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CONFLICT OF INTEREST STATEMENT

I currently have, or I have had in the past 2 years an affiliation or financial interest with the University of South Carolina around this presentation, including:

- ~~Consulting~~
- **Employment**
- ~~Stock holder or stock options~~
- ~~Royalties or licensing fees~~
- ~~Honoraria~~
- ~~Promotional fees~~
- ~~Research funding~~
- ~~Corporate laboratory funding~~
- ~~Scholarship~~
- ~~Other(s)~~

Consistency is Key:

Implications for Motor Control Theories in Sport & Athletic Performance

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Consistency is Key:

Implications for Motor Control Theories in Sport & Athletic Performance

- **DEFINE**
  - "**Sport Performance**" (SP)
  - "**General Athletic Performance**" (**GAP**)
  - "**Specific Sport Skills**"

- **LITERATURE REVIEW**
  - "**GAP**" ≈ "**GAP**"
  - **Impulse-Momentum Theorem**
  - **Impulse-Variability Theory**

- ***APPLIED* SPORTS SCIENCE RESEARCH**
  - **Squat Jump Peak Velocity / Impulse-Momentum**

The Foundation of Sport Science Research:

- Identifying – Measuring – Improving:
  - Factors Related to "**Sport Performance**" (SP)
- "**SP**" in current body of literature is:
  - ***NOT*** clearly defined
  - ***NOT*** linked to ***competitive SP outcomes***
    - e.g., yards per carry, batting average, hitting percentage, rank or placement, etc.
- Current literature predominantly linked to:
  - ***General Athletic Performance*** (**GAP**)
    - e.g., physical qualities related to strength, speed, power, agility, and endurance

WHAT IS "SPORT PERFORMANCE"?

SPORT
PERFORMANCE

– Specific to measurable *competition related* performance metrics such as:

- *Yards Per Carry, Batting Average, Hitting Percentage, Points Per Game, Race Time, Rank, or Placement*

GENERAL ATHLETIC
PERFORMANCE

– Measurable *physical qualities* related to:

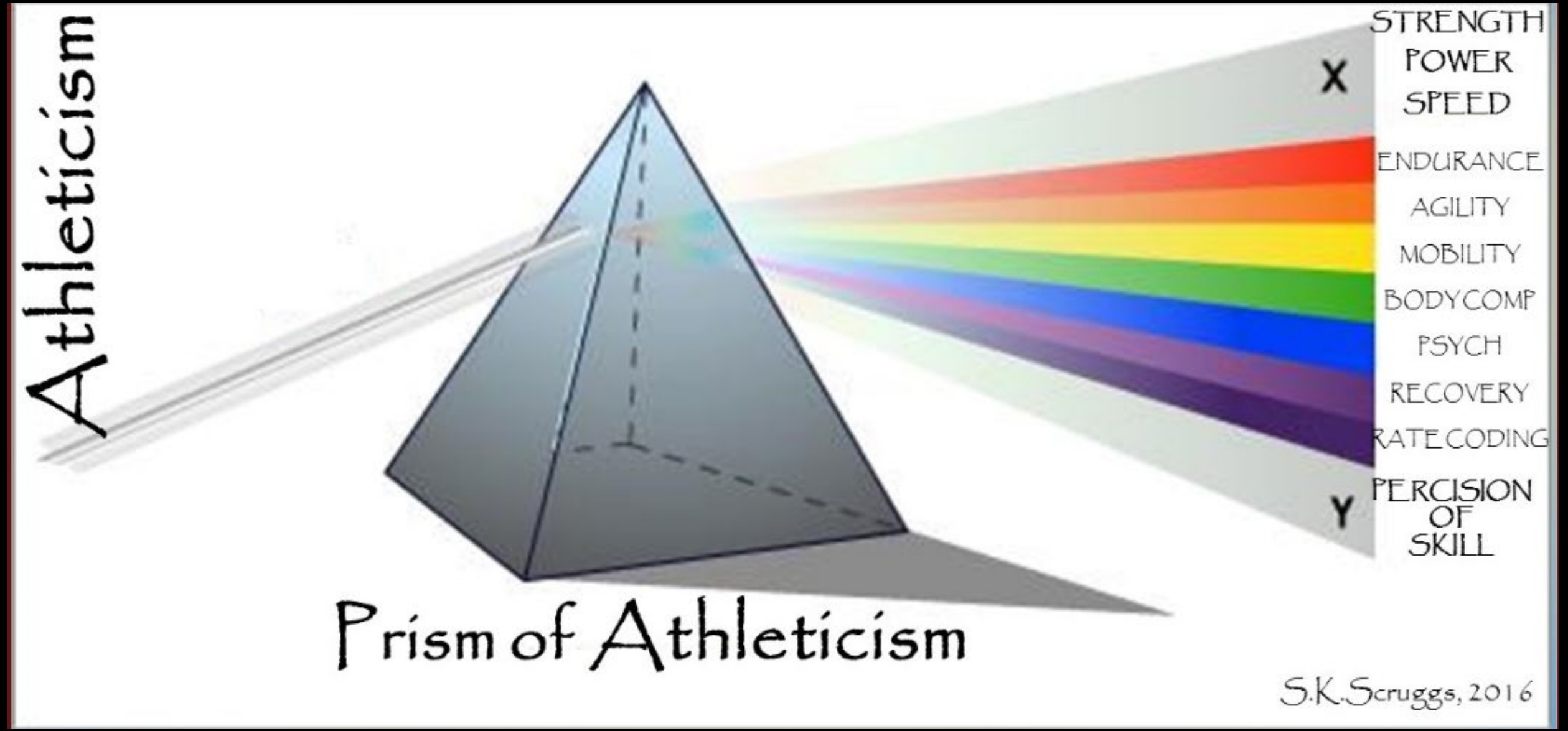
- *Strength, Speed, Power, Agility, and Endurance*

SPECIFIC SPORT
SKILLS

– Sport *specific applications / outcomes* associated with:

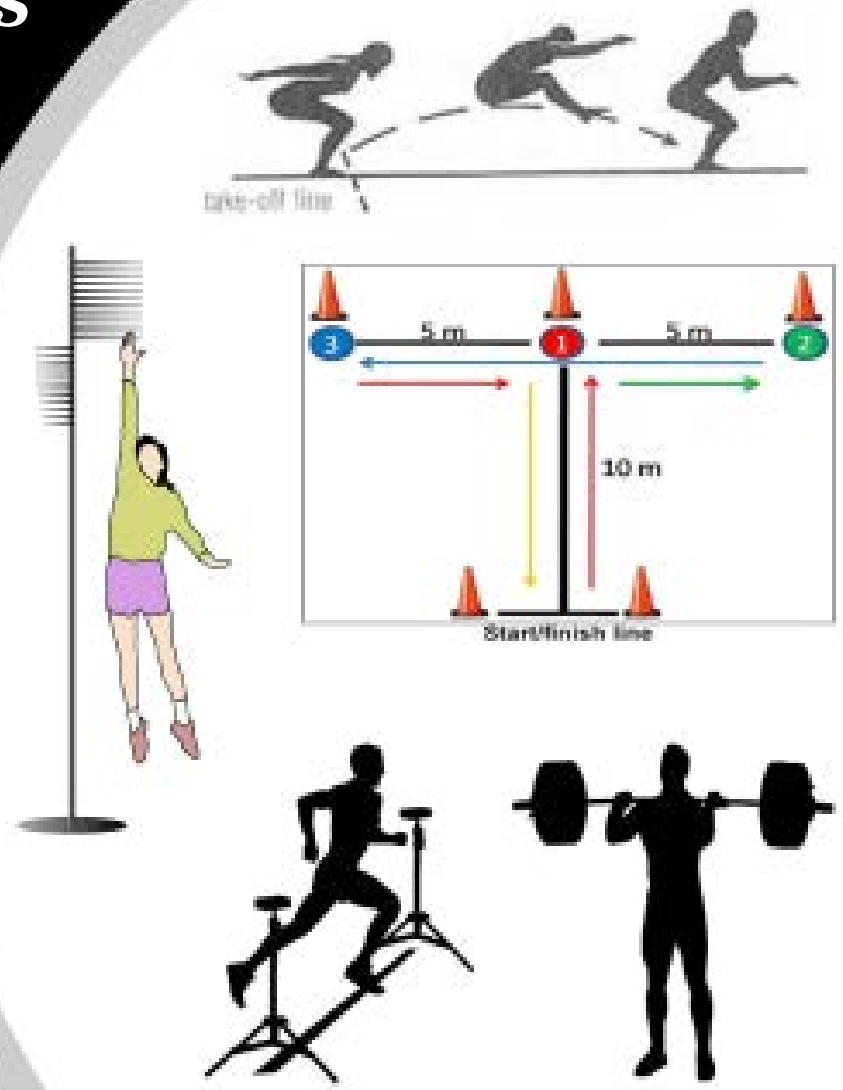
- *Kicking, Throwing, Striking, Running, and Jumping*

Alejo, B. (2019). [Misconceptions of practitioner titles within the field of strength and conditioning: Athletic performance coach versus sport performance coach]. *Personal Communication, 13 Jul 2019*

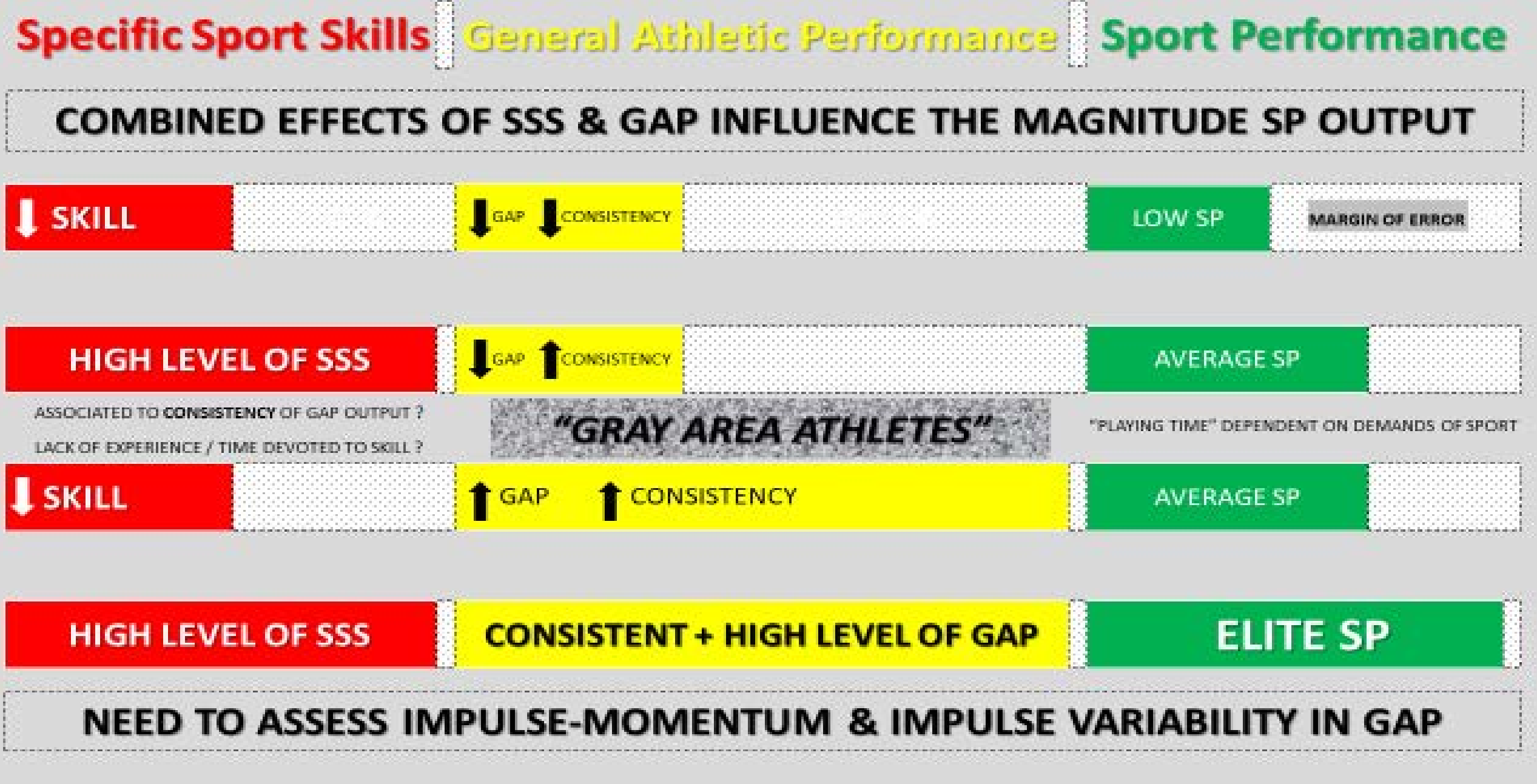

Athleticism
STRENGTH
POWER
X
SPEED
ENDURANCE
AGILITY
MOBILITY
BODYCOMP
PSYCH
RECOVERY
RATECODING
Y
PERCISION
OF
SKILL
Prism of Athleticism
S.K.Scruggs, 2016

GAP ≈ GAP | Lab & Field Assessments

- **Traditional GAP markers: r < 0.58 to 0.87**
  - **Traditional** | 1RM, jump height, sprint & agility times, etc
    - Stone et al., 2003; Carlock et al., 2004; Peterson et al., 2006; Kraska, et al., 2009; Conlon et al., 2013; Israetel, 2013; Kavanaugh, 2014; Huan, 2015
- **Non-Traditional GAP markers** *may* predict **SP outcomes** better than traditional markers
  - 10-meter sprint ***impulse-momentum*** = discriminator of playing level (**rank**) in pro rugby (Baker & Newton, 2008)
  - Peak bar ***velocity*** (squat **jumps**) **=** indicator of start performance in swimming (Garcia-Ramos et al., 2016)
  - Peak ***velocity*** (squat **jumps**) = postdictor of mins played in NCAA D1 women's soccer (Magrini et al., 2017)



GAP Variability has not been examined in "high-level" athletic populations


Specific Sport Skills
General Athletic Performance
Sport Performance
COMBINED EFFECTS OF SSS & GAP INFLUENCE THE MAGNITUDE SP OUTPUT
SKILL
GAP
CONSISTENCY
LOW SP
MARGIN OF ERROR
HIGH LEVEL OF SSS
GAP
CONSISTENCY
AVERAGE SP
ASSOCIATED TO CONSISTENCY OF GAP OUTPUT ?
LACK OF EXPERIENCE / TIME DEVOTED TO SKILL ?
"GRAY AREA ATHLETES"
"PLAYING TIME" DEPENDENT ON DEMANDS OF SPORT
SKILL
GAP
CONSISTENCY
AVERAGE SP
HIGH LEVEL OF SSS
CONSISTENT + HIGH LEVEL OF GAP
ELITE SP
NEED TO ASSESS IMPULSE-MOMENTUM & IMPULSE VARIABILITY IN GAP

IMPULSE-MOMENTUM THEOREM

- **IMPULSE** = area calculated within force-time curve
- **DURATION OF IMPULSE** = initiation of force until force is no longer applied (i.e., @ toe-off)
- **NEWTON'S 2nd LAW =** velocity of body at the end of acceleration measures the impulse when mass is constant
- "Any variables that influence the magnitude of force (*first 50 ms*?), or the duration of the action, influences the resultant impulse, relative to system mass"

  - Schmidt, R. A., Zelaznik, H. N., Hawkins, B., Frank, J., & Quinn, J. T. (1979). Motor-output variability: A theory for the accuracy of rapid motor acts. *Psychological Review, 86*, 415-451.

$$F = ma$$

$$F = m\frac{\Delta v}{\Delta t}$$

$$F\Delta t = m\Delta v$$

The Impulse

The Change in Momentum

IMPULSE VARIABILITY THEORY: Part 1a

- **Hermann von Helmhotlz** (1852) – Nerve Impulses / Reaction Time
  - **Woodworth / Martin and Müeller** (1899) – Speed-Accuracy Trade-Off Theory
  - **Fitts** (1954) – Fitts' Law
  - **Urbin & Stodden** (2012) – Inverted U Phenomenon
- **Sherrington & Langley** (1881) – severed spinal cord of dog = "Neuro-Muscular"

- **Poincaré** (1892) – Chaos Theory (Mathematics)
  - **Winter** (1961) -- The Lorenz Incident (Weather Prediction Models)
  - **Gleick** (1987) – Chaos Theory
    - "Find Order / Behavior in Chaotic Systems Over Time"

IMPULSE VARIABILITY THEORY: Part 1b

- **Schmidt & Sherwood (1979 – 1982) – Impulse Variability Theory**

- **Newell (1986) –** Model of Constraints
  - Profile / Identify:
    - Organism / Athlete(s)
    - Environment
    - Task(s)

- **Thelen** (2005) – Dynamic Systems Theory …

- **Complexity Principle**
  - Interacting parts producing coherent pattern given …

- **Continuity in Time Principle**
  - "Self-Organizing"
  - Continuous Interaction b/t Neurological + Biological + Musculoskeletal Systems

- **Dynamic Stability Principle**
  - Stability ≠ Incapable of Change
  - Development = Continual Effort(s) to Make Movement Happen

IMPULSE VARIABILITY THEORY: Part 2a

- Research on multijoint ballistic motor skills (i.e., kicking and throwing) suggest a potential relationship of the **variability in neuromuscular impulse** *(first 50ms?)* and **specific sport skills**, and possibly **SP outcomes**

  - Chappell, A., Molina, S. L., McKibben, J., & Stodden, D. F. (2016). Examining Impulse-Variability in Kicking. *Motor Control, 20*(3), 222-232.
  - Molina, S. L. (2015). *Integration of impulse-variability theory and speed-accuracy trade-off in children's multijoint ballistic skill performance.* Doctoral dissertation, Retrieved from https://scholarcommons.sc.edu/etd/3202. (3202)
  - Molina, S. L., Bott, T. S., & Stodden, D. F. (2019). Applications of the speed-accuracy trade-off and impulse variability theory for teaching ballistic motor skills. *Journal of Motor Behavior*. doi:10.1080/00222895.2019.1565526
  - Urbin, M. A., Stodden, D. F., Fischman, M. G., & Weimar, W. H. (2011). Impulse-variability theory: Implications for ballistic, multijoint motor skill performance. *Journal of Motor Behavior, 43*, 275-283.

- **Impulse-Variability Theory** (**IVT**) - variability in the movement outcome is a function of the *initial force generated (first 50ms!!!)* by the neuromuscular system

  - Carlton, L. G., & Newell, K. M. (1993). Force variability in isometric tasks. *Biomechanics-IX*(Champaign, IL: Human Kinetics.), 128-132.
  - Schmidt, R. A., Zelaznik, H. N., Hawkins, B., Frank, J., & Quinn, J. T. (1979). Motor-output variability: A theory for the accuracy of rapid motor acts. *Psychological Review, 86*, 415-451.

IMPULSE VARIABILITY THEORY: Part 2b

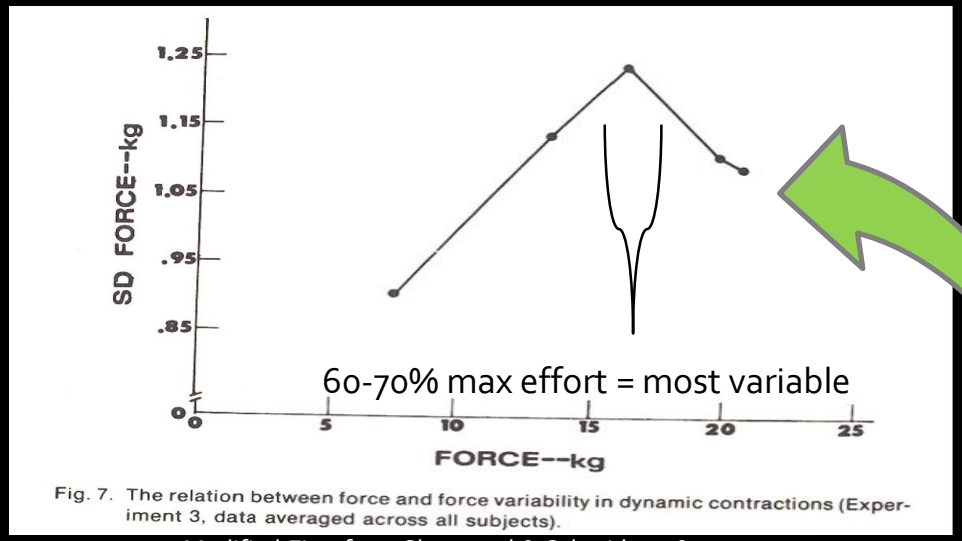


Fig. 7. The relation between force and force variability in dynamic contractions (Experiment 3, data averaged across all subjects).

Modified Fig 7 from Sherwood & Schmidt, 1980

- An inverted-U phenomenon between force and the variability in force
  - Schmidt & Sherwood, 1982; Sherwood & Schmidt, 1980
- At-or-near maximal force output ➔ force output variability decreased

"It appears that task constraints dictate the force variability function that will be generated because, as evidenced in isometric tasks, subjects will systematically modulate the manner in which force is produced as a function of the force requirements of the task. These adaptations by the subject to task demands have a number of implications for force production..."

Newell, Carlton & Hancock (1984), p. 148

IMPULSE VARIABILITY THEORY: Part 3

- Initial IVT research = isometric = necessary but the practical applications were limited:
  - 1. **Controlled Lab Experiments** – lab-based isometric assessments are not necessarily applicable to performance in real-world situations (i.e., **SP outcomes**, **GAP**, **or specific sport skills**)
  - 2. IVT was derived using single-joint laboratory tasks, limiting the generalizability to more complex skilled behaviors, such as multijoint ballistic skills (e.g., **jumping**, **throwing**, **striking**, and **kicking**)

- Wulf & Shea (2002) called for *more **complex skills*** to be examined
  - Wulf, G., & Shea, C. H. (2002). Principles derived from the study of simple skills do not generalize to complex skill learning. *Psychonomic Bulletin & Review, 9*(2), 185-211.

- Urbin, Stodden, Molina, and others have began investigating the relationship between IVT, *speed-accuracy trade-off theory*, and multi-joint ballistic skill performance (i.e., speed, accuracy, and variability), with **throwing** and **kicking**
  - Urbin, M. A., Stodden, D. F., Boros, R., & Shannon, D. (2012). Examining impulse-variability in overarm throwing. *Motor Control, 16*, 19-30.
  - Urbin, M. A., Stodden, D. F., Fischman, M. G., & Weimar, W. H. (2011). Impulse-variability theory: Implications for ballistic, multijoint motor skill performance. *Journal of Motor Behavior, 43*, 275-283.
  - Molina, S. L. (2015). *Integration of impulse-variability theory and speed-accuracy trade-off in children's multijoint ballistic skill performance.* Doctoral dissertation, Retrieved from https://scholarcommons.sc.edu/etd/3202. (3202)
  - Chappell, A., Molina, S. L., McKibben, J., & Stodden, D. F. (2016). Examining Impulse-Variability in Kicking. *Motor Control, 20*(3), 222-232.
  - Molina, S. L., Bott, T. S., & Stodden, D. F. (2019). Applications of the speed-accuracy trade-off and impulse variability theory for teaching ballistic motor skills. *Journal of Motor Behavior*.

Research Gap

- No research has examined ***intra-set variability***, via **GAP assessments**, to assess association or contribution to **SP outcomes**
- No research has examined the ***combined impact*** of maximal **GAP** output and intra-set **GAP variability** on **SP outcomes**
- **Purpose:**
  - Examine association and contribution of maximal effort **GAP** output and **GAP variability**, via traditional and non-traditional **GAP markers**, to **SP outcomes** (i.e., intra-team Rank of SP and Starter vs Non-Starter group membership)

Participants and Setting

- n = 20
- Female
- Members of an *elite* NCAA D1 beach volleyball team
  - ELITE = ranked 8 in their domain (Kearney, 1990; Sands et al., 2019)

Demographic and	Team		Starters		Non-Starters	
Anthropometric Markers	*M*	*SD*	*M*	*SD*	*M*	*SD*
Age (years)	19.75	1.52	19.70	1.57	19.80	1.55
Height (cm)	173.32	6.49	172.47	7.33	174.17	5.80
Standing Reach (cm)	223.71	7.70	223.90	7.94	223.52	7.88
Weight (kg)	66.91	7.75	69.42	8.24	64.40	6.70
Fat Mass (%)	20.35	4.06	20.68	3.58	20.02	4.66

Aim 1A

Examine and compare associations among **GAP markers** from 7 traditional assessments and 2 non-traditional assessments in NCAA DI beach volleyball athletes.

STATISTICS PERFORMED:

- Pearson's Bivariate Correlation
- Bonferroni Adjustment – p-value for each test must be equal to its alpha divided by the number of tests performed (9 test / .05 = $p \leq .006$) Armstrong, 2014
- Power – probability that a test correctly rejects the null hypothesis ($1-\beta \geq .75$) Yuan & Maxwell, 2005

SJ Impulse-Momentum

1RM Front Squat	***r* = .89****
1RM HexBar DL	***r* = .88****
1RM Power Clean	***r* = .74****
SJ Peak Velocity	***r* = .72****

1RM Front Squat

1RM HexBar DL	*r* = .95**
SJ ImpMo	*r* = .89**
1RM Power Clean	*r* = .84**
App VJ Height	*r* = .60*
SJ Peak Velocity	*r* = .60*

1RM HexBar Deadlift

1RM Front Squat	*r* = .95**
SJ ImpMo	*r* = .88**
1RM Power Clean	*r* = .79**
SJ Peak Velocity	*r* = .61*

1RM Power Clean

1RM Front Squat	*r* = .84**
1RM HexBar DL	*r* = .79**
SJ ImpMo	*r* = .74**

VJ Height

App VJ Height	*r* = .88**
SJ Peak Velocity	*r* = .81**

Approach VJ Height

VJ Height	*r* = .88**
SJ Peak Velocity	*r* = .78**
1RM Front Squat	*r* = .60*

SJ Peak Velocity

VJ Height	***r* = .81****
App VJ Height	***r* = .78****
SJ ImpMo	***r* = .72****
1RM HexBar DL	*r* = .61*
1RM Front Squat	*r* = .60*

MedBall Toss

1RM HexBar DL	*r = .55, p = .013*
SJImpMo	*r = .54, p = .014*
SJ Peak Velocity	*r = .53, p = .015*

T-Test Agility

1RM HexBar DL	*r = -.51, p = .023*
SJ Peak Velocity	*r = -.49, p = .027*
SJ ImpMo	*r = -.48, p = .034*

Note. ** $p \leq .001$, * $p \leq .006$, multi-collinearity issues for regressions

Aim *1.B1*

Examine associations of **GAP**, anthropometric and demographic markers to **intra-team rank of SP** (via expert raters) in an NCAA DI beach volleyball team.

Order of Association to SP Rank		*r*	*M*	*SD*	Unit of Measurement
SJ Peak Velocity		**-.71****	2.44	.18	m/s
SJ Impulse-Momentum		**-.71****	212.39	27.21	kg·m/s
1RM Front Squat		-.66*	78.86	18.84	kg
VJ Height		-.64*	58.80	5.62	cm
Approach VJ Height		-.63*	65.60	5.30	cm
1RM HexBar Deadlift		-.63*	100.00	24.30	kg
MedBall Toss		-.60	10.11	.86	m
1RM Power Clean		-.49	57.05	14.78	kg
T-Test Agility		.44	5.46	.14	secs
Fat Mass		-.31	20.35	4.06	%
Age	"Domain Specific	.16	19.75	1.52	years
Standing Reach	Criteria"	-.08	223.71	7.70	cm
Height		.04	173.30	6.49	cm

Note. ** $p \leq .001$
* $p \leq .003$

Spearman's Rho Correlations

Aim *1.B2*

Examine the contribution of **GAP markers**, from traditional and non-traditional assessments, to **intra-team rank of SP** in an NCAA DI beach volleyball team.

GAP Markers	χ^2	R^2	*OR [95% CI]*	*p*
(1) SJ Impulse-Momentum and VJ Height				
Overall Model	**13.10*** **	**.48**		
SJ Impulse-Momentum			-.89 [-.80 to 0-.99]	**.027***
VJ Height			-.92 [-.84 to -1.02]	.108
(2) SJ Peak Velocity and 1RM HexBar Deadlift				
Overall Model	**10.41****	**.41**		
SJ Peak Velocity			-.90 [-.81 to -1.01]	.050*
1RM HexBar Deadlift			-.95 [-.85 to -1.05]	.284
(3) Approach VJ Height and 1RM Front Squat				
Overall Model	**11.06****	**.43**		
Approach VJ Height			-.92 [-.83 to -1.02]	.130
1RM Front Squat			-.91 [-.82 to -1.01]	.080

Note. $*p \leq .05$, $**p \leq .005$, $***p \leq .001$

Ordinal Logistic Regression

Aim *1.C1*

Examine associations of **GAP**, anthropometric and demographic markers when comparing **starters and non-starters** in an NCAA DI beach volleyball team.

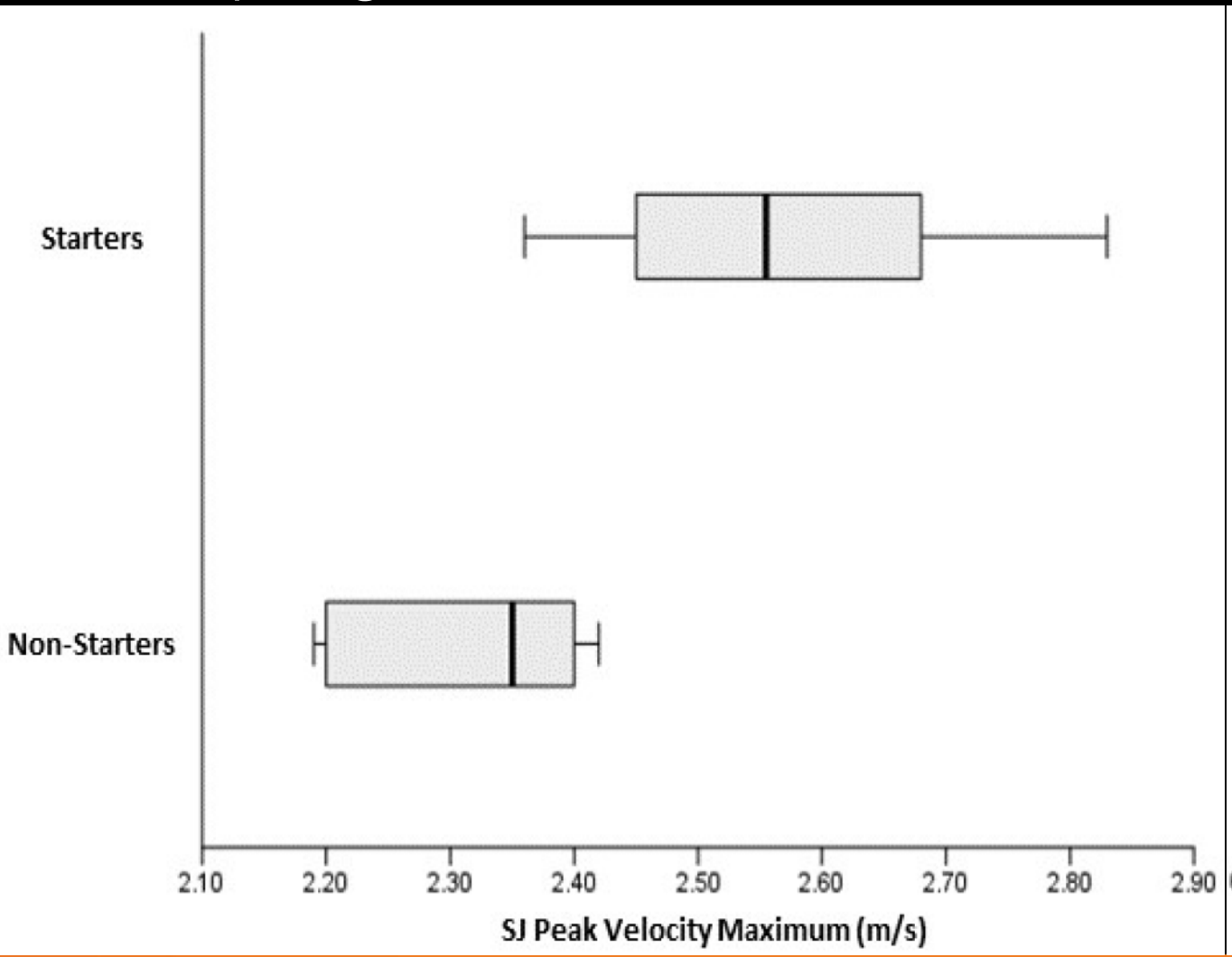
		STARTERS			NON-STARTERS			
Order of Association to SP Rank	***r***	***M***	**±**	***SD***	***M***	**±**	***SD***	**% DIFF**
SJ Peak Velocity (m/s)	**.74****	2.57	±	.15	2.31	±	.10	**+ 10.66%**
SJ Impulse-Momentum (kg·m/s)	**.66****	229.98	±	25.93	194.81	±	14.25	**+ 16.56%**
VJ Height (cm)	.56	61.98	±	4.93	55.63	±	4.47	+ 10.80%
1RM Front Squat (kg)	.55	89.09	±	18.86	68.64	±	12.71	**+ 25.93%**
Approach VJ Height (cm)	.55	68.45	±	4.95	62.74	±	4.07	+ 8.70%
MedBall Toss (m)	.55	10.57	±	.69	9.65	±	.78	+ 9.65%
1RM HexBar Deadlift (kg)	.52	112.27	±	22.55	87.73	±	20.08	**+ 24.54%**
T-Test Agility (secs)	-.44	5.40	±	.12	5.51	±	.14	- 2.02%
1RM Power Clean (kg)	.43	63.18	±	14.08	50.91	±	13.39	**+ 21.51%**
Height (cm)	-.14	172.47	±	7.33	174.17	±	5.80	- .98%
Fat Mass (%)	.08	20.68	±	3.58	20.02	±	4.66	+ 3.24%
Age (years)	-.03	19.70	±	1.52	19.80	±	1.55	- .51%
Standing Reach (cm)	.03	223.90	±	7.94	223.52	±	7.86	+ .17%

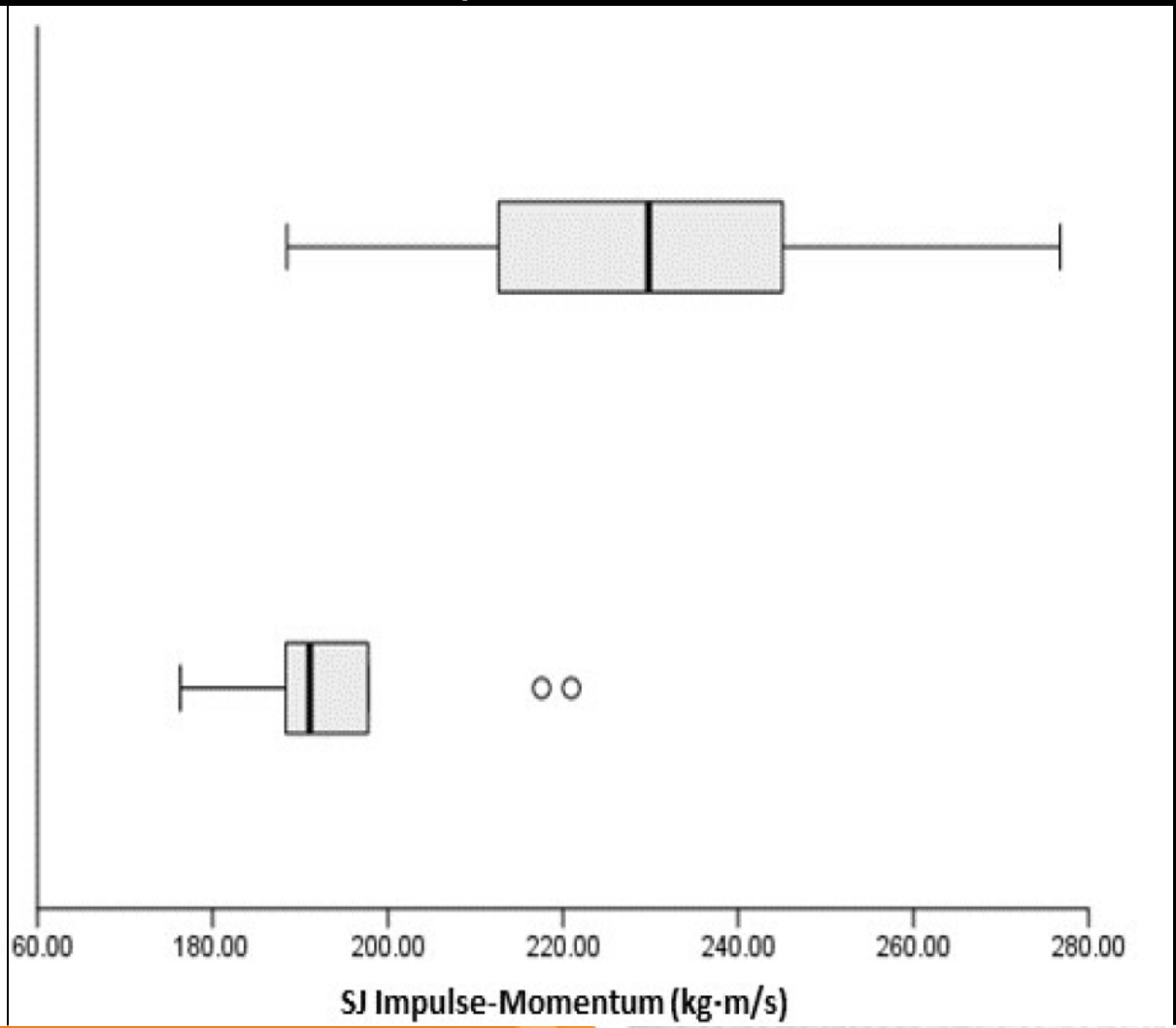
Note. ** $p \leq .001$, * $p \leq .003$

Point-Biserial Correlation Coefficient (*rpb*)

Aim *1.C1 CONTINUED….*

Examine associations of **GAP**, anthropometric and demographic markers when comparing **starters and non-starters** in an NCAA DI beach volleyball team.





Aim *1.C2*

Examine the contribution of **GAP markers**, from traditional and non-traditional assessments, **starters and non-starters** in an NCAA DI beach volleyball team.

GAP Markers	χ^2	R^2	*OR [95% CI]*	*p*
(1) Starters vs Non-Starters				
SJ Peak Velocity	**17.53****	.78	1.87 [.952-3.67]	.035*
(2) Starters vs Non-Starters				
SJ Impulse-Momentum	**11.55****	.59	1.28 [1.04-1.58]	.010**
(3) Starters vs Non-Starters				
Vertical Jump Height	**7.78****	.43	1.18 [1.02-1.36]	.014*

Note. $**p \leq .01$, $*p \leq .05$

Binary Logistic Regression

Aim *2.A*

Determine **intra-set variability** from 2 traditional and 2 non-traditional **jump-based GAP** assessments.

$$\text{Variable Error} = \sqrt{\Sigma(x_i - M)^2}$$

	M	*SD*
VJ Height Variability	1.02	1.65
Approach VJ Height Variability	1.61	1.76
SJ Peak Velocity Variability	1.05	1.02
SJ Impulse-Momentum Variability	4.03	1.36

Aim *2.B1*

Examine associations of **intra-set variability**, from 2 traditional and 2 non-traditional **jump-based GAP** assessments, to **intra-team rank of SP** in an NCAA DI beach volleyball team.

	Spearman's Rho Correlations	
GAP Markers	***r***	***p***
SJ Peak Velocity Variability	-.43	.057
SJ Impulse-Momentum Variability	-.29	.201
Approach VJ Height Variability	-.23	.368
VJ Height Variability	-.14	.603

Note. $*p \leq .01$

*Aim *2.B2**

Unable to run ordinal logistic regression due to insignificant associations to SP rank.

Aim *2.C1*

Examine associations of **intra-set variability**, from 2 traditional and 2 non-traditional **jump-based GAP** assessments, when comparing **starters and non-starters** in an NCAA DI beach volleyball team.

GAP Variability Markers	*r*	*p*	STARTERS *M ± SD*	*% DIFF*	NON-STARTERS *M ± SD*
SJ Peak Velocity Variability	**-.62***	**.003**	**43.92 ± 6.60**	**- 24.32%**	**56.08 ± 6.60**
SJ Impulse-Momentum Variability	-.54	**.014**	44.73 ± 7.72	- 21.08%	55.27 ± 9.48
Approach VJ Height Variability	-.42	.064	45.89 ± 3.47	- 16.44%	54.11 ± 12.71
VJ Height Variability	-.09	.701	50.89 ± 11.92	- 3.56%	49.11 ± 8.21

Note. *$p \leq .01$

Point-Biserial Correlation Coefficient (*rpb*)

Aim 2.C2

Examine the contribution of **intra-set variability**, from **jump-based GAP** assessments, to **starters and non-starters** in an NCAA DI beach volleyball team.

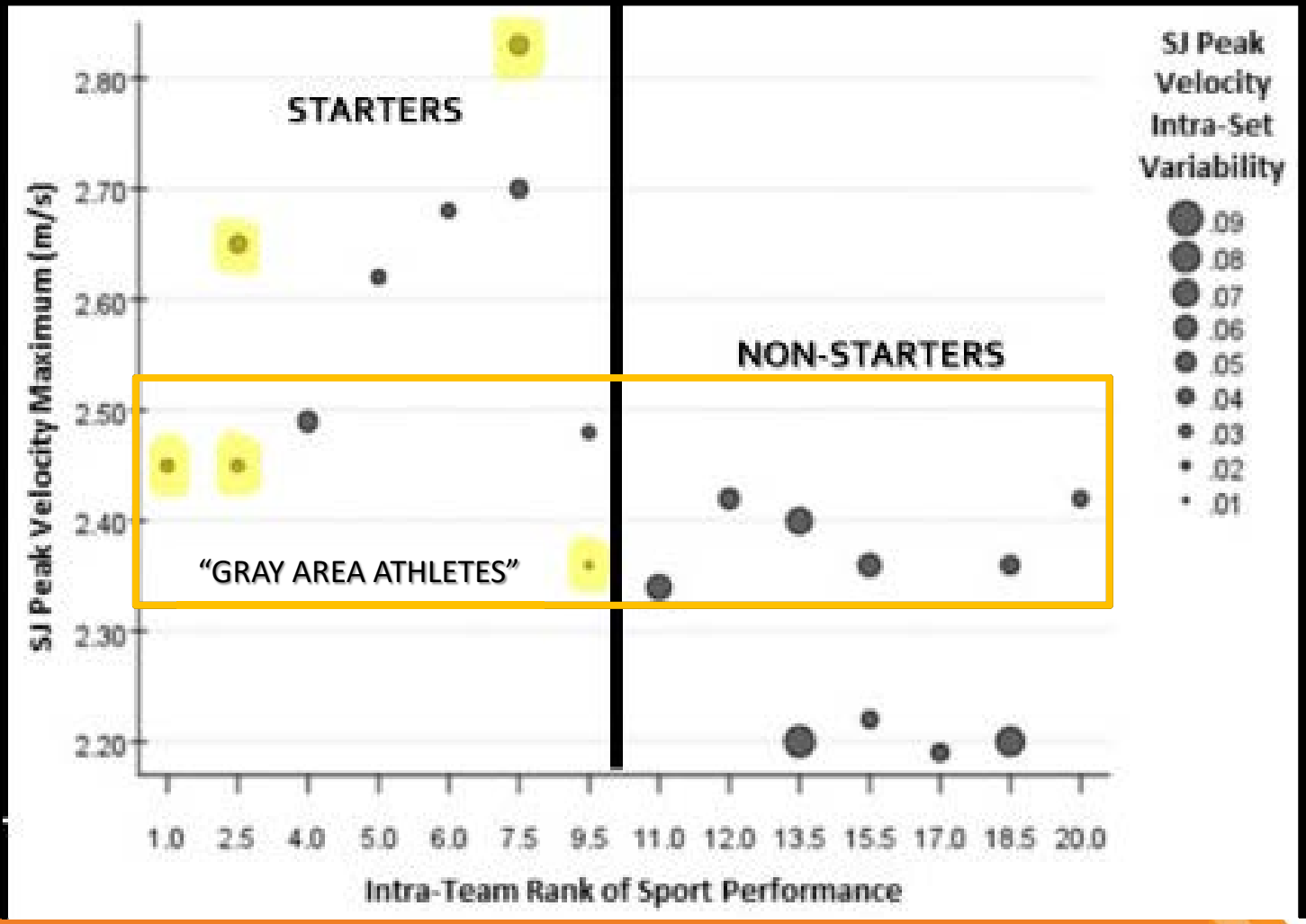
GAP Variability Markers	$\chi 2$	R^2	*OR [95% CI]*	*p*
(1) Starters vs Non-Starters				
SJ Peak Velocity Variability	**10.10***	.53	.79 [.64 - .98]	.017*
(2) Starters vs Non-Starters				
SJ Impulse-Momentum Variability	**6.96***	.39	.85 [.73 - .99]	.020*

Note. $*p \leq .05$

Binary Logistic Regression

Aim 3.A

Unable to run regression with combined GAP maximum and GAP variability due to insignificant association of GAP variability to SP rank.



Aim *3.B.*

Examine the predictive utility of **GAP maximum**, in conjunction with **intra-set variability**, for distinguishing **starters and non-starters** in an NCAA DI beach volleyball team.

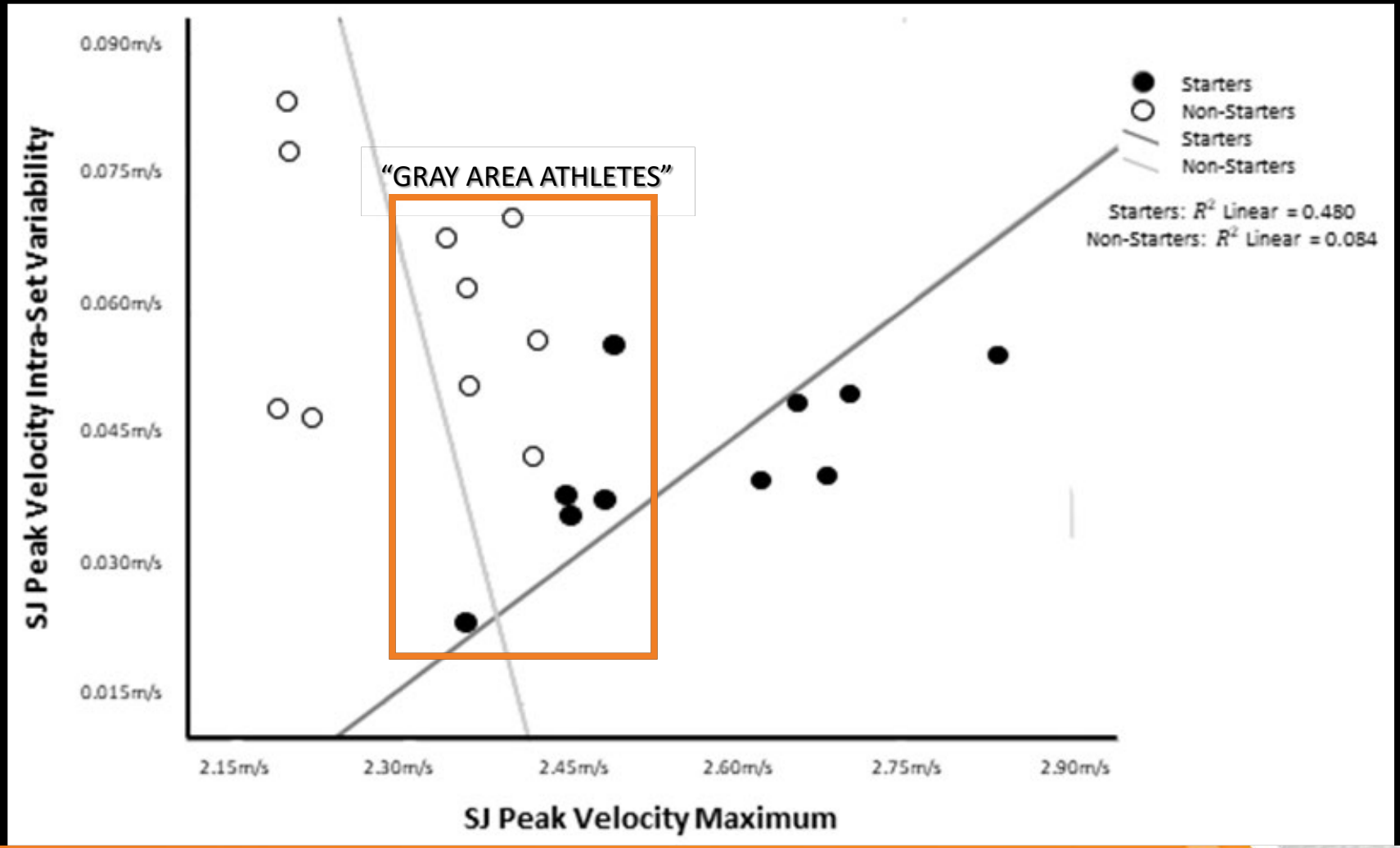
GAP Maximum and GAP Variability	$\chi 2$	R^2	*STARTERS*	*NON-STARTERS*
(1) SJ Peak Velocity Maximum and SJ Peak Velocity Variability	**27.73****	**1.00**	10/10 (*100%*)	10/10 (*100%*)
(2) SJ Impulse-Momentum Maximum, VJ Height Maximum, and SJ Peak Velocity Variability	**19.71****	.84	9/10 (*90%*)	9/10 (*90%*)

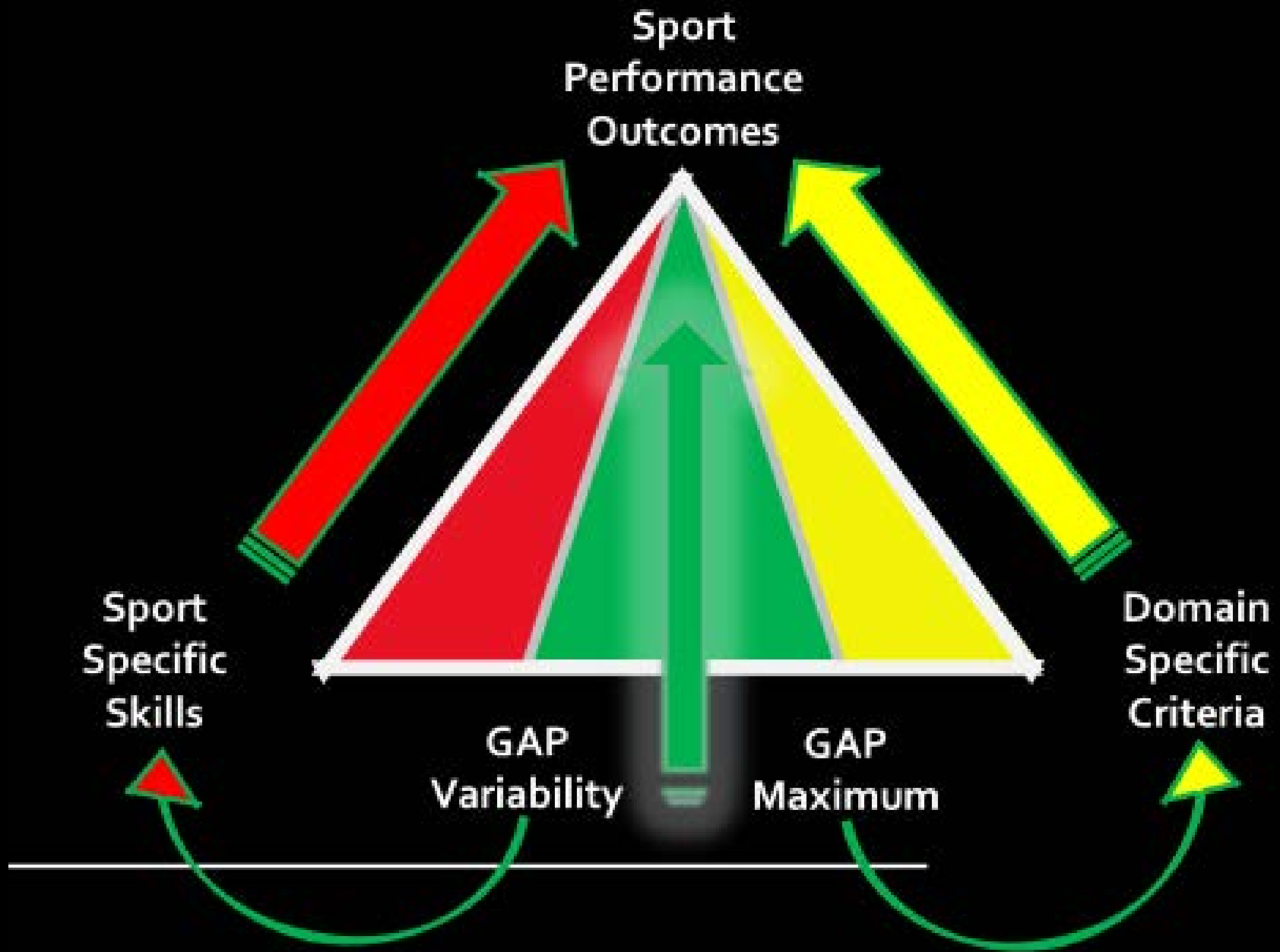
Note. $^{**}p \leq .01$, $^{*}p \leq .05$

Binary Logistic Regression

Aim *3.B. continued…*

Examine the predictive utility of **GAP maximum**, in conjunction with **intra-set variability**, for distinguishing **starters and non-starters** in an NCAA DI beach volleyball team.




Sport
Performance
Outcomes
Sport
Specific
Skills
Domain
Specific
Criteria
GAP
Variability
GAP
Maximum

CONCLUSION:

- Non-Traditional GAP Maximum Markers
  - Greater association / contribution to SP outcomes
- SJ Peak Velocity Variability
  - Just as good as:
    - SJ Impulse-Momentum Maximum
    - Vertical Jump Height Maximum
- Combined Effects of GAP Maximum and GAP Variability
  - STRONG Predictive Utility to SP Group Membership
- "Controlled Aggression"
  - High GAP Maximum Output + High Consistency of GAP Output = High SP Outcomes
- View SP Through "New Lens" …

GAP ← CONSISTENCY → SP

FUTURE RESEARCH CONSIDERATIONS:

- Compare: squat jump impulse from force plates ($Force \Delta Time$) vs squat jump impulse-momentum from linear position transducer ($Mass\ \Delta Velocity$)
- Examine: GAP maximum and GAP variability longitudinally
- Examine: GAP maximum and GAP variability to Sport Performance outcomes in other sports
  - Golf, Tennis, Baseball, Indoor Volleyball, Basketball, Football, etc
- Investigate: GAP maximum and GAP variability to non-contact injury risk (i.e., ACL tears)
  - Bilateral and unilateral asymmetries
  - Pre – vs – Post operative function
- Observe: GAP maximum and GAP variability during childhood – and – youth development
  - Physical Education and Youth Sports
  - Both play a role in development – and – retention of Fundamental Movement Skills
  - FMS → GAP → SP

QUESTIONS…

COMMENTS…

FEEL FREE TO GRAB ME FOR A SIDEBAR CONVERSATION…

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SPORTS SCRUGGS PERFORMANCE COACH

THANK YOU