UNDERSTANDING AND INTERPRETING YOUR S.T.A.R.S. RESULTS

As you read through your S.T.A.R.S. athlete report, consider each of your test results and make a list of which areas fell below the normal range. Separate your list into strength/power, flexibility, and agility/balance/coordination. This way you can identify the broader areas that need improvement by category. Share this information with your parent, coach, and off-ice trainer! Work with your coach and trainer to incorporate the appropriate exercises into your off-ice training to improve your skills.

Keep in mind that the S.T.A.R.S. report compares you to other athletes in your age and gender group, as a percentile of the top scorer(s). This means that while your performance may have increased in the past year, the performance of the group (including the top performer) may have also increased. This would mean that even if you are performing better, your individual S.T.A.R.S. score(s) may be decreased relative to your group. It is therefore essential that you look at the numbers on your report and note your progress relative to yourself over time.

To see how your RAW scores compare by your gender and skating level, see Appendix B.

You can use your results to make changes to your on- and off-ice training in ways that will improve your performance. If you are unsure where to begin, consult the S.T.A.R.S. exercise guide that was emailed to you after the combine, or you can find a downloadable PDF of the guide at http://www.STARScombine.org on the right hand tab under “Resources.” The guide is organized into exercises by test, so you can easily focus your attention to the appropriate area/skill.

When increasing, or changing your work out, use the 10 percent rule: Do not increase any one component of your overall training program by more than 10 percent in a week. Progress your workouts gradually with the guidance of your professional trainer or coach. Set realistic goals and compare your progress to yourself over time. Use the statistical information appropriate to your gender and skating level as a general guide to your progress. It is important to work with your coach and trainer to set sensible, realistic, and safe goals; think quality over quantity.

Remember that maintaining a strong level of sports specific athletic fitness will go a long way in helping you to avoid injury while helping you to progress in your on-ice skating skills. By participating in the S.T.A.R.S. program and using your results as a guideline, you are ready to begin or refine your training plan to improve your fitness on and off the ice.
UNDERSTANDING & INTERPRETING YOUR S.T.A.R.S. RESULTS

There are three important ways to interpret your data:
1) Comparing yourself to your own past scores – Individual Athlete Report
2) Comparing yourself to other athletes of the same gender and age group – S.T.A.R.S. Score
3) Comparing yourself to other athletes of the same skating level

1) INDIVIDUAL ATHLETE REPORT

The first page of the report shows your raw scores for each test you completed most recently (the 2017 S.T.A.R.S. season) as your scores from up to three prior seasons (if you participated). If you have participated in prior years, you will see an additional column on the left hand side of the table showing the percentile change from the most recent previous test for each individual assessment. This will show you how you are progressing with each assessment.

Example:
Push-up count for 2013 = 10
Push-up count for 2014 = 20
% change from previous test = 100%

2) COMPARISON BY GENDER AND AGE GROUP (S.T.A.R.S. SCORE)

For each test, your percentile is calculated against all other athletes in your same age and gender group, with a maximum of 100 if you performed the best in your group. All 15 tests are added up and this gives you a possible maximum score of 1500 – this sum is your S.T.A.R.S. score. The top performer in each age and gender group and the top overall performers are recognized.

Keep in mind that your percentile will vary not just by how you performed, but also by how your group performed (kind of like grading on the curve). This means that while your performance may have increased in the past year, the performance of your group may also have increased. This would mean that even if you are performing better, your S.T.A.R.S. score may have decreased. It is therefore essential that you look at the numbers on your report and note your progress relative to yourself over time.

You will notice that besides the total S.T.A.R.S. score, the data is also presented organized into the three categories of tests:
1) Strength/Power
2) Agility/Balance/Coordination
3) Flexibility

3) COMPARISON BY GENDER AND TEST LEVEL

This table displays the mean, median and 95 percent confidence interval range for each of the 15 S.T.A.R.S. tests. The data is calculated based on the 2017 S.T.A.R.S. season and organized by skating test level (you were also given a worksheet on the day of testing showing the 2016 data).

It is very important to consider ALL of the above when assessing your athletic progress with the help of your coach, trainer and parent. Each athlete will develop at his or her own pace and it is not uncommon for individual traits to vary, particularly as you go through growth spurts and/or different training cycles throughout the season.

Please direct questions to STARS@usfigureskating.org.

As some tests have been updated for the 2017 season, you will notice the athlete report will have some changes from previous seasons. The information on the previous tests will still be shown as well as the addition of new assessments.
RESULTS AND CALCULATIONS

Range: Measures the magnitude of distribution between the highest and lowest values in an entire sample set.

*These high and low values are the upper-most and lower-most extremes of the sample set. The magnitude of range is determined as the lowest value subtracted from the highest value.

**Sample calculation of range:**

Highest Value – Lowest Value → Range = 32-19 = 13

**Raw data set for push-ups, Novice – Senior, female:** 24, 21, 30, 32, 19, 20, 28

- Highest Value = 32, Lowest Value = 19

95 percent Confidence Interval (CI) Range: Measures magnitude of dispersion between the majority 95 percent of the sample values, excluding the top and bottom 2.5 percent of the total sample range.

The 95 percent CI is calculated using the sample mean (average), standard deviation for each specific sample set and the alpha value to achieve the desired confidence level (0.05 for 95 percent). To determine a 95 percent confidence interval, the following equation is used:

\[
95\% \text{ Confidence Interval} = (\text{mean}) \pm 1.96 \left( \frac{\text{standard deviation}}{\sqrt{\text{sample size}}} \right)
\]

Mean: The average value of a specified sample set.

*It is calculated as the sum of all data scores for a specific sample set divided by the sample size (see equation below). The mean score is determined from the sets of scores within each grouped division of skating level and gender only – it is NOT the national mean value across all levels and genders.

**Sample calculation of mean:**

Sum of all data / sample size → 174 / 7 = 24.86

**Raw data set for push-ups, Novice – Senior, female:** 24, 21, 30, 32, 19, 20, 28

- Sum of data = 174 Sample size = 7

Median: The median value is the exact middle number of a chronologically ordered numerical data set; this value represents the dividing line between the top 50% and the bottom 50% of the data.

The median score is determined from the sets of scores within each grouped division of skating level and gender only – it is NOT the national median value across all levels and genders.

**Sample calculation of median:**

Middle value in ordered list → Median = 24

**Raw data set for push-ups, Novice – Senior, female:** 24, 21, 30, 32, 19, 20, 28

- Ordered data list: 19, 20, 21, 24, 28, 30, 32
WHY IS S.T.A.R.S. AND OFF-ICE TRAINING IMPORTANT?

S.T.A.R.S. fitness testing consists of 15 specific strength and conditioning assessments in three areas important to on-ice performance: 1) Strength and power; 2) Flexibility; 3) Agility, balance and coordination. Although all of these athletic skills are trained on the ice, off-ice training in these areas is also important for strengthening muscles, improving specific techniques and reducing the athlete’s risk of injury. Athletes who participate in the S.T.A.R.S. program can use their test results to tailor off-ice strength and conditioning programs with the goal of improving performance both off and on the ice.

A goal of the S.T.A.R.S. program is to encourage athletic improvement through progressive recognition: Every skater is provided the opportunity to be recognized for national performance, individual achievement and personal improvement. Participation in S.T.A.R.S. should be fun, motivating, challenging and personally rewarding.

S.T.A.R.S. OBJECTIVES

1. Promote and enhance athleticism and athletic ability in all figure skaters through assessment, recognition and opportunity.
2. Reduce the rate of injury across all figure skating disciplines and competitive levels by increasing overall fitness.
3. Assist coaches, trainers and parents in developing and guiding their skater’s potential.
4. Connect skaters, coaches and parents with qualified strength and conditioning specialists in their region and around the country.
5. Be challenging and fun!

STRENGTH/POWER

Strength and power are the basis for critical skating skills such as jumping, spinning and skating with excellent acceleration and sustained speed. Having appropriate muscular strength and power can help improve explosiveness of jumping, control body stability and improve skating quality.

FLEXIBILITY

Flexibility is an important component for maintaining muscle and joint elasticity and range of motion. Certain skills and movements in figure skating require a full and functional range of motion and flexibility (i.e. spirals, split jumps, etc.). It is important to maintain and improve these aspects through routine stretching and range of motion exercises before and after skating practice and performance.

AGILITY/BALANCE/COORDINATION

Nearly all figure skating technique requires agility, balance and coordination. In the context of skating skills, agility is the ability to quickly move from one position or direction to another while maintaining balance and coordination. Balance is the ability to maintain the body in position with steadiness and poise. Coordination is the ability to move various body parts simultaneously as required and to combine certain movements in sequence.
DEVELOPMENTAL CHANGES OVER TIME

Skaters need room to grow and improve

Figure skating is predominantly a youth sport (early specialization). While athletes range across a broad spectrum of age, the majority of competitive skaters are children, adolescents and young adults. Within this age range, it is important to keep in mind the impact of individual biological changes (physical growth and development) on performance as athletes become older and stronger.

Certain developmental changes can impact athlete performance and may occur rapidly at times. Children are expected to grow taller and develop more physical strength as they progress into adolescence and early adulthood. Additionally, both males and females encounter puberty related hormonal changes. Most changes for females occur sooner than they do for males, then begin to taper off during early adulthood. Some key physical developmental changes are noted in the tables here.

Young athletes can expect to see changes in physical athletic performance on and off the ice during childhood and adolescence. Rapid changes in body size and weight will likely affect timing of certain skills, balance and coordination. But not to worry, this is all normal. To compensate for such periods of rapid change, techniques may need to be adjusted frequently as the body grows taller and stronger.

The sport of figure skating is highly demanding on the body and should be of special concern to developing young athletes. Repetitive high-impact activity on a developing body can cause permanent damage to bones and tissues if not monitored properly. To ensure proper development, young athletes should seek professional guidance with a certified trainer or coach and check their individual growth and development at least annually with a pre-participation exam from a qualified physician or other health care provider.

### Developmental changes in boys / young men:

<table>
<thead>
<tr>
<th>Age</th>
<th>Typical Changes Observed</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-11</td>
<td>• Growth spurt in arms and legs</td>
</tr>
<tr>
<td></td>
<td>• Average increase in height 2-3 inches per year</td>
</tr>
<tr>
<td></td>
<td>• Improvement and refinement of coordination skills</td>
</tr>
<tr>
<td></td>
<td>• Complex movements - twisting, turning, spinning, kicking, etc.</td>
</tr>
<tr>
<td>12-15</td>
<td>• Begin puberty</td>
</tr>
<tr>
<td></td>
<td>• Testosterone increases; voice lowers</td>
</tr>
<tr>
<td></td>
<td>• Increase in muscle mass with exercise</td>
</tr>
<tr>
<td>16-18</td>
<td>• Growth spurt</td>
</tr>
<tr>
<td></td>
<td>• Muscle mass reaches close to mature proportion</td>
</tr>
<tr>
<td>18-20</td>
<td>• Reach mature height and weight</td>
</tr>
</tbody>
</table>

### Developmental changes in girls / young women:

<table>
<thead>
<tr>
<th>Age</th>
<th>Typical Changes Observed</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-11</td>
<td>• Growth spurt in arms and legs</td>
</tr>
<tr>
<td></td>
<td>• Average increase in height 2-3 inches per year</td>
</tr>
<tr>
<td></td>
<td>• Improvement and refinement of coordination skills</td>
</tr>
<tr>
<td></td>
<td>• Complex movements - twisting, turning, spinning, kicking, etc.</td>
</tr>
<tr>
<td>8-12</td>
<td>• Growth spurt</td>
</tr>
<tr>
<td></td>
<td>• Breast development begins</td>
</tr>
<tr>
<td></td>
<td>• First menstrual period (around age 12)</td>
</tr>
<tr>
<td>13-15</td>
<td>• Breast development continues</td>
</tr>
<tr>
<td></td>
<td>• Growth spurt usually ends</td>
</tr>
<tr>
<td></td>
<td>• Body fat reaches close to mature proportion (20-25%)</td>
</tr>
<tr>
<td>16-18</td>
<td>• Breast development reaches to close to mature size</td>
</tr>
<tr>
<td></td>
<td>• Total body weight reaches healthy mature proportion</td>
</tr>
<tr>
<td></td>
<td>• Gain in muscle mass with exercise</td>
</tr>
<tr>
<td>18-20</td>
<td>• Reach mature height and weight</td>
</tr>
</tbody>
</table>
1. Hex Jump
Hex jump is a test of your reaction time jumping in, out and around each of the sides of a marked hexagon in a continuous clockwise direction for a total of 18 two-footed jumps. This tests your ability to make rapid movements, changes of direction, while maintaining core balance. The goal is to cleanly complete all 18 jumps in the fastest time possible.

2. Vertical Jump
Vertical jump height is essential to all jumping movements in figure skating. The goal is to jump up as high as possible with a fully extended body position all the way through the toes and fingertips. Optimal jump height can be achieved by properly stacking the body in order of ankles, knees, hips – making a right angle to the ground (90°) – then exploding out of each joint following in opposite order of stacking (i.e. hips, knee, then ankle). Improving your ability to jump high off the ice will improve your ability to jump high on the ice. Advanced off-ice training can include resistance bands/tubes or hand weights to add difficulty and build leg strength in jumping exercises.

3 & 4. Single Leg Bound (right and left foot)
This exercise is a maximal jump for distance both taking off and landing on the same leg. Single leg exercises are important as most skating skills are completed on one leg. This test measures both strength and power in the leg as well as the ability to control the take off and landing with balance and control. It also identifies symmetry between the left and right leg.

5. Timed Tuck Jumps
Timed tuck jumps assess your ability to consistently and quickly rebound jump up and down to a marked height within a 30-second time frame – similar to combination jumping moves on the ice. The athlete must successfully complete as many tuck jumps with their knees at the bent 90° standing position height (level that elastic strap is placed) within the time frame – only jumps that are equal to or higher than the elastic band count. This test measures quantity of jumps completed.

6. Push-Ups
Push-ups are a fundamental exercise for arm strength and shoulder stability. In skating, arm strength and shoulder stability are important for rotational control on entry and landings of spins and jumps, as well as for male and female pair and dance skaters to hold their partner off the ice or hold an air position in lifts. In a correct push-up position, the athlete is in a facedown and planted position with the hands directly under the shoulders, feet together, ankles flexed and fingers facing forward. An appropriate pace is established as one second down and one second up (aided with the ticking beat of a metronome). On the down part of the push-up, elbows should be bent 90° relative to the floor and 45° from the torso. The push-up test measures quantity of consecutive successful push-ups at pace that are completed until exhaustion.
7. Bent Knee V-Up
Core strength and balance is critical to all movements in figure skating – spins, jumps, footwork, changes of direction and edge balance, etc. Bent knee v-ups are an abdominal strength and core balance exercise involving a crunch-like motion of the front abdominal muscles (6-pack abs) while balancing on your gluteus muscles (buttocks). Correct performance of this exercise begins by lying face up on the floor with legs extended, feet slightly flexed, arms lifted slightly to the sides of the torso and head, neck and shoulders just barely lifted off the ground. From this position, you simultaneously raise your torso and bend your knees toward your chest while balancing on your buttocks and sit bones – do not touch the floor with your hands, legs, or balance on lower back or shoulders. Return to the first position and repeat as many successful repetitions as quickly as possible within the 30-second time frame.

8. Side Plank
Core strength and body alignment are important to all movements in figure skating – spins, jumps, footwork, changes of direction and edge balance, etc. The side plank is an oblique (side) abdominal strength exercise involving balance and proper body alignment of the shoulders, spine and hips. Correct positioning involves balancing on your dominant side with weight supported by the elbow and forearm on the floor, feet sideways and stacked directly on top of each other with the body raised and aligned parallel to the wall – balance is held as long as possible without losing correct position in the hips or spine (maximum time limit = 120 seconds).

9. & 10. Front Split (right and left leg)
Front splits demonstrate upper leg muscles and hip joint flexibility. Skaters with a large range of such flexibility are capable of achieving high spirals with fully extended legs, front split and stag jumps and other movements requiring split-like positions (i.e. pairs female star lift positions, etc.). In this exercise, legs are fully extended (dominant foot in front) with feet parallel to the floor – if full splits cannot be achieved, weight may be supported with hands on the floor next to the hips. Measurement is taken from lateral ankles of your front foot to the back foot. This measurement is then compared to your anthropomorphic measurement of leg length to give you an estimate percentage of your potential flexibility in the forward/backward range of motion of the hip joint. Athletes vary in range of flexibility depending on physical body characteristics and routine practice of stretching exercises. This test is evaluated on both legs to also identify symmetry on both sides of the body.

11. Standing Spiral
The standing spiral is essentially the identical stretch position as an on-ice spiral. You are assisted into a fully stretched spiral position on your dominant spiral leg and a distance measurement from lateral ankle of the free leg to lateral ankle of the standing leg is taken. To achieve the optimal height of the spiral free leg, flexibility in the hip joint and lower back as well as muscle strength in the legs is essential. Athletes should regularly practice stretching their spiral position to improve joint mobility and flexibility. Athletes vary in range of flexibility depending on physical body characteristics and routine practice of stretching exercises.
12. Seated Reach
The seated reach exercise tests your postural spine muscles, lower back, gluteus and leg muscles flexibility. Having back and leg muscle flexibility improves your overall range of motion throughout the spine, hips and legs – this helps skaters achieve fully stretched positions and reduce the risk of injury due to improper posture in spins, jumps, lifting, etc. In a seated position, legs fully extended front of body and slightly apart with toes pointed upward, you take a deep breath and reach down and forward between the legs and past the feet as far as possible on the exhale. Athletes vary in range of flexibility depending on physical body characteristics and routine practice of stretching and range of motion exercises.

13. Lumbar Extension
The lumbar extension measures the amount of flexibility in the spine. Skaters are required to have a degree of flexibility in the lumbar spine to obtain positions in camels, spirals, lifts and various variations of spins and steps. The test is execute by having the skater lay on their stomach and then extend their arms beneath their shoulders lifting the chest off the ground. From their they arch their back and push their hips towards the ground as they bend their knees and pull their toes towards their head.

14 & 15. Spiral Balance (eyes open and eyes closed)
Balance, coordination and proprioception are integral to the sport of figure skating in all disciplinary movements because you have to be able to balance on the blades of your skates while turning, spinning and gliding. The spiral balance is an exercise to test your ability to balance on one foot without shoes on in a basic skating spiral position. The free leg is required to be extended and held a minimum of hip height. The standing spiral is completed with eyes open and held as long as possible (maximum time limit = 120 seconds). The second spiral balance is completed with eyes closed and held as long as possible (maximum time limit = 120 seconds).

15. Anthropomorphic Measurements
Anthropomorphic measurements are simply measurements of various body parts. Such measurements are taken for comparison and calculations of certain exercise results in all three areas of the S.T.A.R.S. fitness test – Strength and Power, Flexibility, Agility, Balance and Coordination.

- Anthropomorphic measurements taken for S.T.A.R.S.:
  - Body Weight (pounds)
  - Height of Head (inches) – standing height
  - Height of Greater Trochanter (inches) – leg length
  - Height of Lateral Malleolus (inches) – ankle height
  - Thigh Circumference (inches)
  - Hip Width (inches)
  - Shoulder Width (inches)

Note: These measurements were not reported to the athletes. They were taken for statistical purposes only, as there is currently no normative data available.
REFERENCES


U.S. Figure Skating S.T.A.R.S. Program 2014-13 Manual