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## **Addictive by Design: Parallels Between Tobacco and Ultra-Processed Food**

A new report by researchers from the University of Michigan, Duke University and Harvard University synthesizes global evidence on addiction science, policy regulations and public health history to show the parallels between ultra-processed foods (UPFs) and tobacco products. The findings show that UPFs are deliberately engineered for maximum appeal and profitability, using strategies long employed by the tobacco industry for cigarettes. The authors argue that many UPFs share more characteristics with cigarettes than they do with minimally processed fruits and vegetables.

The report examined five key areas where industry strategies used for UPFs are similar to those historically used for tobacco products:

1. Dose optimization: the dose that achieves the desired therapeutic effect
2. Delivery speed: the rate at which drug is released and reaches its site in the body
3. Hedonic engineering: designing products to maximize pleasure and reward
4. Environmental ubiquity: accessibility and normalized exposure to the products
5. Deceptive reformulation: making minor products changes to appear healthier or improved without meaningful benefit

### **Key Findings**

#### **1. Dose Optimization**

- Both cigarettes and UPFs are intentionally engineered to deliver a “just right” dose of reinforcing substances—nicotine in cigarettes, and refined carbohydrates and fats in UPFs—to promote repeated use.
- UPFs blend refined carbohydrates and fats to maximize pleasure. This sugar-fat combination in nature is rare and triggers stronger reward responses than either nutrient alone.

#### **2. Speed of Delivery**

- Both cigarettes and UPFs are designed to rapidly deliver active compounds into the body, maximizing reinforcing effects.
  - UPFs are often manufactured with enzymatic additives that mimic the body’s natural digestion so that food is broken down and absorbed more quickly into the body, effectively making UPFs “prechewed,” “presalivated” and “predigested.” Extensive processing removes fiber, protein and water—components that normally slow digestion—allowing refined carbohydrates and fats to be absorbed more quickly.

- By contrast, minimally processed foods retain their structure, fiber, protein and water, requiring more chewing and digestion and leading to slower absorption, a more gradual rise in blood glucose and potentially slower, more sustained dopamine responses.
- Both cigarettes and UPFs are designed to deliver intense but short-lived pleasure, creating rapid sensory highs that fade quickly and drive repeated, compulsive use, unlike minimally processed foods, which release nutrients and satisfaction more gradually.

### **3. Hedonic Engineering**

- Cigarettes and UPFs take advantage of the brain's sensitivity to sensory cues like taste, smell, mouthfeel and appearance to create products that feel pleasurable and make people want to consume the product again.
  - UPFs contain food additives that manipulate their flavor, texture and aroma.
  - Brand loyalty is a key part of the sensory experience. Many UPF consumers prefer particular brands because of their specific combination of flavor, texture and aroma.
  - Visual cues further enhance the sensory experience. Both the tobacco and UPF industries deliberately use color and visual design to increase product appeal and encourage consumption.

### **4. Environmental Ubiquity**

- Smoking and UPF consumption both became normalized through convenience driven infrastructure and targeted marketing that make these products ubiquitous.
  - Smoking evolved from an occasional activity to an everyday behavior as lighting a cigarette became tied to routines like meals, commutes and work breaks. Similarly, UPFs became ever-present through innovations such as microwave ovens, drive-thru windows, vending machines and delivery apps that make these products instantly accessible and effortless to consume.
  - Before smoke-free policies became widespread, cigarettes were everywhere in public settings, making it very difficult for smokers to quit smoking. Today, UPFs face few restrictions and are just as widespread, creating a similar challenge.

### **5. Deceptive Reformulation**

- Both the tobacco and food industries “health wash” their products, reformulating and marketing them to appear less harmful while preserving their addictive properties.

- Products labeled as “low fat” or “sugar free” often contain non-sugar sweeteners or are fortified with nutrients like fiber, iron or calcium without actually making the products healthier. For example, protein-enriched UPFs marketed as a healthier option despite being high in addictive nutrients.

### Key Messages

- UPFs are deliberately engineered for maximum appeal and profitability, using strategies long employed by the tobacco industry and sharing more characteristics with cigarettes than with minimally processed foods like fruits or vegetables.
- UPFs are deliberately engineered to deliver refined carbohydrates and fats into the body as quickly as possible, intensifying reward and reinforcing repeated consumption in ways that mirror how cigarettes rapidly deliver nicotine.
- Cigarettes and UPFs take advantage of the brain’s sensitivity to sensory cues like taste, smell, mouthfeel and appearance to create products that feel pleasurable and make people want to consume the product again.
- Smoking and UPF consumption both became normalized through convenience driven infrastructure and targeted marketing, making these products ubiquitous and difficult to avoid. Just as cigarettes were once ubiquitous in public spaces—making quitting extremely difficult—UPFs now face few restrictions and are omnipresent, creating a comparable challenge for reducing consumption.
- Both the tobacco and food industries use deceptive reformulation called “health washing” to make their products appear less harmful while preserving their addictive properties.

### Citation:

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