Reply to Comment

How does chewing gum affect cognitive function?

Reply to Scholey (2004)

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Abstract

Cognitive effects of glucose from chewing gum and other mechanisms can be investigated further when factors like the flavouring of the gum and the participants’ familiarity with gum chewing are assessed.

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The hypothesis that chewing enhances glucose delivery

Scholey’s (2004) review is a timely summary of a number of studies that examine the lay belief that chewing gum enhances cognition. Indeed the present ‘mini-symposium’ provides a useful forum in which to examine the current state of play.

To this end we discuss here how the studies reviewed by Scholey conform to our hypothesis that chewing gum affects some aspects of cognition by means of enhanced glucose delivery via the act of chewing. At first blush the data reported by Tucha et al. (2004) and Baker et al. (2004) seem inconsistent with this hypothesis. However, Tucha et al. found null effects with respect to both gum-related improvement in cognition and changes in heart rate. This is consistent with our hypothesis that heart rate must increase for chewing gum to enhance cognition.

Familiarity with gum chewing

Scholey (2004) observed that the different gum brand used by Tucha et al. (Dandy Sakiz) from that used by Wilkinson et al. (2002), Stephens and Tunney (2004), and Baker et al. (Wrigley’s) may have failed to influence performance because it produced different (insufficient?) resistance to chewing. We suggest another possibility that improved cognitive performance depends on gum chewing experience, and that the participants employed by Tucha et al. were inexperienced gum chewers. Some circumstantial evidence supports this. Wilkinson et al. found impaired Simple Reaction Time during sham chewing, which they suggested was a reflection of diversion of attentional resources during performance of an unfamiliar behaviour. Tucha et al.’s significantly slower Tonic Alertness Reaction Time in both gum chewers and sham chewers, relative to a quiet control, may likewise reflect a lack of familiarity by the participants with both sham chewing and actual chewing.

We have no evidence as to the familiarity with gum chewing of the participants employed by Tucha et al., although cultural factors might conceivably differentiate this German university student sample’s gum chewing experience from that of the UK university student samples employed by Wilkinson et al., Stephens and Tunney, and Baker et al. We suggest that future studies make some assessment of participants’ familiarity with the chewing of gum.

Involvement of flavourings

In the two experiments reported by Baker et al. (2004), sugar-free gum was used without any additional glucose...
administration (as in our study); moreover, in their Experiment 2, no chewing took place at all. In both cases, recall of words was better than in control conditions in which no gum was administered.

We employed sucking a mint sweet as a control for the introduction of mint flavour, but still observed performance benefits in the chewing gum condition compared with the mint sweet condition. Nevertheless, this raises the intriguing possibility that the effects may in part be due to a general arousing effect of the flavouring (mint). As a herbal remedy, mint is more commonly associated with effects on the gastro-intestinal system. However, its cognitive effects have been noted for some time: ‘Being smelled unto, it is comfortable for the head and memory’ (Culpepper, 1693). Thus a further possible explanation of Tucha et al.’s null effects may be that the chewing gum that they used simply did not contain the ‘right’ flavour.

An interesting line of enquiry suggested by all of these studies may, therefore, be to examine the effects of flavours on cognitive function, while controlling all other variables. Although there is already a proliferation of control conditions in research into cognitive effects of gum chewing (e.g. sham chewing, artificial and naturally sweetened gum, non-gum mint flavoured sweets etc.), chewing gum research is in its infancy and various hypotheses need to be excluded before we can focus on any particular mode of action.

References


