



Drug influences on consumer judgments: emerging insights and research opportunities from the intersection of pharmacology and psychology

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Abstract

Recent evidence at the intersection of pharmacology and psychology suggests that pharmaceutical products and other drugs can exert previously unrecognized effects on consumers' judgments, emotions, and behavior. We highlight the importance of a wider perspective for marketing science by proposing novel questions about how drugs might influence consumers. As a model for this framework, we review recently discovered effects of the over-the-counter pain reliever acetaminophen, which can alter consumers' emotional experiences and their economic behavior well beyond soothing their aches and pains, and also present novel data on its memory effects. Observing effects of putatively benign over-the-counter medicines that extend beyond their originally approved usages suggests that many other drugs are also likely to influence processes relevant for consumers. The ubiquity of drug consumption—medical or recreational, legal or otherwise—underscores the importance of considering several novel research directions for understanding pharmacological-psychological interactions on consumer judgments, emotions, and behaviors.

Keywords Decision making · Emotion · Memory · Pharmaceuticals · Substances · Acetaminophen

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The marketing, advertising, and consumption of drugs—medical or recreational, legal or otherwise—is ubiquitous in the twenty-first century marketplace. Such substances range from opioids to over-the-counter (OTC) painkillers, from alcohol to marijuana, and from caffeine to nicotine (e.g., e-cigarettes). Many consumers use one or more such drugs on a regular basis, if not daily, and yet little is known about the wider impact of such substances on everyday consumer decision-making. Recent evidence at the intersection of pharmacology and psychology suggests that these various drugs can exert broader effects on consumers' judgments, emotions, and behavior than previously considered, making an enhanced understanding of their role in marketplace decision-making essential for consumers and managers alike.

Although there are important issues to consider with respect to all these substances—each with distinct biological effects and thus diverse effects on decision making—herein, we focus on OTC pain relievers because they are among the most trusted and frequently used by consumers. Indeed, at least a quarter of Americans use acetaminophen, ibuprofen, or aspirin in any given week (Kaufman et al. 2002). Recent research has suggested that these compounds, especially acetaminophen, can alter consumers' emotional experiences—an effect far broader than specifically soothing their aches and pains. Given the central role of emotions in marketplace decision making (Ferrer et al. 2015), an understanding of the implications of pharmacological-psychological interactions on consumer decision-making is essential.

1 Beyond pain relief: consuming acetaminophen blunts emotionality

Surprisingly, acetaminophen, in particular, has been demonstrated to exert a wide variety of psychological and behavioral effects beyond pain relief. The first study along these lines showed that a twice-daily regimen of acetaminophen (vs. placebo) significantly attenuated consumers' *hurt feelings* due to social rejection (DeWall et al. 2010; see also Mischkowski et al. 2019). Later, even broader emotional effects of acetaminophen were found: Durso et al. (2015) demonstrated that acetaminophen blunts consumers' emotional sensitivity, dampening their evaluations of both negative *and* positive emotional experiences. Specifically, participants randomly assigned to ingest acetaminophen rated unpleasant pictures less negatively *and* pleasant pictures less *positively* than those taking placebos. Further work has demonstrated numerous consequences of the emotional blunting effect of acetaminophen, including reduced monetary punishments levied on consumer theft (Randles et al. 2013) and increased trusting behavior (Roberts et al. 2019).

Here, we report for the first time additional evidence that acetaminophen can influence the extent to which consumers experience emotions related to a concept of particular importance to marketing—memory. The focal question was whether acetaminophen could blunt how consumers felt about and expressed their emotions toward *previous* experiences retrieved from memory. Seventy-seven participants randomly assigned to ingest acetaminophen or a placebo were asked to recall and write about a past regretted episode (from same data collection as Durso et al. 2015). Participants then indicated (i) how clearly and vividly they could “see” the memory in their minds (4-point scale, higher values represented more clarity) and (ii) how uncomfortable they felt while “re-living” the experience in writing (11-point scale, wherein higher values represented more discomfort).

Participants consuming acetaminophen recalled the regrettable memory with less clarity ($M = 2.80$) than those taking the placebo ($M = 3.31$), $t(75) = 2.93$, $p = 0.005$. Moreover, participants also reported less discomfort (though not significantly) under acetaminophen ($M = 4.02$) compared to the placebo ($M = 5.17$), $t(75) = 1.59$, $p = 0.116$, when recalling this past regretted action. As predicted, judgments of vividness and discomfort were correlated ($r = 0.24$, $p = .036$) and mediation analysis with bootstrapping revealed a significant negative indirect effect of acetaminophen (vs. placebo) on participants' experienced discomfort through its negative effect on memory vividness, $b = -0.41$, 95% CI $[-1.15, -0.04]$.

In the product purchasing context, such effects may reduce the clarity of consumers' counterfactual thoughts, and thus their emotional responses toward regretted decisions made before they even ingest acetaminophen. Therefore, marketers might need to consider that high levels of past satisfaction (or *dissatisfaction*) could be blunted by current pharmacological influences in their customers. Although these findings represent but one specific effect of acetaminophen with relevance to consumer decision making, they add further evidence that this drug can blunt more than present pain, therefore having the potential for widespread impact on marketplace behaviors.

2 Future research crossing consumer psychology and pharmacology

The results to date suggest vast and uncharted territory regarding how drugs and pharmaceutical products can influence consumers' judgments, emotions, and behavior beyond their purported purposes. Opportunities for future research abound beyond acetaminophen, and are open to examination with methods ranging from placebo-controlled double-blind experiments, to correlational analyses of participant-reported drug use and observed outcomes in a variety of domains (Roberts et al. 2019). Thus, though acetaminophen provides a promising exemplar by which to understand various drug effects on consumers, further drug-specific investigations would likely yield a diversity of mechanisms, effects, and outcomes as a function of dosage, context, and consumers themselves.

First, there is a particularly salient and important situation where consumers are likely to be under the influence of drugs—the medical context. Healthcare consumers—be they viewing pharmaceutical advertisements at home or visiting a medical facility—are especially likely to be influenced by drugs when making pivotal life decisions (Stremersch 2008). Emotion has been specifically identified as having potent effects on multiple components of medical decision-making ranging from risk perception to processing (Ferrer et al. 2015), so emotion-altering effects of drugs could influence such decisions. Research addressing these unknowns would be invaluable: To what extent do these drugs cause consumers to make decisions based less on their emotional reactions? Do decisions based more or less on emotion lead to better, or worse, health outcomes? Beyond emotions, what other cognitive and behavioral effects might these drugs have on consumers?

Second, ingesting drugs could alter how consumers make decisions in non-medical everyday marketplace contexts. For instance, taking acetaminophen (vs. placebo) can cause consumers to make riskier decisions (e.g., “Investing 10% of your annual income in a new business venture;” Way and Keaveney 2018). Of course, it is critical to

understand the mechanisms by which any given drug exerts its effects, be they expected or beyond their advertised benefits. How might drugs with similar versus dissimilar mechanisms of action influence consumers' risk judgments, and ultimately their expenditures and investments in the marketplace? Acetaminophen and other emotion-altering drugs could blunt consumer reactions to advertising appeals, or reduce impulsive purchases of hedonic products like candy and lottery tickets. On the other hand, such drugs may also ameliorate positive emotions such as hopefulness, thereby potentially *increasing* impulsive consumption (Winterich and Haws 2011). Examining the link between drug usage, varying dosages, distinct mechanisms, and self-control behaviors would prove useful to consumers and marketers. Further, if consumers have taken drugs for pain relief, they might be more likely to shop online while under the direct influence, leading to many interesting questions. For example, are these consumers less likely to write emotional online reviews or to react strongly to others' recommendations? Might consumers taking various drugs feel more or less satisfied when using products or watching their favorite shows? And, when consumers experience ambivalence and decision conflict, could drugs similarly reduce or magnify these feelings and thereby influence their confidence and actions?

Finally, although we focused on emerging findings related to acetaminophen and its emotional blunting effects, this focus can be expanded in multiple ways to include other drugs and consumers' dispositional characteristics. A larger perspective could include studying popular products containing caffeine, alcohol, nicotine, and so on. Which consumers are more or less likely to use various drugs—to their benefit or detriment—and how will their marketplace behaviors in turn differ? For example, consumers who are more dispositionally impulsive or risk-seeking may consume more drugs and prefer more hedonic (vs. utilitarian) products. There exist additional considerations regarding consumers' age, as children and the elderly likely exhibit varying sensitivity to different drugs. Finally, the price sensitivity of consumers may be affected by drug usage, leading to more or less sensitivity to marketplace promotions. In all, measuring consumers' decision-relevant individual differences, like their emotional sensitivity, could further our understanding of how taking these drugs influence consumers' memories, emotions, persuadability, and ultimately their marketplace behavior.

3 Concluding thoughts

Numerous questions emerge related to understanding the effects of consuming drugs on individuals' thoughts, emotions, and behavior, beyond those advertised. Importantly, we highlight here that examining the impact of acetaminophen and other substances on marketplace phenomena is of particular importance. What might it mean for consumers, businesses, and policymakers to consider that these drugs exert more complex and context-dependent effects impacting perceptions of past, present, and future consumption than what has been previously understood? There exist countless marketplace contexts where the influence of drugs and pharmaceuticals might meaningfully change consumer behavior, including responses to advertising and product assortments, risk-taking, choice overload, persuasion knowledge, impulsive buying, online shopping, word-of-mouth, satiation, enjoyment, and more. The nascent but rapidly growing literature at the intersection of pharmacology and psychology suggests tremendous

opportunities for marketing researchers to investigate these effects in terms of their psychological and situational moderators, all in view of the full extent of implications that these findings might have for consumers, businesses, regulators, and society at large.

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