A pilot randomized control trial examining the treatment efficacy of a novel approach to cognitive remediation in public safety personnel with post-traumatic stress disorder (PTSD) and co-morbid conditions

PTSI in Public Safety Personnel

CIHR Catalyst Grants

Margaret McKinnon, PhD, CPsych
Homewood Chair in Mental Health and Trauma
Associate Professor and Associate Chair, Research
Department of Psychiatry and Behavioural Neurosciences
McMaster University
Senior Scientist, Homewood Research Institute
Research Lead, Mental Health and Addictions, St. Joseph's Healthcare Hamilton

St. Joseph's Healthcare Hamilton | The Research Institute of St. Joe's Hamilton

McMaster University PSYCHIATRY AND BEHAVIOURAL NEUROSCIENCES

HRI HOMEWOOD RESEARCH INSTITUTE

The Research Team

Margaret C. McKinnon, Ph.D., C. Psych. McMaster University, Hamilton, Ontario
Ruth Lanius, M.D., Ph.D., F.R.C.P.(C), Western University, London, Ontario
Col Rakesh Jetly, M.D., Health Services Branch, Canadian Armed Forces
Don Richardson, M.D., Western University, London, Ontario
Randi McCabe, PhD, C. Psych, McMaster University, Hamilton, Ontario
Charlene O'Connor, MSc., Homewood Health Centre, Guelph, Ontario
Heather Hood, Ph.D., C. Psych., Homewood Health Centre, Guelph, Ontario
Jenna Boyd, MSc., McMaster University, Hamilton, Ontario
Alina Protopopescu, BSc., B.A. McMaster University, Hamilton, Ontario
Chantelle Lloyd, B.A., McMaster University, Hamilton, Ontario
Aamna Quereshi, BA., McMaster University, Hamilton, Ontario

Project Staff
Emily Levitt, B.A., Homewood Research Institute, Guelph, Ontario
Courtney Ropp, MSc., Homewood Research Institute, Guelph, Ontario
Sarah Sousa, MSc., Homewood Research Institute, Guelph, Ontario
Andrea Brown, PhD, Homewood Research Institute, Guelph, Ontario
Heather Millman, MSc, Homewood Research Institute, Guelph, Ontario

CIMVHR Knowledge Translation Sessions

- Participants identified urgent need for research that addresses **Return to Work/ Transition to Non-Military employment** and associated insecurity (e.g., financial, family functioning); GBA+ Analysis

- Themes identified included:
  - Having a job is not an indicator of a successful transition
  - Need to do **meaningful work**. Infuse respect and importance to job duties.
  - Need to focus on **transferrable skills.**
  - Need to address **a drop in status.**
  - Need to **track outcomes of early reintegration** (satisfaction, trajectory, net benefit).
  - Require interventions to improve attention/ focus.
  - Improving non-verbal communication, emotion comprehension/social cognition.
  - Increasing group belonging.
  - Increasing flexibility, accommodation, and support.
  - Create a **scaffolding support system**.
  - Women
  - LGBTQ2S/ Trans community
  - Sexual trauma during military service

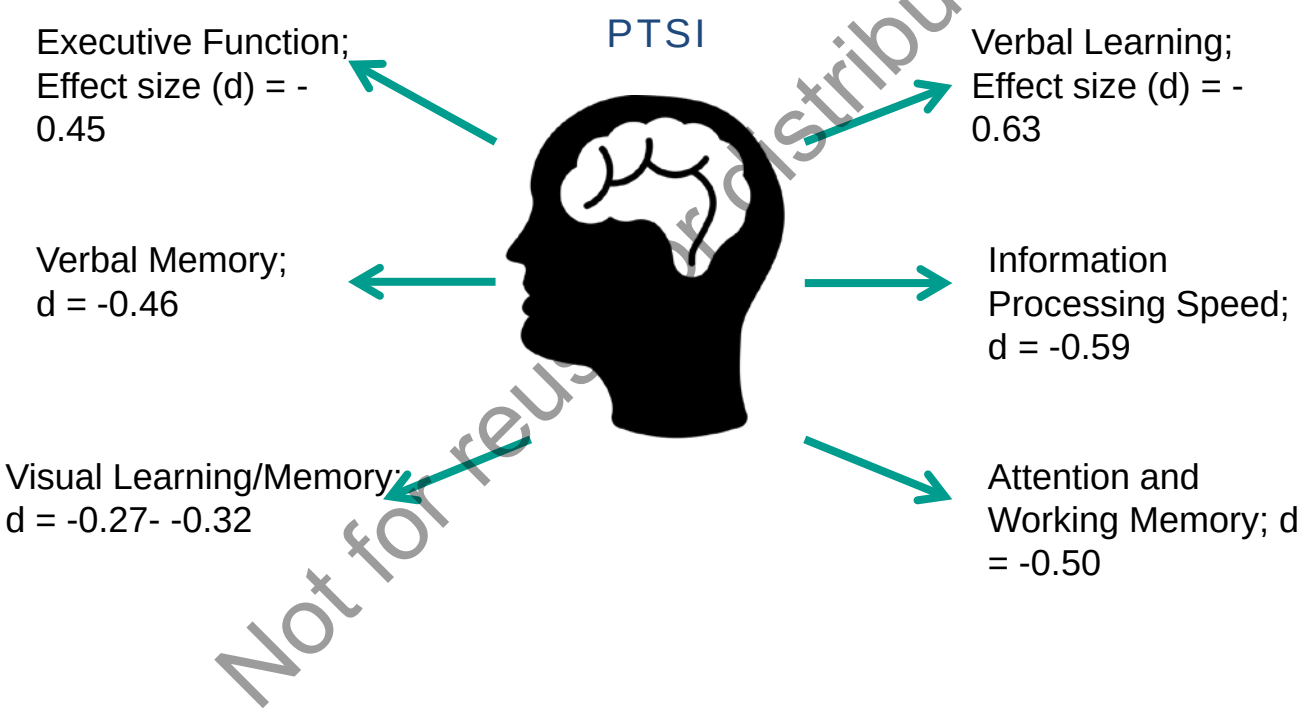
REAL-WORLD FUNCTIONING

- Individuals suffering with PTSI experience social impairment, high absenteeism, unemployment and work-related disability
- Disability particularly high when tasks require high concentration and have high cognitive demands
- Rates of return to work among individuals with PTSI are 27%, 34%, and 67% at one month, eight months and four years, respectively.
- Cost to employee/ family/ municipality

Relation between cognition and functional outcomes

- Strong relation between cognitive difficulties (e.g., working memory, executive functioning, attention) and decreased workplace productivity in depression (Evans et al., 2013; McIntyre et al., 2013; Trivedi et al., 2013)
- Poor performance on measures of learning, non-verbal function and motor functioning were predictive of functional impairment (e.g., work, family, education) at 6-month follow-up

It‘s more than just concentration …



Scott et al. (2015). Psychological Bulletin. 141:105.
Image credit: mind by Hopkins from the Noun Project

Implications of cognitive dysfunction in PTSI

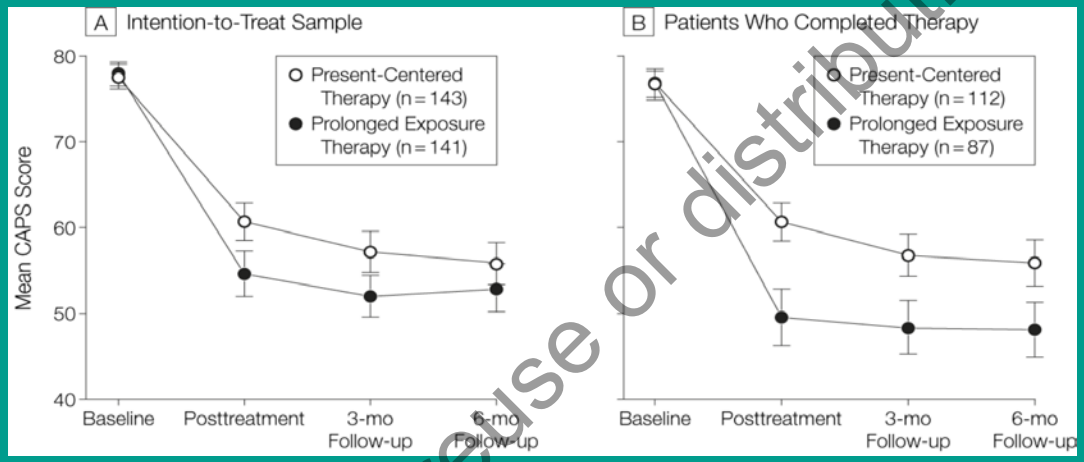

- Reduced verbal memory and inhibitory control predicts response to cognitive behavioural therapy in PTSD
- Executive functioning performance predicted response to fluoxetine in MDD



- Cognitive functioning (memory performance) predicts occupational and social functioning as well as health-related quality of life among veterans with PTSD

Gueze et al. (2009). Depression and Anxiety, 26:7.
Wrocklage et al. (2016). Journal of the International Neuropsychological Society, 22: 399.
Wild & Gur (2008). British Journal of Psychiatry, 193:254.
Dunkin et al. (2000). Journal of Affective Disorders, 60:13.
Image credits: the Noun Project

The present picture



PTSD indicates posttraumatic stress disorder. Data are observed means with standard error bars. Values were imputed for missing data at immediate posttreatment and 3- and 6-month follow-up in the intention-to-treat sample.

JAMA. 2007;297(8):820-830. doi:10.1001/jama.297.8.820

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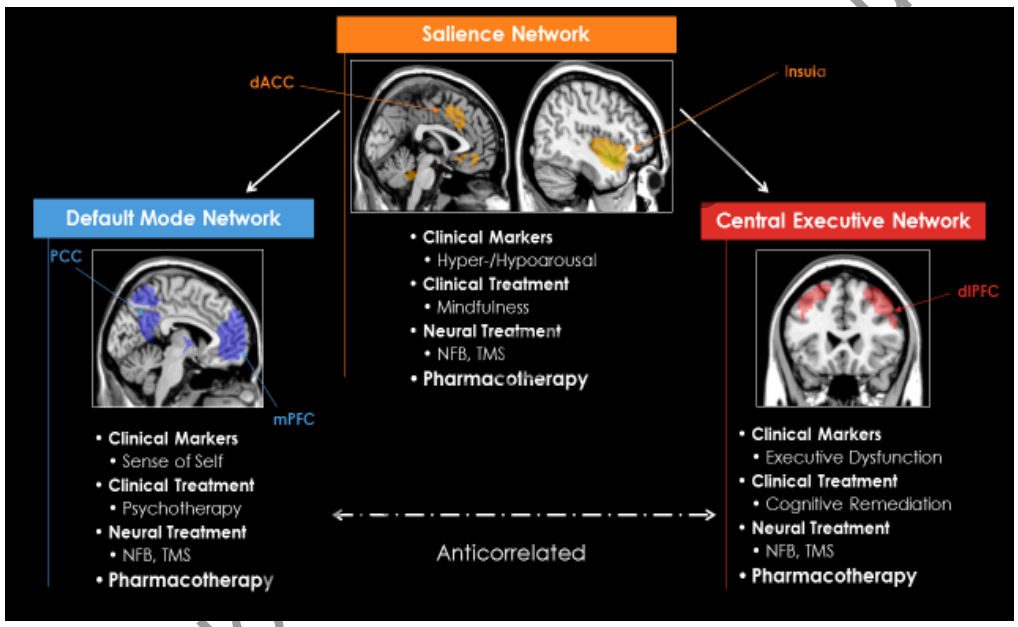
Translating treatment approaches to the unique public safety arena

Neuroscientifically-informed treatment

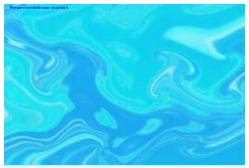


Lanius, R. A., Frewen, P. A., Tursich, M., Jetly, R. & McKinnon, M. C. Restoring large-scale brain networks in PTSD and related disorders: a proposal for neuroscientifically-informed treatment interventions. *Eur. J. Psychotraumatol.* **6,** 27313 (2015)

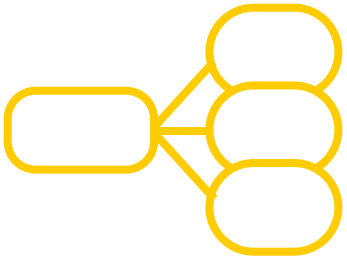
Goal Management Training (GMT)

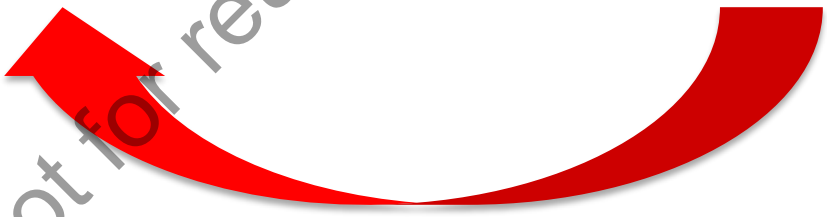
- Skills-based cognitive remediation treatment that includes:
  - Psychoeducation
  - Self-monitoring
  - Mindfulness-based strategies

STOP-Presentmindedness-State Cycle



"What am I doing?"





- Has demonstrated efficacy in improving fronto-temporally mediated domains of cognitive functioning in several clinical populations
  - Older adults
  - Traumatic brain injury
  - ADHD
  - Polysubstance abuse disorder
  - Spina bifida

- A recent meta-analysis of 21 treatment studies investigating GMT reported small-medium effect size improvements on measures of executive functioning, working memory, and long-term memory, as well as self- and other-reported executive difficulties, mental health status, and functional outcomes.

- Critically, the majority of these results were maintained at follow-up.

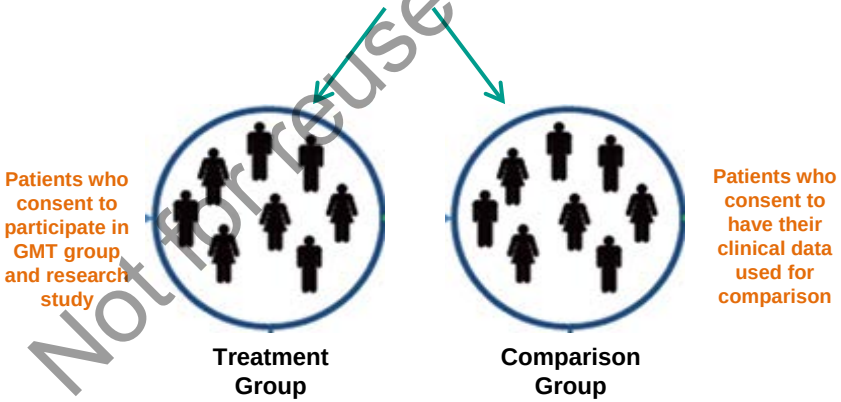
Stamenova V, Levine B. Effectiveness of goal management training® in improving executive functions: A meta-analysis. Neuropsychol Rehabil. 2018;14:1-31

Goal Management Training

Goal Management Training in PTSD

Feasibility Study

Participant Pool: Inpatient Program for Traumatic Stress Recovery



Goal Management Training in PTSD

Preliminary Results: Goal Attainment Scaling

Example 1:

Pre: “When reading, my mind wanders within a minute and I have to re-read the same paragraph over and over”

Post: “I am able to read a full chapter before my mind wanders”

Example 2:

Pre: “I lose or misplace several important things every day several times per day, including my phone and glasses”

Post: “I lose or misplace my phone one to two times per week”.

Goal Management Training in PTSD

Preliminary Results: Comments from participants

In your opinion, how did the GMT group help to improve memory, attention, organization, or concentration?

"It taught me to pace myself and to practice stop! It was helped me to focus, allowing me to have less slips"

"I [am] not sure it improved my memory a whole lot but I believe that it helped significantly with my concentration on things and I am able to notice things faster when they start to spin out of control"

"Yes. Validation was key to this group in that I always knew that I had difficulty with concentration memory, attention etc. knowing that these issues are now associated with my "PTSD brain" I don't feel as angry, sad, or project blame/stupidity on myself for doing this wrong"

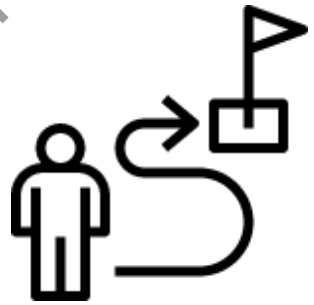
"YES it is the only group that addresses the cognitive impairments caused by PTSD. The rest of the program, while excellent, only focuses on emotions"

GMT Feasibility Trial Results

- Pilot study from Boyd et al. (2019), found that participating in GMT was associated with **improvements on measures of:**
  - Executive functioning
  - Processing speed
  - Attention
  - Verbal memory
- Patients receiving GMT also experienced an **improvement in their ability to engage in goal-directed behaviours while experiencing difficulties with emotion regulation**

Study Aim

To conduct a pilot, randomized controlled trial (RCT) to determine the efficacy of GMT in a sample of Public Safety Personnel (PSP) experiencing symptoms of PTSD and other mental health symptoms

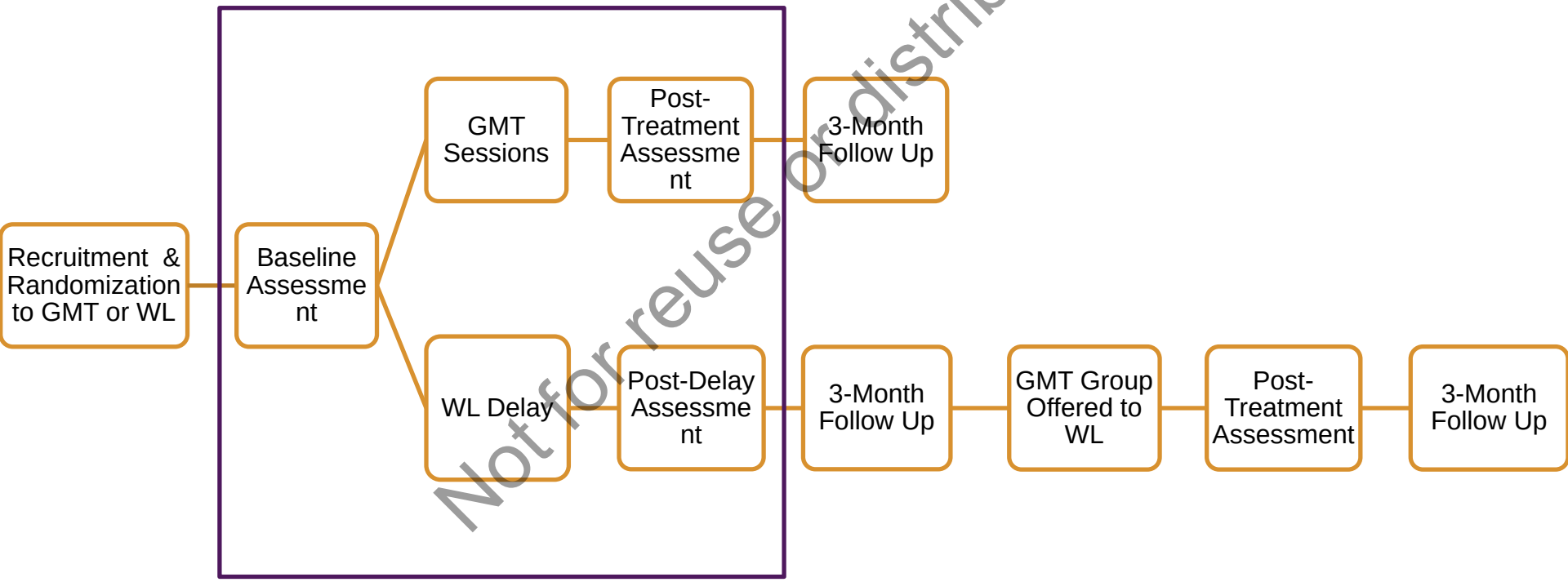


Hypotheses:

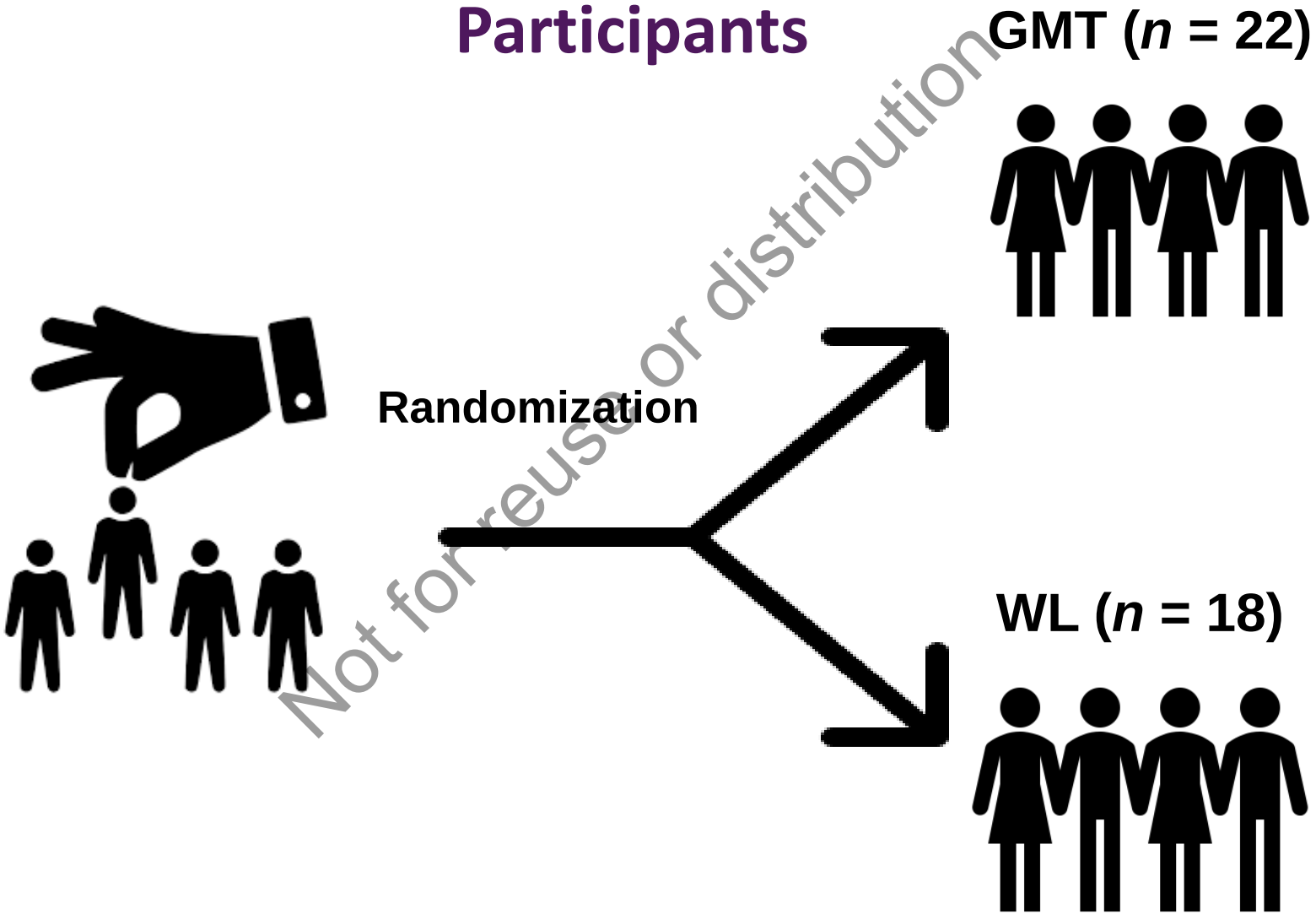
Predict that PSP receiving GMT in comparison to the waitlist condition (WLC) will experience improvements in:

1. Objective measures of cognitive functioning, including executive functioning, processing speed, sustained attention, and verbal memory
2. Subjective cognitive functioning
3. Functioning
4. Symptoms of PTSD, difficulties with emotion regulation, dissociation, depression, and anxiety

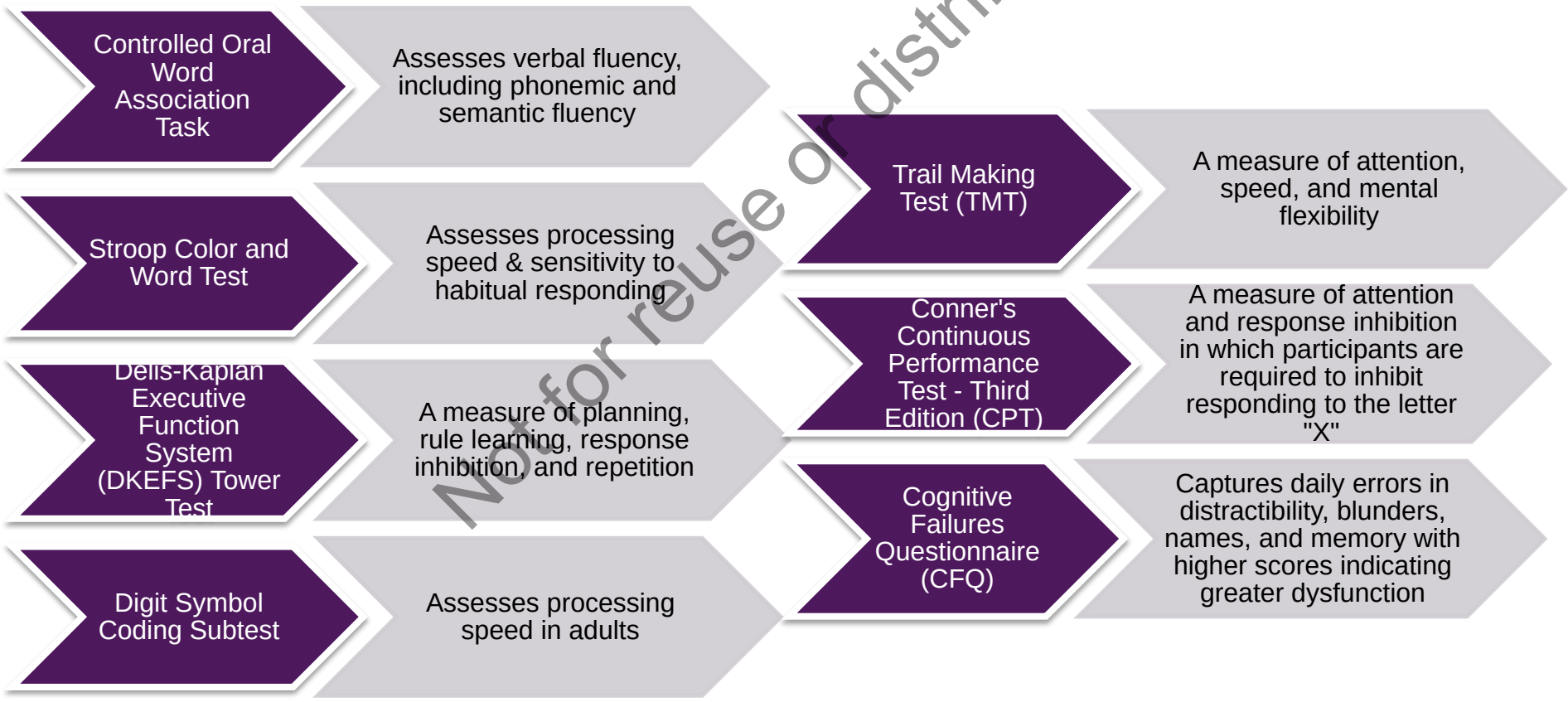
Study Design



Participants



Measures of Objective & Subjective Cognitive Functioning



Measures of Functioning & Self-Reported Symptoms

WHO Disability Assessment Schedule (WHODAS)	Assesses individuals' functioning across six domains such as, mobility, self-care, socializing, etc.
The PTSD Checklist for DSM-5 (PCL-5)	Assesses the severity of PTSD symptoms according to the diagnostic criteria outlined in the DSM-5
Difficulties in Emotion Regulation Scale (DERS)	Assess difficulties with emotion regulation across six domains
Multiscale Dissociation Inventory (MDI)	Assesses dissociative symptoms in the past month
Beck Depression Inventory-II (BDI-II)	Assesses severity of depressive symptoms in the past 30 days
Beck Anxiety Inventory (BAI)	Assesses severity of anxiety symptoms in the past 30 days

Demographic & Clinical Characteristics

*Approximately 75 percent still at work

	GMT (n = 22)	Waitlist (n = 18)
Demographics		
Sex (Female: Male)	10:12	3:15
Age (Mean, (SD))	43.95 (6.73)	44.61 (8.54)
Years of Education (Mean, (SD))	17.50 (3.19)	17.00 (2.50)
Race (shielded for reasons of confidentiality)		
CAPS-5 – Severity Score (Mean, (SD))	40.86 (12.67)	36.00 (14.33)
CAPS-5 – PTSD Criteria Met (% of Sample)	90	77.8
Clinical Characteristics - MINI Diagnoses (% of Sample)		
Major Depressive Disorder	63.6	61.1
Generalized Anxiety Disorder	54.5	27.8
Social Anxiety Disorder	50.0	27.8
IQ (Mean (SD))		
WTAR – Premorbid IQ	113.32 (5.38)	113.44 (6.08)

Results

Simple Main Effects Analyses of Objective Cognitive Functioning

Tests of Executive Functioning, Processing Speed, & Attention	Group	*F*	*p*	η^2_p
COWAT - FAS	GMT	7.587	.010	.219
	WL	2.768	.109	.093
Stroop – Color	GMT	.680	.417	.025
	WL	4.982	.034	.156
Stroop – Color-Word	GMT	2.204	.149	.075
	WL	11.043	.003	.290
Stroop – Interference	GMT	2.880	.101	.096
	WL	6.582	.016	.196
WAIS-IV Digit Symbol Coding	GMT	5.650	.025	.173
	WL	7.079	.013	.208
TMT – Part B	GMT	4.277	.049	.146
	WL	3.549	.071	.124

Simple Main Effects Analyses of Objective Cognitive Functioning

Tests of Executive Functioning, Processing Speed, & Attention	Group	*F*	*p*	η^2_p
DKEFS Tower – First Move Time	GMT	15.722	.001	.377
	WL	1.479	.235	.054
DKEFS Tower – Time Per Move	GMT	25.405	<.001	.494
	WL	1.543	.225	.056
DKEFS Tower – Rule Violations	GMT	.247	.623	.009
	WL	7.118	.013	.215
CPT – Commissions	GMT	14.233	.001	.354
	WL	5.437	.028	.173
CPT – Detectability	GMT	7.564	.011	.255
	WL	.510	.481	.019
CPT – Perseverations	GMT	6.360	.018	.187
	WL	1.539	.226	.056

Simple Main Effects Analyses of Objective Cognitive Functioning

Tests of Verbal Memory	Group	*F*	*p*	η^2_p
CVLT – Short Delay Free Recall	GMT	3.887	.056	.129
	WL	4.076	.054	.131
CVLT – Trial 5 Z Score	GMT	14.264	.001	.346
	WL	3.602	.068	.118

Simple Main Effects Analyses of Subjective Cognitive Functioning

	Group	*F*	*p*	η^2_p
CFQ	GMT	5.344	.029	.165
	WL	.152	.699	.006

Simple Main Effects Analyses of Functioning & Self-Report Symptom Measures

	Group	*F*	*p*	η^2_p
WHODAS	GMT	11.39	.002	.305
	WL	.095	.760	.004
PCL-5	GMT	5.63	.026	.197
	WL	.199	.660	.009
DERS	GMT	6.85	.015	.209
	WL	.371	.548	.014
MDI	GMT	4.223	.050	.135
	WL	.424	.520	.015
BDI	GMT	11.314	002	.303
	WL	1.951	.174	.070
BAI	GMT	7.788	.010	.238
	WL	.623	.437	.024

Results Summary:

- Based on current analyses, there were significant improvements on **objective measures of cognition** for PSP who participated in the GMT intervention.

- This included **significant improvements** on measures of **verbal fluency** (COWAT FAS), **planning** (DKEFS First Move), **impulsivity** (DKEFS Time per Move), **attention** (TMT Part B), **cognitive shifting** (TMT Part B), and **discrimination** (CPT detectability).

- PSP in the GMT condition also significantly **improved** from pre- to post-testing on measures of **subjective cognition, functioning, and self-report symptom measures (PTSD symptoms, difficulties with emotion regulation, dissociation, depression symptoms, anxiety symptoms)** relative to those in the WL condition.

- Overall, these were **medium to large effects,** suggesting that these findings may be replicated in a larger trial.

Relevance & Future Work:

- These findings support the previous work conducted by Boyd et al. (2019), suggesting that GMT can successfully target objective and subjective difficulties with cognitive functioning in PSP with symptoms of PTSD.
- Moreover, GMT was associated with improvements in participants' overall functioning.
- This was accompanied by improvements in symptoms of PTSD, difficulties with emotion regulation, dissociation, depression, and anxiety.
- These findings suggest that GMT may be a useful intervention to address the cognitive difficulties associated with PTSD, as well as assist with improving real-world functioning (e.g., return to work, home life).
- It is recommended that future work assess the impact of GMT on brain functioning (e.g., fMRI studies) and return to work outcomes.