to their abilities, the two women set out to design a psychological instrument that would explain, in scientifically rigorous and reliable terms, differences according to Jung's Theory of Personality Preferences. And so was born the Myers-Briggs Type Indicator (MBTI). The idea behind the MBTI was that it could be used to establish individual preferences and then to promote a more constructive use of the differences between people. The MBTI is based on the original work of Jung, who proposed that human behavior is predictable, and personality type remains constant throughout life. Each of these personality traits is associated with certain preferences that may influence subject’s responses to a given work situation or task, and with certain circumstances that can energize or stress an individual. Jung's theory became increasingly popular in the 1980s due largely to the landmark accomplishments of this mother-daughter team.
The Myers-Briggs Type Indicator has become well-known and is widely used throughout the world. Katharine Cook Briggs and her daughter Isabel Briggs Myers categorized the personality characterization indicator into four independent scales (Briggs & Briggs Myers, 1998):

1) Introversion (I)/ Extraversion (E)
2) Sensing (S)/ Intuition (N)
3) Thinking (T)/ Feeling (F)
4) Judging (J)/ Perceiving (P)

These characteristics of each personality type are often called traits, and the MBTI is accordingly considered by many a “traits instrument.” There is a basic difference, however, between both measuring instruments. The MBTI sorts people qualitatively, not quantitatively, as traits measures do (Briggs Myers, 1998, p. 5).

*Introversion/Extraversion*

The terms Introversion and Extraversion are considered attitudes and explain people’s orients and receives their energy. In the extraverted attitude, the energy flow is outward, and the preferred focus is on other people and things whereas in the introverted attitude, the energy flow is inward, and the preferred focus is on one's own thoughts, ideas and impressions.

*Sensing/Intuition*

Sensing and Intuition are the perceiving functions. These are considered the non-rational functions because a person does not necessarily have control over the method by which
The Relationship Between Posture and Personality Type

he or she receives data, but only how to process it once he or she has collected it. Sensing people tend to focus on the present and on concrete information and experiences. Sensing prefers to receive data primarily through the five senses. Intuitives tend to focus on the future, with a view toward patterns and possibilities. These people prefer to receive data from the subconscious, or perceiving relationships via insights.

**Thinking/Feeling**

Thinking and Feeling are the decision-making (judging) functions. They both strive to make rational choices by using the data received from their perceiving functions as discussed above. Thinking people tend to base their decisions on logic "true or false, if-then" connections and on objective analysis of cause and effect. Feeling people tend to base their decisions primarily on values and on subjective evaluation of person-centered concerns. Feelings use "more or less, better-worse" evaluations. In the Western culture, it could be said that thinkers decide with their heads, while feelers decide with their hearts. When Thinking or Feeling is extraverted, decisions tend to rely on external sources and the generally accepted rules and procedures. When introverted, Thinking and Feeling decisions tend to be subjective, relying on internally generated ideas for logical organization and evaluation.

**Judging/Perceiving**

For extraverted types, the J or P points to the dominant function, which is displayed in their favorite outer world. For introverted types, the J or P points to the auxiliary
function, used in the outer world. The other function, used in their favorite inner world, is the dominant function (Myers & Kirby, 1994, p. 5)

Judging and Perceiving refer to the preferred mental functions \((J = T \text{ or } F \text{ and } P = S \text{ or } N)\). People who prefer judging tend to like a planned and organized approach to life and prefer to have things settled. People who prefer Perceiving tend to like a flexible and spontaneous approach to life and prefer to keep their options open. (The terminology may be misleading for some—the term "Judging" does not imply "judgmental," and "Perceiving" does not imply "perceptive.")

To further understand a possible relationship between personality type and posture, it is helpful to look at the definition of each.

The definition of “Personality”:

1. The visible aspect of one's character as it impresses others.
2. A person as an embodiment of a collection of attitudes.

The definition of “Posture”:

1. Manner, disposition, feeling, position, etc., with regard to a person or thing; tendency or orientation, esp. of the mind: a negative attitude; group attitudes.

(Random House Unabridged Dictionary, 2006)

Human position refers to a position of a person’s body, but can also be called a person's attitude or bearing. Attitude is also a part of personality. Current technology has advanced to the point that data can record remarkable amounts of information about the
human body, both mental and physical. For the research on the relationship between posture types and personality types, data have been collected using two very accurate and proven methods of measuring and identifying human personality types and biomechanical profiles. The Myers-Briggs Personality Type Indicator has provided results on personality types, and the biomechanical measurement on posture has been administered by the BioPrint system from Biotonix. The Myers-Briggs Personality Type Indicator identifies one of the sixteen personality profiles defined by the instrument. The BioPrint system identifies one of the four types of posture for each subject. According to Kendall and Kendall (1983), a person can represent one of four major types of posture: ideal posture, kyphosis-lordosis, flat back, and sway-back. The Bioprint system identifies which category the patient represents.

Psychology

Personality psychology is a branch of psychology that studies personality and individual differences. One emphasis in this area is to construct a coherent picture of a person and his or her major psychological processes. Another emphasis views personality as the study of individual differences, in other words, how people differ from each other.

Personality can be defined as a dynamic and organized set of characteristics possessed by a person that uniquely influences his or her cognitions, motivations, and behaviors in various situations (Ryckman, 2004). The word "personality" originates from the Latin persona, which means mask. Significantly, in the theatre of the ancient Latin-speaking
Personality type refers to the psychological classification of different types of people according to their preferences, tendencies, and behavioral consistencies. Personality type characteristics are behavioral manifestations of such preferences and are distinguished from personality traits, which come in different levels or degrees. According to type theories, for example, there are two types of people, the ones who prefer introversion and the ones who prefer extraversion. According to trait theories, introversion and extraversion are part of a continuous dimension, with many people in the middle. The idea of psychological types originated in the theoretical work of Carl Jung. Therefore personality assessment began with the study by C.G. Jung (1923), and advanced over the years with the research of several psychologists throughout the world, including Katharine Briggs with her daughter, Isabel Briggs Myers, who together developed an advanced method of categorizing personality type.

The MBTI contains four separate dichotomies: E-I, S-N, T-F, and J-P. Two of these, S-N and T-F, describe mental functions and reflect basic preferences for use of perception and judgment. The other two, E-I and J-P, reflect attitudes or orientations. Together, these functions and orientations influence how a person perceives a situation and decides on a course of action. In her studies of people and extensive reading of Jung's theories, Myers concluded there were four primary ways people differed from one another. She labeled these differences as "preferences," drawing a similarity to "hand preferences" to illustrate
that although people use both of their hands, a preference for one over the other will exist, and take the lead in many of the activities in which hands are used.

The first set of mental function relates to how people "Perceive" or take in information. In the MBTI, this is the second letter. Those who prefer Sensing Perception favor clear, tangible data and information that fits in well with their direct, here-and-now experience or memories of past experiences.

In contrast, those who prefer Intuition Perception are drawn to connecting information that is more abstract, conceptual, and big-picture, and represents imaginative possibilities for the future.

The second set of mental function identifies how people form "Judgments" or make decisions. In the MBTI, this is the third letter. Those who prefer Thinking Judgment have a natural preference for making decisions in an objective, logical, and analytical manner with an emphasis on tasks and results to be accomplished. Those whose preference is for Feeling Judgment make their decisions in a somewhat global, visceral, and harmony- and value-oriented way, paying particular attention to the impact of decisions and actions on other people.

There are two other mental preferences that are part of the Myers-Briggs model: focus and attitudes, along with outer world orientation. The first is the dimension of personality discovered by Carl Jung, which became widely adopted by general psychology: Extraversion-Introversion. The second is the dimension of personality that is Myers'
unique contribution to Jung’s theory: an element she inferred from Jung’s work but was not clearly addressed as an essential component of his theory of types. This is the style or orientation a person uses in dealing with the external world: Judging or Perceiving.

Focus and attitudes pertain to the two forms of energy consciousness each person experiences on a daily basis. A person occupies two mental worlds: one is inwardly turned, the other is turned outward. One of these worlds is the elemental source of energy. In the MBTI, this is the first letter.

Those who prefer Introversion draw their primary energy from the inner world of information, thoughts, ideas, and other reflections. When circumstances require an excessive amount of attention spent in the "outside" world, those preferring Introversion find the need to retreat to a more private setting as if to recharge their drained batteries.

In contrast, those who prefer Extraversion are drawn to the outside world as their elemental source of energy. Rarely, if ever, do extraverted people feel their energy batteries are "drained" by excessive amounts of interaction with the outside world. They must engage the people, places, and activities in the outside world for their life force.

While the E-I dimension was Jung’s gift to general psychology, unfortunately it has been widely distorted into a well-unwell scale with characteristics of Introversion being cast in a negative light and, conversely, characteristics of Extraversion cast in a positive light. This cultural bias frequently leads naturally introverted types to mistakenly identify themselves as Extraverts, in response to social pressure.
The fourth letter in the MBTI code is J, standing for Judgment or P, standing for Perception. They indicate an individual’s orientation towards the outer world and what actions or behaviors produce a preferred lifestyle.

Those who prefer Judging Extraversion (E-J) rely upon either their T or F preference to manage their outer life. This typically leads to a style that is oriented towards closure, organization, planning, or, in some fashion, managing the things and/or people found in the external environment. The drive is to have order in the outside world. While some people employ an assertive manner, others "ordering touch," with respect to people, may be light.

Those who prefer Extraversion and Perceiving (E-P) rely upon either their S or N preference to run their outer life. This typically results in an open, adaptable, flexible style of relating to the things and people found in the outside world. The drive is to experience the outside world rather than organize it; in general, lack of closure is easily tolerated.

To fully understand Katharine Briggs’s work is to realize that the J-P dichotomy has two uses. First, in conjunction with the E-I dichotomy, it is used to identify which of the two preferred functions is the leading, or dominant, function and which is the auxiliary function. Second, it describes identifiable orientations to the outer world.

For a person whose Energy Orientation preference is Extraversion, the attitude (J or P) points to his or her dominant function, ergo "what you see is what you get." But for those whose Energy Orientation favors I, their Extraverted Orientation (J or P) is opposite to
their dominant function. Thus the four I-J types, whose preferred style is Judging, display their perceiving preferences in the outer world. In this way, their extraverted function can mask their dominant process. Likewise the four I-P types, whose extraverted function is a perceiving one, tend to have an open style but, in their inner world, prefer a judging orientation.

Extraverted types who work best by thinking out loud and considering matters in dialogue can be frustrated by Introverted types whose best work on thinking and considering is done internally and detached from active interaction. "Why doesn't she want to tell me what she is thinking; why won't she share her concerns? What is he hiding?" Likewise Introverted types can be harassed by the natural style of Extraverted types. "If he'd just shut up, I'd be able to think about what he said; Why do we have to decide right now? I can’t give you a good answer unless I have some time to reflect on it!" Introverted types who are accustomed to reflecting before they speak are frustrated by Extraverted types who frequently seem to change their mind and change course (because they reflect out loud, may think or talk about it later, and then finally conclude something different).

Types with Judging attitudes are frequently put off by Perceiving types’ disorderly attention to things and people around them - their failures to properly plan, organize, manage, and finish affairs. Perceiving types can be seen as "flakes" who constantly put things off until the absolute last minute. Types with Perceiving attitude often see their opposite types as control freaks and imperceptive draft horses with blinders on - and even then they sometimes miss things that are right in front of their noses! Judging types are
naturally drawn to management positions; perceiving types naturally resist being managed!

The mellowing process of aging sometimes produces similar mellowing of the J and P orientations. Perceiving types discover a need and an appreciation for a greater degree of order in their external affairs and Judging types discover a need and an appreciation for a greater degree of openness and discovery in their external life. To have a good understanding of the relation that exists between personality types and posture types, it is important to know the 16 personality types.

The 16 Types

According to theory, each of the 16 types results from a preference for one pole of each of the four dichotomies over the opposite pole. A preference for any one dichotomy is designed to be psychometrically independent of the preferences for the other three dichotomies. Therefore, preferences for the four dichotomies yield 16 possible combinations called types, which are denoted by the four letters identifying the poles preferred (Myers, Briggs Myers, 1998). The following is a description of the 16 types:

ISTJ

Quiet, serious; earn success by thoroughness and dependability. Practical, matter-of-fact, realistic, and responsible. Decide logically what should be done and work toward it steadily, regardless of distractions. Take pleasure in making everything orderly and organized – their work, their home, their life. Value traditions and loyalty.
ISFJ
Quiet, friendly, responsible, and conscientious. Committed and steady in meeting their obligations. Thorough, painstaking, and accurate. Loyal, considerate; notice and remember details about people who are important to them, concerned with how others feel. Strive to create an orderly and harmonious environment at work and at home.

INFJ
Seek meaning and connection in ideas, relationships, and material possessions. Want to understand what motivates people and are insightful about others. Conscientious and committed to their firm values. Develop a clear vision about how best to serve the common good. Organized and decisive in implementing their vision.

INTJ
Have original minds and great drive for implementing their ideas and achieving their goals. Quickly see patterns in external events and develop long-range explanatory perspectives. When committed, organize a job and carry it through. Sceptical and independent, have high standards of competence and performance for themselves and others.

ISTP
Tolerant and flexible, quiet observers until a problem appears, then act quickly to find workable solutions. Analyze what makes things work and readily process
large amounts of data to isolate the core of practical problems. Interested in cause and effect, organize facts using logical principles, value efficiency.

ISFP
Quiet, friendly, sensitive, and kind. Enjoy the present moment, what’s going on around them. Like to have their own space and to work within their own time frame. Loyal and committed to their values and to people who are important to them. Dislike disagreements and conflicts, do not force their opinions or values on others.

INFP
Idealistic, loyal to their values and to people who are important to them. Want an external life that is congruent with their values. Curious, quick to see possibilities, can be catalysts for implementing ideas. Seek to understand people and to help them fulfill their potential. Adaptable, flexible, and accepting -- unless a value is threatened.

INTP
Seek to develop logical explanations for everything that interests them. Theoretical and abstract, more interested in ideas than in social interaction. Quiet, contained, flexible, and adaptable. Have unusual ability to focus for extended periods of time to solve problems in their area of interest. Sceptical, sometimes critical, always analytical.
ESTP
Flexible and tolerant, they take a pragmatic approach focused on achieving immediate results. Theories and conceptual explanations bore them – they want to act energetically to solve the problem. They focus on the here-and-now, are spontaneous, and enjoy each moment that they can be active with others. Enjoy material comforts and style. Learn best through doing.

ESFP
Outgoing, friendly, and accepting. Exuberant lovers of life, people, and material comforts. Enjoy working with others to make things happen. Bring common sense and a realistic approach to their work, and make work fun. Flexible and spontaneous, adapt readily to new people and environments. Learn best by trying a new skill with other people.

ENFP
Warmly enthusiastic and imaginative. See life as full of possibilities. Make connections between events and information very quickly, and confidently proceed based on the patterns that they see. Want a lot of affirmation from others, and readily give appreciation and support. Spontaneous and flexible, often rely on their ability to improvise and their verbal fluency.

ENTP
Quick, ingenious, stimulating, alert, and outspoken. Resourceful in solving new and challenging problems. Adept at generating conceptual possibilities and then analyzing them strategically. Good at reading other people. Bored by routine, will
seldom do the same thing the same way, apt to turn to one new interest after another.

ESTJ
Practical, realistic, matter-of-fact. Decisive, quickly move to implement decisions. Organize projects and people to get things done, focus on getting results in the most efficient way possible. Take care of routine details. Have a clear set of logical standards, systematically follow them and want others to also. Forceful in implementing their plans.

ESFJ
Warm-hearted, conscientious, and cooperative. Want harmony in their environment, work with determination to establish it. Like to work with others to complete tasks accurately and on time. Loyal, follow through even in small matters. Notice what others need in their day-to-day lives and try to provide it. Want to be appreciated for who they are and for what they contribute.

ENFJ
Warm, empathetic, responsive, and responsible. Highly attuned to the emotions, needs, and motivations of others. Find potential in everyone, want to help others fulfill their potential. May act as catalysts for individual and group growth. Loyal, responsive to praise and criticism. Sociable, facilitate others in a group, and provide inspiring leadership.
ENTJ

Frank, decisive, assume leadership readily. Quickly see illogical and inefficient procedures and policies, develop and implement comprehensive systems to solve organizational problems. Enjoy long-term planning and goal setting. Usually well informed, and well-read, and enjoy expanding their knowledge and passing it on to others. Forceful in presenting their ideas.

In summary the MBTI contains four separate dichotomies: E-I, S-N, T-F, and J-P. Two of these, S-N and T-F, describe functions and reflect basic preferences for use of perception and judgment. The other two, E-I and J-P, reflect attitudes and orientations. Together, these functions and orientations influence how a person perceives a situation and decides on a course of action.

Personality and Health

A relationship between posture, fear, depression and stereotypes has been drawn in several studies. For example, Meier (2003) found that happy thoughts lead to more upright postures, while sad thoughts lead to the slumped, hunched positions typical of unhappy people. Simply looking up also gives a physical boost. It leads to a better, more upright, posture, which can alleviate depression by improving breathing. This in turn leads to increased oxygen levels in the blood and relieves muscular tension in the shoulders. The exact mechanism of how posture affects our moods is not understood.
The whole subject of personality and disease has been shrouded in uncertainty, due to the absence of large-scale studies that would first determine personality characteristics and then observe the participants for many years to discover health-related behaviors and reasons for mortality.

There are two classes of disease: physical and mental. Each arises from the other, and neither exists without the other. Mental disorders arise from physical ones, and, likewise, physical disorders arise from mental ones. The medical field should stop discussing body and mind as separate entities and rather speak of a body-mind continuum. A study of this continuum will have vital consequences for our understanding of the human condition and may revolutionize our conception of disease prevention and cure.

*Personality and Cardiovascular Heart Disease*

Many studies have demonstrated the role of psychosocial and behavioral risk factors in the etiology and pathogenesis of cardiovascular disorders (Sher, 1990). The most well-known of these factors is the Type A behavior pattern. Type A behavior is characterized as being hard-driving, competitive, time-urgent, and irritable (Heilbrun, 1988). These studies show that Type A individuals are at increased risk for developing coronary heart disease (Williams, 1996).

Recently, a new personality construct, the type D or ‘distressed’ personality, has been proposed. Type D is defined as the interaction of negative affectivity and social inhibition (Denollet, 2000) and is characterized by the joint tendency to experience negative
emotions and to inhibit these emotions while avoiding social contact with others. Individuals with type D personality are also at increased risk for developing coronary heart disease as well as other psychiatric and medical disorders (Habra, 2003).

**Personality and Depression**

The enhancement of social functioning has been accepted as an important therapeutic principle in the treatment of depression (Healy, 1997). The Social Adaptation and Self-Evaluation Scale - SASS (Bosc, 1997) has been established as an instrument of social functioning useful in clinical trials. This study is the first to look at clinical and personality variables as determinants of social functioning measured by the SASS.

The results from this study found that extraversion made the largest unique contribution to the social functioning score in the sample. When measuring extraversion with a depressed patient, it is not possible to be certain that the premorbid personality trait was measured (Griens, 2002) although there is some evidence for the stability of personality traits, including extraversion, independent of depressive state (Santor, 1997).

While there is no obvious overlap in the questions in SASS and E.P.Q. (Eysenck Personality Questionnaire), it is possible that the two questionnaires tap into the same construct. Extraversion may be associated with premorbid social support, which has been shown to be a predictor of social functioning in some studies (Dorz, 2002). The E.P.Q. measures the three traits described in the personality theory of Hans Eysenck. These are extraversion, psychoticism and neuroticism. Eysenck's theory is based primarily on
physiology and genetics. Although he was a behaviorist who considered learned habits of
great importance, he considered personality differences as growing out of genetic
inheritance.

Neuroticism has been well studied as a risk factor for depression. Previous studies on
neuroticism did not indicate it as a significant predictor of social functioning perhaps
because their sample came from a tertiary care clinic reflecting a difficult-to-treat
population with high neuroticism scores. In a different sample with a greater spread of
neuroticism scores, the results may be different. It is also possible that neuroticism
correlates with mood (Farmer, 2002) but not social functioning. The failure of other
variables such as age, gender, or polarity to predict social functioning is largely in line
with other studies (Dorz, 2002).

In conclusion, it was found that social functioning, measured by SASS, is predicted by
extraversion scores and the severity of depression. Studies of social functioning should
take premorbid personality traits into account. The findings of this study need to be
confirmed in a larger study with a more representative sample.

**Personality and Spine Loading**

Recent studies have investigated how personality types and psychosocial stress influence
the functioning of the biomechanical system and subsequent spine loading (Marras,
2000). Introverts appeared to have one of the largest reactions to psychosocial stress,
demonstrating increases in normalized compression and lateral shear. Introverts tend to
internalize their thoughts and feelings (Briggs-Myers, 1980), which internalization may result in increased coactivation as a means of controlling the situation, resulting in the higher spinal loading. Intuitors also displayed increases in lateral shear and normalized compression that may be related to their aversion to performing repetitive tasks (Kummerow, 1997). In this experiment, velocity feedback was manipulated, making it appear that the lift needed to be repeated, potentially influencing the control strategy of the lift. Similarly, the thinker personality trait was associated with an increase in absolute spine compression. Thinkers are typically uncomfortable dealing with other people’s feelings, and the negative reactions of the investigators may be stressful to these subjects, resulting in increases in muscle activities and compression. It has also been demonstrated that people of different personality types generate different brain activity patterns. Thus, these coactivity responses might be “hard-wired” to personality.

These findings may help place much of the previous conflicting literature in perspective. Because people of different personality traits respond to psychosocial stress differently, a physical task may be stressful for one personality type and may increase LBD (Lower Back Disorders) risk. Further, because certain personality types are attracted to certain types of work, this study might help determine why previous studies have found conflicting results in the psychosocial stress literature.

Posture

Posture is the emergent alignment of the body that remains relatively constant in its underlying structure and unity across various forms of human positions. It refers to the
The unconscious and stable structural disposition of the body framework that is attained over a long period of continuous body movements and patterns.

These stable postures attained over time are a result of one's lifestyle and orientation. Over time, people come to attain an average posture, bad or inefficient posture, and, sometimes, a good or effective posture. The quality or effectiveness of posture is related to the proportionate structure of the body framework and the optimal balance of the body.

A bad posture or slouching posture is unable to optimally distribute weight across the body framework, and, hence, is ineffective. An average posture is able to maintain distribution of weight and form, but does not attain optimal form and maintenance. A good posture or an erect posture is able to completely and optimally attain balance and proportion of the body mass and framework. A well-proportioned, erect posture optimizes breathing and affects the circulation of bodily fluids. An erect posture is, therefore, most desirable and highly effective for the body structure and proportion.

An erect posture or well-proportioned posture involves various elements of the body and the body’s co-ordination. It includes optimally unrolling the spine until the lower back curves inside while holding the chest raised high without straining breathing. The head assumes an optimal position while keeping the chin parallel to the ground. In an erect posture, the shoulders are very straight and pulled back. Therefore, even though the spine would curves, the posture remains erect while bending because the shoulders stay straight and pulled back thereby maintaining the body proportion and balance. The
optimal structural alignment of the body leads to a straight back. This structural alignment consolidates over a long span of time leading to a well-balanced posture that becomes a natural disposition.

In posturology, posture is elaboration and active preservation of the configuration of the various segments of the body in space; it expresses the way the body faces the stimulation of the outside world and prepares to react to it (Firenzuoli, 2005).

According to Kendall and Kendall, there are 4 major types of posture by which people can be categorized (Refer to Figures 1-4). The first posture is ideal posture (A), the second is kyphosis-lordosis (B), the third is flat back (C), and the fourth is sway-back (D) (Kendall, 1983). The BioPrint system, which is being used in this study of posture and personality, can identify these four types of posture with digital photography and analysis. Combining the BioPrint data with the Myers-Briggs data, this study will add one more letter to each of the 16 personality types in order to create a new and unique formula. Those letters will be (A) for ideal posture, (B) for kyphosis-lordosis posture, (C) for flat-back posture, and (D) for sway-back posture.

The Kendall and Kendall research on posture is the Bible for any health care practitioner working in Biomechanics and Posture. Figures 1 through 4 demonstrate the four posture types according to Kendall and Kendall. These posture categories will be the basis for data collection in the study of posture types and personality types.
Figure 1. Posture A - Ideal Posture
Posture B

Figure 2. Posture B - Kyphosis – Lordosis
Figure 3. Posture C – Flat Back

- Neck Extensors
- Back Extensors
- Hip Extensors
- Hip Flexors
  - Psoas major
  - Iliacus
  - Tensor fasciae latae
  - Rectus femoris

Legend:
- Black: Hyper Contracted / Tight
- Normal / Relax
- Weak / Stretched
Figure 4. Posture D – Sway Back
Posture and Society

A well-balanced or erect posture is considered to be an integral part of physical attractiveness. In most cultures an erect posture is considered a mark of a well-balanced and adaptable personality. Military regimentation and several boarding schools enforce regimen on young men and women in order to have an erect posture, the consequence often being what is termed a military posture or over-correct posture, which may be considered excessively erect with poor balance resulting from excessive tension in the back muscles.

It has also been observed that significantly more women have erect postures than men. Other communities stress posture as an integral part of their lifestyle. The Nuba people in Africa are famed for their posture, which is a product of their natural lifestyle. Across societies, various stylizations of human positions and postures are set for specific occasions, which include etiquette and ceremonial conduct.

Posture and Human Emotions

People's faces show fear in many different circumstances. However, when people are terrified, as well as showing emotion, they run for cover. When we see a bodily expression of emotion, we immediately know what specific action is associated with a particular emotion, leaving little need for interpretation of the signal, as is the case for facial expressions. Research on emotional body language is rapidly emerging as a new field in cognitive and affective neuroscience. In natural situations, emotional signals from facial expression, from body posture, and from voice prosody each provide information
concerning our emotional states, and together they serve the purpose of adaptive behaviour. Given the close relationship between emotional processes and adaptive behaviour already pointed out by Darwin (2003), it is surprising that only facial expressions have so far been the objects of choice in emotion research (Ekman, 1993).

De Gelder and colleagues photographed actors who posed in a variety of positions, showing happy, neutral and fearful stances. They blanked out the faces and showed the photos to four men and three women, while using magnetic resonance imaging to study their brains. They found that people looking at the happy and neutral images showed a response in only the part of the brain that processes visual images. However, when looking at fearful postures, however, the viewers' brains responded with activity in the visual, emotional and motor action areas. This shows that emotions are communicated nonverbally and without any conscious processes involved (de Gelder, 2006).

The belief that personality characteristics of an individual can be reflected in external physical features formed the basis of phrenology and physiognomy. Phrenology was based on the assumption that different traits and abilities were manifested in the shape and unevenness of the head (reading bumps). Developed by German physician Franz Joseph Gall around 1800, and very popular in the 19th century, it is now discredited as a pseudoscience. Phrenology has, however, received credit as a protoscience for having contributed the ideas that the brain is the organ of the mind and that certain brain areas have localized specific functions to medical science.
Its principles were that the brain is the organ of the mind, and that mind has a set of different mental faculties, each particular faculty being represented in a different part or organ of the brain. These areas were said to be proportional to a given individual’s propensities and importance of a mental faculty.

Phrenology, which focuses on personality and character, is to be distinguished from craniometry, which is the study of the skull's size, weight, shape, and physiognomy, which is the study of facial features. However, these fields have all claimed the ability to predict traits or intelligence. They were once intensively praised in anthropology, and ethnology, and sometimes utilized to scientifically justify racism. While some principles of phrenology are well-established today, the premise that the personality is determined by skull shape is considered to be false (Bilz, 1842).

**Psychotherapeutic Postural Integration (PPI)**

Postural Integration (PI) was originally developed in the 1960's by Jack Painter, Ph.D., (1933) a former Professor at the University of Miami. He developed it after many years of self-exploration in the fields of humanistic psychology, deep massage, acupressure and the Five Elements system, gestalt therapy, and especially Reichian therapy in combination with the work and theories of Ida Rolf. Postural Integration is taught and practiced in Europe, USA, Canada, Mexico, South Africa, and Australia and is organized within the International Council of PsychoCorporal Integration Trainers (ICPIT)
Psychotherapeutic Postural Integration (PPI) is a wider development of Postural Integration (PI), an alternative body-psychotherapy method, which attempts to help individuals become aware of themselves in their body by empowering them to change their "bodymind" - their bodies, their emotions, and their attitudes (Penter, 1933). At a practical level, PPI is an active therapy in which the patient/client and practitioner (psychotherapist) interact to release blocked energy and to guide the development of awareness, thus enabling clients to increase their sense of well-being, their capacity to feel, and their ability to express themselves; and to develop their self-awareness and consciousness. It aims to restore unity of tissue, feeling, and awareness by a direct, manual, deep softening and reorganization of the myofascia, which envelopes and coordinates the entire muscular system, while simultaneously bringing together gestalt therapy, emotional release and expression, breathwork, movement awareness disciplines and bodydrama into a single framework.
CHAPTER 3

METHODOLOGY

Overview of the Study

The goal of this study was to uncover a significant relationship between the personality and the posture of subjects ranging from 13 to 82 years of age. Through research in biomechanics and posture, patterns were found indicating connections.

The existing literature indicates that good posture is important in a static position, and that posture is a key factor in chronic back pain. There is also general agreement in literature indicating that optimal posture in an upright position plays a prevalent role in musculo-skeletal health.

Subjects

The 100 subjects used for the study consisted of 50 men and 50 women, sedentary as well as active, ranging from ages 13 to 82. The following subjects were not allowed to participate in the study: subjects who were younger than 13 years of age, and subjects who were not available on the testing date.

All subjects were contacted by phone or directly at the clinic to gauge their interest in and determine their eligibility for the study. Once interested, they were asked to participate according to the schedule of the testing day, between the hours of 8:00am to 8:00pm.
Ethical Considerations

The risks surrounding this study are minimal, considering no invasive measurements were taken. The postural evaluation was carried out in static position by using a digital camera to capture the necessary images. The markers used for the postural evaluation are equipped with a hypoallergenic adhesive, decreasing the possibility of an allergic reaction. Participants completed the relevant questionnaire while seated in a chair at a table in a well-lit room.

All acquired data will remain confidential. All names and personal identification have been substituted by a number ranging from 1 to 100. All personal information and results are kept confidential with only the researcher having access.

All subjects were also asked to sign a consent form explaining the entire procedure and goal of the study.

Variables

Out of the 100 subjects tested in this research, 65% of them were categorized as extraverted and 35% were introverted. To explain the predominance of extraverted subjects, several factors come into play that might be issues in sliding the scale. First, the subjects were asked to appear at a private sports medical clinic so that people whom they have never met for testing to be performed. An extraverted person is more likely to commit to such an obligation whereas an introverted person might actively avoid it. Introverted people typically prefer familiar territory and quiet settings. Another factor in play is that some of the subjects are members of one family, having similar patterns in personality type and physique.
Criteria and Criteria Measures

The first instrument used for this study was the Bioprint System (Biotonix Inc, Montreal, QC, Canada), a biomechanical assessment of posture. The Biotonix’s video system has a high degree of reliability and validity, and, thus, this system is suitable for clinical use in the analysis of posture (Normand, 2002). The procedure begins by marking the subject with 32 hypoallergenic reflective markers on key anatomical landmarks. Digital pictures are then taken of the marked subject with a standard digital Kodak DC240 camera (Eastman Kodak Company, Rochester, NY, USA). The digital photographs are processed through the Bioprint application, which measures and analyzes data from the anatomical markers placed on the subject. The data consist of distance and angles of different body segments in three views and two planes, along with the positioning of the body’s center of gravity. From this data the system will identify any form of postural deviations, including which muscles are weak and which are strong.

Subjects were asked to answer a questionnaire regarding any pain that they might be experiencing in their neck, thoracic, lumbar and any other body parts with tension. They were asked to rate their pain based on their personal pain scale from 0 to 10, 0 meaning no pain and 10 meaning extreme pain.

Design

In this case-control study the relationship between two factors, posture and personality types, was investigated.
A group of individuals were examined, using the MBTI and Biotonix system for their exhibition of these two traits. Non-risk variables including age, sex, and geographic area of residence were also recorded.

Procedure

Data collection was conducted in one day, October 10, 2006, at the researcher’s clinic located in Quebec, Canada. The 100 subjects were scheduled to arrive every five minutes between the hours of 8:00 a.m. to 8:00 p.m. Upon arrival, each subject was briefed on the entire process, and then asked to sign a consent form. Each subject was asked to rate his or her current pain on a pain scale prior to starting the postural test. The postural test was conducted by marking the subjects with anatomical markers and taking digital photographs. Beginning at the marker placement station, the subjects were instructed to wear tight-fitted clothing, such as a swim suit, for easy application of the markers. A total of 32 hypoallergenic markers per participant were placed on key landmarks.

Anterior, Lateral, Posterior Marker Placement

The following charts, Figures 5 through 7, demonstrate where, on a subject’s body, the markers were placed when using the Biotonix Bioprint System (2007). The markers must be placed on specific anatomical locations to help the system analyze the data.
Figure 5. Lateral View of Marker Placement. For Anatomical Reference Refer to Appendix A

Figure 6. Anterior View of Marker Placement. For Anatomical Reference Refer to Appendix A
Figure 7. Posterior View of Marker Placement. For Anatomical Reference Refer to Appendix A

6 of those 32 markers (i.e., Glabella, Chin, Right and Left Acromion Joint, Right ASIS and Right PSIS) contained special reflective spheres and were placed to make those locations distinguishable in pictures. These 6 locations play an important role in categorizing the subject’s posture and the amount of deviation present.

Data collection

After the markers were applied at the marker station, the subjects were taken into an adjacent room for digital photographs. A set of 4 photographs were taken per subject (2 lateral views, 1 anterior and 1 posterior) using a digital camera on a tripod at a distance of 9 feet from a calibrated backdrop. For the first photograph, the subject was asked to stand perpendicular to the backdrop, their left foot placed at a marked location on the
floor. They were then instructed to take five steps in place, eyes closed, to reset their foot proprioceptors. After this, they were re-centered on the backdrop and asked to inhale and exhale in order to adopt a more natural posture. After achieving this relaxed state, the photograph was taken.

For the second photograph, the subject kept the same position, but extended his or her right arm.

For the third photograph, the subject stood parallel to the backdrop with both heels on the marker, arms bent at a $90^\circ$ angle. The subject was then instructed to perform the same actions as on the first photograph to achieve a natural posture.

Finally, for the fourth photograph, the subject stood parallel to the backdrop with his or her toes on the floor marker, and was again instructed to take the steps and to inhale-exhale to achieve a natural posture.

*Figure 8. Position of Subject and Digital Camera*
After completing the digital photograph stage of the testing, each subject was then asked to change back into his or her street clothes and proceed to the personality assessment portion of the study. They were given a Myers-Briggs Type Indicator questionnaire, created by Katharine Briggs and Isabel Myers (1980). At the MBTI questionnaire station, they were given instructions on how to properly complete the 93-question test. The room was well-lit and quiet, as stipulated in the MBTI protocol. After completing this last station, the subjects were asked to bring all documents to the reception area after which they were dismissed.

The final step of this study was the processing of collected data. For the postural data, the images of each subject were processed through the Biotonix Bioprint system. Through that procedure, each picture was scanned and anatomical markers identified. The markers were given X-Y coordinates, which play a role in the different calculations performed by the system. The output was a biomechanical analysis of the subject’s posture, providing qualitative data on different body segments (Refer to Figure 9). Analysis includes plumb line, angle measurement, compression on different levels of the spine, and center of gravity position.

The Biotonix analysis and report were used on the subjects being tested in order to distinguish postural deviations. Following any identified deviation, each subject was given a 10-week personalized corrective exercise program based on the outcome of his or her Bioprint evaluation. Two weeks later, all subjects who participated in the study also received a copy of their Biotonix evaluation of their posture measurements. Figure 9 is
the legend for the Bioprint assessments. L1 to L37 represent biomechanical data used to identify postural deviations.

The following charts in Figures 10 through 13 are examples of the data analysis used by the Bioprint system for posture categorization of subjects. Subjects are categorized under posture types A, B, C, and D, in accordance with Kendall and Kendall’s posture categories (1983). The four posture categories are as follows: ideal posture (A), kyphosis-lordosis (B), flat back (C), and sway-back (D).
**View from the Side (lateral)**

<table>
<thead>
<tr>
<th>Body Segment</th>
<th>Direction</th>
<th>Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head to Shoulders</td>
<td>L1</td>
<td>None</td>
</tr>
<tr>
<td>Shoulders to Pelvis</td>
<td>L3</td>
<td>None</td>
</tr>
<tr>
<td>Hips to Knees</td>
<td>L5</td>
<td>None</td>
</tr>
<tr>
<td>Knees to Feet</td>
<td>L7</td>
<td>None</td>
</tr>
</tbody>
</table>

Note: The ideal angle should be 0°.

<table>
<thead>
<tr>
<th>Body Segment</th>
<th>Direction</th>
<th>Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pelvis</td>
<td>L9</td>
<td>Anterior</td>
</tr>
</tbody>
</table>

Note: There is a normal forward angle between the anterior and posterior pelvic markers of 10°. Angles greater than 15° indicate anterior pelvic tilt - angles less than 5° indicate posterior pelvic tilt.

<table>
<thead>
<tr>
<th>Reference Point on</th>
<th>Direction</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head</td>
<td>L11</td>
<td>0.0 in</td>
</tr>
<tr>
<td>Shoulders</td>
<td>L13</td>
<td>0.0 in</td>
</tr>
<tr>
<td>Pelvis</td>
<td>L15</td>
<td>0.0 in</td>
</tr>
<tr>
<td>Hips</td>
<td>L17</td>
<td>0.0 in</td>
</tr>
<tr>
<td>Knees</td>
<td>L19</td>
<td>0.0 in</td>
</tr>
</tbody>
</table>

Note: The ideal distance should be 0 in.

**Your Projected Center Of Gravity**

<table>
<thead>
<tr>
<th>Displacement</th>
<th>Direction</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left-right</td>
<td>L21</td>
<td>0.0 in</td>
</tr>
<tr>
<td>Anterior-posterior</td>
<td>L23</td>
<td>0.0 in</td>
</tr>
<tr>
<td>Displacement</td>
<td></td>
<td>0.0 in</td>
</tr>
</tbody>
</table>

Note: The ideal distance should be 0 in.

**Moments of Force and Reaction Forces**

<table>
<thead>
<tr>
<th>Segment</th>
<th>Actual weight</th>
<th>Lever arm</th>
<th>Moment of force</th>
<th>Joint reaction force</th>
<th>Effective weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head</td>
<td>13.4 lb</td>
<td>0.27 in</td>
<td>L28 0.5 Nm</td>
<td>L29 59.5 N</td>
<td>L31 13.4 lb</td>
</tr>
<tr>
<td>Head and Trunk</td>
<td>95.4 lb</td>
<td>0.33 in</td>
<td>L32 0.3 Nm</td>
<td>L34 429.6 N</td>
<td>L37 96.5 lb</td>
</tr>
</tbody>
</table>

Figure 9. Example of Bionix Bioprint, a Biomechanical Analysis of the Subject’s Posture
The Relationship Between Posture and Personality Type

Figure 10. Bioprint Posture Analysis of Posture A
The Relationship Between Posture and Personality Type

View from the Side (lateral)

<table>
<thead>
<tr>
<th>Body Segment</th>
<th>Direction</th>
<th>Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head to Shoulders</td>
<td>Anterior</td>
<td>14.4°</td>
</tr>
<tr>
<td>Shoulders to Pelvis</td>
<td>Posterior</td>
<td>6.8°</td>
</tr>
<tr>
<td>Hips to Knees</td>
<td>Posterior</td>
<td>4.5°</td>
</tr>
<tr>
<td>Knees to Feet</td>
<td>Anterior</td>
<td>6.0°</td>
</tr>
</tbody>
</table>

Note: The ideal angle should be 0°.

<table>
<thead>
<tr>
<th>Body Segment</th>
<th>Direction</th>
<th>Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pelvis</td>
<td>Anterior</td>
<td>17.2°</td>
</tr>
</tbody>
</table>

Note: There is a normal forward angle between the anterior and posterior pelvic markers of 10°. Angles greater than 15° indicate anterior pelvic tilt - angles less than 5° indicate posterior pelvic tilt.

How far are you from vertical

<table>
<thead>
<tr>
<th>Reference Point on</th>
<th>Direction</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head</td>
<td>Anterior</td>
<td>1.2 in</td>
</tr>
<tr>
<td>Shoulders</td>
<td>None</td>
<td>0.0 in</td>
</tr>
<tr>
<td>Pelvis</td>
<td>Anterior</td>
<td>1.3 in</td>
</tr>
<tr>
<td>Hips</td>
<td>Anterior</td>
<td>0.9 in</td>
</tr>
<tr>
<td>Knees</td>
<td>Anterior</td>
<td>1.8 in</td>
</tr>
</tbody>
</table>

Note: The ideal distance should be 0 in.

Your Projected Center Of Gravity

<table>
<thead>
<tr>
<th>Displacement</th>
<th>Direction</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left-light</td>
<td>None</td>
<td>0.0 in</td>
</tr>
<tr>
<td>Anterior-posterior</td>
<td>Anterior</td>
<td>0.5 in</td>
</tr>
<tr>
<td>Displacement</td>
<td></td>
<td>0.5 in</td>
</tr>
</tbody>
</table>

Note: The ideal distance should be 0 in.

Moments of Force and Reaction Forces

<table>
<thead>
<tr>
<th>Segment</th>
<th>Actual weight</th>
<th>Lever arm</th>
<th>Moment of force</th>
<th>Joint reaction force</th>
<th>Effective weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head</td>
<td>15.4 lb</td>
<td>1.2 in</td>
<td>1.6 lbfm</td>
<td>106.5 N</td>
<td>25.7 lb</td>
</tr>
<tr>
<td>Head and Trunk</td>
<td>95.4 lb</td>
<td>0.5 in</td>
<td>3.2 lbfm</td>
<td>487.4 N</td>
<td>109.8 lb</td>
</tr>
</tbody>
</table>

Note: Each division equals 1 in.

Figure 11. Bioprint Posture Analysis of Posture B
The Relationship Between Posture and Personality Type

Figure 12. Bioprint Posture Analysis of Posture C

View from the Side (lateral)

<table>
<thead>
<tr>
<th>Body Segment</th>
<th>Direction</th>
<th>Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head to Shoulders</td>
<td>Anterior</td>
<td>6.2°</td>
</tr>
<tr>
<td>Shoulders to Pelvis</td>
<td>Anterior</td>
<td>1.1°</td>
</tr>
<tr>
<td>Hips to Knees</td>
<td>Anterior</td>
<td>6.2°</td>
</tr>
<tr>
<td>Knees to Feet</td>
<td>Posterior</td>
<td>0.1°</td>
</tr>
</tbody>
</table>

Note: The ideal angle should be 0°.

How far are you from vertical

<table>
<thead>
<tr>
<th>Reference Point on</th>
<th>Direction</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head</td>
<td>Anterior</td>
<td>1.6 in</td>
</tr>
<tr>
<td>Shoulders</td>
<td>Anterior</td>
<td>0.9 in</td>
</tr>
<tr>
<td>Pelvis</td>
<td>Anterior</td>
<td>0.6 in</td>
</tr>
<tr>
<td>Hips</td>
<td>Anterior</td>
<td>1.3 in</td>
</tr>
<tr>
<td>Knees</td>
<td>Posterior</td>
<td>0.0 in</td>
</tr>
</tbody>
</table>

Note: The ideal distance should be 0 in.

Your Projected Center Of Gravity

<table>
<thead>
<tr>
<th>Displacement</th>
<th>Direction</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left-light</td>
<td>None</td>
<td>0.0 in</td>
</tr>
<tr>
<td>Anterior-posterior</td>
<td>Anterior</td>
<td>1.0 in</td>
</tr>
</tbody>
</table>

Note: The ideal distance should be 0 in.

Moments of Force and Reaction Forces

<table>
<thead>
<tr>
<th>Segment</th>
<th>Actual weight</th>
<th>Lever arm</th>
<th>Moment of force</th>
<th>Joint reaction force</th>
<th>Effective weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head</td>
<td>13.8 lb</td>
<td>0.7 in</td>
<td>1.1 lbf in</td>
<td>88.9 N</td>
<td>20.6 lb</td>
</tr>
<tr>
<td>Head and Trunk</td>
<td>98.3 lb</td>
<td>0.1 in</td>
<td>1.5 lbf in</td>
<td>448.6 N</td>
<td>104.8 lb</td>
</tr>
</tbody>
</table>
View from the Side (lateral)

How many degrees you are from vertical

<table>
<thead>
<tr>
<th>Body Segment</th>
<th>Direction</th>
<th>Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head to Shoulders</td>
<td>Anterior</td>
<td>17.1°</td>
</tr>
<tr>
<td>Shoulders to Pelvis</td>
<td>Posterior</td>
<td>6.4°</td>
</tr>
<tr>
<td>Hips to Knees</td>
<td>Anterior</td>
<td>7.4°</td>
</tr>
<tr>
<td>Knees to Feet</td>
<td>Anterior</td>
<td>0.3°</td>
</tr>
</tbody>
</table>

Note: The ideal angle should be 0°.

How many degrees you are from horizontal

<table>
<thead>
<tr>
<th>Body Segment</th>
<th>Direction</th>
<th>Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pelvis</td>
<td>Anterior</td>
<td>2.6°</td>
</tr>
</tbody>
</table>

Note: There is a normal forward angle between the anterior and posterior pelvic markers of 10°. Angles greater than 15° indicate anterior pelvic tilt - angles less than 5° indicate posterior pelvic tilt.

How far are you from vertical

<table>
<thead>
<tr>
<th>Reference Point on Body</th>
<th>Direction</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head</td>
<td>Anterior</td>
<td>2.0 in</td>
</tr>
<tr>
<td>Shoulders</td>
<td>Anterior</td>
<td>0.3 in</td>
</tr>
<tr>
<td>Pelvis</td>
<td>Anterior</td>
<td>1.8 in</td>
</tr>
<tr>
<td>Hips</td>
<td>Anterior</td>
<td>1.6 in</td>
</tr>
<tr>
<td>Knees</td>
<td>Anterior</td>
<td>0.1 in</td>
</tr>
</tbody>
</table>

Note: The ideal distance should be 0 in.

Your Projected Center Of Gravity

<table>
<thead>
<tr>
<th>Displacement</th>
<th>Direction</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left-light</td>
<td>None</td>
<td>0.0 in</td>
</tr>
<tr>
<td>Anterior-posterior</td>
<td>Anterior</td>
<td>1.1 in</td>
</tr>
<tr>
<td>Displacement</td>
<td></td>
<td>1.1 in</td>
</tr>
</tbody>
</table>

Note: The ideal distance should be 0 in.

Moments of Force and Reaction Forces

<table>
<thead>
<tr>
<th>Segment</th>
<th>Actual weight</th>
<th>Lever arm</th>
<th>Moment of force</th>
<th>Joint reaction force</th>
<th>Effective weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head</td>
<td>13.4 lb</td>
<td>1.7 in</td>
<td>2.0 lbf•in</td>
<td>125.0 N</td>
<td>27.7 lbf</td>
</tr>
<tr>
<td>Head and Trunk</td>
<td>95.4 lb</td>
<td>0.5 in</td>
<td>5.2 lbf•in</td>
<td>525.0 N</td>
<td>118.6 lbf</td>
</tr>
</tbody>
</table>

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Figure 13. Bioprint Posture Analysis of Posture D
The Relationship Between Posture and Personality Type

For the purpose of this research, only the data from the lateral view were considered in order to be in compliance with Kendall and Kendall’s postural observations. All data from the posture analysis, along with data from the pain scale questionnaire, was compiled manually in an Excel document. The MBTI questionnaire was analyzed using the MBTI analysis grid. The result, or designated personality type, was given to the subjects at the same time as the Bioprint report. All MBTI data were also compiled in an Excel document for the final analysis. The postural, pain scale and MBTI data compiled in the Excel document serves as the essential data for this study.

Statistical Design

Quantification of experiments was performed using a phosphoimager (Molecular Dynamics) and Image Quant software (version 5.2) or densitometry using NIH image software (version 1.63). All data are expressed as the mean ± SEM and were analyzed using, as stated, either one way ANOVA or student t-test or non-linear regression analysis. Also Chi-square was used to make decisions about whether a relationship between two or more variables existed.

Hypothesis

A direct relationship exists between personality types and physical posture. A posture that is out of alignment requires extra work from the muscles to maintain balance, affecting how a person carries himself or herself, and how he or she relates to his or her environment, both on a physical and mental level.
CHAPTER 4

RESULTS

Subject Analysis

One hundred subjects were tested for this research, 50 men and 50 women. The subjects were between 13 and 82 years of age. No specific criteria was used in the selection of subjects. All subjects were French-Canadian, living in Canada between the Québec and Sorel-Tracy areas. A protection of human subjects review form in French was completed by all the participants. Subjects were also asked to answer a pain scale questionnaire, documenting any pain that they might be experiencing prior to participation in the study.

Participants were asked to arrive at a sports medicine clinic in Canada at a specific time and date. Subjects arrived in the requested, tight-fitting attire to facilitate the postural evaluation. Three certified evaluators from Biotonix were in charge of placing the reflective markers on all of the subjects. A supervisor from Biotonix was in charge of taking all of the pictures for the postural evaluation. Two people were responsible for the MBTI testing of all of the subjects, and were supervised by Dr. Cristina Versari, Ph.D., from the San Diego University for Integrative Studies. In one day, 100 subjects were assessed. Assessment in three different areas were conducted: personality type (MBTI questionnaire), biomechanical assessment (Biotonix evaluation), and a pain scale questionnaire (provided by the research group).

The pain scale had four different anatomical areas in question: cervical, thoracic, lumbar, and/or other body parts. If the subjects experienced pain in any of the four areas in
question, they were asked to rate the pain from 0 to 10 in intensity, zero meaning no pain and 10 meaning extreme acute pain.

Results were collected from all three areas of assessments upon completion of 100 subjects. The results from the personality inventory (MBTI) came in the form of a combination of letters- E I S N T F J P, and numbers- 1-26, both in raw scores and in the final result. The postural evaluation results came in the form of numbers. The numbers represent data taken from the Bioprint photographs, measuring angles related to each subject’s posture. The pain scale data consisted of a number between 0 and 10 (refer to Appendix C for all raw data).

After the compilation of all the results in the three categories of testing, a letter was added to the Myers-Briggs Personality Type Indicator (MBTI) test results. The purpose of adding a letter was to create a new formula for the purpose of this study, comparing personality type with posture type.

The following table demonstrates the number of subjects tested and their distribution in each of the four posture categories: A through D. 22 of the subjects are present in posture A, 36 in posture B, 19 in posture C, and 23 in posture D, for a total of 100 subjects.
Table 1

*Number of Subjects in Each Posture Category*

<table>
<thead>
<tr>
<th>Posture</th>
<th>Number of subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>22</td>
</tr>
<tr>
<td>B</td>
<td>36</td>
</tr>
<tr>
<td>C</td>
<td>19</td>
</tr>
<tr>
<td>D</td>
<td>23</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

Each subject was asked to fill out a pain scale questionnaire. Figure 14 shows the average pain felt by each subject in each of the four postures. The subjects were asked to identify the location of the pain (Cervical, Thoracic, Lumbar), as well as the intensity of the pain, on a scale from zero - no pain, to 10 - extremely painful.

*Figure 14. Average Pain Scale from Each Posture Category*

Figure 14 reveals that subjects in posture A have less back pain than do subjects in postures B, C, and D. This includes the subjects who have less back pain in the Cervical, Thoracic, and Lumbar. All other subjects experienced more pain in these areas.
The Relationship Between Posture and Personality Type

Table 2 displays the 16 personality types according to the MBTI Manual (Myers, 2003). The data represent which posture group (A, B, C, or D) each personality type falls under. The results show a total of 100 subjects tested.

Table 2

*MBTI Personality Type in Each Posture Category*

<table>
<thead>
<tr>
<th>MBTI Type</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESTJ</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>ESTP</td>
<td>3</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>ESFJ</td>
<td>1</td>
<td>6</td>
<td>2</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>ESFP</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>ENTJ</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>ENTP</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>ENFJ</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>ENFP</td>
<td>8</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>ISTJ</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>ISTP</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>ISFJ</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>ISFP</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>INTJ</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>INTP</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>INFJ</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>INFP</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>22</td>
<td>36</td>
<td>19</td>
<td>23</td>
<td>100</td>
</tr>
</tbody>
</table>
Out of the 100 subjects, 22 fell into the category of posture A, 36 into posture B, 19 into posture C, and 23 into posture D. All of the 16 MBTI personality types were represented by subjects in this research, with the exception of INTP.

Table 3 is the representation in percentage of each of the 16 personality types for the 100 subjects tested in this research.

Table 3

*Percentage of Subjects in Each Personality Type*

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ISTJ</td>
<td>ISFJ</td>
<td>INFJ</td>
<td>INTJ</td>
</tr>
<tr>
<td>8%</td>
<td>6%</td>
<td>3%</td>
<td>1%</td>
</tr>
<tr>
<td>ISTP</td>
<td>ISFP</td>
<td>INFP</td>
<td>INTP</td>
</tr>
<tr>
<td>4%</td>
<td>8%</td>
<td>5%</td>
<td>0%</td>
</tr>
<tr>
<td>ESTP</td>
<td>ESFP</td>
<td>ENFP</td>
<td>ENTP</td>
</tr>
<tr>
<td>10%</td>
<td>12%</td>
<td>10%</td>
<td>5%</td>
</tr>
<tr>
<td>ESTJ</td>
<td>ESFJ</td>
<td>ENFJ</td>
<td>ENTJ</td>
</tr>
<tr>
<td>7%</td>
<td>11%</td>
<td>5%</td>
<td>5%</td>
</tr>
</tbody>
</table>

The data collected from this research show 65% of the subjects tested as Extraverted and 35% as Introverted. When comparing the difference in percentage, keep in mind the variables previously mentioned in the study. The subjects for this research were asked to
be present at a sports medicine clinic at a specific time and date. Introverted people are not inclined to participate in a situation involving new people and a new setting. They are more comfortable with familiar activities and situations. They avoid large crowds of people. On the other hand, Extraverted people are more inclined to put themselves in a new situation, enjoying the company of new people and a new atmosphere. As a result of these circumstances, Extraverted people were more likely to participate in the study.

Another factor at hand was the relationship between the subjects. Some subjects were related to each other, increasing the odds of similar personality type.

In the following chart, Table 4, we look at combinations of two MBTI preferences compared with posture categories A, B, C, and D. The MBTI preferences are a significant factor in how the subject relates to his or her environment.

Table 4

*Percentage of Preference Combinations in Each Posture*

<table>
<thead>
<tr>
<th>Preferences(E.I.N.S.T.F.P.J)</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>E_ _ J</td>
<td>18%</td>
<td>39%</td>
<td>21%</td>
<td>26%</td>
</tr>
<tr>
<td>E_ _ P</td>
<td>77%</td>
<td>44%</td>
<td>21%</td>
<td>0%</td>
</tr>
<tr>
<td>E_ T_</td>
<td>27%</td>
<td>39%</td>
<td>16%</td>
<td>17%</td>
</tr>
<tr>
<td>E_F_</td>
<td>68%</td>
<td>44%</td>
<td>26%</td>
<td>9%</td>
</tr>
<tr>
<td>ES_ _</td>
<td>50%</td>
<td>56%</td>
<td>19%</td>
<td>17%</td>
</tr>
<tr>
<td>EN_ _</td>
<td>45%</td>
<td>28%</td>
<td>16%</td>
<td>9%</td>
</tr>
<tr>
<td>I_ _ J</td>
<td>5%</td>
<td>11%</td>
<td>31%</td>
<td>30%</td>
</tr>
<tr>
<td>I_ _ P</td>
<td>0%</td>
<td>6%</td>
<td>26%</td>
<td>43%</td>
</tr>
</tbody>
</table>
The four mental functions are also called temperaments. The (SJ), (SP), (NF), and (NT) do not influence posture. They influence decisions; they are not orientations.

The next chart, Table 5, is of significance not only because it shows the relationship between posture and personality type but also because it demonstrates each function as an influence on someone's posture. In order to understand the next chart, we need to
understand the MBTI preference results. In developing the Myers-Briggs Type Indicator (instrument), the aim of Isabel Briggs Myers, and her mother, Katharine Briggs, was to clarify personality type theory and make it accessible to individuals and groups. They addressed the two related goals in the development and application of the MBTI instrument: the identification of basic preferences of each of the four dichotomies specified or implicit in Jung’s theory (Briggs, Briggs-Myers, 1998). The MBTI consists of the following four dichotomies according to the manual:

Favorite world: Do you prefer to focus on the outer world or on your own inner world? This is called Extraverted (E) or Introverted (I).

Information: Do you prefer to focus on the basic information you take in or do you prefer to interpret and add meaning? This is called Sensing (S) or Intuition (N).

Decisions: When making decisions, do you prefer to first look at logic and consistency or first look at the people and special circumstances? This is called Thinking (T) or Feeling (F).

Structure: In dealing with the outside world, do you prefer to get things decided or do you prefer to stay open to new information and options? This is called Judging (J) or Perceiving (P).

The MBTI has 93 questions with two possible preferences for each question. For example, to determine an Extraverted preference or an Introverted preference, there are 21 questions throughout the questionnaire in that category. If the subject chooses all of
those 21 questions as Extraverted preference, the score would be twenty-one for Extraverted preference and zero for Introverted preference. If the subject chose seven questions in Introverted preference the score would be fourteen Extraverted and seven Introverted. By summing the total score for each preference category, you will determine the average score of type preference for that subject.

Table 5 displays the average score of preference for each of the one hundred subjects tested. It is the score for each of the eight possible preferences, and which posture category the subjects fall under.

Table 5  

Averages of Type Preference in Each Posture

<table>
<thead>
<tr>
<th>Preference</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>17</td>
<td>14</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>I</td>
<td>4</td>
<td>7</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>S</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td>N</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>T</td>
<td>9</td>
<td>11</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>F</td>
<td>15</td>
<td>13</td>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td>J</td>
<td>7</td>
<td>11</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>P</td>
<td>15</td>
<td>11</td>
<td>10</td>
<td>9</td>
</tr>
</tbody>
</table>

The Extraverted and Introverted preference in posture A was (E) 17 and (I) 4, for a total of 21. This shows that the Extraverted preference average score for posture A was very high.
The Relationship Between Posture and Personality Type

The Judging and Perceiving preference in posture A was (J) 7 and (P) 15, for a total of 22, showing that the Perceiving preference was very high in posture A. If you look at the intensity of the Extraverted score, it was 17 in posture A, 14 in posture B, 11 in posture C, and 8 in posture D. The Introverted score was 4 in posture A, 7 in posture B, 10 in posture C, and 13 in posture D. The score for Introverted preference was low in posture A, but increased in posture D.

Sensing (S) and Intuition (N) preference was very balanced in postures A, B, C, and D. The same applied for Thinking (T) and Feeling (F) preference.

The Judging (J) and Perceiving (P) preferences had a strong relationship to posture. The Judging preference had an average score in posture A of 7, 11 in posture B, 12 in posture C and 13 in posture D. The Judging preference increased between postures A, B, C, and D. The opposite was true with the Perceiving preference. The Perceiving preference score in posture A was 15, 11 for posture B, 10 for posture C, and 9 for posture D. The intensity for the Perceiving preference decreased from posture A through D.

Figure 15 shows the percentage of Extraverted subjects in each of the four postures. In posture A, there were 96% of Extraverted subjects, posture B had 83% of Extraverted preference, posture C had 42% and posture D had 26%.
Figure 15 shows that the proportion of Extraverted and Introverted preference varied considerably among the four posture groups. These differences were significant ($\chi^2 = 32.2$ (df=1, N=100), $p< 0.0001$), thus giving general support to the overall hypothesis that posture differences are related to personality variables.

Our data ($\chi^2 = 32.2$ (df=1, N=100) $p< 0.0001$) demonstrated the relationship between Extraverted and Introverted subjects with the four different posture categories represented in this research. In posture A, 21 of the 22 subjects were Extraverted (E), meaning that 96% of posture A subjects were Extraverted. Only one person in posture A was Introverted (I), meaning that only 4% of posture A subjects were Introverted. In posture B, 30 subjects were Extraverted and only 6 were Introverted, making 83% of posture B subjects Extraverted and 17% Introverted. In posture C, only 8 subjects were Extraverted
and 11 were Introverted, resulting in 42% Extraverted and 58% Introverted. And finally, in posture D, 6 subjects were Extraverted and 17 were Introverted, meaning that 26% of posture D were Extraverted and 74% were Introverted.

Most people assume that in order to have a good posture you need to be straight, tight, and rigid, when actually the opposite is true. Posture is in better form when fewer muscles are contracted in order to maintain balance and relaxation. This concept is present in the results of posture category and personality type. A significant number of subjects were present in posture A and Extraverted preference. This demonstrates a relationship between a person’s demeanor and how it relates to their posture.

Figure 16 demonstrates that the proportion of Sensing and Intuition preference did not vary considerably among the four posture groups. These differences were not significant ($\chi^2 = 0.14 \text{ (df=1, N=100), p > 0.05}$), thus giving general support to the overall hypothesis that posture differences are not related to these more internal personality variables.
The Relationship Between Posture and Personality Type

Our data also showed the representation between Sensing (S) and Intuition (N) preference in relation to the four postures tested. Out of the 22 subjects in posture A, 12 were Sensing and 10 were Intuitive, meaning 56% were Sensing and 44% were Intuitive. In posture B, 25 out of 36 were Sensing and 11 were Intuitive, meaning that 69% were Sensing and 31% were Intuitive. In posture C, 11 out of 19 were Sensing and 8 were Intuitive, meaning that 58% were Sensing and 42% were Intuitive. Finally, 15 out of 23 in posture D were Sensing and 8 were Intuitive, meaning that 65% were Sensing and 35% were Intuitive.

The chi squared value demonstrated no relationship between posture and the perceiving functions of Sensing(S) and Intuition (N).
Figure 17 shows that there was no significant relationship between Thinking (T) preference and Feeling (F) preference, and posture.

In this research, it was demonstrated that Extraverted types were best represented in posture A, which represents the ideal posture. Introverted types best represented in posture D, which represents the posture with the most deviation. This suggests that posture and personality types are highly correlated in the E/I dimension, but not, however, in the T/F dimension. The result for the T/F preferences throughout the four posture categories did not show results as dramatic as other MBTI preferences. These differences were not significant ($\chi^2 = 0.29 \text{ (df=1, N=100), } p > 0.05$).

Figure 17 shows the representation between Thinking (T) and Feeling (F) preference in relation to the four postures tested. Out of the 22 subjects in posture A, 6 were Thinking
(T) and 16 were Feeling (F), with a 27% preference toward Thinking (T) and a 73% preference toward Feeling (F). We can see that posture A consisted of more people in the Feeling (F) category, who are more flexible and adaptable people. According to Kendall and Kendall (1983), people in the category of posture A have less tension and contraction than postures B, C, and D. Because of their character, people with a Feeling (F) preference are more relaxed and easy-going than those who exhibit Thinking (T) preference. Their character affects their posture and vice versa.

![Figure 18](image)

**Figure 18.** Amount of Judging and Perceiving Preferences in Each Posture Category

Attitude and orientation have a close relationship with posture; the Extraverted and the Introverted are similar to the Judging and Perceiving orientation.

Similar to the previous data, Figure 18 shows the proportion of subjects who utilized Judging or Perceiving preferences also varied considerably among the four posture
groups. These differences were significant ($\chi^2 = 4.79$ (df=1, N=100), $p < 0.05$) and, thus, give general support to the overall hypothesis that posture differences are related to personality variables.

The results in this figure show the emergence of a significant pattern with the attained data. In posture A, 5 people out of 22 had a Judging preference and 17 out of 22 had a Perceiving preference, meaning that the majority of posture A subjects lean towards Perceiving preference at 77%. In posture B, 47% had Judging preference and 53% had Perceiving preference. In posture C, 53% had Judging preference and 47% had Perceiving preference. And finally, 57% of posture D had Judging preference and 43% had Perceiving preference.

Literature on personality types has shown that people with Judging preference prefer to have a tight schedule and be organized. People with Perceiving preference are more flexible and can adapt easily to a new situation. Similarly, people categorized with posture A tend to be more relaxed with less muscle contraction than other posture groups. When a person is uneasy, the body gets tense, causing muscles to tighten and affect posture. The subject’s personality affects the body without him or her even realizing it. This may explain why Extraverted (E) and Introverted (I) subjects may have different posture, as well as the differences between Perceiving (P) and Judging (J) preference.
Further analysis indicated that there is a relationship between posture and the Adaptable Extraverts: ESTP, ESFP, ENFP, ENTP (E_ _P) as well as the Decisive Introverts: ISTJ, ISFJ, INFJ, INTJ (I_ _J).

This chart is a summary of all of the relationships between personality type and posture type. The percentage of Extraverted (E) versus Introverted (I) in each posture showed that the hypothesis of this research has been demonstrated. This dimension of type demonstrated a strong relationship in the Judging (J) or Perceiving (P) dimension, and indicated that the cognitive functions may have a limited relationship with posture.

Extraverted Perceiving (EP) preference, the Adaptable Extraverted, and the Introverted Judging (IJ) preference, who use perception to deal with the outer world, also showed a relationship between personality type and posture type.
Figure 19 demonstrates that the proportion of Extraverted Perceivers (E__P) versus Introverted Judgers (I__J) varies with the four posture groups. The differences in results were significant ($\chi^2 = 23.8$ (df=1, N=100), $p < 0.0001$), thus giving general support to the overall hypothesis that posture differences are related to personality variables.

Figure 20 and Table 6 provide data comparing the four posture types on the pain scale.

These results demonstrate the pain scale from zero to ten in the categories of cervical, lumbar, and thoracic, along with an overall mean pain score. There were significant differences in lumbar pain across the four posture groups, with Posture A showing the lowest pain scores and Posture C the highest. No differences were found across posture groups, however, for cervical or thoracic pain, or for overall mean pain levels.
In conclusion, for centuries doctors and psychologists have tried to demonstrate the close link between the mind and the body. With this research we have been able to scratch the surface of that theory. The data from this study do, in fact, uncover a relationship between mind and body, connecting personality type with posture. We believe this to be true since personality is a part that belongs to the mind just as posture belongs to the body. Therefore, since we show a link between the parts of the whole, we can imply that the whole, which in this case is the mind and the body, are connected too.
CHAPTER 5
DISCUSSION

The hypothesis for this research has questioned the connection between the mind and the body, trying to find a relationship between personality types and posture types. Data have shown a significant pattern, indicating that there is, in fact, a relationship between certain aspects of personality types (i.e., E-I and J-P) and posture types.

Personality Preference and Posture Category

The research has shown a relationship pattern between each type of posture and the combination of two personality type dimensions. The dimensions are one of the attitudes (E or I) and one of the orientations towards the outer world (J or P). The Types of posture are A, B, C or D, as categorized by Kendall and Kendall’s (1983) posture groups. The relationship is indicated by the percent distribution below.

The Decisive Introverts: ISTJ, ISFJ, INFJ, INTJ (I_ _J) are introspective, persevering, and convicted in their beliefs, unless compelling data are provided that override a decision or foregone conclusion. They can, therefore, appear to others to be adamant and inflexible (Briggs & Briggs Myers, 1998). The numbers of Decisive Introverts in posture groups were as follows: Posture A=5%, B=11%, C=31%, D=30%. Only 1 of 22 subjects in posture A were Decisive Introverts (IJ) preference, representing only 5%. In posture B, only 4 out of 36 were Decisive Introverts, which represented 11%. In posture C, 6 out of 19 were Decisive Introverts and 7 out of 23 are Decisive Introverts in posture D. This is an increase from postures A, B, C,
and D. Personalities that are less flexible and adaptable may correlate with a posture that is less flexible and relaxed.

Therefore, a decrease in number of Adaptable Extraverts preferences (EP) was present in each of the postures from A, B, C, and D. According to Kendall and Kendall, muscles are more relaxed and less contracted in posture A than in postures B, C, and D. Subjects with more rigid personality type (like Decisive Introverts preferences) were more present in a rigid and less relaxed posture (like postures C and D). The research has shown that there was no relation between mental process (ST, SF, NF, NT) and posture types.

The Adaptable Introverts ISTP, ISFP, INFP, INTP (I_ _P) are introspective. They are adaptable in many situations, while remaining firm on important issues because of their dominant judging function being central to their personality (Briggs & Briggs Myers, 1998). The Adaptable Introverts in the posture categories were as follows: Posture A=0%, B=6%, C=26%, D=43%.

The Adaptable Extraverts: ESTP, ESFP, ENFP, ENTP (E_ _P) are active, energetic, and sociable, and often seek new experiences. They embrace opportunities with optimism; obstacles are seen as merely temporary setbacks or challenges to be met. They also demonstrate the same kind of flexibility and adaptability as the IP types, but their dominant extraverted perceiving function may contribute to their greater tendency to engage in socially valued leadership behavior (Briggs & Briggs Myers,
17 out of 22 subjects categorized as posture A were Adaptable Extraverts. 16 out of 36 subjects categorized as posture B were Adaptable Extraverts. 4 out of 19 in posture C were Adaptable Extraverts, and none in Posture D were Adaptable Extraverts. Subjects with posture A represented 77%, and posture B represented 44%. Posture C represented 21%, and posture D represented 0%. Subjects with more flexible personality type were more present in posture A.

The Decisive Extraverts: ESTJ, ESFJ, ENFJ, ENTJ (E_ _J) are fast moving, decisive, confident, and enjoy making things happen. They are, therefore, more likely to change their minds if they are not happy with the way things are going. They are seen by others as natural leaders, and they relish that role because it permits them to exercise their dominant judging function to reach decisions and get things done (Briggs & Briggs Myers, 1998). The Decisive Extraverts present in posture categories were as follows: Posture A=18%, B=39%, C=21%, D=6%.

While the issue of theoretical or practical importance of a statistically significant result cannot be quantified, the relative magnitude of a statistically significant relationship can be measured. Chi-square allows for decision making about whether a relationship between two or more variables exists; if the null hypothesis is rejected, we conclude that there is a statistically significant relationship between the variables. But frequently, a measure of the strength of that relationship- an index of degree of correlation, a measure of the degree of association between the variables represented
in our table (and data) is desirable. Luckily, several related measures of association can be derived from a table's chi square value.

With the primary goal of this research being to demonstrate a relationship between posture types and personality types, it is also important, however, to mention the relationship found between the pain scale questionnaire and the posture types. Because each test subject answered a pain scale questionnaire, the results provided a clear pattern of certain postures having significantly more back pain.

**Back Pain and Posture**

Back pain is one of humanity's most frequent complaints. In the United States, acute low back pain (also called lumbago) is the fifth most common reason for all physician visits. About nine out of ten adults experience back pain at some point in their life, and five out of ten working adults have back pain every year (Anderson, 1997).

In this research, 22% of the subjects tested had a good posture. And, out of those 22 people, 19 of them had no back pain. That statistic demonstrates how good posture results in less back pain. These subjects represent the 1 person out of 5 who will not have back pain during his or her lifetime.

The spine is a complex interconnecting network of nerves, joints, muscles, tendons, and ligaments, and all are capable of producing pain. Large nerves that originate in the spine and go to the legs and arms can make pain radiate to the extremities. Muscle imbalances
are by far the most common cause of low back pain. Pain from bad posture often remains as long as the muscle imbalances persist. The muscle imbalances cause a mechanical problem with the skeleton, building up pressure at points along the spine.

A bad posture or slouching posture is unable to optimally distribute weight across the body framework, and, hence, is ineffective. An average posture is able to maintain distribution of weight and form, but does not attain optimal form and maintenance. A good posture or an erect posture is able to completely and optimally attain balance and proportion of the body mass and framework. Also, a well-balanced or erect posture is considered an integral part of physical attractiveness. In most cultures, an erect posture is considered a mark of a well-balanced and adaptable personality.

Posture is the emergent alignment of the body that remains relatively constant in its underlying structure and unity across various forms of human positions. It refers to the unconscious and stable structural disposition of the body framework attained over a long period of continuous body movements and patterns.

These stable postures that are attained over time are a result of a person’s lifestyle and orientation. Similarly, personality is also characterized by orientation and process. Results of this study demonstrated Extraverted and Introverted orientation with the different postures. It is also a possibility that Perceiving and Judging attitudes influence posture. Over time, people come to attain an average posture, bad or inefficient posture,
and, sometimes, a good or effective posture. The quality or effectiveness of posture is related to the proportionate structure of the body framework and the optimal balance of the body.

Although quiet standing appears to be static, modern instrumentation shows it to be a process of rocking from the ankle in the sagittal plane. Standing posture is often linked to an inverted pyramid (Anderson, 1997).

The main objective of the MBTI is to identify which of two opposite categories is preferred on each of the four dichotomies. The Indicator obtains a numerical score based on responses favoring one pole versus its opposite. These calculations are designed not as scales for measurement of traits or behaviors, but rather as indications of preference for one pole of a dichotomy or its opposite.

The letters E or I, S or N, T or F, and J or P are used to designate which of the opposite sides of a respondent's nature are preferred. The intent is to reflect a habitual choice between rival alternatives, analogous to right-handedness or left-handedness.

One expects to use both the right and left hands, even though one reaches first with the preferred hand. Similarly, use of both sides of each of the four dichotomies is expected, but one will dominate, and the person will perform functions and exhibit attitudes with the preferred one.

The four attitudes or orientations (E-I and J-P) have a relationship with posture. In order to understand why attitudes or orientations are related to posture, the way in
which the dominant and the other functions interrelate should first be understood. Each type requires an explanation of the Extroversion-Introversion (E-I) and Judging-Perceiving (J-P) dichotomies, the two pairs of attitudes or orientations and type theory.

With the Extraverted Attitude (E), energy and attention flow out, or are drawn out, to the objects and people in the environment. On the other hand, the Introverted Attitude (I) energy is drawn from the environment towards inner experience and reflection. To many laypeople, the term Extraverted means sociable, and Introverted means shy. Jung’s concept is different from and much broader than the layperson’s view. Seen as different orientations of energy, a preference for extraversion or introversion identifies the direction in which a person's energies typically flow, outward or inward.

The Judging (J) or Perceiving (P) orientation towards the outer world is implicit, but not well explained by Jung. Katharine Briggs described these dimensions in her unpublished work, prior to the publication of Jung’s work. The J-P dichotomy has two uses. First, in conjunction with the E-I dichotomy, it is used to identify which of the two preferred functions is the leading or dominant function and which one is the auxiliary function. Second, it describes identifiable attitudes or orientations to the outer world. In the Judging attitude (J), a person is concerned with making decisions, seeking closure, planning operations, or organizing activities. In the Perceiving attitude, a person is attuned to incoming information. Judging (J) refers to
Thinking (T) and Feeling (F) functions. On the other hand, Perceiving (P) refers to Sensing(S) and Intuition (N) functions.

In order to have great posture, the center of mass for each segment (e.g., the head, trunk or pelvis) has to be well aligned, one on top of the other. When people are stressed and unhappy, their posture changes along with their emotions. When people are relaxed and in good posture, the nervous system is more relaxed because it does not have to work hard to balance the body. This may explain why the majority of Extraverted/Perceivers were counted in posture A. They are usually more easy-going people and adapt better to change. Being extraverted with a perceiving dominant preference makes the individual less susceptible to internal conflict. He or she tends to express his or her emotions with ease and is more willing to discuss his or her feelings. The individual holds less tension inside, which reflects less tension in the muscles, resulting in a better posture.

Deviations are present in postures B, C, and D, requiring those subjects to adapt to those deviations by contracting different muscle groups. Every deviation creates a lever arm, which multiplies the weight of the segment. The body has to support that extra weight by contracting the opposite muscle group to the deviation.

Finally, the results of this study demonstrated that there is a correlation between some aspects of personality type and posture type. A large percentage of the population suffers from back pain and knows very little about their ailment. With this research, the science of back pain prevention may be advanced through the connection with personality type.
This is just the beginning of a new way of treating patients with a more holistic approach. Patients can learn to adopt a better posture and to be aware of their personality type. The mind and the body cannot be separated when dealing with human beings.

This research opens the door for a significant amount of future research. It would be interesting to see if a person who alters his or her posture through exercise and awareness also affects his or her personality type. If that person is able to cure his or her back pain, how will that affect personality?

This research is only a small indication of the inseparable relationship between the mind and the body. Through the data in this research, a connection was found with posture type and personality type in the tested subjects. A connection between posture type and pain was also observed. In order to prove an actual correlation between personality types and back pain, more advanced, detailed research on this hypothesis would have to be conducted. The research on posture and personality opens a new chapter in the connection between the mind and the body, and will hopefully encourage other researchers to explore the connection.
REFERENCES


APPENDIX A

ANATOMICAL MAP OF MARKER PLACEMENT WITH BIOPRINT ANALYSIS

Lateral View: L1- tragus right ear. L2- greater trochanter. L3- Gerdy’s tubercle. L4- transverse tarsal joint


APPENDIX B

DESCRIPTION OF BIOPRINT MARKER PLACEMENT

**Glabella**

A spherical marker is placed on the glabella (nasal eminence).

*To locate marker position:* The flat smooth triangular area of bone between the two superciliary ridges of the forehead. The structure lies superior to the root and bridge of the nose.

**Chin**

A spherical marker is placed on the middle of the chin and overlying the inferior mandible protuberance.

*To locate marker position:* The most inferior point on the chin in the lateral view. The structure lies on the inferior aspect of the midline of the mandible (jaw).

**Right Acromion**

A spherical marker is placed on the right shoulder over the acromion.

*To locate marker position:* The lateral extension of the spine of the scapula, forming the highest point on the shoulder.
**Left Acromion**

A spherical marker is placed on the left shoulder over the acromion.

*To locate marker position:* The lateral extension of the spine of the scapula, forming the highest point on the shoulder.

**Jugular Notch**

A marker is placed on the jugular notch (episternal notch).

*To locate marker position:* The depression in the superior aspect of the sternum between the two clavicles.

**Umbilicus**

A marker is placed over the umbilicus.

*To locate marker position:* This area is located in the middle of the torso between the rib cage and the pelvis. It is also known as the navel or belly button.

**Right Anterior Superior Iliac Spine**

A spherical marker is placed on the right anterior superior iliac spine.

*To locate marker position:* Locate the iliac crests (lateral, superior aspect of the hips), trace the right side to the most anterior point on the iliac crest.
Left Anterior Superior Iliac Spine

A flat marker is placed on the left anterior superior iliac spine.

To locate marker position: Locate the iliac crests (lateral, superior aspect of the hips), trace the left side to the most anterior point on the iliac crest.

Right Styloid Process of the Radius

A flat marker is placed on the right wrist over the styloid process of the radius.

To locate marker position: This structure is proximal to the first metacarpal bone (thumb) at the radiocarpal (wrist) joint.

Left Styloid Process of the Radius

A flat marker is placed on the left wrist over the styloid process of the ulna.

To locate marker position: This structure is proximal to the first metacarpal bone at the wrist joint.

Right Patella

A flat marker is centered over the right patella.

To locate marker position: The patella or knee cap is located anterior in the middle of the knee joint. The marker is positioned at the widest area of the knee cap.
**Left Patella**

A flat marker is centered over the left patella.

*To locate marker position:* The patella or knee cap is located anterior in the middle of the knee joint. The marker is positioned at the widest area of the knee cap.

**Centered Between the Right Medial & Lateral Malleolus**

A flat marker is centered between the right medial and lateral malleolus.

*To locate marker position:* This area is located at the most distal region of the leg, on the ankle joint between the medial and lateral malleolus.

**Centered Between the Left Medial & Lateral Malleolus**

A flat marker is centered between the left medial and lateral malleolus.

*To locate marker position:* This area is located at the most distal region of the leg, on the ankle joint between the medial and lateral malleolus.

**Right and Left Great Toes**

A flat marker is placed on the anterior aspect of
the left and right distal phalanx of the great toe.

*To locate marker position:* The marker is positioned on the tip of the right and left big toes.

**Right Tragus**

A flat marker is placed on the tragus of the right ear.

*To locate marker:* This structure is a small pointed extension of the auricular cartilage partially covering the external auditory meatus.

**Greater Trochanter**

A flat marker is placed over the greater trochanter.

*To locate marker position:* The greater trochanter is located in the middle of the hip bone at the level of the most prominent aspect of the buttock. Define the superior, inferior anterior and posterior aspect of the bony structure and place the marker.

**Just below Gerdy's Tubercle**

A flat marker is placed on Gerdy's tubercle (insertion of the iliotibial tract).

*To locate marker position:* Locate the fibular head below
the right knee joint.
You will feel a depression just in front of the fibular head. Glide your finger approximately 2 cm upward on a 45 degree angle and place the marker over this protuberance.

**Transverse Tarsal Joint**
A flat marker is placed on the transverse tarsal joint (calcaneocuboid joint) posterior to the tuberosity of the fifth metatarsal and directly inferior to the anterior border of the lateral malleolus.

*To locate marker position:* Locate the anterior aspect right lateral malleolus. Trace the fifth metatarsal (little toe side of the right foot) until it intersects a line running inferiorly from the anterior border of the lateral malleolus. Place the marker at the intersection.

**7th Cervical Vertebra**
A flat marker is placed over the spinous process of the seventh cervical vertebra.

*To locate marker position:* Have the subject lower the chin to the chest. The back of his neck will show bony prominences, the biggest of which is C7. Place the marker over this bony structure.
5th Thoracic Vertebra

A flat marker is placed over the spinous process of the fifth thoracic vertebra.

To locate marker position: Have the subject lower the chin to the chest and round the shoulders. The thoracic vertebrae will be more apparent. Palpating down, count 5 spinous process and place marker on the T5 vertebrae.

Posterior Superior Iliac Spine (left)

A flat marker is placed over the left posterior superior iliac spine.

To locate marker position: Locate the iliac crests (lateral, superior aspect of the ilium ("the hips")). Trace the left side to the most posterior point, a small indentation can be felt (SI joint). The skin that lies over this structure is typically characterized by a distinct dimple. Place the marker slightly superior and lateral to this landmark.

Posterior Superior Iliac Spine (right)

A marker is placed over the Right Posterior Superior Iliac Spine.

To locate marker position: Locate the iliac crests (lateral, superior aspect of the hips), trace the right side to the most
posterior point. The skin that lies over this structure is typically identified by a distinct dimple.

**Left Styloid Process of the Ulna**

A flat marker is placed on the left wrist over the styloid process of the ulna.

*To locate marker position:* This structure is proximal to the fifth metacarpal bone at the wrist joint.

**Right Styloid Process of the Ulna**

A flat marker is placed on the right wrist over the styloid process of the ulna.

*To locate marker position:* This structure is proximal to the fifth metacarpal bone at the wrist joint.

**Left Popliteal Cavity**

A flat marker is placed over the center of the left popliteal cavity.

*To locate marker position:* This area is located on the posterior aspect of the knee, forming a diamond shaped hollow.
**Right Popliteal Cavity**

A flat marker is placed over the center of the right popliteal cavity.

*To locate marker position:* This area is located on the posterior aspect of the knee, forming a diamond shaped hollow.

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**Left Achilles Tendon**

A flat marker is centered over the left Achilles tendon at the level of the medial malleolus.

*To locate marker position:* Locate medial malleolus, the internal bony prominence of the ankle. Trace back to the tendon and position the marker on the tendon at medial malleolus level.

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**Right Achilles Tendon**

A flat marker is centered over the right Achilles tendon at the level of the medial malleolus.

*To locate marker position:* Locate medial malleolus, the internal bony prominence of the ankle. Trace back to the tendon and position the marker on the tendon at medial malleolus level.
Left Calcaneous

A flat marker is centered over the calcaneous of the left foot.

*To locate marker position:* The area inferior to the Achilles tendon landmark and just superior to the floor.

Right Calcaneous

A flat marker is centered over the calcaneous of the right foot.

*To locate marker position:* The area inferior to the Achilles tendon landmark and just superior to the floor.