WHO WOULD REPORT CONCUSSIVE SYMPTOMS?

The relationship between young athletes' perceived team environment, barriers, concussion-related knowledge, and likelihood to report

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Reality in youth sport

We wish there could be…	But reality is…
✓ Medical professionals are always at practices and games ✓ FDA-approved concussion diagnostic devices are always there ✓ Some ways to know if a concussion happened	➢ A limited number of medical professionals are available at practice and games ➢ A few or no devices are available ➢ Can athletes report concussions to coaches and parents as well as teammates?

Research Question

Is it possible to help young athletes avoid or reduce multiple concussions?

- Can contextual psychological constructs explain how likely athletes would report concussive symptoms as well as their perceived barriers?

Introduction of the theory: Achievement Goal Perspective Theory (1984, 1989)

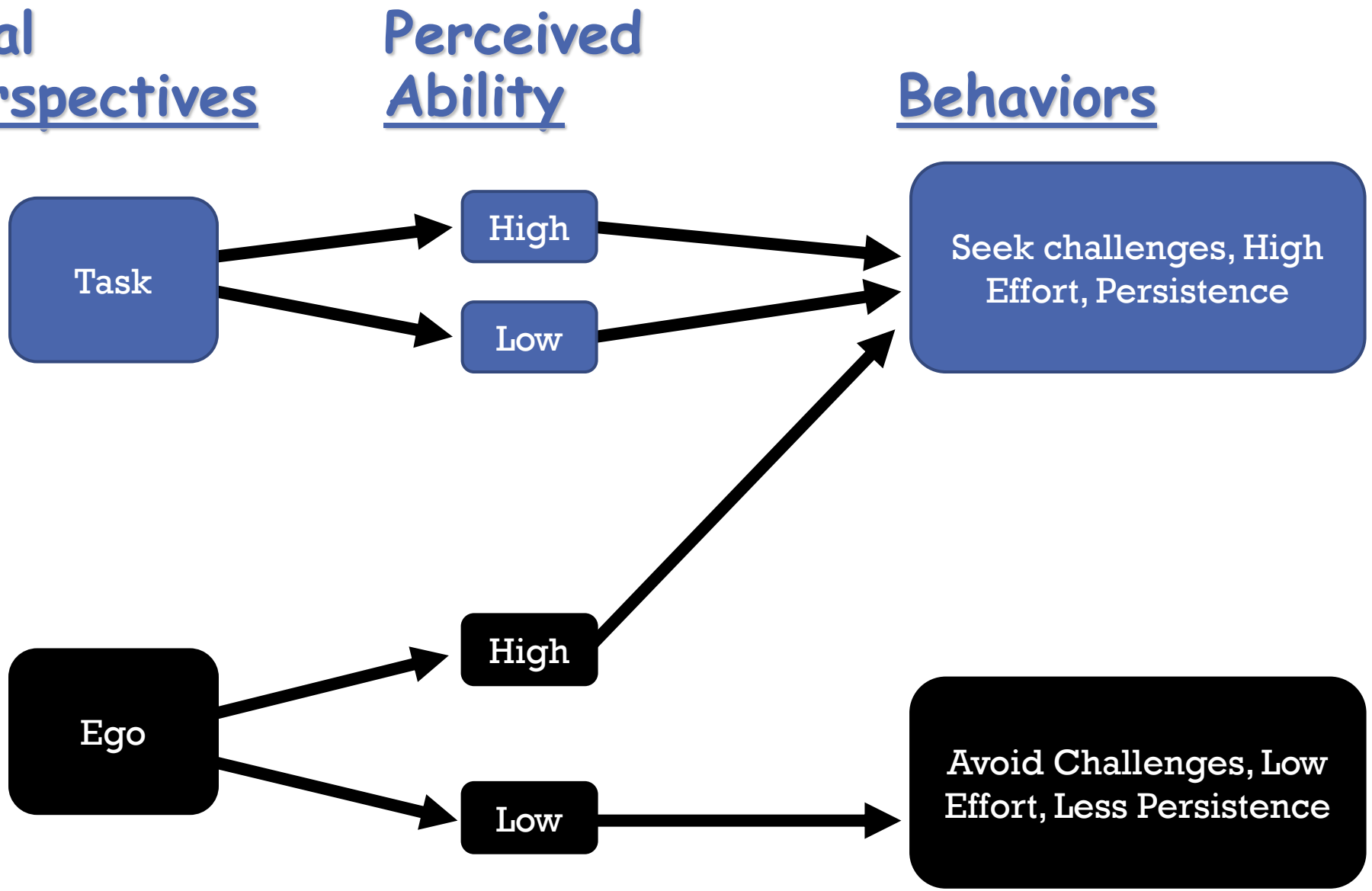
Individuals' involvement in achievement contexts (e.g., school and sport) can be distinguished in two ways:

- ***Task-involvement (self-referenced)***: The intentional focus is on effort, improvement, and mastery of tasks.
- ***Ego-involvement (other-referenced)***: The intentional focus is on demonstrating high ability via normative comparison (outperforming others/winning).

Joan Duda & John Nicholls

Review of the theory

The tenets of the theory



Involvement can be shifted

Individuals' involvement depends on three key factors:

- ***Cognitive development***
- ***Goal orientations***
- ***Motivational climate (environment)*** ←*the construct with this study!*

The involvement (task or ego-involved conditions) can predict significantly individuals'

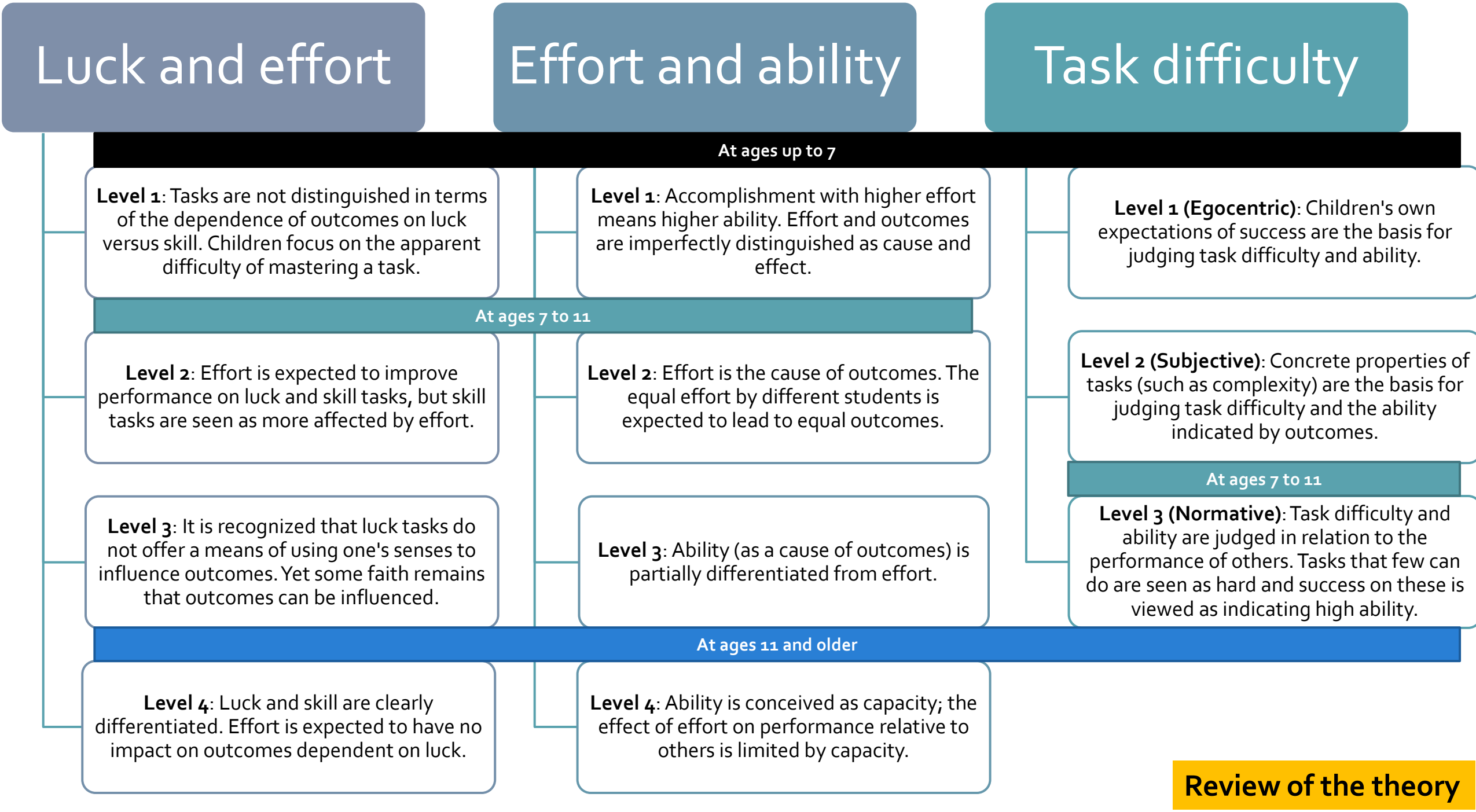
- **Thoughts**
- **Feelings**
- **Behaviors**

In their achievement context (e.g., sport and school)

Cognitive development

The ability to tell these key points around tasks in the achievement contexts is developed over time. This age-related change in their understanding of their own ability with this theory is unique compared to other social cognitive theories.

- Luck and effort
- Effort and ability
- Task difficulty


Luck and effort
Effort and ability
Task difficulty
At ages up to 7
Level 1: Tasks are not distinguished in terms of the dependence of outcomes on luck versus skill. Children focus on the apparent difficulty of mastering a task.
Level 1: Accomplishment with higher effort means higher ability. Effort and outcomes are imperfectly distinguished as cause and effect.
Level 1 (Egocentric): Children's own expectations of success are the basis for judging task difficulty and ability.
At ages 7 to 11
Level 2: Effort is expected to improve performance on luck and skill tasks, but skill tasks are seen as more affected by effort.
Level 2: Effort is the cause of outcomes. The equal effort by different students is expected to lead to equal outcomes.
Level 2 (Subjective): Concrete properties of tasks (such as complexity) are the basis for judging task difficulty and the ability indicated by outcomes.
At ages 7 to 11
Level 3: It is recognized that luck tasks do not offer a means of using one's senses to influence outcomes. Yet some faith remains that outcomes can be influenced.
Level 3: Ability (as a cause of outcomes) is partially differentiated from effort.
Level 3 (Normative): Task difficulty and ability are judged in relation to the performance of others. Tasks that few can do are seen as hard and success on these is viewed as indicating high ability.
At ages 11 and older
Level 4: Luck and skill are clearly differentiated. Effort is expected to have no impact on outcomes dependent on luck.
Level 4: Ability is conceived as capacity; the effect of effort on performance relative to others is limited by capacity.
Review of the theory

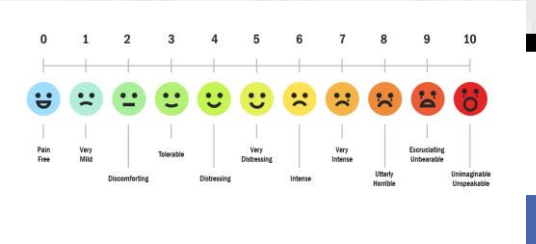
Children's Accuracy in Judging Their Ability about reading

Children's Mean Self-Perception of Reading Achievement & Correlations between Child and Teacher Rating of Achievement

	AGE (years)								
	5	6	7	8	9	10	11	12	13
X	3.1	5.1	9.1	9.0	11.2	13.8	11.6	12.8	15.1
SD	3.8	3.9	5.2	4.8	6.3	5.8	5.9	3.9	7.2
r	--	--	.21	.27	.58*	.71*	.57*	.80*	.78*

* p<.05

* Each class size was 30 students. N=16 for each grade sample. The rankings were measured by ranking indicative faces.



Are these mature understandings of ability good for our optimal motivation?

- The trend for the mature understanding of the ability happens around and/or age 7-11. This trend is applicable to the physical domain (Fry, 2000a & 2000b).
- It brings changes in the meaning of effort, individuals' task choices, and purpose to complete tasks ("the end" versus "an end")
    - E.g., younger children typically do not choose a task because it is easy.

Goal orientations

Personal definitions of success in achievement context based on these two distinctions

- ***Task Orientation (self-referenced):*** feeling most successful when improvement, effort, and mastery in various skills are observed.
- ***Ego Orientation (other-referenced):*** feeling most successful when out-performing other

CORRELATES OF TASK ORIENTATION

- Enjoyment
- Effort/Persistence
- Intrinsic Motivation
- Gender/Ability Equity
- Learning Strategies (committed to learning/practice)
- Less Anxiety, Worry, & Concern About Mistakes
- Positive Attitudes
- Sportspersonship
- Beliefs about Success (effort)
- Purposes of Sport/PE-learn, cooperate, good citizen, active lifestyles
- Performance (growing support)
- Psychological Well Being

CORRELATES OF EGO ORIENTATION

- Decreased Intrinsic Motivation
- Gender/Ability Inequity
- Greater Anxiety, Worry, & Concern About Mistakes
- Negative Sportspersonship Responses
- Achievement Strategies (avoid practice/less open to receiving feedback)
- Beliefs about Success (ability/deception/other)
- Purposes of Sport/PE (elevate social status)
- Psychological Well Being
- Physical Well Being

Motivational climate (environment)

The same labels as in the goal involvement and goal orientation, the distinct motivational climates are:

- Task-involving climate
- Ego-involving climate

Review of the theory

Task-Involving Climate

The emphases on the team by coach/teacher & athletes/students are to:

- Value Effort and Improvement
- Encourage Cooperation
- Make Everyone Feel Like They Play an Important Role
- Treat Mistakes as Part of Learning

Ego-Involving Climate

The emphases on the team by coach/teacher & athletes/students are to:

- Values Performance/Outcome
- Gives Most Attention to the "Stars"
- Encourages Team Rivalry
- Treat Mistakes that should be punished

Correlates of a Task-Involving Motivational Climate

- Enjoyment
- Effort
- Intrinsic Motivation
- Gender/Ability Equity
- Team Satisfaction
- Sportspersonship
- Enhanced relationship w/ peers, coaches
- Psychological well-being (happiness)
- Mindful engagement
- Less performance anxiety
- Less intention to drop out
- Coping skills

Correlates of an ego-involving motivational climate

- Greater Pressure/Tension
- Higher performance anxiety
- Less endorsement of Sportspersonship behaviors
- More problematic relationships between /among athletes & coaches
- Less perceived gender ability/equity
- Lower team satisfaction
- Decreased psychological well-being (depression & sadness)
- Less mindful engagement
- Lower psychological well-being
- Higher intention to drop out

Review of the theory

Caring Climate (Environment)

A setting that is:

- Interpersonally safe
- Inviting/welcoming
- Supportive
- Valued and respected

Caring Climate Correlates

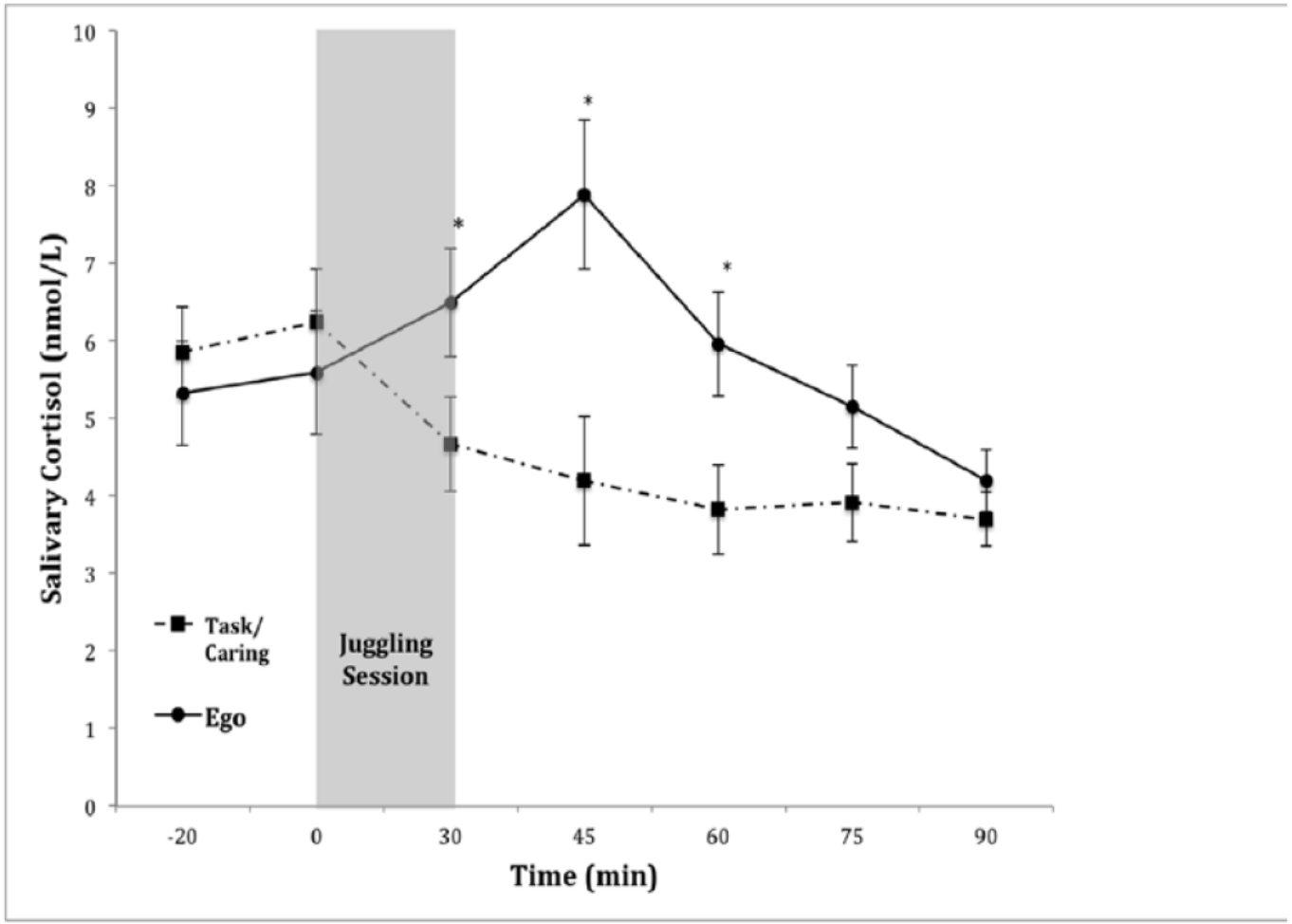
- A caring climate is typically positively correlated to a task-involving climate, while negatively correlated to an ego-involving climate.
  - Intrinsic motivation
  - Commitment
  - Mindful engagement
  - Caring behavior
  - Liking coach & teammates
  - Motivation to continue
  - Well-being
  - And more

An example of a climate experiment with the physiological marker (cortisol: stress hormone)

Table 1 Motivational Climate Manipulation

Time	Caring / Task Involving	Ego Involving
	Icebreaker	**Icebreaker**
5 min	Name Game: The group played a game where they called out participants' names as they tossed objects around the circle.	Glory Days: Group members took turns introducing themselves and sharing their greatest sport accomplishment with the group.
	Instruction & Feedback	**Instruction & Feedback**
3 min	Introduction to juggling and breakdown of steps. Participants were given tips to start to learn to juggle.	Introduction to juggling and breakdown of steps. Participants were given tips to start to learn to juggle.
5 min	Practice: Feedback was task involving and focused on positive reinforcements.	Practice: Feedback was ego involving, praise was given to the best performers and those with the highest skill level (i.e., the confederates).
	Practice Activity #1	**Practice Activity #1**
5 min	Personal Best: Participants practiced in 30-s segments and noted their number of successful toss-to-catch completions per segment. Emphasis was on their improvement and personal best.	Rank Order: While participants practiced juggling, instructors ranked the participants based on their performance (confederates were ranked the best) and compared participants' performances to the confederates.
	Practice Activity #2	**Practice Activity #2**
6 min	Peer coaching: Participants helped coach one another and practiced together. The focus was on trying their best and sharing positive feedback and technical instruction.	On the Spot: Participants took turns competing against one another to see who was the best juggler. Instructors adjusted their previous rankings according to win/loss records.
	Practice Activity #3	**Practice Activity #3**
6 min	Group Best: Participants worked in groups adding up 30 s bests to see if they could beat their own group high score (toss to catch completions).	Championship Match: Teams were formed based on final rankings and juggled against one another until a winning team was determined.

The group difference in salivary cortisol: stress responses between caring/task-involving and ego-involving groups



Review of the theory

Figure 2 — Mean salivary cortisol in nanomoles per liter in response to the experimentally manipulated motivational climate. Vertical lines with crossbars represent ±1 standard error. *Indicates significant ($p < .05$) effect such that participants in the EI group demonstrated a significantly greater level of salivary cortisol relative to the C/TI group.

Purpose of the current study

- To examine the relationship between the motivational climate (i.e., caring, task-, and ego-involving climates) and likelihood of reporting as well as their perceived barriers.

Methods

- 377 young soccer players (female = 286 & male = 88, middle school = 194 & high school = 181, Mean age = 14.14, SD = 1.79, 84% White) completed the survey consisting of the motivational climate, likelihood of reporting in regular games and big games, and 4 types of perceived barriers.

Methods: Motivational Climate

Caring Climate Scale (CCS; Newdon et al,2007) 13 items (5-point scale).

- Caring climate; On this team, the coaches are kind to athletes."

Motivational Climate Scale for Youth Sports (MCSYS, Smith, Cumming, & Smoll, 2008) 12 items (6 items for task and 6 items for ego)

- Task-involving climate; On this team "the coach tells us that trying our best is the most important thing"
- Ego-involving climate; On this team "winning games is the most important thing for the coach"

Research Project

Methods: Barriers

The measure's 14 items were statements of beliefs that could cause an athlete to avoid reporting concussion symptoms (5-point scale)

- **Immediate consequences** (5 items; e.g., "I want to finish the game")
- **Long-term risk or consequences** (4 items; e.g., "I would lose my position [such as being a starter or captain]")
- **Significant others** (3 items; "The coach would be angry with me")
- **Non-recognition of Symptom Severity** (2 items; "I thought the symptom(s) would go away")

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Methods: Likelihood of reporting concussion symptoms

To assess the tendency of the athletes to honestly report concussion symptoms they experienced to their coaches. A 9-point scale ranging from 1 (absolutely would not report) to 9 (absolutely would report) was used. Participants responded to each vignette in the context of both a **regular game** (i.e., regular season game) and a **"big" game** (i.e., an elimination game, a game against a rival team).

- You collide with another player. About 10 minutes after the collision, you notice that you feel dizzy and are developing a headache.

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Methods: Knowledge of Concussion Severity and Symptoms

To determine athletes' knowledge and understanding of the signs of a concussion, a knowledge of concussion severity (10 items) and symptoms (10 items) test was created using a true-false response format.

- It is easy to tell if a person has a concussion by the way the person looks and acts (severity)
- Memory loss (symptoms)

Research Project

Results: Descriptives and correlations

Descriptive Statistics and Correlations

	Mean	Std. Deviation	Reliability (α)	1	2	3	4	5	6	7	8	9	10	11
1. Caring Climate	4.36	0.59	0.92	1.00										
2. Task-Involving Climate	4.21	0.60	0.79	.625**	1.00									
3. Ego-Involving Climate	2.47	0.79	0.75	-.423**	-.322**	1.00								
4. Likelihood to report in regular games	6.93	1.46	0.81	.188**	.233**	-.184**	1.00							
5. Likelihood to report in big games	5.98	1.71	0.83	.131*	.166**	-.224**	.741**	1.00						
6. Immediate consequences barriers	3.42	1.04	0.76	0.00	-0.04	.225**	-.301**	-.441**	1.00					
7. Long-term risk barriers	3.08	1.08	0.75	-.136*	-0.06	.321**	-.249**	-.317**	.538**	1.00				
8. Non-recognition of symptom severity barrier	3.41	1.12	0.71	-0.04	-.107*	.145**	-.267**	-.333**	.440**	.372**	1.00			
9. Significant others barrier	2.29	1.05	0.52	-.170**	-.150**	.274**	-.286**	-.253**	.463**	.539**	.304**	1.00		
10. Knowledge of concussion severity	8.22	1.52	n.a.	0.08	.103*	-0.03	0.01	-.107*	0.06	0.05	0.10	0.01	1.00	
11. Knowledge of concussion symptoms	9.07	0.89	n.a.	0.01	0.00	0.03	0.07	0.00	.133*	0.06	0.05	.121*	.309**	1.00

Results: Independent sample T-Test (male vs. female)

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Group Statistics

gender		N	Mean	Std. Deviation
Caring Climate	Male	85	4.23	0.70
	Female	281	4.40	0.55
Task-Involving Climate	Male	86	4.10	0.78
	Female	286	4.24	0.54
Ego-Involving Climate	Male	83	2.53	0.83
	Female	284	2.45	0.77
Likelihood to report in regular games	Male	85	6.73	1.76
	Female	286	7.00	1.36
Likelihood to report in big games	Male	82	5.92	1.73
	Female	286	6.00	1.70
Immediate consequences barriers	Male	81	3.05	1.11
	Female	259	3.53	0.99
Long-term risk barriers	Male	82	2.91	1.09
	Female	260	3.12	1.07
Non-recognition of symptom severity barrier	Male	85	2.94	1.26
	Female	258	3.56	1.03
Significant others barrier	Male	88	2.26	1.16
	Female	261	2.30	1.02
Knowledge of concussion severity	Male	88	8.08	1.64
	Female	288	8.27	1.48
Knowledge of concussion symptoms	Male	88	8.84	0.99
	Female	288	9.14	0.84

Results: Independent sample T-Test (middle vs. high schools)

Research Project

Group Statistics

AGE_GROUP		N	Mean	Std. Deviation
Caring Climate	Middle School	187	4.35	0.59
	High School	180	4.38	0.60
Task-Involving Climate	Middle School	194	4.26	0.62
	High School	179	4.16	0.59
Ego-Involving Climate	Middle School	189	2.43	0.74
	High School	178	2.52	0.83
Likelihood to report in regular games	Middle School	192	7.04	1.52
	High School	180	6.82	1.38
Likelihood to report in big games	Middle School	189	6.31	1.67
	High School	180	5.64	1.68
Immediate consequences barriers	Middle School	162	3.18	1.04
	High School	179	3.63	0.99
Long-term risk barriers	Middle School	163	2.98	1.10
	High School	180	3.17	1.05
Non-recognition of symptom severity barrier	Middle School	165	3.23	1.20
	High School	179	3.56	1.02
Significant others barrier	Middle School	169	2.19	1.15
	High School	181	2.39	0.95
Knowledge of concussion severity	Middle School	196	7.83	1.59
	High School	181	8.65	1.31
Knowledge of concussion symptoms	Middle School	196	8.84	0.91
	High School	181	9.31	0.79

MODEL FIT INFORMATION

Number of Free Parameters 109

Chi-Square Test of Model Fit

- Value 433.727
- Degrees of Freedom 241
- P-Value 0.0000

RMSEA (Root Mean Square Error Of Approximation)

- Estimate 0.053
- 90 Percent C.I. 0.045 0.060
- Probability RMSEA <= .05 0.288

CFI/TLI

- CFI 0.935
- TLI 0.919

Chi-Square Test of Model Fit for the Baseline Model

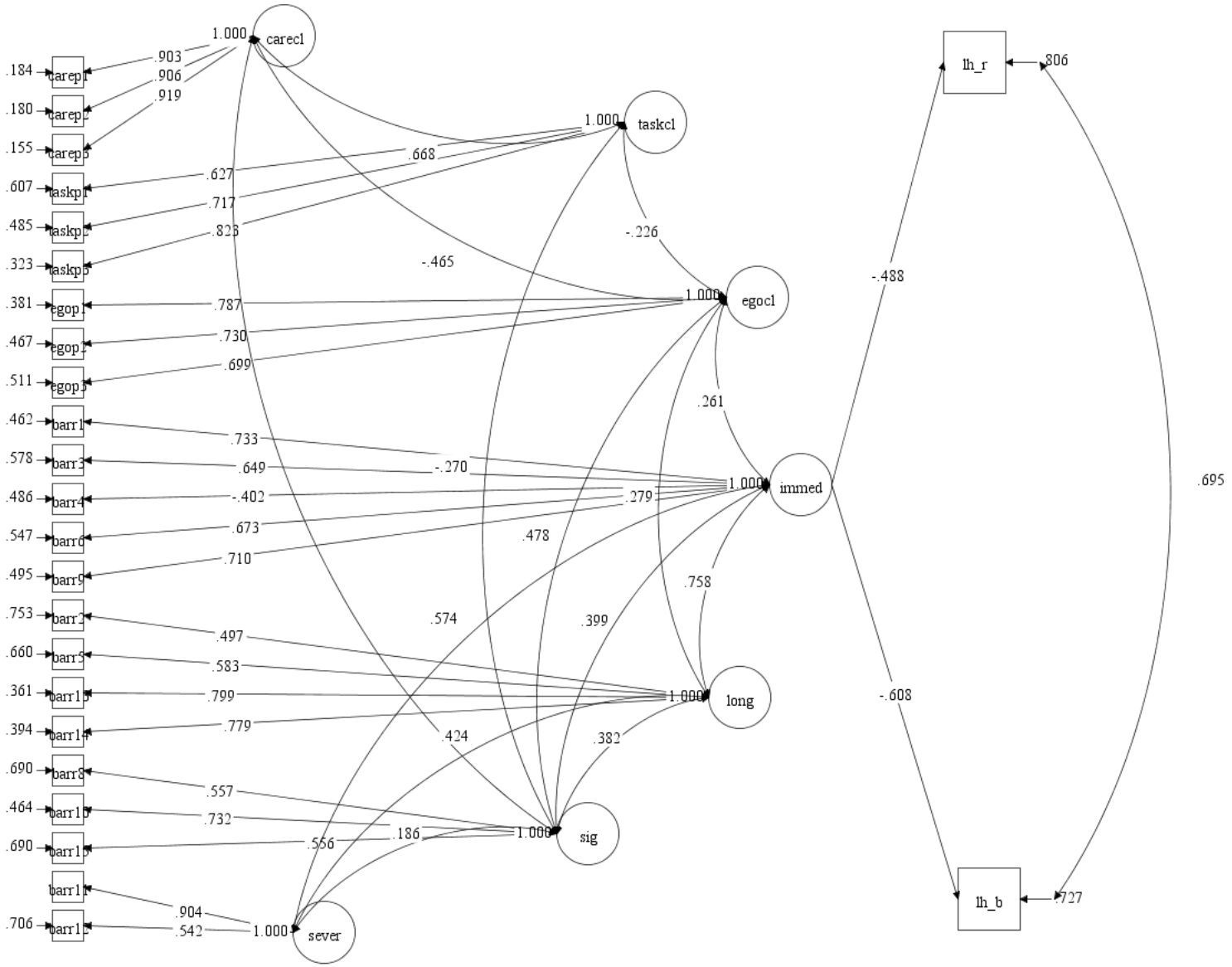
- Value 3248.032
- Degrees of Freedom 300
- P-Value 0.0000

SRMR (Standardized Root Mean Square Residual)

- Value 0.057

Final SEM model.

Research Project



Summary

- Most of the correlations appeared as hypothesized.
  - Caring and task-involving climates were associated with each other while being negatively correlated to ego-involving climate.
  - Caring and task-involving climates were linked to the likelihood of reporting a concussion and negatively linked to the perceived barriers.
  - Ego-involving climate was associated with barrier and (un)likelihood of reporting a concussion
- Age trends were found;
  - Older young athletes understand more about the symptoms and severity of concussion but perceived more barriers and are unlikely to report concussions to their coaches in big games.
- Gender differences were observed;
  - Female young athletes perceived a higher caring climate and higher barriers.
  - Female young athletes scored significantly higher in the knowledge of concussion symptoms
- SEM model suggested if an ego-involving climate was created, young athletes probably would perceive more barriers and they are unlikely to report concussive symptoms to coaches.

Future directions

- Multilevel analyses are appropriate when having more teams.
- The likelihood of reporting symptoms differs from actual reporting behaviors.
- Bigger sample size and varied ethnicities as well as different types of sport will be called.

Research Project

Please share your strategies for creating an optimal environment.