

Addressing the Complexities of mild TBI in Treatment: i-RECOVeR

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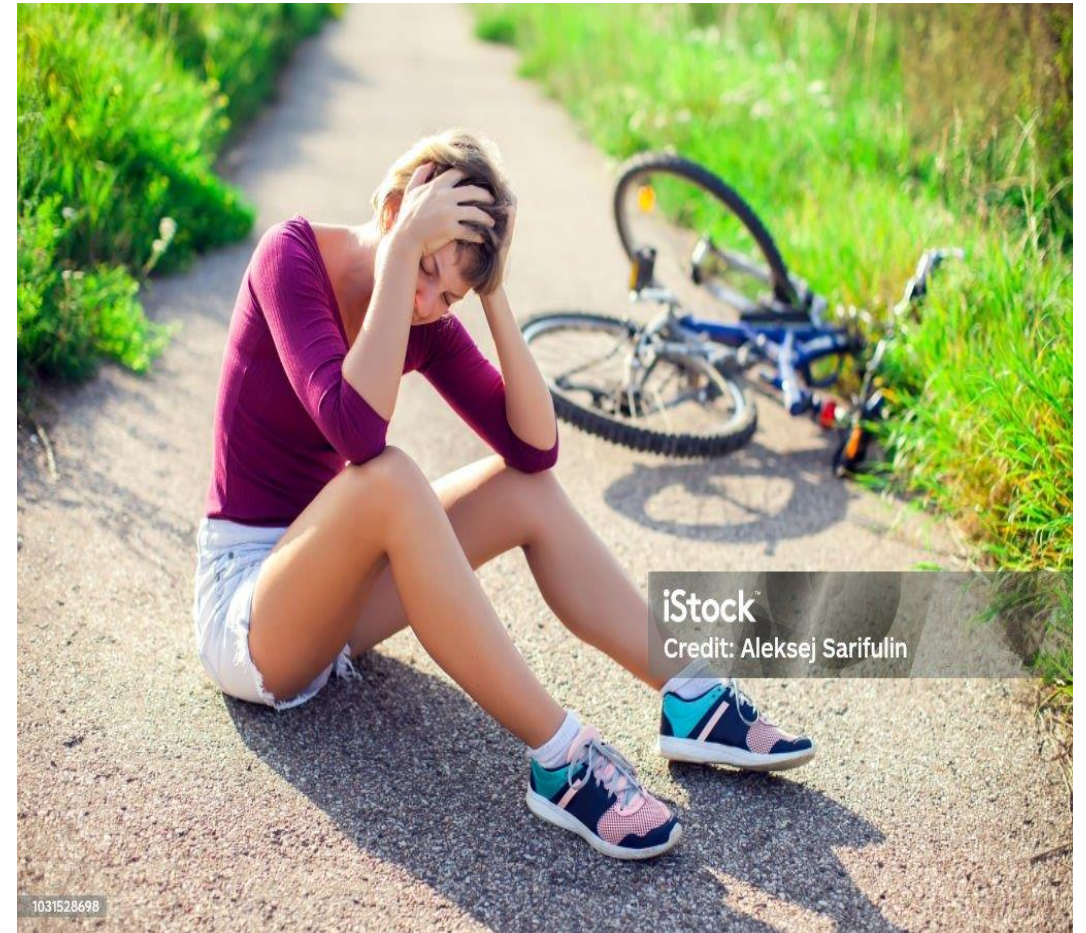
⁵Australian Football League

⁶Epworth Sports and Exercise Medicine Group

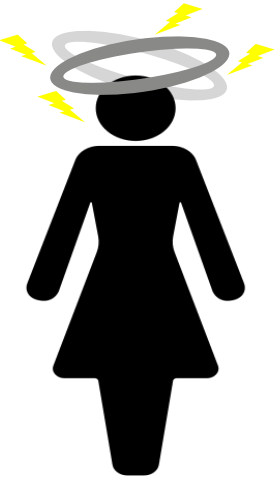


CAUSES OF MILD TBI

- Falls
- Motor vehicle accident
- Sporting injury
- Cycling
- Assault/IPV
- Other/blast related injury



COMMON MILD TBI SYMPTOMS



Headaches
Dizziness/vertigo
Nausea/vomiting
Visual Problems
Sleep disturbance
Intolerance of noise / lights
Decreased balance

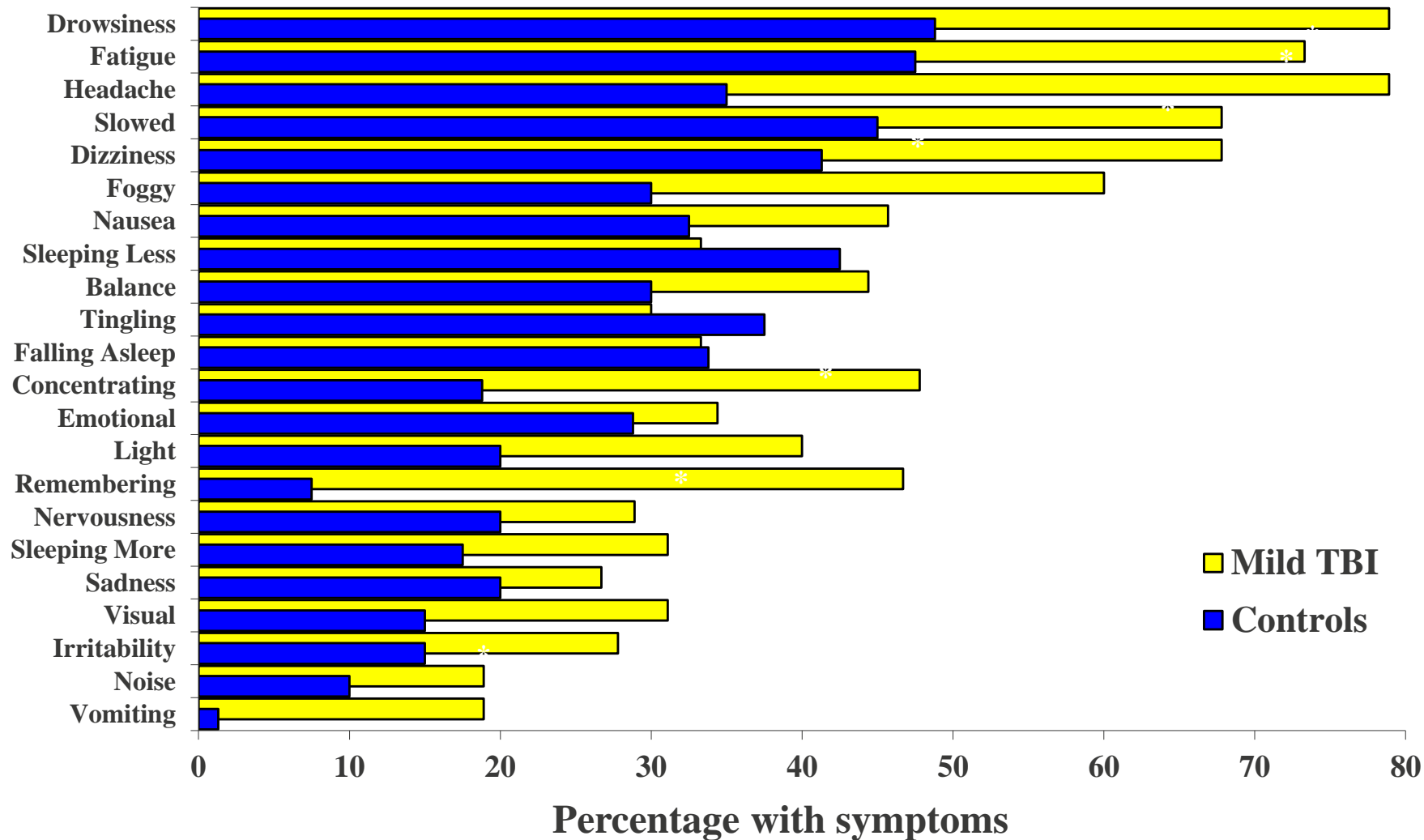
Fatigue
Concentration difficulties
Mental slowness/fogginess
Memory problems
Irritability
Anxiety & Depression



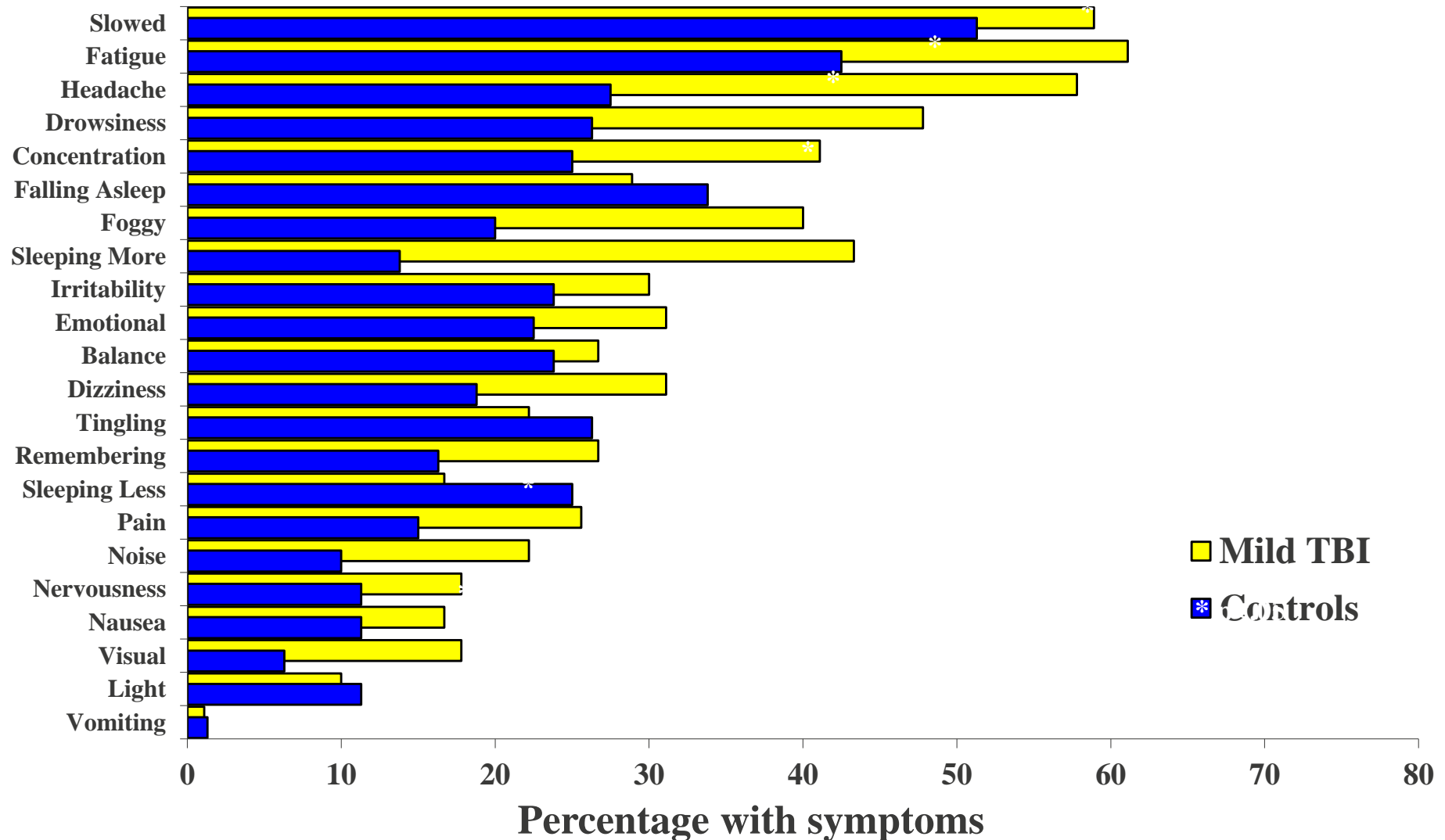
Other injuries: Neck or back pain, fractures to other bodily parts; Potential for post-traumatic stress

POST-CONCUSSIVE SYMPTOMS AT BASELINE (IN ED)

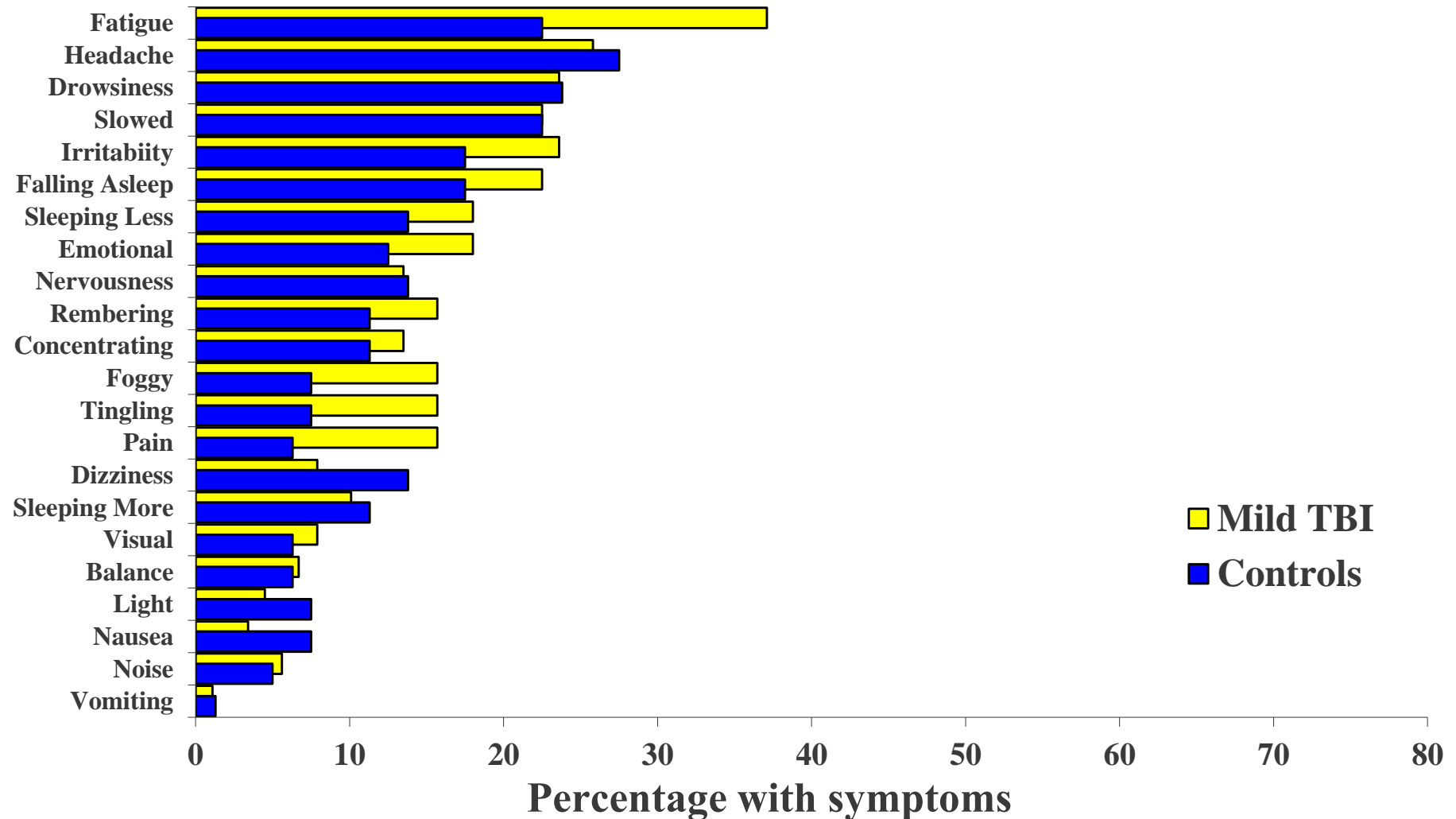
PONSFORD ET AL., J NEUROTRAUMA, 2011



POST-CONCUSSIVE SYMPTOMS AT 1 WEEK



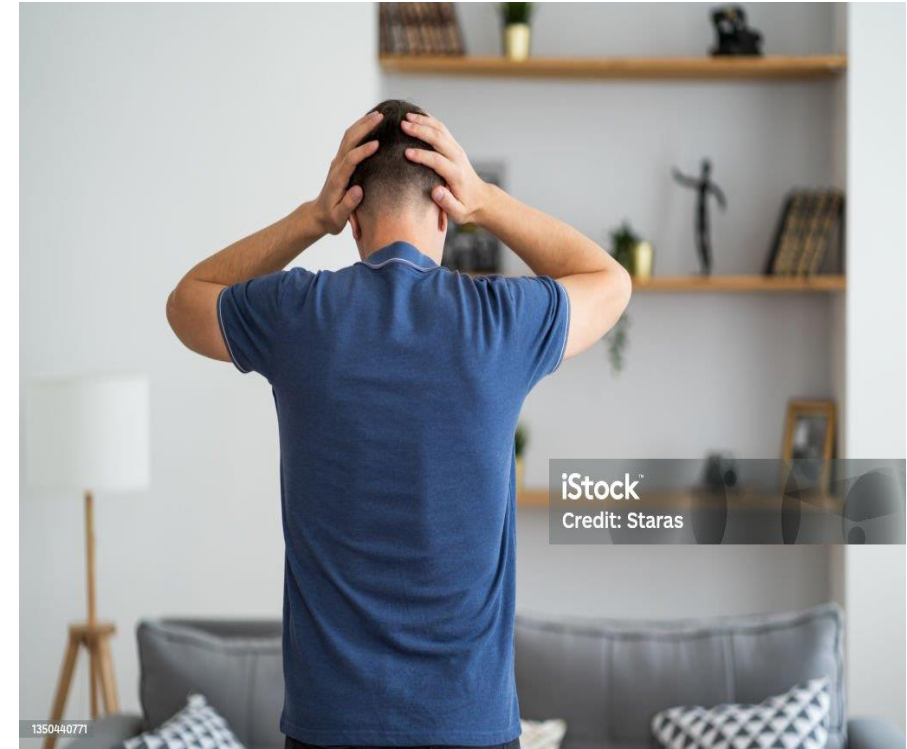
POST-CONCUSSIVE SYMPTOMS AT 3 MONTHS



OUTCOMES FOLLOWING MILD TBI ARE VARIABLE

- Most people recover
- Symptoms generally resolved by 4 weeks post-injury
- 15-30% experience persistent symptoms

WHY???



THE COPING HYPOTHESIS (VAN ZOMEREN AND BROUWER, 1994)

- Post-concussional symptoms result from the chronic effort required to cope with persisting information processing deficits.
- Failure to understand the basis of ongoing difficulties may cause frustration and anxiety, thereby exacerbating cognitive difficulties.
- Anxiety levels at one week predict persistent symptoms
- Early information provision may curtail development of ongoing problems



IMPACT OF EARLY INTERVENTION ON OUTCOME FOLLOWING MILD HEAD INJURY IN ADULTS (PONSFORD ET AL., JNNP, 2002)

- Provision of information booklets resulted in reduced symptom reporting and lower levels of anxiety at three months post-injury
- Supported by other studies by Mittenberg *et al.*, Wade *et al.*, Relander *et al.*

Impact of early intervention on outcome following mild head injury in adults

J Ponsford, C Willmott, A Rothwell, P Cameron, A-M Kelly, R Nelms, C Curran

J Neural Neurosurg Psychiatry 2002;73:330-332

Background: The impact of mild head injury is variable and determinants of outcome remain poorly understood. Results of previous intervention studies have been mixed.

Objectives: To evaluate the impact on outcome of the provision of information, measured in terms of reported symptoms, cognitive performance, and psychological adjustment three months postinjury.

Methods: 202 adults with mild head injury were studied: 79 were assigned to an intervention group and were assessed one week and three months after injury; 123 were assigned to a non-intervention control group and were seen at three months only. Participants completed measures of preinjury psychological adjustment, concurrent life stresses, post-concussion symptoms, and tests of attention, speed of information processing, and memory. Subjects seen at one week were given an information booklet outlining the symptoms associated with mild head injury and suggested coping strategies. Those seen only at three months after injury did not receive this booklet.

Results: Patients in the intervention group who were seen at one week and given the information booklet reported fewer symptoms overall and were significantly less stressed at three months after the injury.

Conclusions: The provision of an information booklet reduces anxiety and reporting of ongoing problems.

some benefit of intervention in terms of time off work and reported symptoms six months after the injury. On the other hand, studies by Gronwall and by Alves *et al* showed no significant impact of the provision of information or reassurance upon reported symptoms.^{2,9} The studies by Relander,³ Wade,⁷ and Alves⁸ focused on patients admitted to hospital. However, most individuals who sustain uncomplicated mild head injury are not admitted to hospital.

In this study our aim was to establish whether early assessment and the provision of written information and suggested coping strategies could reduce the incidence of these problems in a group of individuals with uncomplicated mild head injuries who were not admitted to hospital.

METHODS

Participants

Participants were recruited from consecutive presentations to the emergency departments of two hospitals over a 30 month period. Ethics approval was obtained. Participants were aged 16 years or over, were English speaking, and had a history of trauma to the head resulting in loss of consciousness for less than 30 minutes, post-traumatic amnesia for less than 24 hours, and a Glasgow coma scale (GCS) score of 13-15 on presentation to the emergency department. Participants were recruited only if they had no need for surgery requiring general anaesthesia. Neither computed tomography nor magnetic resonance imaging was undertaken, as the injuries were not considered sufficiently severe. Patients with focal neurological signs were also excluded.

Information about

Mild Head Injury or Concussion ©



Slowness

Some people who have been knocked out find their thinking is a bit slower. This means they might have some difficulty keeping up with conversations or following directions, and things take longer to get done. Encourage others to slow down by asking questions and having them repeat what they have said. Allow yourself extra time to complete tasks and avoid situations where you are under pressure to do things quickly.

Irritability

Some people who have been concussed find that they get annoyed easily by things that normally would not upset them. This does not last very long, but it can be difficult for you and for your family. It happens because the brain controls your emotional system as well as the rest of your body. After concussion your emotions may not be as well controlled as they usually are. There are several ways to deal with this. Some people find that going out of a room, or away from a situation as soon as it begins to get annoying is enough. Others use relaxation techniques to help them get back on an even keel. You may find that you can stop the irritability developing by using up energy with something like hitting a punch-bag, or riding an exercise bicycle, or skipping hard for a while, if tiredness permits. Irritability will be worse when you are tired, so rest will also help.

Noise Problems

When you want to shut out something you don't want to look at, all you have to do is close your eyes. It is much harder to shut your ears. When your brain is fully awake it uses part of its energy to damp down noises that would interfere with what you are doing. After concussion your brain may not have enough energy to spare to do this, and you may find that most noises bother you. Explain to your family and friends, and ask them to keep the noise level down if they can. If you have a very young family who could not be expected to understand, it may be more comfortable for everyone if they can have a few days holiday away with, perhaps, obliging grandparents.

Eye Problems

If these occur there may be either trouble focusing, so that things look blurred or double, or you may find that your eyes are sensitive to bright light. Double vision, and needing to wear dark glasses in strong light, should both clear up within a few days. If you wear glasses, do not go back to your optician to have them changed until you have full recovered from your concussion. It probably is not that your sight has changed, but that your brain is not putting together the messages from each eye as well as it normally does.

What NOT to do

Do not stay in bed until you are better. You do need sleep at this stage, but you also need to give your brain enough to do to help it to recover.

Do not drink alcohol or use drugs. Do not expect your brain to deal with alcohol and drugs in the normal way. The effect of alcohol is very similar to the effect of concussion, and after concussion drink and drugs are more likely to knock you out again.

Do not drive your car or ride your motor bike until you have made sure that your concentration is good, that you can react quickly enough to handle unexpected traffic hazards, and that your ability to judge distances is back to normal.

Do not play sport. Do not put yourself in a position where you are likely to get another bang on the head. Avoid activities such as football and skateboarding where you might get knocked out again, at least until you have recovered from this accident. Some sporting clubs have specific guidelines, so you may need to check with your club for advice. If riding your bicycle, make sure you wear an approved helmet.

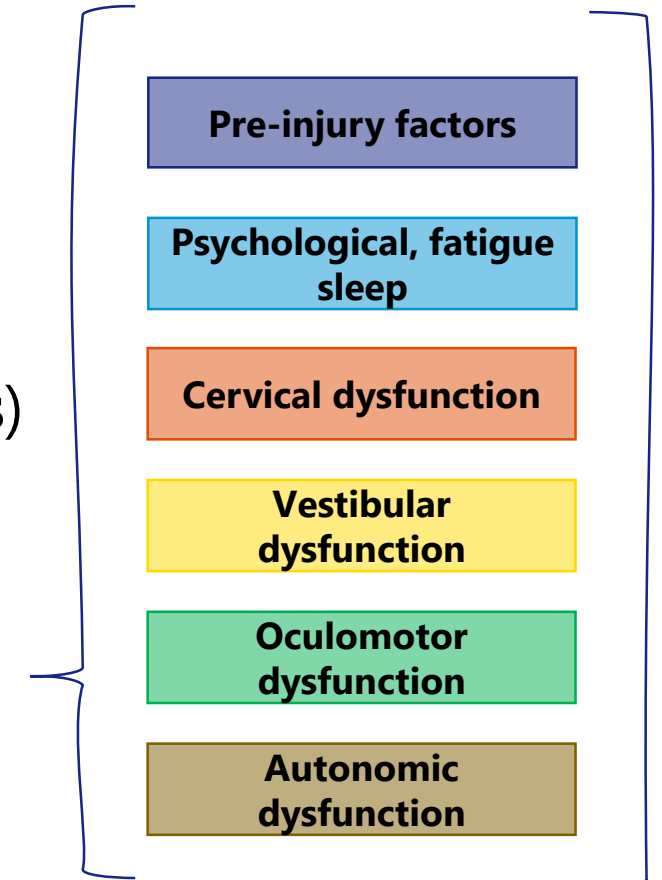
Getting Back to Work

Generally, if you are not experiencing persistent headaches, have no double vision and are not experiencing ongoing dizziness, then you are probably ready to return to work. The best time to return to work will depend on how you are feeling and on the type of job that you are required to perform. For example, if you work in a noisy workplace and are still sensitive to loud noises, then it would be better to delay returning to work until you are able to cope with the noise level.

Level of fatigue or tiredness will also be important in how you perform at work. If you are required to operate machinery then you need to be alert. When first returning to work it may be necessary to take extra breaks or to return on a part-time basis for a few days. Similarly, if you are in a busy office environment you may find that you fatigue quickly and need to take extra breaks. Remember that tiredness can affect your level of concentration, and you will not work as efficiently if you are not concentrating well. You may need to talk to your employer about the most suitable arrangements for returning to work.

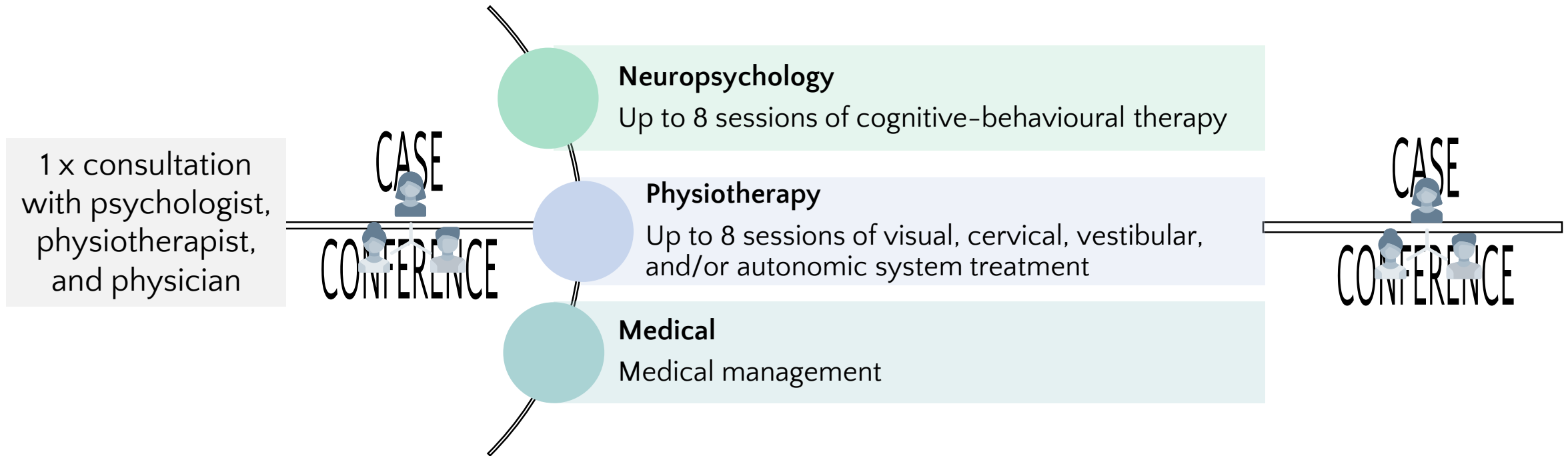
Persistent Symptoms following Concussion/mTBI

- Symptoms typically resolve within **2-4 weeks**
- Up to **30%** experience delayed recovery
- Persistent Post-Concussion Symptoms (PPCSs **>4 weeks**)
- PPCSs **influenced by a range of factors**
- **Interdisciplinary interventions recommended**



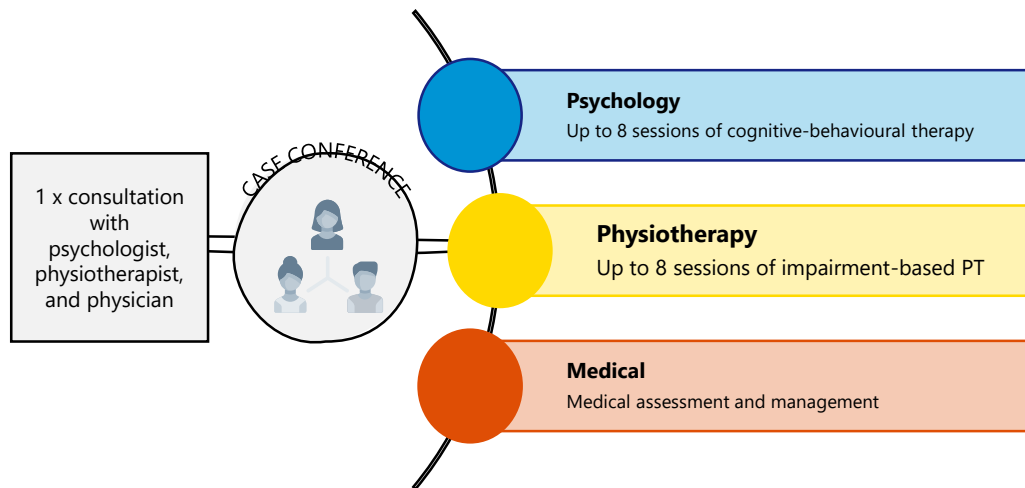
i-RECOVeR intervention

12 week program



i-RECOVeR trial

- Mixed-methods design to pilot a novel intervention for PPCSs – SCED (n=15) & Qual



STUDY PROTOCOL

Open Access



Interdisciplinary Rehabilitation for Concussion Recovery (i-RECOVeR): protocol of an investigator-blinded, randomised, case series with multiple baseline design to evaluate the feasibility and preliminary efficacy of a 12-week treatment for persistent post-concussion symptoms

Jack V. K. Nguyen¹, Adam McKay^{1,2}, Jennie Ponsford^{1,2}, Katie Davies³, Michael Makdissi^{4,5}, Sean P. A. Drummond¹, Jonathan Reyes^{1,5} and Catherine Willmott^{1,2,5*}

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Original article

Interdisciplinary rehabilitation for persisting post-concussion symptoms after mTBI: N=15 single case experimental design



Jack V.K. Nguyen^{1,2,*}, Adam McKay^{1,2}, Jennie Ponsford^{1,2}, Katie Davies³, Michael Makdissi^{4,5}, Sean P.A. Drummond¹, Jonathan Reyes^{1,2,5}, Jennifer Makovec Knight¹, Tess Peverill³, James H. Brennan^{5,6}, Catherine Willmott^{1,2,5}

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Design

Non-concurrent single case experimental design with 1- and 3- month follow-up and randomisation to multiple baselines

Participants

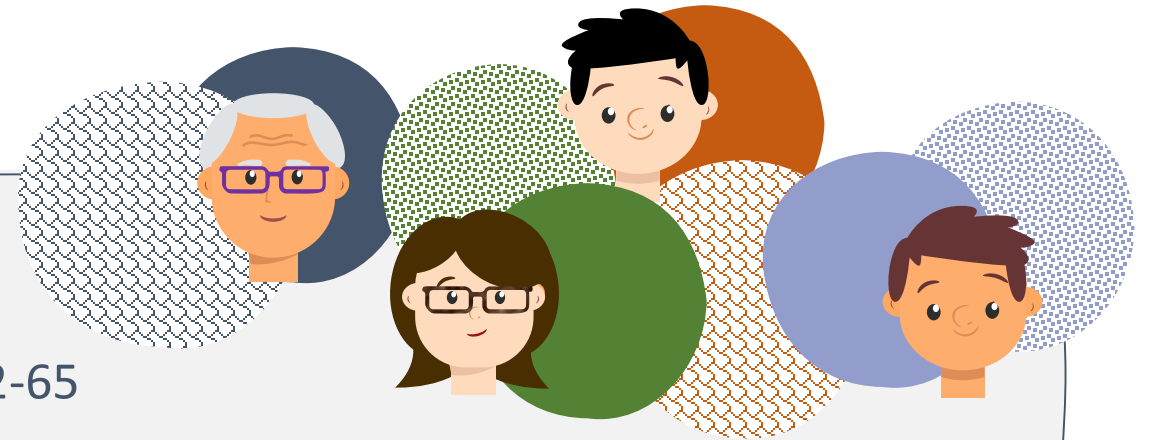
Sex 7 male, 8 Female

Age (years) Mean(SD) = 38.27(15.68), Range = 22-65

Education (years) Mean(SD) = 15.63(2.29), Range = 11-19.5

Time since injury (days) Mean(SD) = 122.33(127.22), Range = 30-373

Mechanism of injury 4 SRC, 2 MVC, 3 fall, 5 direct blow to the head, 1 assault



Measures

SEVERITY OF POST-CONCUSSION SYMPTOMS

Rivermead Post-Concussion Symptoms Questionnaire (RPQ)

FEASIBILITY

Recruitment and retention rates, treatment adherence (7-point Likert scale), and treatment fidelity (CTRS)

SECONDARY OUTCOME

Goal attainment scaling (GAS)

The Rivermead Post-Concussion Symptoms Questionnaire*

After a head injury or accident some people experience symptoms which can cause worry or nuisance. We would like to know if you now suffer from any of the symptoms given below. As many of these symptoms occur normally, we would like you to compare yourself now with before the accident. For each one, please circle the number closest to your answer.

- 0 = Not experienced at all
- 1 = No more of a problem
- 2 = A mild problem
- 3 = A moderate problem
- 4 = A severe problem

Compared with before the accident, do you now (i.e., over the last 24 hours) suffer from:

Headaches.....	0	1	2	3	4
Feelings of Dizziness	0	1	2	3	4
Nausea and/or Vomiting	0	1	2	3	4
Noise Sensitivity, easily upset by loud noise	0	1	2	3	4
Sleep Disturbance.....	0	1	2	3	4
Fatigue, tiring more easily	0	1	2	3	4
Being Irritable, easily angered	0	1	2	3	4
Feeling Depressed or Tearful	0	1	2	3	4
Feeling Frustrated or Impatient	0	1	2	3	4
Forgetfulness, poor memory	0	1	2	3	4
Poor Concentration	0	1	2	3	4
Taking Longer to Think	0	1	2	3	4
Blurred Vision	0	1	2	3	4
Light Sensitivity, Easily upset by bright light.....	0	1	2	3	4
Double Vision	0	1	2	3	4
Restlessness	0	1	2	3	4

Are you experiencing any other difficulties?

1. _____ 0 1 2 3 4
2. _____ 0 1 2 3 4

*King, N., Crawford, S., Wenden, F., Moss, N., and Wade, D. (1995) J. Neurology 242: 587-592

06/23/08

Summary of findings

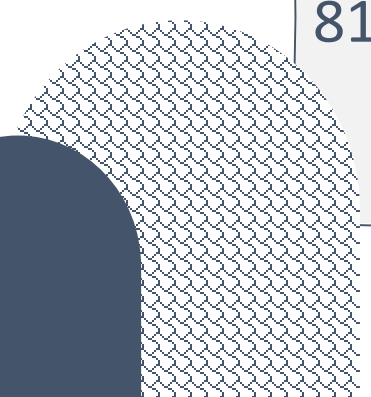
Feasibility. Feasible and tolerable with no adverse effects reported. 61% recruitment, 81% retention rate. High level of adherence to manual. Very good competency.

Preliminary efficacy. Relative to baseline levels of PPCSs severity, intervention-related improvements (mean-level reduction) were observed in 13 participants.

- Seven improving at both a clinically significant (i.e. visual analysis and >4.6 point reduction on RPQ) and statistically significant ($T_{\text{au-U}}$) level.
- Reductions were maintained at 1- and 3-month follow-up.

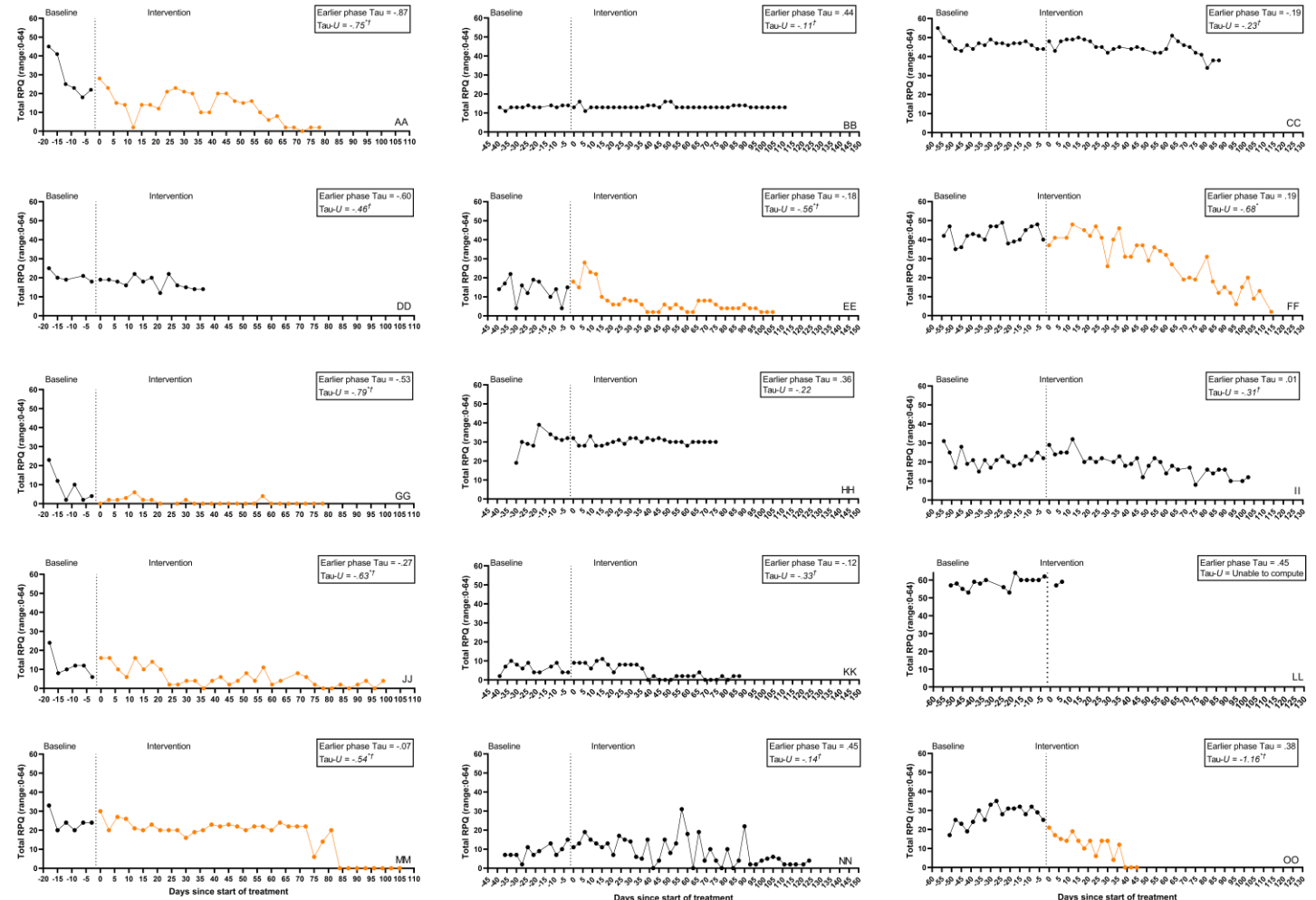
81% of personalised goals were attained at follow-up.

- 10 achieved at least one goal at better than expected level (+1)
- 6 achieved at least one goal at much better than expected level (+2)



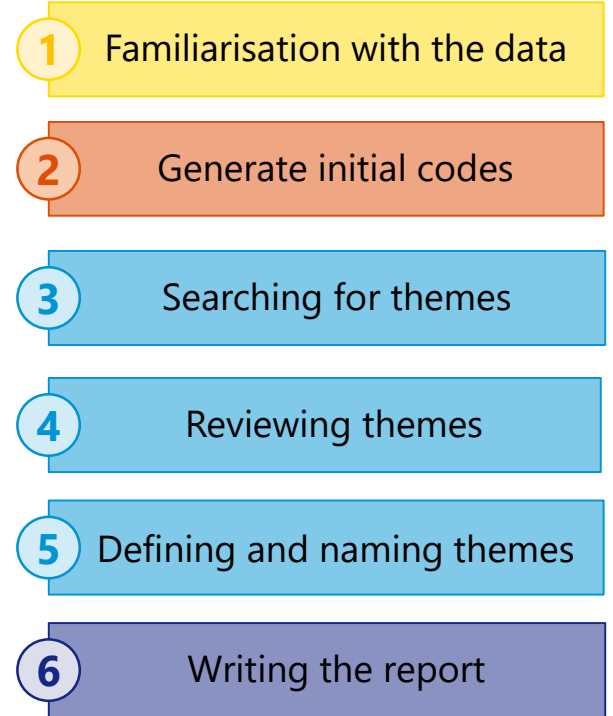
i-RECOVeR SCED findings

- 7/15 showed significant reduction on the Rivermead Post-Concussion Symptoms Questionnaire (Tau-U).
- Symptom reduction maintained at 1- and 3-month follow-up
- 81% goals achieved (Goal Attainment Scaling), 10 at better than expected levels



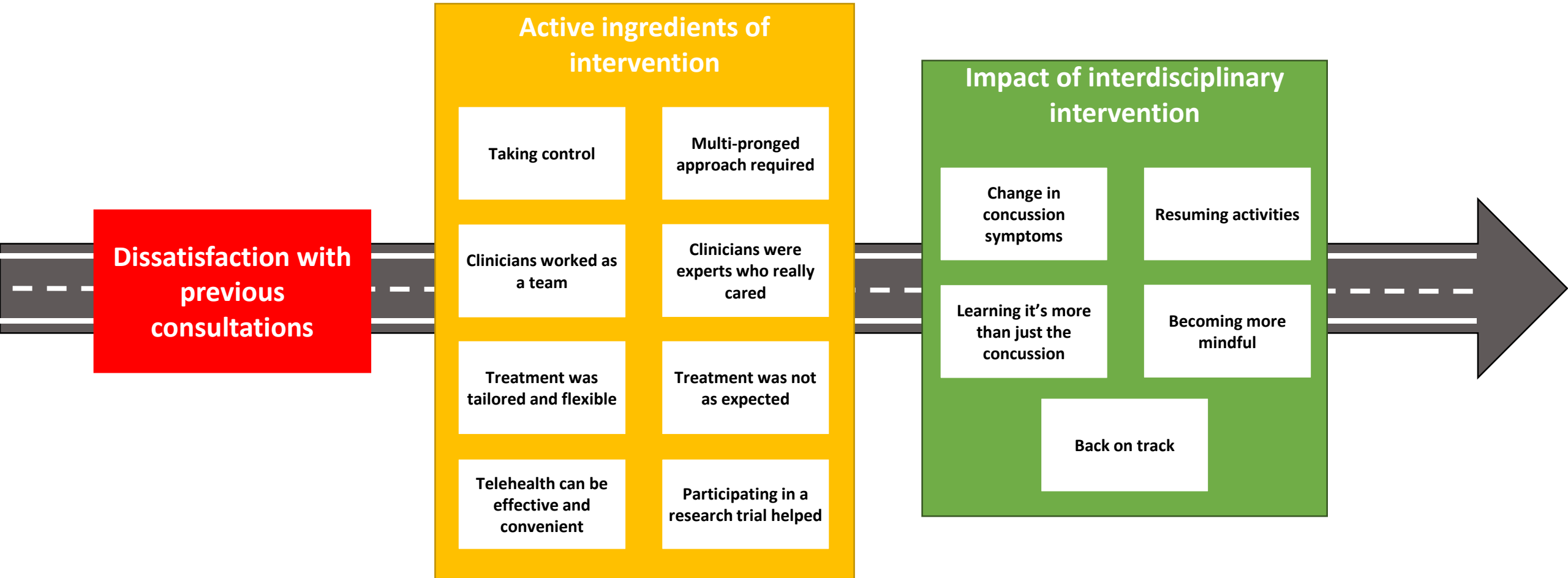
Qualitative study

- **13/15 Individuals with PPCSs** who received i-RECOveR treatment
- **Qualitative semi-structured interviews** via Zoom
- Research questions:
 - Changes in symptoms
 - Effects noticed in daily life
 - Thoughts on treatment
 - Helpful/Least helpful elements of treatment
 - Changes in concussion beliefs
 - Challenges
- Reflexive thematic analysis



Braun & Clark (2021)

Road to recovery after concussion

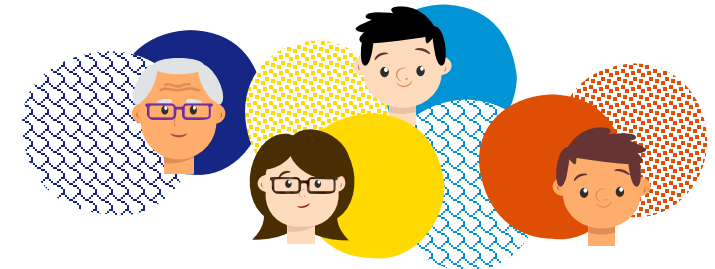


Conclusions

- Study supports the feasibility and acceptability of i-RECOveR. RCT Underway.
- More work to be done to improve acute management of concussion
- Insights into facilitators and barriers of treatment compliance and response
- Treatment engagement and response influenced by a range of modifiable factors
 - Need to emphasise participant autonomy and control
 - Benefit from treatments that are multi-modal, tailored, flexible
 - Importance of having clinicians who are experts, care, and work as a team

Thank you

Dr Jack Nguyen
Dr Adam McKay
A/Prof Catherine Willmott
Katie Davies
Dr Michael Makdissi
Prof Sean Drummond
Dr Jonathan Reyes
Dr Jennifer Makovec-Knight
Tess Peverill
Dr James Brennan



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Interdisciplinary Rehabilitation for Concussion Recovery (i-RECOVeR)

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