Written Testimony before the U.S. House of Representatives Committee on Ways and Means Health Subcommittee Hearing on "Investing in a Healthier America: Chronic Disease Prevention and Treatment"

Ashley N. Gearhardt, Ph.D.

Professor of Psychology

University of Michigan

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Introduction

Chairman Buchanan, Ranking Member Doggett, and Distinguished Members of the committee: thank you for the opportunity to participate in today's hearing. To start, I will briefly outline my qualifications to speak as an expert at today's hearing. I earned my PhD in clinical psychology from Yale University, specializing in addictive disorders, obesity, and disordered eating. I have been on the faculty at the University of Michigan for 12 years, currently serving as a professor of psychology and the director of the Food and Addiction Science Treatment laboratory. Additionally, I am a licensed clinical psychologist with experience treating individuals with substance use disorders, obesity, and compulsive overeating.

Through my clinical experiences, I have gained a firsthand understanding of how hard people are working to try and get control over their eating behavior. I saw that even when people were faced with life threatening health conditions, they often still failed to reduce their intake of highly appealing foods despite being motivated to change. My research has been built on the parallels between what I observed in the clinic and my scientific training on how certain substances can trigger addictive processes that keep people stuck in compulsive and destructive patterns of consumption. In my program of research, I use multi-method approaches to explore the neurobiological, psychological, and behavioral factors that contribute to compulsive overeating across the lifespan. I have published over 175 peer-reviewed articles, including in prestigious outlets like the *JAMA Psychiatry* and *British Medical Journal.*

Rates of Diet-Related Disease in America

Since the 1980s, the United States has witnessed a sharp rise in diet-related diseases. In the last 40 years, the amount of diabetes doubled (1) and the presence of moderate-to-high risk obesity tripled in adults (2). In children, the rise in diet-related disease has been even more

striking. In the 1980s, Type II diabetes in children was almost unheard of, but the Center for Disease Control and Prevention now projects that the rate of this disease will quadruple in children within 40 years (3). Cancer is also a major concern for younger Americans. The rates of 17 out of 34 types of cancer are increasing in younger generations, particularly cancers related to obesity and diet (e.g., colorectal cancer) (4). Obesity and diet-related diseases disproportionately impact rural communities and African Americans/Blacks, Hispanics, and Native Americans, worsening existing health disparities (5, 6). Poor diet-related health also impacts economic viability, reducing workforce productivity and increasing healthcare costs (7). Additionally, it poses a threat to our military readiness, as a less healthy population may not meet the physical standards required for service (8). There is an urgent need for comprehensive strategies to address and mitigate diet-related health issues and health inequities.

The Role of Tobacco Companies in the Modern Food Environment

A major contributing factor to the rise of chronic health issues in America is the changing food environment. In the 1970s and 1980s, the tobacco companies RJ Reynolds and Philip Morris bought processed food and beverage companies, including Kraft and General Foods (9, 10). When Philip Morris merged Kraft and General Foods in 1987, it became the largest processed food corporation in the world (9, 10). Although the tobacco industry sold off many of their holdings in this arena by the late 2000s (9, 10), they had already impacted the nature of the American food supply. Internal tobacco industry documents demonstrate they took strategies designed to develop and sell cigarettes and applied them to their processed food and beverage products (9, 10). This includes putting flavor additives developed to enhance the palatability of cigarettes in their leading children's sugar-sweetened drinks and increasing marketing strategies that targeted children and racial/ethnic minorities (9, 10). For example, Philip Morris's beverage

division developed children-focused loyalty programs, based on a similar program used to promote Marlboro cigarettes, where purchases of sugar-sweetened beverages were exchanged for child-focused gifts and sweepstakes (9, 10). Between 1988 to 2001 products from tobacco-owned food companies were more likely to have products with hyper-palatable combinations of carbohydrates, fat, and salt compared to those from non-tobacco owned companies (11). However, by 2018, non-tobacco owned food companies had increased the level of hyper-palatable ingredient combinations to a level that compared with tobacco-owned companies (11). As a result, the modern food supply has been significantly shaped by the tobacco industry's expertise in maximizing profits from highly appealing products.

The Rise of Ultra-Processed Foods and Beverages

This has resulted in the dominance of ultra-processed foods and beverages in the American diet that have been optimized to maximize palatability and consumer appeal (12, 13). These ultra-processed products are industrial formulations manufactured by deconstructing foods into their component parts, modifying them and recombining them with a myriad of additives (14-16). Common examples of ultra-processed products are industrially created candy, sugar-sweetened carbonated beverages, instant noodles, frozen pizza, and salty snacks (15). Beyond providing calories, the resulting ultra-processed products have little resemblance with nutrient-rich minimally processed foods (e.g., fruit, vegetables) and are a major source of added sugar and saturated fats in the American diet (17, 18). The unnaturally high level of palatability-inducing nutrients (fats, sugars, carbohydrates and/or sodium) in many ultra-processed products trigger reward signals and reduce sensitivity to satiety signals (12, 19). Ultra-processed products also often contain flavor additives and texturizers that enhance taste and the feel of the product in the mouth (14-16). The structure of these products is also altered and important nutrients (e.g.,

fiber) are removed to make them easier to consume and digest (15, 16). Finally, the preservatives in many ultra-processed products allow them to stay shelf-stable and come in convenient ready-to-heat or ready-to-eat packages (14-16), which makes them highly appealing to busy Americans.

The introduction of ultra-processed products into the food supply tends to result in the displacement of health-promoting, minimally processed foods (20). Epidemiological research estimates that the average American adult now gets the majority of their calories (57%) from ultra-processed products while intake of nutrient-rich minimally processed foods like fruits, vegetables, and legumes is decreasing (13). This estimate is even higher for youth. From 1999 to 2018, a global team of epidemiologists found that the percentage of energy consumed from ultra-processed products increased from 61.4% to 67.0% in children 2 to 19 years old (21). Rural communities and communities of color are more likely to be 'food deserts' that lack grocery stores with access to fresh food and instead have higher concentrations of retailers that predominantly sell ultra-processed products (22, 23). Individuals with food insecurity who lack consistent access to nutritious foods are further targeted for the marketing of ultra-processed products. For example, stores in neighborhoods with high Supplemental Nutrition Assistance Program (SNAP) enrollment are four times more likely to advertise or display ultra-processed beverages on the days when payments are distributed (24). Due to structural inequities, African Americans/Blacks, Hispanics, Native Americans and Americans who live in rural areas are more likely to rely on the SNAP program (25, 26) and, therefore, experience additional exposure to unhealthy food marketing. Thus, while an ultra-processed food environment affects all Americans, individuals living in rural communities, communities of color, and those who struggle to afford nutritious food face an environment that makes it even harder to maintain a healthy diet.

A converging body of research highlights the potential ramifications of diets composed mostly of ultra-processed products (27). High levels of ultra-processed food and beverage intake is implicated in higher risk for physical health conditions like heart disease and obesity, but also mental health conditions like anxiety and depression (27). In older adults, high levels of ultra-processed food and beverage intake predicts accelerated cognitive decline and dementia (28, 29).In a controlled randomized crossover trial, a team of researchers at the National Institute of Health found that being given a diet high in ultra-processed foods relative to minimally processed foods over a two-week period was associated with an increased daily intake of 500 calories and a two-pound weight gain (30). This occurred despite the ultra-processed and minimally processed meals being matched on the overall calories available to participants (30). Thus, the high levels of ultra-processed food and beverages in the American diet are a major cause for concern across physical, mental, and cognitive domains.

There are Strong Parallels between Addictive Substances and Ultra-Processed Foods

Ultra-processed products exhibit characteristics similar to those of well-recognized addictive substances. Most addictive substances are created by processing natural substances (e.g., fruit, leaves) into a new product that delivers a heighted dose of a reinforcing ingredient (e.g., ethanol, nicotine) into the body (31). Speed of absorption is also important and the more rapidly the reinforcing ingredient is absorbed the more likely the substance is to be addictive (32, 33). All addictive substances activate the mesolimbic dopamine system, which is key to the reward and motivational mechanisms that go awry in addiction (34, 35). For example, cigarettes are created by processing naturally occurring tobacco leaves through drying and curing into products that can be smoked to rapidly deliver high doses of nicotine into the body. The nicotine in cigarettes is further amplified by flavor enhancers, such as sugar, cocoa, and menthol, which

create brand-specific taste and flavor profiles (36, 37). These tastes and flavors become repeatedly paired with the delivery of nicotine and become salient drivers of smoking behavior in their own right (36, 37). The cigarettes that result from this processing are highly addictive and can lead people to continue smoking even when facing life-threatening health conditions, like heart disease and lung cancer (38).

Similarly, many ultra-processed products are created by processing naturally occurring substances (e.g., fruits, grains, vegetables) into products that deliver unnaturally high doses of rapidly absorbed carbohydrates and/or fats. Refined carbohydrates, like sugar, and fat are highly reinforcing ingredients and they are effective at activating reward mechanisms in the brain (31, 39-41). While many minimally processed foods contain either carbohydrate (e.g., fruit) or fat (e.g., nuts, meat), the combination of both is rare in nature (39). In contrast, ultra-processed foods often deliver high levels of both refined carbohydrates and fats. This combination has a supra-additive effect in activating neural reward systems (40). Evidence exists that sugar, fat, and ultra-processed foods can activate mesolimbic dopamine in the brain at similar magnitudes as nicotine and ethanol (42-47). Additives further amplify ultra-processed products by coupling industry created flavors and textures with the delivery of refined carbohydrates and added fats (15, 16). Thus, these ultra-processed products with high levels of refined carbohydrates and fats are highly rewarding processed substances that share many commonalities with addictive substances like cigarettes (31).

Ultra-Processed Food Addiction

Many people demonstrate classic symptoms of addiction when consuming ultra-processed foods including a loss of control over intake, intense cravings, and continue consumption despite physical or emotional problems (48). We developed the Yale Food

Addiction Scale to apply substance addiction criteria to the intake of such products (e.g., chocolate, soda, pizza) (49). The Yale Food Addiction Scale has been extensively validated and is a widely used measure in the field with over 1000 citations and translations available in over a dozen languages (50). Multiple studies have identified that people report consuming ultra-processed products high in refined carbohydrates and/or fats in an addictive manner, but not minimally processed foods like fruits, vegetables, and legumes (51-53). Dietary intake studies confirm that individuals who meet "food addiction" consume higher levels of ultra-processed products, but lower levels of minimally processed foods (54, 55). Thus, I will refer to the construct measured by the Yale Food Addiction Scale as ultra-processed food addiction in the remainder of my testimony.

Although ultra-processed food addiction is not currently an officially recognized diagnosis by the American Psychiatric Association, the science on this topic has grown quickly. Systematic reviews of over 280 studies from 36 different countries estimate the prevalence of ultra-processed food addiction to be 14% in adults (56), which is similar to the prevalence of alcohol and tobacco use disorder (e.g., 14% for alcohol and 18% for tobacco) (57, 58). The estimated prevalence of ultra-processed food addiction is twice as high (28%) in adults with obesity (56). Particularly relevant to the current hearing, ultra-processed food addiction has been associated with a more than five times greater likelihood of Type 2 diabetes even when adjusting for sex and age (59).

Below is a quote from a participant who was interviewed for a research study in my lab about their experience with ultra-processed food addiction.

> "I can't even be in the same vicinity as [donut store] or any type of donuts, 'cause I will finish a dozen all by myself and I'm type 2 diabetic. So, that could kill me, and I know

that and I know that I shouldn't be eating all those. I shouldn't be eating one, let alone a whole dozen. But for some reason I just can't stop eating them."

In children, the estimated prevalence for ultra-processed food addiction based on a systematic review of the literature is 12%, which surpasses the prevalence of other substance addictions at this stage of development (60). Children are typically protected against exposure to addictive substances through policy initiatives (e.g., marketing restrictions, age limits on purchases), but exposure to ultra-processed foods for children in America is a daily occurrence (21). There is also evidence that ultra-processed food addiction is important for older Americans. In collaboration with Michigan Medicine, my lab recently conducted a study on ultra-processed food addiction in the National Poll of Healthy Aging. This is a nationally representative poll of over 2000 older adults between the ages of 50 and 80. In this poll, 13% of participants met the criteria for a clinically significant ultra-processed food addiction, which was associated with a greater likelihood of reporting being overweight and in poorer physical and mental health (61). Finally, individuals with food insecurity that lack adequate access to nutritious food are more than three times more likely to meet the criteria for ultra-processed food addiction with chips, soda, chocolate, pizza, and ice cream being identified as the most addictive foods (53).

Taken together, this scientific body of evidence suggests that addictive processes play an important role in contributing to patterns of ultra-processed food intake implicated in poor health (39, 62). If addictive mechanisms are being triggered by ultra-processed foods, this may be an overlooked reason why it can be challenging to reduce intake of ultra-processed foods even in the face of health conditions like diabetes.

What Can Be Done to Address this Problem?

A wide range of potential approaches are available for consideration to reduce excessive intake of ultra-processed foods and improve the health of Americans. The history of addressing addiction epidemics suggest that no singular approach will be sufficient to address complex public health issues like the obesity and diabetes epidemic. However, multi-pronged strategies have been effective and similar approaches are being implemented globally to combat the health consequences associated with ultra-processed products. Evidence-based examples include ultra-processed food and beverage taxes and mandatory or voluntary reformulation of the food supply (39). Front-of-pack nutritional and warning labels would provide essential information to consumers about the health consequences of available foods and beverage options. Many nutrient-poor foods aimed at children display health-related claims on their packaging (63), which is confusing to parents trying to make healthy choices for their children. Implementing restrictions on misleading health claims (particularly for nutrient-poor products targeted at children) is essential for promoting healthier diets. Many countries are implementing restricting the marketing of unhealthy food products to children (39) or at the least reducing tax incentives for the advertising of unhealthy foods and beverages (64). This is an important equity issue as Black/African-American and Hispanic children are exposed to more unhealthy food advertisements than non-Hispanic white children (65). Food marketing toward children is increasingly spreading to social media, including the promotion of unhealthy products by paid children influencers (66). Given that social media marketing can be highly personalized based on user metrics and data, it will be essential for policies to protect children from food marketing in this sphere. Convenience is another factor that drives reliance on ultra-processed foods. Many Americans are juggling multiple competing demands on their time, including, child and elder care. This is particularly true for economically disadvantaged Americans who may have

additional time constraints, like multiple jobs or reliance on public transit. Individuals who are Black/African American, Hispanic, or Native American are more likely to be economically disadvantaged in America (67) and, thus, face these additional obstacles to eating a healthier diet. Creative policy solutions are needed to make healthy options composed largely of minimally processed foods convenient and affordable irrespective of financial circumstances. Greater investment is needed to advance the scientific understanding of how ultra-processed products negatively impact health and engage addictive mechanisms to guide the development of effective solutions. Finally, another key point learned from the tobacco addiction epidemic is that prevention efforts can be far more cost effective than relying solely on treatment (68). Targeting prevention efforts on youth, especially, can be particularly helpful to shape lifelong health promoting behaviors (68).

Eating is necessary for survival. We each make numerous food-related decisions every day all while surrounded by grocery stores, restaurants, gas stations, convenience stores and advertisements that promote ultra-processed products. The food and beverage industry has engineered these products to be irresistible, which has resulted in substantial profits for these companies. However, the burden of these costs (e.g., rising rates of disease, mental distress, medical costs) falls on the rest of us. It is essential that we address the systemic factors that contribute to the rising levels of chronic disease and invest in an American food supply that promotes health for all.

Table 1. Diagnostic Criteria for Substance Use Disorders

DSM-5 Diagnostic Criteria for Substance Use Disorders(48)
Consumption of larger amounts and/or over longer time than intended
Persistent, unsuccessful attempts to cut down
Significant time spent obtaining, using, or recovering from effects
Cravings (i.e., intense almost irresistible urges for the substance)
Interference with role obligations at work, school, or home
Use despite social or interpersonal problems
Important activities given up or reduced
Use in physically hazardous situations
Continued use despite physical and/or psychological consequences
Tolerance (i.e., needing more and more of the substance to get the desired effect)
Withdrawal (i.e., experiencing psychological and/or physiological symptoms when reducing intake)

Note. Individuals meet the diagnostic threshold for a substance use disorder in the Substance-Related and Addictive Disorders section of the Diagnostic and Statistical Manual of Mental Disorders-Fifth Edition (DSM 5) by endorsing at least 2 of the symptoms above plus clinically significant functional impairment or distress(48). Severity of substance use disorders determined by the number of symptoms endorsed (mild 2-3 symptoms; moderate 4-5 symptoms; severe 6-11 symptoms).

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