Project Description

Title

Evaluating the effectiveness of the RES@T-A program of Resources strengthening training for adolescents with problematic gaming

Project Team Roles & Responsibilities

All relevant staff are named and described in the HREA

Resources

Resources necessary for the project to be conducted

- A venue for the intervention program to be conducted (CI Tebbut is providing her psychology practice premises on the Central Coast for this purpose)
- Copies of the manuals and materials for participants (these will be copied within the MQ School of Psychology)
- Personnel to set up and conduct testing and run program (this is the team as described in the HREA application).

Funding/support being sought or secured

Kerstin Paschke and Ole Cloes will fly to Australia to help in the first week/two weeks of the project (respectively) funded by a Hamburg University grant to the *Development and evaluation of an intercultural training for adolescent problematic and pathological gamers* MQ-FU-HAM Trilateral strategic partnership project approved by both MQ and the University of Hamburg. We also expect to use money from this grant to purchase some program materials and to purchase gift cards for participants for attending testing sessions.

Background

Literature review

In 2013, the fifth edition of the Diagnostic and Statistical Manual for Mental Health Disorders (DSM-V), a widely used tool for psychiatric diagnosis, included the first screen-based disorder, 'Internet Gaming Disorder' (IGD), in a section for disorders requiring more research. IGD is a disorder characterised by playing online video games at disordered levels whereby the use has many of the features of other 'addictions' (preoccupation, tolerance, withdrawal etc.) and is pursued despite substantial impacts on physical/mental health or other important aspects of functioning. This listing was followed by considerable IGD research, including clinical trials for treatments. In Australia, a study by Warburton et al (2022) found a clinical IGD prevalence rate of 2.8% in teenagers, the group deemed most at risk. This accords with an earlier rate of 3.1% found by King and Delfabbro (2018).

It has been found that at the far end of the spectrum, IGD can be an extremely dangerous disorder, with deaths at the screen noted, as well as very severe negative impacts on mental health, cognitive function, physical health, behaviour, school and relationships, and negative impacts on neural structure and function and markers of development (Kuss et al., 2018; Marshall et al., 2022; Paulus et al., 2018; Sugaya et al., 2019; Warburton, 2021; Warburton et al., 2022; Warburton & Tam, 2019; Yao et al., 2017).

In 2019 the World Health Organisation ratified a similar disorder, 'Gaming Disorder' (GD), in its 11th edition of the WHO International Classification of Disease (ICD-11), as well as a sub-clinical diagnosis of 'Hazardous Gaming' (HG), which involves problematic but sub-clinical video game use. GD has more stringent diagnostic criteria and the prevalence of GD seems to be around 2% in teenagers across western countries. Figures for HG are not available, but there are many studies about a similar construct – problematic video game use (PVGU). Figures for PVGU suggest a prevalence of around 10% in teenagers across western countries (Tam & Warburton, 2019; Warburton, 2021; Warburton et al., 2022).

Gaming Disorder is a newer diagnosis, has different diagnostic criteria, and is much less researched. CI Paschke from the University of Hamburg has developed a pioneering measure to diagnose GD, the GADIS-A (Paschke et al.,, 2020), and CIs Paschke and Warburton have developed an intervention program for youth with HG and GD, called RES@T-A. This is a standardised, manualised program for older children and teenagers and involves 12 sessions. Three are individual sessions pre-, mid-, and post-program, eight are group sessions held in 8 consecutive weeks, and there is a ninth 'booster' group session to reinforce the program gains, 4 weeks after completion. Program elements include parental involvement throughout, individual assessment, psychoeducation, behaviour change techniques, self-awareness and self-monitoring tasks, agreed changes in practice around video game use in the home, emotion management, emotion regulation skills, changing unhelpful thoughts, and meeting needs offline, among others (full manual attached to HREA).

The RES@T-A program has been developed, revised in line with reviews of best practice and theory, piloted, and further revised over the last 2 years. The current, and likely close to final version, has been trialled successfully in Hamburg, but the Australian version, translated into English and culturally adapted for Australia, has not yet been trialled. The current study aims to evaluate how effective the RES@T-A Australia program is, in terms of a range of key outcomes.

Rationale/Justification

As noted, video game based disorders are fairly common and can have severe impacts. However, recent reviews of the treatment literature in the field have revealed that no study has yet to demonstrate a program to be effective using a high standard of proof (Zajac et al., 2020). In addition, there are no manualised programs we are aware for GD and HG (indeed, there are just two found in our literature search for IGD), and there is very little data on the benefits of GD/HG/IGD/PVGU treatment for cognitive function. This research will:
a) pilot a standardised, manualised treatment program with a high likelihood of becoming an effective intervention for older children and teens with problematic or clinical level video game use issues;
b) as a random controlled trial this will likely provide rare high quality evidence as to the program's effectiveness, and its differential effectiveness across multiple important outcomes;
c) outcomes will include rare data on cognitive function, an area where little data are currently available.

Research questions/aims/objectives/hypothesis

Aims:

1. To assess the effectiveness of a new GD/HG intervention program in a pilot study across multiple outcomes, including multiple domains of function;
2. To collect rare data on cognitive function in older children and teens with problematic and disordered screen use and to ascertain which functions improve with the intervention program.

Research questions:

Is the new GD/HG intervention program effective in reducing screen use, in reducing screen-related deficits in function (including cognitive function) and developmental outcomes, and in restoring key needs that are met online?
Are gains maintained at 3 months?

Expected outcomes

Based on the German pilot study, and on our reviews of clinical programs and related theories, we expect the program to:
- help participants reduce screen use;
- have a beneficial effect on cognitive function;
- have a beneficial effect on multiple other outcomes including emotion regulation, stress, sleep, mental wellbeing and self-efficacy around gaming;
- help participants learn to meet their key needs offline as well as online;
- help families work more closely together to manage screen use issues in the homes involved;
- produce longer-term gains for some outcomes but not others, with specific outcomes hard to predict;
- produce mixed results where some positive outcomes are stronger than others, although it is difficult to pinpoint exactly which outcomes are more or less likely to be positively impacted by the program.

References

King, D. L., & Delfabbro, P.H. (2017). Features of parent-child relationships in adolescents with Internet gaming disorder. *International Journal of Mental Health and Addiction, 15,* 1270-1283. DOI: 10.1007s11469-016-9699-6

Kuss, D.J., Pontes, H.M., & Griffiths, M.D. (2018). Neurobiological correlates in Internet Gaming Disorder: A systematic literature review. *Frontiers in Psychiatry, 9,* 166. doi: 10.3389/fpsyt.2018.00166.

Marshall, B., Warburton, W., & Kangas, M. (2022). Internet Gaming Disorder (IGD) in children: Clinical treatment insights. *Annals of Case Reports*. *7*(2), 816. https://doi.org10.29011/2574-7754.100816.

Paschke, K., Austermann, M. I., & Thomasius, R. (2020). Assessing ICD-11 gaming disorder in adolescent gamers: Development and validation of the gaming disorder scale for adolescents (GADIS-A). *Journal of Clinical Medicine*, *9*(4), 993.

Paulus, F. W., Ohmann, S., von Gontardi, A., et al. (2018). Internet gaming disorder in children and adolescents: A systematic review. *Developmental Medicine and Child Neurology, 60*(7), 645-659. DOI: 10.1111/dmcn.13754.

Sugaya, N., Shirasaka, T., Takahashi, K., et al. (2019). Bio-psychosocial factors of children and adolescents with internet gaming disorder: A systematic review. *BioPsychoSocial Medicine, 13*(3), 1-16. https://doi.org/10.1186/s13030-019-0144-5.

Warburton, W. A. (2021). Should internet addiction and gaming addiction be categorized as disorders? In V. Strasburger [Ed.]. *Masters of media: Controversies and solutions* (pp. 43-58). Rowman & Littlefield.

Warburton, W. A., Parkes, S., & Sweller, N. (2022). Internet Gaming Disorder: Evidence for a risk and resilience approach. *International Journal of Environmental Research and Public Health*. *19*, 5587. https://doi.org/10.3390/ijerph19095587.

Warburton, W. A., & Tam, P. (2019). Untangling the weird, wired web of Gaming Disorder and its classification. *HealthEd Expert Monograph 43*. HealthEd: Sydney, Australia.

Yao, Y., Liu, L., Ma, S., et al. (2017). Functional and structural neural alterations in Internet gaming disorder: A systematic review and meta-analysis. *Neuroscience and Biobehavioral Reviews, 83,* 313-324. http://dx.doi.org/10.1016/j.neubiorev.2017.10.029.

Zajac, K, Ginley, M. K, & Chang, R. (2020). Treatments of internet gaming disorder: A systematic review of the evidence. *Expert Review of Neurotherapeutics, 20*, 85-93.

Project Design

The research project setting will be the lounge room of a house leased by CI Tebbutt to house her psychology practice, *Mind and Me* psychology, at Wyong.

Methodological approach

This will be a random controlled trial where participants are randomly allocated to one of three offerings. Those allocated to the first offering will be the first **treatment group** and will provide treatment data. Those allocated to offerings 2 and 3 will initially be in the **treatment as usual** (control) group, and will provide comparison data at the same time that treatment data are collected for offering 1 participants. The children/teens in this group will have their normal treatments as usual for the duration, but will not undertake the program. Those allocated to offerings 2 and 3 will then undertake the treatment program as allotted, using the last collected initial data as baseline data, and then providing further treatment data.

All groups will be tested prior to the program, at the conclusion of its 8th session, and then for retention 3 months after the program. That is:

1. At the time of the first individual session involving the child, parent(s)/guardian(s), and program staff. Cognitive tests will be conducted by PhD student Michoel Moshel. Other tests and the initial assessment will be conducted by program staff. These data will establish **baseline levels**. These tests will run prior to the program beginning.

2. After the final session in the 8 week group program, at the time of the post-program individual session involving the child, parent(s)/guardian(s), and program staff. Tests will be conducted as per baseline. These data will establish **post-program levels** on measures and be used to establish whether the program was effective in the short term.
3. ~8 weeks after the booster group session (12 weeks after the group sessions finish). Tests will be conducted as per baseline. These data will establish **post-program retention** of gains made during the program proper at the 3-month point.

This regime will thus provide not only data as to which outcomes are most positively impacted by the program, but which outcomes are most positively impacted in the longer term.

The Treatment as usual groups would undertake the program as soon after the initial program finishes as practicable.

Participants

Participants will be high school students. We expect ages to range from 12-17, but there may be some variance depending on recruitment success.

We plan to recruit 48 participants (i.e., 16 participants * 3 offerings). 32 of these would initially make up the 'treatment as usual' comparison group. All 48 would eventually provide treatment data across the 3 offerings of the program.

Exclusion criteria

- Participants must be high school students;
- For ethical reasons, participants **cannot** have one of the following conditions:
    - Autism Spectrum Disorder;
    - Bipolar Disorder, Schizophrenia, or another illness with symptoms of psychosis;
    - Another addiction including problem gambling.

Sample size and statistical or power issues

According to ClinCalc (https://clincalc.com/stats/samplesize.aspx), to find a between group difference in IGD symptoms from a score of 5 (clinical) to 4 (sub-clinical) on a 9-point scale, using a SD of 1, we would need 16 per group to find a significant effect at p=.05 with 80% power and Type 2 error set at .20. If the SD (variance) is a little greater, at 1.2, we would need 23 per group. Past studies (eg Warburton et al 2022) find SDs between .9 and 1.3 and 1.2 across both groups seems realistic). Our intention is to statistically split the 48 participants into two groups (ie take control group data from 24) and compare it to the clinical data of the other 24, so that all data is independent. Thus, the sample size should be able to detect a between group difference in symptom reduction. The sample of 48 will all provide repeated measures clinical data, baseline to post- to followup, and this N will be sufficient to find most true effects, even those that are relatively small in size.

Most analyses will be mixed ANOVAS with repeated measures (time 1, 2, 3) by group (treatment v control).

Research Activities: What you are going to do?

Participant commitment

Participants will need to commit to between 13 and 16 sessions, depending on their allocated group. For those randomly allocated to the first offering, the commitment will be to attend 13 sessions. For those randomly allocated to offerings 2 and 3, the commitment is to attend 16 sessions – 3 at the very start and 13 at the time the offering is scheduled.

Project duration

Data collection will be from October 12, 2022 to August 16, 2023. Data analysis is expected to take 6 months, and publications will follow that. It is possible that we may schedule further offerings and collect further data, depending on findings.

Participant follow-up

There is a follow up 'booster' session about 4 weeks after the program finishes. There is also a retention session about 3 months after the program finishes. Participants have access to project personnel throughout the project.

Data Collection/Gathering:

Participants will complete the following tests and questionnaires at the three nominated times. Some will be completed by the participant and some by a parent or guardian. We estimate the completion time to be around 90 minutes at each administration.

Cognitive tests

- The Delis–Kaplan Executive Function System (D-KEFS) is a neuropsychological test used to measure a variety of verbal and nonverbal executive functions for both children and adults (ages 8–89 years). Of the 9 D-KEFS sub-tests, the following 3 sub-tests will be used:
    - The *Trail Making Test* measures flexibility of thinking on a visual-motor sequencing task;
    - The *Verbal Fluency Test* measures letter fluency, category fluency, and category switching;
    - The *Color-Word Interference Test* measures ability to inhibit a dominant and automatic verbal response.

- Booklet Category Test
    - A sensitive screening device that can:
        - Detect the subtle effects of closed-head injuries.
        - Measure cognitive status following neurosurgery or rehabilitation.
        - Confirm suspected deficits in abstract concept formation.

- Wisconsin Card Sorting Task
    - A number of stimulus cards are presented to the participant. The participant is told to match the cards, but not how to match; however, they are told whether a particular match is right or wrong.

- It can be administered to patients to measure frontal lobe dysfunction. and allows the clinician speculate to the following "frontal" lobe functions: strategic planning, organized searching, utilizing environmental feedback to shift cognitive sets, directing behavior toward achieving a goal, and modulating impulsive responding. The test can be administered to those from 6.5 years to 89 years of age. The WCST, relies upon a number of cognitive functions including attention, working memory, and visual processing.

- The Ruff 2 & 7 Selective Attention Test is a very brief test that measures sustained attention and selective attention.

- The WAIS-IV (16-90) or WISC-V (ages 6-16) are the world's most widely used intelligence tests for their relevant age ranges (WAIS adults; WISC children and teens to 16). Several WAIS/WISC components may be used:
  - Block design
  - Matrix reasoning
  - Digit span (forward, backward, sequencing)
  - Similarities
  - Visual puzzles
  - Arithmetic
  - Coding
  - Vocabulary
  - Symbol search
  - Comprehension
  - Information
  - Cancellation

Questionnaires

Construct	**Measure**	**Reference/source**	**Items**
Survey 1: Parent Report (highly sensitive)			**14-17**
Unique ID of child	Generated by survey software		
Group 1, 2 or 3	Group 1, 2 or 3		
Demographics	Screener questions (age, comorbidity) Child name Parent phone, email Child Age, Gender SES Ethnic background		
Co-morbid mental health issues, treatment	Seeing a mental health professional? Medication		
Survey 2: Child report (de-identified, sensitive)			**140**
Unique ID of child	Entered manually		1
Group 1, 2 or 3	Group 1, 2 or 3		1
Age, gender			2

Self-efficacy	General Self Efficacy Scale	Schwarzer & Jerusalem (1995)	13
Gaming Disorder diagnostic criteria	GADIS-A Rev (Aust)	Paschke et al., 2020 Rev. 2022 Warburton.	13
Internet Gaming Disorder diagnostic criteria	IGD-10	Kiraly et al 2017; 2019	10
Social media addiction	Burgen Social Media Addiction Scale (BSMAS)	Andreasson et al 2017	6
Smart phone addiction	Smartphone Application Based Addiction Scale (SABAS)	Csibi et al 2017	6
Emotion dysregulation	EDQ – reduced version ?	Gill et al 2021	16
Perceived stress	Perceived Stress Scale	Cohen et al. 1983	10
Daytime sleepiness	Pediatric daytime sleepiness scale	Drake et al 2003	8
Sleep quality	Pittsburgh Sleep Quality Ind	Buysse et al 1989	18
Family function	Parent-Family Connectedness Scale (Child)	Pianta 1992 Warburton et al 2022	8
Screen time per week	Child's Weekly Screen Time	Saunders et al 2016, Gingold et al 2014, King et al., 2017	10
Developmental impacts of screen use	Screen Developmental Impact Questionnaire (Child Version)	Marshall & Warburton 2021	16
Physical health	Pain in neck, back and wrists, eye symptoms, exercise, BMI		10
Survey 3: Parent report (de-identified, sensitive)			**168-179**
Unique ID of child	Entered manually		1
Group 1, 2 or 3	Group 1, 2 or 3		1
Socioemotional function	Strengths & Difficulties Questionnaire 11-17 Parent	Goodman et al 1997, 1998, 2001	25 +4-11
Screen time per week	Child's Weekly Screen Time	Saunders et al 2016, Gingold et al 2014, King et al., 2017	10
Internet Gaming Disorder diagnostic criteria	IGD-10 – adapted for parents	Kiraly et al 2017; 2019	10
Social media addiction	BSMAS adapted for parents	Andreasson et al 2017	6
Smart phone addiction	SABAS adapted for parents	Csibi et al 2017	6
Attachment relationship	Child Parent Relationship Scale	Pianta 1992	15
Developmental impacts of screen use	Screen Developmental Impact Questionnaire (Parent Version)	Marshall & Warburton 2021	16

Child's mental health	Revised Children's Anxiety and Depression Scale – parent report	Chorpita et al 2000	47
Impact of screen use on sleep	Sleep Disturbance Scale for Children	Bruni et al 1996	26
Child's aggressiveness	Aggression questions	Warburton, 2022	5

Domain	Test	Tasks	Ages	Key Processes	Reliability
Executive Functioning	**D-KEFS**	TMT B	8–89	Sequencing switching/inhibition	Test-retest low
		CWIT Incongruent	8–89	switching/inhibition	
		Verbal fluency	2–95	Response generation, Working memory, Speed	Adequate
	Booklet Category Test		5–80	Abstraction, Nonverbal reasoning	Marginal to high
	Wisconsin Card Sorting task		6.5-89	Set-shifting, reasoning	
	WAIS/WISC $385 for Q-interactive 2.20/ test	Block Design	6-90	Nonverbal reasoning Visuospatial	.88 internal .28 stability
		similarities	6-90	Verbal reasoning	.81 internal .18 stability
		Visual puzzles	6-90	nonverbal reasoning	.9 internal .31 stability
		Matrix reasoning	6-90	nonverbal reasoning	
Attention	**D-KEFS**	TMT A	8–89	Visual search, Scanning	Adequate
		CWIT Congruent	8–89	Speed, fluid ability	
	Ruff 2 & 7		16–70	Sustained Attention Selective Attention	High internal Adequate to high t-r
	WAIS/ WISC	Digit Span Forward	6-90	Sustained Attention	.89 internal .2 stability
Working Memory	**WAIS/ WISC**	Digit Span Backward/ Sequencing	6-90	Working memory	
		Arithmetic	6-90	Working memory Problem solving	.89 internal .18 stability

Data collection/gathering techniques:

Participants will come into the centre to complete the tests (although it is possible some normal controls may be tested elsewhere). Teenagers will complete cognitive tests that will be conducted face to face with a Masters of Neuroscience student, with guidance from supervisors. Some tests will be online while others may involve apparatus and pencil and paper.

Teenagers in the program will also complete a 140 item online questionnaire battery on a computer at the centre. (Eminent developmental psychologist and Editor of the prestigious journal *Developmental Psychology*, Eric Dubow (personal communication), recommends that 140-150 items is the ideal number for such batteries with early teenagers and older children). Their parent(s)/guardian(s) will concurrently complete a 168-179 item online questionnaire battery on a computer at the centre. (Some items do not appear unless a previous item was endorsed, thus the numbers will differ a little).

Impact of and response to participant withdrawal

As this is a clinical trial that is resource intensive and has comparatively few participants, we do ask potential participants up front to commit fully to the program and testing. However, if participants become distressed at any point of the program or testing, participation will immediately cease, and they will be given support. They can then make a decision about whether they want to continue with the session or with the program. If they do not, they are free to withdraw without consequence.

Data Management Plan

The data management plan is in FORA and has been approved. A copy is appended to this document.

Data Analysis

Data will be matched using a unique ID for each participant for each of the four questionnaires across the three time points.

Most analyses will be mixed ANOVAS with control vs treatment group as the between subjects variable, and pre-treatment, post-treatment and 3-month retention as three variables across time. The same analyses will be run for multiple outcomes. Gender may also be used as a between subjects variable, although there may not be enough female participants to do this. For comparisons between program participants with screen problems and normal controls on cognitive tests, t-tests for cognitive measures will be conducted.

We have not identified any potential confounds for the factors being measured, and will set up most surveys to require full completion to minimise missing data. Power calculations are provided in the sample size section of this document.

Data Linkage: Highly Sensitive data will be kept separate from all other data, along with a unique ID for each participant. All other data will use the unique ID, thus rendering the data sensitive rather than highly sensitive. All data sets will be linked by the unique ID.

Outcome measures: All outcome measures are specified in the table above in the *Data Collection/Gathering* section.

Results, Outcomes and Future Plans

For program participants, we expect post-program increases in self-efficacy, decreases in feelings of stress and psychological problems, and improvements in emotion regulation, cognitive function and sleep quality.

Because this is a clinical trial with several individual sessions, participating teens and their parent(s)/guardian(s) will receive individual feedback on their child's progress through the program. In addition, de-identified/aggregated data will be produced related to the efficacy of the program across multiple domains, and this will be condensed into a report that will be sent to participants once the program is completed and data are analysed.

It is also planned to publish analyses of de-identified/aggregated data in scientific journals. The data will also be placed in a curated repository, where it can be released to researchers who meet the criteria for release.

All participants will be provided with advice on where to get further clinical help as part of the program, which will help the participants to transition to other types of assistance for their screen use problems after the program finishes.