



Mood state effects of chocolate, Gordon Parker, Isabella Parker, Heather Brotchie

This is a shortened, simplified version of the article titled 'Mood state effects of chocolate', G. Parker et al, *Journal of Affective Disorders*.

The article provides an overview of studies into chocolate and its effects on mood. It looks at why people crave and eat chocolate and whether it has an effect on a person's mood. In particular, it looks at whether chocolate has antidepressant properties, and if so, how these occur.

The paper explores the various theories for why people crave chocolate and carbohydrates. Theories identified for why people crave and eat chocolate, and impact upon mood, are that chocolate:

- corrects a deficiency in the regulation of mood
- is highly pleasurable
- corrects an imbalance in the diet
- is addictive
- is a means of coping during a negative mood.

Each of these theories is examined and – with the exception of the pleasurable effects of chocolate – all are found to lack substance.

In short, the article argues that while eating chocolate can be highly pleasurable and can satisfy cravings, when eaten as a comfort food or as an emotional eating strategy, it is more likely to prolong a negative mood, rather than shorten it.

A brief summary of the paper's findings follows.

Does chocolate correct a deficiency in the regulation of mood?

Chocolate has been thought to interact with a number of the neurotransmitter systems that affect mood. In particular, it is popularly believed that chocolate or carbohydrate cravings correct a deficiency in the neurotransmitter 'serotonin', which is in short supply in people who are depressed.

The article points out that there is some support for this theory in the literature, particularly in respect of people with 'seasonal affective disorder' and 'atypical depression', and where serotonin levels appear to be restored when carbohydrates are ingested.

If this were true, however, it would not explain why there are differences in appetite among people who are depressed. People with 'melancholic' depression, for example, tend to experience appetite loss rather than food cravings, whereas people with non-melancholic depression are more likely to eat more, as an emotional response to the depression.

Furthermore, studies looking at the physiological effect of food upon serotonin levels show that

- the serotonin levels are dependent on the food ingested having a very low protein level (lower than chocolate),
- the chemical changes that occur are in fact much slower acting than people describe when they eat chocolate
- fat slows the absorption of carbohydrate – and foods such as chocolate are high in fat
- mood changes have been reported by people after eating carbohydrates even when no change in serotonin level has occurred.

So it seems likely that other factors are at play, rather than chocolate boosting serotonin levels and thus improving mood.

Other neurotransmitter roles:

- Dopamine, which underpins the positive reward system, including the anticipation of pleasure, is possibly activated by chocolate.
- The central OPIOID system, which activates a sense of pleasure, is activated by certain palatable foods like chocolate.

Is chocolate craved because it is highly pleasurable?

There is a strong basis for believing that the particular properties of chocolate – including its taste and texture in the mouth, as well as its smell – are enough to explain why people want to eat chocolate.

It is shown that eating chocolate is not linked to hunger or ‘fullness’, nor to any deficiency in caloric intake. If it were, then people would crave equally both and dark chocolate, but they do not.

So chocolate is craved because of its unique sensory attributes, and eating chocolate is the only way to satisfy that craving.

Does chocolate address an imbalance in the diet?

The view has been put that chocolate craving is a response to a magnesium deficiency. However, it has been shown that, while taking a magnesium supplement does reduce chocolate cravings, people who crave chocolate do not crave foods high in magnesium or find that eating such foods satisfies their chocolate cravings.

Also, people who are on a diet do not experience any greater cravings for chocolate than people who are not on a diet, which one would imagine would be the case if cravings were linked to dietary imbalances.

Is chocolate addictive?

Terms such as ‘chocoholic’ and ‘sugar addiction’ are common these days, but there is no real consensus that food cravings, including for chocolate, qualify as an addiction.

<http://www.blackdoginstitute.org.au/media/medioclips/index.cfm>

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It is likely that the ‘orosensory’ properties of chocolate are what people who claim to be chocoholics crave, rather than the digestion of chocolate.

The paper points out that the literature tends to confuse the notions of chocolate craving, emotional eating, carbohydrate craving and self-medication. Instead, it proposes a different model involving two separate strands: (1) chocolate craving; and (2) carbohydrate craving in the context of ‘emotional eating’.

It says that each one is driven by different motivations and activates different neurotransmitters; chocolate craving being driven by the desire for pleasure, with dopamine being released after eating, while emotional eating is characterised by carbohydrate craving and motivated by the comforting effect endorphins have on mood.

This is supported by the fact that when chocolate is craved, only chocolate will satisfy the craving. Yet for people in a negative mood any carbohydrate will suffice, so that chocolate will not necessarily be preferred over any other carbohydrate.

Is chocolate a means of coping during a negative mood?

There are a number of studies looking at how our preference for food changes as our mood changes. For example, people reach for ‘junk food’ when their mood is negative but tend to prefer healthy foods when in a positive mood. Also, people who are overweight more commonly over-eat as a result of emotional stress, but the weight gain this causes can worsen their mood and then trigger another round of emotional eating.

However other factors come into play too, an example being that obese women have been found to eat significantly less when highly anxious than when mildly anxious.

So the links between coping during a negative mood and carbohydrate craving are not at all clear – in fact it has been shown that the natural tendency during stress is to decrease food intake.

Attempts to study whether carbohydrates help alleviate negative mood have been complicated by a number of factors and findings have been mixed. One set of findings showed that carbohydrates cause an initial temporary relief from a negative mood (Wurtman and Wurtman (1989)); another that there was a marked worse mood after the carbohydrate binge (Johnson and Larson (1982); and another study (Thayer (1987)) found that carbohydrate consumption caused reduced energy levels in the longer-term helped to develop and maintain the depression. A further study (Hetherington and Macdiarmid (1993)) found mood was improved only during consumption and that negative moods returned immediately after.

Furthermore, other studies have shown that resisting the craving produces a more positive emotional mood both in the short and long term.

Overall, emotional eating has not been found to have any real or lasting benefit upon a negative mood and in fact repeated emotional eating may in fact contribute to a negative mood.

An evolutionary perspective

Finally, the paper looks at biological mechanisms in the human body that regulate appetite and ‘fullness’ and how they may be challenged by the higher concentrations of calorie-rich, processed foods found in the diets of people living in developed countries. It seems that these mechanisms can in fact be ‘abused’ by calorie-rich processed foods, in that these types of foods activate neurotransmitters in dysfunctional ways.

So overall, while chocolate is, for most people, a pleasurable indulgence, for people who eat it to help with a negative mood, it might provide some immediate feeling of relief but is more likely to prolong the negative mood.

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CHOCOLATE CRAVING

vs

EMOTIONAL EATING

- Desire for hedonic reward
- Dopamine reward system activated
- No substitute

- Chocolate craving
- OPIOID effect sought to alleviate dysphoria
- If no chocolate, any sweet-fat food (e.g. ice cream, cake, chips)
- Seeking relief from negative state

SEEKING PLEASURE AND HEDONISM

- Chocolate unique – sweet, creamy, texture, taste, aroma – perfect orosensory experience.