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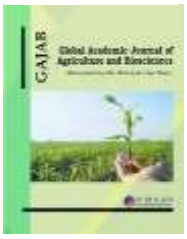

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Review Article

The Enlightenment of Food Emotions with COVID-19

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Abstract: Gustatory stimuli and olfactory can elicit strong emotional responses and are crucial in the perception of food. Yet, the major theories of emotion frequently underrepresent them, and our understanding of emotional phenomena mainly relies on experimental research on visual and auditory stimuli. Though clue is still being collected today, current results indicate that the COVID-19 related to decreased taste and olfaction. Here, I examine how this unprecedented and rare spread of taste and olfaction loss on a global scale, how to inspire the emotions of these senses, and the extent to which they affect food perception.

Keywords: COVID-19, food emotions, taste, and olfaction.

INTRODUCTION

Humans have a superior sense of odor than frequently believed [1]. Humans are equipped to scent billions of various smell [2] and they can track smell in a field like dogs [3]. Gustatory and olfactory stimuli elicit strong emotional reactions [4, 5], and are sometimes even more effective than auditory stimuli or visual [6]. Yet, the major concepts of emotion often fail to fully consider them. For example, emotions caused by odors are not suitable for basic emotion groups [7]. Based on empirical information, it is possible to make observations similar to those commonly found in emotional theory. Though a small group of researchers studies the two-way connection between smell, flavor, taste, food, and food emotional phenomena [8], our understanding of emotion depends mainly on experimental research performed on auditory stimuli and visual. Does anyone hope that the emotional sciences literature will become more inclusive of other sensory modalities in the near future?

Although data is still collecting at this time, more than 4,000 participants have reported that COVID-19 is related to a decrease or loss of taste and smell [9]. Many other shreds of evidence have reached the same outcome [10-15]. About odor, this implies that the opinion of olfactory compounds from the outside globe (i.e., nasal smell; e.g., smelling roses) and the sense of smell in the mouth through food and beverages (post-nasal smell; e.g., sensing of strawberry taste) are both changed. This feeling may diminish (hyposmia) or disappear (insomnia). Therefore, usually only hyposmia (5-8% of the population)/anaerobic (about 1% of the population) [16] individuals can experience it, and a large part of the earth may experience it quickly. When considering the sense of taste that is bitter, sweet, and salty, the contest between the proportion of the population that is usually troubled by these conditions and the large population that may be affected by COVID-19 health crises is even more pronounced. Dysgeusia is decreased taste and ageusia. In other words, loss of taste is much less than anosmia/hyposmia, and only five percent of patients consulted in taste or smell clinics have taste disorders [17]. The unprecedented spread of smell and taste changes in the crowd may make people never realize the importance of these ways of feeling

to a person's mental functions, including a person's emotions, especially food-induced emotions.

Different functions of smell are directly related to emotions [18]. A healthy sense of smell can especially avoid the environmental hazards associated with fear and aversion. Anosmia is accompanied by the fear of being unable to avoid non-microbial ecological hazards, for instance, gas leakage or fire [19]. Although microbial hazards are also a problem: rotten odors, feces, or vomit can cause changes in nausea and potentially unsuitable behaviors without the sense of smell. Besides, it is very difficult to find spoiled food and feel disgusted, which may lead to an unfortunate intake of inappropriate food. Furthermore, even considering completely consumed food, many people with anorexia will encounter food-related problems. Since the post-nasal sense of smell is crucial to perceiving odors (e.g., that is, "perception includes taste when eating food and beverages, oral somatosensory, and post-nasal olfactory signals") [20], the hedonic value of nutrition has dropped sharply is common insomnia. For example, when eating a strawberry, an anosmia person may think it is sweet and sour (due to taste input), but the flavor of the strawberry will no longer survive (because of the unavailability of olfactory input). In society, people with anosmic have also reported some negative results: individuals may feel unsafe regarding their body odor; feel angry, isolated, depressed, etc., because their obstacles are understood (as opposed to deafness or blindness); in some feeling uncomfortable in a social environment such as eating and unable to establish with them. The growing evidence that human odors express information regarding emotions [21] anosmic patients may also need important information about the emotions of others. Also, the loss of smell makes it impossible to enjoy daily odors such as spring smells or cooking smells and usually does not cause inadequate pleasure. Paradoxically, in the spring of 2020, the COVID-19 hit most countries, which may make this aspect especially salient. Lastly, depressive symptoms and mood changes are also common in patients with anosmic [22]. Therefore, the sense of smell and taste is lost at a high emotional price, especially when food-related behaviors are hit.

In addition to the human sense of taste and /or smell, the multimodal nature of tastes requires more consideration of how other receptors in the oral cavity, for instance, receptors that respond to touch, pain, and temperature, are also influenced by COVID-19. There is still scarce evidence today, but an association between COVID-19 and the stated changes in chemical sensations (responsible for cooling, tingling, and burning) modification has been reported [8]. More generally, we are just beginning to find how COVID-19 affects sensory responses related to food consumption and mood.

Worthlessly, COVID-19 is not the just disease related to loss or reduced taste and/or smell: multiple sclerosis, epilepsy, cancer, Alzheimer's disease, Parkinson's disease, etc. [13] are also related to dysfunctions of smell and taste. Cancer specifically illustrates the importance of taste and smell to food intake: in cancer patients, malnutrition is very common, and changes in smell and taste may at least partially contribute to this malnutrition, such as prevalence [23] and training [24] research. In the future, it may be particularly useful to try to sort out and compare the effects of various diseases on taste and/or smell. For example, the Global Chemical Sensory Research Consortium is an international research group dedicated to taste and smell. It is currently trying to find the effects of various respiratory diseases (such as influenza and cold) from the effects of COVID-19 on taste and/or smell.

If the emotional science literature were to include more description of the emotions induced by taste and smell, how would it proceed? First of all, when revising or expounding the theory of emotion, we need to consider these ways of feeling and touch. Vision and hearing are obviously indispensable sensory methods, but other sensory methods or multimodal stimulation are hardly excluded. Such as, the cross-modal interaction between smell and taste [25, 26], and tactile input has been indicated to have an influence on food perception, flavor, and evaluation. More commonly, multimodal stimulation seems to be important for research because the emotional content of a stimulus comes from numerous sensory methods. Second, although smell and taste do have a practical limitation, their usage in an experimental setting may be particularly useful in certain sub-themes of science (e.g., the connection between memory and emotion). First, these practical restrictions are maybe worrying. For instance, taste and smell require to be stowed under suitable conditions (e.g., within a temperature range), and their stability needs to be evaluated regularly during the experiment. Besides, if properly equipped and trained, these restrictions are easy to manage. Devices such as cyclones and olfactory meters can accurately transmit odors and liquids, respectively, and may be adapted to various experimental requirements. Different experiments have successfully used smell and tastes global settings [27], or in unstable backgrounds, such as functional Magnetic Resonance Imaging (fMRI)[28, 29]. It is anticipated that the COVID-19 health crisis will stimulate more research on the connection between smell, flavor, food, taste, and emotion. In the long

run, this may lead to an emotional theory that explains all sensory forms and their connections, which will be a real development for food science.

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