

# Age, Psychological Skills, and Golf Performance: A Prospective Investigation

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This study explored the influence of age in understanding mental skills utilization in the context of performance at a major national golf competition. Participants, who ranged in age and in skill level, included 1,150 male and 170 female amateur golfers competing in the Dupont World Amateur Golf Championship in Myrtle Beach, South Carolina. Measures targeted general mental skills used in competitions, golf-specific skills, and competitive trait anxiety. Hierarchical linear regression was utilized to explore the potential moderating role that chronological age may play in influencing the impact of psychological skills and anxiety on competitive tournament performance across the adult life span. Findings suggested no significant age-moderating effects and instead pointed to the importance of developing golf-specific psychological skills to enhance or maintain performance, irrespective of age. Although automaticity (performance feels “automatic”) predicted performance for all golfers, commitment to the game and confidence in one’s putting did so only for the men. These findings reinforce the age-irrelevant role of such skills in fostering the experience of peak performance in a competitive sport context and underscore the importance of interventions targeting older players to help maintain or facilitate the use of psychological skills in helping them manage their games.

**Key Words:** Age—Competitive anxiety—Golf—Mental skills.

ALTHOUGH golf can be played well into one’s 80s (Chmiel & Morris, 2001), physical sport performance generally declines with age (Bosscher, Van Der AA, Van Dasler, Deeg, & Smit, 1995; Jagacinski, Greenberg, & Liao, 1997). Older adults exhibit more variability in their golf performance than do younger adults, and the decline in the efficiency of older adults’ golf swings can be attributed to a loss of flexibility (Ferrini & Ferrini, 2008; Jagacinski et al., 1997). Despite such physical changes, skilled performance is still possible when older adults spend sufficient time for practice and training (Ericsson, 2000).

Changes in cognition, anxiety, and coping ability also likely influence performance of older adults. Although they experience similar levels of stress and anxiety relative to younger people, older adults perceive problems about which they are anxious as more severe and/or feel less able to handle their anxiety (Bäckman & Molander, 1986). There are also reliable age declines in the ability to control worry/intrusive thoughts, due to perceived/actual performance declines (Murphy, 1999). Such declines may be accentuated in competition (Molander & Backman, 1996), and under such conditions, older adult athletes experience more performance decrements than do younger athletes (Molander & Backman, 1996). In this light, it may be that older players’ lack of awareness of the benefits of psychological coping skills or their unwillingness to utilize such techniques may attenuate their golf performance.

## Purpose of This Study

Although most research targeting the determinants of optimal golf performance has relied on either collegiate

or professional players, the reality is that many players are older (National Golf Foundation, [www.ngf.org](http://www.ngf.org), retrieved March 2, 2009) and do not play at the elite level. These facts compromise generalizations to the average amateur player. In this study, we examined whether age would moderate the impact of the use of general mental skills, golf-specific mental skills, and competitive anxiety on successful golf tournament performance among a large and diverse sample of amateur golfers who varied in age, golf skill, and sex.

## METHOD

### Participants

Participants were 1,150 male and 170 female golfers who played in the Dupont World Amateur Golf Championship in Myrtle Beach, South Carolina. Participants played from those tees consistent with their handicap, irrespective of age. Mean age was 52.59 years ( $SD = 12.54$ ); men and women were of similar ages ( $p > .05$ ). Participants had played golf for more than 20 years ( $M = 23.54$ ,  $SD = 13.90$ ); mean handicap was 15.42 ( $SD = 6.83$ ), though men’s handicaps were lower ( $M = 14.74$ ) than the women’s ( $M = 21.45$ ),  $F(1, 1218) = 175.53$  and  $p < .05$ . The relationship between age and PGA tour pro verified handicap was small ( $r = .15$ ), whereas the correlation between handicap and tournament performance was high ( $r = .81$ ). Because there were sex differences in handicaps and handicaps were related to tournament performance, and because players of a given ability level competed against others of the same gender with similar handicap indexes, analyses were conducted separately by sex.

## MEASURES

**Psychological Skills.**—The 64 Likert-type item, Test of Performance Strategies (TOPS; Thomas, Murphy, & Hardy, 1999) measured goal setting, emotional control, automaticity, relaxation, self-talk, imagery, activation, and negative thinking; higher average scores indicate greater use of that strategy with the exception of negative thinking and emotional control where higher scores indicate less use of that strategy. Alphas from the current sample were 0.76 (activation), 0.72 (relaxation), 0.69 (negative thinking), 0.83 (goal setting), 0.80 (imagery), 0.77 (emotional control), 0.79 (self-talk), and 0.75 (automaticity). Thomas and colleagues have provided detailed information about the scale's factor structure and support for its construct validity.

**Golf-specific skills.**—The 68 Likert-type item, Golf Performance Survey (GPS; Thomas & Over, 1994) assesses psychological skills and tactics in golf, psychomotor skills in golf, and commitment to the sport. Due to overlap between the GPS and the TOPS, only the psychomotor skills subscales (automaticity [13 items], putting skill [3 items], seeking improvement [8 items]) and involvement in golf subscale (commitment [5 items]) were used. Higher average scores indicate greater confidence in each area. Cronbach's alphas for the GPS subscales have ranged from 0.67 to 0.80 (Thomas & Over, 1994). Alphas in the current sample were 0.63 (automaticity), 0.66 (putting), 0.56 (seeking improvement), and 0.84 (commitment). Based on the lower alpha, seeking improvement was dropped from the analyses here. Thomas and Over (1994) provide extensive information concerning the factor structure and construct validity of the GPS.

**Competitive trait anxiety.**—The 21 Likert-type item, Sport Anxiety Scale (SAS; Smith, Smoll, & Schutz, 1990) assesses the following aspects of competition trait anxiety: somatic (9 items), worry (7 items), and concentration disruption (5 items). Higher average scores indicate more anxiety (Smith, Cumming, and Smoll, 2006). Cronbach's alphas in the current sample were 0.89 (somatic), 0.86 (worry), and 0.73 (concentration disruption). Dunn, Dunn, Wilson, and Syrotuik (2000) and Smith and colleagues have provided extensive information about the scale's factor structure and its construct validity.

### Design and Procedure

Golfers were solicited to participate in this study during the tournament registration. As *unadjusted* scores were *first* turned in by the player, and *then* adjusted for a player's handicap index *after* play *within* handicap groupings, age's effects on not only players' use of psychological skills, but also its moderating effect in understanding such skills' ability to predict tournament performance should be

understood in the context of *actual play*—how the player actually scored on a particular day irrespective of handicap. Thus, we used scores that were not adjusted for handicap in our analyses. Psychological skills data were collected 3 days prior to actual tournament play and used to *prospectively* predict *subsequent* tournament performance.

## RESULTS

### Age Moderation of Psychological Skills—Tournament Performance Relationships

We examined age as a moderator of the effects of both psychological skills and competitive anxiety on subsequent tournament performance. An inspection of scatter plots and distributions of standardized residuals revealed linear relationships. We used hierarchical regression analyses following the recommendations of Baron and Kenny (1986) and Frazier, Tix, and Barron (2004). Inspection of postcentered variable correlations confirmed that multicollinearity was not an issue. In that players competed on different courses of varying designs and levels of difficulty in each round of the tournament, total gross scores across three rounds was the dependent variable.

Prior to analyses, the TOPS, GPS, and SAS subscales were factor analyzed for the sample as a whole using a principal components approach with promax rotation to a terminal solution (we present means and standard deviations of the subscales in Table 1). Both the SAS and GPS scores were explained in terms of a single factor (all factor loadings ranged from 0.56 to 0.89), whereas TOPS scores were explained via two underlying factors (Factor I = *cognitive proactivity*, defined by the activation, goal setting, imagery, and self-talk subscales; Factor II = *planful affectivity*, defined by the emotional control, less negative thinking, relaxation, and automaticity subscales). For both factors, loadings ranged from 0.49 to 0.86. Utilizing these factor scores and age, all of which were standardized, as well as the respective factor score by age interactions, predictors were entered in the following order: (a) standardized SAS, GPS, and TOPS factor scores as a set, (b) standardized age, and (c) the respective interactions between each TOPS, SAS, and GPS factor score and age. Analyses were conducted separately by gender. We conducted the regression analyses including age and gender as moderators and interactions with the GPS, TOPS, and SAS scales. With effects coding, gender did not interact with age and the above measures to predict golf performance. However, gender was significantly related to tournament performance across the three rounds in that being a female golfer was predictive of poorer performance. In light of the direct effects of gender and the lack of moderation, we present the regression analyses separately for male and female golfers, highlighting the effects of psychological factors and the potential effects of age as a moderator.

For males ( $n = 1,150$ ), although Step 1 (TOPS, SAS, GPS factor scores) was significant,  $F(4, 1145) = 31.71$ ,  $p < .0001$ , adjusted  $R^2 = 0.10$ , only the GPS factor score predicted tournament performance in the full model ( $\beta = -0.317$ ,  $p < .0001$ ); the more the golfers reported being committed to golf, feeling a sense of automaticity in their play, and believing they were skilled putters, the lower their scores were across the three rounds of the tournament (i.e., the better their performance). For age and the respective interactions between age and the TOPS, SAS, and GPS factors scores, there were no significant effects in predicting tournament performance. The overall final regression model was significant, accounting for 10% of the performance variance,  $F(9, 1140) = 14.64$ ,  $p < .0001$  (see Table 2 for regression coefficients for the overall final model).

Because the GPS composite factor was the only significant predictor of golf performance, we conducted the moderated regression analyses again limiting such analyses to the three GPS subscales (we did not include the SAS or TOPS subscales because their composite factors had not been significant). Again, age and the age by GPS subscale interactions were not significant ( $p > .05$ ), suggesting that age did not moderate the effects of the golf-specific psychological skills nor was it, on its own, a direct predictor of performance. The full model, however, did reach significance:  $F(7, 1142) = 29.60$ ,  $p < .0001$ , adjusted  $R^2 = 0.15$ . The more the male golfers were committed to improving their game ( $\beta = -0.144$ ,  $p < .0001$ ) and played with a sense of automaticity ( $\beta = -0.332$ ,  $p < .0001$ ), the better their performance in the tournament. Surprisingly, the extent to which they

Table 1. Mean ( $M$ ) and Standard Deviation ( $SD$ ) of Unstandardized Predictor and Criterion Variables

Variables	Male golfers ( $n = 1,150$ )		Female golfers ( $n = 170$ )	
	$M$	$SD$	$M$	$SD$
Age	52.59	12.54	51.38	10.13
SAS—Concentration disruption	2.00	0.68	1.90	0.65
SAS—Worry	2.15	0.65	2.26	0.75
SAS—Somatic	1.71	0.59	1.81	0.72
GPS—Automaticity	3.08	0.46	3.15	0.42
GPS—Putting	3.25	0.94	3.11	0.90
GPS—Commitment	3.89	0.83	3.84	0.91
TOPS—Self-talk	2.98	0.83	3.18	0.83
TOPS—Automaticity	2.89	0.69	2.92	0.79
TOPS—Goal setting	3.23	0.85	3.14	0.90
TOPS—Imagery	2.9	0.78	2.84	0.83
TOPS—Activation	3.12	0.75	3.05	0.74
TOPS—Negative thinking	2.40	0.71	2.44	0.72
TOPS—Relaxation	3.06	0.67	2.96	0.76
TOPS—Emotional control	3.30	0.73	3.26	0.82
Tournament Gross Score	92.58	8.88	101.33	12.14

Note. SAS = Sport Anxiety Scale (scores range from 1, *low*, to 4, *high*); GPS = Golf Performance Survey (scores range from 1, *low*, to 5, *high*); TOPS = Test of Performance Strategies (scores range from 1, *low*, to 5, *high*); Tournament Gross Score = average of the gross scores (uncorrected for handicap) across the three rounds of the tournament.

Table 2. Regression Coefficients for Standardized Predictors and Interactions of Tournament Gross Score—Full Model

Variables	Male golfers ( $n = 1,150$ )		Female golfers ( $n = 170$ )	
	$B$ (95% CI)	$\beta$	$B$ (95% CI)	$\beta$
SAS factor	-0.33 (-0.99, 0.32)	-0.04	0.46 (-2.03, 2.90)	0.42
GPS factor	-2.79 (-3.39, -2.22)	-0.32*	-4.27 (-6.55, -1.99)	-0.31*
TOPS factor 1	-0.18 (-0.76, 0.40)	-0.02	0.69 (-1.38, 2.76)	0.06
TOPS Factor 2	-0.10 (-0.78, 0.59)	-0.01	0.35 (-2.20, 2.90)	0.03
Age	0.02 (-0.02, 0.06)	0.02	-0.14 (-0.32, 0.05)	-0.11
Age $\times$ SAS	0.04 (-0.01, 0.10)	0.06	-0.05 (-0.29, 0.21)	-0.04
Age $\times$ GPS	-0.02 (-0.07, 0.03)	-0.03	-0.09 (-0.30, 0.11)	-0.08
Age $\times$ TOPS 1	-0.01 (-0.06, 0.04)	-0.01	-0.06 (-0.26, 0.14)	-0.05
Age $\times$ TOPS 2	0.02 (-0.04, 0.08)	0.03	0.04 (-0.22, 0.30)	0.04

Notes. SAS = Sport Anxiety Scale; GPS = Golf Performance Survey; TOPS = Test of Performance Strategies; CI = confidence interval.

SAS factor = composite factor score of the three subscales (concentration disruption, worry, and somatic); GPS factor = composite factor score of the three subscales (automaticity, putting, and commitment); TOPS factor 1 = composite score of four subscales (activation, goal setting, imagery, and self-talk); TOPS Factor 2 = composite score of four subscales (emotional control, less negative thinking, relaxation, and automaticity). Full Model (men):  $F(9, 1140) = 14.64$ ,  $p < .0001$ , and adjusted  $R^2 = 0.10$ . Full Model (women):  $F(9, 160) = 2.43$ ,  $p < .05$ , and adjusted  $R^2 = 0.07$ .

\* $p < .05$ .

believed they were skilled putters ( $\beta = 0.07$ ,  $p < .05$ ) had the opposite effect.

For females ( $n = 170$ ), again, Step 1 (TOPS, SAS, and GPS factor scores) was significant,  $F(4, 165) = 4.25$ ,  $p < .005$ , adjusted  $R^2 = .07$ , and again, only the GPS factor score predicted tournament performance in the full model ( $\beta = -0.314$ ,  $p < .0001$ ). Steps 2 and 3 of the model were nonsignificant, suggesting that neither age nor its interactions with the TOPS, SAS, and GPS factor scores predicted tournament performance. The final overall regression model was significant, accounting for 7% of the tournament performance variance,  $F(9, 160) = 2.43$ ,  $p < .05$  (see Table 2 for regression coefficients for the overall final model).

Again, we conducted the moderated regression analyses only with the three GPS subscales. Age and the age by GPS subscale interactions were not significant ( $p > .05$ ), though the full model again reached significance:  $F(7, 162) = 5.06$ ,  $p < .0001$ , and adjusted  $R^2 = 0.14$ . For the female golfers, only automaticity ( $\beta = -0.352$ ,  $p < .0001$ ) predicted their performance across the three rounds. As expected, the more automatic their play, the better their performance.

## DISCUSSION

This study evaluated the moderating role of age on the use of general and golf-specific psychological skills and competitive anxiety on the tournament performance of a large and diverse sample of amateur golfers in a national competition. Hierarchical regression analyses suggested that for both male and female golfers, only GPS scores predicted tournament performance—golfers who reported being more automatic in their swings, more committed to their games, but less confident in their putting performed better across the three rounds of the tournament. For all persons, neither age nor its interaction with the GPS, TOPS, or SAS factor scores, as well as its interaction with GPS subscale scores, predicted tournament performance, suggesting that age does not have a direct influence on such performance and that age does not moderate the influence of the use of psychological skills on tournament performance. Such findings were true for both men and women in this sample.

What might account for this age irrelevance? On the assumption that older players might perform more poorly based on their presumed loss of strength and flexibility (Bosscher, Van Der AA, Van Dasler, Deeg, & Smit, 1995; Jagacinski et al., 1997), it may be that older players are less likely to set goals for themselves and may readjust their expectations about doing well in the tournament, perhaps having accepted that they cannot compete with younger and/or more skilled players in terms of their full swing—not being able to generate as much velocity in their swings due to a loss of strength and flexibility, resulting in a loss of distance. Indeed, this loss may motivate them to compete in tournaments where skill differences, that is, handicaps, are taken into consideration. Although these statements about

older players are speculative, and clearly require empirical verification, they nevertheless are in keeping with the value that older persons place on interpersonally satisfying relationships while playing in the tournament, consistent with Socioemotional Selectivity Theory (Carstensen, Isaacowitz, & Charles, 1999). Furthermore, that these compensations may allow older players to successfully utilize sport-specific psychological skills to minimize real or perceived performance declines are consistent with the constructs of secondary control (Heckhausen & Schultz, 1995), flexible goal adjustment (Brandstadter, Wentura, & Rothermund, 1999), and an accommodative identity style (Whitbourne, 1987). Our results are not consistent with those of Murphy (1999). Yet, although the Murphy study found that older persons reported lessened ability to control interfering worry or intrusive thoughts, that research did not involve the study of the suppression of worrisome thoughts in a competitive sport context.

Our findings build on work relying on either professional- or collegiate-level golfers and suggest that at a factor score level, golf-specific skills (e.g., automaticity, commitment to the game) predict better performance for all persons, regardless of age. At the level of GPS subscales, automaticity predicted better performance for both men and women, whereas greater commitment to the game predicted better performance for male golfers only. Interestingly, confidence in one's putting negatively predicted tournament performance for males only.

The findings for factor scores contrast with the claim by Bäckman and Molander (1986) that older adults cannot cope with the high arousal context of competition as effectively as do younger adults due to age-related cognitive deficits. It should be noted that the Bäckman and Molander study involved persons whose golf expertise had not been documented, persons who competed in a mini-golf competition for a small cash prize, and conditions where concerns about strength and flexibility were irrelevant to competition. As such, the skills involved in a laboratory-based mini-golf task are not likely to generalize to a full round of competitive golf involving very diverse skills (e.g., driving off the tee, iron play, course management, executing trouble shots, putting) involved in this study.

In light of the present focus on competitive golf performance, it is important to note that GPS automaticity emphasizes the importance of a consistently well-grooved swing that can be reproduced without conscious effort, whereas commitment emphasizes enthusiastic involvement in the game. Although having confidence in one's putting may help to mitigate concerns about a lack of strength or flexibility, for men only, and irrespective of age, it was a lack of such confidence that predicted better performance, which was unexpected. It may be that being too confident in one's putting led the male golfers to putt too aggressively, translating into higher scores. Regardless, given the strength of the putting skill—performance relationship, the importance



of this variable is much less than the golfers' automaticity and commitment in determining the success with which they played. Additional research with golfers of varying ages is needed to tease out the potential unique influence of perceived putting skill on actual performance in a competitive sport context.

Indeed, the age-irrelevant picture here reflects the central tenet of Continuity Theory (Atchely, 1989), emphasizing the ongoing adaptive reinvestment of oneself into meaningful activities with increased age. That the GPS factor-predicted performance underscores the adaptive value of narrowing one's focus on some skills and not others, consistent with Selection, Optimization, and Compensation (SOC) theory (Baltes, 1997; Baltes & Baltes, 1990). The GPS-specific nature of our findings is paralleled by the importance of domain specificity in understanding other constructs in later life, that is, intelligence (Schaie, 2005).

Despite the limitations of the self-report nature of the instruments utilized and potential selective sampling bias associated with the fact that players who entered the tournament may have been more affluent (tournament expenses exceeded \$1,000 for most players), more committed to the game, or less adverse to competition, our findings are consistent with the compensatory value of the use of psychological skills that de-emphasize the importance of success per se and the adaptive use of such skills to maximize golf performance and achieve flow (Catley & Duda, 1997).

#### FUNDING

This research was supported by a grant from the Association for the Advancement of Applied Sport Psychology to the authors.

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