Assignment

Consider the following six abstracts from scientific articles. Above each abstract we have added a claim – note that this claim is not necessarily made in the article itself. In some cases this claim comes from news articles on the research, for example.

Based on the abstracts, determine whether you think each claim is false, misleading or real. Then determine whether, based on the broader context of what you know, you think each claim is false, misleading or real. Finally, use sources like textbooks and the internet to look up extra information and adjust your categorization if needed.

Claim: Smart patch reduces cravings for alcohol and drugs

Question What is the efficacy of heart rate variability biofeedback (HRVB) in the treatment of substance use disorder (SUD)?

Findings In this randomized clinical trial that included 115 adults with SUD, those receiving HRVB experienced significant reductions in negative affect, craving, and alcohol and other drug use relative to controls. Mechanistic findings suggest that HRVB practice may disrupt moment-level associations between craving and substance use, highlighting its potential as an adjunctive SUD treatment.

Meaning HRVB is a low-cost and accessible treatment that may support SUD recovery; future phase 3 trials are warranted.

Importance Preliminary studies suggest heart rate variability biofeedback (HRVB) may reduce craving and negative affect in individuals with substance use disorder (SUD), but few studies have evaluated whether this translates into improved substance use outcomes, and no prior studies have examined second-generation wearable HRVB technology in this context.

Objective To evaluate the effects of second-generation HRVB on negative affect, positive affect, craving, and alcohol and other drug (AOD) use in adults with SUD.

Design, Setting, and Participants This phase 2 randomized clinical trial included 8 weeks of outpatient treatment. Recruitment was conducted virtually across the US from February 2023 to June 2024. Treatment-seeking adults with SUD were randomized to receive HRVB + treatment as usual (TAU) or TAU only.

Intervention Eight weeks of HRVB.

Main Outcomes and Measures The primary outcomes were negative affect, positive affect, craving, and substance use, assessed with ecological momentary assessment.

Results Of 260 individuals assessed for eligibility, 120 were randomized to receive HRVB + TAU or TAU only. Among study participants (69 female participants of 115 [60.0%]; mean [SD] age, 46.18 [11.59] years), HRVB was associated with significant reductions in negative affect (*b*, –0.01; *z*, –3.21; *P* = .001) and craving (*b*, –0.01; *z*, –4.60; *P* < .001) over 8 weeks. In contrast, the control group experienced increases in both negative affect and craving. No differences were observed for positive affect. HRVB was also associated with a significantly lower proportion of AOD use days (odds ratio [OR], 0.36; 95% credible interval [CrI], 0.25-0.54), representing a 64% reduction in AOD use compared to controls. Treatment condition moderated the within-person relationship between craving and later AOD use (OR, 0.84; 95% CrI, 0.73-0.97), such that those receiving HRVB were less likely to use AOD following craving (*b*, –0.18; 95% CrI, –0.32 to –0.03).

Conclusions and Relevance In this randomized clinical trial, findings suggest second-generation HRVB can reduce negative affect, craving, and substance use among individuals in early recovery from SUD. HRVB appears to confer benefit in part by disrupting the association between craving and subsequent AOD use; these results support HRVB as a potentially efficacious treatment for SUD and warrant further investigation in phase 3 trials.

Claim: Vaccines cause autism

Background We investigated a consecutive series of children with chronic enterocolitis and regressive developmental disorder. Methods 12 children (mean age 6 years [range 3–10], 11 boys) were referred to a paediatric gastroenterology unit with a history of normal development followed by loss of acquired skills, including language, together with diarrhoea and abdominal pain. Children underwent gastroenterological, neurological, and developmental assessment and review of developmental records. Ileocolonoscopy and biopsy sampling, magnetic-resonance imaging (MRI), electroencephalography (EEG), and lumbar puncture were done under sedation. Barium follow-through radiography was done where possible. Biochemical, haematological, and immunological profiles were examined.

Findings Onset of behavioural symptoms was associated, by the parents, with measles, mumps, and rubella vaccination in eight of the 12 children, with measles infection in one child, and otitis media in another. All 12 children had intestinal abnormalities, ranging from lymphoid nodular hyperplasia to aphthoid ulceration. Histology showed patchy chronic inflammation in the colon in 11 children and reactive ileal lymphoid hyperplasia in seven, but no granulomas. Behavioural disorders included autism (nine), disintegrative psychosis (one), and possible postviral or vaccinal encephalitis (two). There were no focal neurological abnormalities and MRI and EEG tests were normal. Abnormal laboratory results were significantly raised urinary methylmalonic acid compared with agematched controls (p=0·003), low haemoglobin in four children, and a low serum IgA in four children.

Interpretation We identified associated gastrointestinal disease and developmental regression in a group of previously normal children, which was generally associated in time with possible environmental triggers.

Claim: Chaos leads to stereotyping and discrimination

Abstract

Being the victim of discrimination can have serious negative health- and quality-of-life–related consequences. Yet, could being discriminated against depend on such seemingly trivial matters as garbage on the streets? In this study, we show, in two field experiments, that disordered contexts (such as litter or a broken-up sidewalk and an abandoned bicycle) indeed promote stereotyping and discrimination in real-world situations and, in three lab experiments, that it is a heightened need for structure that mediates these effects (number of subjects: between 40 and 70 per experiment). These findings considerably advance our knowledge of the impact of the physical environment on stereotyping and discrimination and have clear policy implications: Diagnose environmental disorder early and intervene immediately.

Claim: Chocolate helps against inflammation

Objective

To examine the long-term effect of cocoa flavanols on inflammaging biomarkers in the COcoa Supplement and Multivitamin Outcomes Study (COSMOS).

Methods

COSMOS is a large, randomised, double-blind, placebo-controlled, 2 × 2 factorial trial testing the effects of a cocoa extract supplement (containing 500 mg cocoa flavanols/day, including 80 mg (−)-epicatechin) among women aged ≥65 years and men aged ≥60 years. This ancillary study measured five widely used serum inflammaging biomarkers, including three pro-inflammatory markers (high-sensitivity C-reactive protein [hsCRP], interleukin-6, tumour necrosis factor-α), one anti-inflammatory cytokine (interleukin-10) and one pleotropic cytokine (interferon-γ [IFN-γ]) in a random sample of 598 participants with biospecimens collected at baseline, Year 1, and Year 2.

Results

The mean age was 70.0 ± 5.6 years, and 49.8% were female. Cocoa extract supplementation significantly decreased hsCRP levels compared with placebo, with a between-group difference in yearly percentage change relative to baseline levels of −8.4% (95% CI, −14.1% to −2.3%; nominal *P* = .008; Holm-adjusted *P* value = .039). Moreover, cocoa extract increased IFN-γ with a 6.8% (95% CI, 1.5% to 12.2%, nominal *P* = .011; Holm-adjusted *P* value = .043) difference in yearly percentage change versus placebo. The effects of cocoa extract on other inflammatory markers were not significant (all adjusted *P* values >.05).

Conclusion

Cocoa extract supplementation significantly decreased hsCRP, supporting a role in modulating the chronic inflammaging process as a potential mechanism underlying its cardio-protective effects, including a 27% reduction in cardiovascular disease death in the COSMOS trial. The biological effect of increased IFN-γ by cocoa extract warrants further exploration.

Claim: Neanderthal DNA persists in modern humans outside Africa.

Abstract

Neandertals, the closest evolutionary relatives of present-day humans, lived in large parts of Europe and western Asia before disappearing 30,000 years ago. We present a draft sequence of the Neandertal genome composed of more than 4 billion nucleotides from three individuals. Comparisons of the Neandertal genome to the genomes of five present-day humans from different parts of the world identify a number of genomic regions that may have been affected by positive selection in ancestral modern humans, including genes involved in metabolism and in cognitive and skeletal development. We show that Neandertals shared more genetic variants with present-day humans in Eurasia than with present-day humans in sub-Saharan Africa, suggesting that gene flow from Neandertals into the ancestors of non-Africans occurred before the divergence of Eurasian groups from each other.

Claim: Intermittent fasting provides no cognitive benefits

Abstract

Intermittent fasting is being popularized as a method beneficial not only for weight loss, but also for overall psychological functioning and well-being. However, there is only a handful of studies examining the latter claims. The aim of this open-label study was to contribute to the understanding of the relationship between fasting-based diets, and cognitive functions and other mental health factors such as mood and sleep quality. The research was conducted on a sample of 105 healthy volunteers who were placed in either the experimental (fasting) group (n = 76) or the control (no change in diet regimen) group (n = 29). For a period of 2 months, the experimental group adhered to a time-restricted eating (TRE) form of intermittent fasting: Participants were instructed to fast from eating or drinking for 16 hours per day. Participants in the control group did not adhere to any specific dietary regimen. Cognitive functioning (attention, memory, working memory and executive functions), as well as sleep quality and several mood dimensions (anxiety, depression, fatigue, hostility, friendliness, cheerfulness, concentration, energy) were measured across three time points: Prior to the beginning of the study, and one month and two months later, respectively. Results showed no significant group x time point interactions on any of the measures. In conclusion, the results of this study do not corroborate the notion that TRE regimen significantly influences cognitive functions, mood or sleep of healthy individuals. While fasting-based diets successfully regulate weight, the claims regarding their beneficial effect on psychological functioning in non-clinical populations are yet to be proven.