Experiences of Australian professional female tennis players returning to competition from injury

Janet A Young, Michelle D Pain and Alan J Pearce

Br. J. Sports Med. 2007;41;806-811; originally published online 12 Jun 2007; doi:10.1136/bjsm.2007.036541

ORIGINAL ARTICLE

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Accepted 30 May 2007
Published Online First 12 June 2007

Background: This study examined the experiences of professional female tennis players returning to competition from injury.
Methods: In a study commissioned by Tennis Australia, 55 Australian professional female tennis players responded anonymously to a questionnaire developed for the purposes of this study. The questionnaire consisted of open and closed questions that assessed a player's attribution style, the occurrence and effect of minor and major injuries, frequency and type of treatment sought, attitudinal chances following injury and preventative injury factors.
Results: The quantitative and qualitative analyses of participants' responses revealed players generally displayed an internal attribution style with the majority of minor injuries involving lower limb injuries (attributed to playing on hard surfaces). Players reported these injuries were addressed in a variety of ways including self-treatment. The majority of severe injuries were upper limb/shoulder and these were generally treated at tournament sites with some requiring surgery.
Conclusions: Players adopted a range of measures to assist recovery from severe injury including the services of health professionals. In further findings, a player's attribution style was not a predictive variable, except in terms of the number of tournaments missed for minor injuries. Implications of the study's results and future research directions for cross-cultural studies are highlighted.

For elite athletes to achieve their goals in sport, it is generally accepted that the athlete will need to overcome numerous setbacks and challenges along the way. Some of the most critical challenges arise in dealing with injuries sustained in training and/or competition. Incidences of injuries are on the increase despite improvements in training facilities, equipment, physical conditioning and coaching.[1 2]

Research suggests psychosocial factors, together with physical and environmental factors, might predispose one to injury.[3–6] In a recent study, Devonport, Lane and Hanin[7] examined psychological states experienced by athletes prior to becoming injured, as well as their best and worst performances. ''Best'' performances were associated with lower scores on depression and fatigue, but higher on vigour, than ''injured'' and ''worst'' performances, and ''worst'' performances were associated with higher fatigue and confusion than ''injured'' performance. Further, recall of mood before their ''injured'' performance most closely resembled the ''best'' performance, with the authors suggesting that this might be attributed to the players taking more risks as they strive to maintain their (superior) performance level, or merely from trying too hard (ie, increasing the effort expended). Their third suggestion was that the players became over-confident and complacent, causing them to underestimate the task demands and be less alert in pre-event and mid-event situations.

Devonport *et al*[7] recommended that future researchers try to tease out the above possibilities acknowledging that a limitation of their study was they did not examine the types of injury (ie, to what body part, how severe it was etc), and whether the injury resulted from external factors (ie, from opponents) or from internal or self-generated sources (ie, excessive training). Finally, they suggest that research should also include qualitative methodologies to allow the athlete to fully describe their experiences regarding injury.

Research into the retirement experiences of elite female tennis players[8] revealed a degree of frustration with Australia's governing body of tennis, Tennis Australia (TA), in terms of a perceived lack of support and recognition for the country's former players. In their willingness to further explore issues of player well being, TA commissioned this study to investigate the experiences of professional tennis players, currently competing and retired, who had suffered minor and severe injuries. The aims of the study were to examine in elite Australian female tennis players:

- type of injury sustained and its effect on ability to train and compete;
- if attribution style was associated with frequency of injury, number of tournaments missed, success in ranking and playing career length;
- if attitude changes had occurred for players as a result of their injury; and
- how TA might assist players.

Preliminary data from this study has been published in abstract form.[9]

METHOD

Approval of the study, conforming to the Code of Ethics of the World Medical Association (Declaration of Helsinki), was granted by the Player Development Board of Tennis Australia.

A letter of invitation, plain language description of the project, informed consent form, and anonymous questionnaire were posted to players (competitive and retired) currently on the TA player database of professional female players in the last 10 years (n = 150). To maintain anonymity, response questionnaires were coded and placed in a separate envelope within a self-addressed stamped envelope.

The questionnaire was developed by the investigators in response to the specific areas of interest as defined by TA and

Abbreviations: TA, Tennis Australia; WTA, Women's Tennis Association

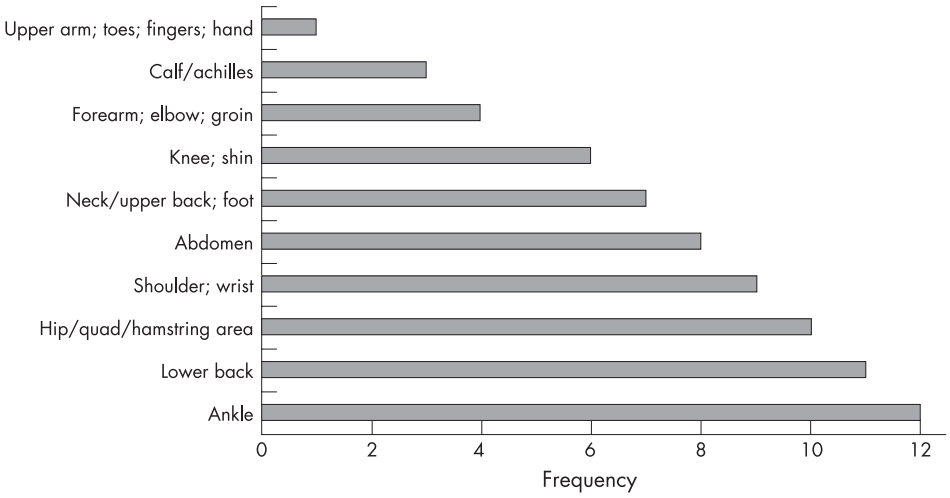

Figure 1 Frequency of minor injuries to body parts (note that players could nominate more than one injured body part).

consisted of two sections. Section 1 contained 21 closed questions that asked participants to rate their responses on a scale from 1 (strongly disagree) to 5 (strongly agree). These questions were included to assess a player's ''attribution style'',[10] with seven questions directed towards whether outcomes were attributed to personal (internal) factors, controllable outside (external) factors or situational factors beyond the player's control (other).

Section 2 of the questionnaire consisted of 21 questions (13 closed and 8 open ended questions) asking players to recount during their professional tennis career: (a) minor and severe/chronic (''severe'') injuries sustained and how the injury affected their tournament participation; (b) the frequency and type of treatment sought for their injury; (c) attitudinal changes that occurred following minor and severe injury; and (d) their beliefs about precautions that limited exposure to injury.

Table 1 Frequency (number) of treatments sought for minor injuries (players could nominate in more than one category)

Treatment	Frequency
Actively sought medical treatment from tournament doctor at the time of injury	16
Actively sought medical treatment from tournament trainer at the time of injury	42
Actively sought medical treatment from own doctor some time after	20
Treated self (with no medical intervention):	
(a) Took anti-inflammatory medication	30
(b) Rest, Ice, Compression, Elevation	43
(c) Rubbed on a heat gel (eg, Dencorub)	26
(d) Treated with ice packs	30
(e) Strapped body part	30
(f) Took headache tablets	5
Used physiotherapy services	40
Used chiropractic services	12
Used massage	35
Used acupuncture	9
Used a sport psychologist:	
(a) Mental images	5
(b) Goal setting	10
(c) Hypnosis/meditation	3
(d) Self talk	9
(e) Other	0
Used other support mechanisms:	
Friends or family (to distract from injury)	16
Coach, manager, other ''entourage'' staff	11
Other:	
(a) Personal trainer	1
(b) Muscle manipulator	1
(c) Yoga	5
(d) Osteopath	1
Total:	400

DATA ANALYSES

Descriptive data was derived from Sections 1 and 2 of the questionnaire and a series of six χ^2 analyses was conducted. Categories for the χ^2 analyses were derived from the frequency with which players nominated themselves as having a ''mostly external attribution'' (n = 12), ''mostly internal attribution'' (n = 31), or ''equally internal and external attribution'' (n = 7).

The χ^2 analyses assessed the relationship between players' attribution style and the degree to which the player's career was affected by severe injuries (unaffected, somewhat affected, or greatly affected), number of tournament missed due to severe injury (never withdrawn, withdrawn from <7 tournaments, or withdrawn from 7+ tournaments), the impact of minor injuries, the number of tournaments missed due to minor injuries and tournament success (rankings ''less than 150'', ''between 150 and 299'', ''greater than 300'').

RESULTS

A total of 55 (36.6%) participants voluntarily consented to the study; 27 were active on the circuit and 28 were retired (average retirement length was 7 years). Of the 26 who were still playing, 24 were not contemplating retiring in the foreseeable future (ie, within 2 years), and two players were thinking of retiring within 1 year.

The average number of years participants had been on the professional women's circuit was 4.3 years. The average Women's Tennis Association (WTA) singles ranking was 501 (3 in the top 100, 16 in the top 500), and the average WTA doubles ranking was 325 (3 in the top 100, 25 in the top 500).

Minor injuries

The types of minor injuries sustained are summarised in figure 1. Minor injuries were classified as ''…short-lasting (less than 1 month) and as a by-product of elite sport''. Total frequency of minor injuries was 73. A total of 53% of minor injuries were to lower limbs, and 29% were for upper limbs and shoulders. Ankle injuries were the most frequent complaint, followed by lower back and hip/quad/hamstring. The majority of the foot injuries in fig 1 were for serious blisters. Players attributed lower limb injuries to playing on a hard surface. The degree to which a player's tennis career had been negatively

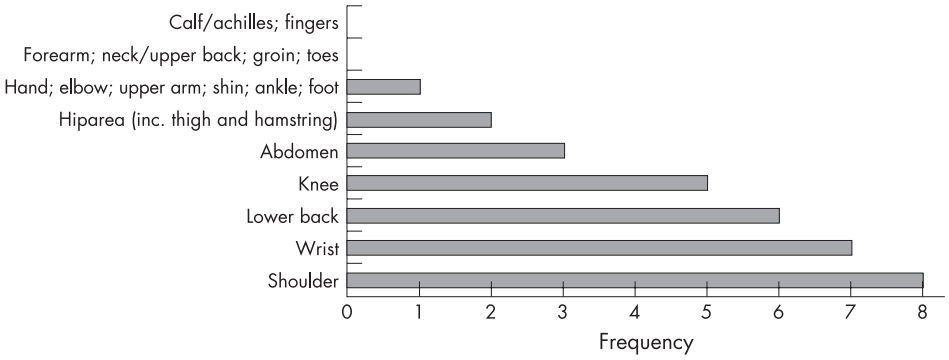

Figure 2 Frequency of treatments sought for minor injuries (note that players could nomimate in more than one category).

affected (ie, affecting the player's ability to train and play) by minor injuries was given an average score of 3.8 (signifying ''hampered, but not extensively'' on a 1–10 point rating scale).

Frequency of treatments for minor injuries

Table 1 shows the frequency of treatment options undertaken by players, assisting their recovery from minor injuries. On a rating scale of 1–10 (1 = never withdrawn due to minor injury, 10 = withdrawn from 10 or more tournaments), an average score of 2.8 was obtained, indicating that the average player had withdrawn from 1–3 tournaments.

Types of treatments for minor injuries

The types of treatments sought to overcome these injuries were extensive (table 1). Many players sought advice from the service providers (physician and physiotherapists) on-site at tournaments, and some then followed up with appointments with their personal physician for their minor injuries. Following a minor injury, self-treatment was also very popular. Sport psychologists were sought to help overcome problems arising from the injury, with goal setting and self talk being the main skills taught. As well, talking to others, usually those well known to the player, such as family, coach and friends, was a strategy used to help with recovery.

Table 2 Frequency (number) of treatments sought for a severe injury (players could nominate in more than one category)

Treatment	Frequency
Actively sought medical treatment tournament doctor at the time of injury	13
Actively sought medical treatment tournament trainer at the time of injury	24
Actively sought medical treatment from own doctor some time after	24
Had surgery to correct the injury	10
Treated self (with no medical intervention):	
(a) Took anti-inflammatory medication	18
(b) Rest, ice, compression, elevation	24
(c) Rubbed on a heat gel (eg Dencorub)	14
(d) Treated with ice packs	21
(e) Strapped body part	18
(f) Took headache tablets	7
Used physiotherapy services	24
Used chiropractic services	8
Used massage	18
Used acupuncture	6
Used a sport psychologist:	
(a) Mental images	4
(b) Goal setting	5
(c) Hypnosis/meditation	2
(d) Self talk	5
(e) Other	0
Used other support mechanisms:	
(a) Friends or family (to distract from injury)	13
(b) Other players	13
(c) Coach, manager, other ''entourage'' staff	10
Other:	
(a) Went to hospital	1
(b) Osteopath	1
(c) Rehabilitation strengthening	1
(d) Unspecified	1
Total:	285

Severe injuries

Severe injuries were defined as those that prevented a player from competing in tournaments for more than 1 month. The degree to which a player's tennis career had been negatively affected (ie, affected ability to train and play) by severe injuries was given an average score of 3.7 (signifying ''hampered, but not extensively'' on a 1–10 point rating scale). Figure 2 presents the frequency of major injuries sustained by the players' sampled.

Frequency of occurrence of severe injuries

According to fig 2, the most frequently cited severe injuries arose in the shoulder, followed by wrist, lower back and knee. Lower limb injuries accounted for 27% of the severe injuries (down from 53% of minor injuries). Upper limb (arm, hand) and shoulder accounted for 49% of injuries (up from 28% of minor injuries).

On a rating scale of 1–10 (1 = never withdrawn due to severe injury, 10 = withdrawn from 10 or more tournaments), an average score of 2.8 was obtained, indicating that the average player in the sample had withdrawn from 1–3 tournaments due to severe injuries.

Types of treatments for severe injuries

The types of treatments sought to overcome these injuries are summarised in table 2. For these more serious injuries, some players expressed the true nature of their severity might have been missed initially for many players, adding to their frustration. A more varied range of treatments was sought, with mixed success. Some thought their problems occurred initially from over-training whereas, some players admitted to trying to return too soon from their injury, adding to their problems.

Table 2 shows that severe injuries were often treated on-site at the tournament and then followed up with appointments to the players' own doctor. The severe injury sometimes required surgery, but at some stage of the players' recovery, they self-treated, as well as received physiotherapy, massage and chiropractic services. Of note, fewer players sought the services of a sport psychologist than they did for minor injuries. Talking to others was still an option to help recovery, but ''talking to other players'' was more likely when a severe injury had occurred.

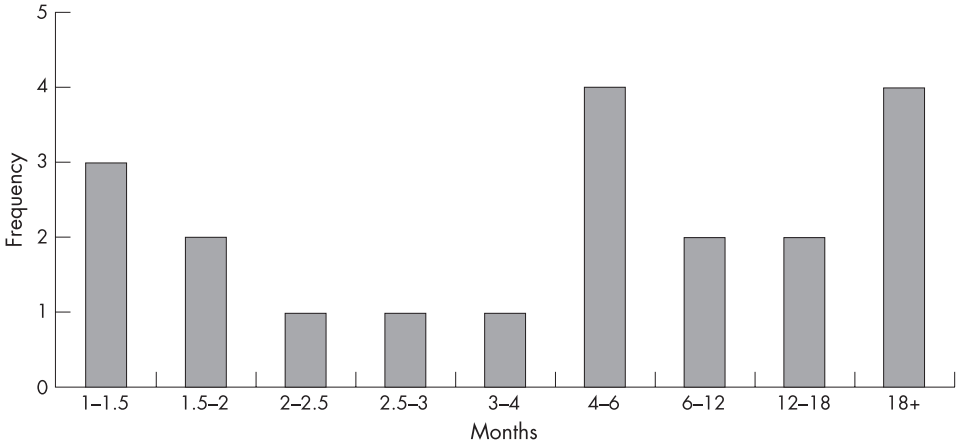

Figure 3 Players perceptions of time taken to return to previous form.

Return to tournament play

With respect to "coming back from a severe injury" (fig 3) players suggested that a return to previous best form took less than 6 months in 12 instances (out of 55 responses), and more than 6 months in eight instances. For some, previous good form was never regained after a serious injury (n = 10). Of those who were retired (n = 25), 15 attributed their decision to retire as being due to "other reasons" and not due to inability to recover from their injuries.

Player recommendations

Players' recommendations to future players regarding injuries and returning to tournament play are presented in table 3. These recommendations include generally inexpensive measures within the players' own control (ie, warm up and cool downs, consistency in their fitness/training, generally "looking after themselves").

Attribution style

A series of four χ^2 analyses showed no significant association between attribution style and the frequency of severe injuries ($\chi^2(4) = 5.218$, $p>0.05$), nor between attribution style and the number of tournaments missed due to severe injury ($\chi^2(4) = 8.725$, $p>0.05$), nor attribution style and the frequency of minor injuries ($\chi^2(4) = 2.380$, $p>0.05$). A statistically significant association between attribution style and the number of tournaments missed due to minor injuries was identified ($\chi^2(4) = 13.490$, $p<0.05$).

A χ^2 analysis indicated there was no statistical association between success (singles ranking attained) and attribution style ($\chi^2(6) = 1.517$, $p>0.05$) nor between attribution style and the number of years a player was on the professional tennis circuit ($\chi^2(6) = 4.721$, $p>0.05$).

Attitude perspectives following injury

Players' perceptions of changes in their "personal values" due to injury where explored. Table 4 summarises the types of responses players made about their "change in attitude" as a result of their injury.

From table 4, the most frequently cited attitudinal changes were for players trying to make themselves a better player (ie, listening to body/don't over-train; incorporate strength and conditioning work) and to appreciate opportunities in everyday life more often. Only 42% of players said they experienced a "change in attitude", however, with the majority claiming their attitude to life was unaffected (at this stage of their life and career).

DISCUSSION

This study found elite female tennis players had been hampered by a range of minor and severe injuries. Players reported varying abilities to prevent, and recover from, these injuries.

Table 3 Players' suggestions regarding precautions that limited exposure to severe injury (players could nominate more than one category)

Suggestion	Frequency
More stretching	9
Doing strength and conditioning/pilates	8
Having a good weight training program	8
Not playing hurt/look after injuries	8
Keeping fit	8
More sleep/rest	7
Better nutrition	5
Having a good "balance" in your life	5
Regular massage	4
Get a second opinion/seek professional help	4
Not over-training	3
Ice injuries as soon as possible	2
Having good technique/been coached well	1
Don't play on hard court surfaces	1
Don't get a cortisone injection	1
Use acupuncture	1
Have an osteopathic screening	1
Total:	76

Table 4 Types of attitudinal changes that occurred following severe injury (players could nominate more than one category)

Attitude change	Frequency
Opportunity to lead a "normal" life/appreciate life more	7
Incorporate strength and conditioning work	6
Listen to my body better/take care not to over-train	5
"Realised how much I loved tennis"	3
Enjoyed making friendships outside of tennis	3
"Realised that I needed a stable income"	2
Better planning of tournament schedule	1
"Realised how much I missed my family"	1
It was a humbling experience	1
I realised how lucky I was	1
"Realised she had a passion to coach tennis"	1
Time to finish school/university	1
Consider retiring from tennis	1
Total:	33

What is already know on this topic

- Incidences of injuries to athletes are on the increase.
- Research supports psychosocial factors, together with physical and environmental factors, might predispose an athlete to injury.

What this study adds

- This study advances our knowledge of the types of injuries suffered, and the strategies adopted to cope with them, by elite female tennis players.
- Attitudinal changes for elite tennis players following severe injury and the role that a national sporting organisation (NSO) can play to educate players and coaches on injury prevention and recovery are identified.

Lower limb injuries were the most frequently reported ''minor'' injuries, and shoulder, wrist and lower back injuries the most frequently reported ''severe'' injuries. Overtraining was frequently cited as the cause of a severe injury, however, some injuries occurred from an initial acute injury, which might not have been effectively diagnosed and/or treated.

The frustration experienced by a perceived ''lack of support'' from the National Federation,[8] and a raison d'etre for further exploration of these issues in the current study, was not evident among this sample of current or newly-retired players who generally believed that ''destiny was in their own hands''. In the main, players demonstrated a dominant ''internal attribution'' style, suggesting they considered themselves responsible for their own success and failures and, consequently, were not reliant on the resources of the National Federation for support.

Notwithstanding the majority of participants demonstrated an ''internal'' attribution style, some attributed their career success to ''external'' causes or to internal and external causes equally. These attribution styles were examined to determine if they were related to the severity of injuries received during the player's career or the number of tournaments missed due to severe, or minor, injuries. The study's findings suggest attribution style have no relationship between the occurrence of severe injuries or minor injuries, or the number of tournaments missed due to severe injury. However, players who more frequently attributed success in tennis to external causes were more likely to miss a few tournaments (and were unlikely to play through a tournament after sustaining a minor injury).

When faced with a minor injury, players who were categorised as having a mostly ''external'' attribution style missed or pulled out of tournaments more frequently than did players with an ''internal'' attribution style. This could have been due to the player paying more attention to an external source, such as the doctor's advice, because with a mostly external attribution, players are more affected by what others say to them. Players with a mostly internal attribution style might have ''listened to their body'' when suffering a minor injury, resulting in them deciding to withdraw from a tournament more frequently than did the players with a ''mostly external'' attribution style.

Further analysis examining attribution style and ''success'' (as measured by singles rankings and years on the professional tennis circuit) indicated there was no association between attribution and ranking or length of career. These findings suggest no one attribution style is ''better'' or ''worse'' for a player's propensity to injury, length of career or ultimate ranking.

In examining players' experiences, this study found 42% of players reported a change in attitude following their return to competition. The range in players' reports of these changes (table 4) suggests an individual approach should be adopted in understanding the experiences of players returning from severe injury.

Although psychological strategies were found to be useful among elite gymnasts in coping with fear,[11] tennis players in this study reported they did not frequently access a sports psychologist to assist in the recovery process. It is however possible players adopted psychological techniques and skills and future studies might explore this possibility.

''Talking to others'' was a strategy players used to help overcome injury, but this research is unable to say if it was for a ''dissociative'' (ie, to distract them by chatting about things other than the injury) or an ''associative'' purpose (ie, find out more information from others who might have suffered a similar injury). Players were more likely to talk to family, friends and coach when recovering from a minor injury, and only included consultations with other players when recovering from a severe injury.

Implications of this study's results highlight a need for TA to focus on providing player/coach education sessions on injury prevention and recovery. To this end, Health Service providers, employed by TA for the various national circuits and events, appear to be best equipped to deliver relevant information on injury related topics to players and their coaches.

With respect to limitations of this study, the researchers acknowledge a lack of generalisability due to a sample restricted to one gender and nationality. These limitations however highlight future research directions to examine the experiences of male and female elite athletes across a range of nationalities. Adopting qualitative measures in future studies to allow athletes to recall their own individual experiences has the potential of providing a fuller understanding of the recovery process for elite athletes returning to sport from minor and major injuries.

ACKNOWLEDGEMENTS

Funding for the study was provided by Tennis Australia. The authors would like to thank Ms Ros Kane for her administrative help with the project, and the players who participated in the study for their time and thoughts in contributing to this project.

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Competing interests: None declared.

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COMMENTARY

This study is an excellent contribution to our increased knowledge of womens' professional tennis. The analysis of the response of players provides very valuable data to help us understand the experience of returning to competition from injury. The conclusions from this paper are useful not only for professional players but also for coaches, trainers and National Tennis Associations interested in providing the best assistance possible for tennis players.

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