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From science to sensational headline: a critical examination of the "sugar as toxic" narrative

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ABSTRACT

Over the past few decades, some scholars have labeled sugar "toxic" and portrayed it as the primary cause of diet-related health conditions. In this paper, this sugar as toxic rhetoric – which is widely echoed in the public sphere – is critically examined in terms of its physiological basis and wider social consequences. We argue that the claims of the narrative are oversimplified and partly based on a particular interpretation of scientific studies. By exaggerating the hazards of sugar consumption often using emotive language, the claims generate public concern about it being a threat to their health, which, in the process, contributes to a sense of moral panic. The resultant anxieties give emphasis to feelings of individual responsibility for regulating sugar consumption, which can further generate feelings of guilt and shame especially among those with limited agency for altering their consumption. We contend that the science on which the sugar as toxic narrative builds tends to be ideologically driven in a way that deflects attention away from a more serious debate about food environments. We conclude that the challenges are considerable for those whose role it is to communicate public health messages, especially if the issue is complex and the science incomplete.

KEYWORDS

Sugar; toxic; moral panic; health; individualism

Introduction

The role of sugar in the development of diet-related health problems has been debated within and beyond scientific circles over several decades (e.g., Lustig, Schmidt, and Brindis 2012; Stanhope 2016; Van Buul, Tappy, and Brouns 2014). Increases in the prevalence of overweight and obesity among the populations of most countries in recent years have given considerable momentum to this debate. In these deliberations, sugar is, at times, characterized as toxic, among other things, and the main cause of the alleged obesity epidemic (e.g., Throsby 2020), a phenomenon characterized by the relatively rapid and uncontrolled global increase in the prevalence of people categorized as overweight and obese. In this paper, we examine critically the argument that sugar is toxic by scrutinizing how scientific evidence – particularly that from the field of physiology – is used, interpreted, and presented in these claims. We pay particular attention to the

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language used by authors – within the scientific field as well as various forms of media – to argue that sugar is "bad for your health". In so doing, we consider the extent to which this anti-sugar rhetoric constitutes a form of "moral panic": that is to say, a reaction that is out of proportion to the scientific evidence (c.f. Cohen 1972), in this case, that relating to sugar. In turn, we consider the consequences of this increasingly dominant narrative for how strategies for the prevention of disease and the promotion of health are framed and communicated.

The paper does not set out to be an exhaustive review of all published research on the health effects of sugar. Rather, our purpose is twofold: first, we present the narrative relating to the toxicity of sugar and how this often diverges from the published findings of scientific articles and, second, we discuss some of the intended and unintended consequences of this phenomenon. Our paper is thus situated in an emerging field of critical work on sugar and health and its presentation in various media (Boero 2012; Throsby 2020; Topić and Tench 2018; Foley, McNaughton, and Ward 2020). The specific departure point for our paper is the anti-sugar narrative relating to its toxicity and the form this takes in a variety of media outlets. In discussing this narrative, we make clear that those who draw on and seek to communicate scientific findings rarely "follow the science" especially when it is complex and provisional. While we use sugar toxicity as our example, we conclude that we have elucidated a more general phenomenon that is pertinent to an array of health (and other) issues and therefore deserving of scrutiny.

For the purposes of this paper, it is important to note that within the sugar as toxic narrative few definitions of toxicity are offered beyond attaching the description to fructose (one form of sugar, which, for example, constitutes 50% of sucrose – or common table sugar). However, in Lustig's (2009a, author's transcription) lecture "Sugar: The Bitter Truth", he explains why he considers fructose to be a poison:

> . . .only the liver can metabolize fructose. So what do we call it when you take in a compound that is foreign to your body and only the liver can metabolize it, and in the process generates various problems, what do we call that? We call that a poison.

Lustig (2016, 282) refers to the Merriam-Webster Dictionary for a definition of toxic as: "the degree to which a substance can damage an organism" and argues that fructose falls under this definition. Lustig (2016) distinguishes between acute and chronic toxicity – when he claims that consumption of fructose has chronic toxic effects on the liver. The scientific studies and related literature that we draw on tend not to define toxicity, but rather leave it open to interpretation. We focus our attention, however, on the physiological basis for the claim embedded in the sugar as toxic narrative, that sugar, and especially fructose, should be considered as toxic.

The (re)-emergence of the sugar as toxic narrative

While interest in sugar and health has oscillated in recent years, Throsby (2018, 954) has argued that sugar has supplanted fat as "public enemy number one in public health campaigns" relating to obesity and cardiovascular disease. However, skepticism toward sugar is not a new phenomenon and can be dated back to at least the 18th century (Fischler 1987). The emergence of a more recent anti-sugar narrative can be identified from the mid-1970s onwards when "Sugar blues" (Dufty 1975) warned of the addictive features of sugar,

comparing it to heroin and morphine. In a similar vein, Yudkin – a British physiologist and nutritionist – published "Pure, white and deadly" (1986). This text made the case for a direct causal relationship between sugar consumption and a wide range of conditions (cancer, diabetes, hypertension, gout, seborrheic dermatitis, shortsightedness, and long-sightedness, for example).

While newspapers continue to publish articles relating to sugar and health (Throsby 2020), the development and expansion of the Internet and social media have allowed the anti-sugar narrative to reach a much wider audience. Use of Twitter and Facebook for news and information has increased among American adults since 2013 (Barthel et al. 2015), a trend evidenced more widely in recent years (Statista 2020a, 2020b). Lustig's YouTube lecture "Sugar: the bitter truth" (2009a), viewed more than 11.1 million times (October, 2020), has been described as a turning point in the revitalization of the anti-sugar narrative (Winkler 2013). The rise in Internet use and the extent to which people not only consume but produce content is likely to have amplified the reach of the lecture through a variety of interdependent processes. Khan and Sievenpiper (2016) noted that Lustig's lecture was followed by a steady increase in the number of editorials, commentaries, and opinion pieces in the scientific literature denoting sugar (especially fructose) as hazardous to health. Moreover, well-established and highly regarded (peer-reviewed) scientific journals with a large readership gave a platform to these arguments. For example, "The toxic truth about sugar" (Lustig, Schmidt, and Brindis 2012) was published in *Nature*, "Sickeningly Sweet: Does Sugar Cause Type 2 Diabetes? Yes" (Lustig 2016) in the *Canadian Journal of Diabetes*, "No sweet surrender" (Loefler 2005) in the British Medical Journal, "Pure white and deadly … expensive: A bitter sweetness in health care expenditure" (Castro 2016) in *Health Economics*. It is likely that these developments gathered momentum because various audiences were receptive to them, given the prevailing social, economic, and political concerns relating to the health consequences of the rise in obesity, and, more recently, diabetes.

In these articles, scientific scholars articulate an explicit warning about sugar consumption. First, there is a description of sugar as toxic, dangerous, and addictive, in which sugar is compared with substances, such as tobacco (Gearhardt et al. 2011), alcohol (Gearhardt et al. 2011; Lustig 2013, 2010), opiates (Thornley and McRobbie 2009) and cocaine (Gearhardt, Roberts, and Ashe 2013). Lustig, Schmidt, and Brindis (2012), for example, claim that sugar is toxic and argue that, like tobacco and ethanol, sugar (mainly due to its fructose component) is a dangerous substance that should be regulated and controlled. Similarly, Loefler (2005) argues that "sugar should be classified as a hard drug, for it is addictive and harmful" (835). Bray (2010) argues that even if sucrose is natural, "natural is no assurance of safety. Morphine, strychnine, and arsenic are all 'natural' but not safe" (1004). Johnson, Sanchez-Lozada, and Nakagawa (2010) argue that excessive fructose intake "should be considered an environmental toxin with major health implications" (2036). The arguments relating to the alleged toxicity and addictiveness of sugar have also found their way into mainstream media, and hence reached large audiences. For example, newspaper articles such as "Robert Lustig: the man who thinks sugar is poison" (*The Guardian*, April 24, 2014), "Sugar Is Definitely Toxic, a New Study Says" (*Time Magazine*, October 29, 2015), and "Sweet and vicious: Is sugar toxic?" (*New York Times Magazine*, April 13, 2011), illustrate how research from some of the aforementioned scientific articles have made the transition to a much wider audience.

Second, sugar consumption is strongly linked to the development of obesity and a number of diseases associated with metabolic syndrome (Basu et al. 2013; Castro 2016; Lustig 2009b, 2010, 2016; Malhotra 2013; Nguyen and Lustig 2010; Ivancic 2018). In particular, sugar consumption is identified as one, and often *the*, most important cause of the so-called obesity epidemic (Bray, Nielsen, and Popkin 2004; Johnson et al. 2007; Loefler 2005; Lustig 2009b, 2010; Taubes 2013). In an article entitled "The fructose epidemic", Lustig (2009b, 10) portrays sugar consumption itself as an epidemic and argues that "... consumption (both high fructose corn syrup and sucrose) has increased coincidentally with the worldwide epidemics of obesity and metabolic syndrome". The use of the word "epidemic" implies that something is not only widespread and increasing but also contagious. Even if used metaphorically, its use implies a crisis that is spiraling out of control, which can tend to generate feelings of alarm and panic. Thus, using the term "epidemic" to refer to sugar consumption, obesity and diabetes can be viewed as the foundation on which the anti-sugar narrative is built and develops. Although use of the term "obesity epidemic" has been increasingly questioned (Campos et al. 2006; Monaghan, Colls, and Evans 2013), it continues in debates about the importance of dietary sugar. The argument that sugar is the main cause of the "obesity epidemic" has also been transmitted via the media through articles such as "Sweet and vicious: Is sugar toxic?" (*New York Time Magazine*, April 13, 2011), and "'Sugar is the new tobacco': cuts to amounts hidden in food could halt obesity epidemic, claim doctors." (*The Independent*, January 9, 2014).

There is also evidence that scientific arguments on the dangers of sugar have penetrated mainstream media channels. According to Van Buul, Tappy, and Brouns (2014), Lustig and colleagues' arguments relating to the toxicity of fructose gave rise to international coverage in the daily news, which highlighted fructose as a potential poison. Publications in (non-tabloid) newspapers such as *The Guardian* ("Sugar, not fat, exposed as deadly villain in obesity epidemic": March 20, 2013 and "'We need people to get angry about sugar' says leading cardiologist": November 18, 2015) illustrate this point. Documentary films communicating anti-sugar messages such as "That sugar film" (2014), "Fed Up" (2014), "Sugar coated" (2015) and "The truth about sugar" (2015) have obtained substantial public attention and reached large audiences.[1] Furthermore, the dynamic between scientific publications and wider media is multi-directional and complex, especially in the current era of the Internet and use of social media, as outlined above. It has been increasingly recognized that media narratives such as these are processes that construct meanings rather than merely being reflections of scientific reality (Henderson and Hilton 2018). Furthermore, the film "Fed Up" seems to have influenced subsequent media coverage of topics on the health effects of sugar consumption (Rezapour and Diesner 2014). The scientific evidence to support these claims, however, is somewhat more problematic and complex, and it is to this we now turn.

The physiological basis for the sugar as toxic narrative

High sugar consumption has been associated with a number of diet-related conditions (Dhingra et al. 2007; Malik et al. 2010; WHO 2015). Notwithstanding these concerns, here we focus on the core issue underpinning the anti-sugar narrative, namely, the assertion that sugar is toxic and thus a major cause of diet-related health problems (Basu et al. 2013; Bray 2010; Bray, Nielsen, and Popkin 2004; Castro 2016; Johnson

et al. 2007; Loefler 2005; Lustig 2010, 2016; Lustig, Schmidt, and Brindis 2012; Nguyen and Lustig 2010; Yudkin 1986).

The most commonly consumed sugar is sucrose and, in some countries, high fructose corn syrup (HFCS), both of which are composed of glucose and fructose in approximately 50:50 mix. Glucose is also the building block in starch, found in rice, cereals, corn, potatoes, etc., which globally is the most abundant nutrient in the human diet. The assertion that sugar is toxic is mainly directed toward the fructose part of sugar, which has been increasingly portrayed as particularly harmful to health (see, for example, Lustig (2010) and Bray (2010)). This assertion is based on the different way in which fructose is metabolized in the body compared to glucose. While glucose can be metabolized by cells in virtually all body tissues, fructose is primarily dealt with by liver cells (Tappy and Le 2012; Lustig, Schmidt, and Brindis 2012; Parks et al. 2008; Stanhope et al. 2009) where it can enter different pathways, and amongst others be converted to fat. The way fructose is metabolized in the liver is claimed to increase the risk of several health conditions, such as obesity, insulin resistance, hypertension, coronary heart disease, and fatty liver (Lustig 2010).

Although claims about the negative health effects of fructose might be physiologically plausible, it is critically debated whether and to what degree fructose might have these effects. Furthermore, even though fructose (and other sugars) under particular conditions can have negative consequences, the scientific research that portrays sugar as toxic has been fairly extensively criticized. First, research indicates that the health effects of fructose are dose-dependent (Angelopoulos et al. 2016; Van Buul, Tappy, and Brouns 2014). Yet studies where very high levels of fructose are ingested tend not to reflect levels consumed in everyday life (Gibson et al. 2013; Kolderup and Svihus 2015). Many of the claims of negative health effects of fructose are linked to its potential to be converted to fat in the liver. However, in most studies, an intake of fructose >100 g/day would be required for indications of increased fat production and subsequent increased risk of cardiovascular disease (see, for example: Silbernagel et al. 2011; Kolderup and Svihus 2015). Estimates of fructose intake from both Norway and the U.S. show that the average intake is approximately 50–60 g/day (Chun 2010; Kolderup and Svihus 2015). Studies from the US have also shown that relatively few in the population consume levels over 100 g/day (Sun et al. 2011; Marriott, Cole, and Lee 2009).[2] Nevertheless, a review by Van Buul, Tappy, and Brouns (2014, 125–126) concluded that "Based on the currently available data . . . any statement that ordinary fructose intake is toxic and that consumption of fructose-containing drinks are the leading cause of the global obesity epidemic is not supported by scientific consensus". Papers that omit any discussion of the effects of sugar being dose-dependent (such as Loefler 2005) or do not explicitly highlight the importance of the dose of intake, may thus give an impression that sugar is harmful at any level of intake. In addition to the amount consumed, several other factors may also influence the effect of sugar, such as the energetic conditions under which sugars are eaten, diet composition, and individual physiologic factors (Hellerstein 2002). Thus, to portray sugar as "toxic" without taking into account these other factors oversimplifies a much more complex metabolic phenomenon.

Second, the attention given to fructose obscures the putative role of glucose. Through conversion to fat in the liver, glucose may have many of the same health effects as fructose, although a larger intake of glucose is necessary for this conversion to take place (Svihus and Hervik 2016). Because dietary sources of glucose include starch, intake of

glucose tends to far exceed the intake of fructose in the human diet (the glucose:fructose ratio in human diet has been estimated to be >5:1 (White 2013)). Thus, to claim that fructose is toxic without also to some degree focusing on glucose, further contributes to the oversimplification of a more complex scientific picture.

Third, it is also debated whether the potential negative health effects of sugar are directly related to sugar intake per se or if they rather are a result of excessive energy intake (Ha et al. 2015; Stanhope 2016). This points toward the need for more high-quality human studies of sugar intake without the combined effects of weight gain.

This brief outline of some important criticisms of the sugar as toxic narrative illustrates the way in which the provisional status of scientific knowledge and associated caveats relating to complex mechanisms can be lost in translation. If the aim is to popularize science by generating an eye-catching headline – which media of all types position themselves to do (see, for example, Nelkin (1995)) – then brevity and use of language come to the fore in framing the article rather more than scientific complexity and nuance. An outcome of this process is often the creation of an alarmist headline or hashtag, which may well be likely to generate emotional responses among readers. Evidence from many studies over several decades indicates that most diet-related conditions are multifactorial and are rarely, if ever, reducible to a single nutrient (Blundell et al. 2010; Hruby and Hu 2015), with sugar being no exception (Rippe and Angelopoulos 2015). In sum, the scientific rationale underpinning the sugar as toxic narrative is partial and creates a rhetoric that oversimplifies complex metabolic processes alongside disregarding the uncertainty attached to provisional knowledge.

Ideological underpinning of the sugar as toxic narrative

The sugar as toxic narrative has much in common with the well-established health-related discourse relating to an obesity epidemic. The underlying premise of the latter discourse is the notion of a widespread, rapid, and uncontrollable increase in the incidence of overweight and obesity as the main health threat in a large proportion of high-, middle- and low-income countries and a potential global health disaster (e.g., Gard and Wright 2005; Monaghan, Bombak, and Rich 2017; Shugart 2011). The warnings related to the obesity epidemic have often been communicated as alarmist messages (Shugart 2011), and many public health officials, scientific scholars, and journalists have accordingly used the metaphor of a "war on obesity" (Herndon 2005; Monaghan 2008). Throsby (2020, 13) argues that "without the 'war on obesity', there would not need to be an attack on sugar, whose primary sin is its presumed role in weight gain".

Discourses express ideologically based opinions. The obesity discourse, for example, has been delineated in terms of the predominance of neoliberal values (e.g., LeBesco 2011; Monaghan, Bombak, and Rich 2017) and, relatedly, healthism (e.g., Rich and Evans 2005; Varea and Underwood 2016; Shugart 2011). Both neoliberalism and healthism are centrally underpinned by notions of individual moral responsibility for oneself and one's health in particular (Ayo 2012; Crawford 2006). Falling short in taking care of one's health is viewed as a failure of character (Blaxter 1997) and Herzlich and Pierret (1987) point out that "Today the 'right to health' implies that every individual must be made responsible for his or her health and must learn to adopt rational behavior in dealing with the pathogenic effects of modern life" (p. 231). People who are overweight or obese,

therefore, are regarded as willfully refusing to, or being incapable of, taking responsibility for their own health (Monaghan 2007). As a consequence, obesity is often seen as a moral failing (Heley et al. 2019). Health is thus viewed as a moral imperative, which should take precedence over all other imperatives (Crawford 1980).

The anti-sugar narrative converges with this discourse because sugar consumption is perceived as a major driver of overweight and obesity (Bray, Nielsen, and Popkin 2004; Loefler 2005; Lustig 2009b, 2010; Taubes 2013). Hence, the value and belief in the moral responsibility of autonomous individuals always to act with health – or here, more specifically, sugar consumption and weight control – in mind, underpin both narratives. Throsby (2018) argues that sugar is presented in policy documents, scientific writing, and media presentations as a "specific and urgent public health threat about which something must be done – an urgency which echoes the familiar justificatory rhetorics of the 'war on obesity'" (955).

Discourses relating to healthism, obesity, and sugar are formed partially through the use of language likely to seize people's attention and evoke an emotional reaction. A number of moral imperatives are embedded in the rhetoric relating to sugar and its consumption. Crawford (1977) explicates how neoliberalism promotes the idea that individuals should take responsibility for their health, and, at the same time, invokes blame when they are in need of care and support. A neoliberal view emphasizes responsibility for "oneself" and one's actions, especially those relating to health, through self-sufficiency, self-governance, self-surveillance, and self-regulation (Crawford 2006; Hervik and Thurston 2016). Neoliberal views on health have also been described as moralistic in the sense that prudence and responsibility for health are viewed as an obligation and duty of citizenship (Ayo 2012; LeBesco 2011). According to Throsby (2018), this individualization of health is exemplified by the case of sugar where there is a "boundary between the 'good' citizenship of the abstainer who makes good choices and behaves with good sense and the perilous over-consumption of the chaotic consumer of sugar" (964). More specifically in terms of our analysis, use of the terms "toxic" and "toxicity" imply a lack of moral responsibility among those who continue to (over)consume sugar.

The notion of individual responsibility in the obesity discourse has connotations of moralism and the associated sense of guilt and shame if one falls short (e.g., Bombak 2015; Taylor 2011). Given the social class gradient in relation to sugar consumption and obesity prevalence, the reproduction of blame, shame, and stigma fall disproportionately on those in lower social classes (Monaghan, Bombak, and Rich 2017; Ivancic 2018). As early as 1975, Dufty reflects the moral imperative associated with individualizing sugar consumption when he states that one must suffer the pain of withdrawal when cutting down on sugar, take personal responsibility for one's health through reducing sugar intake and stop being "a nymphomaniac for fudge" (Dufty 1975, 105). Mechling and Mechling (1983) argue that when sugar is treated negatively, consumption of sugar becomes something dirty or a sin, and since consuming sugar is believed to be solely an individual action, those who consume it become dirty or a sinner. In the same vein, Haslam and Haslam (2009) argue that in moral terms today's cigarette is the high fat, high sugar snack. These examples illustrate how moralism is attached to sugar and its consumption especially since responsibility pivots on the notion of knowingly consuming something toxic.

Given that popular narratives shape views about particular foods, eating "unhealthy" sugary food can become a moral issue associated with stigma (Fletcher et al. 2007). Steenhuis (2009) found that women participating in her study often felt guilty when

eating snacks high in sugar, such as cake and biscuits. In the same vein, Pescud and Pettigrew (2014) observed that mothers felt guilty about feeding their children foods high in sugar, even if they offered their own rational reasons for doing so, such as low cost, time constraints and fear of their child experiencing hunger in the future. Alongside feelings of guilt, Macht, Gerer, and Ellgring (2003) found that women eating energy-dense foods also felt shame and sadness. They argue that these negative emotions are based on "culturally determined attitudes to health, slimness and body weight" (Macht, Gerer, and Ellgring 2003, 372). Feelings of guilt related to eating foods perceived to be unhealthy, however, have been found not to alter eating habits (Hur and Jang 2015; Kuijer and Boyce 2014). Thus, the emotional consequences of the hegemonic rhetoric of individualism are part of the everyday experience of consuming a sugar-laden diet and tend not to be a basis from which nutritional changes emerge.

Sugar as toxic – a moral panic?

Several features of what constitutes a moral panic have been outlined by scholars. First, according to Campos et al. (2006, 58), moral panics "involve an exaggeration or fabrication of risks, the use of disaster analogies, and the projection of social anxieties onto a stigmatized group". With regard to the sugar as toxic narrative, disaster analogies are conveyed using words such as "epidemic", "deadly", "health hazard" and "toxic" when describing sugar, and also when it is compared to substances known to be health-harming. In her work on the moral value of sugar abstention, Throsby (2018, 955) argues that "Sugar emerges as an over-determined node for social and medical anxieties about 21st century health, bodies and consumption". The individualization that we argue is embedded in the anti-sugar narrative can give rise to the stigmatization of those who (over)consume sugar onto whom the social anxieties of others are projected. In this way, notions of a moral panic become associated with particular disadvantaged social groups.

Second, and interrelatedly, a further characteristic of moral panics, is that the general attention and response to the perceived threat is disproportionate to the actual danger posed: that is to say, the public concern about the "threat" overstates the actual danger of the subject at least according to extant scientific knowledge (Cohen 1972). The scientific evidence on the health effects of sugar is debated. Yet in the sugar as toxic narrative unequivocal conclusions are drawn, which leads to sugar being portrayed as toxic. Thus, during dissemination the complexity of the relationship between sugar and health tends not to be sufficiently accounted for. However, the threat implied in a moral panic can be genuine, but is typically disproportionate to the level of fear and alarm raised (Goode and Ben-Yehuda 1994). Again, this is well illustrated in relation to sugar, as we have shown.

All scientific evidence requires intelligent interpretation. This is particularly the case with regard to evidence in the public health field where an appreciation of the provisional status of knowledge and the methodological limitations of studies is particularly important when developing evidence-informed policy. In this regard, the exaggeration of the harms of sugar consumption and the oversimplification of the complexity of causal mechanisms at the metabolic level raises the emotional level of the discussion and, in the process, confuses the scientific debate. Fischler (2011, 220) argues that "medicalization and individualization of food and eating (. . .) echoed and amplified by the media, lead to a 'nutritional cacophony' and various degrees of anxiety associated with questionable diets, eating disorders and no

reduction in the prevalence of obesity". We argue that the partial communication of provisional and uncertain scientific evidence, alongside the presentation of emotive and exaggerated messages contribute to the "nutritional cacophony", generating anxiety and a more generalized moral panic rather than contributing to a scientific understanding of an important and complex issue. Furthermore, these overstated messages create disproportionate attention, a consequence of which is that attention is deflected away from other factors involved in the development of complex and multifactorial diet-related health conditions. This has implications for both public health policies and prevention and treatment of diet-related health conditions.

Second, the individualization and moralism embedded in the sugar as toxic narrative seem to be predicated on an unsubstantiated view that "frightening" people can provoke them into altering their behavior. However, such an approach is unlikely to lead to the desired changes in sugar consumption without structural measures being taken (c.f. Witte and Allen 2000; Michie and Abraham 2004). Furthermore, Bleakley et al. (2015) found that fear-based communication of health-related issues can lead to more stigma than other forms of emotional communication (such as humor). A moral panic is especially projected onto those who tend to have least control over their own circumstances. The stigmatized groups – in this case those tending to consume more sugar – follow social patterns (McNeill et al. 2017). Hence, the moralism embedded in the sugar as toxic narrative strikes in ways that are patterned by class, gender, and ethnicity (Throsby 2018).

Although some scholars who promote an anti-sugar narrative call for measures at a societal level to reduce sugar intake (e.g., Loefler 2005; Lustig, Schmidt, and Brindis 2012), the feelings of guilt and shame are experienced at an individual level. Individualizing responsibility for reducing sugar intake neglects the interdependent relationship of people with a saccarogenic environment – an environment that drives sugar consumption.

The neoliberal values associated with individualization are, furthermore, likely to be negative for the agency of individuals. People living within societies where neoliberalism is the dominant discourse tend to express notions of health-related agency (Crawshaw 2012; Peacock, Bissell, and Owen 2014). However, studies have shown that people living in more collective-oriented societies in which the neoliberal views are less dominant, express and experience more health-related agency (Flavin, Pacek, and Radcliff 2014; Hervik and Thurston 2016). It is also worth noting Kirkland's (2011, 464) argument that political and collective efforts can also give rise to processes of moralization relating to food choice and lifestyle through "an unconscious imperialism", which aims to encourage people of lower socioeconomic status, people of minority groups and so on, to adopt the habits and attitudes of the "educated elite". We suggest, however, that a shift from the individualization of responsibility toward a focus on political and collective societal efforts would be beneficial, given the emphasis it gives to creating the conditions within which real agency in relation to health can be expected.

Conclusion

Some nutritional scholars and other scientists engaged in the field of nutrition and health have shown a tendency to communicate anti-sugar messages, which subsequently penetrate various media. We argue that these messages constitute a sugar as toxic narrative. Partial communication of somewhat inconclusive science alongside the use of emotive language

generates a discourse that can create or contribute to creating a moral panic. Eye-catching titles accompanied by oversimplified messages are more likely to engage public attention and raise awareness of the issue. However, we conclude that if the issue is complex, the science incomplete and the commercial imperatives potentially large, as in the case of sugar, this gives rise to a provisional, uncertain and confusing body of knowledge. As we have argued, this creates a context within which various actors can create narratives that are polarized and exaggerated, which are then communicated via popular media, including news media. The implication of this situation is that considerable challenges emerge for those working in the field of communicating evidence-informed public health messages relating to helping the public make healthy choices relation to nutrition in general and sugar in particular. What we have shown is that as far as sugar consumption is concerned, science – particularly within the sugar as toxic narrative – tends to be emotively communicated and ideologically driven in a way that may create further problems and deflects attention away from a more serious debate about the diet and nutrition environments that surround people. Moreover, we think that this point has wider relevance for the communication of other nutritional and health-related issues, but also scientific evidence more broadly, in which processes of politicization – as we are seeing in relation to the COVID-19 pandemic – create an, at times, chaotic and confusing information environment.

Notes

1. "That sugar film" and "Fed Up" were both on Itunes top 50 list of documentaries in their respective years.
2. While estimates of sugar intake worldwide indicate that in most populations it is either decreasing or stable, consumption may be increasing in some countries and in some population sub-groups, where high consumption tends to be class-related (Welsh et al. 2011; Wittekind and Walton 2014; Ivancic 2018).

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