RESEARCH
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Use of Added Sugars Instead of Total Sugars May Improve the Capacity of the Health Star Rating System to Discriminate between Core and Discretionary Foods

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ABSTRACT

Background The Australian Government has introduced a voluntary front-of-package labeling system that includes total sugar in the calculation.

Objective Our aim was to determine the effect of substituting added sugars for total sugars when calculating Health Star Ratings (HSR) and identify whether use of added sugars improves the capacity to distinguish between core and discretionary food products.

Design This study included packaged food and beverage products available in Australian supermarkets (n=3,610). The product categories included in the analyses were breakfast cereals (n=513), fruit (n=571), milk (n=309), non-alcoholic beverages (n=1,040), vegetables (n=787), and yogurt (n=390). Added sugar values were estimated for each product using a validated method. HSRs were then estimated for every product according to the established method using total sugar, and then by substituting added sugar for total sugar. The scoring system was not modified when added sugar was used in place of total sugar in the HSR calculation. Products were classified as core or discretionary based on the Australian Dietary Guidelines. To investigate whether use of added sugar in the HSR algorithm improved the distinction between core and discretionary products as defined by the Australian Dietary Guidelines, the proportion of core products that received an HSR of $\geq$3.5 stars and the proportion of discretionary products that received an HSR of $<$3.5 stars, for algorithms based upon total vs added sugars were determined.

Results There were 2,263 core and 1,347 discretionary foods; 1,684 of 3,610 (47%) products contained added sugar (median 8.4 g/100 g, interquartile range=5.0 to 12.2 g). When the HSR was calculated with added sugar instead of total sugar, an additional 166 (7.3%) core products received an HSR of $\geq$3.5 stars and 103 (7.6%) discretionary products received a rating of $\geq$3.5 stars. The odds of correctly identifying a product as core vs discretionary were increased by 61% (odds ratio 1.61, 95% CI 1.26 to 2.06; $P<0.001$) when the algorithm was based on added compared to total sugars.

Conclusions In the six product categories examined, substitution of added sugars for total sugars better aligned the HSR with the Australian Dietary Guidelines. Future work is required to investigate the impact in other product categories.
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GLOBALLY, NONCOMMUNICABLE DISEASES ARE THE leading cause of death.[1] Currently, 62.8% of Australians are overweight or obese,[2] and poor diet quality and high body mass index are significant contributors to global disease burden.[3] High added sugar intake is a target for intervention due to associations with nutritionally poor diets, weight gain, dental caries, and consequently, risk of developing non-communicable diseases.[4,5]

The term *added sugars* is defined as the sugars added during food production, including sugars, syrups, honey, and fruit

juice concentrates.[6,7] Despite chemical synonymy with intrinsic sugars naturally present in dairy, fruits, and vegetables, a growing body of evidence has linked added sugars with adverse health outcomes, including dental caries,[8] weight gain,[9] type 2 diabetes,[10] and cardiovascular disease.[11-13] For these reasons, the World Health Organization strongly recommends adults and children consume <10% of total dietary energy from "free sugars."[5] A conditional recommendation was made to further restrict free sugars to <5% of energy to reduce dental caries.[5,8] Free sugars are defined in the same way as added sugar, although free sugars include fruit juice. The 2011-2012 National Nutrition and Physical Activity Survey showed that Australians consume, on average, 10.9% of their daily energy intake from free sugars, with an estimated 52% exceeding the World Health Organization's recommendations for free sugars to contribute <10% total energy, and nearly all (98%) consumed >5% of energy from free sugars.[14]

In 2014, the Australian Government introduced a front-of-package labeling system, the Health Star Rating (HSR), which is currently implemented by the food industry on a voluntary basis.[15] The HSR system rates packaged food products from half a star to five stars, where a greater number of stars represents a healthier food choice.[16] To calculate the HSR, products receive a score based on the amount of energy, saturated fat, sodium, and total sugar per 100 g or 100 mL. In addition, "positive" components, such as fruit and vegetable content, and in some food categories fiber and protein, are also included in the score. This front-of-package labeling system was introduced to make it easier for consumers to compare similar products and choose healthier products. The HSR is designed to be used in conjunction with the Australian Dietary Guidelines. Previous research suggests the HSR is reasonably aligned with the Australian Dietary Guidelines.[17,18] However, the HSR is calculated using total sugar content and, therefore, includes both naturally occurring, intrinsic sugars, and added sugars. As a result, products with naturally occurring sugars from dairy, fruit, and vegetable sources, are penalized by the current labeling system. Consequently, there is a need to investigate the use of added sugars in the calculation of the HSR. This research applied a systematic validated methodology[6] to estimate the added sugar content of packaged food products available in Australia in 2015. The aim was to determine the effect of substituting added sugars for total sugars when calculating the HSR, and identify whether use of added sugars in the algorithm improved the capacity to distinguish between core and discretionary food products.

METHODS

This project used The George Institute for Global Health's Branded Food Composition Database. Methods for the collection of food composition data have been described elsewhere.[19,20] Briefly, the database contains annually updated nutrition information for packaged food products available in Australian supermarkets (ALDI, Coles, IGA, and Woolworths) in Sydney, Australia. Sales from these four supermarkets make up 88.4% of total grocery expenditure in Australia.[21] The 2015 version of this database was used, which comprises data collected between October and December 2015 and contains 22,562 product listings. Products had their brand and product name, nutrient content from the Nutrition Information Panel, and ingredients list recorded following standardized procedures. Nutrient information was used to calculate the HSR and added sugar content. Calculated added sugar values were used to replace total sugars in the HSR algorithm. This study was exempt from Institutional Review Board review because the research did not involve human subjects.

RESEARCH SNAPSHOT

Research Question: Does using added sugar, instead of total sugar, to calculate the Health Star Rating improve its capacity to distinguish between core and discretionary food products?

Key Findings: These analyses included 3,610 packaged food and beverage products available in Australian supermarkets. Using added sugar, in place of total sugar, in the algorithm used to calculate the Health Star Rating increased the odds of correct identification of core vs discretionary products by 61%. Substitution of added sugar for total sugar in this front-of-pack labeling system improved the alignment with the Australian Dietary Guidelines.

Product Categories

These analyses include the following product categories: fruit, vegetables, milk, yogurt, breakfast cereals, and non-alcoholic beverages. Fruit, vegetables, milk, and yogurt categories were included because these products contain a high proportion of natural sugars, and so it was hypothesized that using added sugar in the HSR algorithm instead of total sugar would have the greatest effect in these categories. The nonalcoholic beverages category was included because they are the single greatest source of added sugars in Australian diets,[14] and many of these products are discretionary. We wanted to establish the effect of using added sugars in the HSR algorithm for both core and discretionary products. At present, breakfast cereal manufacturers represent the largest proportion of manufacturers adopting the HSR system[22] and, therefore, analysis of these products has the most relevant implication for suggested alterations to labeling policy. A detailed description of the included product categories is available in Figure 1 (available online at www.jandonline.org).

Estimating the Added Sugar Content of Food and Drink

A validated methodology developed by Louie and colleagues[6] was used to calculate the added sugar content of each included product. Two of the authors conducted these calculations (H.M, K.S.P.). This methodology was developed for use in the Australian food supply, with demonstrated accuracy and good repeatability in estimating added sugar values. In accordance with the methodology, added sugar was defined as refined sugars added during cooking or manufacturing, and includes sugars (sucrose), monosaccharides and disaccharides, syrups, honey, molasses, fruit juice concentrates, and maltodextrin. The definition excludes sugar alcohols, fruit juices, and diluted fruit juice