

PSYCHOBIOLOGY SECTION ANNUAL CONFERENCE

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Psychobiology Section Abstracts

Oral Presentations

Listed alphabetically by presenting author

Examining Age-Related Variations and Underlying Mechanisms in the Relationship between Cognitive and Motor Functioning

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Objective: Previous research has revealed strong associations between cognitive functioning and motor functioning in old age, with declines in one of these domains seemingly predicting declines in the other. This leads the scientific community to believe that there are shared, underlying links responsible for the simultaneous deterioration of these processes.

Methods: Using data from the Irish Longitudinal Study of Ageing (TILDA), structural equation modelling was employed to investigate the relationship between cognitive and motor functioning and whether the co-occurring age-related declines in these domains could be explained by an underlying factor.

Results: The results showed a high, statistically significant degree of shared variance between cognitive and motor performance which could largely be explained by an underlying factor, which was proposed to be neurological health. Age was shown to be the biggest predictor of weak cognitive and motor performance, suggesting that advancing age leads to declines in neurological health, which is manifested in a weakening ability to perform well across cognitive and motor tasks.

Conclusions: This knowledge can help with the assessment and early detection of individuals at risk of functional decline, and directs interventions towards those aimed at preserving neural integrity.

The Impact of Ketogenic Diet on Mood, Stress, and Cognition in the General Population

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Objectives: Ketogenic diet is known to reduce pathological stress and improving mood and cognitive functioning in neurodegenerative disorders. However, evidence for its effect on healthy cohorts is not reported in the literature. Our study investigated the impact of ketogenic diet on mood, stress, and cognition in the general population. We hypothesised that ketogenic diet would improve mood and cognition while decreasing perceived stress.

Design: This study followed a quantitative independent groups design. The independent variable was diet, and outcomes were mood, perceived stress, and cognition (planning, working memory, and attention).

Methods: An online survey was distributed through social media to dietary interest groups. After exclusions, the final opportunity sample (n=255) included a ketogenic diet group (n=171) and a control group (n=84), recruited from the general populations of 29 countries. The measures used were a stress scale (PSS-10), mood scales (BL-VAS), and a battery of cognitive tasks (Alphabetical Working Memory, Digit Vigilance, Corsi Blocks, Peg and Ball, and Stroop).

Results: Compared to the control diet, the ketogenic diet group reported lower perceived stress (p<.001) and improved mood (Alertness: p=.001; Contentedness: p<.001; Calmness p=.008). The ketogenic diet group had faster reaction times on Alphabetical Working Memory (p=.002) and Stroop (p=.037) tasks, and shorter completion times on Peg and Ball (p=.016).

Conclusions: Our findings suggest that ketogenic diet improves mood, attention, and reduces perceived stress in the general population. Because stress, low mood, and cognitive dysfunction are precursors to neurodegenerative disorders, ketogenic diet may offer a preventative option for at-risk individuals.

The Kindness Paradox

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The Lovingkindness meditation has been shown to be effective, however available theories do not adequately explain the complexities of the practice. This study used a mixed methods feasibility design of a Lovingkindness group intervention to better understand the mechanisms involved focusing on a number of constructs including attachment, mentalizing and connectedness. Furthermore, the study explored the intervention's suitability for young people who are known to be at increased risk of mental health difficulties and isolation. This is necessary research considering the recent pandemic and associated mental health crisis in this population.

Different methods were used including questionnaires (wellbeing, connectedness, mentalizing and attachment) obtained at three time points, analysed using statistical analyses. Anonymous post-intervention surveys explored attendance and semi-structured interviews explored participants' experience using Thematic Analysis. Participants aged 18-25 were recruited from the community. A total of 48 participants were recruited, 30 gave informed consent and 28 completed pre-intervention questionnaires. There was attrition in both attendance and data collection.

Wellbeing and connectedness statistically improved post intervention. Importantly this study found a kindness paradox; some participants found it powerful or insightful, while others found it challenging or disengaged. Changes in wellbeing over time differed depending on how secure participants felt in their relationships. 68% of participants reported some level of insecurity in their meaningful relationships.

Young people may benefit from Lovingkindness interventions, however interventions will need to take the kindness paradox into account and anticipate the range of experiences that young people may have and offer tailored support.

Polyphenol Dietary Supplementation Shows Different Effects on Immediate and Delayed Memory Functions: A Systematic Review and Meta-Analysis.

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Purpose: To systematically review and meta-analyse contrasting findings concerning polyphenol dietary supplementation on immediate and delayed memory functioning, respectively.

Background: The potential of chronic inflammation and oxidative stress to impair neural functioning and cognitive functioning, has stimulated research into the anti-inflammatory and anti-oxidative properties of polyphenols as a remedial intervention to attenuate cognitive decline in older populations. Such an intervention could also potentially attenuate impaired cognition in those at risk of diabetes through being overweight. However, this literature shows contrasting results. The different neural and cognitive demands of immediate versus delayed memory functioning were investigated as a potential source of variance in results.

Methods: A systematic search was performed in PubMed/Medline, PsycInfo, Scopus and Cochrane databases for RCTs and other studies on human participants which investigated the effect of polyphenols on cognition. Data was

extracted following the PRISMA guidelines. Meta-analyses using random effects models were conducted, respectively, on results for immediate recall/recognition and delayed recall/recognition.

Results and Conclusions: The meta-analysis for immediate recall/recognition comprised 9 studies. It yielded a highly significant summary effect showing better performance associated with polyphenol supplementation compared to placebo conditions. Contrastingly, the meta-analysis for delayed recall/recognition comprised 14 studies. It yielded a nonsignificant summary effect. It was concluded that polyphenol supplementation may enhance immediate memory functioning, but that no evidence was present of an effect on delayed memory functioning. Future research should consider neuropsychological differences in retention and retrieval processes required by immediate and delayed memory tasks. The implications of participants' weight should also be considered.

"Exploring the role of personality traits and coping styles in the relationship between perceived stress and susceptibility to illness?"

Miss Kristan Howourth

Stress is a considerable determinant in the pathology of disease. Personality and coping styles are two psychological dimensions that influence an individual's reactivity to stress. Therefore, this study aimed to investigate the relationships between personality and coping styles with stress and illness to see if psychological traits play a role in illness vulnerability. 85 students completed the Big-5 personality questionnaire (Costa & McCrae, 1986), the Coping Orientation of Problem Experience (COPE; Carver, Scheier, Weintraub, 1989), the Perceived stress scale (PS) (Cohen & Williams, 1988) and the COVID-19 symptom tracker by ZOE. Results showed that only participants high in neuroticism and low conscientiousness reported higher PS, while the rest were unrelated. Also, higher scores in neuroticism predicted higher scores in illness frequency. Avoidant coping was the most maladaptive coping style as it was associated with increased PS and illness. In contrast problem-focused coping and emotionfocused coping appeared to be unrelated to both. However, closer investigation into the components of emotionfocused coping showed it has maladaptive and adaptive qualities. Venting was positively associated with PS and illness, whereas positive cognitive reappraisals (PCR) had negative associations. This study was the first to demonstrate that PCR moderates the relationship between stress and illness. These results suggest that student' personality and coping styles influence how frequently they experience PS and illness. Therefore, those with personality traits that make them vulnerable to stress could be given an option to improve their coping abilities (increase PCR and reducing avoidant coping) to reduce stress and prevent illness.

Alpha phase modulates brain responses: a closed-loop auditory stimulation study

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Objectives: The present study explored the influence of oscillatory phase on neural responses during wakefulness, with phase at stimulus onset hypothesized to modulate EEG alpha power.

Design: Given its effectiveness in modulating sleep oscillations, non-invasiveness, and minimal EEG artifact production, auditory stimulation was employed.

Methods: Data were collected face-to-face in a repeated-measures procedure. Eighteen healthy participants received closed-loop auditory stimulation (CLAS) locked to frontal alpha peak (0°), trough (180°), decay (90°) and rise (270°). Manipulation effects were quantified as percentage changes in alpha power at Fz.

Results: Stimuli were successfully phase-locked (all resultants =~ 1), and phase modulated alpha power (F (3, 51) = 5,07, p = .004; η p2 =.23), with peak producing larger increases (M = 7.1) than rise (M = -4.7, p = .045), and trough (M = -5.7, p = .037). Differences between peak and decay (M = 2.9) were non-significant (p>.99), possibly due to interindividual variability in stimulation responses, with stimuli eliciting larger power increases when delivered at a participant's preferred phase (F(3, 27) = 49,23, p < .001, η p2 = .74) than when applied with a ±90° or +180° angle difference (ps > .001).

Finally, phase effects were alpha-frequency specific, having no influence on delta, theta, beta, or gamma power (ps > .05).

Conclusions: Phase may influence neural response to stimuli, suggesting brain state should be considered when exploring experimental effects. Moreover, CLAS selectively modulated neural activity, supporting further investigation of this tool to study oscillations. Finally, future research should investigate phase effects on behaviour.

Poster Abstracts

Investigating the Relationship between Stress Perception, Personality and Heart Rate Variability

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Objectives: Stress is the body's ability to cope with different stimuli in the environment, however, too much stress is considered a risk factor for poor mental health and the development of physical conditions. Current research exploring the relationship between psychological stress and physiology have led to conflicting findings. Additionally, while individual differences in personality have been related to different responses to psychological and physiological stress, there is little research exploring relationships among the Big-Five personality traits. This research aimed to investigate the relationship between stress perception, personality, and heart rate variability.

Methods: Seventy female university students completed two questionnaires. The Perceived Stress Scale–14 (PSS-14) was used to assess current perception of stress and the NEO Five-Factor Inventory–3 (NEO-FFI-3) to assess the Big-Five personality traits. Twenty-one participants also had their baseline heart rate variability measured using the Polar H10 chest strap monitor and a smartphone application, Elite HRV. Heart rate variability recordings were taken from the last 5-minutes of a 10-minute resting period while lying in a supine position.

Results: The results revealed that current perceived stress was positively associated with the personality trait neuroticism, and negatively associated with the personality traits extraversion and conscientiousness. There was no significant relationship found between current perceived stress and baseline heart rate variability or between the Big-Five personality traits and baseline heart rate variability.

Conclusions: These findings have important implications in helping to understand the development and maintenance of pathologies and, the importance of aiding psychological interventions for those high in neuroticism.

Polyphenol dietary supplementation shows a positive effect on glycated haemoglobin (HbA1c): A Meta-Analysis of systematically reviewed trials

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Purpose: To meta-analyse findings concerning polyphenol dietary supplementation on HbA1c as part of a systematic review and meta-analysis of their effect on cognition.

Background: It is established that diabetes is an important contributor to the growing public health issue of severe cognitive impairment. However, recent studies found cognitive decline to occur in people at risk of diabetes through factors related to being overweight such as, glycaemic dysregulation and insulin resistance. The hypoglycaemic properties of polyphenols stimulated research into its probability as a remedial intervention to potentially attenuate cognitive impairment in people with diabetes. However, there is limited literature in this field for those at risk of the disease. Hence, HbA1c, a biological marker of glucose regulation, was investigated to verify such effect.

Methods: A systematic search was performed in PubMed/Medline, PsycInfo, Scopus and Cochrane databases for RCTs and other studies on overweight participants which investigated the effect of polyphenols on cognition. Data was extracted following the PRISMA guidelines. Meta-analyses using fixed effects models were conducted on results for HbA1c.

Results and Conclusions: The meta-analysis for HbA1c comprised 3 studies. It yielded a highly significant summary effect showing better glycaemic regulation associated with polyphenol supplementation compared to placebo conditions. Nevertheless, the 3 studies individually reported a non-significant effect for cognitive functions. It was concluded that polyphenol supplementation may improve glycaemic control in those at risk of diabetes. More research on the possible effect of polyphenols on regulating blood glucose and consequently, attenuating cognitive impairment, especially in at-risk population, is needed.

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The impact of Covid-19 on infant interactions.

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Objectives: To investigate the medical, psychological and behavioural effects of Covid-19 on mother-infant quality of interaction and infants' quantity of interactions with family and friends.

Design: The CoCoPIP Study is a national online survey. The data from questionnaire questions used in this analysis were aimed at capturing infant caregiving and development and the direct impact of COVID-19 on new parents' and infants' lives.

Methods: Eligibility for the sample was parents of infants in the age range 0-7 months. Any caregiver could participate, with parental appropriate questionnaires. The participants who met all inclusion criteria were 649 mothers.

Results: Results suggested that the medical impact of Covid-19 had no significant effect on mother-infant interaction quality (t(612) = -1.844, p = .066) or quantity of infant interactions (W = 36915.500, p = .603). The psychological impact of Covid-19 on parents significantly affected infants' quantity of interactions. This relationship was found between increased fear of Covid-19 and distancing of infants' interactions with family (t = 2.494, p = .013, ß = .056) and decreased well-being and increased distancing of infants' interactions with friends (t = 2.170, p = .031, ß = .058). Increased adherence to lockdown restrictions was significantly associated with infants' interactions with family (t = -2.855, p = .005, ß = .058).

Conclusions: This study suggests the context of Covid-19 affected distancing of interactions with family and friends more than quality of mother-infant interactions. Limitations of this study were questionnaire response bias and that only mothers' responses were used in the analysis.