The Relationships Among Skill Level, Age, and Golfers’ Observational Learning Use

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The purpose of this study was to examine the influence of skill level and age on golfers’ ($n = 188$) use of observational learning for skill, strategy, and performance functions, as assessed by the Functions of Observational Learning Questionnaire. Golf handicap was used as an objective measure of golf skill level, with a lower handicap reflecting a higher skill level. It was hypothesized that both age and skill level would predict observational learning use, with younger and less experienced golfers reporting increased use of all three functions of observational learning. It was also predicted that age and skill level would interact to predict use of the performance function, with younger golfers employing more of that function than older golfers at the same skill level. Partial support was obtained for these hypotheses. Regression analyses revealed that the interaction of age and skill level predicted use of the skill function. Younger golfers employed more of the skill function than older golfers; however this discrepancy increased as skill level decreased. Age, and not skill level, was a significant predictor of golfers’ use of both the strategy and performance functions, with younger golfers employing more of these functions than older golfers. These results suggest that age-related factors may have a greater impact than skill-related factors on observational learning use across the lifespan.

Observational learning, alternatively termed modeling, refers to the process of learning a desired or target behavior by watching a demonstration of that behavior (Bandura, 1986). In fact, Bandura has suggested that the majority of human behavior is acquired through observation. Not surprisingly, demonstration is an integral part of common teaching methods employed in physical education settings (Graham, Holt-Hale, & Parker, 2001; Rink, 1998).

To date, observational learning studies conducted within sport psychology and motor learning have focused mainly on demonstrating that it is an effective method for facilitating the learning and performance of motor skills (for reviews see Horn & Williams, 2004; McCullagh & Weiss, 2001). A meta-analysis (Ash-
ford, Bennett, & Davids, 2006) examining the effects of observational learning on various motor skill performance measures found that observational learning interventions had a small effect on movement outcome (i.e., measures such as speed or accuracy that are directly associated with the goal of the task) in general, with moderate effects when the experimental task involved a serial (e.g., multipart motor sequence, such as a dive forward mount onto a balance beam) or continuous (e.g., balancing on a stabilometer) skill and small effects when the task was a discrete skill (e.g., golf chip shot). Observational learning interventions also had a large effect on movement dynamics (i.e., form or quality of skill performance), with large effects for serial and continuous tasks and moderate effects for discrete tasks. The findings of a subsequent meta-analysis (Ashford, Davids, & Bennett, 2007) suggest that these effects may vary according to age; with the effect of observational learning on movement outcome being larger in children than in adult populations, and the effect on movement dynamics being larger in adult than children populations.

In addition to producing physical performance benefits, observational learning has also produced improvements in psychological variables for gross motor tasks (McCullagh & Weiss, 2001). For example, when compared with control conditions, observational learning groups have shown increased self-efficacy and decreased anxiety toward performing specific sport skills (Weiss, McCullagh, Smith, & Berlant, 1998) as well as increased self-satisfaction (Clark & Ste-Marie, 2007). This suggests that observational learning can be used as a psychological skill, similar to imagery and self-talk, as well as an instructional tool.

The Functions of Observational Learning

Recently, several researchers (Cumming, Clark, Ste-Marie, McCullagh, & Hall, 2005; Hars & Calmels, 2007) have advocated that observational learning studies should be conducted to explore how observational learning is employed by sport participants in naturalistic environments in addition to the traditional laboratory-based intervention studies typically conducted. It is also important to understand whether observational learning is used in sport environments, and the extent to which this occurs. Field studies are commonly conducted with other psychological skills that have demonstrated similar performance and psychological benefits to observational learning, such as imagery (for a review see Hall, 2001). Despite the fact that learners report employing observational learning as a strategy for acquiring skills in physical education settings (Kermarrec, Todorovich, & Fleming, 2004), and that coaches contend that modeling is frequently employed to improve athlete performance and enhance self-efficacy (Gould, Hodge, Peterson, & Giannini, 1989), little else is known about its use in naturalistic sport environments. Clearly, greater understanding of how individuals employ observational learning in everyday sport environments, as well as the influence of potential moderating factors, is required before effective recommendations for physical educators and coaches can be created regarding the use of observational learning in practical teaching and coaching environments.

To partially address this issue, Cumming et al. (2005) conducted a series of studies to develop and validate the Functions of Observational Learning Questionnaire.
The FOLQ was designed to measure the frequency with which athletes report employing observational learning for three distinct functions: to learn and execute skills (i.e., the skill function), to learn and execute game plans and routines (i.e., the strategy function), and to reach optimal arousal levels, maintain focus, and remain mentally tough (i.e., the performance function). Through factor analytic techniques with several heterogeneous samples of university-aged athletes (i.e., from various team and individual sports and ranging from recreational level to international level athletes), the three factor structure of the FOLQ was established and confirmed. The internal consistencies of the subscales, temporal stability, and concurrent validity of the questionnaire were also demonstrated to be acceptable.

**Factors Affecting Observational Learning Use**

Cumming et al. (2005), as well as subsequent researchers (Hall, Munroe-Chandler, Cumming, Law, Ramsey, & Murphy, in press; Wesch, Law, & Hall, 2007), have used the FOLQ to examine athletes’ general observational learning use as well as differences according to gender, sport type, and competitive level. For all of these investigations, the samples contained university-aged athletes from a range of sports and competitive levels. Results from these studies suggest that overall athletes do use observational learning to a moderate degree, with the frequencies reported for use of each of the functions varying from values that suggest relatively infrequent use (e.g., 2–3 on a 7-point scale where 1 = never to 7 = very often) to those that suggest observational learning is used often for that function (e.g., 4–5 on the same scale). Athletes generally reported employing the skill function most frequently, followed by the strategy and performance functions respectively (Cumming et al., 2005; Hall et al., in press; Wesch et al. 2007). Further, athletes reported employing all three functions more often in practice than competition settings (Hall et al., in press). With respect to gender, both Cumming et al. (n = 200; 77 males, 123 females) and Hall et al. (n = 345; 152 males, 193 females) found no differences in males’ and females’ use of the functions of observational learning. However, Wesch et al. (n = 642; 377 males, 265 females) found that males employed significantly more of the performance function than females. Their result should be interpreted with caution, as the effect size was very small and could be an artifact of the large sample size, but suggests that further examination of this issue may be warranted.

Sport type differences were also evident in athletes’ observational learning use. Comparing athletes in team versus individual sports, Wesch et al. (2007) found that individual sport athletes reported greater use of the skill function than team sport athletes, whereas team sport athletes employed more of the strategy function. Hall et al. (in press) confirmed this finding specific to sport setting, with team sport athletes reporting greater use of the strategy function than individual sport athletes in both practice and competition. Employing an interactive versus independent sport classification system (i.e., sports where performance is dependent upon interacting with an opponent, such as tennis, versus sports where skills are performed independently of the opponent, such as gymnastics), Cumming et al. (2005) found that independent sport athletes employed more of the skill and performance functions than athletes in interactive sports.
In terms of competitive level, there were no differences in athletes’ use of observational learning in the Cumming et al. (2005) or Hall et al. (in press) studies. However, Wesch et al. (2007) found that university-aged varsity athletes employed all three functions significantly more often than university-aged recreational level athletes. This inconsistency highlights one of the problems with employing competitive level as a proxy measure for athletes’ skill level or sport expertise. In questionnaire-based studies examining psychological skill use, athletes are typically asked to self-report their competitive level according to a hierarchy of recreational, provincial/state, varsity, national, or international level, and differences in psychological skill use are then discussed in terms of these categories, or some combination of categories (e.g., elite vs. nonelite). There may be discrepancies among athletes within a single category according to age and years of sport experience, both of which are typically considered by researchers. More importantly however, there may be large discrepancies in athletes’ actual skill level within a single category (Gregg & Hall, 2006). For example, a nonstarter on a Division III NCAA basketball team may have a significantly lower skill level than a starter on a Division I championship winning team. Further, these athletes may also exhibit differences in their psychological skill use. However the relationship between skill level and psychological skill use would be clouded by grouping them within the same category as “varsity level” athletes. It is important to characterize athletes according to their actual skill level, as the learner’s skill level is one of the factors that has been purported to influence both the use and the effect of observational learning on performance (Bandura, 1986; McCullagh & Weiss, 2001; Wesch et al., 2007).

**Observational Learning and Skill Level Influences**

Observational learning interventions to enhance skill acquisition and performance have typically targeted beginner (e.g., Kitsantas, Zimmerman, & Cleary, 2000; McAuley, 1985; Starek & McCullagh, 1999) or intermediate level athletes (e.g., Ram & McCullagh, 2003; Van Wieringen, Emmen, Bootsma, Hoogesteger, & Whiting, 1989; Winfrey & Weeks, 1993). Targeting sport novices makes intuitive sense as research has suggested that receiving task instructions and demonstrations may be most beneficial and that intervention effects may be most evident early in the skill acquisition process (Bandura, 1986; Schmidt 1975). However, it is possible that athletes of all skill levels, even experts, may benefit from employing not only the skill function of observational learning, but the strategy and performance functions as well.

According to Ericsson, Krampe, and Tesch-Römer’s (1993) theory of expert performance, the defining factor in the development of expertise in a given domain is the accumulation of 10 years, or approximately 10,000 hours of deliberate practice. Deliberate practice involves participation in structured activities designed to help skill improvement. Within Ericsson et al.’s theory, these deliberate practice activities must be relevant, require effort, and are not inherently enjoyable. However, within the sport domain, research has demonstrated that deliberate practice activities may be perceived as enjoyable by athletes (Starkes, 2000). Research conducted on sport expertise has found that experts employ more
complex learning strategies than less experienced performers, such as utilizing musical cues in dance and mnemonic devices (Poon & Rodgers, 2000; Starkes, Deakin, Lindley, & Crisp, 1987). It has also been proposed that experts may learn more effectively from a demonstration than novices (Ferrari, 1996; McCullagh & Weiss, 2001). A superior ability to learn from a demonstration may be due to experts’ greater domain-specific knowledge which would enable them to more effectively identify relevant aspects of a demonstration (Abernathy & Russell, 1987; Allard & Starkes, 1980) and apply it to their own performance.

Although it is likely that athletes of all skill levels use observational learning, we currently lack a clear understanding of the relationship between skill level and the use of observational learning. To investigate this relationship, an objective, rather than subjective (self-report) measure of athletes’ skill level is desirable. Golf is one sport where this type of measure is possible to obtain. A golfer’s skill level is indicated by his/her handicap, which reflects the player’s potential ability and is calculated based on his/her scores for a given number of rounds and takes into consideration the difficulty of the course on which those scores were obtained (Royal Canadian Golf Association; RCGA, 2006). Handicaps are commonly used to classify golfers into skill categories at tournaments. Further, previous research has suggested that athletes in independent sports, such as golf, may employ more observational learning than athletes in interactive sports (Cumming et al., 2005).

Observational Learning and Age Influences

An additional factor that tends to be confounded with both skill level and sport type is age. The age for peak sport performance varies according to sport type, with elite tennis players reaching their peak around 24 years of age, and elite baseball players and long distance runners reaching their peak around 28 years of age (Shulz & Curnow, 1988). In contrast, most elite gymnasts retire from competition by late adolescence (Kerr & Dacyshyn, 2000). Therefore, it is difficult to independently examine the effects of age and skill level on physical or psychological performance variables.

Within the observational learning literature, researchers have not yet explored how the use of the functions of observational learning may vary according to athletes’ age. However, research on the relationship between golfers’ age, skill level and use of another psychological skill, imagery (Gregg & Hall, 2006), demonstrated that age and skill level interacted to predict the use of imagery to remain mentally tough and confident (i.e., motivation general-mastery imagery), which is similar to the performance function of observational learning.

One of the challenges of examining the use of observational learning, and other psychological skills, across the lifespan is that patterns of physical activity change with age. As people age, their leisure activity participation has been shown to shift from team sports to outdoor pursuits, such as lawn bowling and golf (Iso-Ahola, Jackson, & Dunn, 1994). In addition, their motives for leisure time activity have also been shown to change with age, with the emphasis shifting from competitive sport to health, fitness and social motives (Kolt, Driver, & Giles, 2004). However, golf is a sport that can be learned at any point in the lifespan and can encourage social interaction and physical activity among adults, regardless of
whether their motives are to learn a new skill or for health and social reasons. Further, research suggests that psychological skill use can aid sport skill learning among older adults, not just among younger adults (Steinberg & Glass, 2001). Despite the possible physical performance and psychological benefits of encouraging psychological skills, there is very little information on how these skills are employed in sport across the lifespan.

**Purpose**

Therefore, the purpose of this study was to examine the relationships among golfers’ skill level, age, and their use of the three functions of observational learning. The current study was based on the methodology of Gregg and Hall (2006), with the major difference being that the current study examined the relationships among age, skill level, and use of observational learning, rather than imagery. Various researchers have suggested that imagery and observational learning share similar cognitive processes and psychological and performance outcomes (Bandura, 1986; Feltz & Landers, 1983; McCullagh & Weiss, 2001). As such, we would expect that age and skill level may exert similar influences on the use of both observational learning and imagery in golfers. Based on the research of Wesch et al. (2007), we hypothesized that skill level would predict observational learning use, with highly skilled golfers employing more of the functions of observational learning than less skilled golfers. More skilled golfers may have had greater exposure to and may be better able to use learning strategies such as observational learning and may therefore use it more frequently to maintain or enhance performance. Based on the findings of Gregg and Hall (2006) for golfer’s use of imagery, we hypothesized that age and skill level would interact to predict golfers’ use of the performance function. In other words, more skilled golfers would use more of the performance function than less skilled golfers but the decline in use of the performance function would be different for older versus younger golfers, with older golfers reporting much less use of the performance function than younger golfers of the same skill level. For the younger golfers, they may have greater knowledge and interest in psychological skill use to enhance their ‘mental game’ (e.g., control arousal, be mentally tough when playing) regardless of their current skill level. Whereas for the older golfers, it may be that only the more highly skilled are concerned with regulating their mindset for performance and have been exposed to psychological skill use.

**Methods**

**Participants**

Participants were 188 golfers (male = 148, female = 40) from 84 different golf clubs in Ontario, Canada. Inclusion criteria for the study were that golfers currently belonged to a specific golf club and knew their current handicap, as calculated by their home club. Golfers ranged in age from 16 to 78 years ($M = 40.29$, $SD = 17.44$), with 1 to 60 years of golf experience ($M = 19.23$, $SD = 13.48$), and had handicaps ranging from 0 to 41 ($M = 13.06$, $SD = 8.81$). Lower handicaps
reflect higher skill levels, with professional golfers being approximately 5 shots better than a handicap of 0. For amateur golfers, the average handicap for a male is approximately 17, whereas the average handicap for a female is approximately 25 (M. MacKay, RCGA, personal communication, May 20, 2008).

Materials

Demographic Information. Participants completed a general information questionnaire asking them to self-report their current age and gender.

Golf Skill. Participants were asked to self-report their years of golf experience, the golf club where they were currently a member, and their current handicap. Golf club membership was included to ensure that participants were regular golfers and had a known handicap. Handicap was used as a measure of skill level, with lower handicaps reflecting higher skill levels. Golf handicaps reflect a player’s potential ability and are calculated for members by the golf club according to a standard formula (RCGA, 2006). This formula takes into consideration the player’s scores for the most recent rounds played (ideally scores from 10 to 20 rounds should be included), and is adjusted according to the difficulty of the courses played, as determined by the RCGA. Therefore, handicap can be considered a standardized score that can be used to compare players, across different golf clubs. Handicaps are used to group golfers according to skill level for tournaments. Handicaps are also public knowledge, and as such, we did not verify individual’s self-reported handicaps.

Functions of Observational Learning Questionnaire (FOLQ). The FOLQ (Cumming et al., 2005) is a 17-item questionnaire that asks participants to self-report the frequency with which they employ observational learning with respect to three functions. Participants are provided with a general definition of observational learning and are then asked to use a 7-point scale (1 = never to 7 = very often) to indicate how frequently they use observational learning for specific functions. The three functions measured by the FOLQ are: skill (6 items; e.g., I use OL to change how I perform a golf skill), strategy (5 items; e.g., I use OL to determine how a strategy will work in a golf game), and performance (6 items; e.g., I use OL to know how to respond to the excitement associated with playing a golf game). The questionnaire was modified to be golf-specific by instructing participants to respond based on their observational learning use when playing golf, including golf-related examples of each of the functions in the instructions (e.g., playing to avoid a hazard as an example of the strategy function), and by making the individual items specific to golf (e.g., by changing items such as I use OL to fine-tune my skills to I use OL to fine-tune my golf skills). Internal consistencies were acceptable for all three subscales (α skill = .92, α strategy = .89, α performance = .90).

Procedure

Ethics approval was obtained from the appropriate institutional ethics review board. The researchers or their assistants approached individuals at various golf clubs or in other areas that were familiar to the participants (e.g., at work, in the community, etc.), explained the study to them, and gave them the letter of infor-
mation and questionnaire package. Individuals who consented to participate in the study completed the questionnaire package and then returned it directly to the researcher. Completion of the questionnaires took approximately 10 min.

Results

Descriptive Statistics and Frequencies

Descriptive statistics were calculated for age, skill level, years of golf experience, and use of the three functions of observational learning (Table 1). An overall examination of the means would suggest that observational learning is used occasionally by these golfers (i.e., 3–5 on a 7-point scale). They reported using observational learning for the performance and strategy functions relatively infrequently, but employed the skill function moderately frequently. A repeated-measures ANOVA, using the Greenhouse-Geisser correction for sphericity, with Tukey post hoc tests revealed that golfers reported significantly different frequencies for their use of the three functions of observational learning, $F(1.87, 350.05) = 172.33, p < .0001, \eta^2 = .921$. Golfers employed the skill function most frequently, followed by the strategy function, and then the performance function.

To illustrate the distribution of golfers across the lifespan and range of handicaps, golfers were grouped into various categories (Table 2). While the variables were maintained as continuous variables in the regression analyses, categories were necessary to provide a clear description of the sample across handicaps and ages. Age categories were based on life cycle groupings employed by the Canadian government for research purposes, representing youth (15–24 years), adults (25–64 years), and seniors (65+ years; Statistics Canada, 2006). Due to the large number of adults in the current sample, golfers were subdivided into younger adults (24–44 years) and middle-aged adults (45–64 years). This classification is also consistent with that used in lifespan research (Levinson, 1978). Handicap

Table 1  Means, Standard Deviations, and Correlations for Golfers’ Age, Handicap, and Use of the Functions of Observational Learning

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predictors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Age</td>
<td>40.29</td>
<td>17.44</td>
<td></td>
<td>.63**</td>
<td>.24**</td>
<td>.27**</td>
<td>.20**</td>
</tr>
<tr>
<td>2. Handicap</td>
<td>13.06</td>
<td>8.81</td>
<td></td>
<td></td>
<td>.65**</td>
<td>.49**</td>
<td></td>
</tr>
<tr>
<td>Functions of OL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Skill</td>
<td>4.80**</td>
<td>1.45</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Strategy</td>
<td>3.90**</td>
<td>1.48</td>
<td></td>
<td></td>
<td>.67**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Performance</td>
<td>3.07**</td>
<td>1.37</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* $p < .05$. ** $p < .01$.

Note. Units of measurement for each variable are as follows: age = years; handicap = standardized score; skill, strategy, and performance = self-reported rating on a 1 (never) to 7 (very often) scale.
groupings were based on standard classes used to group golfers of similar skill levels at tournaments (M. MacKay, RCGA, personal communication, June 28, 2007).

**Preliminary Analyses**

Based on the high ratio of male to female golfers in the sample and the limited research on gender differences in observational learning use (Cumming et al., 2005; Wesch et al., 2007), a preliminary analysis was conducted to determine whether the data could be collapsed across gender for the variables of interest. An independent samples *t* test showed that there were no significant differences in the mean age of males and females within the sample, *t*(186) = −1.41, *p* > .05. An additional independent samples *t* test revealed that males (M = 11.08, SD = 7.51) had significantly lower handicaps than females (M = 20.39, SD = 9.45), *t* (186) = −6.56, *p* < .0001. Therefore, a MANOVA was conducted to examine whether gender was also related to use of the three functions of observational learning and could confound the main analysis. Only golfers with handicaps of 16 or higher were included as the number of males and females was approximately even at this skill level (males = 35, females = 24; recall that there were only 40 females in the study). There were no differences in self-reported use of the functions of observational learning according to gender, Pillai’s Trace = .025, *F*(3, 55) = .471, *p* = .704, η² = .025. Therefore, the data were collapsed across genders and the entire data set (n = 188) was used in further analyses.

To examine the relationship among age, skill level, and observational learning use, bivariate correlations were calculated (Table 1). Age was positively related to handicap, such that older golfers tended to report lower skill levels (recall that higher handicaps reflect lower skill levels). Both age and handicap were negatively related to use of the three functions of observational learning. Older golfers and less skilled golfers reported decreased frequency of observational learning use compared with younger golfers and more skilled golfers. All three functions of observational learning were positively related. Golfers who reported high frequency of one function also reported high frequency use of the other two functions.
Hierarchical Multiple Regression Analyses

To examine whether skill level, age, or the interaction of the two would predict observational learning use, a series of three hierarchical regressions were performed. Recall that it was hypothesized that skill level, as measured by handicap, would negatively predict observational learning use (i.e., golfers with higher handicaps would use less observational learning) and that the interaction of age and skill level would predict use of the performance function of observational learning. Based on previous research demonstrating that skill level was the strongest positive predictor of other psychological skill use among golfers (i.e., imagery use; Gregg & Hall, 2006), and research showing that higher competitive levels may be related to increased observational learning use (Wesch et al., 2007), skill level was entered on the first step, followed by age on the second step, and the interaction term on the third step. The interaction term was calculated and entered according to guidelines for testing moderators (Baron & Kenny, 1986). Variables were entered in this order to ensure that the regressions were conducted according to demonstrated empirical and theoretical relationships between the variables (Bandura, 1986; McCullagh & Weiss, 2001) rather than driven by the current data set (Pedhazur, 1982). To prevent any problems with multicollinearity, the predictor variables were centered for the analyses (Tabachnick & Fidell, 2007).

Age emerged as a significant predictor of all three functions of observational learning (Table 3). With increased age, golfers reported decreased frequency of use for the skill, strategy, and performance functions of observational learning. For the strategy and performance functions, skill level was a significant predictor only when entered as the sole predictor in the equation (i.e., step 1). With the addition of age on step two, skill level became a nonsignificant predictor, indicating that age explained more of the variance in strategy and performance observational learning.

Table 3  Hierarchical Regression Analyses Summary for Centered Handicap and Age as Predictors of Observational Learning Use

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Step &amp; Predictor Variable</th>
<th>B</th>
<th>SE</th>
<th>β</th>
<th>R²</th>
<th>ΔR²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill OL</td>
<td>1. Handicap</td>
<td>−0.03</td>
<td>0.01</td>
<td>−.20**</td>
<td>.04**</td>
<td>.04</td>
</tr>
<tr>
<td></td>
<td>2. Age</td>
<td>−0.02</td>
<td>0.01</td>
<td>−.20**</td>
<td>.07**</td>
<td>.03</td>
</tr>
<tr>
<td></td>
<td>3. Handicap × Age</td>
<td>−0.00</td>
<td>0.00</td>
<td>−.18**</td>
<td>.11**</td>
<td>.03</td>
</tr>
<tr>
<td>Strategy OL</td>
<td>1. Handicap</td>
<td>−0.03</td>
<td>0.01</td>
<td>−.20**</td>
<td>.04**</td>
<td>.04</td>
</tr>
<tr>
<td></td>
<td>2. Age</td>
<td>−0.02</td>
<td>0.01</td>
<td>−.24**</td>
<td>.09**</td>
<td>.05</td>
</tr>
<tr>
<td></td>
<td>3. Handicap × Age</td>
<td>0.00</td>
<td>0.00</td>
<td>−.04</td>
<td>.09**</td>
<td>.00</td>
</tr>
<tr>
<td>Performance OL</td>
<td>1. Handicap</td>
<td>−0.03</td>
<td>0.01</td>
<td>−.18*</td>
<td>.03*</td>
<td>.03</td>
</tr>
<tr>
<td></td>
<td>2. Age</td>
<td>−0.01</td>
<td>0.01</td>
<td>−.15*</td>
<td>.05**</td>
<td>.02</td>
</tr>
<tr>
<td></td>
<td>3. Handicap × Age</td>
<td>0.00</td>
<td>0.00</td>
<td>−.02</td>
<td>.05*</td>
<td>.00</td>
</tr>
</tbody>
</table>

* p < .05. ** p < .01.
learning use than skill level. However, the interaction of age and skill level was a significant contributor to the prediction of the skill function.

To further examine this interaction for the skill function graphically, golfers were categorized into “older” and “younger” groups. Older golfers ($n = 35$) were those that were one standard deviation or more above the mean age of the total sample, while younger golfers ($n = 62$) were those that were one standard deviation or more below the mean age of the total sample (Cohen & Cohen, 1983). The graph of this interaction (Figure 1) illustrates that younger golfers at all skill levels employed more of the skill function than older golfers, and that this discrepancy increased with age, regardless of skill level. That is, older golfers used much less of the skill function than younger golfers with the same handicap, particularly at higher handicaps (i.e., lower skill levels). The one exception to this trend was that older golfers with very low handicaps (i.e., 0–5) appeared to use more of the skill function than younger golfers with the same handicaps. However, this exception is based on the data of only one older golfer with a handicap in the 0–5 range, and therefore must be interpreted with caution.

**Figure 1** — The interaction of age (younger vs. older golfers) and handicap as predictors of use of the skill function of observational learning (OL).
Discussion

The purpose of the current study was to examine the relationships among golfers’ skill level, age, and their use of the three functions of observational learning. Consistent with research on other groups of athletes (Cumming et al., 2005; Hall et al., in press; Wesch et al., 2007), golfers reported employing all three functions of observational learning, with the skill function being used most frequently, followed by the strategy function, and then the performance function. This suggests that golfers are watching others mainly to improve their golf skills, as opposed to learn or improve strategies, or for performance-related functions, such as learning how to regulate arousal levels and remain mentally tough. The mean for each of these functions was comparable to those found in previous studies employing the FOLQ (Cumming et al., 2005; Hall et al., in press; Wesch et al., 2007), suggesting that, overall, athletes use observational learning with moderate frequency. Consistent with our hypotheses, both age and skill level were related to observational learning use, with younger golfers and more skilled golfers generally employing more of all three functions than older and less skilled golfers. These findings are consistent with Gregg and Hall’s (2006) finding that both age and skill level were correlated with use of the cognitive functions of imagery. The skill-related finding is also consistent with Wesch et al.’s (2007) finding that varsity level athletes employed more of all three functions of observational learning than recreational level athletes.

Contrary to our predictions, the interaction of age and skill level was a significant predictor of golfers’ use of the skill function of observational learning rather than the performance function. Younger golfers appear to employ more of the skill function than older golfers regardless of handicap. This suggests that younger golfers are observing others to learn and improve specific aspects of their golf game, such as chipping or putting technique, to a greater degree than older golfers. However, the difference in use of the skill function is much larger between older and younger golfers at lower skill levels (i.e., higher handicaps) when compared with the difference between older and younger golfers’ use of the skill function at higher skill levels (i.e., lower handicaps). Perhaps older golfers, particularly those with low skill levels, have less desire to improve than younger golfers at that same skill level and, as a result, are less likely to engage in observational learning to acquire new skills or to improve their current skill level. This suggestion is supported by research suggesting that older adults engage in physical activities primarily to obtain health benefits, enjoyment, and social interaction rather than for challenge and personal fulfillment, such as learning new skills (e.g., Kirkby, Kolt, Habel, & Adams, 1999; Kolt et al., 2004). Older golfers with high skill levels may still be employing observational learning to make small improvements or maintain their current skill level so that they can prolong their ability to compete with other golfers at their current level. Older golfers may also be lacking models that they perceive as similar in age or ability, and may therefore be less likely to use observational learning as a means for improving or maintaining their golf performance. Instead, older golfers may employ other strategies for maintaining their golf skills.

Also contrary to our predictions, age, rather than skill level, emerged as the strongest predictor of golfers’ use of both the strategy and performance functions
of observational learning. In fact, when age was included in the model, skill level was no longer a significant predictor of observational learning use. This finding is also contrary to Gregg and Hall’s (2006) finding that skill level, rather than age, was the strongest predictor of golfers’ imagery use. While both imagery and observational learning can be considered psychological skills and have similar physical and psychological performance benefits (Cumming et al., 2005; McCullagh & Weiss, 2001), imagery has been widely recognized in the sport psychology literature while observational learning has received very little attention (McCullagh & Weiss, 2002). Therefore, one reason for these conflicting findings may be that golfers at higher skill levels who have been exposed to psychological skills training may have received information and training on imagery use but not on how they can apply observational learning for various functions. Because observational learning can be used for skill learning and enhancement, as well as to increase psychological variables such as self-efficacy (McCullagh & Weiss, 2001), perhaps more information and recommendations on incorporating observational learning use into athlete training programs should be provided to sport psychologists, coaches, and other motor skill instructors.

Studies comparing the effects of imagery and observational learning on sport skill performance have found that novices receiving observational learning or a combination of imagery and observational learning tend to perform better than groups receiving only imagery or a control condition (Ram, Riggs, Skaling, Landers, & McCullagh, 2007; SooHoo, Takemoto, & McCullagh, 2004). Further, when asked what their preferred learning strategy was, more novices indicated observational learning than imagery (SooHoo et al., 2004). These results suggest that for new or unfamiliar sport situations, providing a demonstration upon which athletes can base their imagery may be beneficial for their performance. Watching video of themselves, or of another athlete, in challenging situations such as when performing a new and difficult skill, or competing at an unfamiliar venue could be used to help the athletes create more realistic images of that situation.

For all three functions, it appears that age plays the strongest role in predicting golfers’ use of observational learning. Regardless of handicap, it appears that younger golfers employ more of all three functions of observational learning than older golfers. This pattern of results could be partly due to generational influences. Golfers in their 20s and 30s belong to age cohorts commonly referred to as the younger portion of Generation X and all of Generation Y. While various definitions have been used for these cohorts, Generation X commonly includes those born between 1964 and 1979, while Generation Y includes those born between 1977 and 1994 (Wolburg & Pokrywczynski, 2001). A subgroup of these individuals, born between 1977 and 1997 have been termed the Net-Generation due to their increased exposure to and use of visual media, such as television, internet, video and computer games, and virtual reality technologies, from an early age (Leung, 2004). This emphasis on visual means of learning and interacting may make them more comfortable with applying techniques such as video feedback, or various forms of observational learning to their own sport performance. Similarly, they may also be more likely to engage in observational learning for strategy and performance functions, not just for simply learning or improving skills.

A second generational influence may be the increased exposure to psychological skills training by younger golfers when compared with their older counter-
parts. With the development of comprehensive national coach training programs, such as the National Coaching Certification Program (NCCP) in Canada (Coaching Association of Canada, 2005), younger athletes are more likely to be exposed to psychological skills training and use of video technology at a much earlier point in their sport experience than individuals who made up the older golfer sample. It may be that older golfers simply are not aware of the various functions that observational learning can serve and may not consider observational learning an effective strategy for improving or maintain their performance and psychological states. Older athletes may also employ observational learning for functions other than those identified in research with younger athletes. Further research is needed to test these potential influences and to identify other age-related factors (e.g., motives for participation and availability of models) that may influence observational learning use.

Considering that golf is a sport that can be learned and enjoyed throughout the lifespan and that it provides social and fitness opportunities for older adults, observational learning interventions may benefit older golfers as well as with golfers with higher handicaps. Educating instructors and golfers about the various functions of observational learning may encourage golfers to observe different models based on their motives and goals for participating. For example, psychological skill training programs have been shown to be effective for helping older adults to learn sport skills, such as golf putting (Steinberg & Glass, 2001). However, observing other older golfers experiencing health and social benefits or continuing to play at a high level may also help older adults stay motivated, maintain or improve their current skill level, and increase their self-efficacy for their ability to continue participating in physical activity.

While the current study provides preliminary information on the influence of age and skill level on observational learning use in golf, future studies are needed to determine whether these factors are related to observational learning use in other sports, particularly more interactive and team-based sports. As master’s level competitive sport has gained popularity in recent years (Dionigi, 2006), it provides an opportunity to examine these influences in competitive sport, and creates a new group of athletes that may benefit from psychological skills training. It would also be of interest to examine whether specific model types (i.e., teacher versus peer) are preferred based on the function of observational learning being used, why athletes do or do not employ observational learning, as well as how age and skill level influence use of other psychological skills, such as self-talk and arousal regulation skills.

In summary, the current findings suggest that age-related factors may have the strongest influence on observational learning use among golfers. However, additional information is also needed on how use of the functions of observational learning is related to different performance and psychological outcomes, such as self-efficacy and anxiety, and whether these relationships are moderated by age and skill related factors as well. Future research should also examine whether older athletes employ observational learning for functions not yet identified by younger athletes. Based on our current findings, it appears that observational learning interventions should educate golfers about the various functions observational learning may serve and should encourage golfers to employ the functions that best suit their desired goals for golf participation.
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References


