PTC
Registered Test

SPQ20

sport personality
questionnaire

> User Manual

Mental Skills Assessment

Contents

1.0　Introduction

1.1 Aim

The aim of the SPQ20 is to accurately measure a sportsperson's mental toughness and mental skills in order to help construct a mental skills performance enhancement strategy.

This aim is achieved by providing standardized measures of a sportsperson's overall mental toughness, and specific measures of their confidence and resilience, their work ethic and motives, their relationship and people skills, their ethical principles, and their use of performance enhancement techniques.

It is also achieved by designing a tool that adds value, and is easy to use, acceptable to athletes and coaches, and relevant to today's sport context.

1.2 Sport psychology background

According to Gee (2010), there is a lack of understanding among athletes, coaches, and sporting administrators about how mental skills affect performance, and how training in mental skills translates into improved performance. There are many in the sporting community who are reluctant to use a sport psychologist, and there is a general lack of understanding about the techniques used in sport psychology.

Many coaches believe that sport psychology is only for problem athletes and not part of a general performance enhancement strategy. This lack of understanding fuels a general lack of confidence in what sport psychology can deliver. Sport psychologists must become more effective in educating and informing coaches and athletes about the mechanisms that influence performance and explaining how sport psychology services can enhance the performance of all athletes.

Counterproductive psychological states negatively affect an athlete's performance. For example, athletes require a moderate amount of anxiety to perform optimally but too much anxiety is detrimental to success. Elevated anxiety produces narrowing of the perceptual field, and disrupts fine motor functioning, blood flow, and decision making. Psychological factors act like a strong headwind preventing an athlete from performing in a fluid, automated, and coordinated fashion.

Athletes can learn how to control and minimize the negative effects of psychological factors using sport psychology techniques. An athlete with a lower absolute performance potential can outperform a physiologically superior athlete by minimizing the influence of psychological performance inhibitors. Athletes who are able to control the effects of psychological impediments such as lowered confidence, elevated anxiety, distractions, and motivation experience a lower drop in performance than athletes who surrender to these impediments.

Sport psychology is intended to help athletes compete as close as possible to their 100 percent theoretical potential. A key issue is the ability to handle stress, pressure, anxiety, and nerves associated with competition. The role of sport psychology is to provide athletes with the necessary tools and strategies to handle psychological factors as they arise.

According to Dosil (2008), the role of the sport psychologist is to strengthen the toughness of the tough-minded and toughen up the soft-minded. To achieve this, it is helpful for the sport psychologist to be able to measure the psychological level/mental toughness of athletes in order to commence work with them.

1.3 Mental skills and toughness

The construction of the SPQ20 was guided by a framework of mental skills and mental toughness attributes that emerged from a literature search that identified clusters of attributes covering personality traits, motives, values, trait emotional intelligence, and mental/performance enhancement skills, for example:

- work ethic, achievement drive, competitiveness, conscientiousness, and ethical principles;

- how extravert and outgoing an athlete is, how cooperative and agreeable they are, and how skilled they are at managing relationships with other athletes and coaches;

- flexibility and adaptability, awareness of strengths and weaknesses, and openness to ideas and suggestions from coaches and competitors;

- dimensions of trait emotional intelligence such as ability to read, use, and manage their own and other people's feelings and emotions;

- confidence, resilience, whether they are affected by fear of failure, and whether they exhibit symptoms of burnout and stress;

- how far an athlete makes use of common psychological skills/performance enhancement techniques such as imagery, self-talk, and goal-setting.

The literature search led to the development of an assessment test measuring twenty attributes of mental skills and mental toughness and consisting of twenty scales and 168 items. Table 1 defines what each of the scales in the instrument measures. Analysis of the data collected using this instrument led to the creation of a model of mental skills based on the results of exploratory factor analysis (EFA). Chapter 5 provides details of the EFA.

1.4 SPQ20 model

The SPQ20 factor model of mental skills and mental toughness comprises four key areas that can be thought of as critical attributes/success factors that help create an attitude and mindset, and produce behaviors and competencies that lie behind and help sustain successful performance (Figure 1).

Table 1. SPQ20 scale definitions

Scale	High Score Meaning
Achievement	Motivated to succeed, makes sacrifices to achieve excellence.
Adaptability	Open to new ideas and suggestions, keeps up with technical developments.
Competitiveness	Enjoys competing, wants to be better than others, aims to win.
Conscientiousness	Prepares thoroughly, shows self-discipline, stays with the plan.
Visualization	Uses imagery to rehearse performance, stay calm, and perform well.
Intuition	Uses instincts and intuition to help make performance decisions.
Goal Setting	Sets priorities and goals to help manage learning and development.
Managing Pressure	Handles anxiety and tension before important events effectively.
Self-Efficacy	Displays self-confidence and bounces back from setbacks quickly.
Fear of Failure	Manages fear of failing, letting people down, and not living up to expectations.
Flow	Demonstrates ability to immerse self in performance and play in the zone.
Stress Management	Manages to handle stress effectively, follows a healthy lifestyle.
Emotions	Regulates feelings and emotions to maximize performance.
Self-Talk	Talks positively to maintain composure, stay focused, and perform well.
Self-Awareness	Asks for feedback, demonstrates awareness of strengths and limitations.
Ethics	Exhibits strong principles, behaves ethically, shows sportsmanship.
Empathy	Listens to and shows concern for other people's views and feelings.
Relationships	Develops relationships, engages in conversation, socializes with other athletes.
Aggressiveness	Performs determinedly, tends to overawe and intimidate opponents.
Power	Enjoys having authority over people, aspires to leadership positions.

Achievement and Competitiveness

This factor comprises seven attributes or dimensions. Four of these dimensions are personality traits and three are psychological or mental skills. Athletes who score high on this constellation of attributes are motivated to achieve, competitive, conscientious, and adaptable. These are facets of two of the Big Five personality factors--Conscientiousness and Openness. High scorers on this factor also make use of two key psychological or mental skills--imagery and goal-setting--to achieve a psychological edge, and they use their instincts and intuition. In summary, this factor appears to be a mix of personality attributes, trait emotional intelligence, and two specific mental skills/performance management techniques.

Athletes who are motivated to achieve demonstrate an extraordinary work ethic; they get the most out of training and practice by being enthusiastic, determined, and goal-driven; they review performance continuously; they celebrate successes and good performances; and, they demonstrate through behavior and actions that they want to learn and be the best that they can be. They analyze their strengths and weaknesses in relation to other athletes and where they need to improve to gain competitive edge; they focus on performing well rather than winning; they learn to control their explanations for winning and losing; and, they enjoy the buzz from competing and performing well in front of others.

Confidence and Resilience

This factor comprises eight attributes that provide a rich picture of an athlete's belief, confidence, and resilience. These attributes are facets of the Big Five personality factor known as Neuroticism or Emotional Stability, facets of trait emotional intelligence, and facets of psychological/mental skills. Athletes who score high on this constellation of attributes possess a high degree of self-awareness and possess an unshakable self-belief; they are able to regulate their feelings and emotions; they manage fear of failure; they handle the pressure and stress of competition; and, they are able to get into the zone, maintain composure, and stay focused.

Elite performers are more consistent and superior at remaining determined, focused, confident, and in control under pressure (Jones et al, 2002). They view nervousness as a natural and essential part of strong competitive performance. During competition, they focus on performing to the best of their ability rather than winning. When under pressure, they step back, get things in perspective, and if necessary develop a new game plan. During training and competition, they are able to focus on the task in hand and eliminate possible distractions from what is going on around them. They trust and act on their instincts and intuition, and they are prepared to let go and take calculated risks. They get themselves feeling positive and confident before performing by, for example, recreating past positive experiences. They rehearse beforehand how they see themselves performing and focus on enjoying competing and performing.

Interaction and Sportsmanship

This factor measures an athlete's people skills and ethical principles in sport. Athletes who score high on this factor are outgoing and agreeable individuals who value fairness, integrity, responsibility, and respect. They take an interest in people and enjoy good relationships with coaches and other athletes.
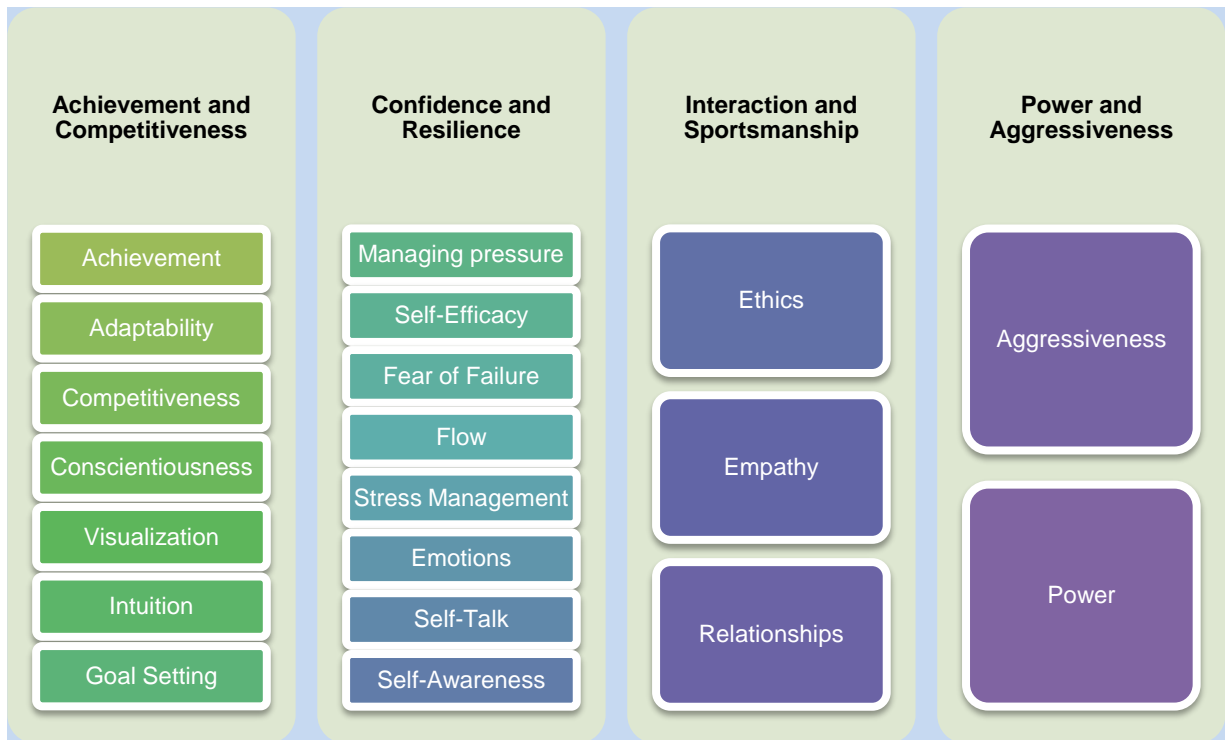
Athletes with good people skills connect face-to-face with people; they initiate interactions and communications with people rather than waiting for other people to come to them. They

develop strong relationships with their coach, team mates, commentators, and sponsors. They make time to have fun with, show interest in, and care for the people who matter most to them. They play fairly using tactics that are in accord with the spirit of their sport. They stick to the rules and regulations of their sport and avoid gamesmanship. They show loyalty to team mates, sport, community, society, and family.

Power and Aggressiveness

This factor measures whether an athlete is motivated by having power and control over people, and how aggressively they perform. Athletes who score high on this factor are prepared to step up, walk the talk, and set an example for the rest of the team. They demonstrate their passion for the game by giving 100 percent every time they train and compete. They practice hard to improve their game and gain confidence to play well. They know when to play aggressively and when to play safe.

Figure 1. SPQ20 framework of mental skills

Achievement and Competitiveness	Confidence and Resilience	Interaction and Sportsmanship	Power and Aggressiveness
Achievement	Managing pressure	Ethics	Aggressiveness
Adaptability	Self-Efficacy		
Competitiveness	Fear of Failure	Empathy	
Conscientiousness	Flow		Power
Visualization	Stress Management	Relationships	
Intuition	Emotions		
Goal Setting	Self-Talk		
	Self-Awareness		

1.5 Comparison with other frameworks

Table 2 shows how the SPQ20 framework of mental skills and mental toughness attributes compares with the frameworks of Fletcher and Sarkar (2012), Jones et al (2007), Clough et al (2002), and Lesyk (1998).

Based on qualitative research with Olympic champions, Fletcher and Sarkar (2012) propose that many psychological factors (personality, motivation, confidence, focus, and perceived social support) protect the world's best athletes from the potential negative effect of stress by influencing how they think about and respond to challenges. Fletcher and Sarkar say that these psychological factors "promote facilitative responses that precede optimal sport performance".

Jones et al. (2002, 2007) employed qualitative methods to develop their framework of mental toughness that consists of two core elements and attributes covering self-belief, desire and motivation, performance focus, lifestyle-related factors, dealing with pressure, anxiety, and pain/hardship associated with top-level performance. The first core element or building block of mental toughness is a general ability or attitude enabling the athlete to cope with and balance the demands that a modern-day sporting career places on an athlete and maintain a whole-life balance. The second element is the possession of superior psychological strategies and mental skills that produce consistent high-level and successful performances.

According to Clough et al (2002), the mentally tough person tends to be sociable and outgoing; they are able to remain calm and relaxed; they are competitive in many situations; they have lower anxiety levels than others; they have a high sense of self-belief and an unshakeable faith that they control their own destiny; and, they can remain relatively unaffected by competition or adversity. The MTQ48 mental toughness questionnaire assesses six attributes: challenge, commitment, control, emotional control, life control, confidence, confidence in abilities, and interpersonal confidence.

Lesyk's (1998) Nine Mental Skills of Successful Athletes framework identifies three levels of skills. Level 1 skills comprise a broad base necessary for achieving long-range goals, learning and developing as an athlete, and sustaining daily practice (attitude, motivation, goals and commitment, and people skills). Level 2 skills are used immediately before performance (self-talk, mental imagery), and Level 3 skills are used during performance (dealing with anxiety, dealing with emotions, and concentration).

These frameworks along with other research suggest a number of common core elements or building blocks of mental toughness.

First, successful athletes need to have a high level of work ethic and achievement motivation. In the SPQ20, this dimension of mental skills is captured by 3 scales labeled Achieving, Competitive, and Conscientious. In Jones et al's framework, this dimension is captured by attributes labeled Focus, Using Long-Term Goals as the Source of Motivation, and Pushing Yourself to the Limit. Clough at al refer to Challenge and Commitment, and Lesyk's attributes are Maintain a High Level of Self-Motivation, and Set High, Realistic Goals.

Second, successful athletes need to possess confidence and self-belief and they need to be able to regulate their emotions and handle pressure and stress. The SPQ20 has five scales that measure these attributes: Managing Pressure, Self-Efficacy, Fear of Failure, Stress Management, and Emotions. In Jones et al's framework, the relevant attributes are defined as Belief, Handling Pressure, Regulating Performance, Awareness and Control of Thoughts and Feelings, and Handling Failure. In the MTQ48, the scales are labeled Emotional Control and Confidence. In Lesyk's framework, the relevant skills are defined as Manage Anxiety Effectively, and Manage Emotions Effectively.

Third, successful athletes need to possess interpersonal skills/ability to manage relationships with the people that they interact with. In the SPQ20, the relevant scales are labeled Empathy and Relationships. In Jones et al's framework, relationship and people skills are implicit in some of the dimensions and subcategories such as attitude and mindset but they are not identified as a distinct skill set. In the MTQ48, mentally tough individuals are

defined as sociable and outgoing and the relevant scale is labeled Interpersonal Confidence. In Lesyk's framework, one of the nine skills is called Deal Effectively with People.

Fourth, successful athletes need to be able to use psychological performance management and enhancement skills such as imagery, goal-setting, and self-talk. In the SPQ20, these are labeled Visualization, Goal-Setting, and Self-Talk. In Jones et al's framework, goal-setting is part of Using Long-Term Goals as the Source of Motivation, and imagery and self-talk are an attribute of other subcategories (for example, Awareness and Control of Thoughts and Feelings). In Lesyk's framework, Use Positive Self-Talk and Use Positive Mental Imagery are two of the nine key skills. The MTQ48 does not have specific scales that measure these skills.

In summary, the four building blocks of mental toughness can be summarized as follows. If you want to succeed in sport at the highest level, you need as a minimum to have work ethic and achievement drive; you need to be resilient and have the ability to manage your feelings and emotions; you need to have interpersonal and relationship skills; and, you need to understand the purpose of and be able to utilize psychological skills such as imagery and self-talk.

1.6 Questionnaire development

The SPQ20 was designed to meet the key criteria in the EFPA Review Model for the Description and Evaluation of Psychological Tests (Bartram, 2002). The EFPA Review Model was produced to support and encourage the process of harmonizing the reviewing of tests. It provides a standard set of criteria to assess the quality of modern psychometric tests. These cover the common areas of test review such as norms, reliability, and validity.

The development of the SPQ20 questionnaire has taken place in 6 work streams. These work streams and their key elements are shown in Figure 2.

Workstream 1
A literature search was conducted and a framework of mental skills was developed as described above. A trial questionnaire was constructed with twenty mental skills assessment scales and an impression management scale. Each scale consisted of eight items with a mix of positively and negatively phrased items. The items in the questionnaire were designed to be short, simple, transparent statements about behaviors in sport. The core items for the impression management scale were selected from the International Personality Item Pool (Goldberg, 1999). Respondents assess how far each statement describes their behavior using a 5-point Likert scale.

Never/almost never	Occasionally	Fairly often	Very often	Always/almost always

I choke under pressure

The trial questionnaire of 168 items with items in random order was published as a free online assessment with a summary computer-generated feedback report.

Table 2. Frameworks of mental skills and toughness

SPQ20	Fletcher and Sarkar (2012)	Jones et al (2007)	Clough et al (2002)	Lesyk (1998)
Achievement	Positive personality	Belief	Challenge	Choose and maintain a positive attitude
Adaptability	Motivation	Focus	Commitment	
Competitiveness	Confidence	Using long-term goals as the source of motivation	Control	Maintain a high level of self-motivation
Conscientiousness	Focus		Emotional control	
Visualization	Perceived social support	Controlling the environment	Life control	Set high, realistic goals
Intuition		Pushing yourself to the limit	Confidence	Deal effectively with people
Goal setting		Handling pressure	Confidence in	Use positive self-talk
Managing pressure		Regulating performance	abilities	Use positive mental imagery
Self-efficacy		Awareness and control of thoughts and feelings	Interpersonal confidence	Manage anxiety effectively
Fear of failure control				Manage emotions effectively
Flow		Handling failure		Maintain concentration
Stress management		Handling success		
Emotions				
Self-talk				
Self-awareness				
Ethics				
Empathy				
Relationships				
Aggressiveness				
Power				

Figure 2. Key phases in SPQ20 development

Workstream 1	
Literature search	Trial instrument

Workstream 2	
Analysis and validation	Finalized instrument

Workstream 3	
Norms	Support materials

Workstream 4	
BUROS review	BPS review

Workstream 5	
Materials revision	Enhanced etesting platform

Workstream 6
Additional construct validation
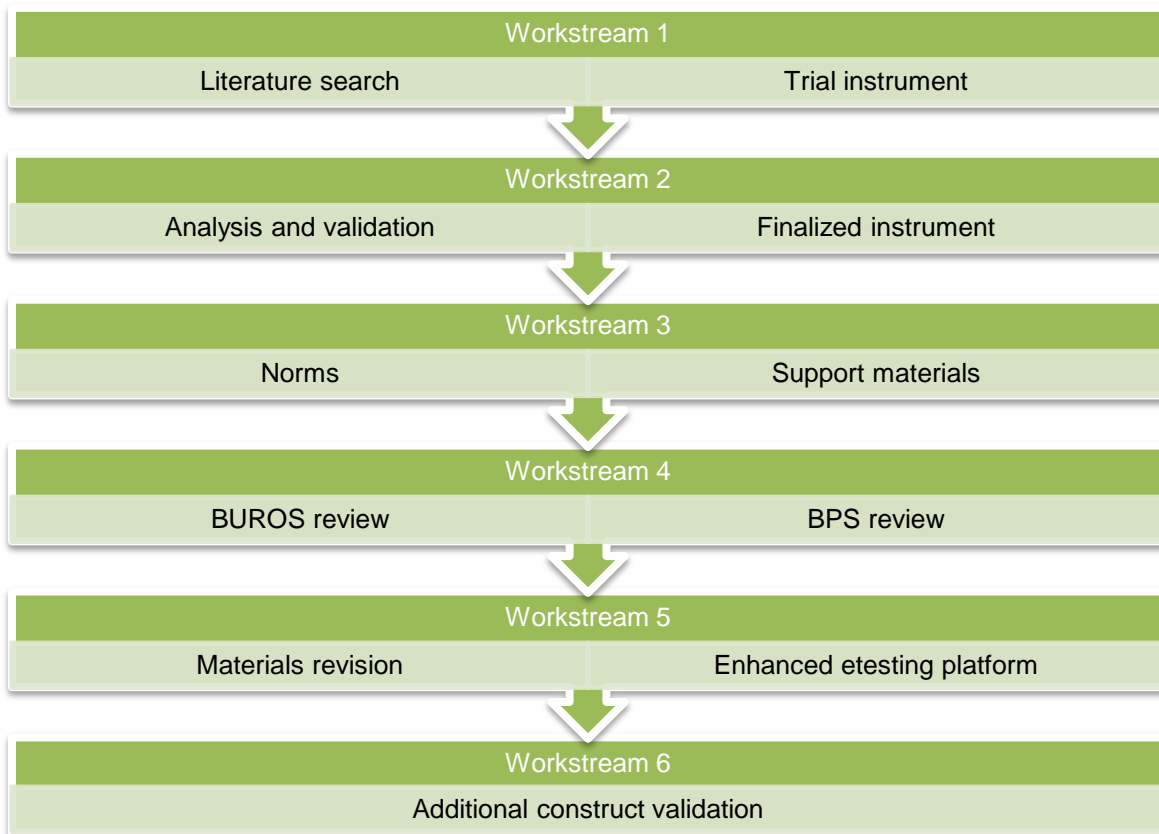
Workstream 2

In the second phase of development, we analyzed the reliability of the scales at regular intervals as the sample size grew and removed poorly performing items to improve scale reliability. We carried out Exploratory Factor Analysis (EFA) to examine the factor structure of the instrument. Construct validity was investigated by analyzing the relationship between SPQ20 scale scores and marker variables from the International Personality Item Pool. Criterion validity was evaluated by looking at the relationship between scale scores and athlete and coach performance ratings. Chapter 5 discusses the technical properties of the questionnaire.

Workstream 3

The comparison group was created from an international sample of 6,000 athletes who completed the online assessment at sportsconfidence.biz between 2003 and 2010. Respondents aged under 16 or over 65 were deleted from the sample. Duplicate cases were also identified and deleted. This left a sample of just under 9,000 athletes. Over two thirds of respondents were from the United States and the United Kingdom, and about one fifth of respondents were from Canada and Australia. A comprehensive feedback report based on the SPQ20 factor model was developed, and this was launched online with a downloadable booklet providing practical performance improvement tips (see Chapter 4 for details).

Workstream 4

The assessment was submitted to the British Psychological Society Psychological Testing Centre for Review and the Buros Center for Testing.

British Psychological Society (2012)

BPS reviews evaluate tests using a 5-star rating system where one star is defined as inadequate and five stars are defined as excellent. In the summary instrument evaluation, overall reliability, criterion-related validity, norms, and quality of documentation received 3-star ratings defined as adequate/reasonable. The quality of materials was evaluated as 4-stars (good) and construct validity was evaluated as 3.5 stars in between adequate and good. Key improvement suggestions were that the rationale behind the questionnaire and the development of the questionnaire needed more explanation; more empirical data was needed on validity and reliability; and, more information was needed on the characteristics of the norm group.

Buros Center for Testing (2011)

Reviews by the Buros Center for Testing comprise separate evaluations by two independent reviewers. Both reviewers gave favorable evaluations of the SPQ20. In the review summary, the first reviewer stated that the SPQ20 "promises to be a useful tool for sport psychologists and coaches in advising and working with athletes", and the second reviewer stated that the instrument "shows promise as an additional tool for athletes, coaches, and sport psychologists who seek to describe and improve athletic performance". The reviewers suggested that the SPQ20 scales should be correlated with additional tests measuring similar constructs; empirical research examining the use of the SPQ20 in interventions should be carried out; and, the user manual should discuss the factor structure with theoretical models and research in the field.

Workstream 5

The user manual was revised, a new test taker preparation guide was developed, and the norms were revised. The instrument was implemented on an enhanced e-testing platform and work on an app version of the assessment began. We plan to launch IOS and Android app versions of the assessment in 2017.

Workstream 6

We carried out a further program on the construct validity of the instrument using marker variables of mental toughness attributes, sport imagery ability, and resilience.

2.0 Administration

The SPQ20 can only be administered online via the Internet. There are two ways that athletes can be tested.

2.1 Administered by professional

Where the test is being administered to a group of athletes by a sports psychologist or coach, the athlete receives an email from the test administrator containing a hyperlink which takes the test taker to a testing screen with instructions on how to complete the test. The test taker then goes through a series of screens with the questions and completes a personal details form.

Once the assessment test has been completed, the athlete may view or download the computer-generated feedback report if the online testing service has been set up to provide feedback reports to test takers. The online testing system can be set up by a test administrator to have feedback reports emailed to the test administrator, or to the test taker, or to the test taker and to the test administrator.

2.2 Direct access

Athletes can also purchase a SPQ20 assessment test direct from sportsconfidence.biz. In this case, the athlete is presented with instructions about how to complete the test, does the test, and then completes a personal details form. The athlete then pays for the assessment by credit card and once the transaction has been processed, the athlete can view and download the feedback report in PDF format. Test takers can also request a copy of their feedback report to be emailed to them.

2.3 Scoring and norming

The scoring and generation of feedback reports are done online. An athlete's SPQ20 raw scores are compared to a very large international comparison group of athletes who have answered the questionnaire. Details of this norm group are given in the Norms section in Chapter 6.

3.0 Scale Descriptions

Each scale description table in this chapter contains elements covering the meaning of low scores, moderate scores, and high scores.

3.1 Scale items

The SPQ20 questionnaire has 8 items per scale with equal numbers of positively and negatively keyed items. The tables below present examples of the items.

3.2 Relationships with other scales

The final section of each table shows other scales that the scale correlates highly with. These correlations are from the international comparison group. The full correlation matrix is shown in Table 6 in Chapter 5.

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Factor 1. Achievement and Competitiveness

Scale 1. Achievement

High scorers

Description
Want to make their mark, give total commitment, keep on trying to do their best, and are willing to make personal sacrifices.

Typical positive item
I want to make my mark.

Moderate scorers

Description
Possess a fair amount of achievement drive but maintain a balance between sport and other parts of their lives.

Or
Demonstrate motivation to achieve in some practice situations and competitions but not in others.

Low scorers

Description
Are less concerned about getting on, doing well, and making their mark. Do not push themselves and may be perceived as lacking motivation to fulfill their potential.

Typical negative item
I give less than 100 percent.

Relationships with other scales

Strongest correlations with   Conscientiousness
                                     Competitiveness
                                     Self-Talk

Factor 1. Achievement and Competitiveness

Scale 2. Adaptability

High scorers

Description
Keep up with technical developments, experiment with new ideas and techniques, and take risks in order to succeed.

Typical positive item
I experiment with new ideas and techniques.

Moderate scorers

Description
Are as change-oriented and adaptable as the average athlete.

Or
Adapt fairly quickly in some practice situations and competitions but not in others.

Low scorers

Description
Prefer stability and continuity to frequent change, are slow to accept innovation in sport, and are somewhat reluctant to take risks.

Typical negative item
I avoid using the latest performance aids.

Relationships with other scales

Strongest correlations with
Achievement
Competitiveness
Conscientiousness

Factor 1. Achievement and Competitiveness

Scale 3. Competitiveness

High scorers

Description
Enjoy competing against others, dream about winning, and long to be the best.

Typical positive item
I want to be in the winner's circle.

Moderate scorers

Description
Are moderately spirited and competitive.

Or
Enjoy winning but do not regard it as the most important thing.

Low scorers

Description
Get satisfaction from participating and are less concerned about whether they win or lose.

Typical negative item
I lack the will to win.

Relationships with other scales

Strongest correlations with

Achievement
Self-Talk
Conscientiousness

Factor 1. Achievement and Competitiveness

Scale 4. Conscientiousness

High scorers

Description
Prepare thoroughly, train hard, and stay with the plan.

Typical positive item
I am reliable and dependable.

Moderate scorers

Description
Are moderately responsible and hard-working.

Or
Can usually be relied on to fulfill their responsibilities and commitments.

Low scorers

Description
Tend to lack self-discipline and can't always be relied on to fulfill their responsibilities and commitments.

Typical negative item
I feel unprepared before competing.

Relationships with other scales

Strongest correlations with
Achievement
Competitiveness
Self-Talk

Factor 1. Achievement and Competitiveness

Scale 5. Visualization

High scorers

Description
Use visualization to rehearse performances and regulate their emotions.

Typical positive item
I use my imagination to rehearse an upcoming performance.

Moderate scorers

Description
Use visualization to a moderate extent.

Or
Have found that visualization techniques have helped in some situations but not others.

Low scorers

Description
Have not learned how to use visualization techniques successfully.

Typical negative item
I experience few benefits from using imagery/visualization.

Relationships with other scales

Strongest correlations with   Competitiveness
Self-Talk
Achievement

Factor 1. Achievement and Competitiveness

Scale 6. Intuition

High scorers

Description
Use their instincts and intuition to help guide their performance.

Typical positive item
I let my deep-down inner feelings guide me.

Moderate scorers

Description
Use feelings and emotions to a moderate extent.

Or
Use facts and information as well as feelings and emotions when deciding what to do.

Low scorers

Description
Prefer to analyze situations rather than rely on feelings and emotions.

Typical negative item
I ignored my gut instincts.

Relationships with other scales

Strongest correlations with	Self-Efficacy
	Visualization
	Conscientiousness

Factor 1. Achievement and Competitiveness

Scale 7. Goal Setting

High scorers

Description
Set objectives around the skills they need to master and measure progress regularly against these objectives.

Typical positive item
I measure progress against my objectives.

Moderate scorers

Description
Use goal setting to a moderate extent.

Or
Have a general set of goals that they are working towards.

Low scorers

Description
Have not learned how to use goal setting as a performance improvement tool.

Typical negative item
I fail to prioritize my goals.

Relationships with other scales

Strongest correlations with   Self-Talk
                                     Conscientiousness
                                     Self-Awareness

Factor 2. Confidence and Resilience

Scale 8. Managing Pressure

High scorers

Description
Are able to relax and stay calm and confident before competitions.

Typical positive item
I feel confident before competitions.

Moderate scorers

Description
Stay reasonably calm before important events.

Or
Manage to stay calm in some situations but have difficulty in others.

Low scorers

Description
Have difficulty staying calm and in control before important events.

Typical negative item
I tighten up before competitions.

Relationships with other scales

Strongest correlations with
Fear of Failure
Self-Efficacy
Flow

Factor 2. Confidence and Resilience

Scale 9. Self-Efficacy

High scorers

Description
Display a high degree of confidence and self-belief and recover quickly from setbacks.

Typical positive item
I bounce back quickly from setbacks.

Moderate scorers

Description
Show a fair degree of confidence and self-belief.

Or
Display confidence and self-belief in some situations but not in others.

Low scorers

Description
Lack confidence and self-belief and suffer mental lapses.

Typical negative item
I get down on myself too easily.

Relationships with other scales

Strongest correlations with   Fear of Failure
Flow
Self-talk

Factor 2. Confidence and Resilience

Scale 10. Fear of Failure

High scorers

Description
Are confident of performing well and showing their ability, and do not worry about living up to other people's expectations.

Typical positive item
I am confident of succeeding and gaining people's trust.

Moderate scorers

Description
Do not usually worry about failing.

Or
Conquer fear of failure in some situations but not others.

Low scorers

Description
Worry about not performing well in front of other people.

Typical negative item
I am afraid of failing and feeling ashamed and embarrassed.

Relationships with other scales

Strongest correlations with   Self-Efficacy
                                    Flow
                                    Stress Management

Factor 2. Confidence and Resilience

Scale 11. Flow

High scorers

Description
Feel that they are currently playing in the zone.

Typical positive item
I feel my play rise to a new level.

Moderate scorers

Description
Are performing reasonably well but falling short of playing in the zone.

Or
Have had moments in competitions when they have felt like they are playing in the zone.

Low scorers

Description
Feel they are not performing to the best of their ability at the present point in time.

Typical negative item
I fail to perform to the best of my ability.

Relationships with other scales

Strongest correlations with
Self-Efficacy
Self-Talk
Fear of failure

Factor 2. Confidence and Resilience

Scale 12. Stress Management

High scorers

Description
Follow a healthy lifestyle, get sufficient sleep and rest, and take care not to burn out.

Typical positive item
I follow a healthy lifestyle.

Moderate scorers

Description
Manage stress as effectively as the average athlete.

Or
Manage to handle stress in their lives and follow a reasonably healthy lifestyle.

Low scorers

Description
Display the physical and emotional symptoms of burnout.

Typical negative item
I feel physically and emotionally exhausted.

Relationships with other scales

Strongest correlations with
Self-talk
Emotions
Self-efficacy

Factor 2. Confidence and Resilience

Scale 13. Emotions

High scorers

Description
Manage to regulate their feelings and emotions successfully.

Typical positive item
I have a successful technique for controlling my feelings and emotions.

Moderate scorers

Description
Manage mood changes as effectively as the average athlete.

Or
Manage to control their feelings and emotions in some situations but not others.

Low scorers

Description
Have not found a successful technique for regulating their feelings and emotions.

Typical negative item
I fail to control my emotions.

Relationships with other scales

Strongest correlations with   Stress Management
                                       Self-Efficacy
                                       Flow

Factor 2. Confidence and Resilience

Scale 14. Self-Talk

High scorers

Description
Use positive self-talk successfully to manage performance stress and anxiety.

Typical item
I tell myself not to give up.

Moderate scorers

Description
Use positive self-talk to a moderate extent.

Or
Use self-talk successfully in some situations but sometimes find negative thoughts and self-talk interfering with performance.

Low scorers

Description
Allow negative thoughts and self-talk to interfere with their performance.

Typical negative item
I talk myself into giving up.

Relationships with other scales

Strongest correlations with   Self-Efficacy
                                      Stress Management
                                      Flow

Factor 2. Confidence and Resilience

Scale 15. Self-Awareness

High scorers

Description
Are aware of their strengths and weaknesses and where they need to improve.

Typical positive item
I reflect on past performances.

Moderate scorers

Description
Show a reasonable degree of self-awareness.

Or
Demonstrate self-awareness in some situations but not others.

Low scorers

Description
Are unaware of their strengths and weaknesses and where they need to improve.

Typical negative item
I am reluctant to ask for feedback.

Relationships with other scales

Strongest correlations with
Self-talk
Emotions
Goal Setting

Factor 3. Interaction and Sportsmanship

Scale 16. Ethics

High scorers

Description
Display sportsmanship, try to do the right thing, and avoid performance enhancement drugs.

Typical positive item
I display strong ethics.

Moderate scorers

Description
Show a reasonable degree of ethical awareness.

Or
Act in an ethical manner in some situations but not others.

Low scorers

Description
Are prepared to take risks and behave unethically in order to succeed.

Typical negative item
I believe the ends justify the means.

Relationships with other scales

Strongest correlations with   Empathy
                                     Self-Awareness

Factor 3. Interaction and Sportsmanship

Scale 17. Empathy

High scorers

Description
Go out of their way to help people, take account of people's views and feelings, and praise others when they perform well.

Typical positive item
I go out of my way to help people.

Moderate scorers

Description
Show a reasonable degree of empathy and warmth.

Or
Show empathy and warmth in some situations but not others.

Low scorers

Description
Are independent-minded and tend to put their own interests first.

Typical negative item
I ignore other people's views and ideas.

Relationships with other scales

Strongest correlations with   Conscientiousness
                                     Achievement
                                     Self-Awareness

Factor 3. Interaction and Sportsmanship

Scale 18. Relationships

High scorers

Description
Enjoy being where the action is, find it easy to talk to people, and use sport as a platform for building relationships.

Typical positive item
I am warm and friendly to other athletes.

Moderate scorers

Description
Are moderately extravert and outgoing.

Or
Enjoy the company of others but also value their privacy.

Low scorers

Description
Are quiet and reserved in groups and dislike being the center of attention.

Typical negative item
I avoid socializing with other athletes.

Relationships with other scales

Strongest correlations with   Stress Management
Self-Talk
Self-Awareness

Factor 4. Power and Aggressiveness

Scale 19. Power

High scorers

Description
Are motivated by exercising power and authority over people.

Typical positive item
I want to have authority over people.

Moderate scorers

Description
Are moderately interested in exercising control.

Or
Show an aptitude for team leadership in some situations but not others.

Low scorers

Description
Tend not to be motivated by power and authority.

Typical negative item
I avoid putting myself forward for leadership positions.

Relationships with other scales

Strongest correlations with   Competitiveness
                                    Self-talk
                                    Relationships

Factor 4. Power and Aggressiveness

Scale 20. Aggressiveness

High scorers

Description
Play aggressively and tend to intimidate opponents.

Typical positive item
I am an aggressive competitor.

Moderate scorers

Description
Play moderately aggressively.

Or
Play aggressively in some situations but not others.

Low scorers

Description
Tend not to display an aggressive attitude or perform aggressively.

Typical negative item
I believe that it is wrong to show aggression.

Relationships with other scales

Strongest correlations with   Power

Response Style

Scale 21. Impression Management

High scorers

Description
Answer questions honestly and self-critically.

Typical positive item
I am a model athlete.

Moderate scorers

Description
Answer questions as honestly as the average athlete.

Or
Have a reasonably accurate picture of their strengths and weaknesses.

Low scorers

Description
Present a less honest and self-critical assessment of their strengths and weaknesses.

Typical negative item
I take advantage of people.

Relationships with other scales

Strongest correlations with   Conscientiousness
                                     Empathy
                                     Managing Pressure

4.0 Interpretation and Feedback Report

This chapter describes how the SPQ20 sten scoring system works and explains how the SPQ20 computer-generated feedback report is constructed.

4.1 Sten scores

The SPQ20 uses the Standard Ten (sten) scoring approach. To help professional users and athletes understand what different sten scores mean, the SPQ20 interpretive model breaks the sten range into five categories. The meaning of each of the categories is defined using Red Amber Green (RAG) traffic light assessment ratings and descriptions of mental skills level and development implications (Table 3).

The table below illustrates the approach, for example:

- A sten score of 8 appearing in the green area of the relevant SPQ20 scorecard indicates that the athlete has Level 5 mental skills which they should make the most of / exploit.

- A sten score of 5 appearing in the amber area of the relevant SPQ20 scorecard indicates that the athlete has Level 3 mental skills which they should endeavor to work on.

- A sten score of 4 appearing in the amber red area of the relevant SPQ20 scorecard indicates that the athlete has Level 2 mental skills which they should try to develop.

Table 3. SPQ20 scoring approach

Sten Range	RAG Rating	Mental Skill Level	Development
8-10	Green	5 Very high	Capitalize on
7	Amber Green	4 High	Round off
5-6	Amber	3 Average	Work on
4	Amber Red	2 Low	Develop
1-3	Red	1 Very low	Improve

Table 4 shows how an athlete's sten scores relate to percentiles. For example, a sten score of 6 indicates that the athlete's mental skills are more developed than those of about 60% of athletes in the international the comparison group.

Table 4. Relationship between stens and percentiles

Sten Score	Higher than
10	99 % of athletes in the comparison group
9	95 % of athletes in the comparison group
8	90 % of athletes in the comparison group
7	75 % of athletes in the comparison group
6	60 % of athletes in the comparison group
5	40 % of athletes in the comparison group
4	25 % of athletes in the comparison group
3	10 % of athletes in the comparison group
2	5 % of athletes in the comparison group
1	1 % of athletes in the comparison group

4.2 Feedback report

The SPQ20 computer-generated feedback report has six sections.

Section 1
Gives a brief introduction to the questionnaire explaining what the instrument measures and how the scoring system works.

Section 2
Provides concise descriptions of what each of the twenty SPQ20 scales measure.

Section 3
Provides an executive summary of the results of the assessment covering seven areas: Overall Mental Skills, Leadership Potential, Achievement and Competitiveness, Confidence and Resilience, Interaction and Sportsmanship, Power and Aggressiveness, and Response Style.

Section 4
Assesses the athlete's overall mental skills by classifying athletes into four groups or styles shown on a matrix with axes of Confidence and Resilience and Achievement and Competitiveness. These two factors measure the athlete's current level of confidence and self-belief, and how driven they are to achieve and win. The four styles are Confident Achiever, Tense Achiever, Easygoing Contestant and Tense Contestant.

This mental skills' matrix provides a visual summary of an athlete's mental toughness and what they need to do and how far they need to travel to become a Confident Achiever. Figure 2 illustrates the approach for an athlete who comes out as a borderline Tense Contestant.

This section also contains two scorecards showing the athlete's overall factor scores and their scores on the scales that make up the two factors. The overall factor scores are the averages of the scale scores.

Figure 3 illustrates a completed scorecard for the Achievement and Competitiveness factor. Below each scorecard, there are short narrative descriptions of the athlete's position on the factor and the scales that contribute to the factor. There are five categories of interpretive description linked to the five sten ranges/traffic light assessments in the profile chart.

Section 5
Measures team leadership/captaincy potential by classifying athletes into four groups shown on axes of Power and Aggressiveness, and Interaction and Sportsmanship. These factors measure an athlete's interest in having power and control over people and their interest in forming relationships, working cooperatively, and acting ethically. The four styles are Democratic Captain, Controlling Captain, Team Player and Individual Player. Like the previous section, this section contains two scorecards showing the athlete's overall factor scores and their scores on the scales that make up the two factors.

Section 6
Gives guidance on development and access to a downloadable booklet with reading recommendations and practical tips and suggestions for performance improvement (Figure 4).

Figure 2. SPQ20 mental skills matrix

Tense Achiever. Athletes in the upper-left part of this amber zone excel in motivation to achieve but lack confidence and resilience. They have the drive to work hard to realize their potential, but at the present point in time, they lack self-belief.

Confident Achiever. Athletes located in the upper-right part of this green zone excel in competitiveness and mental resilience. They feel positive about their game, are mentally strong, are motivated to achieve, and have the will to win.
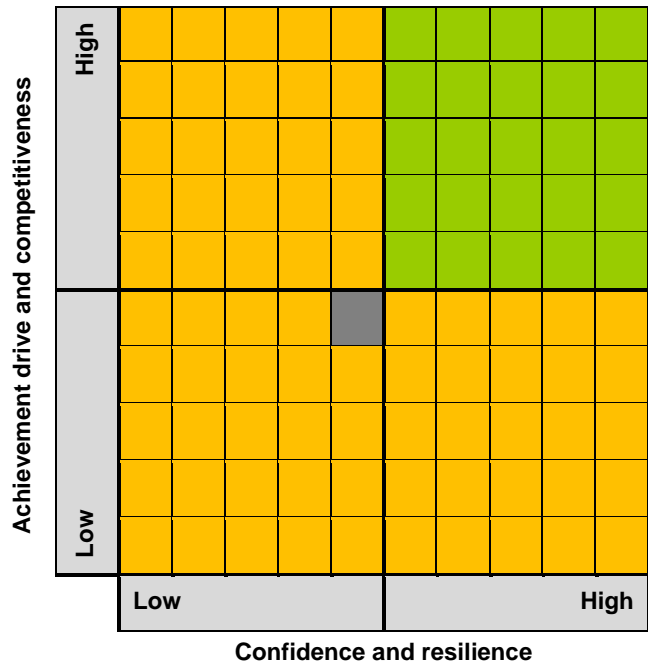
Tense Contestant. Athletes in the lower-left part of this amber zone present as unsure about their abilities and their potential at the present point in time. They need help and support to boost their confidence and motivation.

Easygoing Contestant. Athletes in the lower right part of this amber zone excel in confidence but lack motivation to achieve. They present as sure of themselves and stress-free but they lack the competitive drive to work hard to develop and realize their potential.

Figure 3. SPQ20 achievement and competitiveness scorecard

	Sten									
	1	2	3	4	5	6	7	8	9	10
Achievement					<	…	>			
Adaptability		<	…	>						
Competitiveness		<	…	>						
Conscientiousness					<	…	>			
Visualization				<	…	>				
Intuition						<	…	>		
Goal Setting					<	…	>			
Achievement and competitiveness				<	…	>				
	Improve				**Work on**			**Capitalize on**		

Achievement and Competitiveness	Level 3. Your responses to the questionnaire suggest that you put in as much effort and energy as most athletes to achieve success.
Description of dimensions	
Achievement	Level 3. Your responses indicate that personal achievement is a moderately important driver for you.
Adaptability	Level 1. You present yourself as rather unadventurous and set in your ways. You are very reluctant to experiment and take risks.
Competitiveness	Level 1. Your responses indicate that participating is more important to you than winning.
Conscientiousness	Level 3. You are fairly conscientious and moderately well-organized. You work quite hard to achieve your goals but you maintain a work-life balance.
Visualization	Level 3. You use imagery and visualization to a moderate extent to help think positively and perform well.
Intuition	Level 4. More than the average contestant in the comparison group, you let your deep-down inner feelings guide you and you act on your instincts and intuition.
Goal Setting	Level 3. Your responses indicate that you use goal-setting as much as the average athlete in the comparison group.

Figure 4. Extract of SPQ20 development suggestions booklet

Achievement
• Develop a dream about what you want to achieve in your sport.
• Be prepared to work your butt off to achieve success as a professional or amateur athlete.
• Get the most out of training and practice by being enthusiastic, determined, and goal-driven.
• Review your performance continuously and celebrate successes and good performances.
• Show through your behavior and actions that you want to learn, you want to get better, and you are prepared to put the work in.

Adaptability
• Ask for and be open to advice and support from others – for example, your coach, fellow team mates, sport commentators.
• Try out creative thinking techniques such as brainstorming, the six thinking hats, metaphors and stories to help generate imaginative ideas.
• Try approaching problems from angles that are as far as possible from the ways you have approached them in the past.
• Be willing to adapt your behavior to increase your ability to play well and compete successfully.
• Remember that mental and physical skills' improvement takes time, commitment, and consistent effort.

Competitiveness
• Analyze your strengths and weaknesses in relation to other athletes and where you need to improve to gain competitive edge.
• In competition, focus on performing well rather than winning as focusing on winning will do little to help you win.
• Learn to control your explanations for winning and losing - give yourself full credit for your wins and give your opponents credits for their wins.
• Enjoy the buzz from competing and performing well in front of others
• Believe in your ability and never give up hope.

Conscientiousness
• Be prepared to spend most of your time in training and in practice.
• Develop specific plans and goals to guide your training and practice and focus on the task in hand.
• Prepare yourself thoroughly for competition by developing and rehearsing a competition plan.
• When you are going through a difficult patch, stick with it and do your best rather than give up and going through the motions.
• Try to consistently deliver more than you are asked to do by your coach or team captain.

5.0 Reliability & Validity

5.1 Internal consistency reliabilities

Table 5 presents internal consistency estimates based on Cronbach's Coefficient Alpha together with raw and sten score SEms for the SPQ20. The internal consistencies are in the benchmark 0.6 to 0.8 range with a median of 0.72. Overall, the SPQ20 has adequate internal consistency reliability as defined by the EFPA Review Model.

The sten score SEms range from 0.84 to 1.31 with a median of 1.08. This indicates that there is a 68% likelihood that the person's true score on one of the scales will about one sten either side of the observed score. There needs to be a difference of two stens between the scores of two athletes on a scale before it can be assumed that there is a reliable difference between them on a scale.

Table 5. Internal consistency reliabilities for the SPQ20 (n = 8,927)

Scale	Alpha	Mean	SD	Raw score SEm	sten score SEM
Achievement	0.77	24.14	5.11	2.45	1.02
Adaptability	0.65	19.96	4.08	2.41	1.15
Competitiveness	0.71	24.18	5.02	2.7	1.18
Conscientiousness	0.76	21.87	5.05	2.47	1
Visualization	0.75	19.56	5.62	2.81	0.93
Intuition	0.7	18.77	4.24	2.32	1.11
Goal Setting	0.71	20.56	4.75	2.56	1.14
Managing Pressure	0.82	16.8	6.28	2.66	0.84
Self-Efficacy	0.81	18.52	6.06	2.64	0.95
Fear of Failure	0.82	13.95	6.56	2.78	0.87
Flow	0.76	18.53	5.29	2.59	1.08
Stress Management	0.7	12.24	5.13	2.81	1.09
Emotions	0.72	19.22	5.28	2.79	1.12
Self-Talk	0.77	22.71	5.43	2.6	1.08
Self-Awareness	0.64	20.54	4.56	2.74	1.31
Ethics	0.76	19.87	3.84	1.88	0.94
Empathy	0.65	19.41	4.41	2.61	1.18
Relationships	0.63	20.79	4.78	2.91	1.17
Aggressiveness	0.75	15.43	5.41	2.71	1.06
Power	0.69	20.54	5.1	2.84	1.07
Impression management	0.68	20.01	4.26	2.41	1.11
Median	0.72	19.87	5.1	2.64	1.08

5.2 Scale intercorrelations

Intercorrelations indicate how closely related or independent the SPQ20 scales are. This helps interpretation and throws light on construct validity. Table 6 shows the intercorrelations of the SPQ20 scales. The correlations for the SPQ20 range from -0.31 to 0.77 with three quarters of the intercorrelations falling between -0.31 and 0.49. This indicates a reasonable degree of independence between the scales. The strongest correlations are between scales that make up the statistical factors (section 5.5).

5.3 Intercorrelations and reliability

In order to determine how well a personality assessment instrument differentiates between the different dimensions it is designed to measure, it is necessary to correct the correlations for unreliability. A correlation needs to be divided by the square root of the product of the two variables' reliability to determine what the correlation between the two variables would be if the variables' reliabilities were perfect. If two scales share less than 50% reliable variance, then we can be reasonably certain that they are independent. Seventy six percent of the SPQ20 primary scale pairs share less than 50% common variance indicating that the scales show a fair degree of independence.

5.4 Standard error of difference

The Standard Error of Difference (SEd) helps determine the size of the gap that you need to see between a person's scores on any two scales before you can conclude that the difference is real. The SEd depends on the reliability of the scales–the higher the reliability the smaller the SEd is. If there are two full SEds between the scores on two scales, then there is a 95% likelihood that there is a real difference.

The median SEd for the SPQ20 primary scales is 1.51 indicating that a difference of 3 stens is likely to indicate a real difference between one scale score and another. In other words, you need to see a difference of 3 stens (depending on the scales in question) before you can say that an athlete has more mental skills in one area than another.

Table 6. Scale intercorrelations for the SPQ20 (n = 8,927)

Scale	Achievement	Adaptability	Competitiveness	Conscientiousness	Visualization	Intuition	Goal Setting	Managing Pressure	Self-Efficacy	Fear of Failure	Flow	Stress Management	Emotions	Self-Talk	Self-Awareness	Ethics	Empathy	Relationships	Aggressiveness	Goal Setting
Achievement	1.00	0.50	0.73	0.79	0.51	0.47	0.57	0.22	0.48	0.42	0.50	0.46	0.37	0.63	0.52	0.19	0.48	0.39	0.07	0.43
Adaptability		1.00	0.47	0.44	0.43	0.38	0.38	0.14	0.33	0.31	0.30	0.26	0.22	0.37	0.35	0.03	0.32	0.26	0.05	0.31
Competitiveness			1.00	0.63	0.55	0.48	0.49	0.31	0.57	0.47	0.56	0.46	0.40	0.63	0.49	0.13	0.38	0.44	0.15	0.51
Conscientiousness				1.00	0.49	0.48	0.59	0.33	0.59	0.53	0.57	0.57	0.48	0.62	0.56	0.25	0.50	0.38	-0.04	0.34
Visualization					1.00	0.49	0.48	0.27	0.49	0.42	0.45	0.38	0.44	0.51	0.46	0.14	0.36	0.28	-0.01	0.31
Intuition						1.00	0.38	0.29	0.53	0.47	0.48	0.37	0.36	0.45	0.43	0.09	0.31	0.28	0.06	0.31
Goal Setting							1.00	0.33	0.47	0.42	0.52	0.54	0.48	0.61	0.59	0.19	0.32	0.40	0.05	0.40
Managing Pressure								1.00	0.61	0.62	0.55	0.54	0.53	-0.47	0.39	0.07	0.03	0.28	0.11	0.29
Self-Efficacy									1.00	0.79	0.76	0.64	0.62	0.67	0.53	0.10	0.24	0.38	0.08	0.40
Fear of Failure										1.00	0.64	0.63	0.55	0.61	0.48	0.11	0.22	0.35	0.04	0.31
Flow											1.00	0.62	0.61	0.66	0.58	0.09	0.21	0.43	0.18	0.42
Stress Management												1.00	0.64	0.67	0.57	0.26	0.30	0.48	0.04	0.33
Emotions													1.00	0.60	0.60	0.27	0.35	0.44	-0.11	0.28
Self-Talk														1.00	0.61	0.23	0.33	0.47	0.10	0.48
Self-Awareness															1.00	0.30	0.41	0.47	0.02	0.36
Ethics																1.00	0.40	0.20	-0.25	0.05
Empathy																	1.00	0.40	-0.32	0.10
Relationships																		1.00	0.05	0.43
Aggressiveness																			1.00	0.32
Goal Setting																				1.00

5.5 Factor analysis

Principal components extraction with varimax rotation was performed on the SPQ20 scales on a sample of 8,927 respondents. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy was 0.94, well above 0.6 required for a good factor analysis.

Four factors were extracted with eigenvalues of 1 accounting for 67% of the variance. The variables were on the whole well-defined by the factor solution. Communality values were moderate (0.55) to fairly high (0.81) with a median value of 0.71. With a cut-off of 0.45 for the inclusion of a scale in the interpretation of a factor, all the twenty scales loaded on at least one of the four factors. Two of the variables in the solution loaded on more than one factor. These were the Relationships and Empathy scales.

Table 7 shows loadings of variables on factors, communalities, and percents of variance and covariance. Variables are ordered and grouped by size of loading to facilitate interpretation. Loadings under 0.45 (20% of variance) are omitted.

Factor 1 is the first of two big factors made up of 8 scales that we have labeled Confidence and Resilience: Managing Pressure, Self-Efficacy, Fear of Failure, Flow, Stress Management, Emotions, Self-Talk, and Self-Awareness. In summary, athletes with high scores on Factor 1:

- manage performance anxiety successfully
- have a positive attitude/strong belief in their own capabilities
- are not afraid of failing
- perform frequently in the zone
- are physically and mentally fit exhibiting no symptoms of burnout
- control their feelings and emotions
- talk positively to themselves
- are aware of their strengths and improvement areas

Factor 2 is the second big factor made up of 7 scales covering personality traits and performance enhancement techniques that we have labeled Achievement Drive and Competitiveness: Achievement, Adaptability, Competitiveness, Conscientiousness, Visualization, Intuition and Goal Setting. Athletes with high scores on Factor 2:

- are motivated to achieve
- adapt well to new situations and changing circumstances
- compete to win
- are conscientious and organized
- use their instincts and intuition
- are considerate to their fellow players
- use visualization and goal setting techniques

Table 7. Rotated matrix for SPQ20 scales using principal components extraction, varimax rotation (n = 8,927)

Scale	F_1	F_2	F_3	F_4	Communality
Managing Pressure	0.82				0.69
Self-Efficacy	0.80				0.81
Fear of Failure	0.80				0.75
Flow	0.73				0.73
Stress Management	0.72				0.71
Emotions	0.72				0.70
Self-Talk	0.59				0.72
Self-Awareness	0.49				0.62
Achievement		0.77			0.76
Adaptability		0.73			0.55
Competitiveness		0.69			0.71
Conscientiousness		0.67			0.71
Visualization		0.67			0.56
Intuition		0.64			0.55
Goal Setting		0.47			0.55
Ethics			0.76		0.59
Empathy		0.51	0.65		0.71
Relationships			0.52	0.46	0.60
Aggressiveness				0.73	0.72
Power				0.73	0.67
Percent of variance	44.74	9.23	7.89	5.27	
Percent of covariance	66.65	13.75	11.75	7.85	

Factor 3 is the first of two small factors that we are calling Interaction and Sportsmanship. It is based on 3 scales: Ethics, Empathy and Relationships. Athletes with high scores on Factor 3 behave ethically and are considerate to and build relationships with others.

Factor 4 is the second of two small factors that we are calling Power and Aggressiveness. It is based on 3 scales: Aggressiveness, Power, and Relationships. Athletes with high scores on Factor 4 enjoy having control over people, play aggressively but also build relationships with fellow competitors and team players.

5.6 Relationship to other measures

An essential element of construct validation is correlating test scores with other measures of the same or similar constructs. In order to assess whether the SPQ20 measures the constructs it is designed to measure, we correlated SPQ20 scale scores with marker variables from the International Personality Item Pool and marker variables measuring attributes of resilience and imagery ability. In the EFPA review model, the following quality criteria are given for reviewing construct validity between a test and tests measuring similar constructs: inadequate ($r < 0.55$), adequate ($0.55 \leq r < 0.65$), good ($0.65 \leq r < 0.75$), and excellent ($r \geq 0.75$).

Personality
Over seven hundred respondents completed an online version of the assessment that included marker variables from the International Personality Item Pool. Sixty six percent of the respondents were men and 34 percent were women. Respondents were aged 16-65. The mean age of the sample was 25.7 with a standard deviation of 11.4.

Table 8 shows the relationships between these marker variables and the SPQ20 scales. The correlations between the SPQ20 scales and the marker variables are in the range of -0.70 to 0.73 with a median correlation of 0.60 suggesting that the SPQ20 trait scales are measuring similar constructs to the IPIP variables.

Resilience
In order to assess the construct validity of the SPQ20 resilience factor and its facets, we created marker variables based on psychological attributes of resilience identified by Sarkar and Fletcher (2013).

Two hundred and sixty two athletes completed a modified version of the SPQ20 with eight additional items assessing key attributes of resilience, for example--adapting to stress, getting help and support from friends and family, bouncing back from adversity, coping with slumps. Sixty four percent of respondents were men and 36 percent were women. The mean age of the sample was 24 years with a standard deviation of 11.8.

Table 9 shows the correlations between the resilience markers and the SPQ20 scales and reveals congruent validity where you would expect. For example, there is a reasonably strong correlation ($r = 0.59$) between competence in Handling Stressful Events and the SPQ20 Stress Management scale. The correlation between competence in Bouncing Back from Adversity and the SPQ20 Self-Efficacy scale is 0.57.

Table 8. Correlations between SPQ20 scales and IPIP marker variables (n =725)

Scale	r	Marker	Ref
Achievement	0.68**	Seek to be the best	H276
Adaptability	0.48**	Am open to ideas	H1142
Competitiveness	0.62**	Like to compete and do everything I can to win	S30
Conscientiousness	0.64**	Am always prepared	X87
Visualization	-0.7**	Have difficulty imagining things	H1382
Intuition	0.63**	Follow my instincts	H1371
Goal Setting	0.59**	Am a goal-oriented person	V108
Managing Pressure	0.73**	Am calm even in tense situations	E64
Self-Efficacy	0.67**	Believe that I am important	H740
Fear of Failure	0.7**	Expect things to fail	H645
Flow	0.7**	Can stay focused on tasks, even when I'm happy and excited about an upcoming event	D50
Stress Management	0.56**	Accomplish a lot of work	H554
Emotions	0.63**	Can control my emotions	V137
Self-Talk	-0.62**	Give up easily	H1144
Self-Awareness	0.6**	Always know why I do things	P433
Ethics	-0.4**	Believe that the end justifies the means	H433
Empathy	0.52**	Appreciate the viewpoints of others	H1340
Relationships	0.65**	Talk a lot	R11
Aggressiveness	0.52**	Like to start fights	V127
Power	-0.62**	Am not good at taking charge of a group	V105
Impression management	0.56**	Take advantage of others	H427
Median	0.60**		

** Significant at 0.01 level**,** * Significant at 0.05 level (2-tailed)

The correlation between competence in Excelling in Sport and the SPQ20 Achievement scale is 0.67 which is considered good evidence of congruent validity in the EFPA review model. Competence in Adapting to Stress Better than Others correlates with the Managing Pressure scale at 0.55 and with the Stress Management scale at 0.56. The SPQ20 does not have specific scales that measure the support that an athlete receives from friends and family but these competences do correlate reasonably strongly with the SPQ20 Relationships scale.

More generally, Table 9 informs our understanding of the attributes of resilient athletes. For example, athletes who handle stressful events successfully are able to regulate their emotions, use positive self-talk, believe in their ability, and are aware of their strengths and limitations. Athletes who are good at bouncing back from adversity tend to be more competitive, conscientious, achieving, and emotionally intelligent than athletes who have more difficulty bouncing back. Athletes who say that they excel in their sport make greater use of positive self-talk and goal setting techniques. Athletes who say that they get support from friends and family tend to have better relationship skills than athletes who get less support from their friends and family.

Imagery
In order to assess the construct validity of the SQP20 imagery scale, we created marker variables based on Williams and Cummings (2011) model of sport imagery ability. Williams and Cummings propose that sport imagery competence has a strategy component, a goal component, an emotional component, and a skill component. For example, athletes make up strategies and plans in their minds, imagine themselves winning, anticipate how they will feel when performing, and visualize improving their skills.

Two hundred and sixty two athletes completed a modified version of the SPQ20 with four additional items designed to tap these aspects of sport imagery ability. The correlation between the SPQ20 visualization scale and the marker variables total score was 0.6 which is considered adequate evidence of congruent validity in the EFPA review model.

Table 9. Correlations between SPQ20 and resilience attribute markers (n = 262)

Scale	Handling stressful events	Bouncing back from adversity	Excelling in sport	Coping with slumps	Adapting to stress better than others	Being helped in career by friends	Receiving recognition from peers	Receiving support from family
Achievement	0.28**	0.55**	0.67**	0.27**	0.35**	0.26**	0.30**	0.40**
Adaptability	0.22**	0.35**	0.42**	0.25**	0.17**	0.14*	0.16**	0.24**
Competitiveness	0.26**	0.49**	0.47**	0.22**	0.26**	0.18**	0.27**	0.40**
Conscientiousness	0.37**	0.52**	0.51**	0.24**	0.32**	0.17**	0.23**	0.32**
Visualization	0.24**	0.29**	0.21**	0.11	0.21**	0.10	0.13*	0.10
Intuition	0.21**	0.46**	0.41**	0.23**	0.13*	0.15*	0.18**	0.27**
Goal Setting	0.41**	0.39**	0.48**	0.30**	0.36**	0.13*	0.30**	0.31**
Managing Pressure	0.35**	0.32**	0.27**	0.20**	0.55**	0.01	0.28**	0.08
Self-Efficacy	0.44**	0.57**	0.44**	0.31**	0.47**	0.06	0.30**	0.23**
Fear of Failure	0.35**	0.37**	0.37**	0.20**	0.46**	0.08	0.27**	0.13*
Flow	0.41**	0.45**	0.53**	0.32**	0.44**	0.14*	0.42**	0.33**
Stress Management	0.59**	0.32**	0.33**	0.45**	0.56**	0.18**	0.24**	0.32**
Emotions	0.47**	0.29**	0.22**	0.28**	0.52**	0.17**	0.16**	0.23**
Self-Talk	0.45**	0.40**	0.50**	0.31**	0.43**	0.17**	0.33**	0.33**
Self-Awareness	0.43**	0.35*	0.35**	0.33**	0.37**	0.18**	0.24**	0.38**
Ethics	0.16**	0.01	0.01	0.04	0.03	0.03	0.03	0.23**
Empathy	0.19**	0.28**	0.27**	0.21**	0.12*	0.19**	0.00	0.31**
Relationships	0.36**	0.17**	0.27**	0.21**	0.18**	0.52**	0.37**	0.55**
Aggressiveness	0.09	0.02	0.05	0.03	0.06	0.05	0.17**	0.05
Power	0.31**	0.36**	0.43**	0.21**	0.29**	0.10	0.33**	0.25**

** Significant at 0.01 level, * Significant at 0.05 level (2-tailed)

5.7 Correlations with athletic performance

Two separate groups of respondents were asked to assess their performance on a 4-point scale from "Excellent" to "Not satisfactory" and report their coach's assessment using the same scale. The first group comprised 215 respondents and the second group comprised 257 respondents. The first study was conducted in 2011 and the second in 2016.

In both groups, about two thirds of respondents were men and one third of respondents were women. Respondents were aged 16-65. The mean age of the first group was 26.3 with a standard deviation of 11.5. The mean age of the second group was 24 years with a standard deviation of 11.8.

Table 10 shows the correlations between the SPQ20 scales and reported athletic performance for the self-assessments, coach assessments, and a combined assessment (the sum of the two variables).

The median correlations ranged from 0.19 to 0.30 across the two studies and the average median correlation was 0.24. In the EFPA review model, a validity coefficient in the range of 0.20 to 0.35 is considered adequate, and a coefficient between 0.36 and 0.5 is considered good.

Using the mean correlation of the six coefficients for each scale, the coefficients for fifteen scales can be defined as adequate, and the coefficient for one scale (Flow) can be defined as good.

Across the two studies, the highest correlations were with scales in the Confidence and Resilience factor: Flow, Self-Efficacy, Stress Management, and Managing Pressure. These correlations provide further evidence of the importance of resilience in athletic success.

At the other end of the spectrum, there were four scales with validity coefficients that were not statistically significant: Aggressiveness, Adaptability, Empathy, and Ethics.

Table 10. Correlations between SPQ20 scales and athletic performance

Scale	Group 1			Group 2			Mean
	Self	Coach	Both	Self	Coach	Both	
Achievement	0.21**	0.31**	0.28**	0.23**	0.27**	0.27**	0.26**
Adaptability	0.1	0.22**	0.20**	0.05	-0.02	0.02	0.10
Competitiveness	0.25**	0.22**	0.25**	0.17**	0.25**	0.23**	0.23**
Conscientiousness	0.17*	0.32**	0.28**	0.26**	0.27**	0.30**	0.27**
Visualization	0.26**	0.21**	0.30**	0.05	0.10	0.07	0.17**
Intuition	0.17*	0.17*	0.19**	0.15*	0.14*	0.16*	0.16*
Goal Setting	0.24**	0.30**	0.31**	0.20**	0.32**	0.28**	0.28**
Managing Pressure	0.37**	0.27**	0.37**	0.23**	0.26**	0.28**	0.30**
Self-Efficacy	0.39**	0.31**	0.41**	0.29**	0.29**	0.33**	0.34**
Fear of Failure	0.29**	0.21**	0.30**	.025**	0.22**	0.26**	0.22**
Flow	0.41**	0.34**	0.42**	0.38**	0.43**	0.45**	0.41**
Stress Management	0.33**	0.36**	0.41**	0.25**	0.28**	0.30**	0.32**
Emotions	0.25**	0.21**	0.30**	0.12*	0.24**	0.20**	0.22**
Self-Talk	0.29**	0.26**	0.32**	0.26**	0.30**	0.31**	0.29**
Self-Awareness	0.24**	0.29**	0.30**	0.16*	0.27**	0.23**	0.25**
Ethics	-0.14*	0.03	-0.05	-0.08	0.12	0.02	-0.02
Empathy	-0.11	0.05	-0.02	0.05	0.10	0.07	0.02
Relationships	0.21**	0.23**	0.26**	0.22**	0.24**	0.25**	0.24**
Aggressiveness	0.24**	0.14	0.21**	0.10	0.03	0.07	0.13
Power	0.28**	0.21**	0.29**	0.20**	0.26**	0.26**	0.25**
Median	0.25**	0.23**	0.30**	0.19**	0.26**	0.26**	0.24**

** Significant at 0.01 level, * Significant at 0.05 level (2-tailed)

Table 11. Adjustments to SPQ20 scale scores for response style (n = 8,927)

Scale	High Scorers	Low Scorers
Achievement	-1	2
Adaptability	-1	1
Competitiveness	-1	1
Conscientiousness	-1	2
Visualization	-1	1
Intuition	-1	1
Goal Setting	-1	1
Managing Pressure	-1	0
Self-Efficacy	-1	1
Fear of Failure	-1	1
Flow	-1	1
Stress Management	-1	1
Emotions	-1	1
Self-Talk	-1	1
Self-Awareness	-1	1
Ethics	-1	1
Empathy	-1	2
Relationships	-1	1
Aggressiveness	0	0
Power	0	0

5.8 Response style

The impact of response style on scores was analyzed by comparing the results of test takers with high and low impression management scores – that is sten scores of 8 to 10 and sten scores of 1 to 3. This revealed that there were statistically significant differences related to response style in average scale scores on nearly all the scales. These differences were used to make adjustments to the scores in the SPQ20 computer-generated report (Table 11).

5.9 Demographics and SPQ20 scales

Table 12 shows the influence that age and sex have on the SPQ20 test scores. There are statistically significant correlations between age and test scores in 13 scales but all but one of these are below 0.20 in absolute magnitude. Ethics correlates strongest with age at $r = 0.21$ showing that older athletes tend to be more concerned about ethical behavior in sport. Older athletes also tend to be slightly less competitive, aggressive and outgoing.

There are statistically significant correlations between gender and test scores in 14 scales but the observed gender differences are again very small. The strongest correlations are with Empathy ($r = 0.22$) and Aggressiveness ($r = -0.20$). Female athletes tend to show more empathy and consideration towards their fellow athletes and males tend to perform in a more aggressive manner.

These findings indicate that there is no need for separate norms for athletes in different age groups and that it is appropriate to use combined sex and age norms.

Table 12. Correlations of age and sex with SPQ20 scales (n = 8,927)

Scale	Age	Gender
Achievement	-0.07**	0.05**
Adaptability	0.04**	-0.02
Competitiveness	-0.11**	-0.02
Conscientiousness	-0.01	0.08**
Visualization	0.07**	0.01
Intuition	0.06**	0.02
Goal Setting	-0.02	0.08**
Managing Pressure	0.01	-0.13**
Self-Efficacy	0.04**	-0.06**
Fear of Failure	0.09**	-0.09**
Flow	-0.08**	0.01
Stress Management	0.01	0.00
Emotions	0.00	0.05**
Self-Talk	-0.02	-0.04**
Self-Awareness	-0.01	0.08**
Ethics	0.21**	0.09**
Empathy	0.06**	0.22**
Relationships	-0.11**	0.09**
Aggressiveness	-0.13**	-0.20**
Power	-0.07**	-0.10**
Median	-0.01	0.01

** Significant at 0.01 level, * Significant at 0.05 level (2-tailed). Gender was coded 1 for male and 2 for female.

6.0 Norms

The comparison group was created from an international sample of just under 10,000 athletes who completed the online assessment at sportsconfidence.biz between 2003 and 2010. Respondents aged under 16 or over 65 were deleted from the sample. Duplicate cases were also identified and deleted. This left a sample of 8,927 athletes. We then used SPSS to create a random sample of 6,000 cases with equal numbers of men and women.

The age distribution of the sample is shown in Table 13. Over 50 percent of the respondents were aged 16-20, about one quarter were aged 21-30, and about one quarter of respondents were aged 31-65.

Table 13. Age and gender of comparison group (n = 6,000)

Age	Women	Men	Total
16-20	1,760	1,500	3,260
	29.3%	25.0%	54.3%
21-30	692	707	1,399
	11.5%	11.8%	23.3%
31-40	285	373	658
	4.8%	6.2%	11.0%
41-50	170	281	451
	2.8%	4.7%	7.5%
51-60	73	100	173
	1.2%	1.7%	2.9%
Over 60	20	39	59
	.3%	.7%	1.0%
All	3000	3000	6000
	50.0%	50.0%	100.0%

Table 14 shows that over two thirds of respondents were from the United Kingdom (38%) and the United States (34%), and about one fifth of respondents were from Canada (12%) and Australia (7%).

Table 14. Country of origin of comparison group (n = 6,000)

Country	Percent
United Kingdom	38.6
United States	34.4
Australia	11.9
Canada	7.2
New Zealand	2.9
India	1.4
Ireland	1.2
Malaysia	0.9
Philippines	0.8
South Africa	0.7
Total	100.00

Table 15 shows the top ten sporting backgrounds of athletes in the comparison group. The most popular sports (mostpopularsports.net) are also among the most frequently occurring sporting backgrounds of respondents in the comparison group. We plan to publish separate norms for different sports in the future.

Table 15. Sporting backgrounds of comparison group (n = 6,000)

Sport	Percent
Soccer	22.5
Hockey	8.8
Rugby	7.6
Basketball	4.6
Golf	4.6
Cricket	3.1
American football	3.1
Tennis	3.1
Baseball	2.7
Swimming and diving	2.7

6.1 Calculating sten scores

Sten scores are calculated from an athlete's raw scores on the SPQ20 scales. First, you need to calculate the Z-score which represents how far away the athlete's score is from the group mean in standard deviations. The formula to calculate the Z-score is:

Z-score

$$\frac{\text{Individual's scale raw score} - \text{Group mean scale raw score}}{\text{Standard Deviation}}$$

The formula for calculating Sten scores is:

Sten score
(Z-score x 2) + 5.5

Tables 16 and 17 provide norms for the athlete population with separate norms for men and women and norms for six age bands.

Table 16. SPQ20 athlete norms (n = 6,000)

Scale	General Population		Women		Men	
	Mean	SD	Mean	SD	Mean	SD
Achievement	24.27	5.02	24.51	4.90	24.02	5.13
Adaptability	19.98	4.05	19.88	4.01	20.09	4.09
Competitiveness	24.18	4.97	24.06	4.88	24.29	5.06
Conscientiousness	22.06	5.01	22.43	4.93	21.69	5.06
Visualization	20.72	5.24	20.72	5.26	20.72	5.22
Intuition	18.82	4.20	18.89	4.17	18.76	4.23
Goal Setting	20.71	4.77	21.10	4.83	20.31	4.68
Managing Pressure	17.07	6.31	17.94	6.26	16.19	6.24
Self-Efficacy	18.45	6.03	18.03	5.99	18.88	6.03
Fear of Failure	14.10	6.57	14.78	6.72	13.42	6.35
Flow	18.55	5.28	18.61	5.25	18.50	5.32
Stress Management	12.21	5.16	12.24	5.28	12.19	5.04
Emotions	19.34	5.30	19.55	5.46	19.12	5.13
Self-Talk	22.66	5.47	22.39	5.59	22.93	5.34
Self-Awareness	20.66	4.55	21.04	4.47	20.28	4.59
Ethics	20.04	3.84	20.41	3.72	19.66	3.93
Empathy	22.35	4.39	23.34	4.14	21.35	4.41
Relationships	20.93	4.78	21.40	4.75	20.45	4.76
Aggressiveness	15.12	5.49	13.94	5.40	16.30	5.34
Power	20.39	5.16	19.83	5.15	20.95	5.11

Table 17. SPQ20 age norms (n = 6,000)

Scale	16-20		21-30		31-40		41-50		51-60		over 60	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Achievement	24.62	4.83	23.89	5.22	23.64	5.20	24.15	5.13	24.05	5.08	21.93	5.45
Adaptability	19.78	3.82	20.03	4.07	20.56	4.53	20.48	4.45	20.29	4.50	18.69	4.77
Competitiveness	24.64	4.69	23.97	5.17	23.24	5.30	23.54	5.16	23.78	4.74	19.76	6.14
Conscientiousness	22.21	4.82	21.76	5.23	21.77	5.30	22.36	5.04	22.57	5.15	20.63	5.32
Visualization	20.37	5.04	20.95	5.37	21.10	5.54	21.63	5.34	22.08	5.54	19.59	5.42
Intuition	18.57	4.13	18.91	4.20	19.23	4.39	19.53	4.19	19.77	4.57	17.76	4.02
Goal Setting	20.71	4.54	20.79	4.85	20.55	5.09	20.62	5.26	20.90	5.64	20.49	4.97
Managing Pressure	17.09	6.33	17.00	6.08	17.43	6.45	17.17	6.71	16.03	6.01	15.41	6.56
Self-Efficacy	18.35	5.92	18.44	6.06	18.40	6.27	18.85	6.18	19.71	6.08	18.32	6.47
Fear of Failure	14.44	6.42	14.21	6.62	13.78	6.87	12.81	6.60	11.84	7.03	13.02	6.28
Flow	18.96	5.13	18.24	5.33	17.91	5.40	17.69	5.55	18.21	5.83	17.75	5.47
Stress Management	12.02	5.05	12.70	5.18	12.74	5.29	11.91	5.44	11.02	5.30	11.31	5.32
Emotions	19.46	5.25	19.22	5.26	18.86	5.30	19.15	5.68	20.17	5.69	19.32	4.93
Self-Talk	22.80	5.49	22.51	5.49	22.09	5.45	22.82	5.28	23.41	5.23	21.41	5.63
Self-Awareness	20.75	4.40	20.59	4.64	20.55	4.77	20.47	4.74	20.73	5.08	19.78	4.75
Ethics	19.60	3.51	19.66	3.83	21.06	4.10	21.57	4.25	22.95	4.44	21.03	4.75
Empathy	22.18	4.31	22.22	4.46	22.95	4.48	22.92	4.21	23.41	4.44	20.34	5.36
Relationships	21.42	4.71	20.72	4.73	20.05	4.78	19.69	4.94	20.29	4.76	19.86	4.78
Aggressiveness	15.63	5.71	15.07	5.25	14.24	4.88	13.76	5.20	13.02	4.79	14.37	4.83
Power	20.61	5.22	20.50	4.97	19.65	5.14	20.06	5.14	19.73	5.03	18.32	5.61

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