The Health & Wellness Benefits of Golf Participation & Involvement

For:

Golf 20/20 & World Golf Foundation

Phase 1 of 2 – September 2011:

Review of Academic Literature

Walker Research Group

Analytics | Consulting | Data Management

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Report Overview

This report by Walker Research Group, LLC for the World Golf Foundation and Golf 20/20 (Contract #1) identifies and reports on the literature pertaining to the health and wellness benefits of golf participation and involvement. This report contains three primary topic areas: (1) the health benefits of golf, (2) the wellness benefits of golf, and (3) other related research. What follows are the most relevant pieces of literature available in the academic press.

1. Key Findings – Health-Related Benefits

Since the 1960's, several areas of medicine have been testing, observing, and analyzing the health benefits gained through golf participation and involvement:

"… Golf participation, in-and-of-itself, has not predominately been viewed as paving the way to optimal physical fitness and performance."

- A walked 18-hole round, carrying a bag or using a hand/pull cart, is approximately equal to a 5-mile walk.
- The total caloric expenditure for an 18-hole round is approximately 2,000 calories for walking while carrying clubs. A golfer will burn 25% fewer calories (~1,500 calories) for walking and employing a pull-caddie, and 35% fewer calories (~1,300 calories) when riding.
- Since walking is biomechanically more efficient than running, playing an 18-hole round of golf is roughly equivalent to a 3.5- to 4-mile run.
- The exercise intensity and energy cost of playing 9-holes of golf is roughly equal to 40 minutes of lawn mowing for older men.
- The total distance walked and time to complete an 18-hole round varies for the walk-bag carry (8.69 km, 2.88 hours), walk-pull caddy (7.89 km, 2.88 hours), and cart-riding (3.86 km, 3.37 hours) conditions among recreational golfers.
- When walking 18-holes of golf, blood glucose levels fall by up to 20% for the young, 10% for the middle-aged, and 30% for the elderly players, and body weight is reduced M=0.7% for all groups.
- The caloric cost of golf is 4-6 kcal/min and total energy expenditure was estimated more than 960 kcal during an 18-hole round.
- When walking 18-holes, the young exceed their exercise intensity threshold 6% of the total playing time, the middle-aged 30% of the time, and the elderly 70% of the time.
- Golfers with lower handicaps (i.e., more skilled players) have lower mortality rates compared to higher handicap players.
- While walking 18-holes, heart rates are (on average) less than the maximal heart rate for a particular age range – 18% of the time for young golfers, 16% for the middle-aged, and not at all for the elderly.

- Comparing golf to tennis in a cardiovascular exercise intensity model, a 4 hour walked 18-hole round of golf is roughly equivalent to 2 hours of moderate singles tennis.
- Regular walking when playing golf favorably affects body composition, including a 1.4kg reduction in weight, 2.2cm lost in waist circumference, and a reduction of 2.2cm in abdominal skin fold thickness.
- Golfers who walk show greater increases in high density lipoprotein (HDL) cholesterol levels and in the ratio of HDL cholesterol to total cholesterol.
- Regularly playing two to three 18-hole rounds of golf per week spurs weight loss, improves lipoprotein levels, and improves aerobic fitness.
- Golf is a suitable sport for middle-aged and elderly persons to enhance energy expenditure.
- Walking 18-holes corresponds to moderate to high exercise intensity for aging adults, low to moderate for the middle-aged, and low for young male golfers.
- Based on a cardiovascular model, one 18-hole walked round of golf meets the 10,000 steps per day guideline for exercise recommended by most medical and clinical physicians.
- Three 18-hole rounds of walked golf per week provide enough exercise for healthy weight maintenance for all ages.
- For children, playing golf during extra-curricular and leisure time significantly increases participation and slows unhealthy weight gain.
- In terms of heart rate during play, golf is a suitable sport for middle-aged and elderly persons to enhance energy expenditure.
- Repeated golf practice enhances balance control and confidence among all age ranges. However, older golfers tend to have better static and dynamic balance control and confidence than non-golfing older, healthy adults.
- Walking a golf course, while pulling a cart, provides an adequate training stimulus for patients with heart disease (HD).
- Although playing golf provides a moderate intensity exercise stimulus for seniors, musculoskeletal injuries can also result from participation.
- Recurrent injuries are most common in golfers; however, injuries were more likely to occur over time as opposed to acute onset.

Summary: The studies included in this report show that walking on the golf course can yield a number of positive health and fitness effects for the participant. Moreover, the health and salubrious effects (e.g., eustress) of golf participation cannot be overstated. For example, walking during a golf game is characterized by high adherence and low injury risk and is, therefore, considered a good form of health-enhancing physical activity. Such benefits accrue from walking the entire 18-holes, a hybrid form or walking and riding (e.g., cart path only), just riding, and swinging the golf club. As such, branding messages for walking (in lieu of, or in addition to riding) or a hybrid form of play will perhaps steer/alter the misconceptions of the sport. In sum, walking the golf course provides an appealing alternative to individuals who do not participate in regular physical activity, while inducing the recommended amount of "healthy lifestyle" physical activity.

2. Key Findings – Wellness-Related Benefits

While research on calories, metabolic rates, muscle control, and general physicality required for golf are important to understand the sport's health-related benefits, research examining both general sport participation and golf participation can also provide valuable insights:

"… Beyond basic enjoyment of the sport itself, walking, relaxing, and socializing in a pleasant natural environment are reported to be the main motives for recreational golfers."

Note. Based on the literature search, we conclude that a paucity of research exists on the "wellness" benefits of golf participation (see Figure 1). Therefore, the following points address golf participation (in particular) and sport participation (in general) but are also restricted because nearly all of the research has been conducted on elite/college, and not recreational golfers. As well, since the term "wellness" is a multidimensional construct,[1] we delimited the search to social rather than physical foci (see Figure 2).

- Golf's natural breaks and methodical pace enable socialization opportunities unlike any other sport activity.
- Unlike other sports, golf courses have clubhouses (i.e., a social space) where interaction among participants take place prior to, and after the round.
- When "community" members (e.g., golf participants, country club members, college golfers, etc.) experience social capital, they are more likely to offer support to other members of their community and participate in the activity for a longer period of time.
- For people with mental health disorders, golf promotes physical activity and social inclusion. This is indicated by high attendance rates, voiced enthusiasm for the sport, and the social interactions that occur after play.
- Competitive anxiety, self-confidence, and cognitive anxiety are influenced by social capital creation among participants of sports – for example, golf.
- Golfers with varied experience histories with the sport, differ on both their motivations and constraints to participate in recreational golf.
- Since many physical education teachers are competent golfers quality instruction (i.e., for school-based golf programs) can easily be provided.
- Children enthusiastically enjoy the challenge of hitting a golf ball.
- Self efficacy, psychomotor and psychological skills, competitive anxiety, and information regarding problem areas in one's game are all salient outcomes of golf participation.
- Perceived social support in golf aids performance, regardless of the stress level among participants.

[1] Wellness is generally considered a "state of well-being," or a "state of acceptance or satisfaction with our present condition". Academically, wellness is regarded as "… a multidimensional state of being describing the existence of positive health in an individual as exemplified by quality of life and a sense of well-being" (Corbin & Pangrazi, 2001, p. 1).

- Pre-competitive measures about golf do not predict performance. However, golf performance is a significant predictor of post-round anxiety and self-confidence enhancement.
- Golfers who exhibit lower levels of pre-competitive anxiety perform better than golfers who exhibit higher levels of pre-competitive anxiety.
- Sport type (e.g., golf) and the level of competitive experience significantly influence symptoms experienced in pressure situations.
- Adolescent golfers self-report five stressors before reporting a coping strategy on the golf course.
- Strategies for effective coping in golf are rationalizing, reappraising, blocking, positive self-talk, following a routine, breathing exercises, physical relaxation, and seeking on-course social support. Alternatively, different types of coping responses (e.g., trying too hard, speeding up, routine changes, negative thoughts, lack of coping) are associated with ineffective coping.
- The focusing ability of golfers is higher than tennis players and somatic anxiety levels were much lower for golfers.

Summary: In sum, the sport of golf offers wellness benefits that add value to the sport. The sport reduces participant anxiety levels and reinforces coping. For children, the challenge of hitting a golf ball is a positive experience that engages them beyond other sports. As a lifetime sport, golf offers social interaction and affords participants the opportunity to build social capital through friendships and access to a network of likeminded individuals. However, research on how to develop golf communities remains limited and warrants further attention. As well, the study of what catalyzes individuals to participate and what factors keep them participating, have not been fully fleshed out. Finally, studies of the sociological differences between golf and other sports have not been conducted.

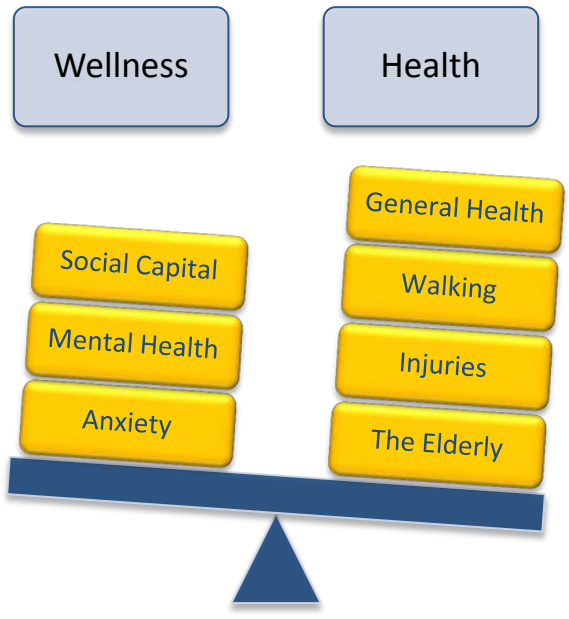

Figure 1. Health and Wellness Golf Research

3. Summarized Research Recommendations

What follows is a summarized list of the research recommendations based on our review of the extant literature (See page 20 for the detailed recommendations).

- In general, since research on the wellness aspects of is lacking, our primary recommendation is to focus Golf 20/20's efforts on the wellness benefits of golf participation.
- A study of golf and social capital formation. In addition, a study of youth socialization through golf could reveal the early benefits of the sport.
- Study the effects of a promotional campaign that combines walking and riding during a round golf (e.g., the "readiness" of golfers to walk using a hybrid-riding model).
- Research on non-traditional golf activities (e.g., driving-range activity, chipping, putting, par-three play, etc.) that details the benefits of practice or non-traditional play.
- Examine the theory of personal/social change for potential and beginning golfers.
- Examine the attractiveness of golf and the motives for play from the perspective of the golfer (i.e., why golfer's play, compared to the benefits).

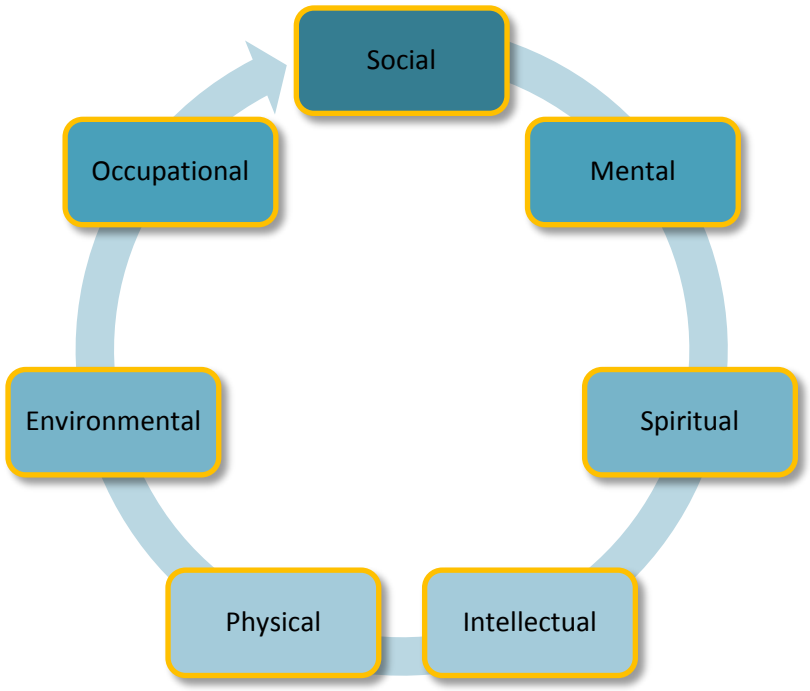

Figure 2. Multidimensional Model of Personal Wellness

4. Literature Review – Health Benefits of Golf Participation & Involvement

While anecdotal discussions regarding the general athleticism of golfers and difficulty of the game are entertaining, they do not add to the debate over whether golf should be regarded as a "sport". Such perceptions of golf may, however, be contributing to the current declining trend of golf participation. According to a National Golf Foundation (2010-2011) report, there has been a 9.1% growth rate since the 1960's compared to -0.7% decline since 2000. In the scientific discourse, health and kinesiology researchers have been testing and reporting on the direct physical and health-related aspects of the game. For example, in a recent (albeit unpublished) study, Dr. Neil Wolkodoff tracked the heart rates, oxygen consumption, carbon dioxide production, and walking patterns of golfers. He concluded that significant energy expenditures are required when playing golf, which exceeded those seen in other participatory sport activities. However, his research suffers from several research limitations making the scientific merit of the work suspect. What follows in this section are a number of more academically rigorous investigations that have identified the health benefits of golf participation and involvement.

Table 4.1. Publication Numbers

Topic Area	1960's	1970's	1980's	1990's	2000's
General Health	0	0	2	4	14
Walking	1	1	0	3	5
Injuries	0	0	0	6	8
Mortality	0	0	0	0	2
The Elderly	0	0	0	1	4
Other	0	0	0	0	5
Total Reviewed	**56**				

4.1. Golf & General Health

A number of studies have examined muscle control, balance, energy expenditures, and other benefits of golf participation. For example, Murase et al. (1989) tested the heart rate of golfers throughout play, and blood samples were compared before and after play. The results suggested that golfing is a suitable sport for middle-aged and elderly persons to enhance energy expenditure. Gao et al. (2011) noted that repeated golf practice enhanced balance control and confidence in golfers. The authors determined whether older golfers had better balance control and confidence than non-golfing older, healthy adults. They concluded that golfing is an activity that enhances both the physical and psychological aspects of balance control. Dear et al. (2010) compared the intensity and energy cost of playing 9 holes of golf with 40 minutes of lawn mowing in older men, determining that both activities meet the current recommendations for health benefits prescribed by physicians. Tsang and Hui-Chan (2010) determined that older golfers had better static and dynamic balance control than older, non-golfing healthy adults. They also found that golfers maintained significantly longer duration in static single-leg stance, achieved less body sway, and lunged significantly farther than did control participants. Dobrosielski et al. (2002) examined the metabolic "cost" of golf, while pulling a cart, in a group of patients with heart disease (HD) and other healthy adults. They concluded that walking the golf course, while pulling a cart, appeared to provide an adequate training stimulus for patients

with HD. Taylor et al. (2006) sought to widen activity exposure and engage children in lifestyle-based activities (e.g., walking) and non-traditional sports (e.g., golf and taekwondo) during extra-curricular time at school, after school, and during vacations. They concluded that an intervention designed to maximize opportunities for physical activity during extra-curricular and leisure time significantly increased physical activity and slowed unhealthy weight gain in primary school-aged children. As well, a number of studies have examined the biomechanics of the golf swing and the implications for general health (e.g., Adlington, 1996; Bechler et al., 1995; Bulbulbian et al., 2001; Lindsay & Horton, 2002; Milburn, 1982; Parziale, 2002; Wallace & Reilly, 1993).

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- Wallace, P., & Reilly, T. (1993). Spinal and metabolic loading during simulations of golf play. *Journal of Sport Science,* 11, 511-515.

4.2. Golf & Walking

Several studies have noted the health benefits of golf, which are predicated on walking the course. For example, Kobriger et al. (2006) recently quantified (i.e., using a pedometer) the number of steps adults take during an 18-hole round of golf. Analyses revealed that each golfer took a mean 11,948 (± 1,781) steps per 18-hole round. Regardless of handicap, sex, or course played, the subjects exceeded 10,000 steps during a typical round of golf – which meets the recommended standards of a physical activity plan. Sell et al. (2008) examined three different conditions in golf for referent comparisons (i.e., walking while carrying a bag, walking with a pull-caddy, and riding). The authors found that the total distance walked and time to completion varied for the walk-carry (8.69 km, 2.88 hours), walk-caddy (7.89 km, 2.88 hours), and cart-riding (3.86 km, 3.37 hours) conditions. The average heart rate was higher in the walk-carry condition (67.4% of max heart rate, 120 bpm) compared to the walk-caddy (61.8%, 100 bpm) and cart-riding (49.4%, 88 bpm) conditions. In addition, Sell et al. (2008) determined the total caloric expenditure for a round of golf to be approximately 2,000 calories for walking and carrying clubs. A golfer will burn 25% fewer calories (about 1,500 calories) for walking and employing a caddie, and 35% fewer calories (about 1,300 calories) when riding in a golf cart. Parkkari et al. (2000) tested the effects of regular walking during golf on various health and fitness indicators in middle-aged men. Results indicated that walking during golf was a practical and safe form of physical activity (with high adherence) that significantly increased aerobic performance and trunk muscle endurance. Broman et al. (2004) quantified the time spent at different exercise intensities for male golfers, in relation to age, while walking a "normal" 18-hole golf course. The authors concluded that walking 18-holes corresponded to an exercise intensity which is moderate → high for the elderly, mainly low → moderate for the middle-aged, and low for young male golfers. All golfers (i.e., regardless of age), perceived their exertion similarly, as weak to moderate. In a related but different take on walking in golf, Puterbaugh (2001) noted that golf's potential as exercise outlet has been largely negated by the increase in motorized golf cart usage (i.e., two of every three rounds played in the US). Accidents in golf carts have increased making the sport more dangerous. A study by Magnussen (1998) determined that golf should be classified as aerobic training for fitness among middle-aged golfers. He found that the mean relative work intensity varied between 43% and 55% of maximal oxygen uptake while walking the course – and the main source of energy was derived from fat. The results indicate that the intensity of exercise for golf participation should be classified as light to moderate.

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4.3. Golf & Injuries

Since golf is becoming more popular, there has been an upshot of epidemiologic data on golf injuries and overuse syndromes, especially regarding their severity. For example, Theriault and Lachance (1998) provided a comprehensive overview of golf injuries and explained that many injuries originate either from overuse or from a traumatic origin and primarily affect the elbow, wrist, shoulder, etc. Professional and weekend golfers tend to present differences in the ranking of injury occurrence by anatomical site; these differences can be explained by their playing habits and the biomechanical characteristics of their golf swing. Many injuries can be prevented by a pre-season, and year-round, sport-specific conditioning program. Kim et al. (2004) concluded that the shoulder is a commonly affected site, with the lead shoulder, or the left shoulder in the right-handed golfer, particularly vulnerable to injury. Similarly, Meira and Brumitt (2010) reviewed the research on golf injuries, swing mechanics, training routines, and general training program design. The authors concluded that injuries are associated with a lack of warm-up, poor trunk flexibility and strength, faulty swing techniques, and overuse. Implementing a training program that includes flexibility, strength, and power training with correction of faulty swing mechanics will help the golfer reduce the likelihood of injury and improve overall performance. Fradkin et al. (2001) found that while warm-up time can significantly reduce injury risk, only a small proportion of amateur golfers perform appropriate warm-up exercises. To improve this, they suggested that golfers should be educated about the possible benefits of warming up and be shown how to perform an appropriate warm-up routine. McHardy et al. (2007) and Wadsworth and Tyler (2007) found that recurrent injuries were most common in golfers, while injuries were more likely to occur over time as opposed to an acute onset. The lower back was the most common injury site, closely followed by the elbow/forearm, foot/ankle, and shoulder/upper arm.

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- Batt, M. E. (1992). A survey of golf injuries in amateur golfers. *British Journal of Sports Medicine,* 26, 63-65.
- Fradkin, A., Finch, C., & Sherman, C. (2001). Warm up practices of golfers: Are they adequate? *British Journal of Sports Medicine,* 35, 125-127.
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- Thériault G., & Lachance P. (1998). Golf injuries: An overview. *Sports Medicine,* 26(1), 43-57.
- Wadsworth, L., & Tyler, M. D. (2007). When golf hurts: Musculoskeletal problems common to golfers. *Current Sports Medicine Reports,* 6(6), 362-365.

4.4. Golf & Mortality

Only a few studies have examined the specific mortality-related benefits from different forms and patterns of leisure-time physical activity – including golf participation. For example, Farahmand et al. (2009) examined mortality reduction in men and women, in all age groups, and in all socioeconomic categories. They found that golfers with the lowest handicap (i.e., the most skilled players) had the lowest mortality compared to those with the highest handicaps. The authors maintained that while they could not conclude with absolute certainty that a 40% decrease in mortality rate was explained by the physical activity associated with playing golf, it is likely part of the explanation. Palank (2001) noted that while golf is a popular physical activity, golf courses have been determined to be the fifth likeliest public location for cardiac arrest. His findings revealed that the incidence of cardiac arrest on golf courses for a period of 3 months in the state of Florida was 10, with no survivors.

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- Palank, E. A. (2001). Golf, a leisure-time physical activity, and risk of primary cardiac arrest. *Cardiovascular Reviews & Reports,* 22(8), 448-450.

4.5. Golf & the Elderly

Golf is considered a "lifetime activity" and is regarded as a relatively risk-free form of exercise for the aging population. Accordingly, studies and reviews of research have been conducted with the aim of identifying the benefits of participation for the elderly. For example, Cann et al. (2005) noted that, although playing golf provides a moderate intensity exercise stimulus for seniors, musculoskeletal injuries can also result from unsafe participation. Strategies for targeted management of the senior golfer's typical concerns can be summarized into 4 categories: (1) injury rehabilitation coordinated by therapists, (2) warm-up routines; (3) club-fitting/coaching on proper technique, and (4) pre-season conditioning programs. Stover and Stoltz (1996) opined that in no other sport does the senior player enjoy as much opportunity to participate and

compete at various skill levels in golf. In other words, one would be hard-pressed to locate another sport that encourages as much mixed competition. In addition, because of their spending power, equipment and travel packages are often geared to the senior player. These and other factors will ensure the continued popularity of the game of golf.

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5. Literature Review – Wellness Benefits of Golf Participation & Involvement

Research on the overall wellness aspects of golf and participatory sport still remain limited in two main ways. First, sport and leisure/recreation research has focused mainly on individual-level constructs (e.g., motivation, attitudes, and ego-enhancement) and their relationships to various levels of attachment. In doing so, the socially constructed meanings of sport (in general) and the relationships built through participation (in particular) have been neglected or viewed as footnotes. Second, an over-reliance on cross-sectional research designs has provided a limited understanding of the social processes that explain participation continuance and life-long sport engagement. Therefore, understanding the "value" of sport participation (e.g., golf) to an individual's overall well-being and what catalyzing forces lead to involvement, commitment, and life-time participation are critical to future research in this area.

Table 5.1. Publication Numbers

Topic Area	1960's	1970's	1980's	1990's	2000's
Social Capital	0	0	0	0	13
Mental Health	0	0	1	4	7
Anxiety	0	0	4	2	4
Total Reviewed	**35**				

5.1. Golf & Social Capital

Aside from golf's health benefits, international organizations such as the World Health Organization (WHO) and the United Nations (UN) have touted the value of sport participation for the creation of social capital (WHO, 2006). Social capital provides value to communities and is best measured through the willingness of members to act on behalf of the community who (in turn) invest in the well-being of other community members. If members perceive the community to have social capital, they demonstrate greater levels of trust and offer support (e.g., instrumental and/or emotional) with the expectation of reciprocation. While sport in general provides social capital (see Jarvie, 2003; Seippel, 2006), productive leisure activities (i.e., sport participation) are more conducive to building social capital than consumptive leisure activities (i.e., watching sport on television, or in person; Van Ingen & Van Eijk, 2009).

While civilized modern societies have high levels of social capital, Putnam (2000) argued that over the last few decades social capital is on the decline in the U.S. Putnam maintained that individuals have historically played in organized social leagues. Today, however, many are likely to participate in sports like bowling on an ad-hoc basis without any weekly/daily obligations. Many sports struggle with this problem and fewer sports are able to provide a sense of community to people, concurrent with an adequate level of social capital. For example, fitness-centers allow participants to show up at will and participate in physical activity without any social interaction – a typical illustration of a "new" sport phenomenon that offers little, if any, social value.

For lifelong participation, social capital is important because it bonds individuals and helps maintain physical activity involvement (Burnett, 2006; Coalter, 2007). The support provided by "others" assumes a key role

for motivation, and can actually prevent people from terminating their involvement with sport (Okayasu et al., 2010; Tonts, 2005). Therefore, building social capital in sport communities is critical to preserving the well-being and health of community members. While little published research is available on how to develop social capital within sport communities, research by Heere and Chalip (under review) suggests that group interaction between members is a crucial element in the development of social capital. Based on this, we argue that golf is well suited for the development of social capital. Unlike other sports, golf courses have clubhouses (i.e., a social space) where people interact prior to, and after their game. Additionally, golf's natural breaks enable unparalleled socialization opportunities. This aspect makes the sport an excellent venue for social capital creation and the subsequent study of this phenomenon.

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5.2. Golf: Self-Esteem & Mental Health

More than a few studies have focused on the mental aspects of the sport. For example, Carless and Douglas (2004) initiated a golf program for people with severe and enduring mental health problems to promote physical activity and social inclusion. The success of the program was indicated by high attendance rates of participants, voiced enthusiasm for the sessions and the social interaction after the games, and the fact that many test members continued to play and new members have joined the group. In addition, Lane and Jarrett (2005) investigated the effects of playing a round of golf on mood states in recreational players. Aging male golfers completed a "mood measure" before and after their rounds. Results indicated that scores on anger, depression, and fatigue increased while vigor was reduced following the game. In other words,

elderly golfers experienced mood profiles (i.e., following golf) similar to younger athletes (i.e., following competition). The results also showed that the golfers walked a mean distance of 10.21km during their rounds – in line with the aforementioned literature on walking and golf.

Sport, including golf, has long been regarded as a tool for psychological development bolstering certain personality traits such as confidence and self-esteem enhancement. Despite this understanding, there is limited scientific evidence on the impact of golf on self-esteem. Although studies have examined the relationship between golf and esteem enhancement, they have tended to focus on the impact of self-esteem on performance (e.g., Prapavessisa & Groveb, 1998; Hardy et al., 2004; Kuczka & Treasure, 2005). For example, Ekeland et al. (2004) found a moderate short-term difference in self-esteem as a result of an exercise program that included golf. In addition, Maltby and Day (2001) found that athletes, including golfers, who had intrinsic motives for playing enjoyed greater psychological well-being, including self-efficacy, than those with extrinsic motivations. However, Hall et al. (1986) failed to confirm their prediction that athletes would exhibit higher self-esteem scores than non-athletes.

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5.3. Golf & Anxiety

Golf is widely regarded as having stress reducing capabilities. However, there is limited scientific/empirical evidence that this actually manifests among recreational golfers. The vast majority of research on golf and anxiety has established the impact of anxiety on elite and college golf performance (e.g., Weinberg & Genuchi, 1980; Cook et al., 1983; Krane et al., 1992; Hardy et al., 2004; Hassmen et al., 2004; Reese et al., 2007). Contrary to these findings, McKay et al. (1997) and McAuley (1985) failed to establish a relationship between anxiety and performance. McKay et al. (1997) did, however, find that golf competition and golf practice were discriminated by anxiety, with anxiety being lower in practice, a finding later confirmed by De Ste Croix and Nute (2008). In examining whether state anxiety was an antecedent or consequence of sport performance, McAuley (1985) found that pre-competitive measures did not predict golf performance, but instead noted that golf performance was a significant predictor of post-round cognitive state anxiety and self-confidence. Although interesting for this literature review, it should be noted that anxiety was an outcome of golf and that performance appeared to determine anxiety increases and fluctuations. This suggests that golf can have both positive and negative effects depending on the level of play and various performance metrics. When compared with tennis, golfers have been found to experience a lower level of somatic anxiety (Jennings, 1988).

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6. Literature Review – Other Related Research

Table 6.1. Publication Numbers

Topic Area	1960's	1970's	1980's	1990's	2000's
Motives	0	0	1	3	2
Women	0	1	1	1	6
Total Reviewed	**14**				

6.1. Golf Motivations & Constraints

While awareness of the health and wellness benefits of golf can be a motivating factor to participate, they also serve as barriers and constraints. Jackson (1993) explored constraints to how people encounter, experience, and respond to the factors that limit leisure behavior. Understanding motives and constraints would facilitate the segmentation of golfers into homogeneous markets to assist management in formulating consumer-oriented marketing strategies. Constraints determine what patterns manifest, not by prescribing them, but by eliminating certain alternative explanations. According to the framework outlined by Newell (1986), constraints emanate from one of three sources: (1) the performer, (2) the environment, or (3) the task[2]. Backman (1991) examined the relationship between consumer loyalty to golf and the perception of constraints that induce individuals to discontinue participation. The findings suggested that loyalty was associated with constraint perception that led to discontinued participation. Interviews conducted by McGinnis and Gentry (2006), as well as transcripts from interviews with 20 female participants of various playing levels and experience, were examined in order to determine the reasons why women not only leave golf but more importantly, why they stay. The data indicate that once golfers became hooked on the game, interpersonal and structural constraints had more influence on participation than intrapersonal constraints – whereas women new to golf face mainly intrapersonal constraints (i.e., mainly related to ability). Gobster (1998) conducted a qualitative analysis to identify themes relating to non-participation, including awareness and knowledge, marginality and opportunity, ethnicity and preference, and perceived discrimination and comfort. The findings suggest that reasons for minority participation are probably more complex and interrelated than previously thought.

Notable References:

- Backman, S. J. (1991). An investigation of the relationship between activity loyalty and perceived constraints. *Journal of Leisure Research,* 23(4), 332-344.
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- Jackson, E. L. (1993). Recognizing patterns of leisure constraints: Results from alternative analyses. *Journal of Leisure Research,* 25(2), 129-149.

[2] *Performer constraints* are those that are internal to the human movement system. *Environmental constraints* are those constraints that are external to the human movement system. *Task constraints* are those constraints that are specific to the task at hand and include task goals, the rules of the task, and any implements or tools used to perform the task (e.g., different golf clubs).

- McGinnis, L. P.; Gentry, J. W. (2006). Getting past the red tees: Constraints women face in golf and strategies to help them stay. *Journal of Sport Management,* 20(2), 218-247.
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6.2. Women & Golf Participation

Research has shown that women participate in golf significantly less than men, which is largely attributed to certain participation barriers. McGinnis (2002) identified a "churning effect" in golf whereby the same number of people leave the game each year as enter. Despite the fact that women consistently make up a disproportionately large amount of the "golf beginner" population, gender comparisons show that women leave the game faster than men and only comprise 1/5 of the participatory golf population. McGinnis (2002) further examined this gap and found that men perceive golf as being more sacred than women. This sacredness was positively associated with more pressure to create impressions and to stay within one's gender boundaries. Further, McGinnis and Gentry (2006) determined the reasons why women left golf. Their results showed that once golfers became hooked on golf, interpersonal and structural constraints had more influence on participation than intrapersonal constraints. Most women (i.e., who are new to golf) face both intrapersonal (e.g., ability) and structural constraints, which differ somewhat different from frequent participants. McGinnis (2009) acknowledged that golf continues to be a male dominated sport consisting of rituals and ritualized behaviors that both reflect and create hegemonic masculinity. Hundleya (2004) conducted a semiotic analysis of the language used on golf scorecards, which confirmed hegemonic practices in golf. For example, the nomenclature on the scorecards traditionally designates a location from which women should tee off. For men, however, this designation is determined by ability. McGinnis et al. (2009) identified that women negotiated masculinized rituals in golf in three ways: (1) accommodating – acknowledging masculine rituals and working around them, (2) being unapologetic – challenging masculine rituals (i.e., that threaten entitlement to golf) and creating women inclusive alternatives, and (3) remaining unaware –focusing on golf as a sport and ignoring or denying masculine dimensions of golf rituals.

Research has also indicated that women experience different outcomes from golf participation. Rockhill et al. (2001) confirmed non-gender specific findings that level of physical activity was inversely associated with mortality risk in women. Rikli and Busch (1986) found that avid women golfers scored significantly better on reaction time, balance, sit and reach flexibility, shoulder flexibility, and grip strength in comparison to inactive women. In terms of negative physical outcomes from golf, women are more prone to certain injuries than men. For example, McCarroll et al. (1990) reported a slightly higher incidence of elbow problems in women. This may reflect biomechanical problems in the golf swing of women related to their greater elbow carrying angle. Swing differences between men and women was confirmed by Egret et al. (2006) who found that women produce a wider swing with larger hip and shoulder joint rotation angles at the top of the backswing. In terms of psychological outcomes (which are largely lacking in the literature), McGinnis et al. (2009) found that, although women golfers experience a heightened sense of community, this sense is not at the same level of engagement as most male golfers. As well, Johnson (1972) identified

that female golfers scored significantly higher than female basketball players on dominance, capacity for status, sociability, social presence, self-acceptance, responsibility, self-control, tolerance, conformance achievement, independent achievement, intellectual efficiency, and psychological-mindedness.

In summary, the differences between men and women golfers suggest that there may be some benefit in specifically targeting women with health and well-being messages, especially when considering the increased barriers to participation they face.

Notable References:

- Egret, C. I., Nicolle, B., Dujardin, F. H., Weber, J., & Chollet, D. (2006). Kinematic analysis of the golf swing in men and women experienced golfers. *International Journal of Sports Medicine,* 27(6), 463-467.
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7. Research Recommendations

The objective of this project, for the WGF and Golf 20/20, is to understand the personal benefits of golf and use this information in awareness campaigns to generate participation. What follows are some preliminary research recommendations based on our review of the extant literature:

- What is apparent is that a lack of research exists on the wellness aspects of golf participation and involvement (e.g., social, cultural, social capital construction, etc.). Conversely, there is a host of empirical data to argue that golf is a "healthy" activity and a biomechanically efficient form of exercise for persons of all demographic categories.

    - **Recommendation**: Based on this observed gap in the literature, our primary recommendation would be to focus research efforts on the wellness benefits of golf participation and involvement – based on the mission, vision, and goals of the WGF.

- Golf is one of the few participatory sport activities in the US that facilitates social capital[3] formation among participants. The clubhouse provides golfers with socialization opportunities prior to, and after a round. And because of the methodical nature of the game, golfers are able to interact socially between shots (i.e., while waiting for the greens and fairways to clear prior to advancing their ball). Despite this, little research has been conducted on examining how and if social capital develops among golfers.

    - **Recommendation:** A study on social capital within golf clubs and members of those clubs, which will result in a list of recommendations on how to increase social capital among golf participants. In addition, a study of youth golf participant socialization could offer some viable insights into the early benefits of the sport.

- According to statistics compiled by the National Sporting Goods Association (NSGA) since 1990, walking for exercise remains the number one participation activity in the US. While the health benefits from golf are attained through walking, the rate of golfers in the US who walk a golf course has declined, and more rounds per year are played while driving in a cart – a change that actually makes the sport a more dangerous activity. Most golf clubs perpetuate the use of carts since it increases the pace of play and drives revenue. And because there is limited awareness of the health benefits of golf, few efforts have been undertaken to encourage golfers to adopt a hybrid form of play where the cart is used to a minimum, and golfers walk as much a they are able to without slowing down (e.g., cart path only, walking to the green after an approach shot, etc.).

    - **Recommendation:** A study examining the effects of a promotional campaign that combines walking and driving during a typical round (e.g., the "readiness" of golfers to walk). This study will also identify the barriers to walking and recommend strategies to help negate such barriers. In other words, the development of an alternative model, one that returns the game's potential for fitness, makes it safe, and invites the young to participate, should be considered.

[3] Social capital provides value to communities and is best measured through the willingness of community members to act on behalf of the community, and invest in the well-being of the other members of a community.

- Because golf is a perfectly suited moderate → intense physical activity for all ages, there are certain demographic characteristics/groups in the US population that should be particularly interesting to the golf industry. Unlike other sports, golf encourages lifelong participation. It is also an ideal activity for those who have not been physically active and hope to re-enter sport participation without the concern of overt bodily impact.

    - **Recommendation:** Examine the attractiveness of golf seek proactive retention strategies for lifelong participation; with a particular focus on women since some women quit being physically active because of their responsibilities as the primary caregiver.

- There is a noticeable lack of research on the health and wellness benefits of certain non-traditional golf activities (e.g., general practice, hitting range balls, par-three course play, executive course play, putting courses, etc.). Anecdotally, we can assume that one of the main barriers for participation is the time involved in a traditional round of golf, which could take 4-6 hours including travel time, prep time, and play. As well, the factors encouraging practice could be stress relief, escape, improvement in one's game, and physical factors (e.g., movement, stretching, cardio, etc.).

    - **Recommendation:** As some non-traditional golf activities might have grater appeal to golfers and non-golfers alike, an examination the health and wellness benefits of these activities aligns well with the mission and goals of Golf 20/20.

- The vision of Golf 20/20 is to understand the health and wellness benefits of the sport and ultimately increase participation. This focus aligns with a social marketing approach to sport participation. Social marketing is the application of marketing, along with other concepts and techniques, to evoke specific behavioral and social goals. Exploring the challenges, barriers, and motives for golf participation, including the significance of the problem and the outcomes (i.e., desired behavior), is critical for the golf's sustainability. The following research recommendations are based on the following questions: What are the benefits of playing golf that potential and active golfers may not be aware of? How can golf meet the needs and wants of potential and active golfers? How can the golf industry remove/reduce the barriers faced by potential and active golfers?

    - **Recommendation:** First, conduct interviews and focus groups with WGF and Golf 20/20 executives to establish desired outcomes for the sport. Second, go beyond the health and wellness benefits to examine the motives, catalyzing factors, barriers, and constraints that contribute to golf participation (or lack thereof). This study will involve primary data collection and analyses to fill the gaps identified by the literature review. Where health benefits data already exists, secondary data analysis will be conducted.

    - **Recommendation:** Examine the concept of personal/social change for potential golfers. This study focuses on the process of potential golfers' behavioral change and relates to the theory of personal/social change.

8. Appendix A: The Review of Literature

The purpose of a literature review is to identify and discuss the published academic information on a particular subject, and sometimes in a particular subject area within a certain period of time.

Depending on the scope of the project or the intended use of the material, a literature review can be a simple summary of sources with annotated descriptions of those sources. However, most academics would agree that a proper literature review should consist of an organizational pattern of the information that combines both summary and synthesis (i.e., a re-organization of information into understandable and manageable topics or themes).

A synthesis might:

- ✓ Be a new interpretation of a given subject or combine the latest information with old interpretations to arrive at a new set of conclusions and directions.
- ✓ Trace the intellectual progression of a field, including major debates, key constructs, methodological refinements, measurement issues, etc.
- ✓ Evaluate all source material and advise the reader on the most pertinent (or relevant) information from which to draw inferences.

For the current project:

- ✓ The WGF and Golf 20/20 contracted Walker Research Group, LLC to conduct a literature review (Phase 1) of the published literature on the health and wellness benefits of golf participation and involvement.
- ✓ Since funding and timelines to conduct the actual research are limited, this review will act as a "stepping stone" to conceptualize and operationalize the final research endeavor(s).
- ✓ The research committee, the World Golf Foundation, and Golf 20/20 will use this report to understand the current work in this area.
- ✓ The depth and breadth of the literature review will also assist Walker Research Group, LLC in noting where the gaps in the literature reside; in addition to bolstering the credibility of our recommendations.

In sum, the comprehensive knowledge obtained from the literature review is the essential element to the design, implementation, and reporting of the final research endeavour(s).

9. Appendix B: Analytic Technique of the Literature Review

To gather the requisite academic material to define the existing research gaps, a comprehensive step-wise literature was undertaken. First, the researchers entered certain keyword pairings (e.g., golf and health, golf and wellness, golf and participation, etc.) into a number of academic databases (e.g., ABI/INFORM, Academic OneFile, ProQuest, PubMed, PsychINFO, SportDiscus, Social Sciences, Health & Wellness Resource Center, Web of Knowledge, etc.). This step assisted in refining the general search topics and helped identify themes in the published academic work. This basic search yielded a number of academic publications with relevant information on the health and wellness aspects of the sport. Once a source was identified, the article was downloaded and saved to an online "drop-box" so duplication of articles was avoided. After the primary literature search, a secondary search was conducted using Google Scholar[4] to check for articles that may have been overlooked during the initial rounds of review.

Following both searches and discussions among the research team, the following topic areas were identified with sub-topics located under each main heading:

(1) Golf Health Benefits

a. Golf and Walking
b. Golf and Biomechanics
c. Golf and Injuries
d. Golf and Mortality
e. Golf and the Elderly
f. Golf and Mental Health

(2) Golf Wellness Benefits

a. Golf and anxiety
b. Golf self-esteem and mental health
c. Golfer motivations and constraints
d. Golf, community, and social capital

(3) Other Related Research

a. Golf Motives and Constraints
b. Women and Golf Participation

The researchers then aggregated the articles organizing them by theme, topic, and major findings. The final literature review accurately depicts the current, salient, and most relevant research on the identified topic areas. The literature review is organized by topic with the major findings of each research theme summarized. This is followed by a synthesis/summary of the articles and recommendations for future research.

[4] Google Scholar provides a way to broadly search for scholarly literature across many disciplines and sources: articles, theses, books, abstracts, and court published documents. It also shows who the article was written by as well as how often and how recently it has been cited in other scholarly literatures.