

A COMPARISON OF MAINSTREAM AND EVOLUTIONARILY INFORMED  
PHYSICAL FITNESS

A THESIS

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By

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### ABSTRACT

Body movement is an artifact of our ancestors. Humans generally engage in daily physical activity of some type, whether walking around the house or participating in a structured sport or exercise program. Although we continue to utilize our bodies for work, play and basic tasks, our movement patterns typically vary from those of our ancestors. Oftentimes, modern physical fitness regimens are comprised of moderate-to-long duration, steady-state cardiovascular work using equipment such as treadmills, and also muscle strengthening work with a variety of machines and free-weights. In contrast, the activity of our ancestors would have likely included a varied combination of high-intensity bursts of cardiovascular work such as sprinting, low-intensity walking and hiking, and complete-body movements that recruited both the musculature and cardiovascular system such as climbing, carrying, lifting, dragging, digging, and swimming (Platek, Geher, Heywood, Stapell, Porter & Walters, 2011).

Although we have gyms and fitness facilities that promote a healthy lifestyle through developing cardiovascular and muscle training activities, our current society is plagued with modern diseases such as heart disease, diabetes and obesity (O'Keefe, Vogel, Lavie & Cordain, 2010). In response to increased awareness of the mismatch between ancestral health and physical activity, and our modern health and exercise choices, greater attention has been given to dietary and physical activity choices in recent years. One result of this has been the emergence of evolutionarily informed fitness training programs that emphasize functional, whole-body activities that more closely mimic the movement patterns of our ancestors. Differences between mainstream and evolutionarily informed training protocols appear to be understudied. This study aimed to

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explore the health and fitness activities, perceptions, expectations, motivations, and outcomes of Gold's Gym members (representative of a mainstream gym experience) and CrossFit members (representative of an evolutionarily informed training program). These variables are included in broad predictions of CrossFit members having higher attendance rates, reporting a greater feeling of community and camaraderie, and increased fitness outcomes as compared to Gold's Gym members.

Results indicated that members of modern and evolutionarily informed fitness facilities might not vary greatly in attendance rates both within group, and as compared to one another. Personality characteristics did not appear to deviate either, although source of motivation (extrinsic versus intrinsic) may. However, motivations for choosing a facility, equipment used, and time spent on activities differed, and coincided with the respective gym type. Furthermore, broad perceptions of physical health and fitness appear to correspond with the underlying philosophy of the fitness facility chosen.

*Keywords:* CrossFit, exercise, evolutionarily informed training, health psychology, motivation, self-determination theory

## INTRODUCTION

### Evolution and Human Movement

Biological evolution happens at a much slower rate than does agricultural or industrial evolution (see Figure 1). As a result, human genes and human lifestyles become incongruent from one another (Eaton & Eaton, 2003). In the Pleistocene, it was necessary for our ancestors to be physically active, in order to obtain food, shelter and safety as well as protect mates and offspring. Comparatively, the industrial and agricultural revolution has provided modern, westernized societies with an abundance of processed food choices that don't need to be hunted down, manually butchered and protected from predators. Rather than trekking long distances over various terrain, lifting, digging, pulling and pushing as was necessitated by these ancestral times, we now use treadmills, recumbent bikes and muscle isolation machines if we want to exercise our heart, lungs and muscles. Many of our modern physical fitness regimens include machine-based muscle isolation work and long steady state cardio, which do not parallel those activities of our ancestors, who performed a combination of high-intensity bursts (sprinting, throwing) and longer, lower-intensity movements (hiking, carrying). In the environment of evolutionary adaptedness (EEA), physical effort was necessary, but unwise or inefficient energy expenditure would have compromised the likelihood of survival and reproduction (Platek et al., 2011).

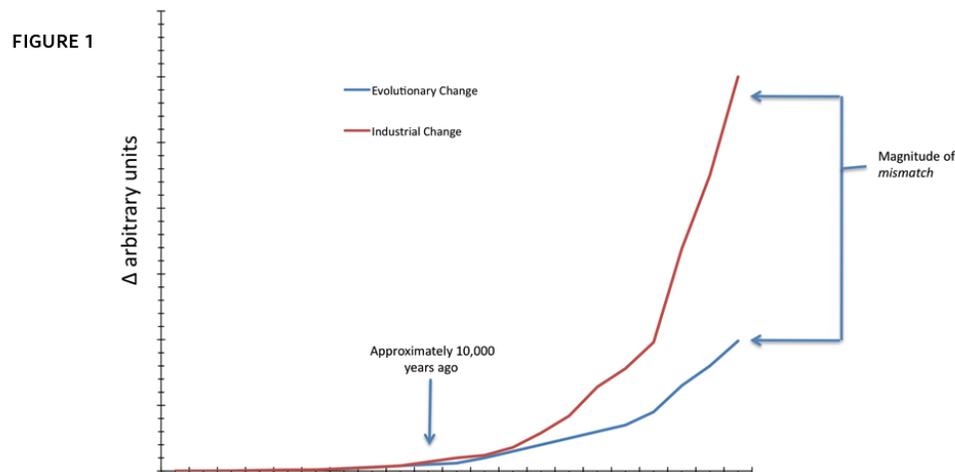
### The Link between Physical and Evolutionary Fitness

Literature suggests physical fitness and evolutionary fitness go hand-in-hand (Platek et al., 2011). Evolutionary fitness, or the ability to survive and reproduce with traits recurring into future generations, is thus logically aided by superior physical fitness. Physical fitness of our ancestors was comprised of a large amount of daily light to

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moderate activity such as walking and some periods of interval-style, high-intensity work, all of which were conducted outside in nature, and included weight-bearing, strength and flexibility building movements with plenty of rest periods built in (O'Keefe et al., 2010). A classic example is short bouts of running after prey (cardiovascular endurance), explosively throwing a spear at said prey (strength, power, accuracy), not getting killed in the process (reaction time), gathering wood/supplies and deep squatting whilst lighting a fire and cooking the meat (mobility, balance, coordination). These actions are still basic, fundamental parts of our movement pattern and are beneficial for the health of our bones, muscles, joints, and ligaments. Currently, the majority of individuals in industrialized societies sit for large portions of the day, but not in the deep squat position our ancestors sat in. We have toilets, chairs, recliners and ergonomic workstations. We have elevators and escalators, cars and public transportation. We rely on refrigeration and modern food packaging. All of these highly convenient but evolutionarily disruptive characteristics create a mismatch between the traits that were preserved throughout evolution due to adaptive purposes in the EEA, such as eating solely as a fuel for physical activity, but are no longer matched with how they are utilized in our current environment (O'Keefe Jr. & Cordain, 2004). Today, we see a much greater prevalence of contemporary diseases, many related to obesity and sedentary lifestyles (O'Keefe et al., 2010). However, the innate physical capabilities and requirements of our ancestors are essentially the same for us in modern times.

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**Figure 1:** Theoretical plot of the mismatch between the rate of biological evolution and industrial/agricultural evolution over the past 20,000 or so years (Platek, 2010).

The aforementioned aspects of modern-day life are important to consider for several reasons. Evolutionarily speaking, selection favors indicators of reproductive fitness in order to have the best chance of reproduction and gene perpetuation. According to Platek (2010), the movements that were necessary for our ancestors and adaptive throughout our evolutionary history may also be the ones that help us achieve the physical attributes that attract mates (e.g. optimal waist to hip ratio/shoulder to waist ratio). With this in mind, one could look to General Physical Preparedness (GPP) and Specific Physical Preparedness (SPP) for support. General Physical Preparedness refers to broad programming that increases work capacity and produces the ability to be prepared for any physical task. This is opposed to SPP, which focuses on becoming excellent in one domain. General Physical Preparedness does not focus on becoming excellent at any one aspect/sport/movement but instead being overall conditioned, strong, fast and flexible. Ancestral-style exercise programming utilizes the motor recruitment patterns to produce both GPP and, possibly optimal mate-worthy bodies (Platek, 2010).

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### Mainstream Exercise

When asked to think of a mainstream or modern gym, perhaps the idea of cardio machines such as treadmills, Stairmasters, and recumbent bikes, weight benches, circuit-training, and resistance machines that target or isolate certain muscle groups come to mind. Group fitness classes such as spin (bicycling), step, and kickboxing may also be part of the prototypical modern fitness facility. Sometimes these facilities may also include the latest amenities such as a sauna, spa services, or a juice/food bar. Gym franchises such as Planet Fitness, World Gym, Equinox, NYSC and Gold's Gym are all examples of these types of fitness centers. See Table 1 for examples of mainstream gym equipment.

### Gold's Gym

For the purpose of this study, Gold's Gym has been chosen as a reference gym as it is well known in the fitness community and embodies many of the characteristics that may come to mind when one thinks of the standard gym experience. Gold's Gym is a corporate, franchised gym chain with over 700 locations throughout the world (Goldsgym.com, n.d.). Heralding itself as "the Mecca" of bodybuilding, Gold's boasts the most up-to-date amenities including the latest cardiovascular and strength training equipment, cardio theater, massage therapy, saunas, juice and food bar, as well as group fitness classes such as yoga, boot camp, cycling, muscle endurance, and mixed martial arts. Equipment ranges from standard cardiovascular equipment such as treadmills and elliptical machines to strength equipment such as resistance training bands, machines, barbells, and kettlebells. Some locations also house fields for team sports, basketball and racquetball courts and an indoor track. Gold's Gym markets itself to everyone, at every level of fitness and experience, from the inexperienced housewife to the "movie star

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training for their next action role (Goldsgym.com).” Typical Gold’s Gym locations include floor trainers and group fitness trainers with a variety of certifications and experience. Members also have the option, and are encouraged to purchase personal training sessions for an additional fee, separate from their monthly membership. As a member of Gold’s, a typical day may include any combination of group fitness classes, general cardio conditioning, and machine or free-weight muscle strengthening exercises. Members may decide to do some cardio training by running on the treadmill while watching their favorite sitcom, or perform some strength training exercises using pulley-based weight machines and/or dumbbells. The standard Gold’s Gym is generally open extended hours to allow members to perform his or her chosen workout(s) on his or her own schedule and time frame.

### Evolutionarily Informed Exercise

The impetus behind evolutionarily informed exercise is to mimic ancestral movement patterns, those which our bodies were designed to do, such as running, jumping, pushing, pulling, lifting, and squatting in short bursts of maximal or near maximal effort, as would have been necessary for hunting, gathering, mate guarding, and overall survival. Short duration, high-intensity movement exercise would have been evolutionarily advantageous to our ancestors. Spontaneous activities emphasized the most efficient means of energy expenditure, while allowing the individual to solve random, varied physically demanding challenges, thus also allowing the individual to be favored by natural selection. Currently, there are several training protocols that could be considered evolutionarily informed, and emphasize functional, ancestral movement patterns as a prescription for optimal health. These include programs such as the

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Evolutionary Fitness program, created by Arthur Devany, The Primal Blueprint by Mark Sisson, MoveNat created by Erwan LeCore, and CrossFit, created by Greg Glassman.

### CrossFit

This study focused on CrossFit (CF). CrossFit is a relatively recent fitness trend that challenges people to become athletes in the “sport of fitness.” According to founder Greg Glassman, CF is evidence-based, evolutionarily informed and empirically driven (Glassman, 2010). CrossFit is a mixed-method type of program, having roots in gymnastics, Olympic weightlifting, powerlifting, and various forms of cardiovascular endurance. Glassman describes CF as a program for increasing capacity across broad time and modal domains as an ideal prescription for increased fitness through constantly varied, functional movements performed at a relatively high intensity (Glassman, 2010). CrossFit may be categorized as a high-intensity interval training (HIIT) program, as many of the workouts employ interval-like programming where the participant moves from one functional movement to another, or between several movements in a given time or for a certain number of rounds. Oftentimes, the workouts span 30 minutes or less and a complete session including warm-up, a concentrated skill and the workout of the day (WOD) will be completed in an hour session, with members fulfilling each aspect of the days programming together. CrossFit and CrossFit-style workouts have become popular across the country and throughout the world, with more than 5,500 affiliated ‘boxes,’ which is the equivalent of the CF gym (Glassman, 2010). Community is, in large part, considered the foundation of CF, where members may feel that their CF teammates are like a second family. A pinnacle characteristic of CF is the ability to scale movements, similar to Gold’s Gym, as all workouts can be made to fit any level of fitness. According to Glassman, “the CrossFit program is designed for universal scalability, making it the

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perfect application for any committed individual, regardless of experience. We've used our same routines for elderly individuals with heart disease and cage fighters one month out from televised bouts. We scale load and intensity; we don't change programs," (2010, p. 24).

The driving force behind CF is to utilize the efficient, compound movement patterns that our bodies were designed to do. CrossFit employs a variety of functional movements incorporating such equipment as kettlebells (cast iron weight shaped like a cannonball with a handle), barbells (a long metal bar able to be loaded with weight), strongman equipment (e.g., stones, yoke, log, and keg), ergometer (rowing machine), and bodyweight movements (e.g., pullups, pushups) to encourage strength and conditioning, stimulate GPP, and a "be ready for anything" mentality. See Table 2 for examples of typical CrossFit equipment.

### Primary Differences between Gold's and CrossFit

Mainstream gyms and evolutionarily informed exercise programs provide very different experiences for their respective members. When compared, specifically, CF and Gold's Gym prove to be highly dissimilar. However, both CrossFit and Gold's Gym have positioned themselves within the market as fitness leaders with locations continuing to open worldwide. The typical physical structure/location and amenities of a standard gym such as Gold's often include modern, similar or identical style buildings that include hundreds of pieces of equipment, saunas, massage chairs, group fitness rooms, indoor sport-specific equipment, and a juice bar/café area. The majority of CrossFit boxes do not offer these amenities. Instead, they are located in various types of buildings and locations from garages to barns and old gas stations. The equipment could be considered primitive in comparison to Gold's; members won't find rows of treadmills, recumbent bikes,

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elliptical machines or seated/pulley assisted weight training apparatuses. Instead, a CF box is likely to include several barbells, iron and/or bumper plates, strongman equipment, pull-up bars, kettlebells, ropes, chains, ergometers, and boxes to jump on, oftentimes with plenty of seasonally-appropriate outdoor work involved. Tables 1 and 2 below provide examples of Gold’s Gym and CrossFit equipment respectively.

*Table 1: Typically used Gold’s Gym equipment*

Equipment Name	Function	Prototypical Design
Treadmill	Endurance, conditioning	
Elliptical	Endurance, conditioning	
Pulley-based Machine	Strength training	
Seated Resistance Machine	Strength training	

*Table 2: Typically used CrossFit Equipment*

Equipment Name	Function	Prototypical Design
Kettlebell	Strength & conditioning	
Barbell	Weightlifting/Powerlifting	

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*Table 2: Typically used CrossFit Equipment*

Dumbbell	Strength & conditioning	
Plyometric Boxes	Conditioning, explosive power	
Medicine Ball	Conditioning	
Ergometer (rowing machine)	Endurance, conditioning	

There are also variations in degree of orientation toward camaraderie between CF and Gold's. At Gold's Gym, a workout could include friends or it could be a solitary activity. Within group fitness classes, members can choose to be social with other class members or keep to themselves. There is no official training protocol at a Gold's, as members may come in and do what they please during whatever time they wish. Conversely, at CF, a coach prescribes the workouts and members perform the entire program together, much like the group fitness classes at a mainstream gym. Unlike a typical CF session, Gold's members are free to come in during normal business hours, spend as much time as they like utilizing the various equipment and services that Gold's has to offer, as well as train in any way they see fit. Additionally, CrossFit has its own specific, proprietary coach certification process whereas Gold's trainers have varying degrees of certifications and accreditations. Finally, coach to participant ratio is smaller at a CF box than many mainstream gyms, with the exception of hiring a personal trainer

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at a mainstream gym. This structure allows for more rapport and individualized instruction as well as specific programming at a CrossFit facility than in a Gold's Gym.

The functional movements of a CF workout that employ several large muscle groups simultaneously are quite different from machines used in mainstream gyms that target isolated muscle groups. Although many Gold's Gym locations offer dumbbells, squat racks and free-weights, the workouts that members perform with them may or may not be functional or performed correctly. Therefore, CF workouts are consistently more closely related to ancestral movement patterns than machine-based workouts. Our ancestors lived an active lifestyle that was varied in the types and durations of movements performed. For example, the movement pattern of a bicep or leg curl machine would have been an unnatural movement for our ancestors to repeatedly engage in. CrossFit programming capitalizes on the power law through a mixture of short, high intensity movements with longer low-intensity movements, in more natural movement patterns, which draws on all three metabolic pathways, ATP, glycolysis, and aerobic (Platek et al., 2011). It has been suggested that the constantly varied, functional movement programming of CF produces physiological results more consistent with our ancestral roots than non-functional isolation exercises and long, steady state endurance activities typically applied in mainstream gyms.

This is not to say that evolutionarily informed styles of training cannot, or do not occur at mainstream gyms. Mainstream gyms may in fact include some of the equipment used in CrossFit gyms such as barbells, boxes, dumbbells and kettlebells. However, for the typical gym member, the use of such equipment *in an evolutionarily informed workout style* appears to be less likely to occur at a mainstream gym. Similarly, many

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conventional gym workouts (e.g., a 30 minute jog on the treadmill) are unlikely to occur at an evolutionarily informed facility.

### Self Determination Theory

Self-determination theory (SDT) may be helpful in understanding the predictions of this research and the proximate mechanisms for the success of CrossFit. Self-determination theory, originally conceptualized by Deci and Ryan, has been increasingly utilized to understand motivation and persistence with regard to exercise programs (Thogersen-Ntoumani & Ntoumanis 2006). Self-determination theory proposes three variations of motivation: *amotivation*, *extrinsic motivation*, and *intrinsic motivation*. Each type of motivation varies by the degree of internalization of external goals. Amotivation refers to the individual holding no value in the outcome of the activity and not seeing a direct link in his or her behavior and the subsequent outcome. An individual would be considered to have extrinsic motivation if his or her behavior is propelled by outward goals such as body image, and intrinsically motivated if the link between behavior and outcome was guided by internal satisfaction such as feeling accomplished (2006). It is possible that the source or type of motivation that the individual experiences may play a part in the initial choice in a fitness facility as well as ancillary decisions such as maintaining attendance and adhering to a training program. If this were to be true, it may be postulated that Gold's Gym members and CrossFit members choose these respective facilities based on different motivations.

### The Present Study

In 2010, over 41 million Americans belonged to a private or public health club or fitness center (Mullen & Whaley, 2010). Surprisingly, this number is not very large when compared to the total US population. Current literature suggests that a combination of

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aerobic and muscle strengthening activities are the key to longevity and positive health indices such as higher bone density, lower adipose tissue, and proper insulin sensitivity (Eaton & Eaton, 2003). In 2010, roughly 12-22% of adults were at recommended levels of physical activity (Dishman, 2001 as cited in Mullen & Whaley, 2010). Similarly, the Center for Disease Control reports that less than half of adults currently meet the minimum recommendation of physical activity (CDC.gov, 2012). Compounding this concern is lagging gym membership rates. The attrition rate of fitness facilities falls around 34.5% per year (IHRSA, 2005 as cited in Mullen & Whaley, 2012). Prior research has addressed topics such as motives to attend a gym or fitness facility and how habitual routines are established. Literature shows that motives for beginning an exercise regimen vary by demographics, most notably, age and gender. Specifically, the reasons for initial attraction to a fitness program and/or the fitness facility vary across the life span (Mullen & Whaley, 2010). Interestingly, there have been conflicting reports regarding the reasons that people continue to follow a physical fitness program. Mullen and Whaley (2010) found that seeing physical change was the greatest factor in sustained commitment to exercise across age and gender categories. Conversely, Ryan, Frederick, Lipes, Rubio and Sheldon (1997) found adherence to a physical fitness regimen is greatly associated with enjoyment, competence and social interaction instead of increased fitness or appearance. Specifically, they found that body-related motivations were negatively related to hours per week of exercise, while enjoyment and competence were positively related. Yet Sherwood and Jeffery (2000) suggest that those engaging in sport are motivated by enjoyment while those engaging in fitness are more motivated by physical

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appearance. This begs the question: if CrossFit is the sport of fitness, how do members reconcile these motivations?

Few studies seem to address any specific type of gym as it relates to the initial decision to join and motivations for maintaining attendance. Further, I am unaware of any existing literature that relates this information to evolutionary roots. Mentions of modalities of training in literature are quite limited and tend to be addressed solely as an ancillary piece of the study design, if at all. Themes regarding perceptions of health and fitness, as well as motivational characteristics of those engaging in various modalities of training or in various types of facilities (e.g. CrossFit versus Gold's) do not appear to be studied at all. Further, links between ancestral fitness and modern fitness are an emerging area. Investigating the ecology of employing evolutionary-informed fitness programming and its possible myriad of physiological benefits is scarce. Doing so could lead to implications for health psychology, sports psychology and other related fields.

That being said, this study aimed to explore the various similarities and differences between CrossFit and Gold's Gym from an evolutionary perspective. Of particular interest was exploring frequency of attendance across time, as well as specific psychological and health variables. These variables included measurements of personality characteristics, motivations for choosing a fitness facility, and individual health indices. Broadly, this study questioned whether Gold's Gym members differ from CrossFit members in terms of how frequently they attend the gym? Further, what draws people to CrossFit versus Gold's? And finally, a goal was to explore CrossFit and Gold's Gym members' overarching perceptions of health and fitness, specifically as they relate to body image, modalities of training and food choices.

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This study consisted of two parts. The first part of the study comprised of a quantitative analysis primarily directed at gym-specific data. The second part was a qualitative analysis of health, body image and nutrition themes. The goal of the resulting data was tying the qualitative and quantitative data together to determine if participants' health, nutrition and body image ideologies align with, or represent the ideology of his or her fitness facility.

Participants were compared in terms of age, gender, income, and length of gym membership. After ensuring that the samples were equivalent in terms of these variables, this study measured the degree to which factors such as demographics, personality traits, and source of motivation for a physical exercise program predicted the quantitative and qualitative hypotheses discussed below. The questions and established measures used for this study were specifically chosen for appropriateness to explore participants' considerations for choosing a fitness program, motivations/feelings about exercise, types of activities engaged in, dietary choices, lifestyle habits, and body image, and can be seen in Appendix A.

### Quantitative Predictions

The primary goal of this study was to quantitatively compare those participants who attend an evolutionarily informed facility with those who attend a mainstream facility (specifically CrossFit and Gold's Gym respectively). This investigation aimed to address the following hypotheses. First, we know that ancestral societies tended to form small groups or communities in order to increase chance of survival through protection from predators and ability to acquire food (Geher, 2014). Modern conveniences have eliminated the need for these small cohesive groups, thus creating a mismatch. Therefore, the small group nature of CrossFit versus the individualistic nature of typical Gold's

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experiences (exclusive of group fitness class participants) was predicted to lead CrossFit members to increase (or at least maintain) frequency of attendance as membership longevity increases, as compared to Gold's members (attendance across time). Second, previous literature provides us with information regarding the relatively small size and population of ancestral communities. Considering CrossFit more closely mimics ancestral conditions, CrossFit members were predicted to report a higher level of community and camaraderie due to the typical small group nature and cohesiveness of CrossFit training. Further, self-determination theory may serve as the foundation for the prediction that CrossFit members and Gold's Gym members may be driven to choose a facility based on different psychological factors. If CrossFit members and Gold's Gym members vary in psychological factors influencing overall motivation, it would follow that motivation for choosing a fitness facility may vary by membership group. As a result, CrossFit members were predicted to show higher levels of intrinsic motivation regarding gym attendance, while Gold's members were predicted to report higher levels of extrinsic motivation. Finally, as discussed during the introduction, the mismatch theory helps support the possibility that typical workouts, in mainstream modern facilities may not provide the types of equipment or atmosphere that encourage the movement patterns humans are developed to perform for optimal health. Because CrossFit taps into natural, evolutionary movement patterns, CrossFit members were predicted to report a greater variety of overall fitness goals and outcomes, including:

- a. Achievement of health-related goals (increased strength, reduced bodyweight)
- b. Transference to sports performance (if applicable)

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- c. Overall health indices/reduction of chronic health concerns
- d. Increased energy levels/decreased stress levels

### Qualitative Investigation

The qualitative investigation of CrossFit and Gold's members' perceptions of body image, health and optimal physical fitness was expected to provide support for findings from the quantitative data, and are also included in Appendix A. The questions in this portion of the survey directed the participant to discuss his or her experiences, values, and ideals regarding a variety of physical fitness, nutrition, and gym-related experiences. The broad predictions expected from the qualitative responses were as follows. First, evolutionarily informed lifestyle factors such as the Paleo diet and atypical body image perceptions (as compared to what's seen in popular media) are anecdotally seen in groups of CrossFitters. Therefore, of particular interest was examining the perceptions of health-relevant outcomes as a function of being a CrossFit or Gold's member. Specifically, a goal was to explore themes that may emerge as they relate to body image, modalities of training and food choices. Furthermore, it was hypothesized that those participants who choose an evolutionarily informed fitness facility such as CrossFit will also have similarly evolutionarily informed themes arising in his or her perceptions of health, nutrition and body image. It was additionally hypothesized that these themes will be divergent from those of Gold's Gym members, who will also be similar to one another (within group). Particular content areas that were examined in this qualitative analysis include:

- a. Foods considered to be healthy
- b. Perceptions of what constitutes a healthy bodyweight/body image

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- c. Perceptions of what kinds of fitness training are essential to achieving a healthy body
- d. Reasons for choosing/maintaining membership with his or her respective gym

METHOD

Participants

188 participants: 76 male, 112 female; 69 Gold's Gym members, and 119

CrossFit members completed the online survey. All subjects met the following criteria in order to participate: they were 18 years of age or older, understood English and were current members of either Gold's Gym or CrossFit, worldwide.

Measures

Background variables were measured based on background demographics and also included questions pertaining to the participants' current geographical location (country and/or state in which they live) and location of the gym at which they are currently a member. The complete list of questions can be seen in Appendix A. The first independent variable in this study was the classification of "novice" ( $\leq 6$  months), "intermediate" ( $> 6$  months but  $\leq 12$  months) or "advanced" ( $> 12$  months). A second independent variable was the type of gym the participant attends. The outcome/dependent variables measured included frequency of gym attendance, current training (workout) programs, perceptions of health and fitness, dietary choices, achievement of fitness-related goals, along with objective markers of fitness such as BMI, number of sick days etc.. Other scales included in the survey to evaluate perceptions of health and fitness, personality and motivation for participating in an exercise program were the Exercise Regulations Questionnaire (BREQ-2) (Markland, 2000), Exercise Motivation Inventory (EMI-2) (Markland, 1997), Exercise Feelings Questionnaire (GOEM) (Markland, n.d.), and Gosling's Ten Item Personality Inventory (TIPI) for measuring personality (Gosling, Rentfrow & Swann Jr., 2003). These scales can be found in Appendices B-E respectively.

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The Exercise Regulations Questionnaire (BREQ-2) (Markland, 2000), is a 19-item measure of individuals underlying decisions to engage, or not engage in exercise. This scale specifically addresses source of motivation. The BREQ-2 is a Likert-type scale from 0 to 4, where 0 = not true for me, 2 = sometimes true for me, and 4 = very true for me. Examples of questions on the BREQ-2 are “I feel ashamed when I miss an exercise session”, and “I take part in exercise because my friends/family/partner say I should”. No published information regarding the reliability and validity of the BREQ-2 is provided.

The Exercise Motivation Inventory (EMI-2) (Markland, 1997), is a 51-item measure that addresses degree intrinsic or extrinsic motivation specifically as it is related to beginning and continuing an exercise regimen. This is a Likert-type scale with anchors from 0 to 5, where 0 = not at all true for me and 5 = very true for me. Examples of questions on the EMI are “personally, I exercise (or might exercise) to look more attractive”, and “personally, I exercise (or might exercise) to give me personal challenges to face”. No published reliability or validity information is given.

The Exercise Feelings questionnaire (GOEM) (Markland, n.d.), is a ten-item measure examining respondent’s feelings regarding the outcomes of his or her physical activity/exercise, and how those feelings relate to how the participant views him/herself as compared to others. Responses are given on a Likert-type scale of 1 to 5 where 1 = strongly disagree and 5 = strongly agree. Examples of questions on the GOEM are “I achieve the exercise goal I set for myself”, and “I know that I am more capable than other exercisers”. No published reliability or validity information is given.

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The Ten-Item Personality Inventory (TIPI) (Gosling, Rentfrow, & Swann, 2003) is used to assess an individual's personality. It measures the Big 5 personality traits (openness, conscientiousness, extrovertedness, agreeableness, and neuroticism). This scale consists of a 7-point Likert-type scale where 1 = disagree strongly and 7 = agree strongly. Sample items include "I see myself as conventional, uncreative" and "I see myself as anxious, easily upset". The alpha levels for the TIPI are 0.68, 0.40, 0.50, 0.73, and 0.45 for extroversion, agreeableness, conscientiousness, emotional stability, and openness to experience scales respectively.

### Procedures

Participants accessed the survey, containing both quantitative and qualitative sections in one session, on the website Qualtrics (Qualtrics.com). Participants were recruited via email to campus-wide listservs, and directly to members of Gold's Gym and CrossFit, on health and fitness-related blogs, to groups and individuals on social networks such as Facebook, and amongst SUNY New Paltz students (for 1 subject pool credit). The survey was expected to take approximately 30 minutes to complete.

## RESULTS

The analyses fundamentally addressed the issues of (a) demographic features of CrossFit versus Gold's members (to address the matched-samples concept), (b) differences in psychological variables between the two groups, (c) differences in physical health-related variables between the two groups, (d) differences in gym-related behavior, and (e) qualitative summaries of themes that emerged in the data.

### Demographic Variables

Of the 188 participants, 69 were Gold's Gym members and 119 were CrossFit members. Overall, there were 76 males and 112 females. t-tests were performed to determine whether the participants in both the Gold's Gym group and the CrossFit group were equivalent in terms of certain demographic variables. The results show that the groups were equivalent in terms of age (Gold's Gym  $M = 34$  years, CrossFit  $M = 33$  years), gender (36% male, 64% female and 43% male, 57% female for Gold's Gym and CrossFit respectively), and income (Gold's Gym median range = \$70,000-\$79,999, CrossFit median range = \$80,000-\$89,999). Participants were also asked to report their length of membership at either CrossFit or Gold's Gym in months. The groups were matched in this domain as well (Gold's Gym  $M = 24.27$ ,  $SD = 34.11$ , CrossFit  $M = 18.00$ ,  $SD = 15.18$ ). These findings imply that the Gold's Gym and CrossFit groups are matched.

### Differences in Psychological Variables

Psychological variables included the following measures: TIPI, BREQ-2, EMI-2, and GOEM. t-tests performed showed no differences between Gold's Gym and CrossFit members on overall personality scores. Further, a correlational analysis revealed no significant differences when comparing length of gym membership and the TIPI, on any single dimension. Finally, a between groups ANOVA was performed to determine whether Gold's Gym and CrossFit members varied on any individual dimension; no significant results were found.

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However, t-tests were also performed for the remaining psychological measurements. When analyzing the BREQ-2, EMI-2, and GOEM scales, several differences in psychological variables across these groups emerged. These are summarized in Table 3.

*Table 3: Means between the Two Groups across Various Psychological Variables*

	Gym Type		<i>t</i>	<i>df</i>
	Gold's	CrossFit		
Openness	10.64 (2.34)	11.16 (2.22)	1.43	168
Conscientiousness	11.62 (2.26)	11.51 (2.34)	0.30	168
Extroversion	9.64 (2.86)	9.25 (3.43)	0.22	168
Agreeableness	10.00 (2.21)	9.95 (2.37)	0.12	168
Emotional Stability	9.62 (3.36)	10.00 (2.63)	0.83	168
Amotivation	3.29 (1.07)	3.16 (0.57)	1.00	157
External Regulation	5.02 (2.23)	5.02 (1.84)	0.01	157
Introjected Regulation	8.93 (3.82)	8.91 (3.65)	0.03	157
Identified Regulation	17.63 (2.63)	18.81 (1.65)	3.05**	157
Intrinsic Regulation	17.79 (3.15)	18.85 (2.03)	2.27*	157

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*Table 3: Means between the Two Groups across Various Psychological Variables*

Relative Autonomy Index (RAI)	59.79 (17.39)	65.73 (12.76)	2.25*	157
Stress Management	3.90 (1.78)	4.00 (0.88)	0.55	151
Revitalization	4.37 (0.77)	4.44 (0.65)	0.60	151
Enjoyment	4.28 (0.97)	4.57 (0.66)	1.94	151
Challenge	3.62 (1.11)	4.16 (0.71)	3.21**	151
Social Recognition	2.30 (1.31)	3.00 (1.10)	3.42**	150
Affiliation	2.60 (1.35)	3.60 (1.02)	4.63***	150
Competition	2.83 (1.41)	3.62 (1.23)	3.59***	150
Health Pressures	2.42 (1.23)	2.30 (0.91)	0.61	149
Ill-Health Avoidance	4.16 (0.94)	4.01 (0.85)	0.95	150
Positive Health	4.63 (0.62)	4.65 (0.62)	0.16	151
Weight Management	4.03 (1.06)	3.64 (1.67)	2.06*	151

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*Table 3: Means between the Two Groups across Various Psychological Variables*

Appearance	3.96 (0.89)	3.97 (0.93)	0.01	151
Strength Endurance	4.48 (0.67)	4.63 (0.58)	1.46	151
Nimbleness	3.96 (1.08)	4.14 (0.83)	1.12	151
Task Orientation	4.38 (0.63)	4.58 (0.46)	1.99*	146
Ego Orientation	1.94 (0.98)	2.15 (1.09)	1.12	146

*Note: \*  $p \leq .05$ , \*\* $p < .01$ , \*\*\* $p < .001$*

### Differences in Physical Health-Related Variables

An independent samples t-test showed no significant difference in bodyweight between the two groups, (Gold's Gym  $M=173.79$  pounds,  $SD=55.02$  pounds, CrossFit  $M=167.78$  pounds,  $SD=33.02$  pounds,  $t(167) = .758$ ,  $p=0.45$ ) or in BMI (Gold's Gym  $M=28$ ,  $SD=8.6$ , CrossFit  $M=26$ ,  $SD=6.0$ ,  $t(166) = 1.68$ ,  $p=0.097$ ). A chi-squared test was performed to determine likelihood of each group to believe that the BMI chart was an accurate portrayal of their health. The results show that CrossFitters were more likely to report that they did not believe the BMI chart to be an accurate portrayal of their health than did Gold's Gym members  $X^2(1, N=169) = 5.07$ ,  $p < .05$ . Some qualitative responses supporting this are shown in Table 4. However, there was a significant difference in the number of sick days taken from work or school responsibilities, over the 12 months prior to completing the survey, between the groups (Gold's Gym  $M=3.18$ ,  $SD=2.66$  CrossFit  $M=2.34$ ,  $SD=1.74$ ,  $t(156) = 2.12$ ,  $p < .05$ ).

*Table 4: Typical Qualitative Responses Regarding the BMI Chart*

	Gym Type	
	Gold's Gym	CrossFit
Do you believe that the BMI chart is an accurate portrayal of your health?	<p>“My BMI fell into the normal range and that is consistent with how I feel about my body and weight”</p> <p>“Yes because I believe I am a little over weight”</p> <p>“I am heavier than normal right now and I have not been eating healthy or working out as much as usual so it makes sense that I am getting closer to the overweight mark. I do not feel healthy.”</p> <p>“I know I need to do more strength training to tighten up”</p> <p>“It seems accurate”</p>	<p>“My weight is more muscle than fat; BMI doesn't take into account body composition.”</p> <p>“Health has much more to do with how you feel versus what some chart says about your health. Also, does the BMI chart account for muscle mass? I'm much stronger than I was even a year ago and see a major difference in the way clothes fit me and even how I carry myself.”</p> <p>“The BMI is valid as an epidemiological data point, not as an individual health assessment. There is no accounting for body composition.”</p>

#### Differences in Gym-Related Behaviors

Chi-squared tests were performed to determine likelihood of each group to consider certain factors when choosing a gym or fitness facility. The results show that CrossFitters were more unlikely to be concerned with the cost of membership as a factor in choosing a gym as compared to Gold's Gym members  $X^2(1, N=188) = 22.75, p < .001$ . Likewise, Gold's members were more unlikely to consider philosophy of the gym when joining,  $X^2(1, N=188) = 62.55, p < .001$  and more likely to consider convenience of location  $X^2(1, N=188) = 5.08, p < .05$ , as compared to CrossFit members.

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It was found that Gold's Gym members spent more time (in minutes) in the gym than CrossFitters ( $M = 87.5$ ,  $SD = 39.83$  and  $M = 76.9$ ,  $SD = 25.42$ ,  $t(157) = 2.04$ ,  $p < .05$ ) respectively, with the percentage of time spent on cardiovascular endurance activities being greater for Gold's Gym members than for CrossFit members, ( $M = 43.45$ ,  $SD = 25.84$  and  $M = 31.67$ ,  $SD = 20.07$ ,  $t(142) = 2.79$ ,  $p < .01$ ). t-tests were performed to determine specifically what activities each group spent time on while in the gym. Table 5 shows that CrossFit members are more likely to spend time on plyometric exercises, interval training, weightlifting, and sport-specific training.

*Table 5: Means & Standard Deviations of Activities Engaged in while at the Gym*

	Gym Type		<i>t</i>	<i>df</i>
	Gold's	CrossFit		
Plyometric Exercises	0.21 (0.41)	0.59 (0.49)	5.70**	185
Interval Training	0.37 (0.49)	0.67 (0.47)	4.20**	185
Weightlifting	0.57 (0.50)	0.85 (0.36)	4.00**	185
Sport-specific Training	0.12 (0.33)	0.23 (0.42)	1.98*	185

*Notes: \*  $p < .05$ , \*\* $p < .001$ . Each scale here is based on the participant checking either "1" indicating s/he engages in the activity, or "0" indicating that s/he does not engage in this activity. A higher mean thus corresponds to more participants engaging in that activity, on a scale of 0-1.*

Further tests were performed to determine specific types of equipment used by each group while at the gym. Overall, the results show that Gold's Gym members were more likely to use modern fitness machines, while CrossFit members were more likely to use strength equipment. Significant results are summarized in Table 6.

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*Table 6: Means & Standard Deviations of Equipment Used while at the Gym*

	Gym Type		<i>t</i>	<i>df</i>
	Gold's	CrossFit		
Rower/Erg	0.12 (.45)	0.72 (0.33)	10.62*	185
Treadmill	0.67 (0.48)	0.08 (0.28)	9.14*	185
Stairmaster	0.34 (0.48)	0.03 (0.16)	5.25*	185
Step-Machine	0.24 (0.48)	0.03 (0.18)	3.71*	185
Stationary Bike	0.43 (0.50)	0.08 (0.27)	5.39*	185
Barbell	0.60 (0.49)	0.87 (0.34)	3.86*	182
Nautilus Machine	0.28 (0.45)	0.02 (0.13)	4.55*	182
Pulley-Based Machine	0.48 (0.50)	0.03 (0.16)	7.05*	182
Smith Machine	0.22 (0.41)	0.00 (0.00)	4.19*	182
Kettlebells	0.22 (0.41)	0.80 (0.40)	9.29*	182
Strongman Equipment	0.03 (0.17)	0.40 (0.49)	7.44*	182

*Notes: \* p < .001. Each scale here is based on the participant checking either "1" indicating s/he engages in the activity, or "0" indicating that s/he does not engage in this activity. A higher mean thus corresponds to more participants engaging in that activity, on a scale of 0-1.*

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To address the hypothesis of attendance across time, the groups were first looked at overall. As a whole, there was no significant difference between Gold's Gym and CrossFit members in how often, in days per week, they attend the gym ( $M = 4.95$ ,  $SD = 1.61$  and  $M = 5.41$ ,  $SD = 1.50$ ,  $t(160) = 1.832$ ,  $p = .07$ ) respectively. Next, the groups were filtered by the following longevity classifications: novice (six months or less of membership), intermediate (greater than six, but less than or equal to 12 months of membership), and advanced (Greater than 12 months of membership). After grouping for longevity of membership, additional t-tests were run to determine if there were any differences in days per week of attendance at each level of longevity. The results show a difference only at the intermediate level classification, with CrossFit members attending more frequently per week than Gold's members ( $M = 5.70$ ,  $SD = 1.66$  and  $M = 4.14$ ,  $SD = 1.07$ ,  $t(35) = 2.35$ ,  $p < .05$ ). Results for the overall attendance and each level of longevity are summarized in Table 7.

*Table 7: Means & Standard Deviations of Days per Week Attendance*

	Gym Type		<i>t</i>	<i>df</i>
	Gold's	CrossFit		
Overall (no longevity filter)	4.95 (1.61)	5.41 (1.49)	1.83	160
Novice ( $\leq 6$ months)	4.53 (1.84)	5.26 (1.54)	1.37	38
Intermediate ( $>6$ but $<12$ months)	4.14 (1.07)	5.70 (1.66)	2.35*	35
Advanced (12 months+)	5.33 (1.49)	5.41 (1.15)	.27	82

*Note: Significant results are demarcated with \*,  $p < .05$*

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To address the question of whether or not Gold's Gym and CrossFit members vary in days per week attendance over time within their respective groups, planned contrasts were performed. No significant results were found, suggesting that members in both groups tended to maintain a relative frequency of attendance across time, despite slight changes in mean days per week attendance as noted in Table 6 above.

Finally, chi-square analyses revealed differences in physical health-related exercise goals among the groups. Specifically, CrossFit members were more likely to strive for muscle gain  $X^2(1, N=188) = 5.44, p < .05$  and increased sports performance,  $X^2(1, N=188) = 16.05, p < .001$ , as compared to Gold's members.

### Qualitative Summaries of Themes that Emerged

For several variables, participants were asked to provide written comments or thoughts on their dietary and physical behaviors. These variables broadly included topics of overall health and wellness, optimal workouts, body image, and nutrition, as well as thoughts on his or her current fitness facility. Some prototypical comments that speak to participants' responses (and that support with the data from the prior quantitative analyses) are presented in Table 8 to help highlight the findings.

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*Table 8: Examples of Responses Regarding Physical Fitness and Nutrition*

	Gym Type	
	Gold's	CrossFit
Thoughts on overall health, wellness, fitness, and body image	<p>“Exercise every day watch calorie intake.”</p> <p>“Eat right, exercise; find the right program for you.”</p> <p>“Find out what you need to operate and be your best each day and meet that goal each time.”</p>	<p>“Finding the balance between mental and physical wellbeing while eating. Focusing on whole foods that are going to energize you and provide food without becoming of focus of restriction and dieting.”</p> <p>“Eating clean, exercising regularly, laughing, and spending time with family &amp; friends.”</p> <p>“First optimal sleep and water. Next healthy food choices. Finally, physically activity that is enjoyable for the individual.”</p> <p>“Weightlifting/strength training, conditioning, Paleo diet, particularly gluten free, sleep 7-8 hours a night, manage stress”</p>

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*Table 8: Examples of Responses Regarding Physical Fitness and Nutrition*

Nutrition, optimal diet/dietary choices	<p>“Breakfast: whitefish or egg salad on crisp bread. Tea. Lunch: salad or sandwich. Afternoon snack: cheese and crackers or chips Dinner: lean meat, carbohydrate (pasta, rice, or potato) and vegetable, sometimes also a salad”</p> <p>“Healthy eating habits mean smaller portions and more frequent meals during the day, eating breakfast, limited amounts of red meat, cooking meals at home as much as possible, little or no alcohol.”</p> <p>“Watch calories and fat.”</p> <p>“Usually just smaller portions of regular meat starch and veggie...”</p>	<p>“I try to follow a paleo diet at least 80% of the time”</p> <p>“Eating regularly throughout the day...meat, veggies, fruit, nuts.”</p> <p>“No artificial sugars, especially high fructose corn syrup...no soda, no wheat, no dairy. Clean eating.”</p> <p>“Meat, fish, fruits, vegetables, nuts, berries, a little starch &amp; sugar.”</p> <p>“Paleo lifestyle. No grains or processed food. I think generally anyone who eats whole foods eats healthy. I always shop the perimeter at the grocery store.”</p>
Body image	<p>“A lot of it is genetic, but controlling portions, eating home-cooked meals, and exercising regularly can help achieve the "optimal" body.”</p> <p>“Hourglass shape, toned muscles, enough fat for curves.”</p> <p>“No softness.”</p>	<p>“Athletic/muscular with some body fat and healthy.”</p> <p>“Strong and lean muscles with little cellulite...an athletic body type, not too thin.”</p> <p>“Curvy and strong.”</p> <p>“Not skinny, a woman with curves muscle tone and a healthy amount of body fat.”</p>

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*Table 8: Examples of Responses Regarding Physical Fitness and Nutrition*

Optimal activities/typical workouts	<p>“In a typical week, I attend 2 cardio classes (Kickboxing and Spin) and one weight-training class (Body Pump). I have also recently started working with a personal trainer for two 30 minutes sessions per week”</p> <p>“Bodybuilding-like exercises, cardio.”</p> <p>“Cardio at least.”</p>	<p>“I’m following a typical Crossfit workout. Warm up/Stretch, Strength Training, Workout of Day. Equipment varies but includes barbells, kettlebells, jump ropes, bars, rings, ropes, tires and stones.”</p> <p>“Some cardio - nothing more than 20 mins. Lift some heavy things - focus on different parts of body. Stretch - improve your flexibility.”</p>
Reasons for choosing current gym/best aspects	<p>“Close to my house.”</p> <p>“My trainer.”</p>	<p>“Community. Friends and family. Coaches are helpful, but push you to your limits when necessary. Crossfit changed my life.”</p> <p>“Provides smaller group training classes so you get more attention from coaches.”</p> <p>“I F'n love it! It changed my physical and mental state 100% for the better”</p> <p>“I absolutely love my gym. It has completely transformed my life. It is more than just the exercise, it is also the people.”</p> <p>“Different ideology, not an "isolative" gym, consistent personalized feedback from coaches, varied workouts”</p> <p>“Instruction, camaraderie and energy.”</p> <p>“The community, the emphases on quality programming, the coaches are genuinely interested in the science of fitness and do plenty of research to share with clients, overall focus on whole-body.”</p> <p>“Great camaraderie and competition levels that push you to do better.”</p>

## DISCUSSION

These findings, in combination, imply that CrossFit facilitates an experience that leads to (a) more attendance at an intermediate level of membership, (b) motivational factors that are more intrinsic in nature, (c) a tendency to see the gym in a broader philosophical context, (d) use of certain equipment and achievement of certain fitness-related goals, and (e) an atypical point of view regarding body image as well as ideal lifestyle and exercise behaviors. However, an implication of differences in overall attendance between the groups, and thus the idea that the proposed mismatch of Gold's Gym versus CrossFit being indicative of attendance rates was not supported.

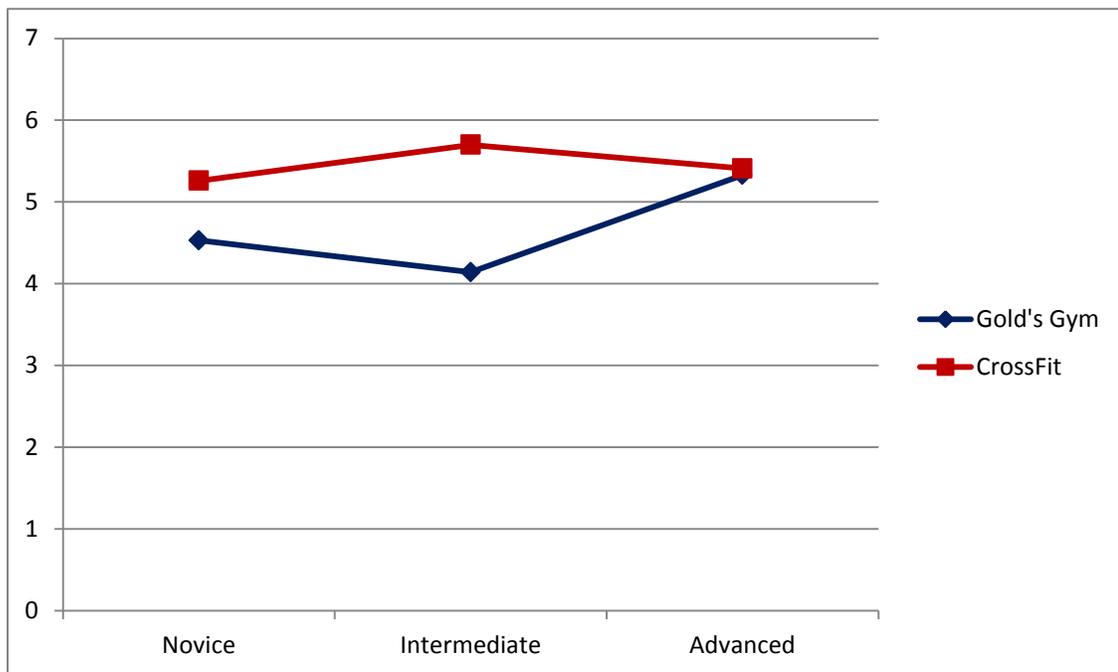
### Membership and Attendance

The first quantitative hypothesis predicted that CrossFit members would increase, or at minimum, *maintain* frequency of attendance as membership longevity increased as compared to Gold's Gym members. This hypothesis was partially supported. CrossFit members scored higher on psychological characteristics of affiliation and social recognition, potentially supporting the idea that the small group nature of CrossFit has an impact on gym-related outcomes such as attendance. However, on the whole, there was no difference in attendance between the groups. One possible reason that attendance did not diverge between groups is that both facilities provide opportunities for members to find something that keeps them interested and physically active. For example, the diversity of sport and recreational activities that are opened up to members of any fitness facility may prompt a Gold's Gym member to find that they are interested in bodybuilding, while through CrossFit, an individual may become interested in Olympic lifting. Each facility thus provides similar opportunities for members to stay active and engaged which transfers to consistent attendance.

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When compared at various levels of membership longevity (novice, intermediate, and advanced), membership only appeared to differ at the intermediate range, (seven to 12 months). Further analysis of these data then showed that relatively speaking, the groups themselves maintained about the same attendance across the levels of membership longevity. These results are represented visually in Figure 2.

*Figure 2: Mean Days per Week Attendance Rates for Gold's and CrossFit Members*



Combined with the results of the TIPI, showing that there were no differences in overall personality characteristics, these findings seem to suggest that the individualistic nature of a modern fitness facility such as Gold's Gym may not hinder attendance over time. The analyses show that Gold's members average just less than five days per week attendance. Similarly, CrossFitters appear to average slightly over five days. These numbers are potentially indicative of response to both the CDC's general recommendation to achieve five days per week of physical activity, and broad CrossFit prescription of three days on/one day off. However, selection bias could also be a factor in these results. The possibility remains that those who chose to respond to this survey were also those who were continually active members of their respective gym. In other

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words, the top tier of those who are motivated to attend a Gold's Gym or CrossFit facility, are active members and excited to discuss their experiences. Conversely, it is possible that inactive members chose to not respond for a variety of reasons, such as not feeling connected to or excited about their respective gym, not wanting to admit not attending as frequently as he or she would like or thinking they 'should', or not being active in social groups that would lead them to see the survey invitation.

However, it is possible that these variables factor into slightly lesser attendance of Gold's Gym members and slightly higher attendance of CrossFit members in the intermediate group. Exercise of any sort (e.g., endurance or strength) is a stress on the body. Stress causes adaptation. Adaptations are necessary for change. For most gym-goers, being completely untrained (i.e., novice) means that even minimal stress will cause an adaptation. As such, novice trainees will see results quickly and steadily. However, as the body becomes more adapted to dealing with stress, and/or the types and intensities of the stress do not change, progress begins to slow. For the general, untrained population, this occurs within the first 12 months of exercise (Wells, 2010). The results of this study revealed that Gold's Gym members scored higher on being motivated by bodyweight-management goals, as compared to CrossFit members. Conversely CrossFit members appear to be motivated by task orientation, challenge, and competition. Weight management is a more tangible goal than challenge, and it is possible that once Gold's members have achieved certain health-related goals, they may reach a point of feeling that consistent attendance is unnecessary. At this point the typical Gold's member may begin to attend less frequently. However, if/when progress toward these goals begins to backslide after a period of decreased frequency of attendance, members may begin to once again show up more frequently in order to return to their desired state of fitness (around the 12 month mark). Broadly speaking, it may be supposed that there is high motivation and rapid change during the initial months, yet decrease attendance when the

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individual begins to plateau. Renewed interest in exercise may then occur again months later when goals are reestablished.

Unlike Gold's members who reported being very unlikely to consider class offerings when choosing a gym, for CrossFit members, it could be argued that the community, rapport, and feeling of accountability to others as a result of the group nature is just reaching a peak during the intermediate period, and helping to keep members committed. Both groups then find a balance between the attendance during the novice and intermediate periods and attend a moderate amount during the advanced stage.

Other factors that are theorized to influence attendance include education about the activities engaged in while at the gym, as well as the degree of monotony of the exercise program. For Gold's Gym members, exclusive of those with a personal trainer, it is possible that they engage in very routine fitness activities, without instruction or education from others. This, in turn, may affect attendance rates. When compounded with a plateau in progress (weight loss, strength gain, etc.), attendance has the potential to decline. However, CrossFit members appear to be more motivated by task orientation, and part of the foundation of CrossFit is constantly varied workouts. This combined with coaching, suggestive of continued education of movements and activities (which may also peak during the intermediate period), helps to keep members attracted to, and attending the gym.

### Motivations for Choosing a Fitness Facility

The second quantitative hypothesis predicted that CrossFit members would score higher on intrinsic motivations than would Gold's Gym members. This hypothesis was supported. When presented with a variety of considerations for choosing a gym or fitness facility, CrossFit members showed a higher tendency to consider the underlying philosophy of the gym over other factors. On the other hand, Gold's Gym members were most likely to consider the proximity of the gym to their home. Further supporting this

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prediction are the scores of other psychological variables. CrossFit members scored higher on the Relative Autonomy Index, which gauges the degree to which a person is self-motivated. Furthermore, CrossFit members also scored higher on overall intrinsic regulation, and identified regulation measures. On the other hand, Gold's members scored higher on weight management, an influence considered extrinsic in nature.

The qualitative responses also support the idea that CrossFit members are more intrinsically motivated as compared to Gold's members. When asked about the gym they attend and reasons for joining/maintaining membership, CrossFit members consistently discussed community, camaraderie, and positive changes in mental state as a result of attending a CrossFit box. Responses from Gold's members were generally focused on proximity to home and a trainer if applicable. Also relevant to source of motivation are the comments regarding the BMI chart and body image. The typical Gold's member was more often self-deprecating in comments about his or her body and what constitutes an ideal body image. CrossFit members often diverged from this trend, discussing healthy amounts of body fat, mental and physical strength, and the way s/he carried him or herself.

### Health Indices, Fitness Outcomes, and Equipment

The final quantitative hypothesis focused on the mismatch between Gold's Gym in terms of equipment and atmosphere and the possibility that CrossFit helps reduce the evolutionary mismatch by providing more ancestral-like movement patterns and equipment. The degree of mismatch and extent of overall health is conjectured to be inversely related. As a result, CrossFit members were anticipated to report a greater variety of fitness goals and outcomes due to being more closely matched with how the human body is designed to perform.

This prediction was partially supported. Although Gold's members spent more time in the gym overall, health indices of bodyweight and BMI of the two groups were

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not significantly different. The analyses however did show that Gold's Gym members took more sick days on average over the year prior to the survey than did CrossFit members. Also, CrossFit members reported a wider variety of goals they wished to achieve from exercising, including sport-specific performance and muscle gain.

The equipment used also supported the initial prediction. Gold's members were more likely to use machines such as treadmills, Stairmaster, step-machine, stationary bikes, and pulley or Nautilus type resistance machines. Conversely, CrossFit members were more likely than Gold's members to use barbells, kettlebells, and strongman equipment. In further support of the original hypothesis, Gold's Gym members reported a greater amount of time spent on specific cardiovascular endurance activities, as opposed to CrossFit members whom were more likely to spend time on plyometric exercises, interval training, weightlifting, and sport-specific activities. As previously stated, hunter-gatherer societies would have needed to be efficient in their energy expenditure, thus rarely engaging in long, steady-state cardiovascular activities in lieu of more interval-like and weight-bearing activities. It can thus be extrapolated that the results of this study directly support the suggestion that CrossFit fosters an environment that is more closely matched to ancestral life than does Gold's Gym.

### Overall Lifestyle, Health, and Physical Activity

When asked to discuss overall health, wellness, and physical fitness, CrossFit members themes repeatedly converged upon topics of lifting heavy things, following a primal-inspired diet, having a healthy amount of body fat, and getting adequate amounts of sleep. Gold's members tended toward a concentration on lower body fat, lower dietary fat and calorie intake, and getting adequate cardiovascular exercise. The overarching theme of bodyweight loss or maintenance was common among Gold's Gym participants, while very few CrossFit members addressed bodyweight. Through the qualitative responses, it was clear that CrossFit members worry less about bodyweight, and more

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about strength, feeling and moving in a healthy way, as well as making meaningful interpersonal connections throughout their lives. These themes were consistently apparent in questions about body image, nutrition, and typical workouts. It may be deduced that, as expected, Gold's Gym and CrossFit members have broad lifestyle views closely aligned with the underlying philosophy of their chosen fitness facility.

### Implications

Because diet and fitness trends come and go, and primal-inspired physical activity and nutrition are still relatively new to the general population, it is not surprising that little research can be found specifically addressing the topics in this study. However, by exploring this area further, it would stand to reason that any addition to the subject matter as a whole might be beneficial on several levels. This research has the potential to unite several disciplines in a common goal of furthering research related to optimal physical fitness regimes, optimal diet and nutrition, and advances in pathology and immunology as just a few examples. Furthermore, questions and future research in a variety of areas may conceivably be drawn from research such as this. For instance, questions regarding psychological factors related to choosing, and maintaining a type of fitness facility and/or nutrition plan may be related to evolutionary and biological factors not previously considered. Whether people knowingly choose a more evolutionarily informed approach to health and physical activity, the possibility remains that such a choice could be explained by evolutionary mechanisms, thus furthering links between evolutionary fitness indicators and the maintenance of our physical fitness. What, if any, links can be found between how humans essentially move and care for their bodies, and the mates that they attract.

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For this study specifically, especially given the ability to match the groups in terms of demographic characteristics, this research had the ability to go beyond the basics of age, gender, income, and media marketing. Doing so could lead to future research with the possibility to inform the healthcare, sports medicine, exercise science, nutrition, and other related fields. For example, the results of this study could further research into the psychology of exercise attrition. If we as a nation are out of shape and tend to drop out of gym memberships, then perhaps the results of this study and similar research could be applied to decreasing attrition rates.

### Limitations and Other Considerations

This study is not without limitations. The participants were predominately white, middle class individuals from the Northeast area of the United States. This may be attributed to the fact that this survey was primarily distributed online and mainly through social media channels such as Facebook. This study relied on people continuously disseminating the survey link with others that they knew and who were also Gold's or CrossFit members. Given that people tend to associate with others that are similar to themselves, it is not surprising that the sample represented here is relatively homogenous. Furthermore, it was found that CrossFit gyms were more willing to distribute this survey to members, while many Gold's Gym locations both online and in person were hesitant.

It is important to note that the qualitative analysis of the responses in this study was not conducted systematically (e.g. content word count) and were solely used for support of and to determine if participant perspectives were aligned with what the quantitative data show. For this to be considered a true qualitative study, more in depth analysis of the qualitative responses would need to be conducted. Furthermore, this study aimed to explore a comparison of evolutionarily informed health and physical fitness to

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modern physical health and fitness. As such, the distinction of CrossFit and Gold's Gym in this study are merely representative of the broader categories of evolutionarily informed fitness facilities and modern fitness facilities, respectively. The implications of this research are aimed at a general approach to physical wellness, rather than a specific prescription for choosing a fitness facility.

### Conclusion

Evolutionary health and physical fitness appear to be a growing trend to address the mismatch between modern lifestyles and biological factors. This study aimed to compare evolutionary health and physical activity to modern modalities and perceptions. On the whole, this research found that it appears membership in an evolutionarily informed facility or modern facility may not be indicative of potential attendance rates. What's more, personality characteristics did not appear to differ significantly, although source of motivation (extrinsic versus intrinsic) did. General motivations for choosing a facility, equipment used, and time spent on activities varied, and typically coincided with the respective gym type. Furthermore, based on qualitative responses, broad perceptions of physical health and fitness appeared to correspond with the underlying philosophy of the fitness facility chosen.

Future research in this area would benefit by looking at a greater breadth of facilities, as well as a more diverse participant sample. A closer look at personality characteristics (e.g., full measure versus the Ten Item Personality Inventory), and a longitudinal exploration of outcomes resulting from a primal lifestyle versus a modern lifestyle would be highly recommended. Optimally, a future study would be truly experimental versus cross-sectional, where participants are randomly assigned to gyms

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and a myriad of outcome data is collected longitudinally. Nonetheless, preliminary research on this topic has the potential to influence a broad scope of disciplines.

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APPENDICES

Appendix A

- Q1: Which gym do you belong to?  
Q2: Please indicate your age  
Q3: In what nation do you currently reside?  
Q4: If within the United States, please indicate your state of residence  
Q5: What is your gender?  
Q6: What is religious affiliation?  
Q7: What is your race?  
Q8: Please indicate your employment status  
Q9: What is your combined annual household income?  
Q10: Please indicate your marital status  
Q11: Do you have children?  
Q12: TIPI (see appendix E)  
Q13: What is your current height (in feet/inches)?  
Q14: What is your current weight (in pounds)?  
Q15: Have you ever evaluated yourself using the BMI chart, prior to this survey?  
Q16: According to the [BMI] chart above, what is your BMI?  
Q17: Do you believe that this chart provides an accurate portrait of your health?  
Q18: Please elaborate on why you answered yes or no to the question above  
Q19: How many hours, on average, do you sleep per night?  
Q20: If you are employed or in school, how many sick days (specifically due to a medical condition you experienced) have you taken in the past 12 months?  
Q21: How many gym/fitness center/health club facilities have you been a member of over the past 5 years?  
Q22: How long have you been a member at your current gym?  
Q23: Do you currently participate in any individual or team sports?  
Q24: Thinking about your current gym, what factors went into your choice to join?  
Q25: If you chose 'other' above, please elaborate  
Q26: Do you currently train with a coach or personal trainer?  
Q27: On average, how many days per week have you attended the gym over the past month?  
Q28: What, if any, barriers have prevented you from attending your current gym as frequently as you had planned? (Check all that apply)  
Q29: If you chose 'other' above, please elaborate  
Q30: What outcomes do you wish to achieve from attending your current gym? (Check all that apply)  
Q31: If you chose 'other' above, please elaborate  
Q32: What types of activities do you engage in while at your current gym? (Check all that apply)  
Q33: If you chose 'other' above, please elaborate  
Q34: Which types of cardiovascular equipment do you use most frequently at your current gym? (Check all that apply)  
Q35: If you chose 'other' above, please elaborate

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- Q36: Which types of strength or resistance training equipment do you use most frequently at your current gym? (Check all that apply)
- Q37: If you chose 'other' above, please elaborate
- Q38: What other types of equipment do you typically use at your current gym? (Check all that apply)
- Q39: If you chose 'other' above, please elaborate
- Q40: What, if any group fitness classes do you attend? (Check all that apply)
- Q41: If you chose 'other' above, please elaborate
- Q42: On average, how long do you spend at your current gym each time you attend (in minutes)?
- Q43: Please indicate the percentage of time you generally spend on each of the following activities while at your current gym
- Q44: Have you incurred any injuries specifically as a result of your activities at your current gym?
- Q45: Does your current gym offer nutrition programs, counseling, or classes?
- Q46: BREQ-2 (see appendix B)
- Q47: EMI-2 (see appendix C)
- Q48: GOEM (see appendix D)
- Q49: Please indicate whether you currently follow any of the following dietary protocols
- Q50: If you chose 'other' please list
- Q51: Please indicate any specific reasons for your current dietary choices (check all that apply)
- Q52: If you chose 'other' please list
- Q53: How many different diet/nutrition programs have you tried in the past 5 years?
- Q54: Please check any statements that may apply to your current ideology regarding food choices (check all that apply)
- Q55-66 are Qualitative/open ended questions
- Q55: How would you describe your overall health?
- Q56: Please describe your typical diet/dietary choices
- Q57: Please describe your thoughts on what constitutes healthy eating habits
- Q58: Please describe your vision of the optimal body for your gender (e.g., shape, amount of fat, amount of muscle, skin tone, etc.)
- Q59: What activities, lifestyle habits, and/or food choices do you believe to be necessary for an individual to achieve the optimal body you described above?
- Q60: If you were to give advice to a friend who does not currently exercise, on how to become "fit" or "get in shape", what would you describe as the optimal exercise regimen?
- Q61: What other lifestyle/nutrition advice would you give a friend who wants to become "fit" or "get in shape"?
- Q62: Please describe your typical workout (including any relevant information about how often you exercise, what equipment you use, or any goals you have that were not previously addressed)
- Q63: Please describe your overall experience/feelings regarding your current gym

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Q64: What are the best aspects of your gym or those that you feel set your gym apart from others?

Q65: Please elaborate on any changes in frequency of attendance during the course of your membership at your current gym

Q66: If you've belonged to other gyms/fitness facilities over the past 5 years, please describe your experiences in relation to your current gym and, reasons for leaving that other facility

Appendix B

**EXERCISE REGULATIONS QUESTIONNAIRE (BREQ-2)**

Age: \_\_\_\_\_ years                      Sex: male    female (please circle)

***WHY DO YOU ENGAGE IN EXERCISE?***

**We are interested in the reasons underlying peoples' decisions to engage, or not engage in physical exercise. Using the scale below, please indicate to what extent each of the following items is true for you. Please note that there are no right or wrong answers and no trick questions. We simply want to know how you personally feel about exercise. Your responses will be held in confidence and only used for our research purposes.**

		Not true for me		Sometimes true for me		Very true for me
1	I exercise because other people say I should	0	1	2	3	4
2	I feel guilty when I don't exercise	0	1	2	3	4
3	I value the benefits of exercise	0	1	2	3	4
4	I exercise because it's fun	0	1	2	3	4
5	I don't see why I should have to exercise	0	1	2	3	4
6	I take part in exercise because my friends/family/partner say I should	0	1	2	3	4
7	I feel ashamed when I miss an exercise session	0	1	2	3	4
8	It's important to me to exercise regularly	0	1	2	3	4
9	I can't see why I should bother exercising	0	1	2	3	4
10	I enjoy my exercise sessions	0	1	2	3	4
11	I exercise because others will not be pleased with me if I don't	0	1	2	3	4
12	I don't see the point in exercising	0	1	2	3	4
13	I feel like a failure when I haven't	0	1	2	3	4

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exercised in a while

14	I think it is important to make the effort to exercise regularly	0	1	2	3	4
15	I find exercise a pleasurable activity	0	1	2	3	4
16	I feel under pressure from my friends/family to exercise	0	1	2	3	4
17	I get restless if I don't exercise regularly	0	1	2	3	4
18	I get pleasure and satisfaction from participating in exercise	0	1	2	3	4
19	I think exercising is a waste of time	0	1	2	3	4

Appendix C

**The Exercise Motivations Inventory - 2 (EMI-2)**

On the following pages are a number of statements concerning the reasons people often give when asked why they exercise. *Whether you currently exercise regularly or not*, please read each statement carefully and indicate, by circling the appropriate number, whether or not each statement *is true* for you personally, *or would be true* for you personally if you did exercise. If you do not consider a statement to be true for you at all, circle the '0'. If you think that a statement is very true for you indeed, circle the '5'. If you think that a statement is partly true for you, then circle the '1', '2', '3' or '4', according to how strongly you feel that it reflects why you exercise or might exercise. Remember, we want to know why *you personally* choose to exercise or might choose to exercise, not whether you think the statements are good reasons for *anybody* to exercise. It helps us to have basic personal information about those who complete this questionnaire. We would be grateful for the following information:

**Your age** ..... years

**Your gender** male/female

		<b>Not at all true for me</b>				<b>Very true for me</b>
<b>Personally, I exercise (or might exercise) ...</b>						
1 To stay slim	0	1	2	3	4	5
2 To avoid ill-health	0	1	2	3	4	5
3 Because it makes me feel good	0	1	2	3	4	5
4 To help me look younger	0	1	2	3	4	5
5 To show my worth to others	0	1	2	3	4	5
6 To give me space to think	0	1	2	3	4	5
7 To have a healthy body	0	1	2	3	4	5
8 To build up my strength	0	1	2	3	4	5
9 Because I enjoy the feeling of exerting myself	0	1	2	3	4	5
10 To spend time with friends	0	1	2	3	4	5
11 Because my doctor advised me to exercise	0	1	2	3	4	5

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12	Because I like trying to win in physical activities	0	1	2	3	4	5
13	To stay/become more agile	0	1	2	3	4	5
14	To give me goals to work towards	0	1	2	3	4	5
15	To lose weight	0	1	2	3	4	5
16	To prevent health problems	0	1	2	3	4	5
17	Because I find exercise invigorating	0	1	2	3	4	5
18	To have a good body	0	1	2	3	4	5
19	To compare my abilities with other peoples'	0	1	2	3	4	5
20	Because it helps to reduce tension	0	1	2	3	4	5
21	Because I want to maintain good health	0	1	2	3	4	5
22	To increase my endurance	0	1	2	3	4	5
23	Because I find exercising satisfying in and of itself	0	1	2	3	4	5
24	To enjoy the social aspects of exercising	0	1	2	3	4	5
25	To help prevent an illness that runs in my family	0	1	2	3	4	5
26	Because I enjoy competing	0	1	2	3	4	5
27	To maintain flexibility	0	1	2	3	4	5
28	To give me personal challenges to face	0	1	2	3	4	5
29	To help control my weight	0	1	2	3	4	5
30	To avoid heart disease	0	1	2	3	4	5
31	To recharge my batteries	0	1	2	3	4	5
32	To improve my appearance	0	1	2	3	4	5
33	To gain recognition for my accomplishments	0	1	2	3	4	5

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34	To help manage stress	0	1	2	3	4	5
35	To feel more healthy	0	1	2	3	4	5
36	To get stronger	0	1	2	3	4	5
37	For enjoyment of the experience of exercising	0	1	2	3	4	5
38	To have fun being active with other people	0	1	2	3	4	5
39	To help recover from an illness/injury	0	1	2	3	4	5
40	Because I enjoy physical competition	0	1	2	3	4	5
41	To stay/become flexible	0	1	2	3	4	5
42	To develop personal skills	0	1	2	3	4	5
43	Because exercise helps me to burn calories	0	1	2	3	4	5
44	To look more attractive	0	1	2	3	4	5
45	To accomplish things that others are incapable of	0	1	2	3	4	5
46	To release tension	0	1	2	3	4	5
47	To develop my muscles	0	1	2	3	4	5
48	Because I feel at my best when exercising	0	1	2	3	4	5
49	To make new friends	0	1	2	3	4	5
50	Because I find physical activities fun, especially when competition is involved	0	1	2	3	4	5
51	To measure myself against personal standards	0	1	2	3	4	5

Appendix D

**EXERCISE FEELINGS QUESTIONNAIRE (GOEM)**

Age: \_\_\_\_\_ years

Sex: male female (please

circle)

**We are interested in the things that make people feel they have done well when they engage in physical activities or exercise. Using the scales below, please indicate the extent to which you disagree or agree with each of the statements. Please note that there are no right or wrong answers and no trick questions. We simply want to know how you personally feel about exercise. Your responses will be held in confidence and only used for our research purposes.**

**In my physical activity, I would feel / do feel that things go well when...**

	<b>Strongly disagree</b>				<b>Strongly agree</b>
1 I exercise to the best of my ability	1	2	3	4	5
2 Other exercisers don't do as well as me	1	2	3	4	5
3 I make progress	1	2	3	4	5
4 I achieve the exercise goal I set for myself	1	2	3	4	5
5 I can show other exercisers that I'm better than everyone else	1	2	3	4	5
6 I feel like I've improved	1	2	3	4	5
7 I prove to myself that I am the only one who can do a certain exercise task	1	2	3	4	5
8 I know that I am more capable than other exercisers	1	2	3	4	5
9 I exercise at a level that reflects personal improvement	1	2	3	4	5
10 I can prove to others that I'm the best	1	2	3	4	5

Appendix E

**Ten-Item Personality Inventory-(TIPI)**

Here are a number of personality traits that may or may not apply to you. Please write a number next to each statement to indicate the extent to which *you agree or disagree with that statement*. You should rate the extent to which the pair of traits applies to you, even if one characteristic applies more strongly than the other.

Disagree strongly	Disagree moderately	Disagree a little	Neither agree nor disagree	Agree a little	Agree moderately	Agree strongly
1	2	3	4	5	6	7

*I see myself as:*

1. \_\_\_\_\_ Extraverted, enthusiastic.
2. \_\_\_\_\_ Critical, quarrelsome.
3. \_\_\_\_\_ Dependable, self-disciplined.
4. \_\_\_\_\_ Anxious, easily upset.
5. \_\_\_\_\_ Open to new experiences, complex.
6. \_\_\_\_\_ Reserved, quiet.
7. \_\_\_\_\_ Sympathetic, warm.
8. \_\_\_\_\_ Disorganized, careless.
9. \_\_\_\_\_ Calm, emotionally stable.
10. \_\_\_\_\_ Conventional, uncreative.

TIPI scale scoring ("R" denotes reverse-scored items): Extraversion: 1, 6R; Agreeableness: 2R, 7; Conscientiousness; 3, 8R; Emotional Stability: 4R, 9; Openness to Experiences: 5, 10R.