

Environmental noise's effect on food reward

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ABSTRACT

Food rewards include both wanting and liking, yet these emotions are expressed in very different brain substrates. While like is linked to consummatory and hedonistic experiences, desire indicates anticipatory and motivating activities. Additionally, behavioural paradigms have quantitatively segregated these various constructs. Indeed, how much food is appreciated depends on internal, physiological, and interoceptive factors. However, it is still unknown how these appetitive and rewarding reactions to food may be influenced by contextual sensory cues. We used an online version of the Leeds Emotional Response Scale to investigate the effects of environmental soundscapes on explicit liking, explicit wanting, implicit wanting, choice frequency, and reaction time of healthy/unhealthy food in light of the growing empirical focus on sound in food research. dietary preference survey. To elicit emotional relaxation and arousal, loud restaurant noises and soft natural noises were used, respectively.

One time with each soundscape playing in the background, 101 healthy university students performed a repeated-measure design of the LFPQ. Although the post hoc analyses failed to approach significance, generalised linear mixed model analyses found a significant interaction effect between soundscape and meal type on choice frequency. There are no known interactions between soundscape and meal type that affect craving or liking. However, hypothesis-driven studies indicated no influence of soundscape on any desiring measures (explicit or implicit), although nature sounds boosted explicit liking of healthy (vs. harmful) foods. Finally, exploratory analysis showed that noise from restaurants generated faster response times for both healthy and unhealthy items (as opposed to noise from outdoors). The study serves as an example of how contextual audio manipulation of certain food reward measures and decision processes is possible in an online setting
Keywords: Food rewards; Hedonistic experiences; Consummatory; Dietary preference survey

INTRODUCTION

The intrinsic rewards of food influence numerous physiological and psychological processes that come after. Conceptually, these include systems for inspiration, fun, and education. Hedonic pleasure and incentive motivation/salience, also known as "liking" and "wanting," are equally important in the reward circuitry of the brain and are probably equally important to the latter, which has received the majority of attention in computational models. Although they are related, the brain foundations that give rise to liking and desiring are essentially distinct. While the striatal dopaminergic system controls anticipatory and motivating behaviours of desiring, consummatory and hedonic eating experiences of like are connected to the "hedonic hotspots" in the endogenous opioid system. The majority of techniques used to behaviorally quantify these various food reward components, however, have been limited to self-report measures like liking for or desire to. These are often not measured implicitly; instead, they are evaluated using explicit rating instruments, such as Visual Analogue Scales (VAS). The

multidimensionality of food reward has only been operationalized by a few numbers of instruments using more thorough frameworks. The Finlayson, King, and Blundell-created Leeds Food Preference Questionnaire (LFPQ) integrates explicit and implicit food reward responses into a single paradigm. In particular, the LFPQ uses motivation and pleasure ratings, a response time-based forced-choice approach, and motivation and pleasure ratings to behaviorally distinguish explicit liking, explicit desiring, implicit desire, and relative preference. Since then, this computer-based platform has been translated into other languages and used largely to research various homeostatic and physical factors on food reward, including hunger, weight, and/or activity status. In addition to internal, physiological, and interoceptive emotions, external influences also influence how people value food. In reality, several effects of contextual cues in the dining environment on food sensation, valuation, and behaviour have been shown by a substantial body of sensory and consumer research. Numerous studies emphasising the underappreciated power of sound and music have caused an

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especially dramatic increase in auditory contributions to this subject over the past ten years. These include adjustments in taste/flavor perception and food choice attentiveness. The subjective and self-reported measure of like has also been extensively researched in relation to taste and sound. The general view among researchers is that louder background music or restaurant noise makes people less likely to enjoy flavours. According to Bravo-Moncayo et al., attentional processes can be used to explain these events since "louder noise may reduce the ability to pay to certain components of the experience." Evidence of sensation/emotion transference, affective priming, or embodied cognition, all of which occur when listening to ambient soundscapes, can be used to support an alternative hypothesis. Researchers Xu et al. and Biswas, Lund, and Szocs showed using biometric measurements that listening to loud music and music with negative connotations respectively increased physiological arousal, which was then linked to additional behavioural and perceptual consequences (i.e., food choice and taste intensity). This implies that arousal states can be increased (vs. lowered) by extremely loud (vs. gentle) noise, which affects experiential food like. Contrarily, noises that are positively connected with the environment, such as bird singing or ocean waves, seem to encourage emotional relaxation and, consequently, consistent eating choices. The body of research shows that contextual aural

signals can affect people's internal physiological and psychological states, which in turn affects how they choose and consume food. This is shown in the conceptual model of food reward and associated drivers in. However, measures of subjective liking are at the core of the present research on sound-evoked food reward. We sought to broaden the scope of the existing measures of food reward in light of this empirical framework and its constraints. We specifically looked into how environmental sounds affected several reward metrics recorded by the LFPQ. To enhance the emotional induction of the soundscapes and determine the combined auditory influence on explicit liking, explicit and implicit desiring, as well as the choice of healthy and unhealthy foods, we changed both background sound type and volume. When compared to loud restaurant noise, which induces high levels of arousal and tension, we anticipated that soothing nature sounds, which promote low arousal and relaxation, would boost reward (value) of healthy (vs. unhealthy) food. Regarding the particular incentive measures, we did not establish any a priori hypotheses. However, since explicit liking and personal preferences may be a more grounded quality, one may anticipate that the presumably more context-dependent and fleeting desiring would be more vulnerable to sensory cues, leading to a higher degree of variations between auditory situations.