measures, including fasting plasma glucose, 2-h plasma glucose post 75 g oral glucose load, glycosylated haemoglobin (HbA1c), and homeostatic model assessment of insulin resistance (HOMA-IR), classifying 61 of 62 subjects correctly.

Conclusions: We provide a simple novel tool based on circulating lipids and metabolites to guide physicians to the most effective insulin-sensitising treatment in individuals with obesity. Future studies are necessary to validate these findings and to compare the efficacy of the biomarker-guided therapy with the traditional treatment.

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Vitamin D supplementation improves adipokine concentrations in overweight or obese adults

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Background: Adipokine dysregulation is a feature of obesity and related cardiometabolic disorders including type 2 diabetes. Vitamin D regulates adipokine production *in vitro*; however, clinical trials have been inconclusive.

Objective: To examine the effects of vitamin D supplementation on serum adipokine concentrations in overweight or obese and vitamin D-deficient adults, using data from a randomized controlled trial (RCT).

Design: Sixty-five individuals with a body mass index (BMI) $\geq$25 kg/m^2 and 25-hydroxyvitamin D (25(OH)D) $\leq$50 nmol/L were randomized to an oral bolus dose of 100,000 IU followed by 4,000 IU daily of cholecalciferol or matching placebo for 16 weeks. Before and after the intervention, we measured BMI, waist-to-hip ratio (WHR), % body fat (dual energy X-ray absorptiometry), serum concentrations of 25(OH)D (chemiluminescent immunoassay) and total adiponectin, leptin, resistin, and adipsin (multiplex assay; flow cytometry). Sun exposure habits, physical activity, and diet were assessed using questionnaires.

Results: Fifty-four participants completed the study (35 M/19F; age = 31.9 $\pm$ 8.5 years; BMI = 30.9 $\pm$ 4.4 kg/m^2 [mean $\pm$ SD]). After 16 weeks, vitamin D supplementation increased serum 25(OH)D compared with placebo (57.0 $\pm$ 21.3 versus 1.9 $\pm$ 15.1 nmol/L, $p < 0.001$). There were no differences between vitamin D and placebo groups for changes in adiponectin, leptin, resistin, or adipsin in unadjusted analyses (all $p > 0.05$). After adjustment for baseline values, season, sun exposure, and dietary vitamin D intake, there was a greater increase in adiponectin (β [95%CI] = 13.7 [2.0, 25.5], $p = 0.02$) and leptin (β [95%CI] = 22.3 [3.8, 40.9], $p = 0.02$) concentrations in the vitamin D group compared with placebo. Results remained significant after additional adjustment for age, sex, and % body fat (both $p < 0.02$).

Conclusions: Vitamin D may increase adiponectin and leptin concentrations in vitamin D-deficient and overweight or obese adults. Further studies are needed to clarify the molecular interactions between vitamin D and adipokines, and to establish the clinical implications of these interactions in the context of obesity.

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Modification of cognitive biases in overweight and obesity

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Introduction: Obesity is partly driven by unhealthy food choices underpinned by cognitive biases, including approach bias (an automatic tendency to move toward rather than away from appetitive food cues) and delay discounting (a preference for smaller, immediate over larger, delayed rewards). Cognitive training strategies aimed at modifying these biases, namely, approach–avoidance training (AAT) and episodic future thinking (EFT) have been shown to improve food choice. However, previous studies tested these training strategies in single laboratory-based sessions among healthy participants. We conducted a pilot randomised trial to examine the effect of these two trainings, delivered daily for one week via smartphone apps, on approach bias for healthy and unhealthy food, delay discounting, and food choice.

Method: Sixty participants with overweight or obesity (39F; age = 26.93 $\pm$ 6.73 years; BMI = 30.34 $\pm$ 3.75 kg/m^2) were randomly allocated to AAT, EFT, or a waitlist control. Outcomes were measured at pre-training, post-training, and at 6-week follow-up. Additional measurements included weight (kgs) and training engagement.

Results: Training session completion rates were high for AAT (85.71%) and EFT (86.43%), t (38) = $-$0.11, $p = 0.92$. Approach bias for unhealthy food was lower in AAT than EFT at post-training ($M_{Diff} = -64.56$, $p = 0.02$, 95% CI [$-$118.83, $-$10.28]). Healthy food choice (%) was higher for AAT than controls at post-training ($M_{Diff} = 23.45$, $p = 0.01$, 95% CI [7.26, 39.64], $d = 1.26$), and 6-week follow-up ($M_{Diff} = 23.92$, $p = 0.01$, 95% CI [5.37, 42.48], $d = 1.24$), and weight reduced from pre-training to 6-week follow-up in AAT ($M_{Diff} = -0.74$, $p = 0.03$, 95% CI [$-$1.40, $-$0.090], $d = 0.47$). However, EFT did not affect delay discounting, food choice, or weight (all p's > 0.1).

Conclusion: AAT is a useful training strategy for improving food choice in obesity and smartphones are a feasible, engaging way to deliver training.

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Intermittent compared to continuous energy restriction on weight loss and weight maintenance: effects after 12 months

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Background and aim: There are few long-term trials comparing intermittent energy restriction (IER) to continuous energy restriction (CER) for weight loss. We compared the effects of CER to two forms of IER; a week-on-week-off energy restriction and a 5:2 program on weight loss, body composition, blood lipids and glucose.

Subjects and methods: In a one-year randomised parallel trial 332 overweight and obese adults, 18–72 years, who were randomised to 1 of 3 groups: CER (4200 kJ/day for women and 5040 kJ/day for men), week-on-week-off energy restriction (alternating between the same energy restriction as the continuous group for one week and one week of habitual diet), or 5:2 (2100 kJ/day on modified fast days each week for women and 2520 kJ/day for men, the 2 days of energy restriction could be consecutive or non-consecutive). Primary outcome was weight loss, and secondary outcomes were changes in body composition, blood lipids and glucose.

Results: 146 individuals completed the study (124 female, 22 male, mean BMI 33 kg/m^2), weight loss, and body fat loss at 12 months was similar in the three intervention groups, −6.6 kg for CER, −5.1 kg for the week-on, week-off and −5.0 kg for 5:2 ($p = 0.2$ time by diet). Attrition rates were not different ($p = 0.4$). HDL-cholesterol rose (7%) and triglycerides decreased (13%) at 12 months with no differences between groups. No changes were seen for fasting glucose or LDL-cholesterol.

Conclusion: We conclude that the two forms of IER were not statistically different for weight loss, body composition and cardiometabolic risk factors compared to CER.

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Improving healthy food purchases from online canteens: A cluster RCT

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Background: School canteens represent an ideal setting to deliver public health nutrition strategies given their wide reach, and frequent use by children. Online canteens, where students order and pay for their lunch online, provide an avenue to improve healthy canteen purchases through the application strategies that impact on purchasing decisions. The aim of this study was to assess the efficacy of a consumer behaviour intervention implemented in an online school canteen in reducing the kilojoule, saturated fat, sugar and sodium content of primary student lunch orders.

Methods: Ten NSW primary schools (2,714 students) currently using an online canteen were recruited to a cluster RCT conducted over a 2-month period. Intervention schools received a consumer behaviour intervention integrated into their online menu (targeting menu labelling, healthy food availability, item placement and prompting). Control schools received no change to their online menu. Data were assessed using separate linear mixed models under an intention to treat framework with multiple imputation.

Results: Analysis of all available data ($n = 2{,}714$ students) showed significant reductions in the average energy (−567 kJ; $p < 0.001$), saturated fat (−2.37 g; $p < 0.001$) and sodium (−228 mg; $p < 0.001$) content of intervention students' lunch orders. No significant differences were observed for sugar (1.16 g; $p = 0.17$).

Conclusions: The study provides strong evidence supporting the efficacy of a consumer behaviour intervention utilising existing online canteen infrastructure to encourage healthier purchasing from primary school canteens. Such an intervention may represent an appealing policy option as part of a broader government strategy to improve child public health nutrition.

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Using online data collection methods to estimate the price and affordability of healthy and less healthy diets under different pricing scenarios

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Introduction: Routine monitoring of diet prices and affordability is critical to inform pricing policies that can improve population diets. Monitoring currently relies on laborious in-store data collection. Studies are yet to comprehensively examine how diet prices can be monitored through the growing availability of online information and how pricing strategies (price promotions and generic brands) affect diet prices/affordability. This study aimed to address these gaps.

Methods: A scraping tool was used to automatically collect online food and beverage prices from a major supermarket chain in June 2018. Pricing information was collected for over 12,000 products. This data was used to compare the price and affordability of two diets (healthy and unhealthy) using the Australian Standardised Affordability and Pricing (ASAP) methods. The price and affordability of a healthy and unhealthy diet was compared under different pricing scenarios, which considered price promotions and generic brands. Diet affordability was measured against the national poverty line and median income quintiles.

Findings: Using the standard in-store approach, the fortnightly price of a healthy diet ($653) was estimated to be cheaper than an unhealthy diet ($820) for a household of four. When accounting for price promotions, the healthy diet remained cheaper, but the price was reduced by 3% compared to 7% for an unhealthy diet. The greatest reduction in diet prices was observed when including generic brands (healthy diet; −19%, unhealthy diet; −17%). All diet prices remained largely unaffordable when measured against the poverty line and lowest income quintile, although generic brands notably improved affordability.

Conclusions: The systematic collection of online supermarket pricing data can facilitate flexible and timely diet price/affordability analyses. These methods should continue to be tested to improve validity against previous Australian studies (by examining sources