Medical Xpress

# Study indicates willpower not depleted by use nor replenished by food

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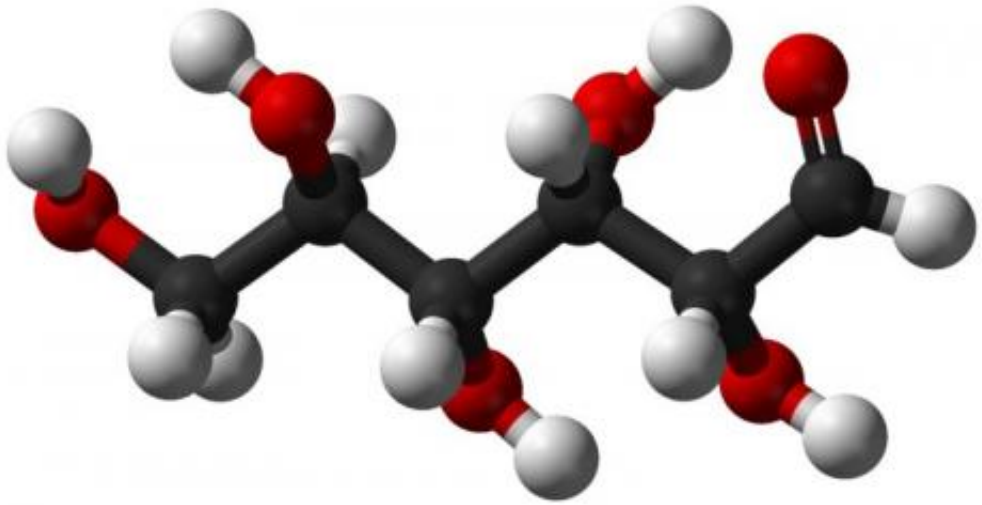

Glucose C6H12O6. Credit: Wikipedia.

(Medical Xpress)—A team composed of researchers from Stanford University and the University of Zurich has found evidence that suggests willpower is not depleted by use, nor replenished by glucose. In their paper, published in *Proceedings of the National Academy of Sciences*, the researchers describe their experiments which indicate that a person's belief that willpower can be depleted has more bearing on their own perception of willpower.

For people, willpower is generally considered to be the ability to not do

something that is desired, or to continue doing something that is not desired for a greater good. Prior research has suggested that willpower, because it requires brain work, can become depleted if more brain food (glucose) isn't provided to the brain. In this new effort, the researchers contradict that theory and suggest that a person's belief in whether their own willpower can be reduced if their brains don't receive reinforcement has more to do with their own individual level of willpower.

The researchers ran three experiments. In the first, a group of volunteers was asked to forgo eating or drinking for two hours prior to the experiment. The first part of the experiment involved quizzing the volunteers on their beliefs about willpower. That was followed by giving all of the volunteers a sweetened beverage—half received a drink with sugar, and half received a drink with a sugar substitute. Following that, each of the volunteers was asked to take tests that measure self-control and brain acuity. In analyzing the results, the researchers found that those volunteers who believed they needed a sugar drink to maintain willpower performed poorly if given an artificially sweetened drink—those who believed willpower was unlimited performed equally well regardless of the sweetener consumed.

In the second experiment, the researchers attempted to nudge the volunteers' views about willpower by manipulating the questionnaire prior to repeating the same exercise. This time around, the researchers found that those volunteers who had been led to believe willpower requires rejuvenating tended to do poorly on the second part of the experiment if they consumed an artificially sweetened drink, while those who had not needed no rejuvenation.

In the third experiment, the researchers ran the same exercise as the first experiment but didn't ask the volunteers to fast prior to the experiment. Also, they lied to the volunteers regarding whether their drink was artificially sweetened or not. Analysis showed that those who believed

willpower needed rejuvenation lagged when given an artificially sweetened drink regardless of whether they knew what they were getting.

These experiments show, the researchers report, that willpower is dependent on an individual's belief in their need for glucose rejuvenation, rather than a physical need to feed the brain more to keep their willpower strong.

**More information:** Beliefs about willpower determine the impact of glucose on self-control, *PNAS*, Published online before print August 19, 2013, DOI: 10.1073/pnas.1313475110

**Abstract**
Past research found that the ingestion of glucose can enhance self-control. It has been widely assumed that basic physiological processes underlie this effect. We hypothesized that the effect of glucose also depends on people's theories about willpower. Three experiments, both measuring (experiment 1) and manipulating (experiments 2 and 3) theories about willpower, showed that, following a demanding task, only people who view willpower as limited and easily depleted (a limited resource theory) exhibited improved self-control after sugar consumption. In contrast, people who view willpower as plentiful (a nonlimited resource theory) showed no benefits from glucose—they exhibited high levels of self-control performance with or without sugar boosts. Additionally, creating beliefs about glucose ingestion (experiment 3) did not have the same effect as ingesting glucose for those with a limited resource theory. We suggest that the belief that willpower is limited sensitizes people to cues about their available resources including physiological cues, making them dependent on glucose boosts for high self-control performance.