

Strength and Conditioning in Golf: Probability of Performance Impact

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Headline

Whether you are a coach, a professional or an amateur golfer, you are sure to have heard the phrase 'golf fitness' and have more than likely been advised that you should have a gym routine to help your golf. Given the somewhat vogue status of 'golf fitness' at present, there is a large body of information around the topic portraying a complexity which for some creates a barrier to getting started. If you are a professional you are sure to have a busy schedule, and the typical amateur does not have the spare time to devote to over-elaborate routines, so it is important allotted gym-time is used wisely; abolishing components which are unlikely to offer much return. Herein we present a *Probability of Performance-Impact Model* (Figure 1) which underpins the strength and conditioning (S&C) service provided at the European Tour Performance Institute (ETPI). The aim herein is to add clarity as to how S&C can impact golf performance, and reassure that gym programmes need not be complicated. The authors hope this will encourage players of all levels to make that behaviour change towards a healthier lifestyle and compliment their golf training with a no-frills gym routine.

Driving Distance

Sceptics of weight training for golfers will be quick to point out legends of the game who did not engage in such activities. Notwithstanding the evolution of the modern golf game (longer courses and the advances in equipment), of course all this tells us is that it is possible to be genetically blessed and get away with not engaging in additional physical work. Despite this few golf coaches or analysts would contest the importance of club head speed (CHS) in modern day golf, research has shown that the faster you swing the club the lower your handicap ($r=0.95$) (1). Further, even subtle increases are associated with significantly lower scores on par 4 and 5 holes (2). Therefore, this is one avenue where a gym programme can have a direct performance impact. Indeed, from Mark Broadie's revolutionary book 'Every shot counts', it is evidenced that a 20-yard increase in distance off the tee will incur 0.75 strokes gained per round (3), equating to three shots over a four-day tournament.

As with most striking, hitting or throwing sports, the lower body is the engine (force generation) for the motion of the golf swing. This is why leg strength is a priority. This is now supported by research indicating significant relationships between lower body strength, explosive strength and CHS (4,5). Most amateurs (and many professionals) will benefit from increases in driving distance secondary to strength training due to their often 'untapped' strength potential. This is particularly true for females and more senior players who generally speaking are more likely to have lower pre-existing muscle mass and strength levels than their younger, male counterparts. Once the force has been generated by the lower body, this then needs to be transmitted into the clubhead across the trunk and through the arms in an appropriately sequenced pattern.

The trunk should therefore be developed to effectively transmit force, thus enhancing the efficiency of the engine (lower body). The latter is equally important, as otherwise the energy created by the lower body is leaked and not transferred into the clubhead.

Injury and Illness Risk-Reduction

Inherently as CHS increases so does injury risk, as the player has to sustain the increased forces associated with swinging faster. To counter this when we plan to upgrade the engine size we also need to build a well-balanced chassis. This means increasing the ability of the relevant tissues (i.e. muscles and tendons) and structures (i.e. bones) to tolerate load. The force magnitude at the lumbar spine alone is worthy justification for the inclusion of strength training. Forces of 7500N (equivalent to 750 Kg) have been reported from elite players swinging with a driver (6). It is therefore unsurprising that in a published injury audit from the PGA European Tour the lower back, along with the neck and wrist, were the most prevalent injury sites (7). The same report showed that 80% of these injuries were related to overuse, which according to a large meta-analysis and systematic review could be reduced substantially through engaging in strength training (8). Many injury resilience strength exercises may actually be the same as the performance enhancement solutions. By way of example, the deadlift will not only increase leg strength to facilitate longer drives but it will also increase the tolerance of the back, trunk and wrist musculature, with particular supporting evidence that it is useful in the rehabilitation of lower back pain (9). This is a real bonus as it makes for efficient programming. Unfortunately, this is not the case for the neck which is insufficiently exposed in traditional compound strength exercises (i.e. deadlifts), so some additional, isolated neck specific conditioning is recommended.

Improving or maintaining mobility is another side effect of good quality strength training. Contrary to common belief, the lengthening phase of muscle activity in strength training exercises increase muscle length and overall mobility (10). Like cardio-respiratory and mobility development, strength training offers an array of health-related benefits which are well documented. Indeed, the American College of Sports Medicine (ACSM) now include (twice weekly) strength training as part of their recommendations for general health. Exercise is now often described as a vaccine to illness given its protective effects against an array of both acute and chronic conditions. Injury or illness means time away from practice, and given that golf is a highly technical sport this is very likely to have a large negative impact on performance over time. Considering the significance of this, it becomes clear that perhaps the largest (albeit indirect) accumulative performance impact we can have is long-term injury avoidance. Unlike with determinants of performance (CHS) where we can only suggest S&C may help, we are probably safe to insist that avoiding injury and illness *will* help performance. If we enable the player to

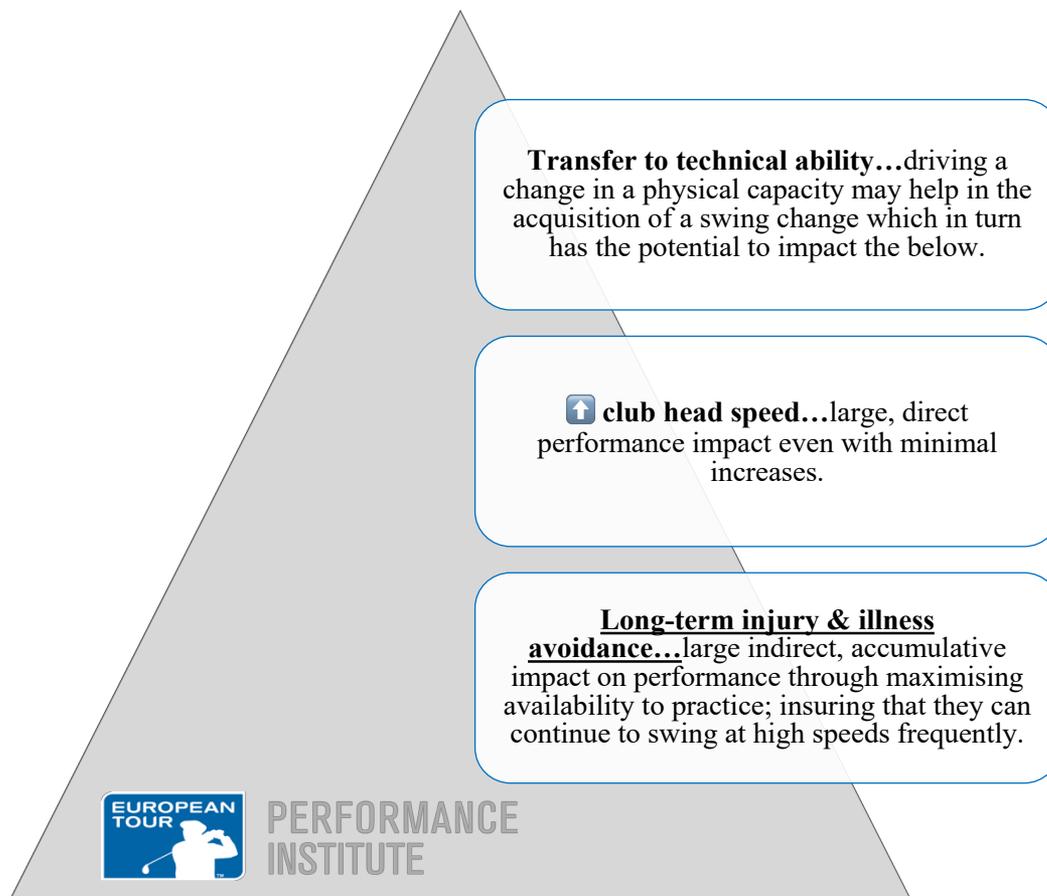


Fig. 1. Probability of Performance-Impact Model: Probability of impact is deemed highest at the bottom.

take to the course, range or putting green as often as they like and miss very few practice days or tournaments, this is likely to accumulate into a large positive performance impact. This is a long process and not a sell that is likely to excite a player, but for the reasons discussed this is the primary goal of the S&C service we provide at the European Tour Performance Institute (ETPI) as reflected by our *Probability of Performance-Impact Pyramid* (Figure 1).

Transfer to Technical Ability

It is commonly accepted that a change in technique is a product of a particular activity, drill, practice design, or pedagogical strategy – this underpins the golf coaching process and anyone who has had lessons will be familiar with it. However, it is perhaps underappreciated how altering a physical capacity (i.e. strength, stability, mobility or control) can over time influence technique. It is important for players and coaches alike to understand that although ‘golf fitness’ can certainly play an important part in helping a player make a swing change, the gym is not the place to rehearse the aspired movement pattern. Rather, the gym should be used to drive changes in physical capacities (identified through a discussion with the swing coach) that may impact on the players ability to make the shapes their coach wants from them.

This is best achieved with de-contextualised exercises that do not resemble the swing pattern, but carry the potential to remove physical barriers that are preventing a player from moving a certain way without loss of posture or compensations. Changes in technique could then obviously have a whole host of secondary effects on CHS and injury risk. For this reason transfer to technical ability should not be overlooked, but there is currently little empirical evidence that supports or refutes the transfer to technical skills. The exercises used to impact technical ability will obviously be specific to the individual, but specialist input will be required to identify and implement this. Even then, the true impact on technique is often unpredictable. It is therefore important that players do not become perturbed by this area, and let this dominate their allotted-gym time. As a general rule of thumb, we recommend no more than 10-20% of the exercises in a gym programme should be designed with this in mind.

Conclusion

Prior to starting a gym programme, players are advised to seek the help of an accredited strength and conditioning coach (ASCC) or certified strength and conditioning specialist (CSCS). One or two coaching sessions under such qualified supervision would be sufficient to establish a gym programme which has a high probability of performance-impact through facilitating longer drives, promoting health and wellbeing, and

increasing resilience to known injury sites. Many golfer's lives are complicated, gym programmes do not need to be.

Key Points

- Appropriate strength and conditioning in golf will most probably reduce injury risk, followed by increase clubhead speed.
- Appropriate strength and conditioning in golf MAY transfer to improved technical ability, but less predictably.
- As a result, we should focus on developing physical qualities which will improve these areas in order of priority, and not overcomplicate training or become obsessed with achieving technical transfer.
- Appropriately qualified strength and conditioning coaches are well placed to support players and technical coaches navigation of the 'golf fitness' landscape.

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