# Strength Training for the Brain: Using Technology to Deliver Mindfulness Training to Improve Strength and Conditioning Performance

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## ABSTRACT

THIS ARTICLE EXAMINES THE BENEFITS OF USING MINDFULNESS THROUGH TECHNOLOGY TO ENHANCE STRENGTH AND CONDITIONING (SC) TRAINING PERFORMANCE. ALTHOUGH THE EFFECTIVENESS OF MINDFULNESS HAS BEEN DEMONSTRATED IN ATHLETES FROM NOVICE TO COLLEGIATE LEVELS, ATHLETES CONTINUE TO FAIL TO USE MINDFULNESS CITING A RANGE OF ISSUES INCLUDING TIME DEMANDS AND EXPENSE OF PSYCHOLOGISTS. ONE SOLUTION MAY BE THROUGH USING TECHNOLOGY TO EXPLORE SMARTPHONE APPLICATIONS THAT CAN DELIVER MINDFULNESS TRAINING BEFORE AND DURING SC SESSIONS. IT IS PROPOSED THAT THE USE OF SMARTPHONE TECHNOLOGY MAY BRIDGE THE GAP THAT EXISTS IN PAST METHODS OF DELIVERY OF MINDFULNESS INTERVENTIONS. FOR A VIDEO ABSTRACT DESCRIBING THIS ARTICLE, SEE, SUPPLEMENTAL DIGITAL CONTENT 1, (SEE VIDEO, http://links.lww.com/scj/a197).

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## INTRODUCTION

Achieving optimal performance during strength and conditioning (SC) sessions requires a multidimensional approach that not only involves physical conditioning and specific skills development, but should also include mental preparation. Elite athletes are constantly aiming to optimize every SC training session to achieve peak performance for competitive situations (12).

It is evident that to maintain consistent performance during SC sessions, elite and professional athletes need good support and resources, such as suitable training venues, equipment, technology with feedback, and coaching to assist in player development. Together, these resources are required to prepare athletes for each session, and the daily repetitiveness of training and the heavy physical toll placed on the body while continually endeavoring

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for improvement. However, for many elite/professional athletes, it may not be the physical burden placed on them while striving for success that causes them to underperform, but rather the psychological burden of repetitive training regimes, coupled with constant expectations and pressure to perform continually at an optimal level (12).

Research demonstrates the importance of mental skills training techniques on successful athletic performance (4). A number of individual athletes and organizations have now begun the process of implementing nontraditional performance enhancement techniques that includes mental skills training as part of their high-performance programs. However, it can be argued that mental skills training is not widely embedded within the philosophies of athletic performance cultures (11). It is important that mental and physical training are viewed as complementary rather than mutually exclusive to provide a holistic athlete approach to training. With strong foundations already developed and implemented in physical training for athlete performance, mental training strategies may be used as a key tool to improve the already proficient physical training regimes. For example, mental training can "value-add", improving athlete's ability to optimize their physical training programs and time spent with their SC coaches. SC coaches can use these simple, noninvasive mental training techniques in conjunction with physical training for their athletes. The possibility for SC coaches to implement simple mental training techniques to improve the physical training output of their athletes is an exciting step that provides an opportunity to enhance physical training programs along with athlete's performance potential. It is important to note that the mental skills presented in this article do not require a qualified psychologist, but rather are programs well designed by sport psychology professionals that can be implemented by anyone (19). The preparation of an athlete requires a mix of physical and mental training.

Most understand the requirements of an athlete's physical training but many athletes are either not fully aware of current mental training techniques or are apprehensive regarding the potential benefits of mental training (11). Athletes and physical training staff who are aware and appreciate the benefits of mental training can help and push for the incorporation of mental training sessions into athlete's schedules. The purpose of this article is to review what cognitive skills are essential for successful performance; review what mental training can do cognitively for the elite athlete; and finally, address the key issues and solutions regarding mental training to obtain the best out of athletes' training and competition. The literature presented in this article aims to include SC studies; however, where this is not possible, the article includes more general sports to illustrate the concepts presented.

## COGNITIVE SKILLS ESSENTIAL TO ATHLETE SC PERFORMANCE

Many sport psychology researchers attribute 3 key cognitive areas that athletes can work on: attentional control, resiliency, and mental toughness. Attentional control describes an individual's capacity to choose what he/she pays attention to and what they ignore (2). Wulf (20) concluded after investigating a group of golfers (n = 30) that an external focus of attention (in directing one's attention to environmental effects on performance) was more effective when compared with a group of golfers who used an internal focus of attention (in which athletes focus on their own body movements), and a control group (whom were given no instruction). Interestingly, the internally focused group performed similar to the control group (whom were given no instruction) who used no form of attentional focus. This study demonstrates the importance of attention to improve the learning and performance of motor skills that are fundamental to training sessions and ultimately successful sporting performances. Similarly, La Forge (17) highlights the importance of attentional control for strength training. This study examined the athletes' use of an internal mental focus during physical training, in turn, allowing training to have a mind and body focus, rather that purely a physical focus, therefore, significantly improving physical outcomes.

Resiliency is the ability for an athlete to appropriately adapt to stress and adversity (17). Martin-Krumm et al. (18) demonstrated the effect that resiliency has on an athlete's performance. For example, in youth basketball athletes (n = 62), those with an optimistic mindset performed better on a basketball skills task while receiving false feedback that they had failed, when compared with both athletes with a pessimistic mindset and athletes with a neutral mindset (18). Maintaining a resilient mindset during fatigue, challenge, and adverse circumstances that are encountered during SC sessions may improve performance during competition. Mental toughness is defined as the ability to consistently perform toward the upper range of one's talent and skill, regardless of the competitive circumstances in any given scenario (13). Mental toughness has been identified as important to sporting success at all levels and across all sporting activities (21). Many cite studies by Gucciardi et al. (13) who examined 3 Australian rules football teams (n = 75). One team completed a mental toughness training program, the second team completed a psychological skills training program (focusing on attentional control, mental rehearsal, and self-efficacy), and the third team was a control group. Multisource ratings (i.e., self-report and parent and coach rating) of mental toughness for all 3 conditions were obtained. Both the mental toughness and psychological skills groups significantly improved their levels of flow, which can be thought of as an optimal performance state (complete absorption in the task at hand), with an enhanced skilled

performance compared with the control group; these findings highlight the importance of psychological skills training for improving performance.

### BENEFITS OF MENTAL SKILLS TRAINING FOR SC PERFORMANCE

It is well recognized that physical training is pivotal to athletic performance output (20). As sports science has evolved over the last century, coaches and athletes have begun to incorporate new training techniques to give them the edge on opposing athletes. It is not uncommon for professional teams to spend large amounts of time, money, and resources on trying to gain the very most out of their athletes' physical ability. However, despite many coaches and athletes purporting the importance of remaining mentally tough, focused, or disciplined during adverse moments during training and competition, mental skills training is only recently being recognized as a meaningful part of a high-performance program (20). Similarly, SC coaches often place the emphasis on the physical benefits of SC training, and do not employ much mental training. They should aim to employ such mental techniques when pushing athletes past their physical boundaries when completing lifts or improving their conditioning. So what does the literature report on the efficacy of mental training for athletes, and what techniques should SC coaches be focusing on regarding athletes' mental training?

Athletes at all levels in organized sporting programs are constantly confronted with frustrations, distractions, and interruptions, on a day-to-day basis. So it is important that athletes have the appropriate resources and skills to maintain a level of mental control (the ability to focus on the relevant cues when under fatigue). This control is required to continually maintain an efficient level of performance when training and competing. To ensure that athletes can cope with the demands of life and pressures to perform at their optimal levels during sessions, it is vital that athletes recognize the importance of mental recovery (mental disengagement from sporting performance). Edwards and Edwards (10) demonstrated in Under 21 rugby players (n = 9) who underwent psychological training, including mindfulness for a period of 4 months, significantly improved on the Minnesota Satisfaction Questionnaire and the Psychological Wellbeing scales of mental preparation and anxiety compared with a matched control group. Despite a small sample size, these authors expressed that athletes who undertake psychological training for mental recovery decrease the likelihood of experiencing diminished performance in both training and competition, as well as physical and emotional exhaustion (10). There is an opportunity for SC coaches to use mental skills training with athletes to prepare them for overcoming obstacles by boosting confidence for optimal performance (15). As demonstrated in a review of the literature by Gardner and Moore (12), for a long period sport psychologists have acknowledged that psychological skills such as mindfulness, can help develop an athlete's capacity to focus on performance (including training), cope more effectively with negative situations, and attend to the moment in training and competition emphasizing that an athlete's ability to maintain attentional control (capacity to focus on as specific task) for an extended period is important in every type of SC session.

Mindfulness training is an extremely effective tool for increasing an athlete's level of mental functioning (6). Its effectiveness is hypothesized to be because of the mechanistic similarities between sensations experienced during peak performance and mindfulness training (1). Furthermore, the relaxation component of mindfulness training has been associated with enhancing an athlete's ability to mentally recover after performance. Increased recovery enhances overall levels of well-being, which play a significant role in achieving peak-performance output on a consistent basis (8).

### MINDFULNESS AND ATHLETIC TASK PERFORMANCE

Mindfulness has been linked to the psychology of peak performance in sport (15). Evidence has shown that present moment focus is associated with the likelihood of successful performance, by ensuring that unnecessary distractions, whether linked to past or future events, do not inhibit momentary concentration (15). At the core of mindfulness lies the nonjudgmental focus of one's attention on their experience (15). Unpleasant thoughts are simply acknowledged and accepted, rather than suppressed or replaced by positive thoughts (13). An open, receptive stance toward the broad domain of conscious experience is adopted in mindfulness (15). Bishop et al. (5) explains the operational definition of mindfulness as being made up of 2 components. First, the self-regulation of attention is focused on the immediate experience, allowing for the increased recognition of mental events in the present moment. Second, adapting a particular orientation toward one's experience in the present moment requires an orientation that is characterized by curiosity, openness, and acceptance (5). Mindfulness as a mental skill aims to enhance an individual's focus on the present moment, while being completed in varying methods (14,9). Although it should be noted that mindfulness can be completed in any environment (i.e., at home, outdoors, or in the workplace), it is hypothesized that mindfulness can be applied during SC sessions to assist reaching flow states to improve performance, irrespective of the previous lift (Table 2). Similarly, mindfulness provides an opportunity for athletes to put concerns about the past or future aside and focus on the present moment.

Mindfulness is being proposed as a strategy in sport to increase focus for performance enhancement because of its association with concentration and attention. For example, Bernier et al. (4) examined the effect of mindfulness training on the performance of elite golfers (n = 7). The training program

**Table 1**
**Suggested mindfulness "Smartphone Applications" (Tlalka S and Tlalka. Mindfulness: Apps for That?—mindful. Mindful, 2013. Available at: http://www.mindful.org/mindfulness-apps-for-that/. Accessed: February 26, 2016)**

| Mindfulness smartphone applications | Cost of access | Brain training smartphone applications | Cost of access |
|---|---|---|---|
| Calm | Free | Lumosity | Free |
| Mindfulness training | Free | Cognifit brain fitness | Free |
| Headspace | Free | Personal Zen | Free |

effectively helped enhance performance during competition by increasing task relevant attention and focus (100% of golfers in the mindfulness-training group enhanced their national ranking compared with only 28% of golfers in the control group).

Peak-performance experiences or "being in the zone" are often associated with states of flow (1). Flow and mindfulness share a number of defining characteristics. Flow can best be described as an optimal psychological state of peak performance that can occur when there is a balance between perceived challenges and skills (8). This deeply rewarding state tends to involve intense concentration so focused that it amounts to absolute absorption in the specific activity, loss of self-consciousness, and a sense of everything clicking into place (1). Flow is an elusive and unconscious phenomenon that results in an enjoyable and intrinsically motivating experience (8). The experience of flow is strongly associated with peak performance. Research by Aherne et al. (1) demonstrated a relationship between-mindfulness training and flow experiences in athletes undertaking SC programs (n = 13). Athletes who received the mindfulness training intervention reported significant increases of flow compared with that of the control group. Specifically, the intervention group reported improved levels of sense of control and concentration on task postmindfulness training, which are skills that are fundamentally important for optimal SC performance.

In attempting to increase the flow experience, many athletes, coaches, and sport psychologists use techniques such as goal setting, imagery, and self-talk, to minimize the impact of negative mental thoughts and in turn improve athletic performance (7). However, a focus on controlling or eliminating maladaptive thoughts and emotions may not be as beneficial as previously assumed. This action could unexpectedly trigger a brain monitoring process that searches for unwanted thoughts and brings them to the athlete's awareness (12). Such awareness leads to self- and task-irrelevant focus, which can negatively impact performance (12).

Empirical research supports a positive link between mindfulness training and increased peak performance. Gardner and Moore (12) demonstrated a robust relationship between measures of mindfulness and flow in athletes and also significant increases in levels of flow after receiving this specific training. Aherne, Moran and Lonsdale (1) have also demonstrated in collegiate athletes from various sports the link between the potential for mindfulness to induce and help maintain "flow state," which is an essential part of peak performance (1). Specifically, athletes who underwent mindfulness training reported increases not only in global flow scores but also on the flow dimensions of "clear goals" and "sense of control". Given this evidence, it is acknowledged that training can be greatly influenced by mindfulness and help improve an athlete's SC performance (12).

## WHY DO NOT ATHLETES USE MINDFULNESS FOR SC PERFORMANCE?

Despite the growth and effectiveness of sport psychology, a gap still exists in elite sport regarding how to best deliver mental skill techniques such as mindfulness, during specific sessions such as SC training. Athletes and coaches are aware of the effect of mindset on athletic task performance; however, mental skills techniques are still being underutilized. Evidence supports that with such utilization, athletes could benefit greatly from the services of a sport psychologist, yet still fail to do so (11). Specifically, Ferraro and Rush (11) concluded that of the athletes they examined (n = 20), 100% reported that they would benefit from seeing a sport psychologist, but only 10% had engaged with one. Participants failed to access a psychologist because of a fear of lost time for physical conditioning training, along with concern regarding expenses associated with consulting a psychologist (11).

## THE POTENTIAL OF SMARTPHONES AS A TOOL TO ENGAGE ATHLETES DURING SC SESSION'S

The growth and establishment of smartphone mobile devices over the past 10 years has vastly affected the user's experience. Smartphones are small, always on, and carried on the person at all times (16). Furthermore, these devices have imbedded within them a number of additional capabilities and features such as email, text messaging, video viewing, and wireless Internet access. With these current advances in mobile technology, smartphones harbor the capability to outnumber personal computers in the near future. To provide an example of this explosion, it is now estimated that 50% of mobile users worldwide

**Table 2**
**Example strength-training program incorporating an example form of mindfulness training to help induce and maintain a "flow state" (1,3,9)**

| Record all loads lifted | | | Session date | | | Week 1 | | Week 2 | | Week 3 | | Week 4 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Presession | Mindfulness | Athlete to complete smartphone mindfulness program for 10 min before session starting—to facilitate reaching a flow state | | | | | | | | | | | |
| | | | | | | | WGT | REP | WGT | REP | WGT | REP | WGT |
| 1 | Chin Ups | Step load | Control | 90 | 1 | | | | | | | | |
| | | | | | 2 | | | | | | | | |
| | | 5 reps O.T.M. | | | 3 | | | | | | | | |
| | | Athlete to take 3 deep controlled breaths before and after each exercise set to maintain mindfulness throughout session to facilitate reaching a flow state | | | 4 | | | | | | | | |
| | | | | | 5 | | | | | | | | |
| | | | | | 6 | | | | | | | | |
| | | | | | 7 | | | | | | | | |
| 2 | Seated row | Volume | Control | 120 | 1 | 12 | | 12 | | 12 | | 12 | |
| | | Athlete to take 3 deep controlled breaths before and after each exercise set to maintain mindfulness throughout session to facilitate reaching a flow state | | | 2 | 12 | | 12 | | 12 | | 12 | |
| | | | | | 3 | 12 | | 12 | | 12 | | 12 | |
| | | | | | 4 | 12 | | 12 | | 12 | | 12 | |
| | | | | | 5 | 12 | | 12 | | 12 | | 12 | |
| | | | | | 6 | | | | | | | | |
| 3 | Bench pull | Volume | Control | 90 | 1 | 6 | | 6 | | 6 | | 6 | |
| | | Athlete to take 3 deep controlled deep breaths before and after each exercise set to maintain mindfulness throughout session to facilitate reaching a flow state | | | 2 | 6 | | 6 | | 6 | | 6 | |
| | | | | | 3 | 6 | | 6 | | 6 | | 6 | |
| | | | | | 4 | 6 | | 6 | | 6 | | 6 | |
| | | | | | 5 | 6 | | 6 | | 6 | | 6 | |

(continued)

**Table 2 (continued)**

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 6 | | | | | | | | |
| 4 | DB shrugs | Volume | Control | 0 | 1 | 15 | | 15 | | 15 | | 15 | |
| | | Athlete to take 3 deep controlled breaths before and after each exercise set to maintain mindfulness throughout session to facilitate reaching a flow state | | | 2 | 15 | | 15 | | 15 | | 15 | |
| | | | | | 3 | 15 | | 15 | | 15 | | 15 | |
| | | | | | 4 | | | | | | | | |
| | | | | | 5 | | | | | | | | |
| | | | | | 6 | | | | | | | | |
| | Orange pull aparts | Volume | Control | 60 | 1 | 20 | | 20 | | 20 | | 20 | |
| | | Athlete to take 3 deep controlled breaths before and after each exercise set to maintain mindfulness throughout session to facilitate reaching a flow state | | | 2 | 20 | | 20 | | 20 | | 20 | |
| | | | | | 3 | 20 | | 20 | | 20 | | 20 | |
| | | | | | 4 | | | | | | | | |
| | | | | | 5 | | | | | | | | |
| | | | | | 6 | | | | | | | | |
| 5 | Arms | | | | | 12&12 | | 12&12 | | 12&12 | | 12&12 | |
| | | Athlete to take 3 deep controlled breaths before and after each exercise set to maintain mindfulness throughout session to facilitate reaching a flow state | | | | 12&12 | | 12&12 | | 12&12 | | 12&12 | |
| | | | | | | 12&12 | | 12&12 | | 12&12 | | 12&12 | |
| | | | | | | 12&12 | | 12&12 | | 12&12 | | 12&12 | |
| | | | | | | 12&12 | | 12&12 | | 12&12 | | 12&12 | |
| Postsession | Mindfulness | Athletes to complete mindfulness smartphone application for 10 min after SC session to facilitate mental recovery | | | | | | | | | | | |
| Flexibility/recovery | Protein immediately after weights | | | | | | | | | | | | |
| | Lat stretch | | | | | 30 s e/s | | 30 s e/s | | 30 s e/s | | 30 s e/s | |
| | Pec stretch | | | | | 30 s e/s | | 30 s e/s | | 30 s e/s | | 30 s e/s | |
| | Foam roll | | | | | 5 min | | 5 min | | 5 min | | 5 min | |

DB = dumbbell; O.T.M. = or to maximum; REP = repetition; WGT = weight.

use a smartphone (16). Essential features of smartphones are applications (commonly known as apps), which are downloadable software products. Some popular mindfulness smartphone applications are shown in Table 1. Apps cover a range of topics and are used within many areas (16). Even with the dramatic increase in availability and use of smartphones and apps, little is known about their efficacy for the delivery of psychological interventions for SC performance enhancement. It is therefore important for SC coaches to understand how smartphones can be used to deliver psychological interventions for performance enhancement. This is especially relevant for athletes who do not have the resources to access the appropriate professionals. Research demonstrates that an athlete's inability to effectively use proven mental training interventions is due to constraints both perceived and actual (11).

The use of smartphones as a mode of delivery could become an important asset in improving athletes' engagement with psychological interventions, which can help aid performance enhancement for athletes during SC sessions (16). The overall advantage of using smartphone applications for psychological interventions is that sessions last for 10 to 20 minutes. It provides athletes the flexibility to complete sessions before, during, or after their SC sessions, either in a quiet place at a training venue or at home.

Mindfulness techniques are gaining greater attention from athletes and SC coaches, regarding their capacity to enhance an athlete's ability to perform at an optimum level in all facets of training and competition. Professional athletes and sporting organizations are taking more time to train and develop their athletes holistically. They are investing additional recourses into nontraditional performance enhancement methods such as mental training to help their athletes gain small but significant performance improvements. Mindfulness, in particular, has been demonstrated to be a scientifically sound mental training technique (8), therefore facilitating understanding and quantifying its use within real-world practical circumstances. Mindfulness smartphone applications such as Headspace (Tlalka S and Tlalka. Mindfulness: Apps for That?–mindful. Mindful, 2013. Available at: http://www.mindful.org/mindfulness-apps-for-that/. Accessed: February 26, 2016) are an extremely viable resource for SC coaches to maximize every session making sure athletes are in the best possible mental state to achieve their goals during the allocated SC training time. Table 2 provides an example strength-training program that incorporates mindfulness smartphone training.

## CONCLUSION

This article proposes that easily assessable smartphone applications could provide a currently underutilized opportunity for athletes and SC coaches to incorporate mindfulness in SC training sessions. Furthermore, to address the concern of time and expense, this article has suggested smartphone technology as a vehicle for mindfulness delivery. The stresses that athletes face on a daily basis may predispose them to mental stress and/or fatigue. This can play a role in their physical performance output during SC training, or key moments during performance. Evidence supports a link between mindfulness training and flow states, which in turn facilitates peak performance (8). Research acknowledges that athletes currently perceive mental skills training techniques as taking away from time that could be used to improve more observable training variables such as technical skills, strength, agility, and recovery training (11). Therefore, the potential of integrating traditional mental skills training techniques such as mindfulness into their athletic programs is limited. Current smartphone technology can help overcome the current concerns faced by athletes. The technology and content in apps can provide mental skills training in an efficient and accessible manner to meet the demands of an athlete's training schedule. Specifically, mindfulness smartphone apps have the potential to be an extremely efficient method, and another tool in the growing repertoire of training techniques required by SC coaches to obtain the best out of their athletes.

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## REFERENCES

1. Aherne C, Moran AP, and Lonsdale C. The effect of mindfulness training on athletes' flow: An initial investigation. *Sport Psychol* 25: 177–189, 2011.
2. Astle D and Scerif G. Using developmental cognitive neuroscience to study behavioral and attentional control. *Dev Psychobiol* 51: 107–118, 2009.
3. Baechle TR and Earle RW. *Essentials of Strength Training and Conditioning*. Champaign, IL: Human Kinetics Publishers, 2008.
4. Bishop SR, Lau M, Shapiro S, Carlson L, Anderson ND, Carmody J, Segal ZV, Abbey S, Speca M, Velting D, and Devins G. Mindfulness: A proposed operational

definition. *Clin Psych Sci Prac* 11: 230–241, 2004.

5. Bernier M, Thienot E, Cordon R, and Fournier JF. Mindfulness and acceptance approaches in sport performance. *J Clin Sport Psych* 25: 320, 2009.
6. Carmody J and Baer R. Relationships between mindfulness practice and levels of mindfulness, medical and psychological symptoms and well-being in a mindfulness-based stress reduction program. *J Behav Med* 31: 23–33, 2003.
7. Conroy D and Metzler J. Patterns of self-talk associated with different forms of competitive anxiety. *J Sport Ex Psych* 26: 69–89, 2004.
8. Csikszentmihalyi M. The contribution of flow to positive psychology. *The Sci Opt Hope*: 387–395, 2000.
9. Davis D and Hayes J. What are the benefits of mindfulness? A practice review of psychotherapy-related research. *Psychother* 48: 198–208, 2011.
10. Edwards D and Edwards S. The evaluation of a psychological skills training program for rugby players: Sport science. *Afr J Phys Health Edu, Rec Dance* 18: 525–534, 2012.
11. Ferraro T and Rush S. Why athletes resist sport psychology. *J Sport Psych* 3: 9–14, 2000.
12. Gardner F and Moore Z. A mindfulness-acceptance-commitment-based approach to athletic performance enhancement: Theoretical considerations. *Behav Ther* 35: 707–723, 2004.
13. Gucciardi D, Gordon S, and Dimmock J. Towards an understanding of mental toughness in Australian football. *J App Sport Psych* 20: 261–281, 2008.
14. Hayes S and Shenk C. Operationalizing mindfulness without unnecessary attachments. *Clin Psych Sci Prac* 11: 249–254, 2004.
15. Kee Y and Wang C. Relationships between mindfulness, flow dispositions and mental skills adoption: A cluster analytic approach. *Psych Sport Ex* 9: 393–411, 2008.
16. Kratzke C and Cox C. Smartphone technology and apps: Rapidly changing health promotion. *Int Elec J Health Edu* 15: 72–82, 2012.
17. La Forge R. Mind-body fitness: Encouraging prospects for primary and secondary prevention. *J Cardiovasc Nurs* 11: 53–65, 1997.
18. Martin-Krumm C, Sarrazin P, Peterson C, and Famose J. Explanatory style and resilience after sports failure. *Personal Individual Differences* 35: 1685–1695, 2003.
19. Rosenzweig S, Greeson J, Reibel D, Green J, Jasser S, and Beasley D. Mindfulness-based stress reduction for chronic pain conditions: Variation in treatment outcomes and role of home meditation practice. *J Psychosom Res* 68: 29–36, 2010.
20. Wulf G and Su J. An external focus of attention enhances Golf shot Accuracy in beginners and experts. *Res Quart Exe Sport* 78: 384–389, 2007.
21. Young J and Pearce A. Teaching mental toughness in tennis. *J Sci Med Sport* 13: 44, 2010.