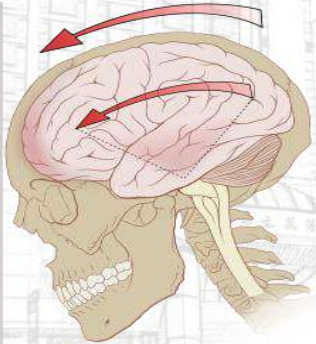


頭部外傷病人介入運動治療是否可以減緩腦震盪症狀的持續時間?

引言人:7B 蔡淑君 護理長
報告日期:111/02/15



(圖片取自<https://zh.wikipedia.org/wiki/>)

前言

- 頭部外傷的發生率（新發病例數）是每年每10萬個人中就有300例（是人口比例的**0.3%**）
- 創傷性腦損傷 (TBI) 被歸類為**輕度 (mTBI)**，佔所有 TBI 的**70-90%**。
- 持續性腦震盪後症狀通常由**身體、認知和情緒症狀**組成。
- 身體和認知方面的**休息**，直到症狀消失為止，一直被認為是腦震盪治療的主要方法。
- 腦震盪症候群會影響到**生理、心理及生活品質**。
- 在腦震盪後症狀的患者中，**運動**已被證明可以降低 PCSS 評分。
- 108年-110年頭部外傷為本病房疾病診斷**第二名(約占20%)**。



腦震盪後症候群

(postconcussion syndrome, PCS)

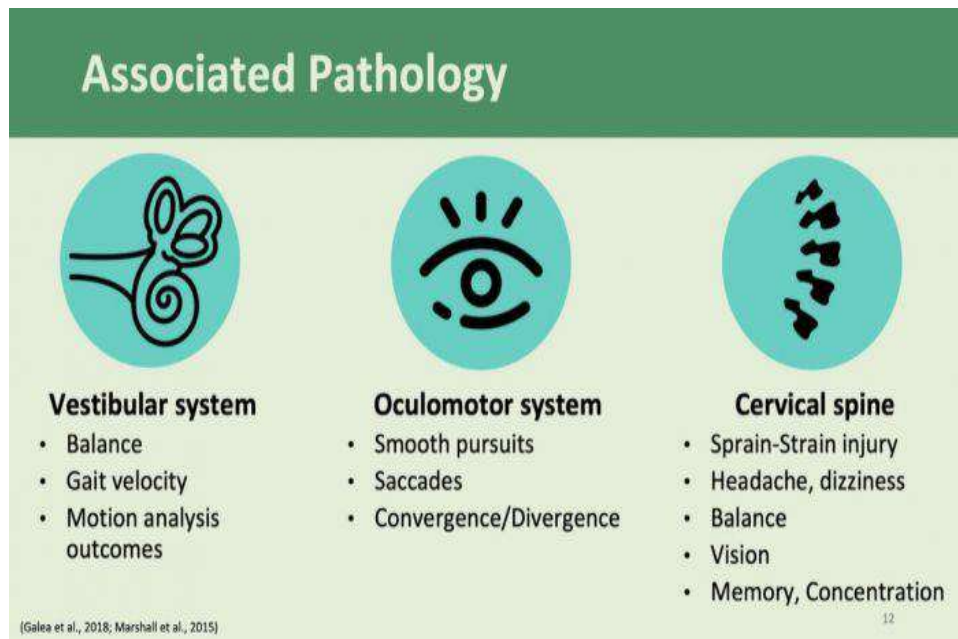
- 為輕度頭部外傷 (mild traumatic brain injury, MTBI) 後常見的困擾。
- 為「早期症狀」：主要為頭痛、頭暈等，常於受傷後立即發生 (immediately after injuries)。
- 「晚期症狀」：主要為憂鬱、焦慮、記憶力下降等，常於受傷後數週 (a few weeks later) 發生。
- 分為「身體」、「認知」、「情緒」等三種症狀類型。於受傷後 1 至 3 個月內即可改善；少數患者 (約 10–20%) 卻會受到持續性 PCS 的影響，時間可從 3 個月至長達一年以上。
(Dikmen et al., 2017)



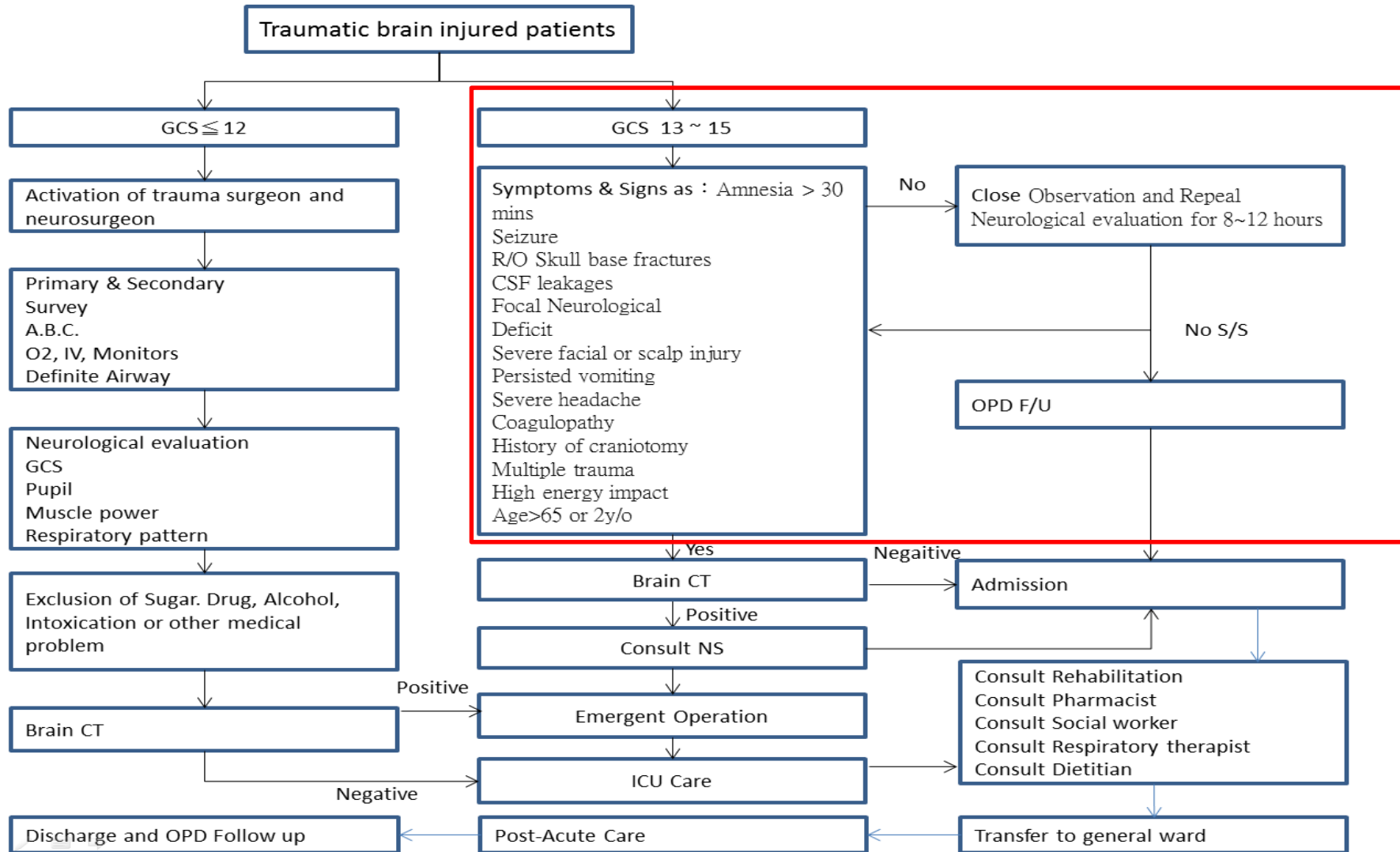
腦震盪後症候群

(postconcussion syndrome, PCS)

- 症狀：頭痛、認知異常（覺得在一片迷霧中）、情緒不穩
- 表現：短暫的失去意識或是失去記憶
- 平衡感異常：步態不穩
- 行為模式改變：焦躁易怒
- 認知功能下降：反應遲緩
- 睡眠週期障礙：倦怠



創傷性腦損傷照護流程



輕度頭部外傷病患住院照護 (Care of Hospitalized MTBI Patients)

- 輕度頭部外傷病人有以下之情形**建議留院觀察**
 - 腦部電腦斷層檢查 (Cranial CT) 有新的且具臨床意義之異常發現。
 - 腦部電腦斷層檢查 (Cranial CT) 無論異常與否，GCS score 小於 15 分。
 - 符合 腦部電腦斷層檢查 (Cranial CT) 之檢查標準，但因故未做腦部電腦斷層檢查 (Cranial CT) 。
- 令醫師關切之持續性症狀，如**持續嘔吐、嚴重頭痛、癲癇或腦脊髓液外漏或神經學症狀**。
- 有其他令醫師關切之症狀，如藥物或酒精中毒 (drug or alcohol intoxication)、顱外受傷或休克 (extracranial injuries or shock)、疑似非意外性傷害 (suspected non-accidental injury) 。
- 有社會、經濟因素之特殊考慮。
- 輕度頭部外傷留院觀察建議。
 - GCS score 15 分以下，宜每 **1 小時** 檢視 1 次，**最少 12 小時**。
 - GCS score 15 分，宜每 **4 小時** 檢視 1 次，**最少 12 小時**。
- 輕度頭部外傷病人意識與神經學症狀惡化或未改善，神經外科醫師為綜合研判病情可重複 腦部電腦斷層檢查。
- 輕度頭部外傷病人出院後，**宜門診追蹤**，並給予**頭部外傷衛教資料**。



頭部外傷照護

1. 臥床休息，避免暈眩而再度摔倒，盡量不要閱讀書報、看電視。
2. 3天之內應密切觀察神經功能及意識變化，1週內避免劇烈運動及高處工作。
3. 水分勿攝取過多，維持平日八成即可。
4. 禁止刺激性飲料，如茶、咖啡、酒等，禁止抽菸。
5. 勿服用安眠藥、鎮靜劑等藥物，以免誤判病情。
6. 頭部撕裂傷須包紮加壓止血，並緊急就醫；縫合後須觀察傷口有無發炎感染的紅腫熱痛現象，並觀察局部神經學症狀。
7. 腦出血和頭蓋骨骨折出院後如有行動不便，行走需要使用行動輔具或由他人攙扶，並觀察局部神經學症狀。



Post-Concussion Symptom Scale (PCSS)

1. Headache

No headache (0)

2. Nausea

No nausea (0)

3. Vomiting

No vomiting (0)

4. Balance problems

No balance problems (0)

5. Dizziness

No dizziness (0)

6. Fatigue

No fatigue (0)

7. Trouble falling to sleep

No trouble falling asleep (0)

8. Excessive sleep

No excessive sleep (0)

9. Loss of sleep

No loss of sleep (0)

10. Drowsiness

No drowsiness (0)

11. Light sensitivity

No light sensitivity (0)

12. Noise sensitivity

No noise sensitivity (0)

13. Irritability

No irritability (0)

14. Sadness

No sadness (0)

15. Nervousness

No nervousness (0)

16. More emotional

Not more emotional (0)

17. Numbness

No numbness (0)

18. Feeling "slow"

No feeling slow (0)

19. Feeling "foggy"

No feeling foggy (0)

20. Difficulty concentrating

No difficulty concentrating (0)

21. Difficulty remembering

No difficulty remembering (0)

22. Visual problems

No visual problems (0)

- **腦震盪後症狀量表 (PCSS)** 最初於 1998 年發表在《頭部創傷康復雜誌》上。它最初是作為匹茲堡鋼人隊腦震盪管理計劃的一部分而開發的。
- 該措施由 **22 個與腦震盪後症狀相關的問題** 組成。調查對象被要求根據 **0-6 的 7 點李克特量表** 對每種症狀進行評分。
- Higher scores indicate a higher severity of post-concussive symptoms. The greatest possible score is **132** and the lowest possible score is 0.



ImPACT

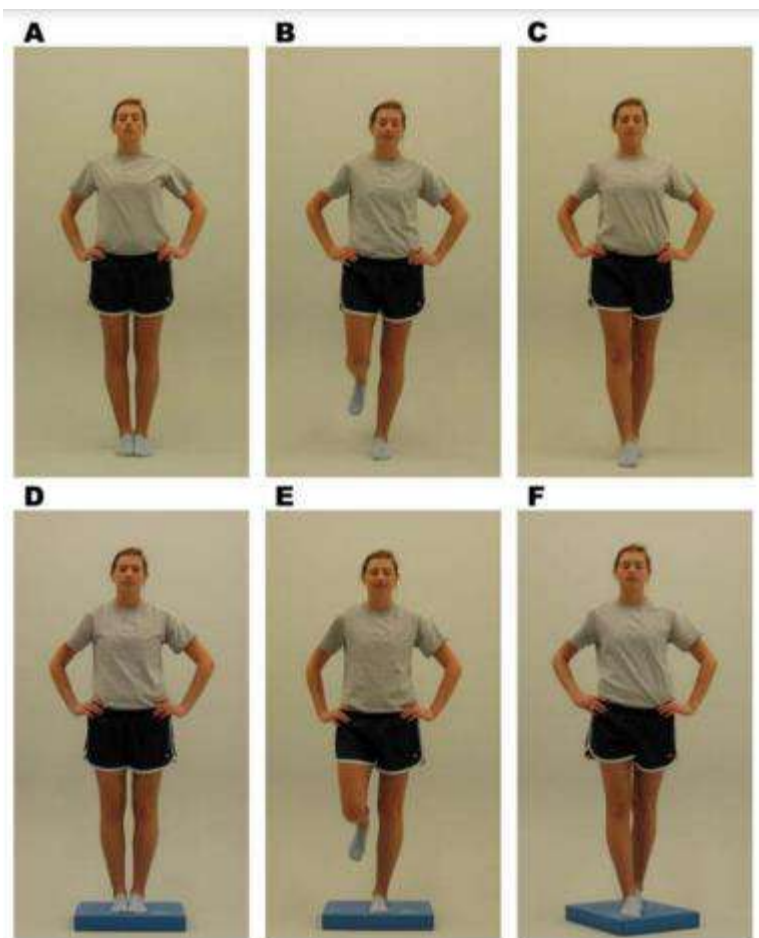
- ImPACT 是一套電腦的應用程式，發行於2000年初期，裡面主要包括六項檢測，以及一項症狀評估量表，是目前美國食品藥品管理局（Food and Drug Administration）核准，可在市面上販售，用來檢測可能由**急性腦損傷**（例如：**腦震盪**）所造成的**認知功能**影響。

六項檢測	五個綜合分數
文字記憶 (word memory) 形狀記憶 (design memory) 視覺工作記憶 (X' s and O' s) 圖像配對 (symbol match) 顏色配對 (color match) 三文字檢測 (three letters)	語言記憶 (verbal memory) 視覺記憶 (visual memory) 視覺運動速度 (visual motor speed) 反應時間 (reaction time) 衝動控制 (impulse control)

- 除了**反應時間跟衝動控制**以外，其他的指標都是**分數越高表示認知功能越好**。其中衝動控制主要是衡量檢測過程中，受試者總共有多少失誤 (error)，如果這項分數超過30分，當次的檢測結果可能是不準確或是無效的。



平衡誤差評分系統 (BESS)



- 用於評估輕度頭部損傷對靜態姿勢穩定
- 可在任何環境中進行，(約 10 分鐘)

Score Card

Balance Error Scoring System (BESS) (Guskiewicz)			
Balance Error Scoring System – Types of Errors 1. Hands lifted off iliac crest 2. Opening eyes 3. Step, stumble, or fall 4. Moving hip into > 30 degrees abduction 5. Lifting forefoot or heel 6. Remaining out of test position >5 sec	SCORE CARD: (# errors)	FIRM Surface	FOAM Surface
	Double Leg Stance (feet together)		
	Single Leg Stance (non-dominant foot)		
	Tandem Stance (non-dom foot in back)		
	Total Scores:		
	BESS TOTAL:		

The BESS is calculated by adding one error point for each error during the 6 20-second tests.

Which **foot** was tested: Left Right
(i.e. which is the **non-dominant** foot)



文獻介紹

Meta-Analysis > Am J Sports Med. 2018 Mar;46(3):743-752. doi: 10.1177/0363546517706137.

Epub 2017 Jun 1.

The Effect of Physical Exercise After a Concussion: A Systematic Review and Meta-analysis

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Affiliations + expand

PMID: 28570092 DOI: 10.1177/0363546517706137

6.203

Impact Factor

5-Year Impact Factor 7.392

Journal Indexing & Metrics »



Appraisal sheets(FAITH)

- Appraisal Tool

- [統合分析 Meta-analysis]

- **步驟1：研究探討的問題為何 (PICO)**
- 步驟2：研究的品質如何 (內在效度)
- 步驟3：研究結果之意義為何 (效益)



步驟 1：系統性文獻回顧探討的問題為何？

研究族群 / 問題 (Population/ Problem) :

- Concussion patients

介入措施 (Intervention) :

- exercise

比較 (Comparison) :

- Non exercise

結果 (Outcomes) :

- PCSS、BESS、ImPACT



Appraisal sheets(FAITH)

- Appraisal Tool

- [統合分析 Meta-analysis]

- 步驟1：研究探討的問題為何 (PICO)
 - **步驟2：研究的品質如何 (內在效度)**
 - 步驟3：研究結果之意義為何 (效益)



步驟 2：系統性文獻回顧的品質如何?(FAITH)

•【F】研究是否找到 (Find) 所有的相關證據？

良好的文獻搜尋至少應包括**二個主要的資料庫**(如：Medline, Cochrane 考科藍實證醫學資料庫, EMBASE 等)，並且加上文獻引用檢索(參考文獻中相關研究、Web of Science, Scopus或 Google Scholar)、試驗登錄資料等。文獻搜尋應**不只限於英文**，並且應同時使用**MeSH**字串及一般檢索詞彙(**text words**)。

搜尋5個資料庫

KEY WORD

英文文獻

This systematic review and meta-analysis followed the guidelines of Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)²⁴ and Meta-analysis Of Observational Studies in Epidemiology (MOOSE).³² A comprehensive literature search was performed on the role of exercise in concussions employing the following databases: **MEDLINE, Scopus, Cochrane Central Register of Controlled Trials, PsycINFO, and SPORTDiscus**. To identify these articles, we used the following search terms and their corresponding Medical Subject Heading (**MeSH**) terms: **concussion, brain concussion, postconcussion syndrome, sports-related concussion, mild traumatic brain injury (mTBI), exercise, physical exertion, treadmill, cognitive activity/exercise, rest, physical rest, cognitive rest, and rehabilitation**. Cognitive activity or exercise was considered as a mental effort and activity including but not limited to reading, writing, or playing computer games.²¹ **Only English-language articles were included, with no minimum search date through September 30, 2016**. We performed a hand search of articles, systematic reviews, reviews, and guidelines and reviewed trial registries for potential studies. The authors of the included studies and reviews were contacted to inquire about the existence of both unpublished and published studies that we were not aware of.



步驟 2：系統性文獻回顧的品質如何?(FAITH)

• 【F】研究是否找到 (Find) 所有的相關證據？

良好的文獻搜尋至少應包括**二個主要的資料庫**(如：Medline, Cochrane 考科藍實證醫學資料庫, EMBASE 等)，並且加上文獻引用檢索(參考文獻中相關研究、Web of Science, Scopus或 Google Scholar)、試驗登錄資料等。文獻搜尋應**不只限於英文**，並且應同時使用**MeSH**字串及一般檢索詞彙(**text words**)。

The studies were imported into Covidence software (Veritas Health Innovation), and duplicate articles were removed. **Two assessors** performed a **first-level** selection based on titles and abstracts by following the inclusion/exclusion criteria independently and in duplicate.

Inclusion criteria were the following: participants (those of any age or sex, diagnosed with a concussion or mTBI, occurring from any sport, activity, combat, accident, or life event, within 3 months of injury), intervention (physical exercise such as exertion, activity, treadmill, cycling, stretching), comparison (no physical exercise, physical rest), outcomes (PCSS, number of patients with symptoms of a concussion, duration of symptoms of a concussion,

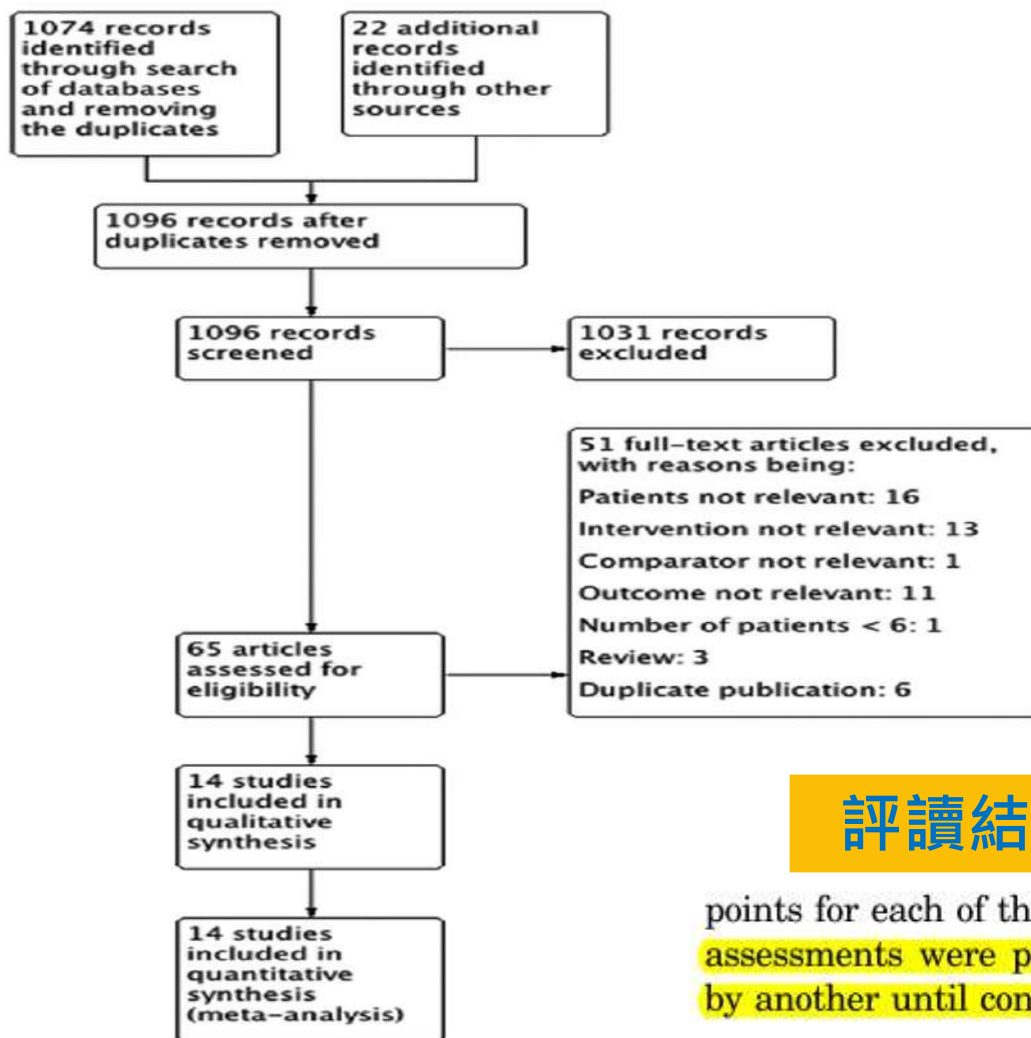
ImPACT, Balance Error Scoring System [BESS], neuropsychological tests, recovery, full function, days off work, duration of rest, and mental activity), and study design (RCTs, cohort studies, case control studies, before and after [pre-post] studies).

Exclusion criteria were the following: participants (those with a moderate or severe traumatic brain injury, mixed population of a mild with moderate or severe traumatic brain injury, penetrating head injury, concussive event that occurred more than 3 months prior), intervention (use of drugs alone or with physical exercise, intervention not clear), comparison (single-arm study with missing baseline data, no comparator data), outcomes (irrelevant outcomes such as center-of-mass medial/lateral displacement, peak velocity,¹¹ functional magnetic resonance imaging, cost), and design (reviews, letters to the editor, case reports, commentaries, editorials).

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PRISMA 的流程圖



評讀結果：●是○否○不清楚

points for each of the 6 trials.³⁴ Data extraction and quality assessments were performed by one reviewer and checked by another until consensus was reached.

Figure 1. PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flowchart of studies.

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Appraisal FAITH-步驟 2：系統性文獻回顧的品質如何(A)

【I】是否只納入 (Included) 具良好效度的文章？

僅進行文獻判讀是不足夠，系統性文獻回顧只納入至少要有一項研究結果是極小偏誤的試驗。在文章的方法章節，可以找到文章評估的方式，及由誰完成評估的，在結果章節則會提供審查者意見一致性的程度。

Evidence was assessed using the **GRADE** process that considered the following components: study design, risk of bias, heterogeneity, directness, precision, and publication bias as well as magnitude of effect, confounding, and dose-response relationship. GRADEpro software was used and based on addressing the components of the GRADE; evidence was graded as high, moderate, low, or very low quality. Evidence of the PCSS, symptoms of a concussion, IMPACT, balance, bed rest, days off work, and neuropsychological tests was graded (Appendix Table A1).

The risk of bias of **RCTs** was assessed using the Cochrane Collaboration's tool. We assessed randomization (random sequence generation), allocation concealment, blinding of participants, outcome assessments, attrition bias (incomplete outcome data), reporting bias (selective reporting), and other biases in each study. The methodological quality of **cohort studies** was assessed using the Scottish Intercollegiate Guidelines Network (SIGN) 50 tool. The methodological quality of before and after studies was assessed by the National Institutes of Health's Quality Assessment Tool for **Before-After (Pre-Post) Studies**.

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Appraisal FAITH-步驟 2：系統性文獻回顧的品質如何(A)

【I】 是否只納入 (Included) 具良好效度的文章？

Appendix Table A1. GRADE on the role of exercise in subjects with concussion.

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	No. of participants (studies)	Quality of the evidence (GRADE)	Comments
	Risk with Control	Risk with Exercise				
Total PCSS (Overall) assessed with: PCSS Scale from: 2.7 to 28.9 follow up: mean 1 months	The mean total PCSS (Overall) was 23.8±22.9	The mean total PCSS (Overall) in the intervention group was 13.06 lower (16.57 lower to 9.55 lower)	-	716 (8 observational studies)	⊕⊕⊕○ MODERATE	Mixed data of RCT, cohort and before after studies. The data from a good quality studies as well as an RCT showed a similar effects.
Percentage of subjects with Symptoms follow up: mean 10 days	Study population		RR 0.74 (0.63 to 0.86)	1255 (2 RCTs and one a Propensity score matched study)	⊕⊕○○ MODERATE	Mixed data of 2 RCTs, and a Propensity score matched study. The data from a good quality studies showed a similar effect.
	40 per 100	30 per 100 (25 to 34)				
	Low					
	38 per 100	28 per 100 (24 to 33)				
	High					
	40 per 100	30 per 100 (25 to 34)				
Duration of symptoms assessed with: Days Scale from: 33 to 51 follow up: mean 6 months	The mean duration of symptoms was 51.2±45.1 Days	MD 18.01 Days lower (38.93 lower to 2.91 higher)	-	58 (1 RCT)	⊕⊕○○ LOW a,b	
ImPACT Score (Visual Memory) Change Scale from: 10 to 30 follow up: mean 20 days	The mean imPACT Score (Visual Memory) was 5.2±17.8	MD 11.3 higher (3.35 higher to 19.25 higher)	-	88 (1 RCT)	⊕⊕⊕○ MODERATE ^a	
ImPACT Score (Processing Speed) Change Scale from: 10 to 30 follow up: mean 20 days	The mean imPACT Score (Processing Speed) was 13.7±18.7	MD 4.3 higher (3.73 lower to 12.33 higher)	-	88 (1 RCT)	⊕⊕⊕○ MODERATE ^a	
ImPACT Score (Reaction Time) Change Scale from: 10 to 30 follow up: mean 20 days	The mean imPACT Score (Reaction Time) was 25.6±20.2	MD 10.7 lower (18.99 lower to 2.51 lower)	-	88 (1 RCT)	⊕⊕⊕○ MODERATE ^a	

Appraisal FAITH-步驟 2：系統性文獻回顧的品質如何(A)

【I】 是否只納入 (Included) 具良好效度的文章？

Appendix Table A1. GRADE on the role of exercise in subjects with concussion.

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	No of participants (studies)	Quality of the evidence (GRADE)	Comments
	Risk with Control	Risk with Exercise				
ImPACT Score (Verbal Memory) Change Scale from: 10 to 30 follow up: mean 20 days	The mean ImPACT Score (Verbal Memory) was 4.2±19.0	MD 0.7 lower (8.56 lower to 7.16 higher)	-	88 (1 RCT)	⊕⊕⊕○ MODERATE ^a	
Balance Error Scoring System (BESS) follow up: mean 10 days	The mean balance Error Scoring System (BESS) was 21±9	MD 2 lower (5.98 lower to 1.98 higher)	-	88 (1 RCT)	⊕⊕⊕○ MODERATE ^a	An observational study showed improvement in Brulinks-Oseretsky Test (BOT)-2 Balance scaled score after exercise p = 0.05. No marked effect on other components of balance.
Bed Rest assessed with: Days follow up: mean 10 days	The mean bed Rest was 3.2±7 days	MD 1.6 days lower (3.66 lower to 0.46 higher)	-	178 (1 RCT)	⊕⊕○○ LOW ^{a,b}	
Days off work assessed with: days follow up: mean 12 months	The mean days off work was 32.2±34 days	MD 14.5 days lower (24.52 lower to 4.48 lower)	-	178 (1 RCT)	⊕⊕○○ LOW ^{a,b}	
Neurophysiological tests follow up: mean 10 days	SDMT total correct were significantly less at day 3, MD [95% CI], p = 0.008, -7.70 [-13.39, -2.01] and significantly more at day 10 MD [95% CI], 3.90 [0.56, 7.24], p = 0.02 with exercise compared to control. No significant difference in computer-based neurocognitive tests between the two groups at both the time intervals		-	88 (1 RCT)	⊕⊕⊕○ MODERATE ^a	
*The risk in the intervention group (and its 95% confidence interval) is based on the assumed risk in the comparison group and the relative effect of the intervention (and its 95% CI). CI: Confidence interval; MD: Mean difference; RR: Risk ratio						
GRADE Working Group grades of evidence High quality: We are very confident that the true effect lies close to that of the estimate of the effect Moderate quality: We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different Low quality: Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect Very low quality: We have very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect						
a. ⊕⊕⊕ Three or less studies for this outcome b. ⊕○○ Poor quality of study (s)						

評讀結果：○是○否●不清楚

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Appraisal FAITH-步驟 2：系統性文獻回顧的品質如何(A)

【I】是否只納入 (Included) 具良好效度的文章？

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Appendix Table A2. Characteristics of Included Studies.

Study	Study Design	Participants (N, mean age)	Intervention	Definition of concussion	PCSS	Outcome(s)	Key Findings
Baker et al 2012	Prospective Cohort	63 patients, 27.3 y	Exercise rehabilitation	Followed, Kelly et al 1998	NR	Symptoms, time to return to full daily functioning	72% of those who participated in exercise rehabilitation returned to full daily functioning.
Clausen et al 2016	Before and after study	6 student-athletes, 23 y	Aerobic exercise (20 mins/day, 5-6 days/week). Intervention began before week 12 post-injury and lasted 12 weeks.	Followed, WHO ICD-10	PCSS, 22 symptoms	Symptoms, PCSS	Exercised improved CO2 sensitivity and ventilation in concussed athletes. Exercise also reduced the level of resting symptoms in concussed athletes.
Gagnon et al 2009	Before and after study	16 athletes, 14 y	Active physical rehabilitation (1 month post-injury)	Followed, McCrory et al., 2005, Canadian Pediatric Society	PCSS, 22 symptoms	Symptom: PCSS. Return to lifestyle/sports	All participants in the cohort decreased their PCSS scores and returned to normal activities and sports, on average, 4.4 weeks after intervention.
Gagnon et al 2016	Before and after study	10 athletes, 16.3 y	Active physical rehabilitation (1 month post-injury) until symptom resolution.	Followed, McCrory et al., 2005, Canadian Pediatric Society	PCSS, 22 symptoms	Symptoms, PCSS. Mood, energy, balance, and cognition.	Post-concussion symptoms and fatigue decreased while mood improved after intervention.
Grool et al 2016	Retrospective Cohort study with Propensity score matched data	2413 patients 5-18 y, 1108 patients having propensity score matched data	Physical activity within 7-28 days post-injury	Followed McCrory et al 2012.	NR	Post concussive symptoms, self-reported	Physical activity within 7-28 days of injury was associated with nearly half the rate of persistent post-concussive symptoms.
Howell et al 2016	Prospective Cohort	364 patients, 15 y	No Intervention. Measured the association between levels of activity and symptom duration	Followed, McCrory et al 2012.	PCSS, 22 symptoms, 0-6 scale	Symptoms, PCSS	PCSS score and female sex were the only variables independently associated with symptom duration for the entire cohort. Higher levels of physical activity were only associated with shorter symptom duration in patients between 13 and 18 years of age.



Appraisal FAITH-步驟 2：系統性文獻回顧的品質如何(A)

【I】是否只納入 (Included) 具良好效度的文章？

P.11

Kurowski et al 2016	RCT*	26 patients, 15.4 y	Aerobic exercise vs a full-body stretching (6 weeks)	Followed, Ruff et al 2009	PCSI, 21 symptoms, 0-6 scale	Symptoms, PCSI	There was a greater rate of improvement of symptoms in the exercise group than in the stretching group.
Leddy et al 2015	RCT, Abstract	41 patients, 15.8 y	Treadmill exercise assessment vs no exercise the day of injury	NR	NR	Symptoms, ImPACT, Exercise tolerance	No significant difference in exercise tolerance and daily symptom between groups 2 weeks after treadmill exercise assessment.
Leddy et al 2013	Prospective Cohort*	8 patients-4 controls, 22 y	Aerobic exercise vs stretching	Followed, WHO, ICD-10	PCSS, 22 symptoms	Symptoms and cerebral blood flow via fMRI	Controlled aerobic exercise for 12 weeks decreased the number of reported symptoms and increased activation in the cingulate gyrus, lingual gyrus, and cerebellum of concussed patients.
Maerlender et al 2015	RCT	28 student-athletes	Mild-moderate exercise vs No exercise	NR	NR	Symptoms and recovery time	Mild to moderate physical exertion during recovery produced no significant differences in recovery time between groups. However, high levels of exertion were deleterious.
Majerske et al 2008	Retrospective cohort	95 student-athletes, 15.9 y	Comparison of 5 levels of activity (No school/exercise activity to school activity and participation in a sports)	Followed, Kelly et al 1991.	PCSS, 22 symptoms, 0-6 scale	Symptoms, ImPACT, PCSS	No statistically significant relationship between symptom scores and levels of activity following injury were observed.
Mittenberg et al 1996	RCT	58 patients, 46.6 y	1 hour of cognitive therapy vs advice for a period of rest	Followed, American Psychiatric Association, 1994; WHO, 1978	Structured symptom checklist	Symptoms	Patients who received cognitive therapy reported shorter symptom duration, fewer symptoms at follow-up, and fewer symptomatic days and lower mean severity levels 6 months post-injury.
Relander et al 1972	RCT	178 patients, 37 y	Routine (not encouraged to move) vs Active treatment (physiotherapy and encouraged)	No clear definition	Customized questionnaire of symptoms	Symptom, length of stay in hospital, duration of bed rest, time off work	No significant difference between the two groups in duration of bed rest or length of stay in hospital. No difference in number of patients with symptoms in both groups. Number of days off work was less in active treatment group compared to rest group.

Appraisal FAITH-步驟 2：系統性文獻回顧的品質如何(A)

【I】是否只納入 (Included) 具良好效度的文章？

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Thomas et al 2015	RCT	88 patients, 13.7 y	Usual care (1-2 days rest) vs Strict rest (5 days)	Acute Concussion Evaluation form, CDC	PCSS, 19 symptoms, assessing 4 domains, 0-6 scale	Symptoms, BESS, ImpACT, PCSS	No difference in neurocognitive or balance outcomes in both groups. Strict rest group reported more daily post-concussive symptoms and slower symptom resolution.
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BESS: Balance Error Scoring System; CDC: Centers for disease and prevention; CNT: Computerized neuropsychological tests; ICD: International classification of disease; ImpACT: Immediate Post-Concussion Assessment and Cognitive Testing; N: Number of Subjects; PCSI: Post-Concussion Symptom Inventory; NR: Not reported; PCSS: post concussion symptom scale, symptom severity score; SAC: Standard Assessment of Concussion; SF-36: medical outcomes study 36 item short form health survey; WHO: World health organization; y: years. *We extracted before after data from these studies



Appraisal

FAITH 步驟 2：系統性文獻回顧的品質如何 (T-H)

- **【T】** 作者是否以表格和圖表「總結」(Total up) 試驗結果？
- 以「森林圖」(forest plot) 呈現研究結果，最好再加上異質性分析。
- **【H】** 試驗的結果是否相近 - 異質性 (Heterogeneity) ？
- 在理想情況下，各個試驗的結果應相近或具同質性，若具有異質性，作者應評估差異是否顯著 (卡方檢定)。根據每篇個別研究中不同的 PICO 及研究方法，探討造成異質性的原因。



Appraisal FAITH-步驟 2：系統性文獻回顧的品質如何(A)

【I】 是否只納入 (Included) 具良好效度的文章？

P.746

TABLE 1
Effect of Exercise on Symptoms Overall and by Subgroup^a

Outcome	Mean ± SD or %		Studies/Patients, n	MD (95% CI) or RR (95% CI)	I ² , %	P Value
	Exercise	Control				
Total PCSS score						
Overall	10.2 ± 14.3	23.8 ± 22.9	8/716	-13.06 (-16.57 to -9.55)	44	<.00001
RCT	14.0 ± 16.0	21.5 ± 16.0	1/88	-7.56 (-14.25 to -0.87)	NA	.03
Nonrandomized studies	9.8 ± 14.2	24.6 ± 24.2	7/628	-13.80 (-17.45 to -10.16)	40	<.00001
Sports related	10.1 ± 14.7	23.9 ± 23.6	7/667	-12.73 (-16.77 to -8.68)	52	<.00001
Adolescents	10.4 ± 14.6	24.4 ± 23.9	6/689	-13.10 (-17.74 to -8.46)	54	<.00001
Adults	5.9 ± 6.7	18.4 ± 4.9	2/27	-12.40 (-16.87 to -7.93)	0	<.00001
PTE <5 d	12.9 ± 14.9	21.0 ± 14.5	2/100	-10.02 (-14.66 to -5.37)	0	<.0001
PTE ~11 d	10.1 ± 15.5	24.9 ± 27.8	2/506	-10.85 (-19.56 to -2.14)	69	<.01
PTE 21-90 d	8.4 ± 6.5	24.5 ± 15.7	4/110	-14.88 (-18.78 to -10.98)	0	<.00001
Good-quality studies	8.2 ± 12.3	24.1 ± 21.7	6/518	-13.83 (-17.00 to -10.66)	24	<.00001
Percentage of patients with symptoms						
Overall	29	40	3/1255	0.74 (0.63 to 0.86)	0	.0001
RCT	35	39	2/147	0.90 (0.59 to 1.38)	0	.64
Propensity score matching study	29	40	1/1108	0.72 (0.61 to 0.85)	NA	<.00001
Sports related	29	40	2/1196	0.73 (0.62 to 0.85)	0	<.0001
Adolescents and children	29	40	2/1196	0.73 (0.62 to 0.85)	0	<.0001
Adults	38	40	1/59	0.96 (0.50 to 1.82)	NA	.89
PTE <5 d	29	40	3/1255	0.74 (0.63 to 0.86)	0	<.0001
Good-quality studies	29	40	2/1196	0.73 (0.62 to 0.85)	0	.0001
Duration of symptoms						
RCT, adults, PTE <5 d	33.2 ± 35.6	51.2 ± 45.1	1/58	NR	NA	.05

^aI², heterogeneity; MD, mean difference; NA, not applicable; NR, not reported; PCSS, Post-Concussion Symptom Scale; PTE, posttraumatic event; RCT, randomized controlled trial; RR, risk ratio.

Appraisal

FAITH步驟 2：系統性文獻回顧的品質如何 (T-H)

【T】作者是否以表格和圖表「總結」(Total up) 試驗結果？

【H】試驗的結果是否相近 - 異質性 (Heterogeneity) ？

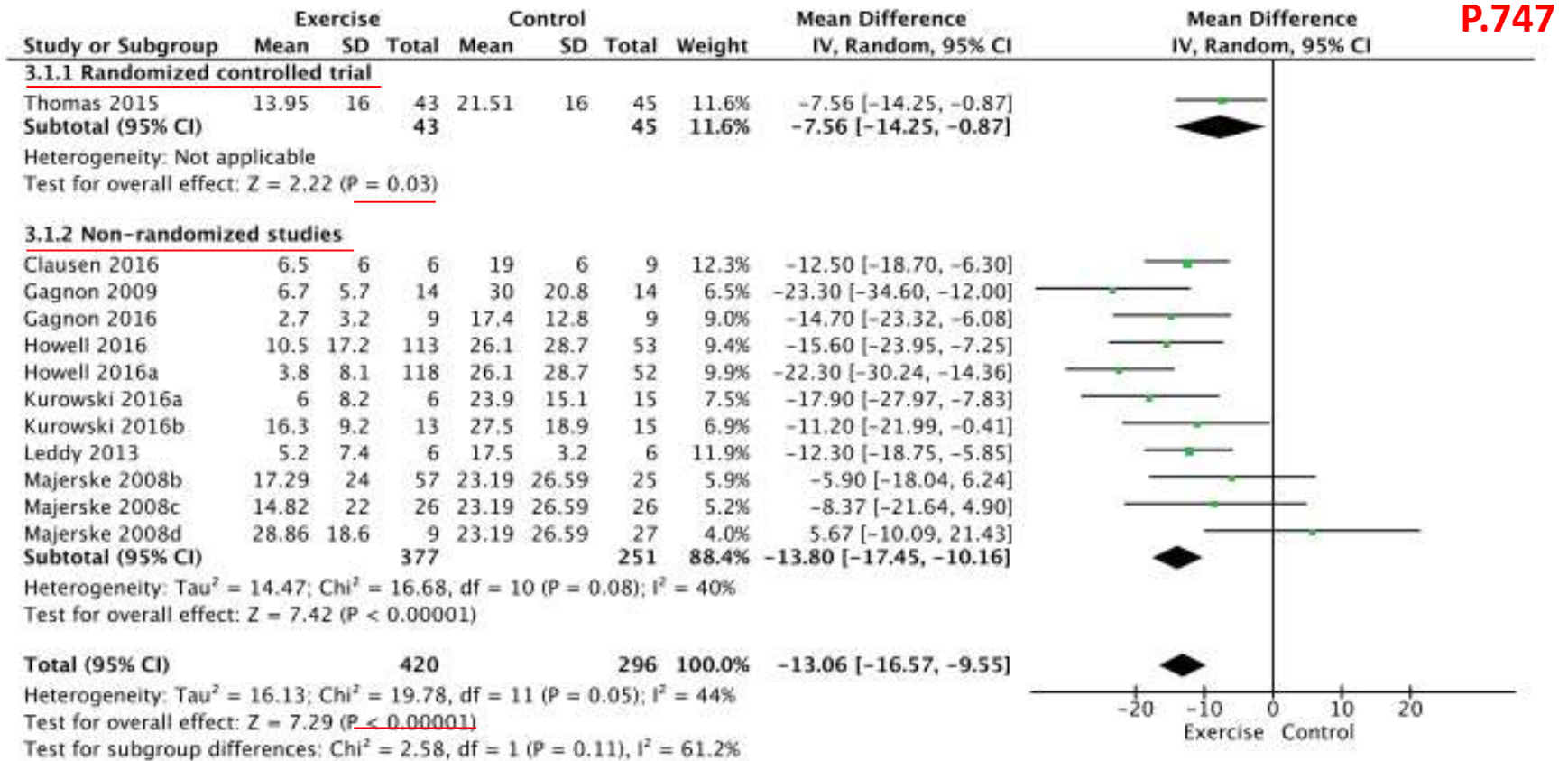


Figure 2. Effect of exercise on the Post-Concussion Symptom Scale (PCSS) score. I², heterogeneity; IV, inverse variance; RCT, randomized controlled trial.

Appraisal

FAITH步驟 2：系統性文獻回顧的品質如何 (T-H)

【T】作者是否以表格和圖表「總結」(Total up) 試驗結果？

【H】試驗的結果是否相近 - 異質性 (Heterogeneity)？

P.748

TABLE 2
Effect of Exercise on Different Outcomes After a Concussion^a

Outcome	Mean ± SD, n, or %		Studies/Patients, n	MD (95% CI) or RR (95% CI)	I ² , %	P Value
	Exercise	Control				
ImPACT score change, adolescents ^b						
Verbal memory						
Overall	0.3 ± 6.9	0.6 ± 7.8	3/286	-0.03 (-0.27 to 0.21)	0	.82
RCT	2.5 ± 14.5	3.1 ± 14.4	2/116	-0.24 (-0.79 to 0.31)	43	.39
Visual memory						
Overall	4.5 ± 7.0	1.6 ± 7.1	3/286	-0.14 (-0.64 to 0.35)	74	.57
RCT	12.3 ± 15.8	3.7 ± 13.7	2/116	0.06 (-1.08 to 1.19)	85	.92
Visual motor speed						
Overall	5.0 ± 6.9	4.3 ± 4.8	3/286	0.06 (-0.18 to 0.31)	0	.61
RCT	13.9 ± 15.5	10.4 ± 8.6	2/116	0.14 (-0.22 to 0.51)	0	.44
Reaction time						
Overall	4.6 ± 6.9	8.5 ± 8.1	3/286	0.01 (-0.45 to 0.47)	70	.97
RCT	11.1 ± 14.9	18.9 ± 15.5	2/116	-0.43 (-0.80 to -0.06)	0	.02
Impulse control						
Overall, RCT	-2.6 ± 10	-5.6 ± 11.8	1/88	0.27 (-0.15 to 0.69)	NA	.21
BESS, overall, RCT						
3 d	22.4 ± 12.0	23.6 ± 9.0	1/93	NR	NA	.59
10 d	19.0 ± 10.0	21.0 ± 9.0	1/88	NR	NA	.32
Balance tests, overall						
BOT-2 balance scaled score	17.0 ± 2.4	14.2 ± 3.6	1/18	NR	NA	.05
Foam double leg	20.0 ± 0.01	20.0 ± 0.01	1/18	NR	NA	>.99
Foam single leg	5.3 ± 2.9	4.7 ± 2.3	1/18	NR	NA	.49
Foam tandem	9.7 ± 7.2	7.2 ± 3.6	1/18	NR	NA	.35
Neuropsychological tests, RCT, adolescents, sports related						
Total correct on SDMT ^c						
3 d	59.9 ± 14.0	67.6 ± 14.0	1/93	NR	NA	.008
10 d	71.5 ± 8.0	67.6 ± 8.0	1/88	NR	NA	.02
Days off work						
Overall, RCT	17.7 ± 34.0	32.2 ± 34.0	1/178	NR	NA	<.05
Hours of mental activity, overall, RCT						
Moderate and high at 2-5 d	8.3 ± 7.0	4.9 ± 7.0	1/88	NR	NA	.02
School and after school	6.7 ± 6.0	3.8 ± 6.0	1/88	NR	NA	.02
Days of bed rest, RCT, <5 d						
Overall, RCT	1.6	3.2	1/14	NR	NA	NS
Percentage of patients with full function						
Overall, cohort	72	17	1/63	NR	NA	.02
Days of recovery from concussion						
Overall, RCT	15 ± 14	13 ± 13	1/28	NR	NA	.69

^aBESS, Balance Error Scoring System; BOT-2, Bruininks-Oseretsky Test; I², heterogeneity; ImPACT, Immediate Post-Concussion Assessment and Cognitive Testing; MD, mean difference; NA, not applicable; NR, not reported; NS, not significant; RCT, randomized controlled trial; RR, risk ratio; SDMT, Symbol Digit Modalities Test.

^bStandard mean difference.

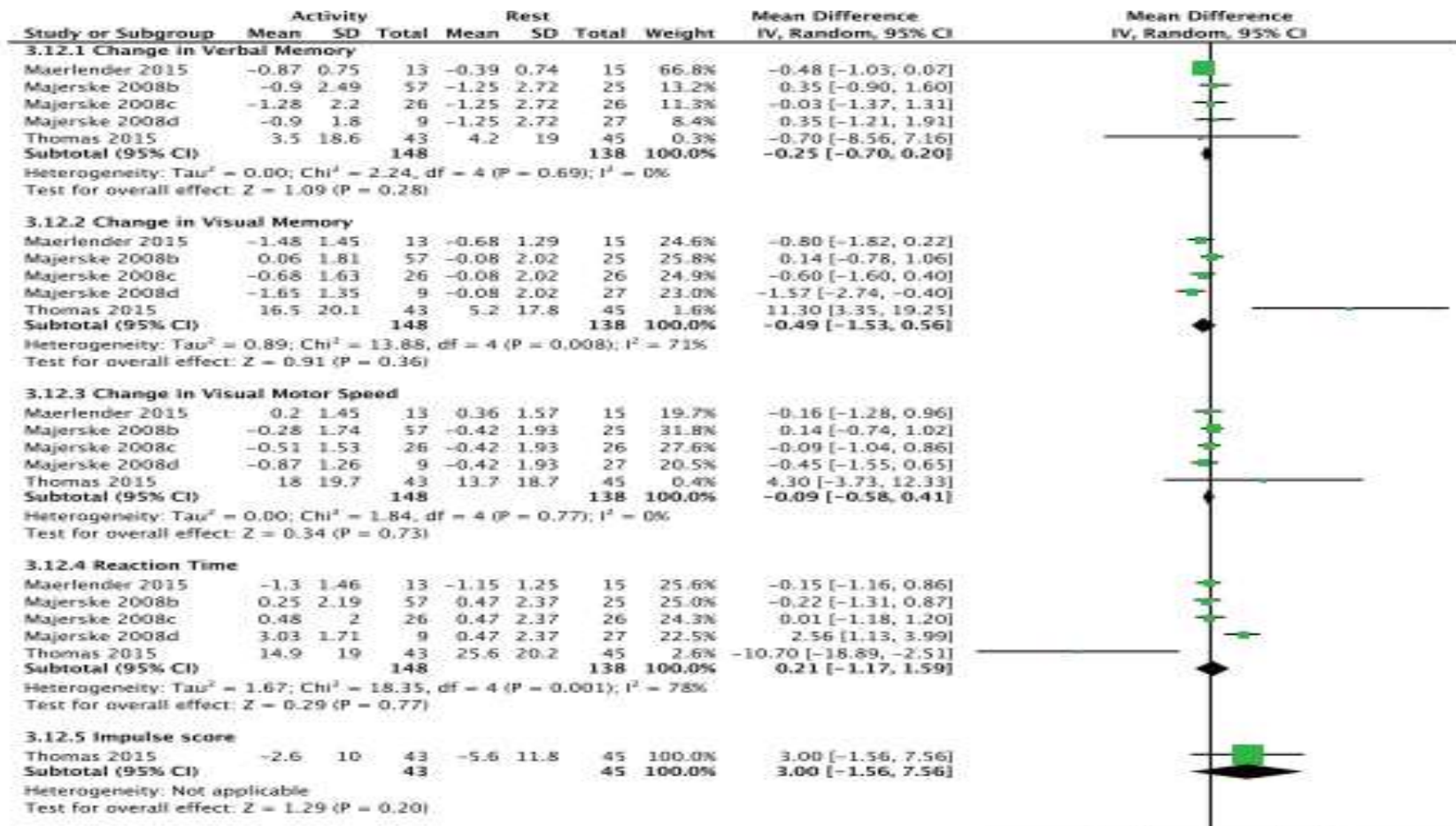
Appraisal

FAITH步驟 2：系統性文獻回顧的品質如何 (T-H)

【T】作者是否以表格和圖表「總結」(Total up) 試驗結果？

【H】試驗的結果是否相近 - 異質性 (Heterogeneity) ？

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評讀結果：●是 ○否 ○不清楚

Figure 3. Effect of exercise on change in the Immediate Post-C heterogeneity; IV, inverse variance.

評讀總表

系統性文獻回顧品質	評讀結果
研究是否找到(Find)所有的相關證據？	是
文獻是否經過嚴格評讀(Appraisal)？	是
是否只納入(Included)具良好效度的文章？	不清楚
作者是否以表格和圖表「總結」(Total up)試驗結果？	是
試驗的結果是否相近-異質性(Heterogeneity)？	是



Appraisal sheets(FAITH)

- Appraisal Tool

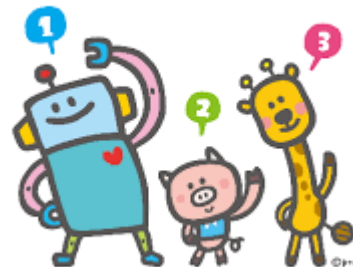
- [統合分析 Meta-analysis]

- 步驟1：研究探討的問題為何 (PICO)
- 步驟2：研究的品質如何 (內在效度)
- **步驟3：研究結果之意義為何 (效益)**



結論

- 運動訓練改善腦血流量、氧合代謝、腦血管及神經功能，改善腦震盪後的恢復。
- 運動可以減少臥床休息的時間，減少焦慮、抑鬱、改善患者行為、心理和認知活動。
- 增強思維和記憶力，改善腦震盪的症狀。



限制、建議

- 由於沒有對照組，無法估計安慰劑效應或其他可能影響結果的因素。
- 大多數研究沒有提供關於運動強度對腦震盪後不同結果的影響的數據。
- 這些研究沒有評估體育鍛煉的依從性。








感謝聆聽 恭請指教



依系統性文獻回顧之結論

 是否同意將復建運動納入腦震盪病人的常規
照護？

-  同意 0位
-  待評估 8 位
-  不同意 12位

