Young, drunk, and fast: Paradoxical rapid reaction time in hazardous drinkers

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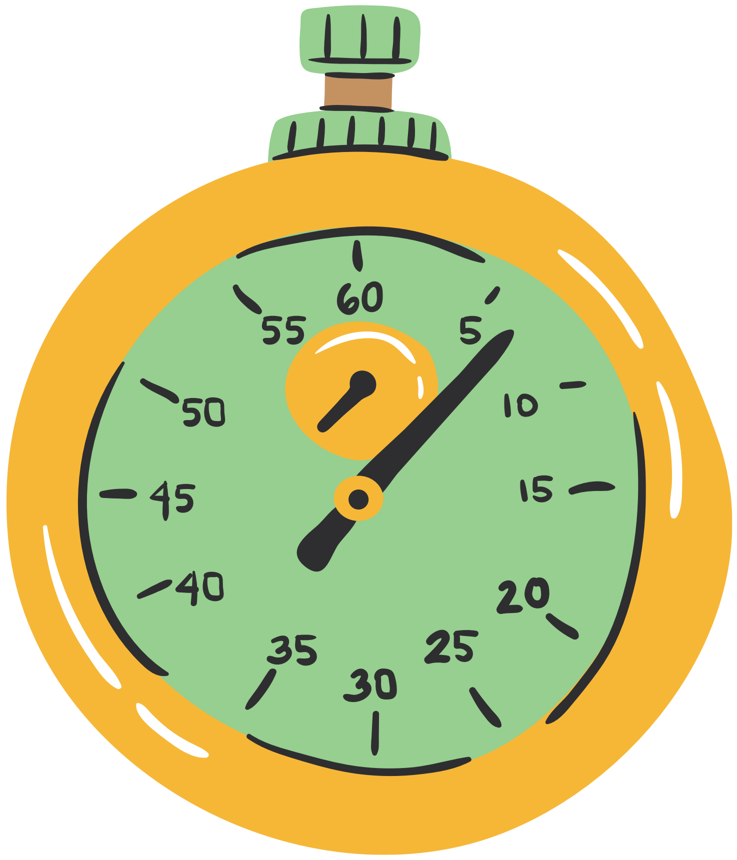
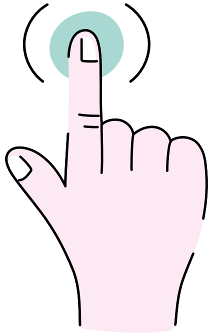
Processing Speed = efficiency of cue interpretation and response selection [1]

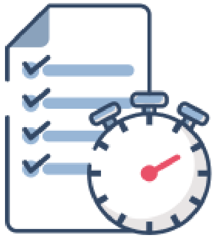
- Impaired in diagnosed alcohol use disorders [2]
- In hazardous drinkers (increased risk of harm) evidence is mixed [3,4,5], possibly due to differences in sensory mode [6,7] or software latencies [8]
- Using vibrotactile perception may reduce same-sense distraction [8]
- Assessing reaction time using specialist hardware/software (Brain Gauge Pro) may be more accurate [9]



Study Aim

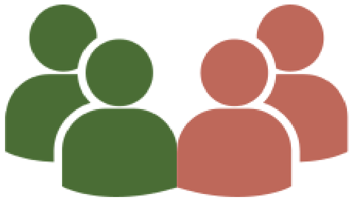
- To assess performance on vibrotactile simple and choice reaction time between hazardous and non-hazardous drinkers, using Brain Gauge Pro.





Measures

Vibrotactile choice and simple RT
EFI (subjective function)
AUDIT
HADS



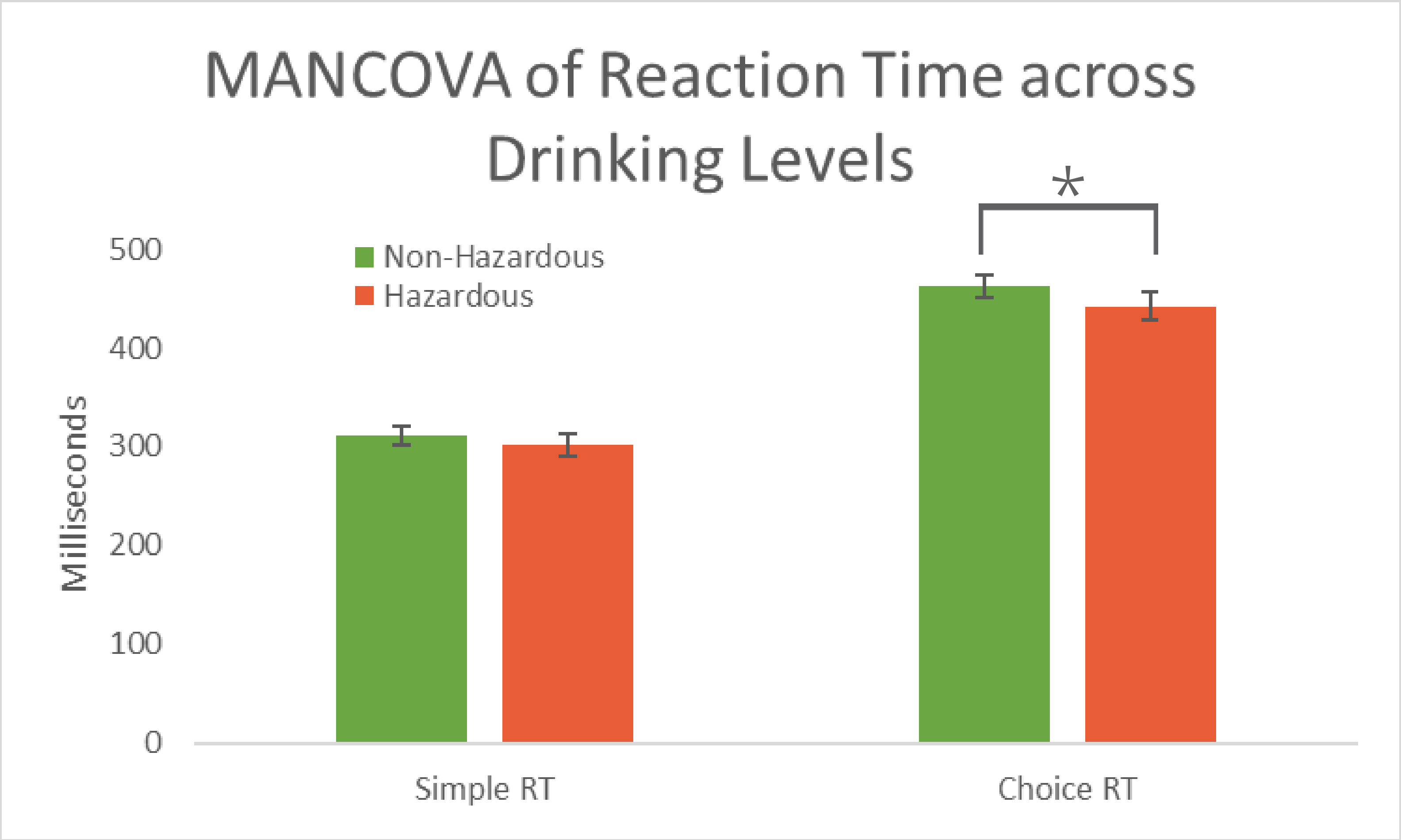
Groups

Hazardous = AUDIT score of ⩾8

Methods

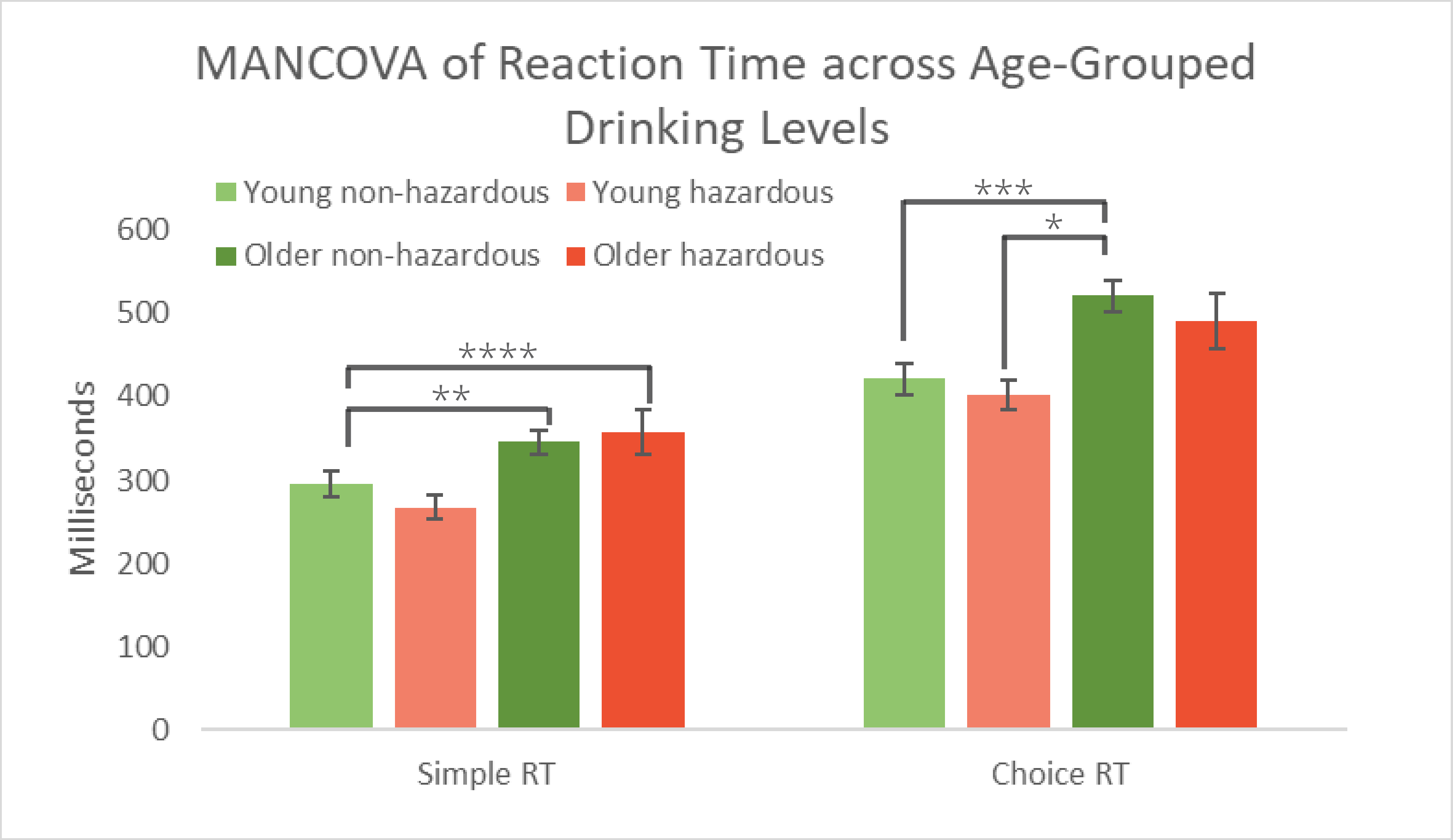
MANCOVA of raw RT scores
Correlation between EFI and RT

Results



- Hazardous drinkers better at choice RT, age and gender significant covariates
- Choice RT = requires more executive control

Exploratory Results



- Exploration found young hazardous drinkers performed better than both older groups at Simple RT, while older non-hazardous were worse than both young groups at Choice RT.

Correlations between subjective function and reaction time

- Significant positive correlations between both RT measures and the subscales Impulse Control (moderate) & Organisation (weak).
- So, RT worsened as subjective function improved.

Findings in Context – Effects of Ageing or alcohol-related impulsivity?

Are older drinkers' brains more susceptible to alcohol damage [10]?
Exploratory finding of younger hazardous drinkers being best at simple RT, and older non-hazardous drinkers being poorest at choice RT – is this not so clear cut?

- **Are the quicker RTs indicative of impulsivity?**
  - Being impulsive may increase chances of drinking hazardously [11]
  - Alcohol's effects on GABA may increase already heightened impulsivity in young people [12], relates to exploratory finding, could this dull with age?
- **But, no speed-accuracy trade off…**
  - In the current study, hazardous drinkers were no more likely to make errors on choice RT, so findings may not indicate impulsivity (though perhaps choice task too easy to induce errors in this sample)

Findings…Beneficial neurotransmitter imbalance?

- **Is there a pattern of drinking that creates a specific NT balance in young drinkers that induces fast choice RT?**
  - **Alcohol disrupts NT systems**
    - Acute: increases inhibitory function
    - Chronic: neuroadaptation increases excitation for balance [13]
    - Could there be a NT ratio "sweet spot" that limits neuronal noise but accelerates excitatory synaptic transmission, before adaptation or age/alcohol damage? See [14,15,16] for info on NTs and speed]
  - **Speculation, no assessment of NTs**
    - Research investigating NT activity and processing speed in hazardous drinking would tell us more. If possible, such an effect may require very specific circumstances.

Findings…Metacognition or Method?

- **Why did hazardous drinkers perform better, but report worse day-to-day function?**
  - **Alcohol can impair metacognition [17]**
    - Perhaps hazardous drinkers were less accurate at reporting day-to-day function (though individuals who reported better impulse control taking longer to respond to tasks makes sense (thinking before acting?))
  - **Nerve damage**
    - Alcohol use disorders can lead to nerve damage in extremities [18], while this seems unlikely in the current cohort, perhaps the results indicate that vibrotactile perception is not appropriate for recording alcohol-related function differences.

Future research

- Further research should - use additional methods across varying drinking patterns to assess alcohol and RT, including assessment of neurotransmitter activity, neural activation, and using various sensory stimulus types.

- If you would like to ask a question about this research, feel free to email me (Anna) at A.Powell@2019.ljmu.ac.uk

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