

Abstract

The global incidence of obesity exceeded one billion individuals in 2022 (NCD Risk Factor Collaboration (NCD-RisC), 2024). Furthermore, the prevalence of severe obesity within populations has more than doubled since 1990 and has quadrupled among adolescents aged 5 to 19 (NCD Risk Factor Collaboration (NCD-RisC), 2024). The implications of obesity are manifold, encompassing physical, psychosocial, and economic burdens, such as hypertension, type 2 diabetes mellitus, depression, anxiety, and significant healthcare costs (Guh et al., 2009; Tremmel, Gerdtham, Nilsson, & Saha, 2017). In addressing overweight and obesity, dietary choices play an important role alongside other interventions (Burke & Wang, 2011). It is therefore essential to understand how a healthy diet can be promoted.

A strong influence on food choice lies in the perceived health and taste characteristics of individual foods. A recurring nutrition study carried out in Germany, utilizing data from a representative Forsa survey, indicated that the primary factors influencing food choices are healthiness and tastiness (Techniker Krankenkasse, 2017, 2023). Nevertheless, despite the perceived significance of a healthy diet among many individuals, there seems to be a disparity between this awareness and the food choices made in practice.

One challenge in opting for healthy foods stems from the perceived conflict between short-term gratification and long-term gains. Tasty foods offer immediate sensory pleasure, serving as a compelling primary reward. Conversely, committing to a healthy diet offers prospective long-term advantages but necessitates resisting the immediate gratification of less healthy alternatives in the moment. This decision can be understood as a type of intertemporal choice, i.e., a decision between a small but sooner available reward and a large but delayed reward (Ainslie, 1975; Samuelson, 1937). Given the profound impact of food choices on both individual well-being and societal health, numerous studies have already investigated the factors that influence decisions favoring healthier food options. However, the precise mechanisms through which these factors impact the decision-making process and affect the processing of health and taste characteristics are still unknown.

Hence, the aim of the present thesis is to investigate how health and taste properties impact the decision-making process over time. This knowledge could be used to identify and further develop strategies to encourage healthier food choices. I investigate the influence of health and taste characteristics in two ways by examining the influence of context-based and item-based

factors in choosing between a healthy but less tasty and an unhealthy but tasty food. As context-based factors, I conduct a direct comparison between explicit and implicit manipulations to assess their effects on the temporal processing of health and taste attributes. Additionally, as an item-based factor, I investigate how the modality of stimulus presentation, i.e., whether food items and their perceived health and taste properties are presented visually as images or in text format, affects food choices and the underlying decision-making process.

In Study I, I compared two context-based influences on food choices. First, I compared the influence of cues to focus on either short-term or long-term consequences as an explicit manipulation. Second, I compared the influence of priming participants with a mindset toward a balanced diet and a mindset with unrelated content as an implicit manipulation. I used mouse-tracking as a process-tracing method to calculate the impact of health and taste attributes over time. I expected that a mindset favoring a balanced diet (implicit manipulation) and the focus on long-term consequences of food choices (explicit manipulation) would support healthy food choices. Furthermore, an enhanced consideration of health aspects should manifest in participants' mouse movement patterns. Encouraging a focus on long-term consequences over short-term ones resulted in a greater number of healthy choices, decreased response times for healthy decisions, and heightened the impact of health considerations in the decision-making process. The impact of the implicit manipulation showed greater variability. While emphasizing long-term consequences facilitated healthier food choices and reduced decision conflict, the present mindset seemed to have a minor effect.

In Study II, I focused on item-based influences on food choices. I examined the influence of the modality of stimulus presentation on food choices and decision conflict. In one condition, food items were shown as images. In the second condition, they were represented by percentages reflecting their respective health and taste attributes (e.g., 80% healthy and 30% tasty), as rated by each individual participant. I employed electroencephalography (EEG) to calculate mid-frontal theta band oscillations (4-7 Hz frequency range) as a neural conflict marker. I expected more impulsive (i.e., unhealthy) choices in the image condition compared to the text condition and increased mid-frontal theta power for healthy compared to unhealthy choices and difficult decisions compared to easy decisions. Behavioral results revealed a reduced amount of healthy choices and lower response times in the image condition in contrast to the text condition, indicating a tendency towards more impulsive decision-making in the former. At the neural level, enhanced mid-frontal theta power was observed for healthy choices

over unhealthy ones and for difficult decisions over easy ones, but only in the image condition. These results imply potential disparities in conflict types and/or decision-making strategies between the image and text conditions. These findings contribute to our comprehension of how dietary choices can be steered towards healthier options.

In Study III, I also focused on the influence of the modality of stimulus presentation as an item-based factor. First, I aimed to replicate behavioral results from Study II, and, second, I additionally examined attentional processes using eye-tracking. As in Study II, I expected more impulsive, i.e., unhealthy, choices in the image condition compared to the text condition. In term of visual attention, I expected that more visual attention should be paid on the healthy item while making healthy choices. In contrast, more visual attention should be paid on the tasty item while making unhealthy choices. The analysis of behavior revealed a heightened frequency of unhealthy choices and decreased response times in the image condition compared to the text condition, indicating a higher tendency toward impulsive decision-making when exposed to pictorial stimuli. Eye-tracking data indicated distinct attentional patterns between the two conditions: in the text condition, more attention was directed toward the item corresponding to the subsequent choice rather than the alternative option, whereas in the image condition, this phenomenon was observed solely for the healthy item. These findings suggest potential differences in conflict types and/or decision-making strategies between the image and text conditions. The current results underscore the influence of food presentation format on attentional and decision-making processes, offering valuable insights for promoting healthier dietary choices.

In conclusion, my dissertation reveals that the promotion of healthy dietary choices and the impact of health attributes can be heightened through context-based factors, such as focusing on future consequences, and item-based factors, such as presentation modality. These factors also alter the underlying dynamics of decision-making. Consequently, my research offers new implications for how interventions to promote healthier eating can be better targeted, e.g., by presenting food options in the form of text descriptions rather than images and by integrating personalized taste and health ratings into online shopping interfaces. Overall, this thesis underscores the importance of understanding how individuals process health-related versus taste-related information during decision-making. Focusing on these dynamics raises novel research questions and offers insights into the development of interventions to combat unhealthy eating behavior and its consequences.