

Which Type of Golfers Are Interested in Playing a Reversible Golf Course Design: A Survey Study

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This study examines golfers' desires to play reversible golf courses (RGC), such courses can be played in two directions using a combination of existing and added tees and greens. Through the use of a survey of golfers the research also probes golfers' preferences for the reasons they play the game and golfer demographics and how those factors are connected to the desire to play RGCs. Findings point to strong desire among all types of golfers, with different preferences, to play RGCs. Note: The funding for this research came from the Angelo State University New Faculty Research Start-up program.

Keywords: reversible golf course, golf management

INTRODUCTION

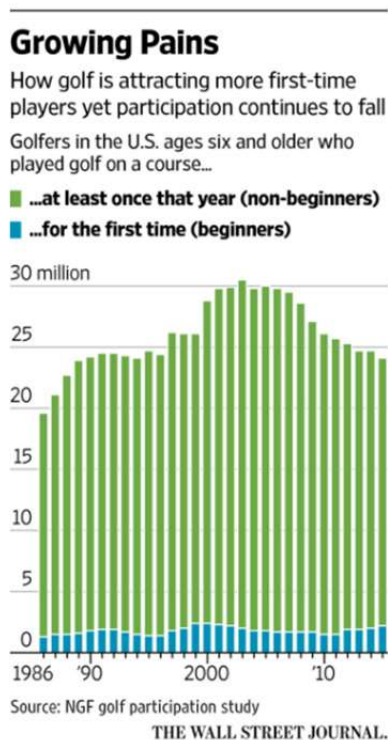
Golf is a timeless game that has its roots in Scotland. Golf was first acknowledged in writing in 1457 when the “King banned the gowff because they were not practicing archery to protect themselves from the English” (Cupp and Whitten, 2012). One of the oldest and most notable golf courses in the world is the Old Course at St. Andrews. This course was designed as a links style course. Links referring to the “area along a coast that often includes sand dunes and few, if any, trees.” These lands were used for golf courses because “farmers deemed these coastal lands useless because of the sandy soil, so golf course designers began to make use of them.” Links courses were also unique in their design in that “the first nine holes go out to the furthest point from the clubhouse and the second nine brings you back to the clubhouse.” (Berner, n.d.). By the late 1800s, the game of golf had found its way to the United States and many other countries. Since then, the game of golf has gained increased significance in the United States with many people actively participating in the game.

Golf is now one of the most popular participative sports in the United States; for the period 2009-2015 golf ranked number seven as an exercise activity among those aged 15 and above who participate in such activities (U.S. Bureau of Labor Statistics, 2017). Golfers enjoy many benefits that the game can bring, including several health advantages. A meta-analysis investigating the relationship between golf

and health found that golf, a moderately intense physical activity, can lead to improved cardiovascular, respiratory, and metabolic health; there is also limited evidence of improved mental health among golfers (Murray, et al., 2016). One cited study even found that regular golfers can have up to five years of increased life expectancy (Murray et al., 2016). Other non-health benefits include spending time outdoors with family and friends, challenging oneself to improve continuously, and participating in an activity that can be played throughout one's life. The Bureau of Labor Statistics study on U.S. exercise habits found that golf is enjoyed by all age groups, with those over the age 55 making up almost one-half (47.8%) of participants (U.S. Bureau of Labor Statistics, 2017).

Even with all the positive benefits golf provides participants, the total number of golfers in the U.S. is approximately 20% lower than the peak year of 2003, when the National Golf Foundation (NGF) reported over 30 million active golfers in the country (Deegan, 2019). See FIGURE 1. However, in its latest annual report, the NGF found that the total number of on-course golf participants has stabilized somewhat over the past five years at just over 24 million golfers. An increase in the number of golf participants from 2017 to 2018 is cited as the first incremental increase the industry has seen in the past 14 years (Matuszewski, 2019). The Foundation also reports that the number of golf courses in the U.S. decreased by 8% between 2006 and 2018 (National Golf Foundation, 2019). Summing up the state of the game in the U.S. for 2018, the Foundation states, “approximately 15,000 faculties, 24 million golfers, and in the neighborhood of 450 million rounds played – is strikingly similar to 20 to 25 years ago,” (Matuszewski, 2019).

FIGURE 1
NUMBER OF GOLFERS (IN MILLIONS) IN THE U.S. FROM 1986 TO 2016 (COSTA, 2016)



Golf as a business in the U.S. has been struggling since the economic downturn in 2008 (“The Future of Golf: Handicapped,” 2014). There are many reasons given for the decline, the cost of playing golf in a downturned economy is certainly one factor, but others including the time it takes to play a round of golf (upwards of five hours on a busy municipal course on the weekends), the difficulty of the game, and the

stodgy reputation of the sport are often cited as reasons for the drop in participation (“The Future of Golf: Handicapped,” 2014). While the number of golfers has stabilized over the past few years, the number of rounds played declined between 2017 and 2019 by 3.5% (456 million to 440 million) (NGF, 2018; Mackin, 2020). To combat such trends, the golf industry is trying many different approaches. More radical approaches include concepts such as SPRINT6GOLF, which is played over just six holes and uses a 30-second shot clock to speed play (HSBC, 2020). Or the TopGolf approach, which offers players the experience of hitting sensor enabled golf balls at different targets and awards points for good shots, all the while enjoying food and beverages (“The Future of Golf Handicapped,” 2014). Other attempts to get more golfers on traditional courses have including encouraging rounds of nine-holes, instead of the traditional 18 (HSBC, 2020). Professional golfer Tiger Woods, in reference to new golfers, once said, “How do you keep them still interested in it? How do you keep it fun? That’s one of the things we’re running into right now with the game of golf. It’s just stagnant... There’s no sustainability” (Costa, 2016).

According to the NGF, a total of 198.5 18-hole equivalent golf courses closed in the U.S. in 2018, while only 12.5 new 18-hole equivalent courses opened. This represents a 1.2% decline in the number of available courses for golfers to play (Matuszewski, 2019). Matuszewski wrote that this continues a trend seen since 2006 and is not surprising as the industry works to correct an oversupply of courses. Much of the recent money being spent on golf course development has been on renovations to existing courses, not on new courses (Matuszewski, 2019).

Designing and building a golf course is no easy task. Unlike the early links courses of Scotland, that were shaped and designed by sand dunes and other natural terrain, today’s courses often require a great deal of human design and earth work to be built. Modern golf course designs are more complex and consist of many varied techniques for reshaping the natural landscape (Cupp and Whitten, 2012). New course sites must meet economic and physiographical criteria and must consider site governance and off-site issues that could affect the nature and character of a golf course. The American Society of Golf Course Architects (ASCGA) addresses some of the specifics of building a golf course in the “New Courses” section of their website (www.ascga.org/design/new-courses). Their rule of thumb is that it takes approximately 175 acres of usable land to build a standard eighteen-hole golf course (ASCGA-Site Selection & Evaluation, n.d.). However, many factors can alter this estimate including the number of holes to be built (nine or eighteen), length of the course, and terrain, among others, can alter the amount of useable land needed.

Along with the amount of land needed, development costs are also a significant factor when building a golf course. Generally, the cost of the golf course depends on a variety of factors. According to Scott Macpherson Golf Design (n.d.), three of the most important factors are: the style and level of course, the land for the course, and the course architect’s skills. U.S. course developers can expect to spend at least two million dollars above land costs to develop a modern, regulation-length golf course (Scott Macpherson Golf Design, n.d.). However, as shown in TABLE 1, the cost of building a golf course can range from a low end of \$520,000 to a high end of \$5,800,000. In addition, Golf Course Industry magazine reports the costs to maintain a course to range (on average) from \$500,000 to \$750,000 annually (“Budget: 2016 State of the Industry Report,” 2016). Once a developer has decided to create a new golf course, it usually takes between one and two years to build the course. It can often take an additional one to two years to obtain all permits and required approvals before construction can begin (Amick, n.d.).

TABLE 1
COST OF BUILDING A GOLF COURSE

Construction Items	Minimalist Course	Average Course	Up Scale Course
Mobilization	10,000	35,000	75,000
Layout, Staking, Civils	10,000	30,000	120,000
Erosion Control	0	25,000	150,000
Clearing and Grubbing	3,000	35,000	280,000
Selective Clearing	0	54,000	240,000
Topsoil Strip	40,000	150,000	300,000
Rock Blasting	0	15,000	150,000
Earthmoving	0	375,000	750,000
Shaping	75,000	150,000	300,000
Topsoil Replacement	40,000	150,000	240,000
Storm Drainage	10,000	75,000	500,000
Golf Drainage	20,000	100,000	150,000
Irrigation + Pumpstation	130,000	345,000	910,000
Greens (11,150 sq.m.)	36,000	190,000	600,000
Tees (11,150 sq.m.)	30,000	60,000	100,000
Bunkers	17,000	52,000	84,000
Cart paths	0	112,000	530,000
Seedbed Prep	50,000	95,000	125,000
Grassing (Seed/Sprigs)	50,000	120,000	110,000
Grassing (Sod)	0	50,000	200,000
BUILD TOTAL (US \$)	521,000	2,218,000	5,814,000

Source: Golf Course Builders Association of America, ASGCA, and Denis Grffiths. 2004 (retrieved from scottmacphersongolfdesign.com)

REVERSIBLE GOLF COURSES

One possible means of helping to stem the decline in the number of golfers in the U.S. since 2003, keep golfers interested in the game, and get them to play more is to design and build reversible golf courses. Such courses allow golfers to play the same course in two directions, which can create more interest, challenge, and cause golfers to play more often (Rothman, 2017). This in turn, can help increase the total number of golfers and total number of golf rounds played per year at a course, increasing course revenues. Another benefit of a reversible golf course is that the course can be designed and built to have the ability to play “two different courses” on the same amount of land needed to build one golf course, saving land costs. In addition, a reversible golf course assists in keeping the land sustainable for longer periods of time by allowing the fairway grass and the greens to grow and recover better.

In a fully reversible 18-hole golf course, the same 18 greens are incorporated into an ingenious routing, in which the layout plays clockwise one day and counterclockwise the next day. It means on day one, the golfers will play the course starting from hole 1, continue to play hole 2 and so on until hole 18. On the next day, the golfers will play the same course in reverse, starting from hole 18 (i.e. from the opposite side of the green using a different set of tees) and continue to play hole 17 and so on until hole 1.

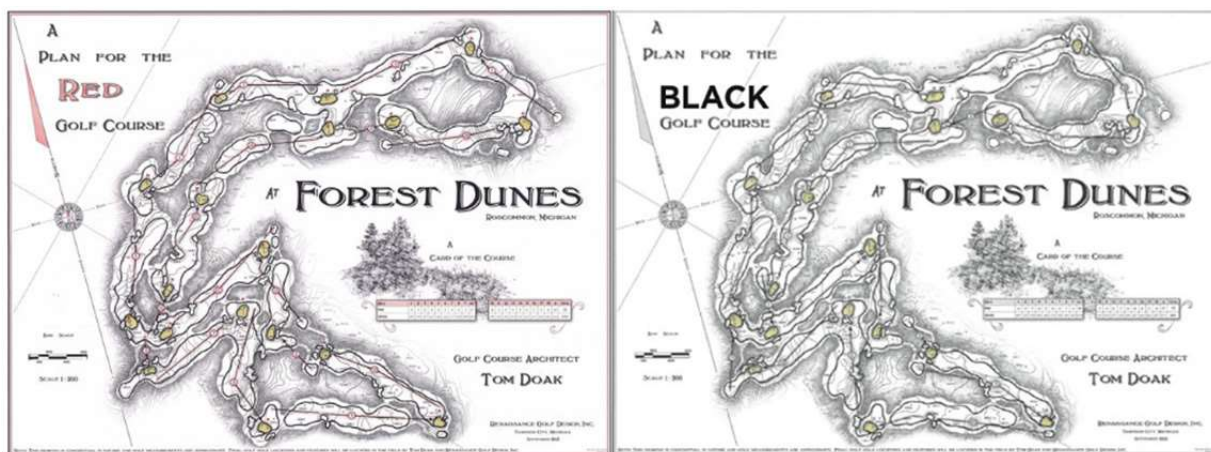
While today’s golfers may not be familiar with the concept of reversible golf courses, the concept is not new. At the Old Course at St. Andrews loop (or reversible) golf was once a regular, weekly occurrence. The course was reversed every week so that the grass on the fairways had a chance to grow and recover. Modern golfers and golf fans may be more familiar with the standard right-handed routing at the Old Course, which is how the course is played today. However, from 1872 to at least 1904, on a

weekly basis, the course was played in the reverse order of holes, on what was known as the left-handed routing. This regular rotating routing scheme was used during those 30-odd years (Klein, 2018). Since then, the left-handed routing (or reversible course) has only been used intermittently, including for maintenance reasons and sometimes around April Fool’s Day weekend. Major championships at The Old Course have always used the right-handed routing, except for the 1886 British Amateur.

Tiger Woods went on record during his preparation for The British Open in 2015 saying that he would love to play the Old Course at St. Andrews in reverse at least once in his lifetime. Woods said, “Before I die, I want to play it one time backwards. I want to play from hole 1 to 17, 2 to 16, so on and so forth. I’d love to be able to play it that way, just one time. I think that would be just a blast, because I can see how certain bunkers, – why would they put that there? And then, if you play it backwards, you see it. It’s very apparent. That’s totally in play. That one day would be a lot of fun to be able to do it” (Miceli, 2018).

An example of a modern fully reversible 18-hole golf course design is the ‘The Loop at Forest Dunes’, in Roscommon, Michigan which opened in Summer 2016, where golfers can play this course both forward as well as reverse (Rothman, 2017). Tom Doak designed and built the course which is the first 18-hole reversible course of its kind in the U.S. The course received honors as the “Best New Course” from both the Golf Digest and the Golf Magazine (Shenouda, 2017). This course provides the opportunity and the challenge to play the course forward on day one and in reverse the next day. This has attracted many golfers to stay at this golf resort to enjoy the opportunity to play this course both forward and reverse over the two days. Reversible golf courses can generate more interest and challenge for golfers to play the same course in multiple ways, which in turn can help generate more interest and revenues for these golf courses. As shown in FIGURE 2, golfers head out on this course in a clock-wise rotation (the black routing) on day one. The next day, everyone turns around and plays the same course in a counter-clockwise manner (the red routing). Instead of relying upon one set of tees, this course has deployed two completely different sets of tees, one set of tees for clockwise play and other set of tees for counterclockwise play.

**FIGURE 2
FOREST DUNES REVERSIBLE GOLF COURSE DESIGN**



Designing and building a golf course to work in both directions adds complexity and is more challenging for the course architect. This is because, when a golf course designer designs a course, they design it hole-to-hole. The designer arrives at a course site, surveys the land and then designs the holes based on the natural undulations of the earth along with any planned earth moving. The idea of designing a reversible golf course would present a challenge not only for the golfer, as they would have to adapt to a different course each day, but also for the designer, as the process of golf course design would change. It

would no longer be enough for the designer to design a hole so that it can be played only from one side of the green. They would have to design the holes so that they can be played from both sides of the green from different set of tee boxes.

This research study uses survey methodology to determine the characteristics of golfers who would be interested in playing reversible golf courses. Our research can help inform golf course owners and designers as to the merits of building reversible course and help determine where to build such courses in an attempt to increase revenues and profit.

RESEARCH PROPOSITIONS

Through this study we hope to answer the question, “What type of golfers would be interested in playing on a course designed to be reversible?” To answer this question, we developed a survey to collect data to discover the characteristics of golfers who would be interested to play a reversible golf course design. The research propositions that follow are based on the beliefs that long-time golfers who play regularly, well and at a “home course” will be more interested in playing reversible golf courses (P1-P4). In addition, golfers who have more limited opportunities to play different courses, but also want to play different courses and will travel to play golf occasionally will be more interested in playing reversible golf courses (P5-P9). As well, golfers who wish to become better at the game will be more interested in playing such courses (P10). Golfers who are more interested in the social aspects of playing golf may also be more interested in playing reversible courses (P11 & P12). Lastly, golfers who typically play at public courses will be more interested in the reversible course concept (P13). Demographics related to being more likely to play at reversible courses include age, education, income, work-life balance, and marital status also will play a role in whether golfers will be more likely to desire to play reversible courses (P14-P19).

The research propositions are as follows:

- P1:** Golfers who play at least 6-10 times per month will be interested in playing a reversible golf course.*
- P2:** Golfers who have been playing more than 10 years will be interested in a playing reversible golf course.*
- P3:** Golfers whose average score is less than 45 (for nine holes) will be interested in playing a reversible golf course.*
- P4:** Golfers who play most often at their primary golf course will be interested in playing a reversible golf course.*
- P5:** Golfers who live in a town with less than 200,000 population will be interested in playing a reversible golf course.*
- P6:** Golfers who have less than 4-6 golf courses within 25-30 miles from their home will be interested in a playing reversible golf course.*
- P7:** Golfers who take golf vacations on average once per year, will be interested in playing a reversible golf course.*
- P8:** Golfers who primarily play public golf courses will be interested in playing a reversible golf course.*
- P9:** Golfers who are older than 30 years and younger than 60 years will be interested in playing a reversible golf course.*

P10: Golfers who have at least a bachelor's degree will be interested in playing a reversible golf course.

P11: Golfers whose annual household income is more than \$75,000 per year will be interested in playing a reversible golf course.

P12: Golfers who work more than 40 hours per week will be interested in a playing reversible golf course.

P13: Golfers who are single and not in a committed relationship will be interested in playing a reversible golf course.

P14: Male and female golfers will be equally interested in playing a reversible golf course.

METHODOLOGY AND DATA COLLECTION

A 21-question survey built in Qualtrics was used to collect data. We employed Qualtrics Research Services (<https://www.qualtrics.com/research-services>), which offers panels and high quality, complete survey responses to find respondents and cause them to complete the survey. A total of 320 respondents completed the survey. The initial question on the survey screened the participants such that only golfers completed the survey. For this study, a golfer is defined as someone who participates in golf on at least an annual basis (one time per year). We did not screen out golfers based on ability because we were interested in all types of golfers and their opinions regarding reversible golf courses. Data was collected over three months in the last quarter of 2018.

RESULTS

Golfing Profile of Respondents

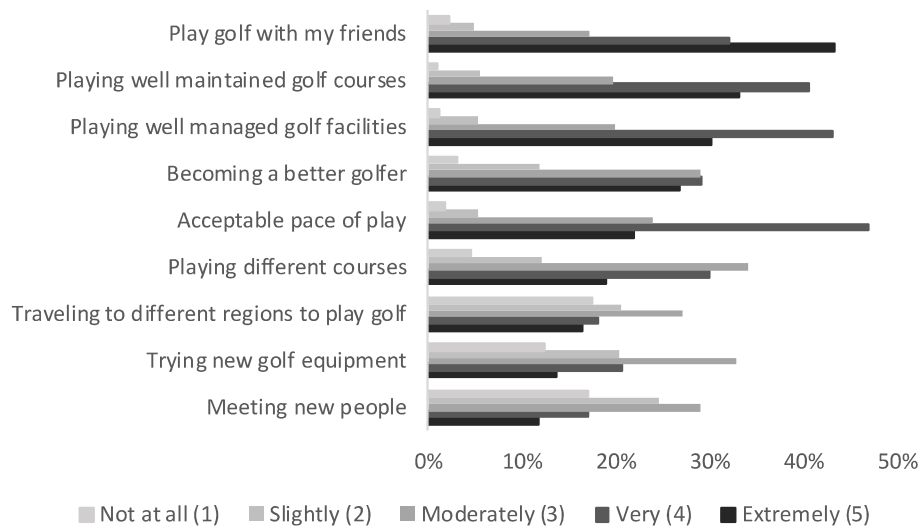
The Appendix lists the 21 survey questions and summary results. Questions 2 through 4 help build a profile of the types of golfers who responded to the survey. Most have significant experience playing golf, with over 60% playing more than 10 years and only three percent playing for a year or less. The average score for nine holes was 45, indicating that the average golfer played “bogey golf,” scoring one stroke over par for each hole. This shows that the average respondent is a somewhat better golfer than is typical, since the overall average golfer scores 50 over nine holes (The Original Golf Blogger, 2010). Over 80% of the respondents play golf at least twice per month during peak golf season. The above results show that on average, the respondents are good golfers who play regularly.

Furthermore, questions 6 and 7 indicate that many respondents have more than enough choice when it comes to courses to play. Over 50% of respondents have more than six golf courses within 30 miles of where they live and 78% of respondents have at least four courses within a day trip. Over 74% have a home course. Thirty-three percent are members of a golf club and 17% primarily play private courses, which is slightly more than the national rate of 10% reported in 2012 (GolfInfoGuide.com, 2012). Twenty-eight percent of respondents take at least one golf vacation per year, and 43% do not take golf vacations.

Golfing Preferences of Respondents

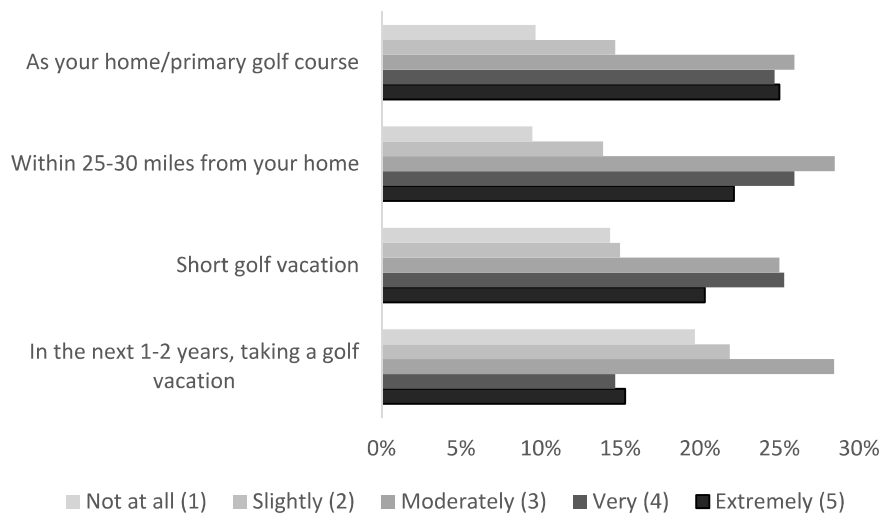
Survey question 12 asked respondents what aspects of golf are important to the respondent personally. FIGURE 3 offers details as to respondents' preferences. The darker the bar, the more important the factor to the golfer. “Playing golf with my friends” had the most respondents say that it was Extremely Important, with “Meeting new people” having the fewest.

FIGURE 3
WHAT ASPECTS OF GOLF ARE MOST IMPORTANT?



Questions 13-1 through 13-4 asked the respondent’s interest in reversible golf courses. FIGURE 4 shows that respondents are interested in reversible golf courses for both their primary course as well as day trips and short golf vacations; however, more interest exists in having reversible courses closer to home. Less interest exists for traveling to play a reversible golf course.

FIGURE 4
GOLFERS’ INTEREST IN REVERSIBLE GOLF COURSES



Respondent Demographics

Questions 14 through 21 collected data on respondent demographics. As seen in the tables in the Appendix, over 80% of respondents are between 30 and 70 years old, with 25% being between 61 and 70. All have graduated high school and 71% have some sort of college or university degree. The top five

states in which respondents live are California, Florida, Texas, Ohio, and New York. FIGURE 5 shows responses by state.

**FIGURE 5
RESPONDENTS BY STATE**



Over 80% of respondents reported incomes of more than \$50,000, with 35% making \$100,000 or more. Twenty-seven percent were retired and 6% were unemployed, leaving two-thirds that worked. Response by gender was similar between men and women, 56% and 44%, respectively. Seventy-five percent are married and 89% were Caucasian.

ANALYSIS

From the results above, golfers are interested in reversible golf courses. In this section, we investigate which golfer traits are related with reversible golf course interest. Depending on the question's scale, either ANOVA or correlation was generated for all questions compared to the question asking: *Are golfers interested in reversible golf courses as their home or primary course?* This question was chosen to simplify and shorten the analysis. We believe similar results would be generated for the other three questions concerning the desire to play a reversible golf course. Using the question on home or primary course also heightens the importance of the desire to play such a course, since it would be a regular occurrence for the golfer.

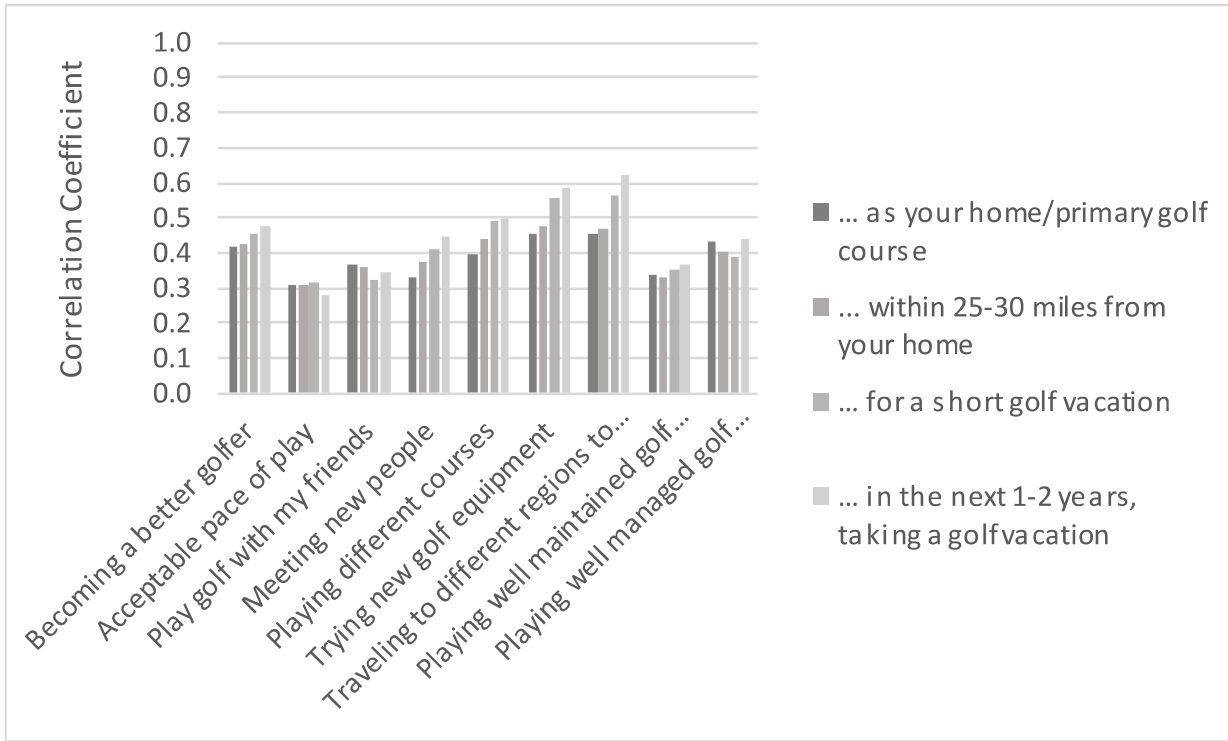
Regarding the desire to play a reversible course, TABLE 2 shows the ANOVA and correlation output comparing the primary reversible course question to the other survey questions. Subsequently, individual charts have been generated for comparisons to explore each of the research propositions.

TABLE 2
ANOVA AND CORRELATION TABLE COMPARING REVERSIBLE HOME COURSE QUESTION TO OTHER SURVEY QUESTIONS

Survey Questions		ANOVA F		Correlation	
Q1	What activities do you participate on a yearly basis?				
Q2	Approximately how many years have you been playing golf?	8.50	***		
Q3	What is your average score for 9 holes?			-0.20	***
Q4	During your peak golf season, on average, how many times do you play per month?	6.25	***		
Q5	What is the approximate population of the town you live in?	1.36			
Q6	How many golf courses are within a 25-30 mile radius from your home? (i.e. where you currently live)	0.20			
Q7	How many golf courses are within a reasonable distance for a day trip to play golf?	3.44	**		
Q8	Do you have a home/primary course that you play most often?	15.11	***		
Q9	Are you a member of a golf club?	16.50	***		
Q10	Do you primarily play public or private courses?	7.34	**		
Q11	Do you take golf vacations? If so, on average, how many do you take per year?	10.63	***		
Q12	Which aspect(s) of golf are important to you?				
Q12 - 1	Meeting new people			0.33	***
Q12 - 2	Trying new golf equipment			0.46	***
Q12 - 3	Traveling to different regions to play golf			0.45	***
Q12 - 4	Playing different courses			0.40	***
Q12 - 5	Acceptable pace of play			0.31	***
Q12 - 6	Becoming a better golfer			0.42	***
Q12 - 7	Playing well managed golf facilities			0.43	***
Q12 - 8	Playing well maintained golf courses			0.34	***
Q12 - 9	Play golf with my friends			0.36	***
Q14	What is your current age?	20.50	***		
Q15	What is the highest level of education you have completed?	1.17			
Q16	Which state do you currently live? Top Five	1.67	*		
Q17	What is your total annual household income before taxes (000)?	1.55			
Q18	How many hours do you work per week?	7.10	***		
Q19	What is your gender	0.03			
Q20	Marital Status	2.95	*		
Q21	What is your Race/Ethnicity?	0.57			
significance levels: *** p < .001; ** p < .01; * p < .05					

FIGURE 6 shows that responses to each of the reversible course questions are highly correlated with golfer's interest in certain aspects of the game. All correlations were significant at a $p < .001$. The highest correlations occur for the golfers who are interested in new courses, new regions, or new equipment. Although still significant, the weakest correlation is for golfers interested in an acceptable pace of play. Finally, for those golfers interested in new courses, regions, and equipment, the highest correlations were for those planning to take a golf vacation to a reversible golf course.

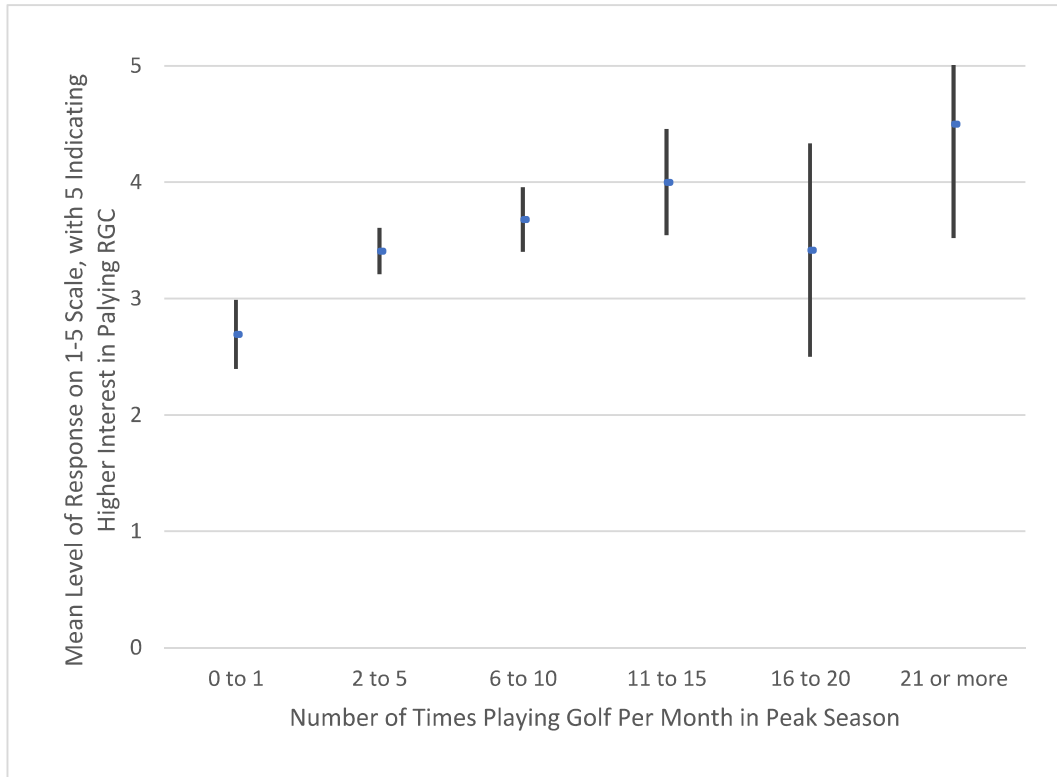
FIGURE 6
GOLFERS' INTEREST IN REVERSIBLE GOLF COURSES VERSUS IMPORTANT ASPECTS OF GOLF



PI: *Golfers Who Play At Least 6-10 Times Per Month Will Be Interested In Playing A Reversible Golf Course.*

Based on the results shown in TABLE 2, there is a relationship between the desire of golfers to play a reversible golf course (RGC) and the amount of golf they play (Question 4, ANOVA $F = 6.25$, $p < .001$). This is further shown in FIGURE 7, which reveals the mean level of response on golfers' desires to play RGC's associated with the number of rounds they play per month during peak golf season. In the figure, the tick marks on the graph indicate the mean level of response on a 5-point scale, with 5 being "extremely interested" and 1 being "not interested at all." The lines represent a 95% confidence interval around the mean.

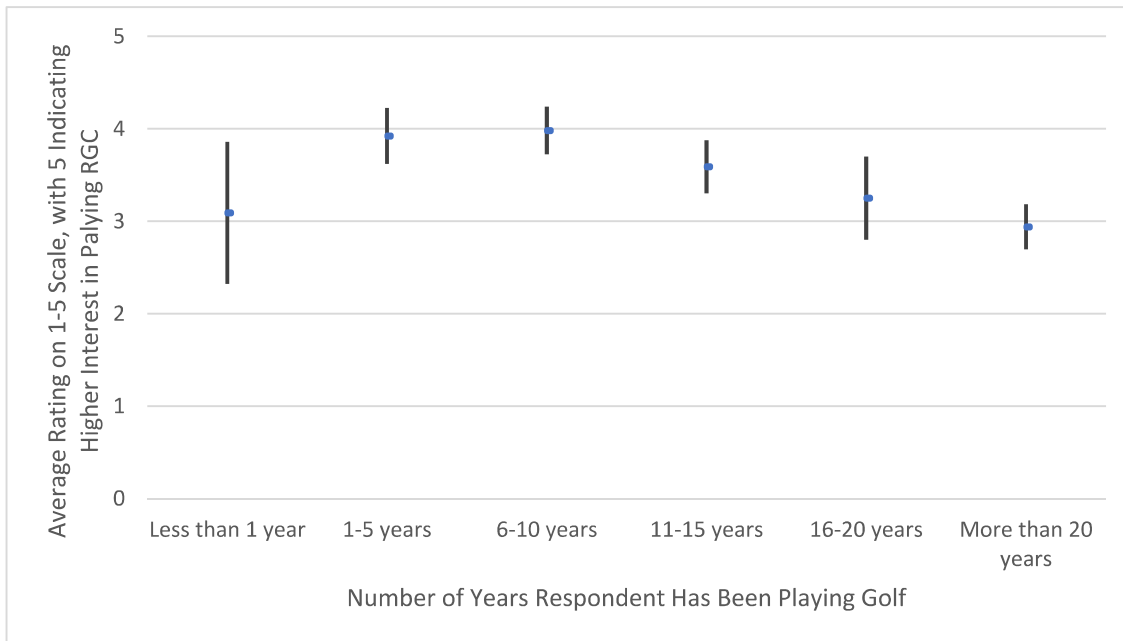
FIGURE 7
FREQUENCY OF PLAY VERSUS INTEREST IN PLAYING A REVERSIBLE GOLF COURSE



P2: Golfers Who Have Been Playing More Than 10 Years Will Be Interested In A Playing Reversible Golf Course.

Proposition 2 is not supported by the data. As seen in TABLE 2, there is a significant relationship between the number of years a golfer has played the game and their desire to play an RGC (Question 2, ANOVA $F = 8.50$, $p < .001$). However, as seen in FIGURE 8, more experienced players are not the golfers who have more interest in playing RGCs. The figure shows that other than beginnings, golfers earlier in the playing ‘career’ are more interested than golfers later in the career.

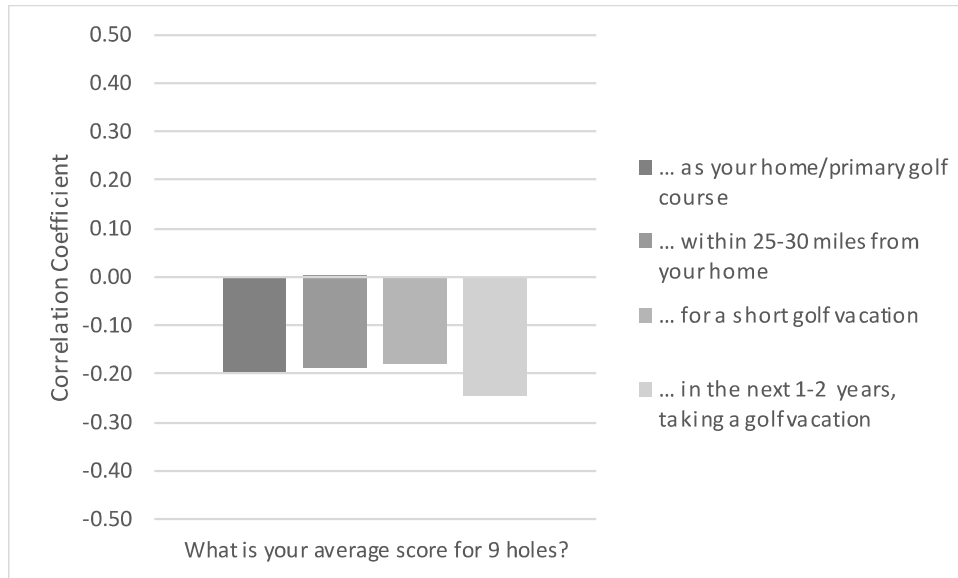
FIGURE 8
GOLFERS' INTEREST IN RGC VERSUS YEARS PLAYING GOLF



P3: *Golfers Whose Average Score Is Less Than 45 (For Nine Holes) Will Be Interested In Playing A Reversible Golf Course.*

Better golfers are slightly more interested in playing RGCs. The correlation coefficient reported in TABLE 2 between golfers' average reported 9-hole score and their desire to play an RGC as their home or primary course indicates a weak relationship between the variables (Question 3, $r = -.20$, $p < .001$). FIGURE 9 shows that similar relationships exist between the desire to play any type of RGC and golfers' abilities.

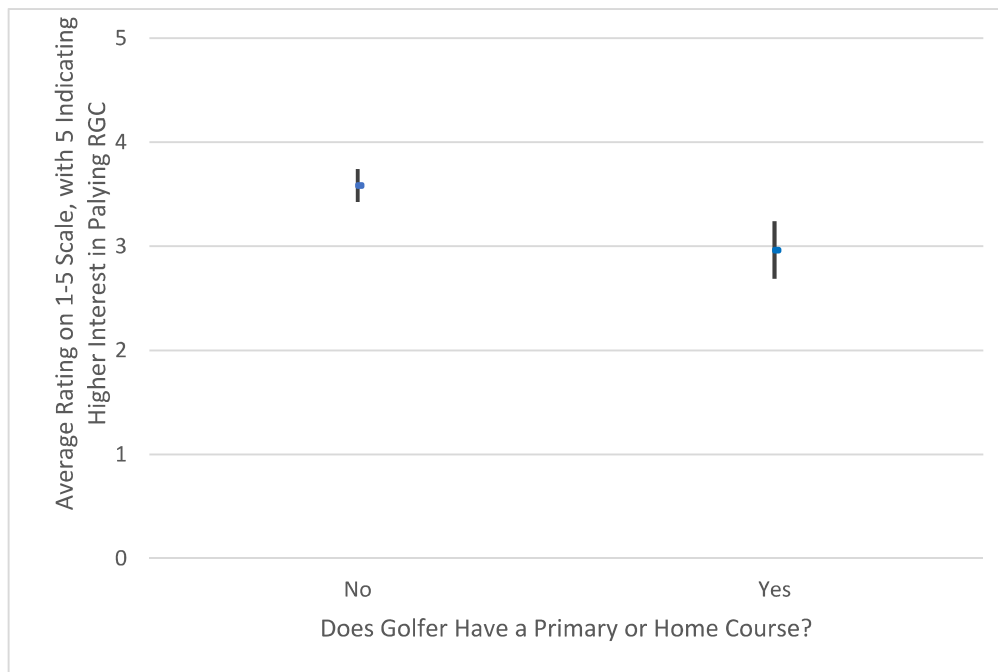
FIGURE 9
CORRELATION OF GOLFERS' INTEREST IN RGC VERSUS SCORING AVERAGE



P4: *Golfers Who Play Most Often At Their Primary Golf Course Will Be Interested In Playing A Reversible Golf Course.*

While there is a relationship between whether or not a golfer has a home or primary course and their desire to play an RGC (TABLE 2, Question 8, ANOVA $F = 15.11$, $p < .001$), the relationship is in the opposite direction than anticipated (FIGURE 10). Those with a home or primary course on average score 2.96 on a five-point scale as to their desire to play such a course (5 = extremely interested), while those that do not have a home or primary course score 3.58 on the scale, a significant difference as seen in the ANOVA results.

FIGURE 10
GOLFERS WITH A HOME OR PRIMARY COURSE VERSUS THOSE WITHOUT ON
DESIRE TO PLAY RGC



P5: *Golfers Who Live In A Town With Less Than 200,000 Population Will Be Interested In Playing A Reversible Golf Course.*

TABLE 2 shows that golfers’ interest in playing RGCs is not influenced by whether they live in rural towns or large cities (Question 5, ANOVA $F = 1.36$, n.s.); therefore, Proposition 5 is not supported. FIGURE 11 also indicates the lack of a pattern or preference among those living in different sized cities.

P6: *Golfers Who Have Less Than 4-6 Golf Courses Within 25-30 Miles From Their Home Will Be Interested In A Playing Reversible Golf Course.*

Similarly, to the results for P5, Proposition 6 was also not supported by the data. The number of courses within 25-30 miles of a golfer’s home did not relate to their desire to play RGCs (Table 2, Question 6, ANOVA $F = .20$, n.s.). FIGURE 12 shows the means of respondents’ desires to play RGCs across the various course number categories being close to equal.

FIGURE 11
GOLFERS' INTEREST IN RGC VERSUS SIZE OF HOME CITY

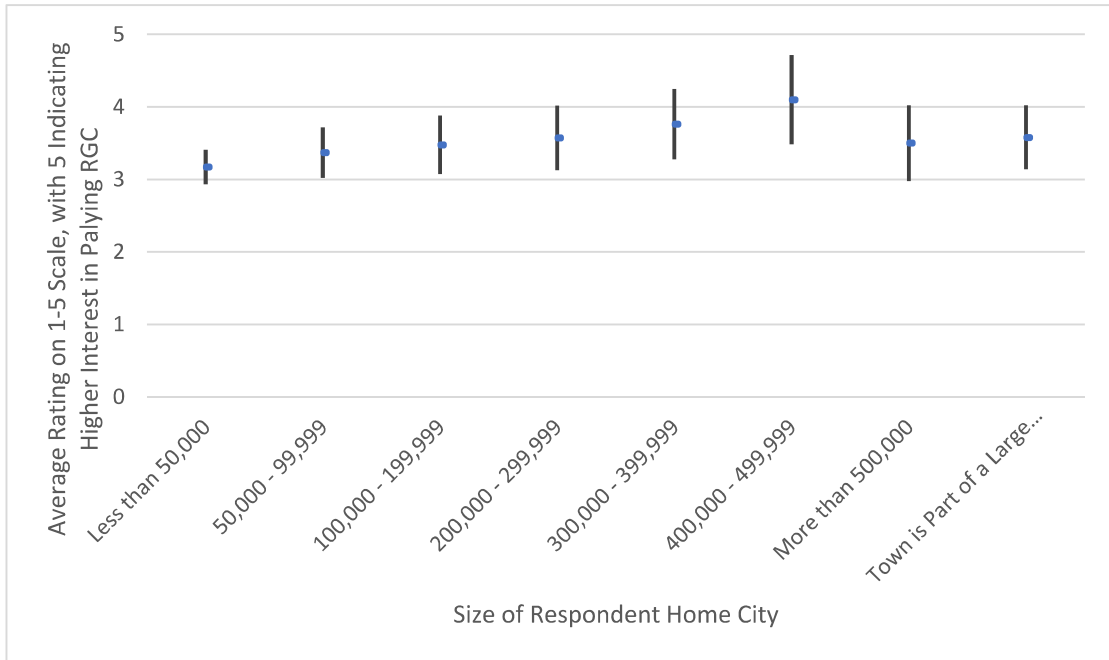
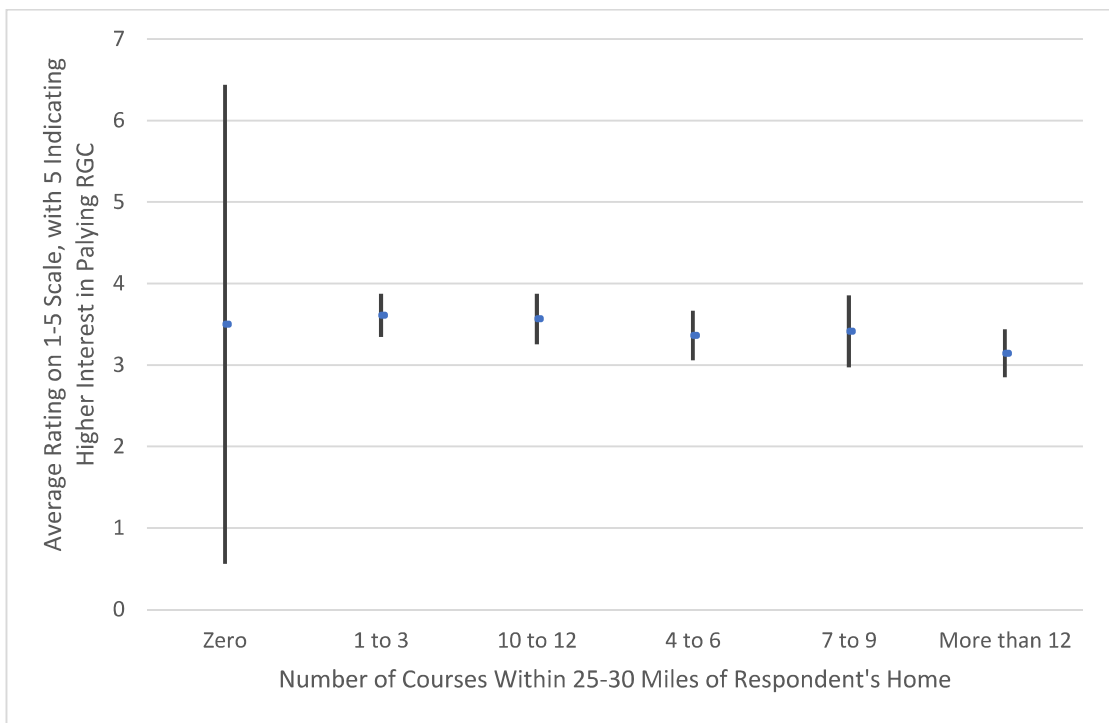


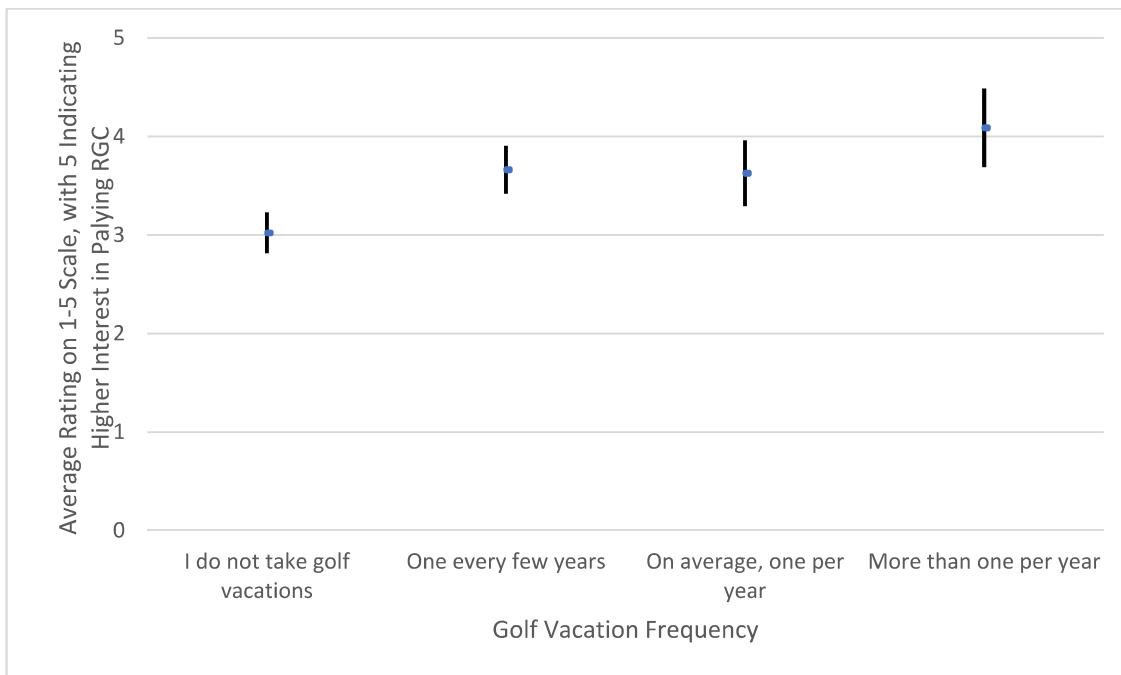
FIGURE 12
GOLFERS' INTEREST IN RGC VERSUS HOW MANY COURSES WITHIN 30 MILE DRIVE OF HOME



P7: *Golfers Who Take Golf Vacations on Average Once Per Year, Will Be Interested In Playing A Reversible Golf Course.*

Golfers who take more golf vacations are more interested in playing RGCs (TABLE 2, Question 11, ANOVA $F = 10.56$, $p < .001$). FIGURE 13 shows that those who take an occasional golf vacation and those who average one golf vacation per year are more interested in playing RGCs than are golfers who do not take golf vacations. Those who regularly take more than one golf vacation per year are the most interested in playing RGCs.

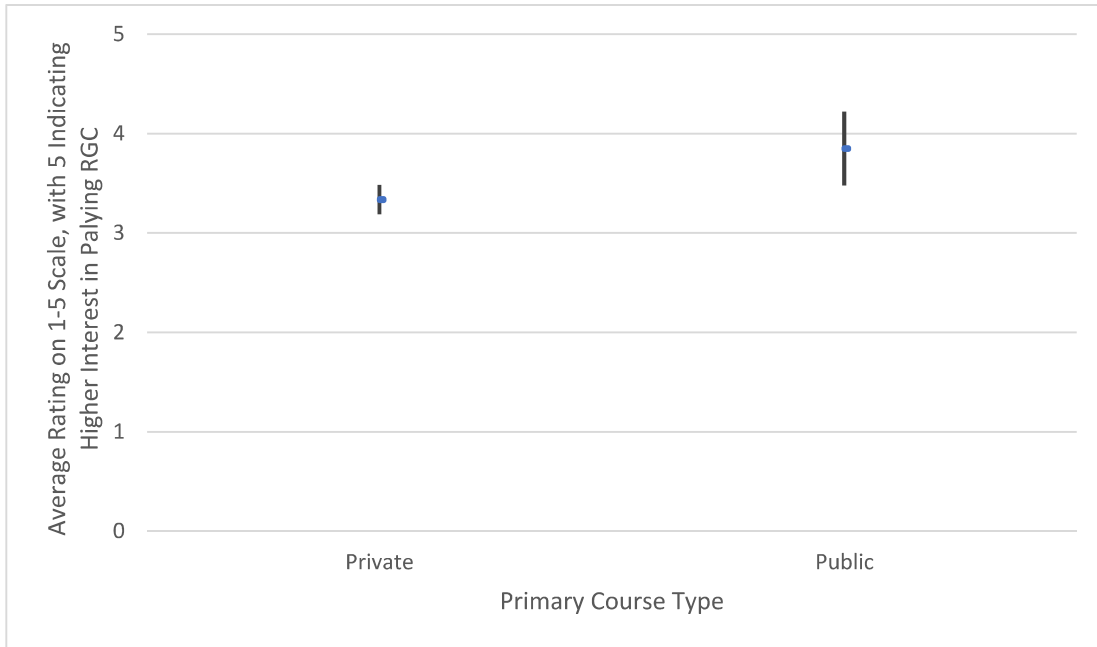
FIGURE 13
GOLFERS' INTEREST IN RGCs VERSUS FREQUENCY OF GOLF VACATIONS



P8: *Golfers Who Primarily Play Public Golf Courses Will Be Interested In Playing A Reversible Golf Course.*

There is a significant difference in the desire of golfers who primarily play public courses to play RGCs versus those who primarily play private courses (TABLE 2, Question 10, ANOVA $F = 7.34$, $p < .01$). Those who primarily play public courses are significantly more interested in playing RGCs (FIGURE 14).

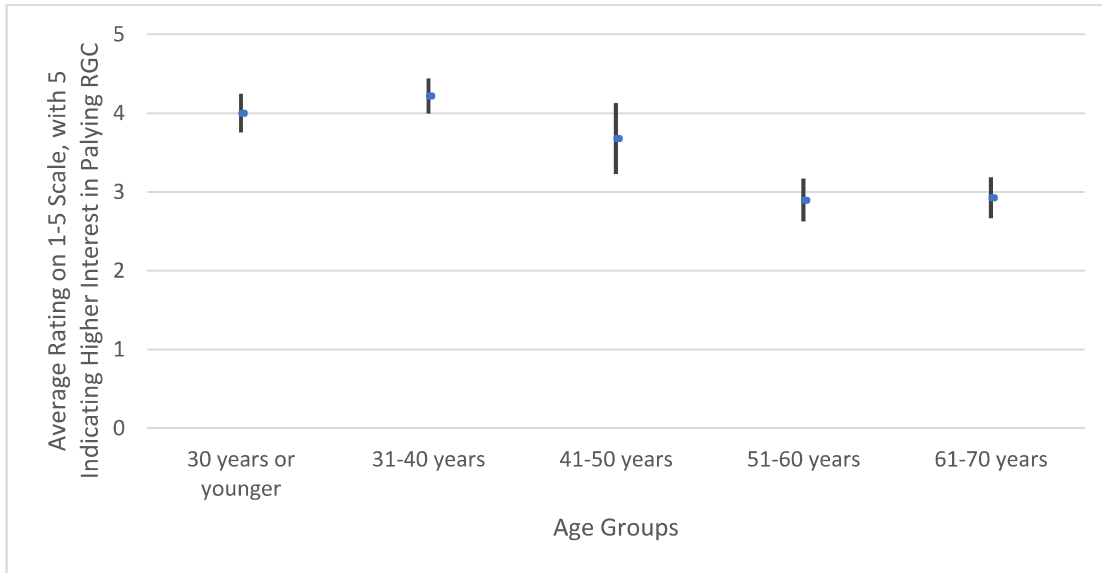
FIGURE 14
GOLFERS' INTEREST IN PLAYING RGCS VERSUS PLAYING PRIVATE OR PUBLIC COURSES



P9: *Golfers Who Are Older Than 30 Years And Younger Than 60 Years Will Be Interested In Playing A Reversible Golf Course.*

While there is a significant difference between golfers' age groups and their desire to play RGCs (TABLE 2 Question 14, ANOVA $F = 20.5$, $p < .001$), the pattern of the difference does not follow the prediction. FIGURE 15 shows in general that as golfers age, their desire to play RGCs decreases.

FIGURE 15
GOLFERS' INTEREST IN PLAYING RGCS VERSUS GOLFER AGE



P10: *Golfers Who Have At Least A Bachelor's Degree Will Be Interested in Playing A Reversible Golf Course.*

Proposition 10 is not supported by the data (TABLE 2, Question 15, ANOVA $F = 1.17$, n.s.). FIGURE 16 shows that education level makes little difference in golfers' desires to play RGCS.

P11: *Golfers Whose Annual Household Income Is More Than \$75,000 Per Year Will Be Interested In Playing A Reversible Golf Course.*

Likewise, proposition 11 is not supported by the data (TABLE 2, Question 17, ANOVA $F = 1.55$, n.s.). FIGURE 17 also indicates a lack of a pattern between income level and golfer's interest in playing RGCS.

FIGURE 16
INTEREST IN PLAYING RGCS VERSUS EDUCATION LEVEL

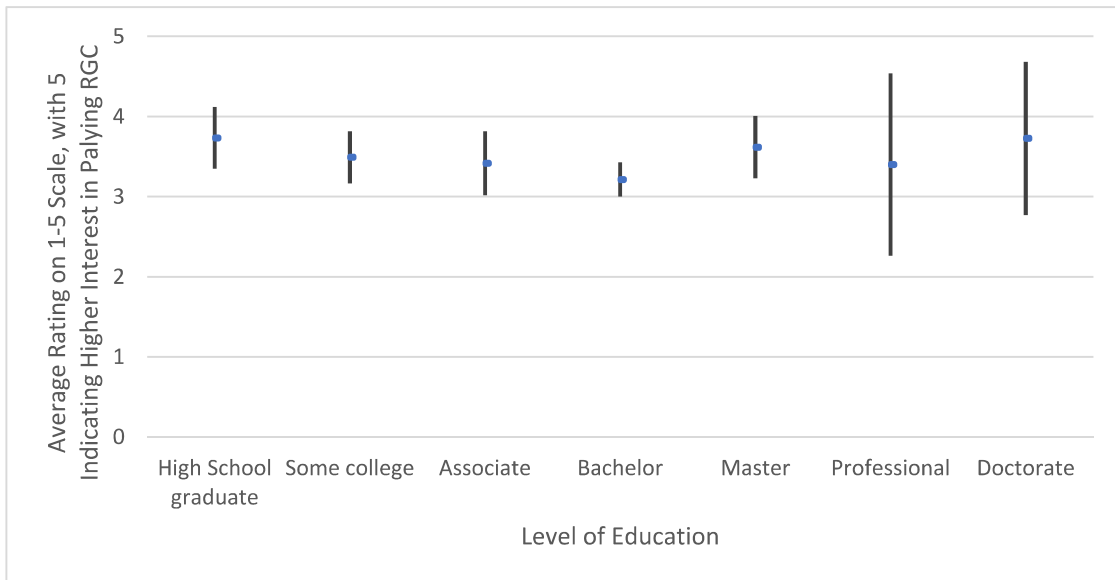
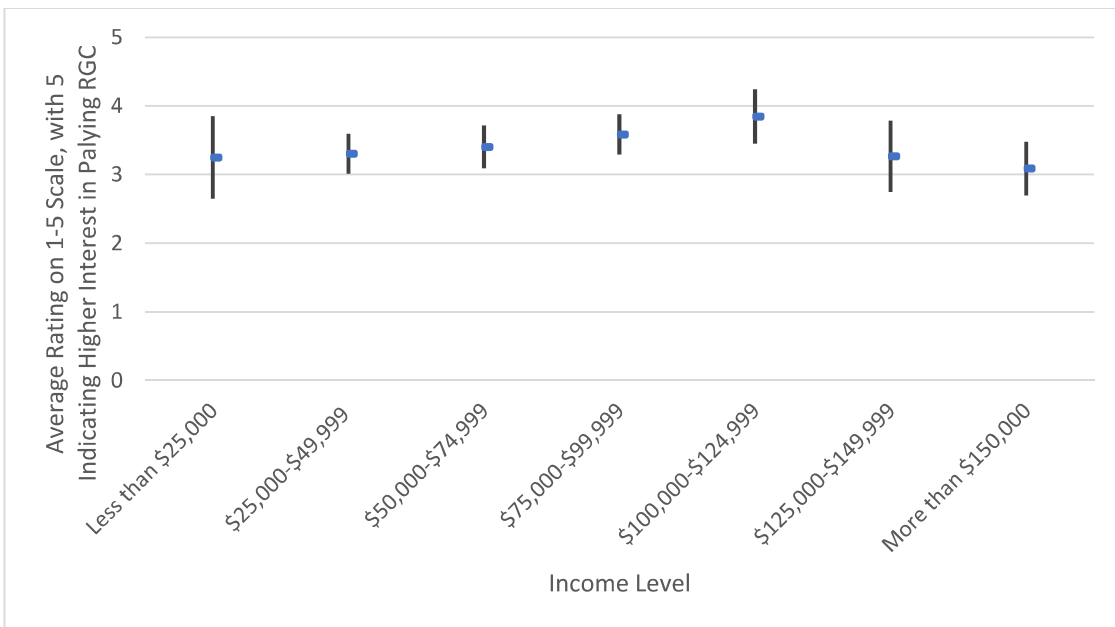


FIGURE 17
INTEREST IN PLAYING RGCS VERSUS INCOME LEVEL

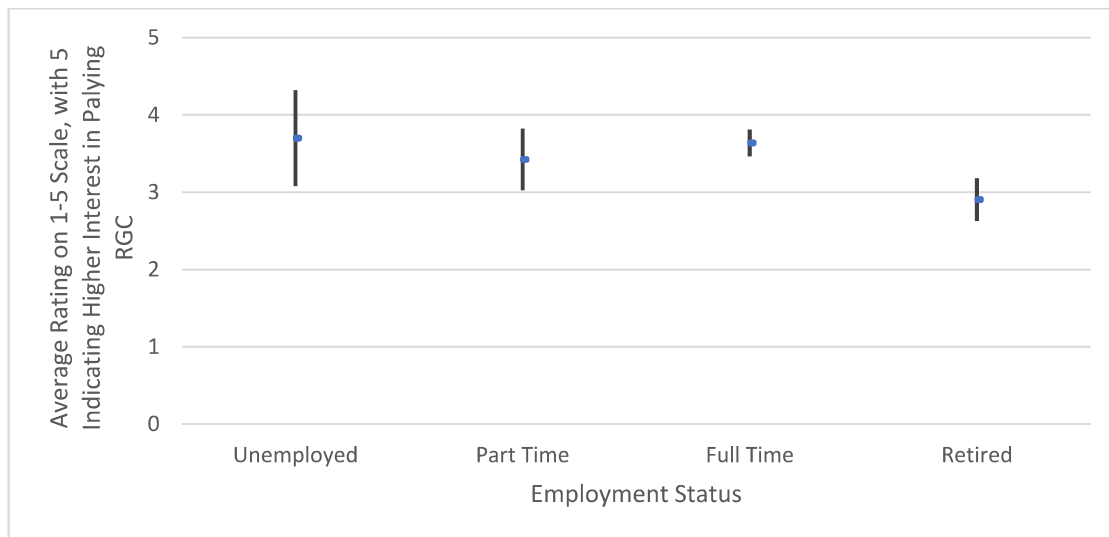


P12: *Golfers Who Work More Than 40 Hours Per Week Will Be Interested In A Playing Reversible Golf Course.*

There is a significant difference between golfers’ desires to play RGCs based on their employment status (TABLE 2, Question 18, ANOVA $F = 7.10$, $p < .001$); however, the pattern found in the data does not match the predicted pattern in Proposition 12. FIGURE 18 shows that golfers who are unemployed or

work part time or full time are about equal in their interests of playing RGCs. It is only golfers who are retired that have less interest in playing RGCs.

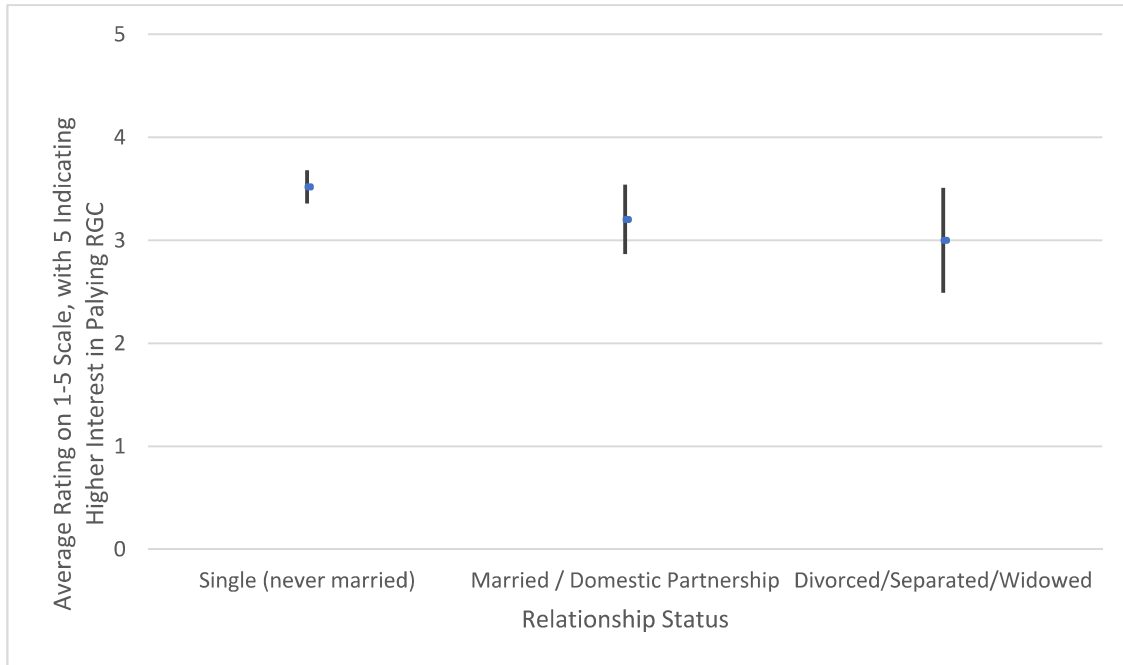
FIGURE 18
INTEREST IN PLAYING RGCS VERSUS EMPLOYMENT STATUS



P13: *Golfers who are single and not in a committed relationship will be interested in playing a reversible golf course.*

Proposition 13 is supported by the data (TABLE 2, Question 20, ANOVA $F = 2.95$, $p < .05$); FIGURE 19 shows that single/never married golfers have the highest interest level among golfers, based on relationship status, in playing RGCs.

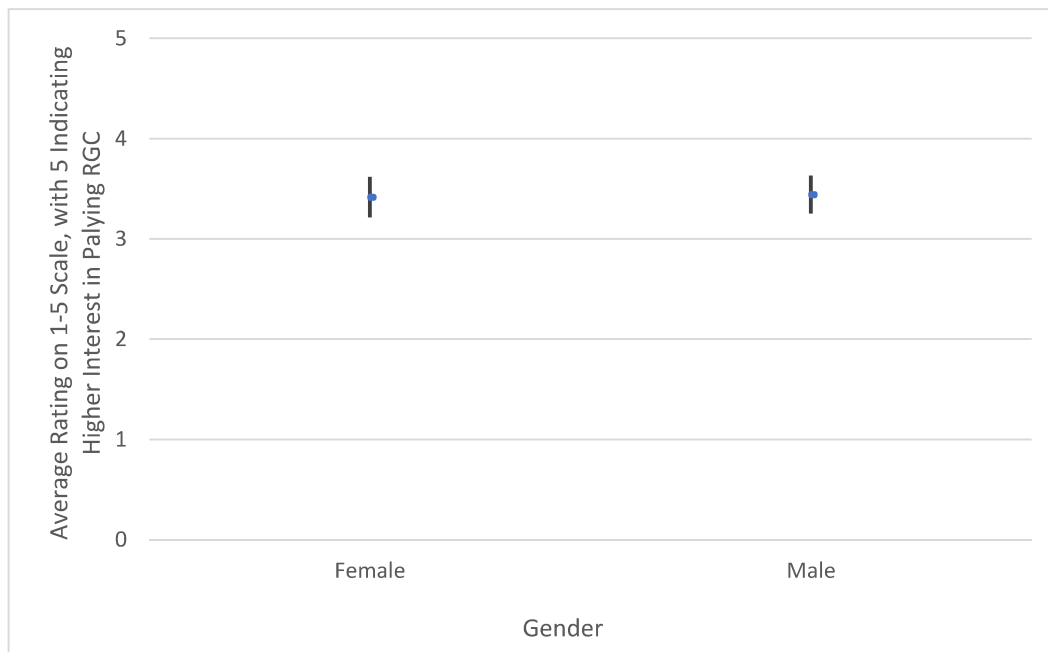
FIGURE 19
INTEREST IN PLAYING RGCS VERSUS RELATIONSHIP STATUS



P14: *Male and Female Golfers Will Be Equally Interested in Playing A Reversible Golf Course.*

As predicted in Proposition 14 male and female golfers are not different in their desires to play RGCs (TABLE 2, Question 19, ANOVA $F = .03$, n.s.). FIGURE 20 shows little difference between the means of the two genders in their interests in playing RGCs.

FIGURE 20
INTEREST IN PLAYING RGCs VERSUS GOLFER GENDER



DISCUSSION

In general, the results show that golfers are at least moderately interested in playing reversible golf courses. With the exception of when they go on golf vacations, where 58% of golfers expressed at least moderate interest in playing RGCs, golfers' level of moderate interest is at least 70% for all other golf experiences. Interestingly, 50% of golfers indicated that they were either very interested or extremely interested in playing an RGC if it was their home or primary course. This may be due to golfers getting bored playing the same course over and over, with them seeing a reversible course as more interesting and more challenging alternative.

All of the various golfing preferences and desires we investigated were significantly correlated with golfers' desires to play RGCs. The highest correlation was found for golfers who like to try new equipment ($r=.46$), followed by those who like to travel to different regions to play golf ($r=.45$), those who like to play well managed facilities ($r = .43$), and those who want to become better golfers ($r = .42$). The two lowest correlated preferences were for golfers who desire to meet new people while golfing ($r = .33$) and those who are concerned about an acceptable pace of play ($r = .31$). Our conclusion is that no matter the preferences a golfer has when playing the game, reversible golf courses are of interest.

Through the Propositions, we also found many types of golfers who are interested in playing reversible courses. Those who play more golf, score better when playing, take more golf vacations, and play public over private courses all have more desire to play reversible courses. We also found that golfers who do not currently have a home or primary course that they play most often are more interested in playing RGCs; this is a slightly different question than that discussed above, which asked if golfers desired to play an RGC as their home or primary course. In terms of golfer demographics, we also see that younger golfers are typically more interested in playing RGCs than are older golfers. This was bore out in both questions on age and working status, with retirees desiring to play RGCs less than working golfers. The data also shows that single golfers are more interested than those in relationships or who have been in relationships in playing RGCs. Lastly, we found that there is no difference between men and women as to their desires to play reversible golf courses.

While this is the first study that examines what type of golfers want to play reversible golf courses, the results point to great interest among golfers to do so. Several of the findings may be interesting to course locators, planners and designers as they look to create new courses that have less impact on the environment in terms of land use and location. Using the data contained here as a guide, course owners can also use the findings to help investigate course locations using geographical information systems and market segmentation data.

REFERENCES

- Amick, W.A. (n.d.). *The Building of a Golf Course*. Retrieved March 20, 2019, from <http://www.amickgca.com/building.htm>
- ASGCA, American Society of Golf Course Architects. (n.d.). *Site Selection and Evaluation*. Retrieved May 1, 2019, from <https://asgca.org/design/new-courses/site-selection-evaluation/>
- Berner, D. (n.d.). *What Is a Links Style Golf Course?* Retrieved March 6, 2019, from <https://golftips.golfweek.com/tailoring-game-mountain-desert-links-style-courses-20761.html>
- Budget: State of the Industry Report. (2016, January 25). *Golf Course Industry*. Retrieved January 2020, from <https://www.golfcourseindustry.com/article/budget/>
- Costa, B. (2016, March 7). Americans Want to Play Golf—Until They Try It. *The Wall Street Journal*. Retrieved January 16, 2020, from <https://www.wsj.com/articles/americans-want-to-play-golf-until-they-try-it-1457379085>
- Cupp, B., & Whitten, R. (2012). *Golf's Grand Design: The Evolution of Golf Architecture in America*. Scotts Valley, CA: CreateSpace Independent Publishing Platform.
- Deegan, J. (2019). *NGF Study Finds Golf Participation Rises for the First Time in 14 Years*. Retrieved January 15, 2020, from <https://www.golfadvisor.com/articles/golf-participation-rises-ngf>
- GolfInfoGuide.com (2012). *By The Numbers: USA Golfers and Golf Courses*. Retrieved March 19, 2019, from <https://golf-info-guide.com/golf-tips/golf-in-the-usa/by-the-numbers-usa-golfers-and-golf-courses/>
- HSBC. (2020). *State of Play 2020*. Retrieved February 2, 2020, from <https://www.hsbc.com/who-we-are/our-brand/sponsorship/golf>
- Klein, B. S. (2018). *Play it backwards: A brief history of reversible golf course design*. Retrieved on March 20, 2019, from <https://www.golfadvisor.com/articles/play-it-backwards-a-brief-history-of-reversible-golf-course-design>
- Mackin, T. (2020). *Wet, But Not So Wild. Q-NGF*. Retrieved February 21, 2020, from https://www.thengfq.com/2020/02/wet-but-not-so-wild/?utm_source=ngf&utm_medium=QC&utm_campaign=Feb20&ID=
- Matuszewski, E. (2019). Golf Participation Increases, Both On and Off the Course. *Forbes*. Retrieved January 15, 2020, from <https://www.forbes.com/sites/erikmatuszewski/2019/07/02/golf-participation-increases--both-on-and-off-the-course/#580f782f4af4>
- Miceli, A. (2018). *Backward thinking? Not at Old Course*. Retrieved March 29, 2019, from <http://www.morningread.com/features/7e2a9d98-a649-4459-9430-07a3a410a849>
- Murray A., Daines L., Archibald D., Hawkes R., Grant L., & Mutrie, N. (2016). The relationship and effects of golf on physical and mental health: a scoping review protocol. *British Journal of Sports Medicine*, 50, 647-650.
- National Golf Foundation (2019). Retrieved January 15, 2020, from <https://www.ngf.org/golf-industry-research/>
- Rothman, E. (2017). *Inside the Loop, Tom Doak's reversible 18-hole course in Northern Michigan*. Retrieved on April 30, 2019, from <https://www.golf.com/courses-travel/2017/09/20/inside-loop-tom-doaks-reversible-course-northern-michigan>
- Scott Macpherson Golf Design. (n.d.). *The Cost of Building a Golf Course*. Retrieved January 15, 2020, from <http://www.scottmacphersongolfdesign.com/media-releases-more/articles/the-cost-of-building-a-golf-course/>

Shenouda, S. (2017). *The Loop at Forest Dunes Earns Rare Best New Course Honors from Both Golf Digest and GOLF Magazine*. Retrieved March 20, 2019, from <https://www.dbusiness.com/daily-news/the-loop-at-forest-dunes-earns-new-course-honors-from-both-golf-digest-and-golf-magazine>

The Future of Golf Handicapped. (2014, December 14). The Economist. Retrieved January 16, 2020, from <https://www.economist.com/christmas-specials/2014/12/17/handicapped>

The Original Golf Blogger. (2010, July 23). *What Percentage of Golfers Shoot Under 100?* Retrieved on March 30, 2019, from https://golfblogger.com/what_percentage_of_golfers_shoot_under_100/

U.S. Bureau of Labor Statistics. (2017). Retrieved January 14, 2020, from <https://www.bls.gov/spotlight/2017/sports-and-exercise/home.htm>

APPENDIX – SURVEY QUESTIONS AND RESULTS

Q1	What activities do you participate on a yearly basis?	Basketball 76	Golf 320	Swimming 129	Cycling 106				
Q2	Approximately how many years have you been playing golf?	< 1 year 3%	1-5 years 16%	6-10 years 18%	11-15 years 14%	16-20 years 12%	20+ 36%		
Q3	What is your average score for 9 holes?	Min 30	Max 60	Avg 45	StDev 7				
Q4	During your peak golf season, on average, how many times do you play per month?	0 to 1 16%	2 to 5 46%	6 to 10 24%	11 to 15 8%	16 to 20 4%	21 or more 1%		
Q5	What is the approximate population of the town you live in?	< 50,000 31%	50,000 - 99,999 17%	100,000 - 199,999 14%	200,000 - 299,999 9%	300,000 - 399,999 7%	400,000 - 499,999 3%	500,000+ 20%	
Q6	How many golf courses are within 25-30 mile radius from your home?	0 1%	1 to 3 22%	4 to 6 24%	7 to 9 22%	10 to 12 9%	More than 12 23%		
Q7	How many golf courses are within a reasonable distance for a day trip to play golf?	0 0%	1 to 3 21%	4 to 6 18%	7 to 9 15%	10 to 12 11%	More than 12 35%		
Q8	Do you have a home/primary course that you play most often?	Yes 74%	No 26%						
Q9	Are you a member of a golf club?	Yes 33%	No 68%						
Q10	Do you primarily play public or private courses?	Public 83%	Private 17%						
Q11	Do you take golf vacations? If so, on average, how many do you take per year?	None 43%	< One per year 29%	One per year 17%	> One per year 11%				
Q12	Which aspect(s) of golf are important to you?	Extremely (5)	Very (4)	Moderately (3)	Slightly (2)	Not at all (1)	Average		
Q12-1	Meeting new people	12%	17%	29%	25%	17%	2.8		
Q12-2	Trying new golf equipment	14%	21%	33%	20%	13%	3.0		
Q12-3	Traveling to different regions to play golf	17%	18%	27%	21%	18%	3.0		
Q12-4	Playing different courses	19%	30%	34%	12%	5%	3.5		
Q12-5	Acceptable pace of play	22%	47%	24%	5%	2%	3.6		
Q12-6	Becoming a better golfer	27%	29%	29%	12%	3%	3.8		
Q12-7	Playing well managed golf facilities	30%	43%	20%	5%	1%	4.0		
Q12-8	Playing well maintained golf courses	33%	41%	20%	6%	1%	4.0		
Q12-9	Play golf with my friends	43%	32%	17%	5%	2%	4.1		
Q13	Please rate your interest in playing a 'reversible golf course design'?	Extremely (5)	Very (4)	Moderately (3)	Slightly (2)	Not at all (1)	Average		
Q13-1	In the next 1-2 years, taking a golf vacation	15%	15%	28%	22%	20%	2.8		
Q13-2	Short golf vacation	20%	25%	25%	15%	14%	3.2		
Q13-3	Within 25-30 miles from your home	22%	26%	28%	14%	9%	3.4		
Q13-4	As your home/primary golf course	25%	25%	26%	15%	10%	3.4		
Q14	What is your current age?	<= 20 years 1%	21-30 years 15%	31-40 years 22%	41-50 years 9%	51-60 years 28%	61-70 years 25%	71+ years 0%	
Q15	What is the highest level of education you have completed?	Some high school 0%	High School graduate 9%	Completed some college 18%	Associate Degree 11%	Bachelor Degree 39%	Master Degree 15%	Professional Degree 3%	Doctorate Degree 3%
Q16	Which state do you currently live? Top Five	California 11%	Florida 9%	Texas 9%	Ohio 6%	New York 5%			
Q17	What is your total annual household income before taxes (000)?	< \$25 6%	\$25-\$49 18%	\$50-\$74 19%	\$75-\$99 22%	\$100-\$124 12%	\$125-\$149 11%	\$150+ 12%	
Q18	How many hours do you work per week?	Unemployed 6%	Retired 27%	20 hours or less 3%	21-30 hours 6%	31-40 hours 28%	41-50 hours 22%	51 hours or more 7%	Other 1%
Q19	What is your gender?	Male 56%	Female 44%	Self-describe 0%	Prefer not to say 1%				
Q20	Marital Status	Married / Dom. Partnership 75%	Single 17%	Divorced / Separated 7%	Widowed 2%				
Q21	What is your Race/Ethnicity?	African American 2%	Asian 4%	Hispanic 4%	Native American 1%	Pacific Islander 0%	White / Caucasian 89%	Other 1%	