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Greater energy, protein and fat intake following the addition of sauce to an older adult's meal

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Current estimates suggest that 15–20% of the UK older population suffer from undernutrition, with resultant negative effects on health⁽¹⁾, at least partly as a result of under-eating^(1,2). Eating, however, can be strongly affected by various food-related characteristics, such as palatability and familiarity^(3,4), characteristics that can be increased by the use of condiments and sauces, such as gravy and tomato ketchup (for example, see Pliner & Stallberg-White⁽⁵⁾). The present study has investigated the impact of the addition of sauce to an older adult's meal on short-term intake.

Twenty-eight individuals aged >65 years were recruited from five residential homes in Belfast, UK. All participants undertook the study on four separate occasions during the main meal of the day. On two occasions each participant received their main meal with no sauce, on the other two occasions each participant received the same main meal with sauce (gravy, white sauce, mustard sauce and tomato-based sauce). Intake during each meal was calculated based on weight consumed of all individual food items. Pleasantness and familiarity were measured following consumption, using five-point Likert scales. Hunger and desire to eat were also measured before the start of each meal to ensure against confounding, again using five-point Likert scales. Sauce *v.* no-sauce conditions were compared using repeated measured *t* tests.

Compared with meals with no sauce, meals with sauce were found to result in significantly greater intakes of energy (*t*(27) 2.18, *P*=0.04), energy consumed from protein (*t*(27) 2.97, *P*<0.01) and energy consumed from fat (*t*(27) 2.62, *P*=0.01). No differences were found between meals with and without sauce in weight of food consumed and energy consumed from carbohydrate (largest *t*(27) –0.85, *P*=0.40). No differences were found between meals with and without sauce in pre-meal hunger or desire to eat (largest *t*(27) 0.58, *P*=0.57), or in amount of food provided (*t*(109) 0.13, *P*=0.89). Post-meal ratings of pleasantness or familiarity were also found not to differ between meals with and without sauce (largest *t*(27) 1.47, *P*=0.15). A similar pattern of results was also found when participant expectations were taken into account, with no differences between individuals who expected sauces to have an effect on intake and individuals who expected no effects (largest *F*(1,26) 3.38, *P*=0.08).

The findings of the study suggest that the addition of sauce to an older adult's meal can result in increases in total energy consumed and in energy consumed from protein and fat. These findings suggest that sauces may provide a potential means of increasing energy intake in older adults. Similar findings have also been suggested elsewhere using condiments^(6,7). The increase in energy consumed from protein and fat and the absence of effects on energy consumed from carbohydrate also suggest that the increased energy intake is a result of increases in the consumption of meat and fish items. This finding is unsurprising, given the usual addition of sauce to the meat or fish part of a meal, and may further increase the value of sauce as a potential means for increasing intake. The absence of effects on weight of food provided and weight of food consumed also suggest that these effects are unlikely to be a demonstration of increased consumption as a result of increased provision. Effects are also unlikely to be a result of differences in pre-meal hunger or desire to eat, or participant expectations. Furthermore, the present findings are also unlikely to be a result of increases in palatability and familiarity. The mechanisms by which sauces increase intake may therefore be unrelated to palatability or familiarity, but instead may be related more to the semi-solid nature of sauce. Semi-solid foods have previously been suggested to aid the passage of foods through the digestive system, particularly when gastrointestinal secretions and motility may be reduced or impaired^(1,2).

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