

DRINK SCORES



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Advising people on a balanced diet is sometimes a complex instruction. People want to know the precise amounts and times of the day of the right foods and drinks for them; anything else just leads to randomness and muddle, and from that, a decline into chaos and anarchy (dietetically speaking).

The current love of spread-sheeted information, and computer-cracked health scoring tabs and apps, fits in with the growth of self-monitoring appliances. Perhaps being able to self-score and self-monitor diverse health behaviours, including food and drink consumption, may be the way to self-motivate and self-remedy fitness and well-being. The only danger being that, as geeky whiz kids develop more computer algorithms, health professionals, such as dietitians, may no longer be needed.

But of course not! Dietitians have unique insights and skills that no number crunching, bleeping-blinking computer could ever match. But there has been some interest in scoring foods and diets, with methods that bring new ways to assess and correlate intakes to disease risk and health outcomes. And numeric scores are what computers (and some people) like best.

Kiyah Duffey and Brenda Davy from Virginia Technical University developed a way to score the healthiness of fluid intakes, published in the *Journal of the Academy of Nutrition and Dietetics* in July 2015. And the Healthy Beverage Index (HBI) is just the kind of tool so in-demand by software designers and app developers.

WHAT IS THE HBI AND WHAT DOES IT SHOW?

Score components relate to both amounts and nutritional quality of

fluids consumed, with highest theoretical points being 100. Duffey and Davy describe fluid requirements as 1.0ml liquid for each kcal consumed and are calculated at 2000ml for typical US adults. Drinking at least these amounts of fluids per day, scores 20, with proportionately lower scores for lower amounts. Energy from fluids is also a generic factor, with less than 10% of total energy intakes scoring highest points of 20 and more than 15% scoring lowest points of 0. This seems a tight fit with minor fuzzy factor for major point differences.

Then come the individual fluid component scores. Water (either tap or bottled) gains up to 15 points if at least 20% of requirements are consumed in this form, contrasting with 0 points if no fluid is consumed directly as water. The next highest scoring component includes sugar-sweetened beverages (SSBs). Of course, in the nutrition literature, this term has come to mean 'full-fat' versions of carbonated canned or bottled drinks, but it also includes any sugar containing dilutable squashes and syrups, fruit-flavoured drinks and sweetened teas or coffees, including the popular coffee-shop milk-shake style versions. Not consuming these items gives 15 points to the score; consuming more than 8.0% of total energy from SSBs brings the point score down to zero. Small 5-point units are gained by not consuming full-fat milk and further 5-point units come from consuming

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Table 1: Ursula's two-day score

Day 1	Day 2
Black tea, 750ml	Black tea, 750ml
Coffee plus soya milk, 300ml	Green tea, 250ml
Red wine, 350ml	Coffee plus soya milk, 300ml
Black tea, 250ml	Orange juice, 100ml
Total fluids: 1650ml	Total fluids: 1400ml
HBI score: 55	HBI score: 77

modest amounts of drinks, including unsweetened tea and coffee, low-fat milk or soya milk, diet drinks, pure fruit juice and alcohol. Exceeding modest amounts of these latter items brings the point score back down to zero. If your head is buzzing, it is because this is really information for a computer programmer, but what are the outcomes of this beverage scoring system?

OUTCOMES

Duffey and Davy model different beverage diaries. A healthy one scoring the top 100 points, includes 1500ml from tap or bottled water, 750ml (three mugs) from black coffee or green tea, 250ml from skimmed milk and even includes a small (150ml) glass of red wine. From this selection, more than 2600ml of fluids are consumed, providing nearly 200kcal. The contrast is the 'typical' American beverage diary. Water provides only 250ml of fluid intakes. An equal amount comes from black coffee. Most fluid consumed comes from sodas, both standard and diet versions, and an additional 250ml comes from vanilla latte. This beverage diary provides 1700ml of total fluids per day and an energy intake of nearly 500kcal. The HBI score for the typical American beverage diary is 56 points.

The average HBI score of US adults was assessed from National Health and Nutrition Examination Survey (NHANES) five-year data collected to 2010. Analysis from more than 16 thousand intake diaries produced a score of 63, slightly higher than the modelled typical beverage intake score of 56. Individuals with the highest HBI scores were those consuming most of their fluid intakes as water. While intakes of water were variable, the range of scores for intakes of SSBs and energy from beverages was even more variable (more than a 10-point

range), suggesting that these were the most challenging themes in trying to increase HBI scores in the US population.

A random two-day score was calculated for the author (see Table 1). Scores were both lower (55) and higher (77) than for the US population score of 63. Total energy requirements were suggested by Dr Duffey to be a modest 1600kcal, so requirements for total liquid intakes were defined as 1600ml daily. The inadequacies of day one were no water intake, excess alcohol and excess energy intakes (due to the half-bottle of red wine). The inadequacies of day two were lesser, but still an indication of the challenge to achieve top scores: no water intake and inadequate total fluids consumed: 200ml short of the calculated requirement. While conceding shamefully to being a camel about drinking straight-water and preferring hot beverages for hydration, the HBI score system only allows a maximum score of 85 if water-pure is not consumed (even with lakes of tea).

Duffey and Davy further assessed the association between the HBI and various markers of cardio metabolic risk from the NHANES data. Higher HBI scores (by at least a 10-point difference) were associated with better cardio metabolic measures: in normal-weight adults these were lower odds of having a high waist circumference, of hypertension and of having more favourable lipid profiles. In men specifically, there were also lower odds of having high C-reactive protein levels. Duffey and Davy concede limitations of their methodology, but suggest that the data supports some indications of adverse cardio metabolic health outcomes from fluid deficits. They propose refinements of the HBI to optimise measured and observed health associations. But, in any case, they advocate for US adults to drink enough tap or bottled water. ▶

THE HYDRATION INDEX

Another index proposed for scoring fluids, is the hydration index. This has been developed by Dr Stuart Galloway at the Health and Exercise Science research group at the University of Stirling, and was presented at the 6th European Hydration Institute Meeting held in London this June². Hydration efficiency of fluids consumed relates to volumes over time, of course, but also factors such as energy density of the fluid, electrolyte content and the presence of diuretic agents. In order to develop the hydration index, Dr Galloway investigated the effects on urine output and fluid balance of consuming one litre of 13 different drinks compared to the reference of still water. More than 70 willing male students participated in the drinking trials and they may have been especially keen on the day that a litre of lager was offered at breakfast.

Urine outputs over four hours from fasted students were highest from the consumption of a litre of still water, and were similar for cola drinks, tea or coffee, lager, orange juice or sports drinks. Urine outputs were lower after intakes of a litre of oral rehydration solutions or of milk. Variations in caffeine content and sugars content

below levels of 10% had no influence on hydration index scores.

WHAT TO DRINK FOR HYDRATION?

Dr Galloway's data supports the particular benefits of still water, but other typically consumed drinks scored nearly as well, including lager. Lower hydration index scores were demonstrated for milk and drinks with higher (above 10%) sugars content, and perhaps these choices should specifically be omitted from advice on effective hydration sources.

There are many health and, perhaps, some cognitive benefits from consuming adequate amounts of fluids and, for most people most of the time, typical choices made provide adequate hydration. However, unintended excess energy intakes are a risk if most fluids consumed also provide calories, and keeping most fluid intakes energy-free is an important public health message - which runs counter to the many urgent advertising messages communicating that people (young men) seeking vigour need energy drinks. Water cannot be challenged as the pinnacle source of hydration, but many other drinks are nearly as good - and tea remains my personal choice of wet-stuff. ■

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