

Experiences of Concussion in Female Roller Derby Players



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M E D I C I N E

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Disclosures

- No conflicts of interest to disclose
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Outline

- What is a concussion?
- Why derby?
- How did we tackle the questions?

- How common is it?
- How bad is it?
- What can I do to mitigate my risk?

What is a concussion?

- Concussion is an older term for **common mild** traumatic brain injuries
 - Diagnosed based on an event + change
 - Brief duration of disability(?)
 - Often do not present in ER
- Now: under the spectrum of **mild TBI**

What is a concussion?

- No loss of consciousness or no more than 30 minutes
- No more than a day of post-traumatic amnesia (“lost time”)
- At worst, remain near normal on Glasgow Coma Scale

Repeated injury



Lifestyle



Changes
cognition,
coordination,
and balance



Changes
aggregate over
injuries



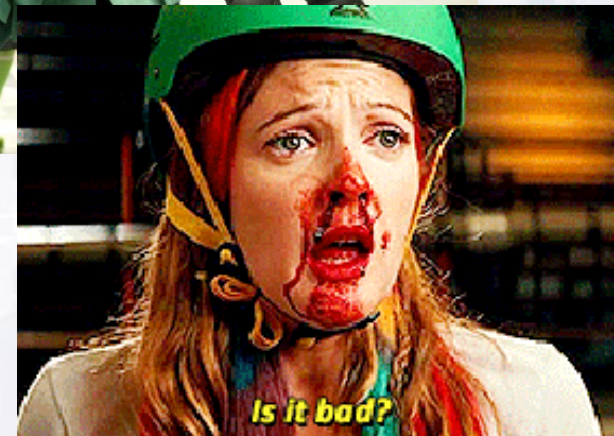
Sub-concussive
exposure
counts!

Outline

- ~~What is a concussion?~~
- **Why derby?**
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Derby: a crash course



Derby: a crash course

- Lane et al.: 6.5% of all sports related concussions seen at one ER were associated with skating, roller derby, and skateboarding combined.

Derby: a crash course

- Hoskins & Hooker: 54.1% of 75 players approached at a derby-specific conference in Las Vegas had experienced at least one concussion



Derby: a crash course

- Paulsen: 540 Swedish players
 - Most common injuries are:
 - Concussions
 - Ankle, knee, and finger sprains
 - Torn knee ligaments

Derby: a crash course

And that's it...

Outline

- ~~What is a concussion?~~
- ~~Why derby?~~
- **How did we tackle the questions?**
 - How common is it?
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How we tackled the questions

- Online survey received 1489 clicks in approx. 2 years from 25 countries, including 47 states of the United States.
- 665 roller derby players provided information
- 565/665 completed at least some of the activities

How we tackled the questions

- **How common is it:** Medical history
- **How bad is it:**
 - Memory tasks: n-back tests

N-back working memory task

In this task, you will see a sequence of snowflakes. Only respond with a **S** (S for Same) if the one you see matches the one you saw 1 trial ago. If it not the same, respond with **D** (for different).

For example, in the following sequence, you only would hit the **S** when the snowflakes pointed to appear. Only these are the same as the one 1 ago.



press space to continue

N-back working memory task

In this task, you will see a sequence of words. Only respond with a **S** (S for Same) if the word you see matches the one you saw 1 trial ago. If it not the same, respond with **D** (for different)

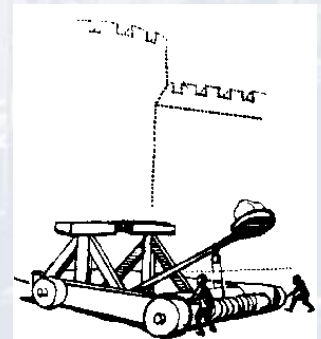
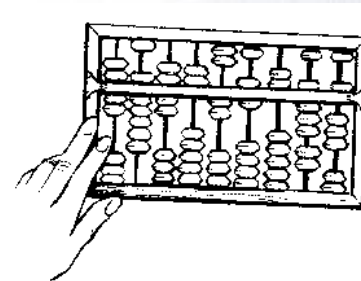
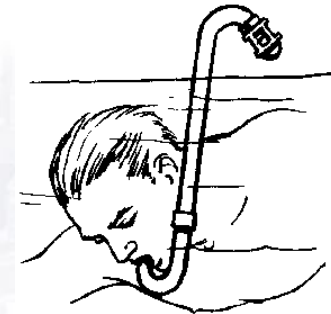
For example, in the following sequence, you would hit the **S** when the words marked in **green** appear. Only these words are the same as the word 1 ago.



press space to continue

How we tackled the questions

- **How common is it:** Medical history
- **How bad is it:**
 - Memory tasks: n-back tests
 - Language tasks:
 - Letter fluency
 - Picture naming for uncommon words
 - Language sample



How we tackled the questions

- **How common is it:** Medical history
- **How bad is it:**
 - Memory tasks: n-back tests
 - Language tasks
 - Questions about thoughts and feelings
 - Social support
 - Negative bias
 - Resilience
 - Toughness
 - Injustice
 - Injury perception

How we tackled the questions

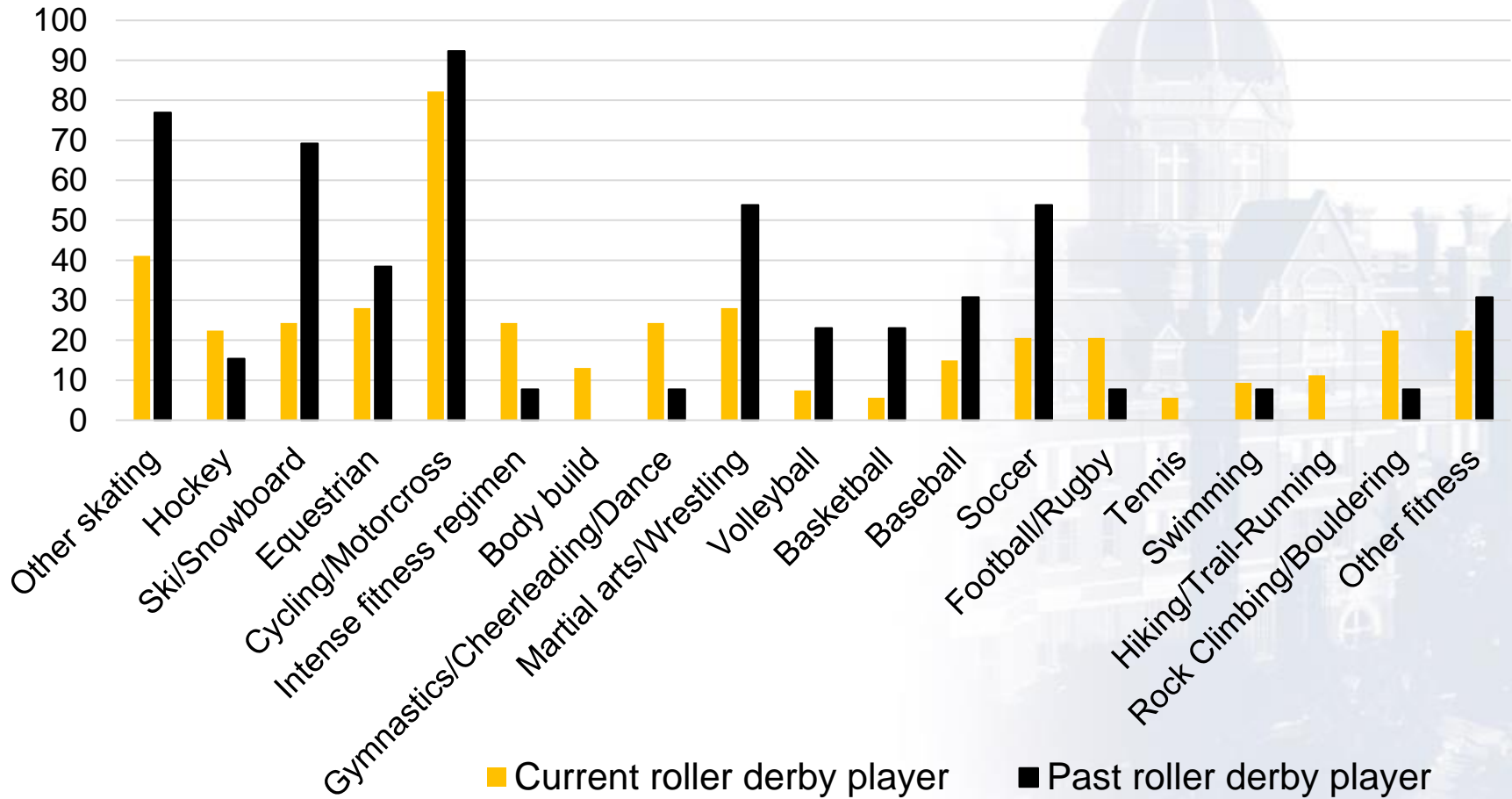
- **How common is it:** Medical history
- **How bad is it:**
 - Memory tasks: n-back tests
 - Language tasks
 - Questions about thoughts and feelings
- **What can I do to mitigate my risk:**
 - Player demographics, Medical history

Sample

| | Current (N=535) | Past (N=130) |
|-----------------------------|-----------------|--------------|
| Age (years)† | 32.66(7.26) | 35.48(7.20) |
| Gender | | |
| Female | 481 | 120 |
| Male | 25 | 3 |
| Non-binary/Other | 29 | 7 |
| Trans* | 4 | 2 |
| Education (years) | 16.11(1.97) | 15.97(1.85) |
| Years of roller derby† | 4.56(2.65) | 5.81(4.60) |
| Concussion endorsement | | |
| Recent | 31[39] | 3 |
| History | 384[72] | 108[8] |
| None | 79 | 14 |
| Concussions per player | 2.16(1.95) | 3.08(2.46) |
| Significant hits per player | 16.90(27.02) | 25.24(34.14) |
| Somatic symptoms | 20.00(15.94) | 16.83(15.40) |

†p < 0.001 in an independent samples t-test.

Other sports



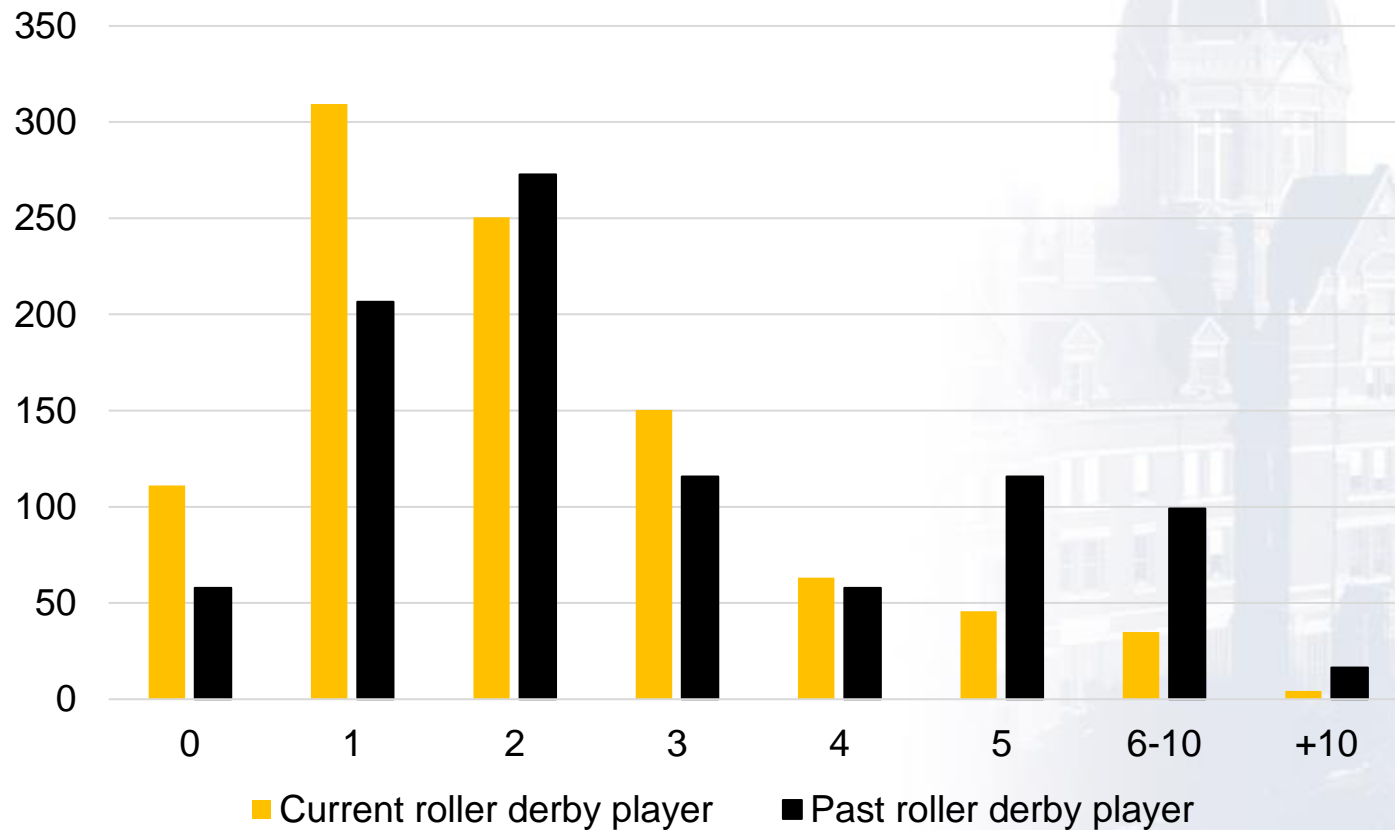
Outline

- ~~• What is a concussion?~~
- ~~• Why derby?~~
- ~~• How did we tackle the questions?~~
- How common is it?**
- How bad is it?**
- What can I do to mitigate my risk?**

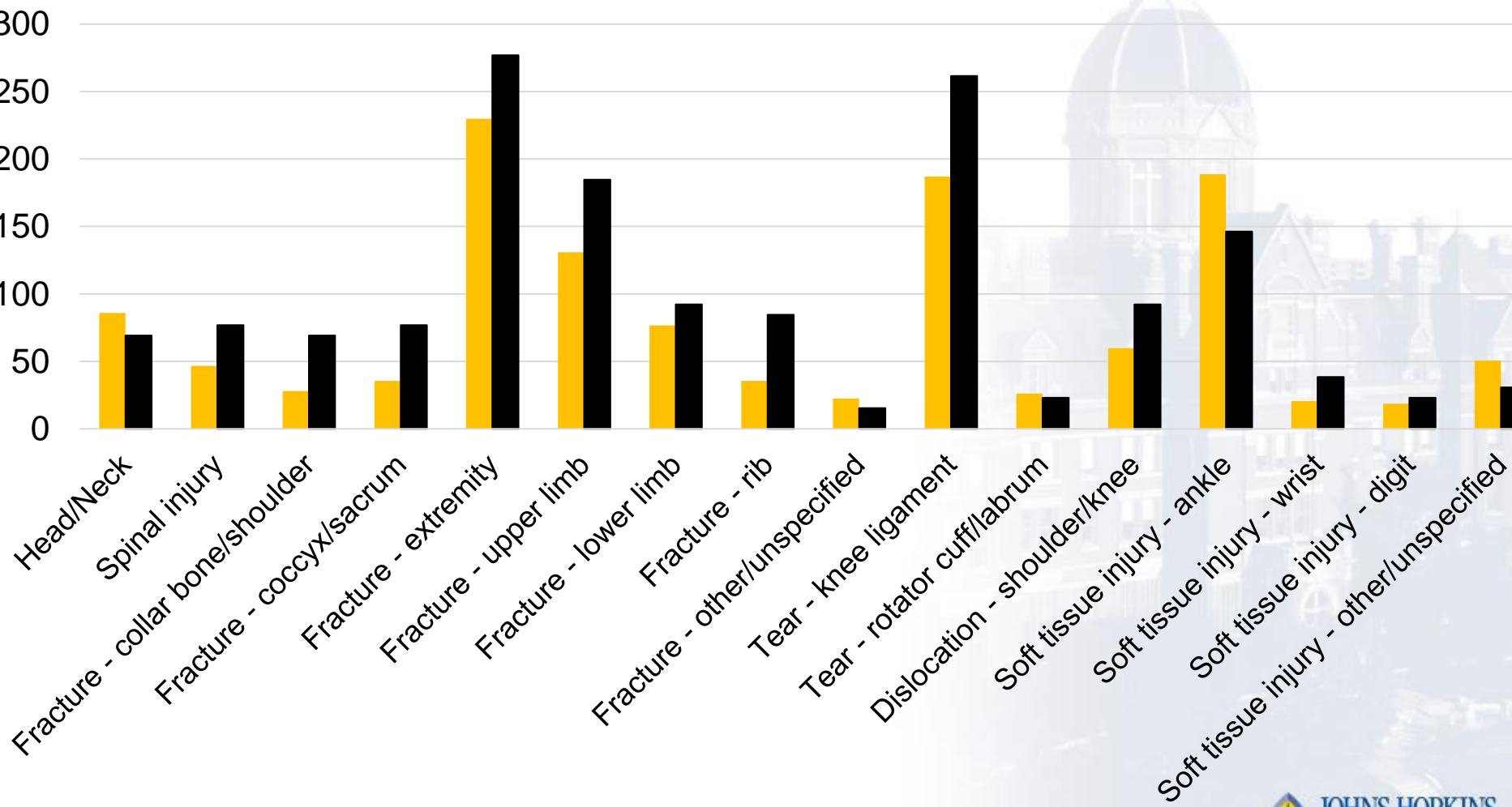
How common is it?

- Per 1000 athletes...
 - Current players reported 775.70 concussions, approximately 2 per player
 - Former players reported 853.85 concussions, approximately 3 per player

How common is it?



How common is it?



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■ Current roller derby player

■ Past roller derby player

How bad is it?

- Concussion status did **NOT** have a significant effect on:
 - Memory performance
 - Single word-level language
 - Discourse quantity, length, or complexity

Demographic description of sample used for task analysis

| | Recent concussion (N=27) | History concussion (N=392) | No concussion (N=146) |
|--|-----------------------------|-------------------------------|--------------------------|
| Participation status | | | |
| Current | 24 | 311 | 125 |
| Past | 3 | 81 | 21 |
| Age (years) † | 33.75(7.94) | 33.67(7.26) | 31.74(6.61) |
| Gender | | | |
| Female | 25 | 359 | 129 |
| Male | 0 | 19 | 3 |
| Non-binary/Other | 2 | 14 | 12 |
| Trans* | | 2 | 3 |
| Education (years) | 16.11(2.19) | 16.11(1.98) | 16.32(1.83) |
| Years of play† | 3.80(2.45) | 5.08(3.43) | 4.02(2.58) |
| Bouts/year | 12.00(11.37) | 10.37(17.57) | 7.83(4.98) |
| Practices/year | 10.41(3.20) | 9.91(3.59) | 10.96(10.80) |
| Concussions per player | 2.61(1.76) | 2.42(1.92) | - |
| Mean days post | 18.39(9.04) | 143.67(198.54) | - |
| Somatic symptoms† | 29.37(22.19) | 21.56(16.23) | 13.42(11.31) |
| <p>†p < 0.05 in one-way analysis of variance. Results are reported as either a count or Mean(Standard Deviation). Mean days post refers to the number of days since the last reported concussion.</p> | | | |

What can I do to mitigate my risk?

- 3 sport factors considered
 - Position
 - Full-contact scrimmage frequency
 - Kind of flooring (wood, cement, etc.)
- **None of these were associated with greater concussion risk**

| Concussions by bout characteristics | |
|--|------------|
| Concussions | |
| Position | |
| Jammer | 2.39(2.31) |
| Blocker | 2.4(2.07) |
| Pivot | 2.23(1.55) |
| Court | |
| Wood | 2.52(2.15) |
| Cement | 2.44(2.34) |
| Sport court | 2.15(1.79) |
| Rubber/Plastic | 2.31(1.90) |
| Other/Unknown | 1.69(1.08) |
| Full-Contact scrimmages | |
| Always | 2.34(2.10) |
| Sometimes | 2.48(2.09) |
| Results are reported as Mean(Standard Deviation). | |

What can I do to mitigate my risk?

- 3 personal factors considered
 - Developmental diagnoses
 - Significant neurological history
 - Visual disturbance
- **Significant risk factors included:**
 - Age
 - Years of participation
 - Neurological history
 - Visual disturbance

What did we learn?

- **How common is it?**
 - 2-3 concussions per player
 - Only 10% of current players and 5% of past players have never had one
- **How bad is it?**
- **What can I do to mitigate my risk?**

What did we learn?

- **How common is it?** – Quite common
- **How bad is it?**
 - Minimal evidence of cognitive effects or their duration
 - Limitations:
 - Sub-concussive hits may muddy data
 - Mild lingering effects not detected
- **What can I do to mitigate my risk?**

What did we learn?

- **How common is it?** – Quite common
- **How bad is it?** – Not too bad
- **What can I do to mitigate my risk?**
 - Little impact of how you play
 - Prior history may make playing riskier, especially those with corrected vision or a history of more severe brain injuries

Thank you!



BILD Brain Injury & Language Development



Rochelle Newman



Zafer Keser

