Highest priority for physical training?

Every coaches' group we asked said the
same thing about developing adolescent players:

besides skills, decisions, and other mental qualities, it's all about

Speed, Quickness, Agility

It's not just coaches' opinions.
Five decades of Evidence --->

Speed, quickness, agility (SQA) <==> the highest priority

45 years of evidence:

1) July, 1979, Colorado: *An amazing fact!*

This fact has never been published, and might seem highly improbable. Tryouts for the 1980 US Hockey Team were conducted during the US Olympic Sports Festival for many sports. The invitees were the top 80 amateur hockey players in the country.

In two weeks, these players (4 teams) were evaluated in games and practices by a committee of coaches. On the second day we tested Skating 'Top Speed and Acceleration,' outlined in conditioning books that went to players in April.

Statistical analysis of the Top Speed and Acceleration tests was done <u>after</u> the selection committee picked the team.



Later, analysis showed:
The 1980 Olympic Gold Medal Team – selected solely on the basis of game competition – was significantly faster on skating tests than the average of unsuccessful candidates ($p<0.01$).

<u>No other sport</u> has shown that its top team is measurably faster than the runner up; nor that any physical test discriminates between two nearly identical elite groups in this way – not strength, endurance, flexibility, etc. Keep in mind that all candidates were judged to be the best amateurs in the country, so … was this a statistical fluke?

The next chart shows: teams (same age) at a higher level are faster.

At the request of some GM's these results were not published

This chart represents 5000+ players, 200+ teams or groups, camps

Teams or Groups	Faster than	Teams or Groups	Faster than	Teams or Groups
1980 USA Gold-Medal Olympic Team	>	Unsuccessful candidates		
USA Olympic Teams (amateur)	>	D-1 College teams	>	D-3 College teams
D-1 National Champion	>	Other D-1 College teams	>	Unsuccessful candidates
D-3 National Champion	>	Other D-3 College teams	>	Unsuccessful candidates
D-1 National Champion	>	D-3 National Champion		
USA Junior Teams (fall camp for Worlds)	>	Tier-1 Junior Teams	>	Tier-2 Junior Teams (all in the US)
High school varsity teams	>	JV teams (same age as V)	>	Unsuccessful candidates
National Select camps (ages 15-18)	>	Commercial camps		
Youth AAA-Teams (ages 13-18)	>	Youth AA-Teams (age 13-18)	>	Youth A or B-Teams (age 13-18)
NHL teams	=	AHL teams	>	NHL teams' prospect camps

Do NOT miss this chart

- ***Skating tests were electronically timed using photoelectric cells (Test-retest: r=0.98).***
- ***There were individual exceptions, of course, but all team comparisons were statistically different (p<0.01).***
- ***Results for females were qualitatively the same, but only 7 teams & camps, 500 athletes were tested.***
- ***Skating acceleration and cornering S-test yielded similar results.***
- ***Coaches did not see statistical results before making cuts.***

At higher levels, speed is essential.

Other factors (mental, physical) are super-important but not as reliably measured.

2) It was NOT a fluke. As we continued to test, we found that all amateur Olympic teams (1980–94) were faster on skating tests than college teams, but not different than AHL or young NHL players.
Note: AHL and amateur Olympic teams were about the same age, while NHL teams were older. At around 27 years of age, NHL folks stop training for speed, and just maintain strength, 'systems,' & endurance. This is unwise if the object is to win games and extend careers.

I certainly do NOT claim that skating speed, quickness, and agility are the reasons any Olympic Team is successful. Nor do I recommend that skating speed is the most important aspect of a young person's development.

Competitiveness, confidence, toughness, creativity are more important, but …

Speed, Quickness, and Agility are essential and trainable off-ice!

3) July, 1979: At the same Olympic Festival, we were asked to test run-up velocities of the long jumpers on the US track team, using electronic timers and photocells. Each of the top 6 jumpers (in the US) had 5 trials; **Without exception among the 30 jumps, the speed of run-up correlated perfectly with the length of jump (within each jumper's trials, and between jumpers).**

So, in one Sports Festival, on the US hockey and track teams, we were able to measure SPEED among elite athletes who's sports have a competitive objective other than speed.



4) In that same summer, we intercepted communications between Soviet sports scientists and their hockey coaches, including test data.

The Russians' major off-ice priority was SPEED, and their tests verified what we found on every team we tested for the next four decades:

Running and skating speed are highly related at all ages

5) February, 1980: Eric Heiden and his coach, Diane Holum proved to the world that if an efficient skater was intelligently conditioned (off-ice as well as on-ice) he could win ***EVERY*** speed skating event from sprints to distances: 500m, 1000, 1500, 5000, and 10,000m!!!



Some might consider this the closest thing to a miracle at Lake Placid.

Their training featured skating-specific strength, endurance, and explosiveness.

Hollywood might promote the idea of 'MIRACLES,' but Herb Brooks, Eric Heiden, and Diane Holum believed in intelligent, hard work: Preparation, not miracles.

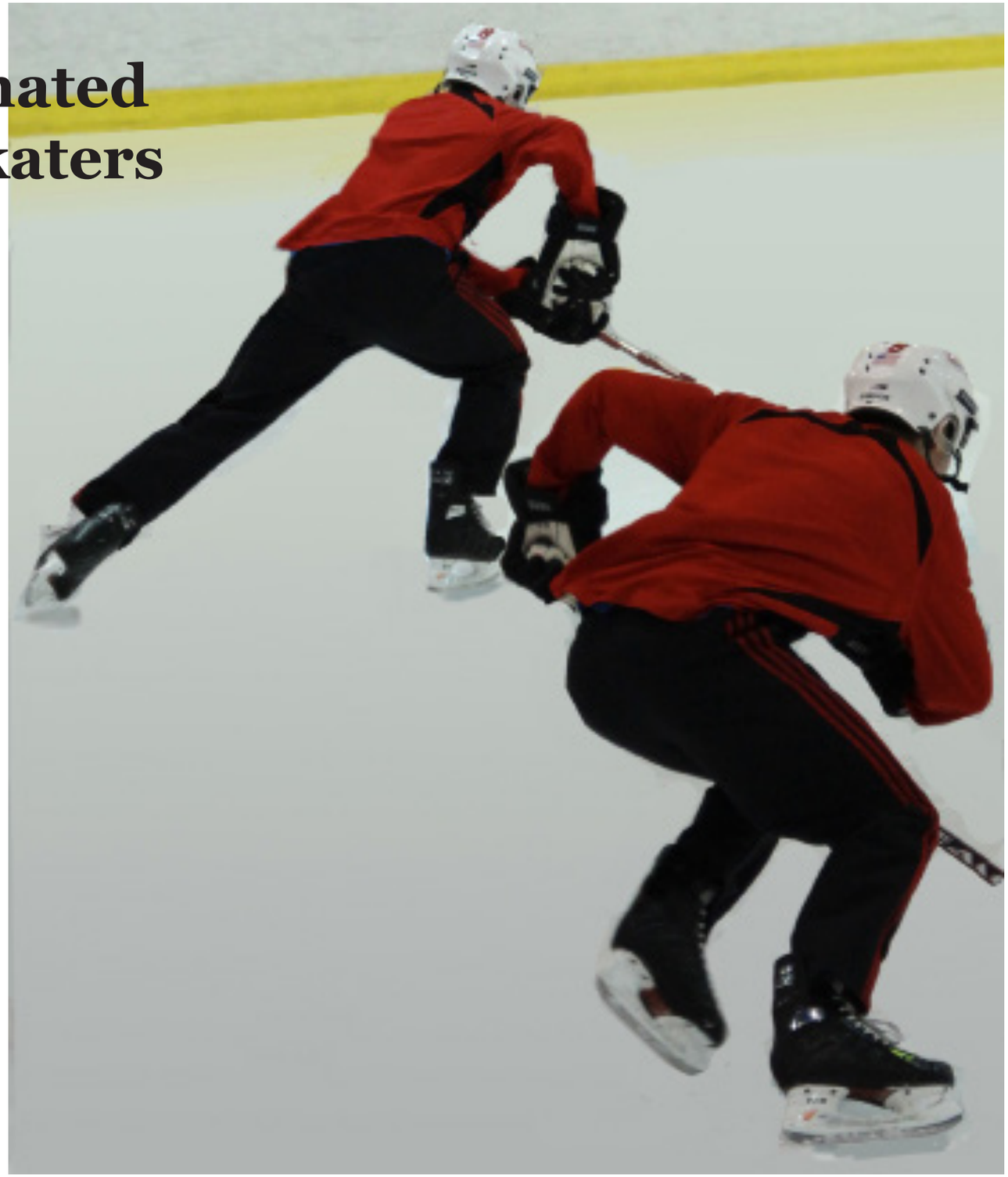
6) Further testing (fifty years; n=5000) showed that teams in a higher designated classification are faster on skating tests of Speed, Quickness, and Agility than teams of the same age in a lower class.

(Note: an agility test was added, an S-test around 2 corners. All tests electronically timed, and comparisons significant p<0.01)

More recently, at the University of Minnesota, Peterson and colleagues found that skating Top Speed, Acceleration, and Endurance were greater for D-1 college and junior teams compared to a D-3 college team. They also reported greater measures of bicycle peak power and vertical jump height, but no difference in aerobic capacity V02 *peak (Peterson, 2015a)*.

Summary of Test results for 5000 athletes:

Teams in a higher designated level of play are faster skaters



7) Over fifty years, every coaches' group told us Skating Speed, Quickness, Agility were the top priorities for off-ice training Our on-ice test results verified the hockey coaches' priorities.

Apparently this was not communicated to some strength-conditioning coaches, because strength – not speed – appears to be their highest priority off-ice.

Moving up a level requires skating speed

Anyone who has coached understands Igor Larionov's comment …
"It's not how fast you skate; it's how fast you THINK."

I agree 100% about quick thinking. It is the most important factor. However, it also matters how fast you skate!

High school Tryouts –>

3 varsities, 3 JV's
Coaches didn't see these results until after picking the teams.

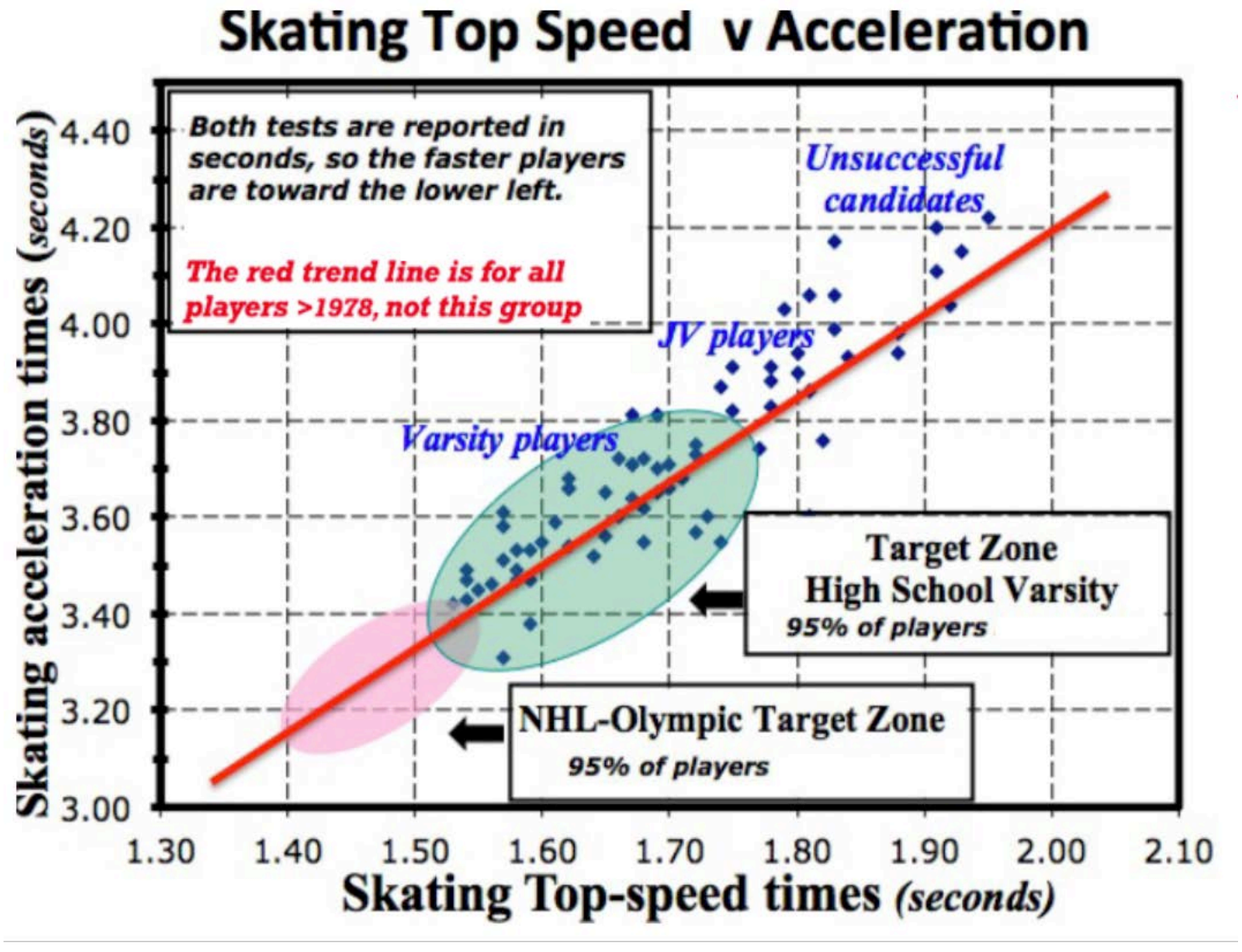
Those who made the varsity were faster than those who made JV – who were faster than unsuccessful candidates

(no significant difference in age).

Key: Every dot represents two results (in seconds)for each player.

•Time to skate 50'atTop Speedafter a long (250') run-up.

• Time to accelerate from 10'to 90' from a standstill.



8) Relationships to skating were investigated by off-ice testing with more than 100 teams over 45 years. We found the same results every time, at every age: Off-ice sprints and vertical jump are highly related to skating Speed & Acceleration.

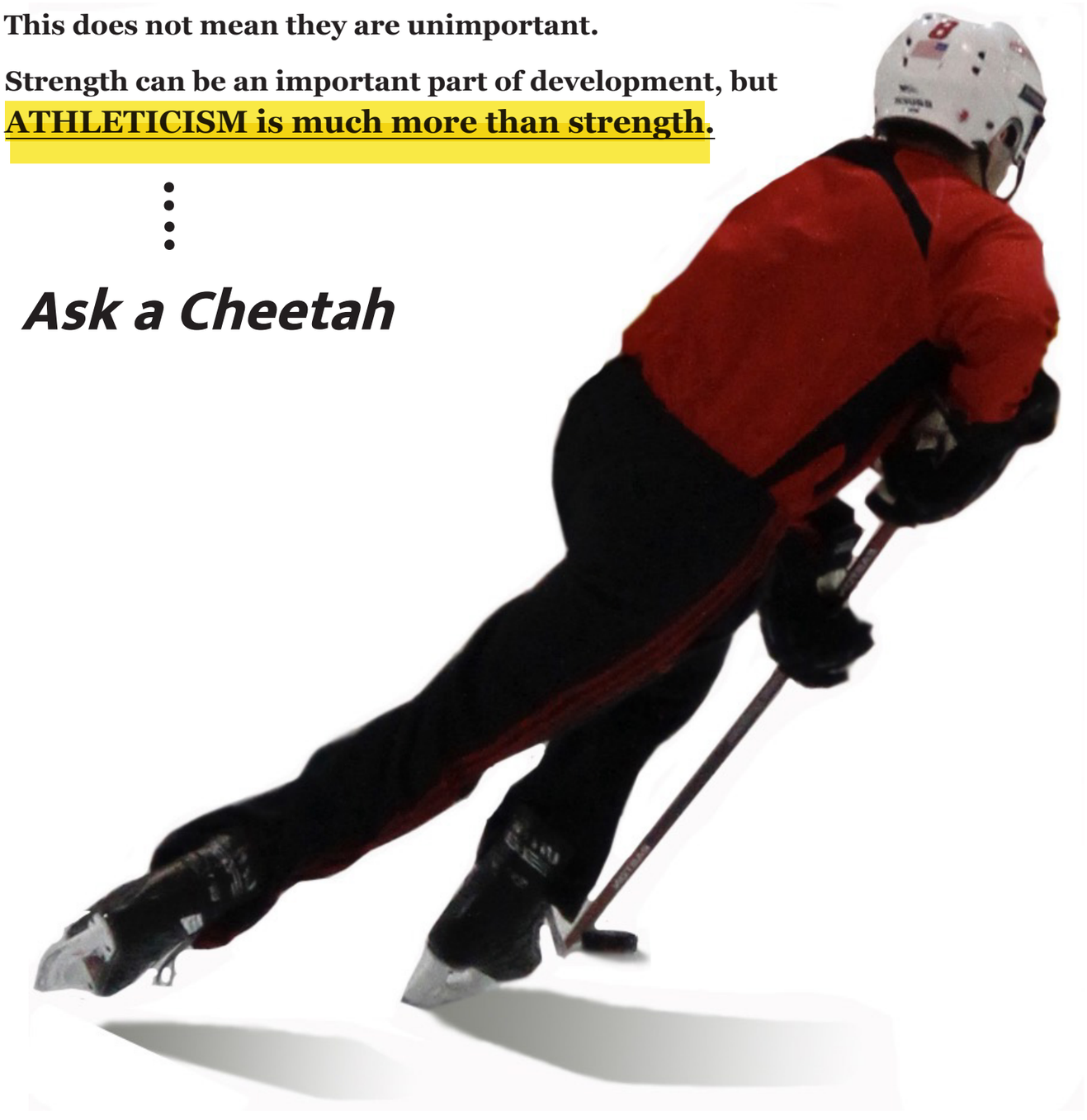
Tests of strength, endurance, core stability, flexibility were not statistically related to skating.

This does not mean they are unimportant.

Strength can be an important part of development, but ATHLETICISM is much more than strength.

⋮

Ask a Cheetah







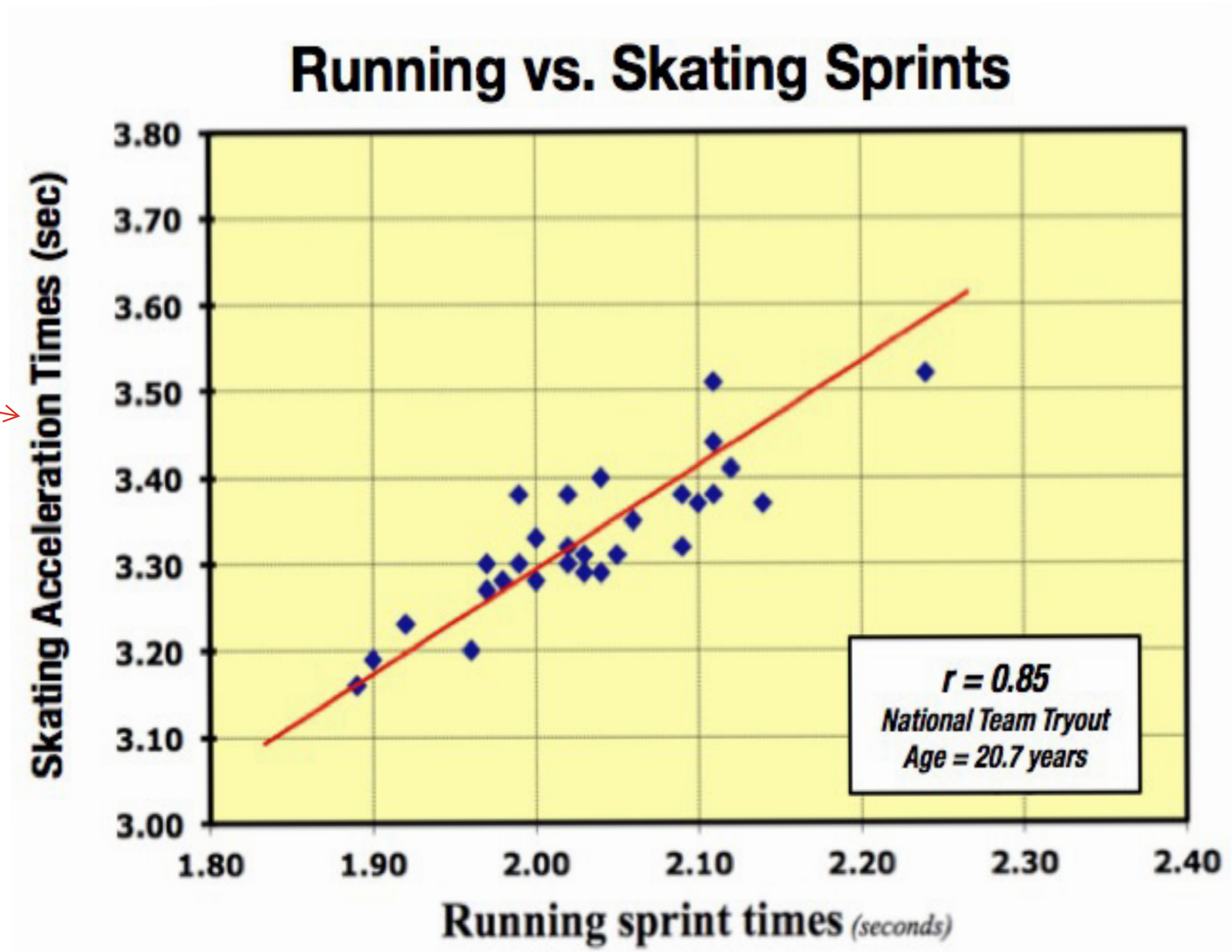
Skating speed is highly related to sprint speed

Of hundreds of teams tested on the ice, many were tested to find activities off-ice that could improve skating speed, acceleration and cornering

Key: Every dot represents two results (in seconds) for each player.

•Off-ice time to sprint a given short distance (we used 40 yards at first, but found distances as short as 15 yards produced the same correlations to skating).

•On-ice time to accelerate from 10' to 90' from a standstill.



Skating speed & acceleration are highly related to Jump height

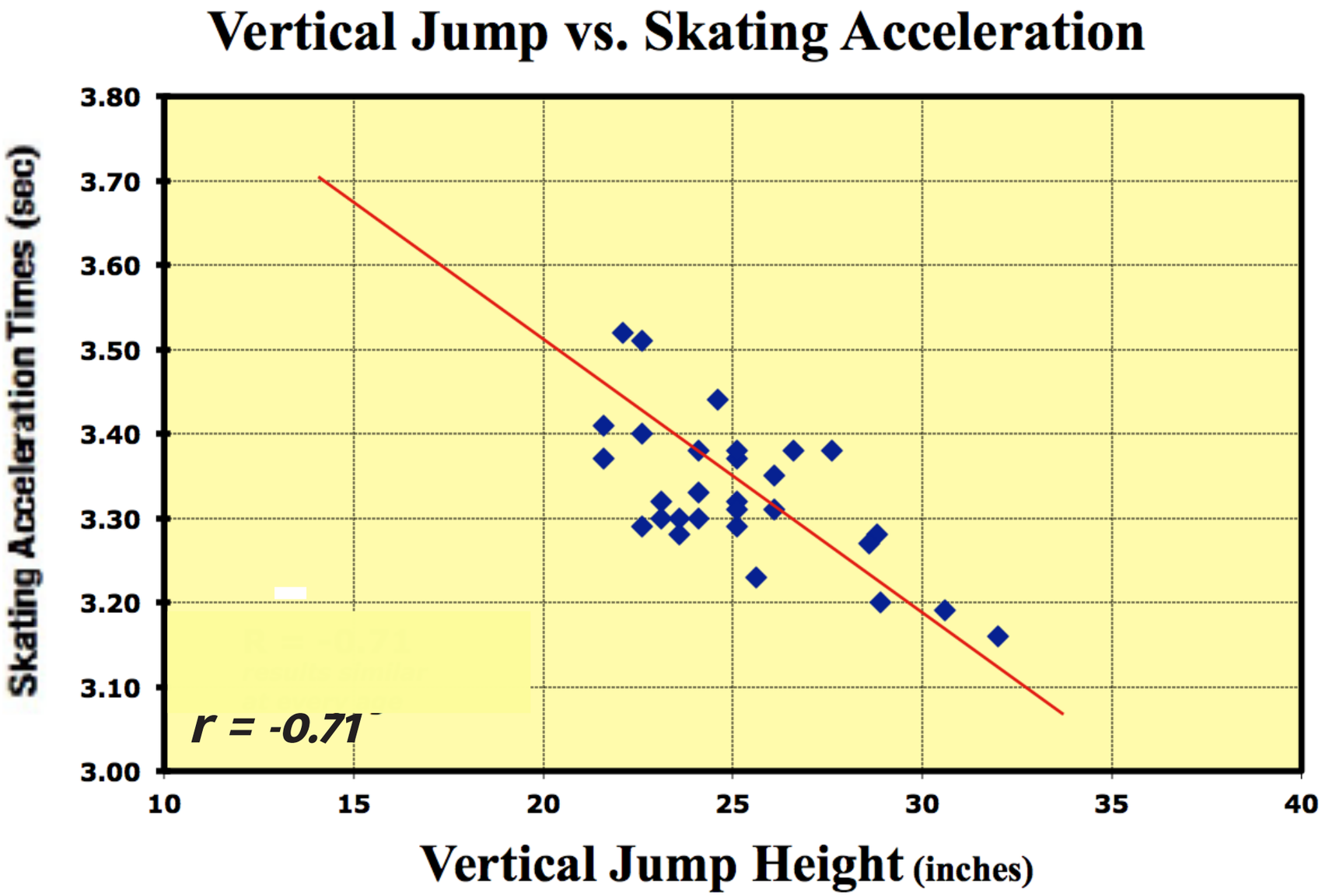
In 50 years of testing, nothing correlated to skating as well as sprints and jumps.

Accelerating your body with unrestricted use of the arms must be learned at a young age.

These correlations, by themselves, do not justify claiming that vertical jumps or sprints are factors in the improvement of skating acceleration or top speed.

However, in several longitudinal studies with male and female players** (Age 13-35), **improvements in sprints, jumps, and skating were always highly related.

Each team we tested had correlation (-0.9 ≤ r ≤ -0.7) and p<0.01



Some unsophisticated thoughts to understand the statistics.

On the two pages before this the graphs demonstrate correlations that are good (high r-values) compared to other physiological data.

In general, graphs are easier to understand than the math which gives them their 'r' value.
The closer 'r' is to {1 or -1} the easier it is to see that a regression line can be drawn, which seems to 'fit' the data.
On the other hand the closer 'r' is to zero the more difficult it becomes to find a line that characterizes the data.

Note 1:There are always players (outliers) who don't fit the generalization we make to characterize what the graph shows.
Note 2: Every test we did was with one team, so generally, the players were the same age and were playing at the same level.

Conclusions:

- *Players at a higher designated level of play are faster skaters at top speed after a significant run-up.*
- *They are faster skaters on a straight ahead acceleration sprint to 90 feet.*
- *They are faster on an S-test of cornering agility, and they are quicker on a stop-start test.*
- *This is true at every level and every age before elite college, AHL, and NHL levels.*
- *NHL players are not necessarily faster than elite college or AHL players.*
  The game is faster in the NHL because of the puck-control, passing and decision-making skills.
- *Heavier players are likely to be slower. Taller players are also likely to be slower.*
  Reminder: There are exceptions. Of course, there are tall players and heavy players who are fast.
  Statistics generalize – drawing regression lines or comparing the average of the group of tall players to the group of short players.
- *I state these relationships of body size to skating speed because they warrant your attention if you think you need to be bigger and stronger. That's a common myth.*
- *If genetics say you are not going to be big (pick a height or weight you consider big) ...*
  if you are not going to be big, you better be fast in open ice and quick in small areas.



Skating Sprint Start
hip Abduction-Rotation-Xtension

This first step is exactly like a skating stride –
not only range of motion, but speed as well.

Why ‘Skater’s Jumps’ not ‘Sprinter’s Plyos’?

We’ve never seen a player improve on the skating acceleration test, who did not also improve in the short off-ice sprint and vertical jump tests. This does not mean they all worked on sprints and jumps. Some did not. But improvement in one goes hand in hand with improvement in the other.



‘Skaters Jumps’

There’s no formal definition for ‘plyometrics,’ but skaters and sprinters have different needs. Sprinting requires great force (impulse) for brief contacts with the track, so their plyos feature brief contact.

Skaters need knee bend + great horizontal force (impulse) with each stride, so there is no attempt to rush

Jumping without much knee bend is wasting an opportunity to improve good skating habits.

Skater’s jumps should be done without stopping. Isolated single jumps don’t stimulate the stretch reflex like maximum repeat jumps



Force Multipliers

As the arms and shoulders are elevated vigorously and naturally in the early moments of a maximum jump or skating stride, it assists the movement in two ways:

a) starting upward momentum of your center of mass;

b) stretch-reflex through the core to the gluteus muscles.

These are essential force multipliers to lower body muscles.

So, while you're still young …

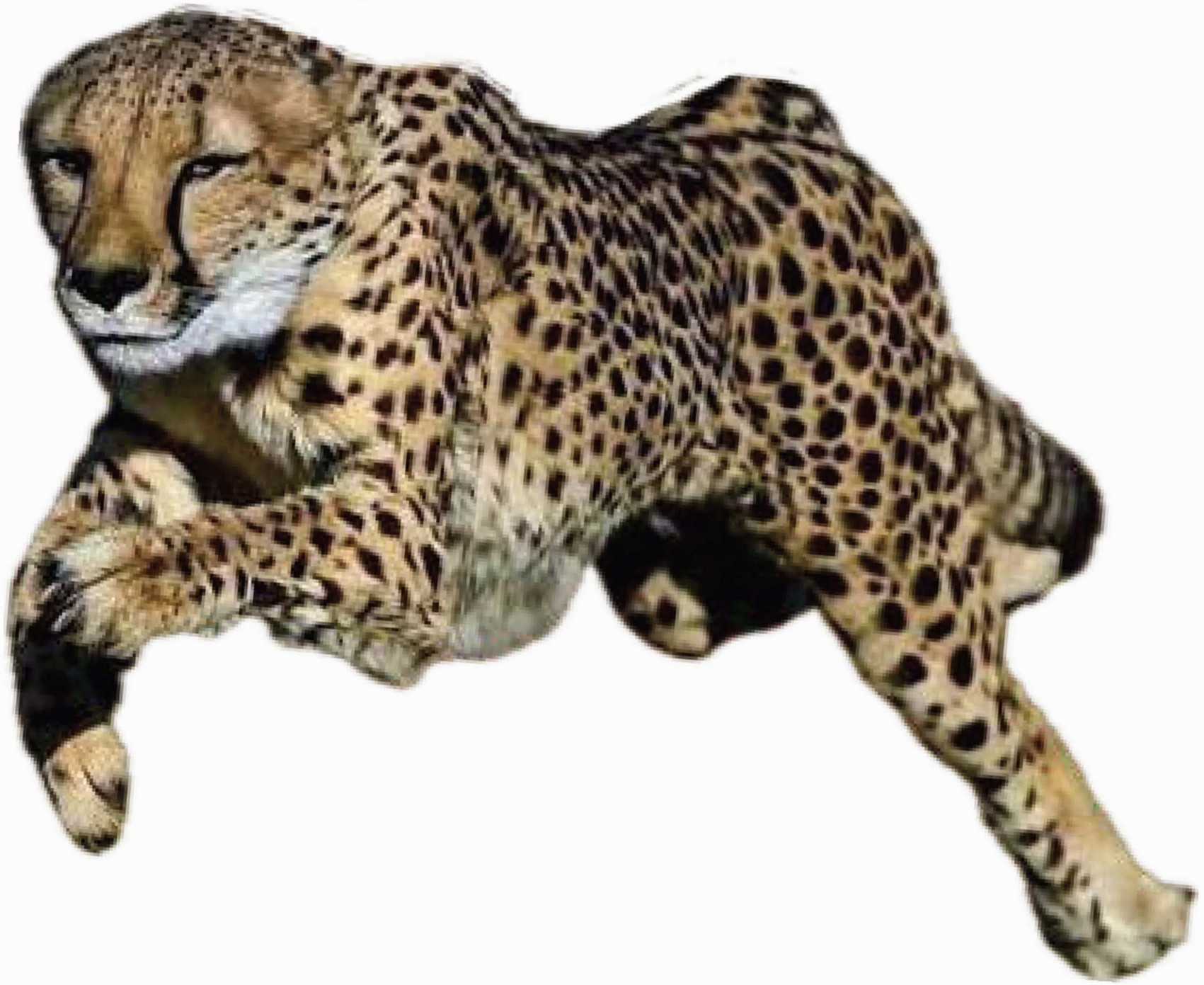
… while the nervous system is learning athletic movement, training must promote 'whole-body' integration of forces. Lower-body strength training must add jumps and sprints into each workout. Include SUPERSETS: {squats & sprints} or {squats & jumps}.

Jumping, sprinting, skating are 'whole-body' … not 'lower body' movements.

For young athletes to develop speed, restriction of the arms for an entire workout is counterproductive, whether restricted by antiquated rules for skating and jumping, or because the arms are holding a barbell.

When training teenagers: allow natural athleticism to dominate movement …

… as a Cheetah would.



Tragedy at ASU: Torture … Not Training

The recent catastrophic injury to an Arizona State University hockey player during a team workout in the desert sun is a call to action for adults in every sport.

I'm sad and angry as I write, because this is not accidental. It is calloused, negligent, abuse of athletes who should be able to trust the coaching staff. Matthew Mayich, a 20 year-old hockey player is brain dead in a coma, weeks after being tortured in the desert heat — tortured in the guise of training and team-building.

The idea – 'no pain no gain' – must be eliminated in the field of strength/conditioning.

Greg Powers, head hockey coach at ASU brought in a former Green Beret, Tim Zeisel, to torture the hockey team in the heat – illegal, because it violated several ASU, and state policies – irrational because this was a hockey team, subjected to an irrelevant workout in the desert sun.

Torture? Consider this statement of events, written by players. A required emergency ice water bath was missing. Drinking water was selectively withheld from those who needed it most, like Matthew. Players who were suffering (crawling and disoriented) from the heat had to continue bear crawl while the speedier players got drinking water. Several players vomited. And Zeisel belittled those who struggled the most, saying his 8-year-old son could do better.

It reminds me of a sad day for football 25 years ago. The Minnesota Vikings killed Korey Stringer. Yes, "Killed." The language is unusual and inflammatory, but I know the situation all too well. I was asked by his wife's attorneys to study his medical history at Ohio State University, and with the Vikings. On both teams, he suffered many heat related events over several years – including his collapse the day before and again the day he died – the hottest day of the year. Ranchers were actually warned to get their cattle out of the sun that day.

The step-by-step gross negligence by Viking coaches, trainers, and physicians is astounding.

After Stringer and 22 football players or wrestlers died from heat stroke and dehydration in one year, 2001, I traveled the country to investigate places where tragedies occurred. Imagine, in a small Alabama town, <u>two young athletes died this way that same summer!</u>

Reports are often biased to protect football when submitted to the National Center for Catastrophic Sport Injury Research at the University of North Carolina. When I visited the Center in 2001, I was told there are actually more heat-related deaths than reported, but it is common to use language like 'cardiovascular event' rather than just tell it like it is: heat stroke, as a result of torture.

Partial remedies have been installed in the NFL and college, but this ignorant concept still exists to threaten teenage athletes: 'No pain, no gain.' Unreasonably heavy squats are another example of dangerous training based on faulty research conclusions. I've seen permanent crippling back problems from strength programs that ignore scientific data and safety guidelines.

No one should ever be hurt in training.

There are some who say training needs to be painful, but we've seen hundreds of young athletes who pursued and accomplished their goals – and did not consider it pain. Rather, the hard work and long-term discipline were 'fun, tough, satisfying, and a badge of accomplishment.'

A group of ASU hockey players are asking the city and state police to investigate, because they no longer trust university coaches and administrators. What a shame. If student-athletes cannot trust their school or coaches, who can they trust?

We adults can do better. Training must be:

(1) 100% safe;
(2) relevant and productive for hockey;
(3) based on scientific data, not opinion.

You want to be an NHL'er?
So did Matt Cullen.

So, he worked his tail off,
played 21 years, and
won three Stanley Cups.

OverSpeed Skating.
Dryland skating drills.
Sprints, Jumps, Agility.
Other sports.
Weight training.
Stickhandling drills.
Quick-release shooting.

