Extinction of gambling cue-reactivity in offending problem gamblers

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Acknowledgements

Southern Adelaide Local Health Network
Department for Communities and Social Inclusion
Magistrate Brett Dixon and team Adelaide Magistrates Court
Context / background

SA Courts Gambler's Intervention Program
Conditioning interpretation of cue reactivity for additions

Cue-related specificity

Preferred vs non preferred beverages among alcoholics (Staiger & White, 1991)

Cigarettes vs neutral cues among smokers (Carter & Tiffany, 2001)
### Gambling related cue-reactivity

<table>
<thead>
<tr>
<th>Study</th>
<th>Description</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodano &amp; Wulfurt, 2010</td>
<td>Video – active/abstinent PGs and social gamblers. No difference in HR. Active greater self-report urges (N=63)</td>
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<tr>
<td>Potenza et al., 2003</td>
<td>Video – PG higher urges FMRI than controls (N=22)</td>
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<tr>
<td>Blanchard et al., 2000</td>
<td>Video, fear, stressor – PGs and control. PGs greater subjective urges. No dif on HR, skin resistance, bp. (N=14)</td>
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Gambling related cue-reactivity

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<tr>
<td>Anderson &amp; Brown, 1984</td>
<td>Invivo vs lab. Invivo setting HR was greater among regular gamblers (N=24)</td>
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<tr>
<td>Lisham et al., 2011</td>
<td>Imaginal exposure greater self-report urges than photos among regular gamblers (N=48)</td>
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<tr>
<td>Kushner et al., 2007</td>
<td>Moderate to high self-report urges invivo casino environment among PGs (N=18)</td>
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Cue exposure with response prevention

- Cue exposure therapy (CET) assumes that the cue-reactivity is classically conditioned

- Non PGs exhibit elevated HR in response to gambling behavior

- Cue-reactivity is thus an unconditioned response (UR) to the stimulus of gambling behaviour itself
Cue exposure with response prevention

Neutral cues become conditioned stimuli (or cues) for a gambling response

External cues
- Money
- Venue
- Lights, sounds

Internal cues
- Negative affect
- Positive affect
Cue exposure with response prevention

- Urge to gamble is a negative state for the problem gambler
- Gambling alleviates this state
- Gambling behaviour is maintained

operant conditioning

variable interval schedule of reinforcement.
Cue exposure with response prevention

Based on conditioning theory

- Repeated exposure to the CS without the associated response results in extinction of the CR, if the exposure is prolonged until habituation

- Gambling cue-reactivity extinguished through repeated cue exposure with response prevention
## Cue exposure and PG

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<tr>
<th>Study</th>
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<tr>
<td>Symes &amp; Nicki, 1997</td>
<td>2 case studies. PG reduced 1MFU</td>
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<tr>
<td>Echeburua et al., 1996</td>
<td>BT, CT, CBT, wait. 12MFU BT higher success (N=64)</td>
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<tr>
<td>Echeburua et al., 2000</td>
<td>BT with &amp; without RP (N=69) 12MFU RP higher success</td>
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<tr>
<td>Echeburua et al., 2002</td>
<td>Case study, PG reduced 12MFU</td>
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## Cue exposure and PG

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<th>Study</th>
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<tr>
<td>Oakes et al., 2007</td>
<td>Case study video-conf. PG reduced 4 yr FU</td>
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<tr>
<td>Tolchard et al., 2006</td>
<td>Case study single session. PG reduced 6MFU</td>
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<tr>
<td>Riley et al., 2011</td>
<td>PG reduced (n=347)</td>
</tr>
<tr>
<td>Smith et al., 2015</td>
<td>BT, CT RCT 6MFU. PG reduced both groups (N=51)</td>
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In summary

- CET provides an effective mode of treatment for PG, presumably by extinguishing gambling related cue-reactivity

- No previous study has investigated the extinction of gambling related cue-reactivity via CET using physiologic measurement
## Aims of current study

1. Demonstrate gambling related cue-reactivity among a group of offending PGs referred for treatment by a local court diversion program

2. Examine the extinction of gambling related cue-reactivity following CET, using physiologic measurement
Methods

Participants

- 20 PGs ref by Court
- No active sub abuse or psychosis
- Complete set of measures
Ethics

• The study was approved by the Southern Adelaide Clinical Human Research Ethics Committee, project number 402.13

• All participants signed individual consent forms
Participants

16 (80%) slots, 4 wagering (horses, dogs, sports)

14 (70%) Aus, 2 Thai, 3 African, 1 South Pacific

10 Male, Age 45 (SD=9.59)
Measures

Physiological measurement

- Polar RC3-GPS with Polar H3 chest strap heart rate sensor
- Tested against standard clinical ECG equipment (Osanai 2010; Vanderlei et al., 2008)

- HR sampled at 1 sample per second
- Average HR in bpm for each recording
- Uploaded to PC for analyses
Measures

Subjective measures

- Victorian Gambling Screen Harm-to-Self sub-scale (VGS-HS; Ben-Tovim et al., 2001)
  - 15 items
  - 0 to 60, PG ≥21

- The Gambling Urge Scale (GUS; Namrata & Tian 2004)
  - 0 to 47
CET Procedure

CET delivery
- Manualised (Smith et al., 2015)
- Up to 12 weekly sessions
- 3 therapists, postgrad CBT, > 7 yrs experience

CET
- CET rationale 1st session
- Cue hierarchy 2nd session
- HW from 2nd session (Riley, 2015)
## HR measurement Procedure

### Conditions
- No caffeine or meal 30 mins prior
- Taken pre and post
- Resting & exposure each point

### Resting
- Sitting, at clinic
- 5 mins to habituate to procedure
- 5 mins continuous recording

### Exposure
- Sitting, local venue
- 5 minutes quiet sitting
- Focus on CS, 5 mins continuous recording
Results

• Participants attended average of 7.95 sessions (SD = 3.32)

• All participants scored above VGS-HS cut off for PG
Effectiveness CET outcome across dependent variables

- Wilcoxon Signed-ranks test
- All pre and post differences were significant $p \leq 0.001$
Cue-reactivity Pre-treatment

- Positive cue-reactivity
- Higher median HR ranks during invivo exposure, $Z = -3.78$, $p < 0.001$,
Cue-reactivity Post-treatment

- ns difference between resting and exposure

Resting: 80 bpm
Exposure: 79 bpm
Cue-reactivity Post-treatment

Change scores calculated at pre and post by subtracting resting from exposure HR

Pre = 6.9
Post = -.1

Difference significant
$Z = -3.88, p < 0.001$
Discussion

- In-vivo gambling cues elicited a significant arousal response
- Cue-reactivity was extinguished following CET

- Increase of 7bpm
  - Greater than Blanchard et al. (2000) lab setting
  - Less than Anderson & Brown (1984) invivo actual gambling
Discussion

• 7bpm arousal response is comparable to individuals with PTSD during exposure to traumatic imagery (Barkay et al. 2012)

• Urge a significant predictor of both relapse, and continuing to gamble (Smith, Battersby, Pols, et al. 2015)
Discussion

• Extinction of the urge to gamble appears to be an important factor in PG recovery

• Further research – is extinction of physiologic cue-reactivity related to lower relapse rates?
Discussion

- No sig association between HR and GUS
- 3 possible explanations

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<tr>
<td>Measurement error GUS</td>
<td>Previous 24 hours GUS vs invivo HR</td>
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<td>Low urge awareness</td>
<td>Previous research has found low levels of mindfulness among PG</td>
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<tr>
<td>Reliance of honest responding</td>
<td>Under reporting of GUS due to legal context</td>
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Limitations

• Small sample
• No follow up data – sustainability of change unknown
• No control
• Sample comprised offending PGs
• Sample may be different to problem gamblers not facing criminal charges
• Need to repeat with non-offending PGs
Conclusions

• First step in demonstrating the extinction of gambling related cue-reactivity using physiologic measurement

• Portable HR monitors may offer a novel and useful tool for problem gambling therapists and their patients to observe cue-reactivity during the treatment process
Questions / comments

Thank you

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