Mysterious Consumption: Preference for Horizontal (vs. Vertical) Uncertainty and the Role of Surprise

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Mysterious consumption items represent products that are chosen or purchased without knowing the exact nature of the product(s). In contrast to the widely accepted notion of uncertainty aversion, the present research shows that consumers prefer uncertainty over certainty in the context of mysterious consumption. Across a variety of products (stress balls, ice cream, songs, teas, snacks, hotel rooms, masks, rental cars), participants preferred mysterious consumption items over non-mysterious consumption items of equal expected value. The value of mysterious consumption lies at least in part in the uncertainty about the nature of the outcome among objectively similar outcomes. Specifically, the uncertainty around horizontally differentiated outcomes (i.e., outcomes that differ as a matter of taste) in the case of mysterious consumption focuses consumers on the positive side of uncertainty: the opportunity to be surprised. The preference for uncertainty is not observed when the possible outcomes are vertically differentiated (i.e., outcomes that differ in objective superiority, as is the case in existing demonstrations of uncertainty) or when horizontal uncertainty is reduced to a degree that diminishes the ability to be surprised. The findings reconcile literatures on surprise and uncertainty aversion and help explain mysterious consumption as a substantive phenomenon in the marketplace.

Keywords: consumer behavior, judgment and decision making, decisions under uncertainty, surprise, mystery/opaque/surprise marketing

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Consumers are increasingly engaging in mysterious consumption, a phenomenon whereby consumers purchase products without knowing their exact nature. For example, Fanta, Twizzlers, Oreo, and Pringles have all introduced mystery flavors. Sugarfina offers mysterious candy selections to "keep the consumer guessing," Hallmark offers themed "Mystery Christmas Ornaments," and Marine Layers has a "Mystery Tee" vending machine that allows consumers to buy a t-shirt of uncertain color and design. Other prominent examples of mysterious consumption include booking sites that provide service offerings of unknown nature (e.g., Hotwire for hotels, Enterprise for rental cars) as well as the subscription box trend: Birchbox (cosmetics), Stitch Fix (clothing), Tie Bar (clothing), Hello Fresh (food), and FabFitFun (home goods) are a few examples of a growing industry that has introduced uncertainty about product selections at the time of purchase (Kestenbaum 2018).

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Why do such products exist in the marketplace, particularly given what we know about consumers' aversion to the unknown (Gneezy, List, and Wu 2006)? Mystery products have advantages to marketers, which may explain the popularity from a supply side; they can aid inventory efficiency (Fay and Xie 2015), increase trialability of products, and help attract consumer segments with weak product loyalty (Fay and Xie 2008; Jerath, Netessine, and Veeraraghavan 2010). From a demand side, their popularity could at least partially be explained by established drivers of consumption, such as the frequently associated price discounts (e.g., Hotwire; Chandon, Wansink, and Laurent 2000), trialability (e.g., subscription boxes; Steenkamp and Baumgartner 1992), limited-time offers (e.g., seasonal flavors; Sevilla and Redden 2014), or allowing consumers to outsource difficult decisions to external parties or experts (e.g., Hello Fresh; Steffel and Williams 2018).

Importantly, none of these consumer-focused explanations fully capture or necessitate what is common to all of the examples outlined above: that the product is unknown and therefore uncertain at the time of purchase.

In the present research, we argue that mysterious consumption is also driven at least in part by the uncertainty inherent in and unique to it. Specifically, in contrast to the wide-spread assumption that consumers avoid uncertainty and prefer certainty (Allais 1953, 1990; Gneezy et al. 2006; Kahneman and Tversky 1979), we argue that consumers *prefer* uncertainty over certainty in the context of mysterious consumption. In mysterious consumption, the nature of the product (e.g., product design, flavor, assortment) among similarly priced items is unknown. Thus, mysterious consumption differs from existing demonstrations of uncertainty aversion using (usually monetary) gambles in that it is marked by horizontal uncertainty: the possible outcomes differ as a matter of taste as opposed to objective superiority (e.g., amounts). The horizontally differentiated outcomes associated with mysterious consumption, we argue, focus consumers on the positive side of uncertainty—the opportunity to be surprised by the nature of the outcome (Charlesworth 1969; Mellers et al. 1997).

We isolate and focus on the role of uncertainty in mysterious consumption using controlled studies in an attempt to make important theoretical and practical contributions. Reconciling the literatures on surprise and uncertainty aversion, we identify horizontal uncertainty as a type of uncertainty that is desirable. The resulting theoretical framework provides important nuance to the extensive literature on uncertainty aversion. We make these theoretical contributions while also explaining the psychology behind a substantive marketing phenomenon that is difficult to understand in the noisy marketplace.

THEORETICAL BACKGROUND

Uncertainty describes a general state of limited or imperfect knowledge and therefore comes in many forms and degrees. That said, the subjective value of uncertainty is most prominently studied in the fields of behavioral economics and judgment and decision making, which has led to a widespread belief in uncertainty aversion.

Uncertainty Aversion

Research on decision making under uncertainty has pictured consumers as uncertainty averse when evaluating gains in preference elicitation procedures; certain outcomes are preferred over uncertain ones in ways that violate expected utility theory (Allais 1953, 1990; Gneezy et al. 2006; Kahneman and Tversky 1979). Demonstrations of uncertainty aversion in this literature have focused on two types of uncertainty aversion: risk aversion and ambiguity aversion.

The most prominent examples of uncertainty aversion are demonstrations in the domain of risk. Risk aversion represents the general finding that, when presented with an option of a sure gain and a risky one with similar expected value, people tend to show a preference for the certain outcome. Importantly, risk aversion is so strong that uncertain prospects are valued below even the most undesirable possible outcomes (Gneezy et al. 2006), a phenomenon that has been coined "the uncertainty effect": participants are willing to pay less for a gamble with a 50% chance of winning a $50 gift card and a 50% chance of winning a $100 gift card than they are willing to pay for a guaranteed $50 gift card despite the former option having higher expected value (Gneezy et al. 2006). Evidence for uncertainty aversion is bolstered by demonstrations of ambiguity aversion, which describes a preference for risk with known probabilities over unknown probabilities (Epstein 1999). For example, people prefer outcomes that will be determined by a draw from an urn with 50 red and 50 blue balls over a draw from an urn with 100 total balls with unknown numbers of blue or red balls.

The rich literature on risk/uncertainty aversion has established various factors that make risk relatively more or less aversive (Duke, Goldsmith, and Amir 2018; Martin, Reimann, and Norton 2016; Yang, Vosgerau, and Loewenstein 2013; Young et al. 2012). Importantly, none of these findings show a systematic reversal of uncertainty aversion (i.e., a preference for uncertainty over certainty) and to date, uncertainty aversion for gains is widely accepted in psychology and behavioral economics (Ruan, Hsee, and Lu 2018; Shen, Fishbach, and Hsee 2015, 1303; see also General Discussion).

Upsides of Uncertainty

Given this widespread uncertainty aversion in preference elicitation studies, one might assume that uncertainty is always undesirable. Yet, while not focused on the same paradigm and dependent measures as the literature reviewed above (i.e., valuation or choice), at least three streams of literatures point to some positive sides of uncertainty.

First, we know that lack of information about an outcome or event can pique interest and curiosity (Sevilla and Meyer 2020; Whitchurch, Wilson, and Gilbert 2011). Incomplete knowledge can serve as an intrinsically motivated desire—or passion even—for more information (Loewenstein 1994; Menon and Soman 2002; Van Dijk and Zeelenberg 2007). This curiosity elicited from uncertainty has been widely shown to increase motivation during goal pursuit (Ruan et al. 2018; Whitchurch et al. 2011). For example, uncertain gifts can promote the purchase likelihood of a target product to a similar degree as certain ones (Goldsmith and Amir 2010), and people are more likely to work for a reward if the reward is uncertain than if it is certain (Shen et al. 2015). Likewise, uncertain promotions generate greater consumer interest than precise or certain discounts (Ailawadi et al. 2014; Dhar, Gonzalez-Vallejo, and Soman 1999). Of course, the motivating effect of uncertainty could be attributed to uncertainty being so aversive that consumers want to resolve it. Still, at least for positive or non-negative outcomes, the literature often portrays curiosity as a positive feeling of interest and a pleasant anticipation of new information (Loewenstein 1994; Kashdan and Silvia 2009; Sevilla and Meyer 2020).

Second, relatedly, uncertainty in the form of missing information about an outcome or how an event will unfold can be enjoyable (Bar-Anan, Wilson, and Gilbert 2009; Vosgerau, Wertenbroch, and Carmon 2006; Wilson et al. 2005). Recent research shows that people anticipate enjoying uncertain options as much as certain ones once they are revealed (Moon and Nelson 2020). Moreover, people appear to enjoy the experience of uncertainty itself. Winning a lucky draw but not knowing the exact prize for a period of time has been shown to elicit greater positive feelings before the reveal of the prize than knowing the exact prize (Lee and Qiu 2009), and creating and then resolving uncertainty can generate a net positive hedonic experience (Ruan et al. 2018). While these researchers have argued that consumers are generally unaware of the positive effects of uncertainty on affect before the resolution of that uncertainty, and therefore would not actively choose it (Ruan et al. 2018; Wilson et al. 2005, in line with the uncertainty aversion literature), there is some anecdotal evidence that people sometimes embrace uncertainty. For example, some consumers deliberately delay learning about outcomes of events (e.g., the sex of an unborn child; Shipp et al. 2004) and go to great lengths to avoid spoilers that would reveal the outcome of narrative entertainment, reality shows, and sporting events (Bolton 2016; Gigerenzer and Garcia-Retamero 2017; Leavitt and Christenfeld 2011; Yan and Tsang 2016). The stated reason for such deliberate ignorance is often wanting to preserve an element of surprise (Gigerenzer and Garcia-Retamero 2017; Shipp et al. 2004), which leads to the next point.

Third, the flipside of uncertainty is that it allows for a surprise upon reveal (i.e., uncertainty and surprise represent two sides of the same coin). Surprises, traditionally conceptualized as unexpected events, are usually associated with amplified emotions (Charlesworth 1969; Mellers et al. 1997; Westbrook and Oliver 1991). Importantly, consumers seem to recognize at least some benefits of surprises in the domain of gains, as evidenced by the prevalence of surprises in our society (e.g., surprise parties, surprise gifts) and the fact that consumers expect surprises to increase consumer satisfaction with an outcome, a product, or a service (Buechel et al. 2014; Buechel, Zhang, and Morewedge 2017; Heilman, Nakamoto, and Rao 2002; Imrie 2005; Kim and Mattila 2010). Thus, uncertainty increases the anticipated affect upon uncertainty resolution.

Together, these streams of literature suggest that uncertainty has an exciting and hedonically rewarding side. And while none of the reported findings examine a direct preference for uncertainty over certainty in controlled experimental settings, they are still quite at odds with the many demonstrations of uncertainty aversion in the judgment and decision-making literature. Yet, a more nuanced understanding of when uncertainty is desirable or aversive is currently missing. In the following, we propose a framework that reconciles these two sides of uncertainty.

THE PRESENT RESEARCH

We argue that consumers select into uncertainty in the context of mysterious consumption, which we define as situations for which there is incomplete knowledge about the nature of the outcome among *objectively* similar outcomes (i.e., horizontally differentiated possible outcomes; Spiller and Belogolova 2016).

This context of mysterious consumption, we argue, differs from the contexts used to demonstrate uncertainty aversion in important ways. In the standard paradigm used to demonstrate uncertainty aversion, participants evaluate gambles with different objective amounts of a known entity (usually monetary amounts but sometimes also nonmonetary amounts; Allais 1953) with either exact (risk aversion) or ambiguous probabilities (ambiguity aversion). This paradigm is intuitive, clean, and efficient in demonstrating violations of expected value. However, it is also exactly this objectivity that differentiates the context used to demonstrate uncertainty aversion from the contexts of mysterious consumption.

Theoretical Framework: Horizontal and Vertical Uncertainty

We conceptualize mysterious consumption around horizontal uncertainty. The literature defines horizontal differentiation as outcomes or products that differ as a matter of taste. For horizontally differentiated items, superiority among possible outcomes cannot easily be established as a matter of fact; the optimal choice depends on the consumer. Importantly, these options need not be similarly

desirable for the individual decision maker or across consumers. The decision maker may: (a) have strong preferences among the horizontally differentiated options and (b) believe that other consumers share these preference (Spiller and Belogolova 2016). The defining feature of horizontal differentiation is that the options are *objectively* similar. For example, Pepsi and Coke would be considered to be horizontally differentiated, despite Coke being more popular (i.e., subjectively preferred). Horizontal differentiation is contrasted to vertical differentiation, which is traditionally used to model differences in quality in marketing (Chen 2009). For vertically differentiated options, there is consensus among consumers that options differ in objective superiority (Spiller and Belogolova 2016; Tirole 1988). For example, most consumers would likely agree that both Pepsi and Coke are superior in quality to store brands.

Thus, conceptually central to the vertical–horizontal differentiation continuum is the degree of perceived objective superiority such that the differentiation has been paralleled with "beliefs about objectivity and subjectivity in other domains" (Spiller and Belogolova 2016, 2). In this sense, the gambles commonly used to demonstrate uncertainty aversion could be said to represent extreme versions of vertically differentiated uncertainty in that the superiority of the different possible outcomes (e.g., different monetary amounts) is so objective that the preference for one over the other is considered normative. By contrast, the examples of mysterious consumption mentioned in the opening paragraph are either classic examples of horizontal uncertainty (e.g., flavors, designs) or represent scenarios where objective superiority is at least not easily established in prospect (e.g., flat-rate subscription boxes with various products).

We posit that the vertical and horizontal uncertainty distinction is critical to the reconciliation of the aforementioned literatures on uncertainty aversion and the upsides of uncertainty. Not only does mysterious consumption exist in the marketplace, as motivated in the opening paragraph, but many scenarios that speak to the beneficial aspects of uncertainty in the previous section (e.g., curiosity around narrative entertainment, wanting to be surprised by a gift or the sex of a baby) better match the context of mystery/horizontal uncertainty than gambles. Moreover, some researchers have already argued that differences in quantitative amounts (i.e., vertical uncertainty) commonly used to study decisions under uncertainty are especially likely to induce risk aversion (Martin et al. 2016). Specifically, Martin et al. (2016) argue that consumers are relatively less risk averse for qualitative differences in experiences than they are for money. They found, for instance, that participants preferred an uncertain food option with more heterogeneous ratings (i.e., riskier uncertain option) over an uncertain food option with less heterogeneous ratings (i.e., safer uncertain option), keeping average ratings constant.

The findings by Martin and colleagues differ from ours in scope and conceptualization[1] but are highly relevant with respect to their explanation for their findings. They argue that existing demonstrations of risk aversion using monetary amounts tend to focus the consumer on reference points that are in line with the status quo (i.e., "zero change in wealth," p. 1460), making it easy to code any deviations from the certain option as gains versus losses. As a result, such monetary gambles are particularly likely to induce loss aversion (Kahneman and Tversky 1979) and therefore are avoided.

In the case of mysterious consumption, the possible outcomes differ as a matter of taste and are objectively similar. We argue that the reference point and the distinction between gains and losses relative to it are therefore less salient in the case of horizontally differentiated uncertain outcomes. As a result, instead of focusing the consumer on potential losses (Kahneman and Tversky 1979), horizontal uncertainty may be more likely to allow consumers to focus on the positive side of uncertainty: the opportunity to be surprised.

We thus predict that when using comparable preference elicitation procedures as used in demonstrations of risk/uncertainty aversion, consumers will prefer mysterious consumption items over comparable non-mysterious ones. Normatively speaking, in the absence of any information, a mystery item could reveal itself to be any of the possible outcomes among subjectively more and less desirable ones. Consumers should therefore anticipate the mysterious consumption item to be representative of the average (subjective) desirability/value of all possible outcomes (i.e., normative theories would predict indifference). If consumers disproportionally favor mysterious consumption items over non-mysterious consumption items of equal or higher "expected value," then we interpret this as a preference for mysterious consumption. This interpretation is akin to the interpretation of uncertainty aversion except that the literature on uncertainty aversion would predict the opposite (i.e., disproportionate favoring of certain option over uncertain options of equal or higher expected value).[2]

> **H1a:** For positive outcomes, consumers exhibit a preference for mysterious consumption items over non-mysterious consumption items of *equal expected value* (i.e., median or average desirability of all possible items).

1 The work by Martin and colleagues does not focus on nor does it establish a preference for uncertainty over certainty. Moreover, their constructs (qualitative vs. quantitative differences) are confounded with our horizontal/vertical distinction, which we will disentangle in our studies and General Discussion.

2 Notably, neither the interpretation of uncertainty aversion nor the preference for mysterious consumption assumes a preference for uncertainty over the most desirable possible outcome or the option of choosing one's preferred option among the possible outcomes—the most desirable option should always be favored according to normative theories (i.e., indifference would no longer represent the normative decision criterion).

The appeal of mysterious consumption, we argue, lies at least in part in the (horizontal) uncertainty inherent in it. Compared to classic demonstrations of uncertainty/risk aversion, mysterious consumption is less likely to focus the consumer on losses relative to a salient reference point. Instead, it is more likely to focus the consumer on the positive side of uncertainty: the opportunity to be surprised.

> **H1b:** Consumers value mysterious consumption items at least in part because they want to be surprised by the nature of the outcome among horizontally differentiated outcomes.

If consumers enjoy mysterious consumption because the nature of the horizontally differentiated outcome upon reveal is unknown, then the preference for uncertainty should be less likely to be observed for situations that involve a similar amount of uncertainty, but where the uncertainty is more vertical in nature. For example, the preference for mysterious consumption should be less likely to be observed in situations where the outcomes differ in amounts or in perceived objective superiority (Spiller and Belogolova 2016; vertical uncertainty), which could make deviations/losses from a status quo more salient. Thus, we hypothesize that increasing vertical uncertainty among the possible options will diminish the preference for mysterious consumption.

> **H2:** The preference for uncertainty is less likely to emerge when the possible outcomes are vertically differentiated than when they are horizontally differentiated, as is the case for mysterious consumption.

Moreover, if consumers enjoy mysterious consumption because the horizontal nature of the uncertainty focuses the consumer on the positive side of uncertainty, that is, the opportunity to be surprised, then the preference for mysterious consumption should be less likely to be observed when the uncertainty does not allow for a surprise outcome. For example, limiting horizontal differentiation by making the possible outcomes more similar should make mysterious consumption less appealing because the horizontal uncertainty, and in turn the surprise aspect, is diminished. Formally:

> **H3:** The preference for uncertainty is less likely to emerge when horizontal uncertainty is reduced to a degree that reduces the surprise element.

In addition to the formal hypotheses, our studies manipulate and control for various factors and alternative explanations that set apart our context of mysterious consumption from demonstrations of risk/uncertainty aversion (e.g., how the outcome is determined, whether it involves the possibility of no gain, etc.) in an attempt to reconcile the divergent findings and further the understanding of when uncertainty is more or less desirable.

OVERVIEW OF STUDIES

We demonstrate that consumers prefer uncertainty over certainty in the context of mysterious consumption. Consumers favor mysterious consumption over non-mysterious consumption because the uncertainty around the nature of the outcome among horizontally differentiated options (e.g., the flavor, color, design, assortment) allows for a surprise.

A first set of studies focuses on whether consumers show a preference for mysterious consumption and why. Four initial studies observing hypothetical and consequential choices in the field and in the lab show that consumers are more likely to choose a mysterious consumption item than a non-mysterious one of equal expected value. Studies 2A and 2B examine the *extent* of this preference and whether wanting to be surprised best explains the preference for mysterious consumption.

We then report a series of studies that: (a) situate our findings within the literature on uncertainty, (b) test our theoretical framework, and (c) elucidate when consumers prefer uncertainty over certainty. Study 3 replicates the preference for mysterious consumption while also directly comparing it to the classic paradigm used to show risk aversion (marked by vertical uncertainty), thus showing how different types of uncertainty with similar stakes can be more or less desirable. Studies 4 and 5 build on study 3 by directly manipulating horizontal (vs. vertical) uncertainty while keeping the amount of uncertainty constant and testing our process measure of surprise via mediation. Study 6 further examines the role of surprise by diminishing horizontal differentiation, thus reducing the surprise element and attenuating the preference for mysterious consumption. Our empirical package also includes various ancillary studies (reported in appendix H) and successful replications (reported in web appendix D).

Data Transparency

Study materials and data sets for all studies (including ancillary studies and replications) are available on OSF (doi:10.17605/OSF.IO/R6JWE): https://tinyurl.com/9jmnw3uz. Unless specified, we report the results of our full samples because any preregistered exclusions always showed consistent or stronger results. The web appendix contains additional evidence (replications, extensions, results of auxiliary measures). A copy of the web appendix can be found in the OSF folder.

STUDIES 1A–D: PREFERENCE FOR MYSTERY

To provide an initial test for the preference for mysterious consumption, we conducted a series of simple studies

in which participants made a choice between a mysterious consumption item and a non-mysterious consumption item.

Study 1A: Ice Cream

We observed the choices of 100 customers of an ice cream shop located in a major city in the Midwest during a 3-day data collection period. Customers were given a short questionnaire (appendix A) on which they indicated their choice between a mystery ice cream flavor and a non-mystery ice cream flavor (order counterbalanced). The mystery flavor was an unknown flavor to be determined by a random draw from 10 available flavors on the menu (participants were aware of the 10 possible options prior to making their choice). The non-mystery flavor was one of the store's top-selling flavors (i.e., dark chocolate, strawberry, or salted caramel) rotated throughout the day and therefore was highly desirable. Only the choice between the mystery versus non-mystery option was of theoretical interest; we included different flavors to ensure generalizability.

After indicating their choice, participants were either given a voucher for the non-mystery flavor or the experimenter drew the flavor from an opaque brown bag containing vouchers for all 10 flavors. The vouchers were redeemable at the register only that day (preregistration: https://aspredicted.org/6zr2c.pdf).

Supporting hypothesis 1a, 75% of participants preferred the mystery option over the non-mystery option, which differed significantly from a 50% of choice share (χ^2 (1, $N = 100$) = 25.00, $p < .001$). The results were significant for each of the individual ice cream flavors (strawberry: 79.41%, χ^2 (1, $N = 34$) = 11.77, $p < .001$; salted caramel: 75.00%, χ^2 (1, $N = 32$) = 8.00, $p = .005$; dark chocolate: 70.59%, χ^2 (1, $N = 34$) = 5.77, $p = .016$).

Study 1B: Stress Balls

We observed the choices of 100 student passersby at the University of South Carolina. A table was set up outside of the business school to give away free stress relief balls during the final examination week. The table displayed two stress relief balls: a mystery ball presented in an opaque paper bag and a non-mystery ball. The presentation order was counterbalanced. For practical purposes, the mystery stress relief ball was a randomly selected design from one of three possible designs used in the non-mystery options, but participants were not aware of the available options. The non-mystery stress relief ball was one of three possible design options rotated throughout the day. These designs (i.e., plain red, smiley face, and globe; appendix B) were chosen based on a pretest reported in web appendix A to be gender neutral and highly desirable (e.g., two of the options were among the top 3 rated options out of 20 different designs pulled from Amazon). Note that only the choice between the mystery versus non-mystery option was of theoretical interest; we included different designs to ensure generalizability.

Supporting hypothesis 1a, 89% of participants preferred the mystery option over the non-mystery option, which differed significantly from a 50% of choice share (χ^2 (1, $N = 100$) = 60.84, $p < .001$). The results were significant for each of the individual stress relief ball designs (red: 97%, χ^2 (1, $N = 33$) = 29.12, $p < .001$; globe: 91.4%, χ^2 (1, $N = 35$) = 24.03, $p < .001$; smiley face: 78.1%, χ^2 (1, $N = 32$) = 10.13, $p = .001$). The possible outcomes in this study were unknown and the expected value was therefore more ambiguous than in study 1A or the remaining studies. Still, participants actively chose the uncertain option.

Study 1C: Hotels

A total of 142 undergraduate students participating in one data collection phase (50.7% female; M_{age} = 20.23, SD = 1.79) at the University of South Carolina were shown 20 hotel options (appendix C). They then made a choice between a mystery hotel that would be randomly selected from a list of 20 hotels and a non-mystery hotel that was a randomly displayed option from the same list of hotel options. Thus, in this study, the likelihood of getting each hotel was constant across conditions. We used the context of hotels as it is akin to prominent examples of mysterious consumption in the real world (e.g., Hotwire), but our more controlled context did not promise a price discount as hotel booking sites often do.

Supporting hypothesis 1a, 68% of participants preferred the mystery option over the non-mystery option, which differed significantly from a 50% of choice share (χ^2 (1, $N = 142$) = 19.04, $p < .001$).

Study 1D: Songs

A total of 125 undergraduate students participating in one data collection phase (30.4% female, 1.6% prefer to self-identify, 0.8% prefer not to say; M_{age} = 20.06, SD = 1.13) at the University of South Carolina were shown 50 popular songs (appendix D). For each song, participants first indicated whether they would watch the official music video of the song or skip it if it came on YouTube. The goal of this exercise was to establish a list of *acceptable* songs.[3] Participants were then told that they would watch the official music video of one of the songs they said they would watch (i.e., acceptable songs) and that their task was to describe the music video after viewing it. Thus, participants in this study knew that they would have to consume the chosen product. They made a choice between a mystery song that would be randomly selected from the list of

3 One item requested no response as an attention check. The results were the same when we excluded participants who failed the attention check (84% vs. 50%; χ^2 (1, $N = 73$) = 32.89, $p < .001$).

acceptable songs and a non-mystery option, a randomly displayed option selected from the same list of acceptable songs. Note that in this case, the number of songs in the mystery set depended on the number of acceptable songs, thus ranging from 2 to 49 (median = 26; $M = 24.59$, SD = 9.97; preregistration: https://aspredicted.org/dd7mg.pdf).

Supporting hypothesis 1a, 81% of participants preferred the mystery option over the non-mystery option, which differed significantly from a 50% of choice share (χ^2 (1, $N = 125$) = 47.43, $p < .001$). The number of mystery songs did not predict preference for mystery (Wald < 1). A successful replication ($N = 266$) is reported in web appendix D.

Ancillary Study. A previously run version of this study ($N = 261$; 54.8% female; $M_{age} = 20.63$, SD = 1.60) provides an accidental conservative test of hypothesis 1a. Due to a programming error, participants were shown 25 mystery options even when the number of acceptable songs was below 25. As a result, in 42% of the cases, the mystery list included unacceptable songs. Still, supporting hypothesis 1a, even when including these cases, 59% of participants preferred the mystery option over the non-mystery option, which differed significantly from a 50% of choice share (χ^2 (1, $N = 261$) = 7.76, $p = .005$). Note that this effect was stronger when excluding participants as preregistered in study 1D (64%; χ^2 (1, $N = 168$) = 12.60, $p < .001$).

Discussion

Across a variety of products, participants preferred a mystery option over a non-mystery option. This was observed in various settings (hypothetical and consequential choices, recorded in the field and lab), for more- and less-expensive products, for various numbers of outcomes (10 ice cream flavors, ambiguous number stress ball options, 20 hotel options, and varying song options), and for various procedures used to select the non-mystery options (store data, pretests, random selection, and self-reported acceptable options). The finding thus cannot be explained by the selection of the certain item, nor can it be explained by any expectation about the mystery option (e.g., the possibility that participants expect mystery items to be curated in a fashion that leads to expectations of these items being higher than average—our assumption about their expected value).

Some may wonder whether our effect would hold for negative outcomes. An ancillary study ($N = 100$ US AMT workers) using the same procedure as study 1C for aversive jelly bean flavors also showed a preference for mysterious consumption in the negative domain (63%, χ^2 (1, $N = 100$) = 6.76, $p = .009$; appendix H). However, given that the existing literature already paints consumers as risk seeking for losses (Kahneman and Tversky 1979), making this finding less novel, we focus our investigation on positive mysterious consumption scenarios more common in the marketplace.

STUDIES 2A AND 2B: THE ROLE OF SURPRISE

Studies 2A and 2B seek further evidence for the preference for mysterious consumption. In addition, they begin to explore why consumers prefer mysterious consumption items over non-mysterious consumption items of equal or greater (subjective) value.

Study 2A: Wanting to Be Surprised

Study 2A further examines the robustness and extent of the preference for mysterious consumption by having participants choose between a box with a mystery snack selection and a box with a non-mystery snack selection, with the latter varying by appeal (one of three kinds: either an average, above-average, or self-curated box). Recall that horizontal differentiation does not mean that all options are similarly popular or desirable to consumers (Spiller and Belogolova 2016), and pretests therefore make it possible to select items that will be more or less appealing, on average, even among horizontally differentiated products. In line with hypothesis 1a, we predicted that participants would prefer mystery boxes over average non-mystery boxes. As a more conservative test of hypothesis 1a, we also included an above-average box condition. A third condition included a self-curated box. We did not make any predictions for this last condition. According to normative theory, all participants should choose to curate their box so we simply wanted to explore how the preference for the mystery box would compare to this (normatively) most desirable option. In line with hypothesis 1b, we expected that wanting to be surprised would predict the preference for mysterious consumption even when controlling for other possible drivers.

Method

A total of 150 US AMT workers (40.4% female; $M_{age} = 37.73$, SD = 12.69) were randomly assigned to one of three conditions in which they indicated their preference between a mystery box and one of three non-mystery boxes (either an average box, an above-average box, or a self-curated box).

In all conditions, participants were given a list of 20 different snacks and were told about a box that contained an unknown selection of those snacks. Specifically, they were told that the box contained five snacks from the list, but they would not know which snacks it contained until they received it. They were asked to choose between this

mystery box and a non-mystery box, which varied by condition.

In the average box condition, participants chose between the mystery box and the average box (Skittles, Haribo Gummy Bears, Chex Mix, Snickers, and Sun Chips) selected based on a pretest such that the average of the five snacks ($M = 2.86$, SD = 0.96) did not differ from the average of all snacks on the list ($M = 2.89$, SD = 0.78; $t(151) < 1$; see appendix E and web appendix A for the pretest of all snack options and ratings).

In the above-average box condition, they chose between the mystery box and an above-average box (Doritos, Skittles, Oreos, Kit Kat, and M&Ms) selected such that the average of these five snacks ($M = 3.27$, SD = 0.97) was significantly higher than the average of all snacks on the list ($M = 2.89$, SD = 0.78; $t(151) = 4.82$, $p < .001$).

In the self-curated box condition, they chose between the mystery box and the self-curated box, which would allow them to choose any five snacks from the same list of snacks.

We then collected measures tapping into possible drivers of this preference. We hypothesize that consumers seek out mysterious consumption because the uncertainty about the nature of the product among horizontally differentiated products allows for a surprise. However, there are other theoretical reasons that might help explain the allure of mysterious consumption. We thus asked participants to what extent wanting to be surprised, the ease of the decision, the amount of work required to make the box selection, wanting to discover new snacks, and wanting to get their favorite snack influenced their choice of box (1 = not at all, 5 = a great deal).

Results

In line with hypothesis 1a, participants showed a preference for mystery boxes over average non-mystery boxes (76% vs. 50%; χ^2 (1, $N = 50$) = 13.52, $p < .001$). This preference was even observed for above-average non-mystery boxes (74% vs. 50%; χ^2 (1, $N = 50$) = 11.52, $p = .001$), which did not differ from the average box condition ($\chi^2 < 1$). The preference for mystery boxes did not extend to self-curated boxes (28% vs. 50%; χ^2 (1, $N = 50$) = 9.68, $p = .002$), which differed significantly from both other conditions (χ^2s (1, $N = 100$) > 21.16, $ps < .001$). That said, collapsed across all three experimental conditions, we see an overall preference for mystery boxes over non-mystery boxes (59% vs. 50%; χ^2 (1, $N = 150$) = 5.23, $p = .02$).

Wanting to Be Surprised. A (box: average, above-average, self-select) between-subjects ANOVA on surprise ratings revealed a significant effect of box ($F(2, 147) = 6.30$, $p = .002$; $\eta^2 = 0.08$). Simple effects revealed that participants reported that wanting to be surprised influenced their choice more in the average ($M = 2.80$; SD = 1.36) and above-average conditions ($M = 3.14$; SD = 1.67) than in the self-select condition ($M = 2.08$; SD = 1.54; $Fs(1, 147) > 5.50$, $ps < .02$). The surprise ratings for the average and above-average conditions did not differ ($Fs(1, 147) > 1.20$, $ps > .26$).[4] Means for other measures are reported in web appendix B.

Controlling for choice sets, which were included as dummy variables, a logistic regression with surprise, decision ease, effort, and wanting to discover new snacks as predictor variables revealed that wanting to be surprised was the only significant predictor of the choice of mystery boxes across conditions ($B = -1.11$, SE = 0.33; Wald = 11.48, $p < .001$; hypothesis 1b). Decision ease, work required to make the box selection, wanting to discover new snacks or getting favorite snack did not emerge as significant predictors ($Bs < |1|$, Wald < 2, $ps > .19$).

Study 2B: Individual Difference Measure of Surprise

Study 2B uses a similar simple preference paradigm as in studies 1A–D to examine the process of surprise via individual differences in a consequential choice study. Individual difference measures and choice were temporally separated to rule out any demand effects. In line with hypothesis 1b, we predicted that individual difference in liking surprises would predict the choice of mysterious consumption.

Method

A total of 196 undergraduate students (47.4% female; $M_{age} = 19.75$, SD = 1.10) participated in two ostensibly separate studies in the lab during one data collection phase at the University of Southern California in exchange for course credit (10 participants did not complete both studies).

In a first "study" (i.e., part 1 of our study), participants filled out various individual difference measures tapping into the possible drivers of mysterious consumption. We asked participants to what extent they agreed with liking surprises (I like surprises; I can't stand being surprised (*R*), $r = 0.50$, $p < .001$; Cronbach's alpha = 0.74; averaged to an index), decision avoidance, variety seeking, openness to new things, and optimism (1 = strongly disagree; 7 = strongly agree).

Participants then participated in different, unrelated studies that took at least 10 minutes to complete. After completing the final study, they were told that they could

4 Additional analyses reveal that, conditional on having chosen the mystery option, the surprise ratings were higher in the self-select ($M = 4.00$; SD = 1.30) and the above-average conditions ($M = 3.73$; SD = 1.45) than in the average condition ($M = 3.18$; SD = 1.29; $Fs(1, 147) > 3.30$, $ps < .05$), suggesting that when selected over a desirable certain item, the surprise is an especially strong motivator for choosing mysterious consumption.

choose a snack to take home as a "thank you" for participating in today's studies. Participants were shown a mystery snack to be selected from the same list of 20 snacks used in study 2A and a non-mystery snack, which was randomly selected from the top 10 most popular snacks on the list (preregistration: https://aspredicted.org/jv3tv.pdf).[5]

Results

In line with hypothesis 1a, participants showed a preference for mystery snacks over above-average non-mystery snacks (80% vs. 50%; χ^2 (1, $N = 196$) = 68.56, $p < .001$).

Supporting hypothesis 1b, a logistic regression using the surprise measure, along with the other four trait measures as predictor variables, revealed that individual differences in liking surprise predicted the choice for mysterious consumption ($B = 0.37$, SE = 0.14; Wald = 6.93, $p = .008$), whereas other measures did not (Bs $< |1|$, Walds < 1.50, ps $> .22$). Note that entering each predictor individually also revealed an effect of surprise ($B = 0.39$, SE = 0.14; Wald = 7.89, $p = .005$) whereas the other measures did not predict choice (Bs $< |1|$, Wald < 1.25, ps $> .26$).

Discussion

Studies 2A and 2B provide further evidence for the desirability of mysterious consumption and also show that the ability to be surprised makes mysterious consumption appealing. Participants chose a snack/snack box of mysterious nature over non-mystery options of equal expected value and above-average expected value. State and trait surprise predicted this choice while controlling for other possible drivers.

We observe a preference for mystery despite what we know about uncertainty aversion and what would be expected from normative theories around expected value, which we can further illustrate and quantify using our pretest data: while snack preference is a matter of taste, our pretest contains information about which snacks, among objectively similar outcomes, are subjectively more or less popular (see appendix E for pretest and web appendix A for informative density plots). We used 100,000 Monte Carlo simulations to calculate the probability that the mystery option would be better than the non-mystery option among participants. In study 2A, the probability of the mystery option being better than the average option was 49.87% (thus almost perfectly aligning with our assumption of expected value), and the probability of the mystery option being better than the above-average option was only 30.56%. Yet, in both cases, we observed a preference for mystery (a choice share of 76% and 74%, respectively). In study 2B, the probability of the mystery option (a randomly selected item among the full set of 20 options) being better than the non-mystery option (a randomly selected item among the top 10 options) was 37.77%. Nevertheless, a full 80% chose it. These studies thus both demonstrate violations of expected value and go against previous demonstration of uncertainty aversion. Study 3 will calculate this probability on the sample who completed the study (as opposed to the pretest sample reported here).

Worth noting is that, in the exploratory condition in study 2A, participants preferred a self-curated option over mystery. Importantly, hypothesis 1a predicts a preference for mysterious consumption over non-mysterious consumption of *equal* expected value. The preference for this normatively most desirable non-mysterious option therefore does not challenge hypothesis 1a. In fact, the observed 28% choice share for mystery in this condition is still much greater than what normative theories would predict (i.e., <1%; the probability that any mystery combination would contain participants' five top choices). The greater valuation of mystery compared to normative theories is supported in two studies reported in the web appendix E using willingness to pay (WTP) as the dependent measure.

Studies 2A and 2B also elucidate why consumers seek out mysterious consumption. The desirability of mysterious consumption seems to be driven by the uncertainty inherent in them, thus allowing consumers to be surprised, over other possible motivators (i.e., decision ease, variety seeking, optimism, and wanting to explore new options). Aside from ruling out alternative explanations statistically, the study design itself addresses other possible drivers. We have noted that a possible benefit of mysterious consumption in the marketplace is that it absolves the consumers from decisions. However, neither the mystery nor the non-mystery items required selections. An exception is the self-select condition in study 2A, in which participants preferred choosing over mystery, thus further ruling out this explanation. And given the absence of a price deal and the familiarity with the snacks used, price discounts, outsourcing decisions to experts or trialability are also unlikely explanations in this context. Thus, while additional factors may certainly drive mysterious consumption in the marketplace, we demonstrate that the opportunity to be surprised makes mysterious consumption items desirable independent of other motivators, thereby isolating uncertainty as a driver of mysterious consumption in a controlled setting.

5 The preregistration states that the certain option would be a randomly displayed option among all possible outcomes. However, we changed the non-mystery option to be 1 out of the 10 most popular options after the first two laboratory sessions because over 90% of participants were selecting the mystery snack. Given the change in study design, we excluded participants who were shown a non-mystery option ranked below the top 10 options from the analysis (full data set is posted on OSF). The results for hypothesis 1a (82%; χ^2 (1, $N = 238$) = 94.54, $p < .001$) and hypothesis 1b hold for the full sample (surprise; $B = -0.32$, SE = 0.13; Wald = 6.25, $p = .006$; other measures: Bs $< |1|$, Wald < 1.80, ps $> .19$).

STUDY 3: MYSTERIOUS CONSUMPTION VERSUS RISK AVERSION

Study 3 was designed to replicate the preference for mysterious consumption while also directly comparing it to the paradigm used to show risk/uncertainty aversion.

Specifically, participants chose between a certain, known product and different types of uncertain options. In one condition, the uncertain option was a mystery product (horizontal uncertainty condition; hypothesis 1a). In a condition adapted from the classic risk aversion paradigm, the uncertain option was a risky gamble (i.e., a chance of either winning two non-mystery products or nothing; vertical uncertainty). In line with risk aversion, we predicted that participants would prefer the certain option over the risky prospect. This study also included an exploratory risky mysterious consumption condition in which mysterious consumption and risk were combined (i.e., a chance of either winning two mystery products or nothing). Uncertainty aversion predicts that more uncertainty should be more aversive, such that adding uncertainty in the form of mysterious consumption would exacerbate risk/uncertainty aversion. Our theorizing would predict that adding horizontal uncertainty may make a risky gamble less aversive.

Method

A total of 461 undergraduates (52% female, 0.7% nonbinary, 0.2% prefer not to say; $M_{age} = 19.82$, SD = 1.55) at the University of Southern California participated in the study in exchange for course credit.

In a first part, participants completed a snack rating task. All participants rated each of the 20 snacks from studies 2A and 2B on five-star scales. They then evaluated five pairs of snacks from the same list and indicated their preference on a binary measure ("Which do you like more?": Twinkies or Jelly Bellies, Kit Kat or Reese's Peanut Butter Cups, Skittles or Snickers, Lays Chips or Doritos, Fruit Roll-Ups or Haribo Gummy Bears). We were interested in participants' preference between Snickers and Skittles, two generally desirable snacks with different ingredients. The better-liked option between the Snickers and the Skittles was selected as the target snack, which would represent the certain non-mystery option in all of the choice conditions. The goal of this exercise was to identify a relatively well-liked snack option as to provide a conservative test for the preference for mysterious consumption.

Participants then moved to the second and main part of the study, which involved a choice task. They were shown their target snack (either a fun-sized Skittles or Snickers, depending on which one they had indicated to like better in the first task) and chose between their target snack and one of the following uncertain options:

In the mysterious consumption condition (horizontal uncertainty), participants chose between their fun-sized target snack and a fun-sized mystery snack that would be revealed upon receiving it, selected from the list of snacks they had evaluated in the previous task. In line with hypothesis 1a, we predicted a preference for mysterious consumption over the target snack (i.e., certainty).

In the risky gamble condition (vertical uncertainty), participants chose between their target snack and a 50% chance of getting two of the same target snacks or a 50% chance of getting no snack. This condition was included to replicate risk aversion using our (non-monetary) stimuli, and we expected participants to prefer the certain option in this condition.

In the exploratory risky mystery gamble condition (vertical and horizontal uncertainty), participants chose between their target snack and a 50% chance of getting two fun-sized mystery snacks or a 50% chance of getting no snack. Thus, this option was marked by double uncertainty: uncertainty about the number of items to be gained (zero or two snacks; vertical uncertainty) and uncertainty about the nature of the outcome (horizontal uncertainty) should any gain occur. Uncertainty aversion would predict this to be the least desirable option, whereas our preference for mysterious consumption account would predict that the mystery content might be able to mitigate risk aversion.

Results

Most importantly, and in line with hypothesis 1a and replicating previous studies, we found a preference for mysterious consumption. Participants in the horizontal uncertainty condition were more likely to choose the mystery snack (59% vs. 50%; χ^2 (1, $N = 163$) = 5.16, $p = .02$) than a (well-liked) non-mystery snack, thus showing a preference for uncertainty.

In the risky gamble (vertical uncertainty) condition, we found the opposite. In line with risk aversion, participants were less likely to choose the uncertain snack option (either two target snacks or nothing) than the certain target snack, thus showing a preference for certainty (28% vs. 50%; χ^2 (1, $N = 156$) = 29.64, $p < .001$). This choice share differed significantly from the mystery condition reported above (28% vs. 59%; χ^2 (1, $N = 319$) = 30.48, $p < .001$).

Interestingly, however, this risk aversion disappeared when mystery was introduced. In the risky mystery gamble condition, there was no significant difference in choice share of the uncertain option (48% vs. 50%; $\chi^2 < 1$) over the certain option. Comparing this condition to the risky gamble condition with non-mystery snacks revealed that the presence of the mystery snack significantly increased the preference for the uncertain option (48% vs. 28%; χ^2 (1, $N = 298$) = 12.27, $p < .001$). However, a comparison with the mystery condition also revealed that including mystery in a risky choice did not fully override risk

aversion, as choice shares for the uncertain option were lower in this condition than in the pure mystery condition (48% vs. 59%; χ^2 (1, $N = 305$) = 3.70, $p = .054$).

Discussion

Study 3 replicates the preference for mysterious consumption over highly desirable known options. Instead of relying on simulation based on pretests as in studies 2A and 2B, this study allowed us to calculate the normative choice within the same sample. Based on participants' snack rating at the beginning of the study, the displayed target snack was liked better than the average of all rated snacks in 70.1% of cases.[6] The mystery option was chosen by 59% of the sample, even though it would have been the normative choice for only 29.9%.

Using the classic risk aversion paradigm, it also replicates risk aversion in that participants were less likely to choose the uncertain option when it was risky (i.e., the possibility of winning two non-mystery snacks or not winning anything; vertical uncertainty). Importantly, adding mystery to this type of risky gamble (i.e., the possibility of winning two mystery snacks or not winning anything; horizontal and vertical uncertainty) increased preference for the uncertain option compared to a risky gamble with a non-mysterious option. This suggests that the horizontal uncertainty associated with mysterious consumption can counteract risk aversion to a certain extent and make it more appealing. That is, in line with our argument, uncertainty is not always aversive.

STUDIES 4–6: HORIZONTAL AND VERTICAL UNCERTAINTY

The studies so far have demonstrated a preference for mysterious consumption and also show that adding uncertainty in the form of mystery (i.e., horizontal uncertainty) can attenuate risk aversion in the classic paradigm used to demonstrate it. The next studies were designed to more directly test the boundaries of our effect using theoretically derived moderators. We have argued that the horizontal nature of mysterious consumption gives rise to the preference for uncertainty. While there is still risk at the individual level based on heterogeneity in taste, horizontal uncertainty is less likely to focus the consumer on a loss relative to a salient reference point, thus allowing them to focus on the positive side of uncertainty: the opportunity to be surprised.

To test this, studies 4 and 5 directly manipulate horizontal versus vertical uncertainty and also examine our proposed process via mediation. A final study 6 manipulates the extent of horizontal differentiation to test whether mysterious consumption is less desirable when the possible outcomes are less likely to allow for a surprise.

STUDY 4: HORIZONTAL VERSUS VERTICAL DIFFERENTIATION

Study 3 already included a vertical uncertainty condition often used in demonstrations of risk aversion. However, the vertical uncertainty differed from the horizontal one in that it had fewer possible outcomes (i.e., less uncertainty) and that it included the possibility of not gaining anything. Study 4 manipulates the source of uncertainty while keeping the amount of uncertainty constant. That is, we manipulate whether the *nature* of the outcome among objectively similar options is unknown (i.e., the outcome is 1 out of 20 different flavors; horizontal uncertainty) or whether the *amount* of a known outcome is unknown (i.e., the outcome is 1 out of 20 different quantities; vertical uncertainty). The product used in this study was tea, but because differences in product amounts may be subject to satiation effects, we also included a monetary vertical uncertainty condition (as commonly used in demonstrations of risk/uncertainty aversion; Martin et al. 2016).

We expected to replicate the preference for mysterious consumption in the horizontal uncertainty condition. Moreover, we predicted that the preference for uncertainty would be stronger for the horizontal than for the vertical uncertainty conditions because the former would be more likely to be driven by the positive aspect of uncertainty: wanting to be surprised.

Method

A total of 309 US AMT workers (47.2% female, 1.6% non-binary/other; M_{age} = 41.40, SD = 12.17) were randomly assigned to one of three conditions in which they indicated their preference between an uncertain option and certain option. Three replications of this study are reported in web appendix D.

In a *horizontal* uncertainty/mystery tea condition, participants saw a list of 20 teas from the brand Yogi and were given a choice between 10 Green Tea Energy tea bags and 10 tea bags of one uncertain flavor from the shown list, where the outcome would be determined by rolling a 20-sided die (equivalent of a 5% chance of receiving each type of tea). Green Tea Energy tea was selected as the certain option based on a pretest revealing it to be a well-liked flavor ($M_{GreenTeaEnergy}$ = 3.17, SD = 1.38 vs. M_{all} = 2.64, SD = 0.79; $t(244) = 5.98$, $p < .001$; web appendix A).

In a *vertical tea* condition, participants chose between 10 Green Tea Energy tea bags and an uncertain amount of

6 Looking at the mean star-rating for the displayed target snack (either Skittles or Snickers, depending on which one they liked better) suggests that the resulting target snacks were overall well liked by the participants ($M = 3.16$, SD = 1.29 and $M = 3.37$, SD = 1.21, respectively, both of which were rated higher than the mean snack rating of $M = 2.92$, SD = 0.71; $ts > 2.86$, $ps < .005$ and closer to the highest snack rating of $M = 3.66$). A comparison between each participants' liking of the target snack and the mean of all snack ratings revealed that the target snack was more desirable in 70.1% of participants (i.e., the certain item represents the normative choice in this sample).

Green Tea Energy tea bags among 20 options, where the outcome would be determined by rolling a 20-sided die (equivalent of a 5% chance of receiving each amount). The 20 possible outcomes were listed and ranged from 1 to 20 tea bags, with an expected value of 10.5 tea bags.

In a *vertical monetary* condition, participants chose between a certain dollar amount ($2.50) and an uncertain dollar amount among 20 options, where the outcome would be determined by rolling a 20-sided die (equivalent of a 5% chance of receiving each amount). The 20 possible outcomes were listed and ranged from $.25 to $5.00, with increments of $.25 and with an expected value of $2.63. Note that the amount was selected to be approximately equivalent to the value of 10 Yogi tea bags (one Yogi tea bag costs around $.25). This condition was included because the stimulus is more neutral, less subject to satiation effects and because most demonstrations of uncertainty aversion feature monetary gambles. Thus, this condition allowed us to disentangle the role of monetary versus non-monetary product amounts within the vertical conditions.

After making their selection, participants indicated to what extent wanting to be surprised influenced their choice (1 = not at all; 9 = very much). In addition, participants reported their outcome focus by indicating what, and to what extent, influenced their choice (−4 = worst possible outcome; +4 = best possible outcome), an exploratory measure adapted from Martin et al. (2016). To test whether our effect holds for individuals who drink green tea (i.e., acceptable option), we also asked participants if they would drink a cup of the Green Tea Energy tea (yes, no). Additional exploratory measures collected in this and in replications of this study are reported in web appendices B and D.

Results

Supporting hypothesis 1a, we found a preference for mysterious consumption. In the horizontal tea condition, participants were more likely to choose the mystery tea flavor over a certain well-liked tea flavor (73% vs. 50%; χ^2 $(1, N = 100) = 21.16, p < .001$). This preference for uncertainty also held for Green Tea Energy drinkers only (72% vs. 50%; χ^2 $(1, N = 83) = 16.49, p < .001$).

In the vertical tea condition, supporting hypothesis 2, the pattern differed from the horizontal tea condition (41% vs. 73%; χ^2 $(1, N = 204) = 20.83, p < .001$). Participants were marginally less likely to choose the uncertain tea bag amount than the certain 10 tea bag amount (41% vs. 50%; χ^2 $(1, N = 104) = 3.12, p = .078$).

In monetary vertical uncertainty condition, the pattern also differed from the horizontal tea condition (33% vs. 73%; χ^2 $(1, N = 205) = 32.33, p < .001$). Participants were less likely to choose the uncertain monetary amount over the certain monetary amount (33% vs. 50%; χ^2 $(1, N = 105) = 11.67, p < .001$). A comparison between this condition and the theoretically equivalent vertical tea condition showed no significant difference in choice shares (33% vs. 41%; χ^2 $(1, N = 209) = 1.44, p = .23$).

Surprise. A (type of uncertainty: horizontal tea, vertical tea, vertical monetary) between-subjects ANOVA on surprise ratings revealed a significant effect of uncertainty type ($F(2, 306) = 18.87$, $p < .001$; $\eta^2 = 0.11$). Simple effects revealed that participants reported that wanting to be surprised influenced their choice more in the horizontal tea condition ($M = 6.39$, SD = 2.83) than in the vertical tea condition ($M = 4.82$, SD = 3.09; $F(1, 306) = 15.37$, $p < .001$) or the vertical money condition ($M = 3.96$, SD = 2.65; $F(1, 306) = 36.82$, $p < .001$), with the latter two also differing ($F(1, 306) = 4.66$, $p = .03$). The theoretically appropriate planned contrast weights (1 −0.5 −0.5) revealed that the horizontal condition differed from the two vertical conditions ($F(2, 306) = 33.00$, $p < .001$).

Focus. While not an articulated hypothesis, we also examine the role of differences in salient reference point/focus (Martin et al. 2016) relevant to our theorizing. A (type of uncertainty: horizontal tea, vertical tea, vertical monetary) between-subjects ANOVA on focus ratings revealed a significant effect of uncertainty type ($F(2, 306) = 5.65$, $p = .004$; $\eta^2 = 0.04$). Simple effects revealed that the focus rating was higher in the horizontal tea condition ($M = 1.41$, SD = 2.24) than in the vertical tea ($M = 0.20$, SD = 2.77; $F(1, 306) = 11.22$, $p < .001$) or in the vertical money condition ($M = 0.70$, SD = 2.70; $F(1, 306) = 3.84$, $p = .051$), with the latter two not differing ($F(1, 306) = 1.99$, $p = .16$). The theoretically appropriate planned contrast weights (1 −0.5 −0.5) revealed that the horizontal condition differed from the two vertical conditions ($F(2, 306) = 9.34$, $p < .001$).

Mediation. To test whether choice was mediated by wanting to be surprised (hypothesis 1b) independent of the role of focus, we used model 4 of the PROCESS macro (Hayes 2013) to examine both mediators in parallel. Uncertainty type was used as the predictor variable, surprise and focus as mediators, and choice as the dependent variable. The analysis revealed that the effect of uncertainty type on choice was mediated by surprise (indirect effects, horizontal vs. vertical tea: $B = -0.74$, SE = 0.23; 95% CI = −1.24 to −0.33; horizontal vs. vertical monetary: $B = -1.14$, SE = 0.26; 95% CI = −1.73 to −0.73) even in the presence of weaker indirect effects for focus (horizontal vs. vertical tea: $B = -0.64$, SE = 0.22; 95% CI = −1.14 to −0.26; horizontal vs. vertical monetary: $B = -0.38$, SE = 0.20; 95% CI = −0.80 to −0.02). Models entering the mediators individually revealed statistically comparable effects.

Discussion

Preference for uncertainty was only observed in the mysterious consumption condition (horizontal uncertainty); it was not observed when the amount to be gained of a known

outcome was unknown (tea or monetary amount; vertical uncertainty). The effect was mediated by wanting to be surprised and, building on the work of Martin et al. (2016), a greater differential focus on the best versus worst possible outcome. Notably, surprise and focus both add explanatory power, such that the preference for mystery is not explained by greater focus on the best option alone. Indeed, the surprise mediator is stronger and more consistent than the focus mediator (see replications in web appendix D).

Note that the effects for the tea conditions hold when only people who said they would consume the certain tea were included in the analysis (i.e., the certain option represents an acceptable option). Moreover, study 4 held constant the stake, amount of uncertainty (number of possible outcomes), the chance mechanism, the wording, and the fact that all outcome options were marked by a gain (i.e., there was no no-gain option as in study 3), thus isolating the source of uncertainty (i.e., horizontal vs. vertical) as the critical factor determining whether consumers show a preference for uncertainty. As a result, this study rules out that mysterious consumption is driven by the absence of the lottery element (Yang et al. 2013) or the possibility of not winning anything (Duke et al. 2018).

This study also further clarifies the role of outcome domain (money vs. non-money; Martin et al. 2016): despite one vertical condition involving a monetary outcome and the other a non-monetary product, neither of the vertical conditions revealed a preference for uncertainty. Thus, the non-monetary nature of mysterious consumption cannot explain its appeal, in line with the fact that some existing demonstrations of uncertainty/risk aversion involve (vertically differentiated) non-monetary outcomes (Allais 1953; vacation length) and even gift boxes (Duke et al. 2018; boxes containing an uncertain value of gifts). While satiation or waste considerations could explain the lack of preference for uncertain quantity amounts in the vertical tea condition, this explanation is less viable for the vertical monetary condition.

STUDY 5: QUALITATIVE HORIZONTAL VERSUS VERTICAL DIFFERENTIATION

Studies 3 and 4 rely on extreme versions of vertical uncertainty in that we examined different amounts of a good for which subjective superiority can be calculated and quantified. However, in doing so, studies 3 and 4 confound vertical and quantitative differentiation. Moreover, the vertical conditions do not represent the marketing relevant vertical differentiation, modeled as differences in quality or "perceived objective superiority" among products.

Thus, this study builds on studies 3 and 4 by manipulating vertical differentiation via qualitative differences (i.e., customer ratings). This allows us to (a) test our theorizing using marketing relevant differentiation and (b) to disentangle vertical differentiation from qualitative versus quantitative differences among options (Martin et al. 2016).

We expected to replicate the preference for mysterious consumption in the horizontal uncertainty condition. Moreover, we predicted that the preference for uncertainty would be stronger for the horizontal than for the vertical uncertainty condition because the former would be more likely to be driven by the positive aspect of uncertainty: wanting to be surprised.

Method

A total of 201 Prolific respondents (61.7% female, 3.5% non-binary; M_{age} = 29.06, SD = 10.65) were randomly assigned to one of two conditions in which they indicated their preference between an uncertain option and certain option.

In the *horizontal* uncertainty condition, participants saw a scenario akin to the one used in study 1C, whereby participants chose between a randomly displayed certain four-star hotel and a mystery four-star hotel, all said to have four-star consumer ratings.

In the *vertical* uncertainty condition, participants chose between a randomly displayed certain four-star hotel which was said to have a four-star consumer rating and a mystery four-star hotel with consumer rating hotels ranging from three to five stars. The three consumer rating levels were said to be represented equally, such that the expected value was the same as the certain hotel but the "mystery" hotel options were marked by vertical uncertainty.

Participants then indicated to what extent wanting to be surprised influenced their choice (1 = not at all; 9 = very much). In addition, participants reported their outcome focus by indicating what, and to what extent, influenced their choice (−4 = worst possible outcome; +4 = best possible outcome; Martin et al. 2016). Additional exploratory measures collected (e.g., uncertainty, valuation) and replications of this study are reported in web appendices B and D (preregistration: https://aspredicted.org/yj5ac.pdf).[7]

Results

Choice. Supporting hypothesis 2, participants in the horizontal uncertainty condition were more likely to choose the uncertain option than participants in the vertical uncertainty condition condition (67% vs. 43%; χ^2 (1, N = 199) = 11.85, $p < .001$). Consistent with hypothesis 1a, in the horizontal uncertainty condition, participants preferred the uncertain hotel option (67% vs. 50%; χ^2 (1, N = 103) = 11.89, $p < .001$). In the vertical uncertainty condition, participants were directionally less likely to choose the uncertain hotel option, although the choice

7 We report a direct replication of a preregistered study that was collected on undergraduate students (same expected sample size; web appendix D).

share did not significantly differ from chance (43% vs. 50%; χ^2 (1, $N = 96$) = 2.04, $p = .15$).

Surprise. A (type of uncertainty: horizontal, vertical) between-subjects ANOVA on surprise ratings revealed a significant effect of uncertainty type, such that participants reported that wanting to be surprised influenced their choice more in the horizontal condition ($M = 5.92$, SD = 3.01) than in the vertical condition ($M = 4.98$, SD = 3.04; $F(1, 197) = 4.83$, $p = .03$; $\eta^2 = 0.03$).

Focus. The same ANOVA on the focus rating revealed a significant effect of uncertainty type, such that the focus rating was higher in the horizontal condition ($M = 1.21$, SD = 2.59) than in the vertical condition ($M = 0.11$, SD = 3.07; $F(1, 197) = 7.49$, $p = .007$; $\eta^2 = 0.04$).

Mediation. To test whether choice was mediated by wanting to be surprised (hypothesis 1b) independent of the role of focus, we used model 4 of the PROCESS macro (Hayes 2013) to examine both mediators in parallel. Uncertainty type was used as the predictor variable, surprise and focus as mediators, and choice as the dependent variable. The effect of uncertainty type on choice was mediated by surprise (indirect effect, $B = -0.30$, SE = 0.16; 95% CI = −0.67 to −0.04) even in the presence of an indirect effect for focus (indirect effect, $B = -0.46$, SE = 0.22; 95% CI = −0.97 to −0.13). Models entering the mediators individually revealed the same effects.

Discussion

Preference for uncertainty was only observed when the nature of a *horizontally* differentiated outcome was unknown. It was not observed when the possible outcomes were framed to be vertically differentiated in that some uncertain options were said to be qualitatively better or worse according to consumer consensus (i.e., average customer reviews). The effect was mediated by wanting to be surprised and a differential focus on the best versus worst possible outcome (see also replications in web appendix D).

Note that this study experimentally manipulates horizontal versus vertical differentiation while keeping the product constant (i.e., the hotels were the same in both conditions). We rely on average consumer ratings (i.e., star ratings) because they represent consensus about perceived objective superiority among products in line with Spiller and Belogolova (2016). However, we replicate the effect using both hotel star ratings[8] and customer ratings as the vertical differentiator in a conceptual replication reported in web appendix D. In addition, an ancillary study (study B reported in appendix H) uses cars that organically differ on the product differentiation continuum (i.e., similar or dissimilar classes of cars).

By relying on qualitative differences to create vertical uncertainty in this study and in the various conceptual replications, we disentangle our constructs (horizontal vs. vertical differentiation) from the ones used by Martin and colleagues (qualitative vs. quantitative differences), which were confounded in studies by Martin and colleagues and our study 4 (i.e., differences in quantities were also vertically differentiated). We discuss the importance of this distinction in the General Discussion.

STUDY 6: REDUCING HORIZONTAL UNCERTAINTY

This last study manipulates the ability to be surprised by reducing horizontal differentiation and therefore also reducing the surprise factor. If horizontal uncertainty is preferred over certainty because it allows for the opportunity to be surprised, then reducing horizontal uncertainty via differentiation should reduce the opportunity to be surprised and hence the preference for horizontal uncertainty. The intuition behind this is that, in order for an outcome to be conceptualized as a surprise, the outcomes have to be sufficiently different from each other to feel like the outcome is unknown (see pretest B reported in web appendix A confirming this intuition). We predicted that participants would be less likely to choose the mystery option when horizontal differentiation was low than when it was high.

Method

A total of 305 US AMT workers (48.9% female, 1.7% non-binary or other; $M_{age} = 40.27$, SD = 12.18) were randomly assigned to one of two conditions (differentiation: high vs. low).

Participants chose between buying a non-mystery mask and a mystery mask. The mystery mask would be selected from a set of 10 possible options; the non-mystery mask was a randomly displayed option selected from the same set of options. In the high-differentiation condition, the set of 10 possible masks varied in color (i.e., different hues). In the low-differentiation condition, the set of 10 possible masks varied only slightly (i.e., different shades of the same hue, see appendix G). In addition to pretest B confirming the perceived difference in differentiation, these two sets were constructed using a separate pretest such that the sets did not differ in the average attractiveness of each item and that they included options that were as gender neutral as possible (web appendix A). Participants then indicated to what extent wanting to be surprised influenced

8 Readers may wonder if participants confused the customer ratings with hotel star ratings. Our conceptual replication in web appendix D shows that the effect holds for both hotel star ratings and customer ratings as the vertical differentiator, such that either interpretation would support our theorizing. Moreover, a post-test on the same population ($N = 100$) revealed a similar choice share for the uncertain option in the vertical condition (34%) among the 89 participants who passed a reading comprehension check ensuring they understood the instruction.

their choice (1 = not at all; 9 = very much; preregistration: https://aspredicted.org/pg53f.pdf).

Results

Choice. As predicted in hypothesis 3, participants in the high-differentiation condition were more likely to choose the mystery option than participants in the low-differentiation condition (62% vs. 44%; χ^2 (1, $N = 305$) = 9.99, $p = .002$). Participants in the high-differentiation condition showed a preference for uncertainty and were more likely to choose the mystery option than the non-mystery option (hypothesis 1a; 62% vs. 50%; χ^2 (1, $N = 151$) = 8.11, $p = .004$). Participants in the low-differentiation condition did not show a preference for uncertainty (44% vs. 50%; χ^2 (1, $N = 154$) = 2.59, $p = .11$).

Surprise. A (differentiation: high, low) between-subjects ANOVA on surprise ratings revealed a significant effect of differentiation, such that participants reported that wanting to be surprised influenced their choice more in the high-differentiation condition ($M = 5.42$, SD = 2.97) than in the low-differentiation condition ($M = 4.12$, SD = 3.07; $F(1, 303) = 14.11$, $p < .001$; $\eta^2 = 0.05$).

Mediation. To test the relationship between choice and wanting to be surprised (hypothesis 1b) we used model 4 of the PROCESS macro (Hayes 2013) with differentiation as the predictor variable, wanting to be surprised as the mediator, and choice as the dependent variable. The analysis revealed that the effect of differentiation on choice was mediated by wanting to be surprised (indirect effect, $B = -0.59$, SE = 0.17; 95% CI = −0.95 to −0.27).

Discussion

Study 6 further clarifies the condition under which consumers opt into mysterious consumption. In line with hypothesis 3, the preference for mysterious consumption disappears when horizontal differentiation—and thus the level of surprise—is diminished. This study provides process evidence while also highlighting under what circumstances uncertainty is naturally desirable, which has important implications for marketers about how to design mysterious consumption options.

In addition, this last study speaks to two important alternative explanations. First, it speaks to variety seeking. While the study shows that a certain level of perceived variety in possible outcomes is necessary for mysterious consumption to allow for a surprise, the ability to seek variety, defined as "the tendency of individuals to seek diversity in their choices of services or goods" (Kahn 1995) was held constant. Even in the high-differentiation condition, participants were to receive only one randomly determined mask independent of whether they chose the certain or the uncertain mask.

Second, one could argue that people prefer uncertainty in the case of horizontal uncertainty because the options are more homogenous in appeal and therefore less risky than in the case of vertical uncertainty. Contrary to this explanation, the conditions with greater horizontal uncertainty could be argued to be riskier. Yet consumers seem to endorse more risk when it allows for a surprise. This dovetails with the findings by Martin et al. (2016), who show that participants are relatively risk seeking when choosing between two horizontally differentiated uncertain experiences (high vs. low variance in liking, keeping average rating constant). While their choice set differs from ours in that we compare uncertainty to certainty, the two findings align in that both findings show that people seem to embrace higher variance (i.e., more risk) in the case of horizontal uncertainty (see also General Discussion). A replication of this study is reported in web appendix D.

SUMMARY OF EVIDENCE

Given the number of studies reported in the main text and appendices and the variation in the choice shares across them, we summarize the empirical evidence in figure 1. To estimate average choice shares based on these studies, we also pooled our studies using the meta-analytic methodology of McShane and Böckenholt (2017), which estimated that 70.0% of participants preferred the uncertain option on average in the horizontal conditions (95% CI = 65.4–74.6%) and that 41.7% of participants preferred the uncertain option on average in the vertical conditions (95% CI = 35.9–47.5%). We emphasize that the meta-analysis is intended to *summarize* the choice share estimates of the studies reported in our main text and appendices, and it does not provide evidence for or against the proposed effect above or below any evidence provided by the studies summarized by it (Vosgerau et al. 2019).

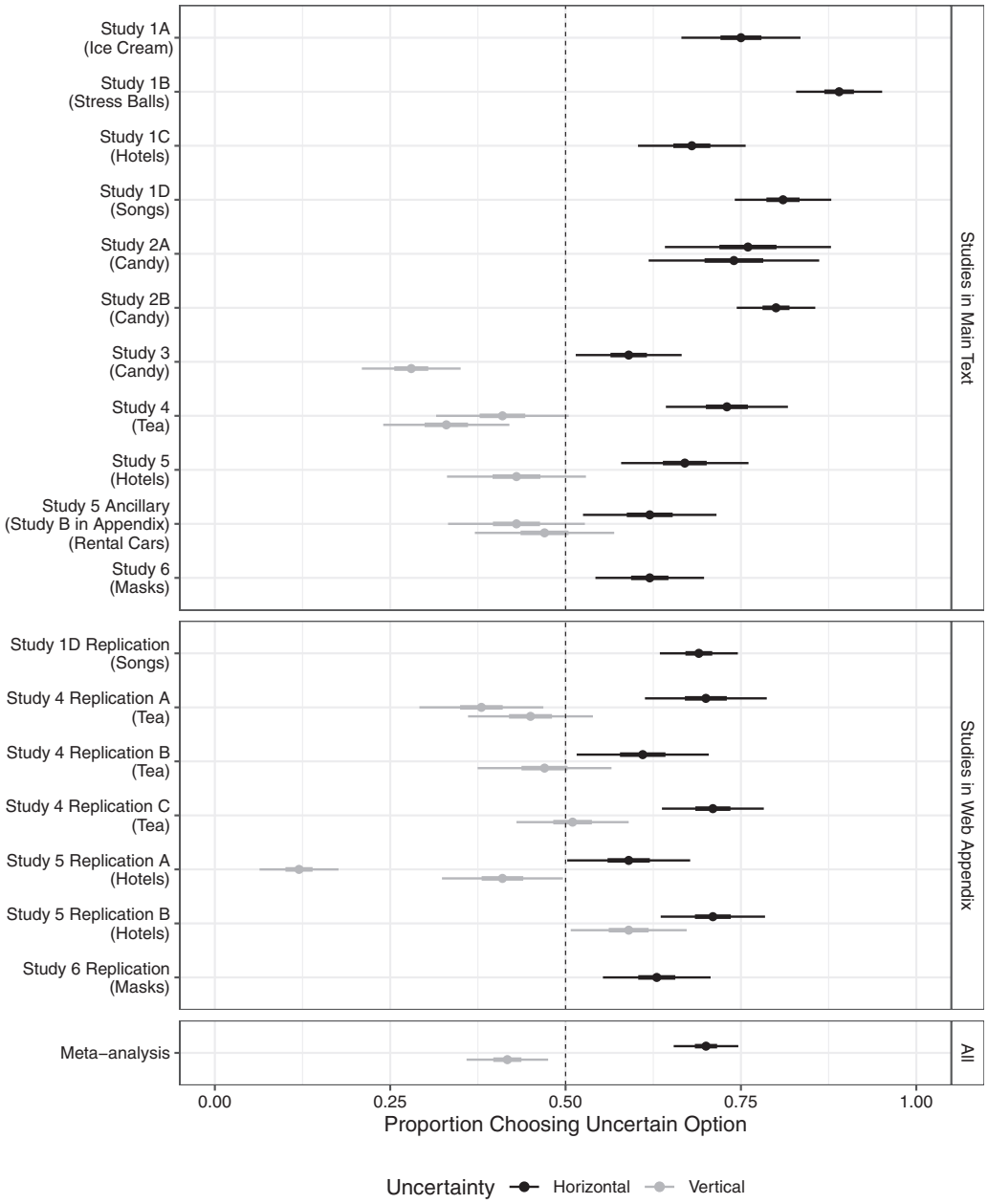
Alternative Explanations

Examples of mysterious consumption in the real world are often associated with price promotions, trialability, and the ability to outsource or sidestep decisions. While such drivers may provide additional appeal in the marketplace (Stich, Spann and Häubl 2018), we isolate (horizontal) uncertainty as one driver of mysterious consumption. In doing so, our empirical package also rules out a host of alternative explanations, which we reiterate and summarize here.

Variety Seeking. The procedures in our studies did not differ in the ability to seek variety as defined in the variety seeking literature (Kahn 1995). Indeed, the number of outcomes received was constant across conditions and in many of our studies, both the certain and uncertain items were randomly determined, thereby providing similar opportunity to seek variety or, relatedly, seek novel options

FIGURE 1

SUMMARY OF CHOICE SHARES ACROSS STUDIES



NOTE.—Point estimates are given by the circles; 50% and 95% confidence interval estimates are given by the thick and thin lines, respectively.

(i.e., trialability). One may argue that it is simply the variety in the possible outcomes that drives the preference for mystery. However, vertical uncertainty conditions in studies 4, 5, and study B provided similar variety in possible outcomes, but participants shied away from variety for such vertically differentiated outcomes. Thus, uncertainty in the form of horizontal product differentiation (i.e., our proposed effect) seems to drive preference for mysterious consumption and not variety more generally.

Choice Overload. One may wonder if the choice of the mystery option is driven by choice overload. However, the

choice sets in our studies were similar to demonstrations of uncertainty aversion in that participants made a choice between two options: an uncertain and a certain option. In our studies, neither the certain nor the uncertain options involved selections, with the exception of one condition in study 2A in which participants welcomed making their own choices. Moreover, the number of options (and any related feeling of difficulty or responsibility) was held constant across the horizontal and vertical uncertainty conditions in studies 4-6, and the number of possible outcomes did not affect the preference for mystery in study 1D, even though decision difficulty would presumably increase as a function of possible outcomes. Likewise, increasing similarity among options decreased the preference for the mystery option in study 6, despite greater similarity presumably increasing decision difficulty.

Risk/Probability/Stake. One may wonder if mysterious consumption is less risky, which could explain the lack of risk/uncertainty aversion. However, adding more uncertainty to an already risky option via mystery increased preference for uncertainty in study 3. Moreover, the mystery option was actually more desirable in the (riskier) high-differentiation condition in study 6 (i.e., greater heterogeneity in designs and resulting taste-based preferences; Martin et al. 2016). The mystery conditions also did not systematically differ in terms of the associated probability, such that the effect could be attributed to differential probability weighting (Kahneman and Tversky 1979). The number of possible outcomes and thus the resulting probability of receiving each item was the same in the horizontal and vertical conditions in studies 4–6 and yet the conditions differed in preference for uncertainty. Lastly, ruling out that our effect can be attributed to stake, we show our effect with a variety of products and various price points, and horizontal versus vertical differentiation moderated preference for uncertainty for outcomes that were similar in stake across conditions in studies 4 and 5. Likewise, holding the type of product constant, preference for mystery diminished when horizontal differentiation was reduced by making the horizontally differentiated outcomes more similar in study 6.

In addition to the alternative explanations addressed in the main text, web appendices B and D also report additional measures collected that can speak to more nuanced process explanations (e.g., reliance on affect versus cognition, and mental imagery). We did not find converging support for any of these measures despite being open to the potential role of these processes in the effect we demonstrate.

GENERAL DISCUSSION

The present research establishes a preference for uncertainty in the context of mysterious consumption (i.e., horizontal uncertainty), counter to the literature on uncertainty aversion, thus explaining the appeal of mysterious consumption observed in the (messier) marketplace.

Across 10 field and lab studies and various replications, we show a preference for mysterious consumption over non-mysterious consumption of equal or higher expected value. Uncertainty in the form of mysterious consumption is appealing because it provides an opportunity to be surprised (studies 2A, 2B, 4, 5, and 6). Reconciling this preference with previous demonstrations of uncertainty aversion, the present research isolates horizontal uncertainty (i.e., uncertainty around the *nature* of the outcome among objectively similar outcomes) as the driver of mysterious consumption. While we find a preference for uncertainty for horizontally differentiated outcomes, this preference for uncertainty disappears when the possible outcomes differ in perceived objective superiority (i.e., vertical uncertainty often associated with demonstrations of risk aversion, studies 3–5) and when horizontal uncertainty is reduced such that it no longer allows for surprise (study 6).

Our results are robust: we test and support our theorizing using hypothetical and consequential choices in the lab and in the field, across different product categories (e.g., food and non-food, hedonic and utilitarian products, products with different price points), for single items or selections of items, and for situations where the population of possible outcomes is known (e.g., specific list of snacks) or open (e.g., any possible stress ball design). Our results also rule out various alternative explanations that may contribute to mysterious consumption in the marketplace both statistically and experimentally (see Summary of Evidence and web appendices B and C).

Theoretical Implications

The present work makes important theoretical contributions to several streams of literatures. First, we show that consumers sometimes prefer uncertainty over certainty. The past literature on judgment and decision making has documented a widespread uncertainty/risk aversion such that people prefer certainty even when certainty represents the worst possible outcome (Gneezy et al. 2006; Kahneman and Tversky 1979). We show that consumers prefer uncertainty in the form of mysterious consumption—when uncertainty lies in the nature of the outcome among horizontally differentiated outcomes. Our findings add to a growing literature on possible benefits of uncertainty. Importantly, our demonstrated preference for uncertainty goes beyond research that has investigated factors that mitigate uncertainty aversion (Duke et al. 2018; Lee and Qiu 2009; Martin et al. 2016; Moon and Nelson 2020; Shen et al. 2015; Yang et al. 2013) or shown that imposed uncertainty can be motivating (Goldsmith and Amir 2010; Hill, Fombelle, and Sirianni 2016; Shen et al. 2015). Using

controlled experimental designs and the same dependent variables used to demonstrate risk/uncertainty aversion, we show that consumers systematically and actively opt into uncertainty in the context of mysterious consumption (i.e., horizontal uncertainty). We thus show an effect that had not yet been demonstrated.

Second, we show that different types of uncertainties—horizontal versus vertical uncertainty—can have different effects on consumer preference, furthering the understanding of when consumers seek out uncertainty and when they avoid it. Our context of mysterious consumption differs from previous demonstrations of uncertainty aversion in that the nature of the outcome, among objectively similar outcomes, is unknown (i.e., horizontal uncertainty). While these situations still involve risk at the individual level, the lack of objectively better or worse outcomes allows consumers to focus on the positive side of uncertainty: the opportunity to be surprised. It is important to highlight that in marketing, the vertical–horizontal differentiation is somewhat fluid and continuous in that consumers hold quite divergent beliefs about whether options within a product category differ as a matter of quality (i.e., one product is objectively better) or taste (i.e., optimal product choice is subjective; Spiller and Belogolova 2016). This continuous nature of the horizontal–vertical differentiation does not challenge our conceptualization. While our studies were set out to provide evidence that uncertainty can be preferred over certainty, the strength of the preference for uncertainty will likely depend on the degree of consensus around whether the possible outcomes are perceived to be a matter of taste (horizontal differentiation) or a matter of quality (vertical differentiation). That is, the likelihood of finding preference for uncertainty (vs. preference for certainty) may decline as a function of differences in perceived objective superiority. Supporting this continuous nature, we find that preference for uncertainty/surprise is negatively related to the perceived objectivity rank in the product categories used by Spiller and Belogolova (2016; study C in appendix H).

Third, by showing when uncertainty or certainty is desirable using established preference elicitation paradigms, we reconcile large and seemingly contradictory streams of literatures that have co-existed without much integration. Literature on decision under uncertainty has painted consumers as risk averse. Literatures on curiosity, surprise, and motivation point to its various benefits. So far, these literatures have co-existed without much reconciliation, which perhaps has been possible because they focus on different dependent variables (e.g., choice and valuation vs. motivation, curiosity, interest, and affect). Our research reconciles the two literatures using the same dependent variables. Thus, not only does lack of information about the nature of the outcome pique interest and curiosity, but consumers prefer horizontal uncertainty over certainty.

Relationship to Previous Research

Building on the previous section, we here further situate our work in relationship to established benefits of uncertainty. The present research shows a systematic *preference* for uncertain target outcomes/products over certain ones with similar expected value (i.e., consumers select into uncertainty), which to the best of our knowledge has not been directly and systematically demonstrated. This is an important and novel insight for practical and theoretical reasons.

Existing research on the benefits of uncertainty has relied on dependent measures that differ from the ones used to demonstrate uncertainty aversion (i.e., choice or valuation). Importantly, recent research suggests that the choice of the dependent variable matters (Yang et al. 2013; Moon and Nelson 2020). Moon and Nelson (2020) show that while people value uncertain options less (in line with risk aversion outlined above), they anticipate enjoying them as much as certain ones. Therefore, uncertainty can have different effects on different dependent variables, which has been used as an explanation to reconcile findings that are at odds with uncertainty aversion. For example, Shen et al. (2015) reconcile the motivating effects of uncertainty with findings of uncertainty aversion in that they explicitly only focus on motivation in the process of reward pursuit instead of the valuations/choices of the reward. We show a preference for uncertainty even when participants are choosing between certain and uncertain gains/rewards, a particularly important dependent measure for marketers who operate in a competitive marketplace.

The findings by Shen and colleagues also highlight a second important distinction, namely whether the reward or the target outcome is uncertain. Much of the literature on the benefits of uncertainty has looked at how externally imposed uncertain rewards affect purchase likelihood of a target outcome or product (Ailawadi et al. 2014; Dhar et al. 1999; Goldsmith and Amir 2010; Laran and Tsiros 2013), whereby the reward acts as an incentive (i.e., an add-on) in the pursuit of a target outcome or product. By contrast, in our case, the uncertainty is associated with the target outcome itself, not the motivating reward, allowing us to directly compare our findings with existing demonstrations of uncertainty aversion for uncertain target outcomes.

Lastly, we want to directly speak to how our findings relate to Martin et al. (2016), who showed that participants are relatively more risk seeking when deciding between two uncertain experiences that differ on qualitative (vs. quantitative) dimensions. While there are similarities in our respective works, as evidenced by our reliance on their process evidence, there are also critical differences. First, we examine preference for certain versus uncertain outcomes as opposed to examining relative risk aversion among different uncertain outcomes, and certain and

uncertain outcomes are psychologically different (Allais 1953, 1990; Gneezy et al. 2006; Kahneman and Tversky 1979). Second, our conceptualization relies on horizontal and vertical differentiation as opposed to qualitative and quantitative differences. The distinction between these constructs is important because the two constructs are: (a) orthogonal and (b) lead to different predictions, which we discuss in turn. Horizontal differentiation can be established via qualitative differences (e.g., flavor, color, design) and via quantitative differences (e.g., the size of an iPhone) as both of these can be a matter of taste. Similarly, vertical differentiation can be achieved by difference in quantity (e.g., more or fewer items of a good) or differences in quality (e.g., a good with higher- or lower-quality ingredients). The two orthogonal constructs were confounded in the studies of Martin and colleagues; the options that differed in quality were horizontally differentiated (i.e., differential heterogeneity in taste ratings, keeping average constant) and the options that differed in quantity were vertically differentiated (similar to our study 4). Our studies 5 and B in appendix H disentangle these two dimensions by introducing vertical differentiation via qualitative differences in options. Importantly, Martin et al.'s (2016) argument about risk seeking for qualitative differences would predict that participants in study 5 would exhibit greater preference for uncertainty in the vertical uncertainty condition than in the horizontal uncertainty condition because the former is marked by greater qualitative differentiation (i.e., greater total qualitative heterogeneity in options). We find the opposite: qualitative vertical differentiation is more aversive than qualitative horizontal differentiation. Thus, our research builds on Martin et al. (2016) in a way that increases explanatory power while at the same time converging quite nicely. Both our work and theirs show that consumers are more likely to endorse uncertainty around horizontal uncertainty, and both findings show that the extent of this preference depends on perceived objective superiority among the options (independent of whether this superiority is based on qualitative, quantitative, or quantified qualitative differences) along with the amount of uncertainty involved (e.g., the amount of variance or differentiation among options; study 6).

In short, nuance is important when talking about the benefits of uncertainty and uncertainty aversion. First, uncertainty can have different effects on different dependent variables. Consumers may be curious, interested, and motivated by uncertain rewards and outcomes, but they may not end up preferring them or valuing them over certain ones. Second, it is important to distinguish between whether the uncertainty lies in the target outcome itself or in an auxiliary reward/incentive intended to motivate the pursuit of a target outcome or product. Third, the type and degree of uncertainty matters; whether uncertainty is more vertical or horizontal in nature, and whether the possible outcomes have low or high variance both influence how uncertainty is perceived. Future empirical and conceptual work is needed for a more nuanced understanding of the interplay between these factors.

Implications for Practice

We extract and isolate horizontal uncertainty as a driver of mysterious consumption in controlled experiments, which provides important insights for marketing academics and practitioners.

The selling of mystery products can be a powerful strategy to motivate sales while also taking advantage of the benefits mysterious consumption offers to the supply chain (Fay and Xie 2015). A great example are recent efforts in providing mystery food selections that reduce food waste (e.g., Too Good to Go; Benveniste 2021). Importantly, our research suggests that the purchase of such products does not need to be motivated by price discounts or other perks; uncertainty alone can be enough to make such offerings appealing and can lead to higher willingness to pay for mysterious consumption items (web appendix E).

However, there are also some considerations that marketers should keep in mind. Not all uncertainty is equal. The appeal of mysterious consumption lies in the uncertainty around the nature of the product among objectively similar outcomes, such that uncertainty is more likely to be selected into when there is horizontal uncertainty than when there is vertical uncertainty. Marketers should thus encourage assumptions about horizontal uncertainty and refrain from creating or framing mystery items around vertical uncertainty (e.g., objective quality, quantity, or the value of items). Indeed, in a study motivated by the popular mystery box trend, Duke et al. (2018) did not find a preference for a mystery box containing contents anywhere between $1 and $20 (when compared to a certain $10), and our findings suggest that this can be attributed to the mystery box being framed around vertical uncertainty. This is useful information for academics and marketers, especially when facing supply chain constraints. To illustrate on a timely example: in ancillary study D (appendix H), consumers preferred an earlier mystery Covid-19 vaccine over a certain one when the possible vaccines were horizontally differentiated (e.g., Moderna or Pfizer), but not when the possible vaccines were vertically differentiated (e.g., Moderna/Pfizer or Johnson & Johnson). Thus, mystery can have benefits for product adoption and supply chain efficiency when products are horizontally differentiated. However, it may hurt product adoption when the possible products are vertically differentiated or when horizontal uncertainty is reduced to an extent that eliminates the surprise aspect. At the same time, our studies speak to factors that do not seem to matter. Previous research suggests that consumers may be averse to gambles or lotteries (Yang et al. 2013), for example. However, the mechanism by which the mystery outcome was selected did not seem to eliminate the preference for

uncertainty in the context of mysterious consumption. This provides important insights on how marketers should structure mysterious consumption.

Conclusion

Challenging the notion that consumers are averse to uncertainty, the present research establishes that consumers prefer uncertainty in the context of mysterious consumption. Reconciling the present research with existing demonstrations of risk and uncertainty aversion, we identify horizontal uncertainty as being desirable to consumers because it allows them to focus on the positive side of uncertainty: the opportunity to be surprised.

DATA COLLECTION INFORMATION

Study 1A: Conducted in Kansas in 2021 by the second author using paper and pencil surveys. A soft copy of the data was analyzed by both authors. Study 1B: Conducted at the University of South Carolina in 2018 by the second author using paper and pencil surveys. A soft copy of the data was analyzed by both authors. Study 1C: Conducted as an online study (due to Covid-19) with students at the University of South Carolina in 2021. Both authors have access to and analyzed the data. Study 1D: Conducted as an online study (due to Covid-19) with students at the University of South Carolina in 2022. Both authors have access to and analyzed the data. Study 2A: Conducted on MTurk in 2018. Both authors have access to and analyzed the data. Study 2B: Conducted as a lab study by the first author at the University of Southern California in 2021. Both authors have access to and analyzed the data. Study 3: Conducted as an online study (due to Covid-19) with students at the University of Southern California in 2020. Both authors have access to and analyzed the data. Study 4: Conducted on MTurk in 2021. Both authors have access to and analyzed the data. Study 5: Conducted on Prolific in 2021. Both authors have access to and analyzed the data. Study 6: Conducted on MTurk in 2021. Both authors have access to and analyzed the data. Data files are stored in a shared Dropbox folder and on the Open Science Framework (doi:10.17605/OSF.IO/R6JWE): https://tinyurl.com/9jmnw3uz.

APPENDIX

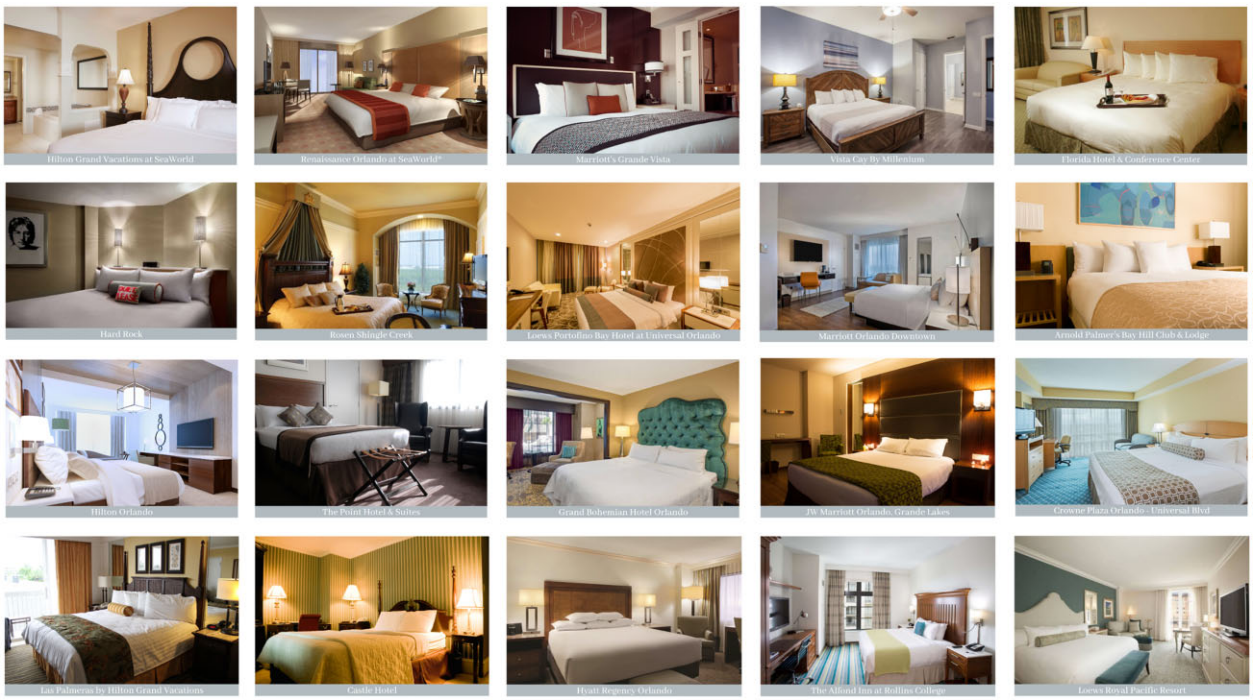
APPENDIX A: QUESTIONNAIRE USED IN STUDY 1A

We are giving away a FREE scoop of ice cream! Which flavor would you like to choose?

Option A	Option B
Getting one scoop of **strawberry/dark chocolate/ salted caramel ice cream** for free	Getting one scoop of **mystery ice cream** for free (there are 10 possible flavors, but the exact flavor will be revealed after a random draw). Possible flavors Madagascar Vanilla Earl Grey Tea Salted Pretzel Cinnamon Cookies and Cream Messenger Coffee Spiced Pumpkin Strawberry Dark Chocolate Salted Caramel

APPENDIX B: STIMULI USED IN STUDY 1B (PRETEST REPORTED IN WEB APPENDIX A)

APPENDIX C: STIMULI USED IN STUDY 1C



APPENDIX D: STIMULI USED IN STUDY 1D

"Tiny Dancer" by Elton John
"Good 4 U" by Olivia Rodrigo
"Hey Jude" by The Beatles
"Billie Jean" by Michael Jackson
"With or Without You" by U2
"Umbrella" by Rihanna ft. Jay-Z
"Yeah!" by Usher ft. Lil Jon and Ludacris
"Fallin" by Alicia Keys
"Lose Yourself" by Eminem
"Tik Tok" by Kesha
"Shallow" by Lady Gaga and Bradley Cooper
"Chandelier" by Sia
"Sorry" by Justin Bieber
"Please Do Not Select Any Option" for This Question
"Oblivion" by Grimes
"Follow Your Arrow" by Kacey Musgraves
"Runaway" by Kanye West
"Mood" by 24kGoldn ft. iann dior
"Adore You" by Harry Styles
"Cut You Off" by Selena Gomez
"One More Night" by Maroon 5
"Hello" by Adele
"Midnight Sky" by Miley Cyrus
"Dynamite" by BTS
"Save Your Tears" by The Weeknd
"Bad Guy" by Billie Eilish
"Dancing On My Own" by Robyn
"Chicken Fried" by Zac Brown Band
"Cardigan" by Taylor Swift
"Blinding Lights" by The Weeknd
"Drivers License" by Olivia Rodrigo
"Levitating" by Dua Lipa ft. DaBaby
"Gaslighter" by The Chicks
"The Box" by Roddy Ricch
"Alright" by Kendrick Lamar
"Shake It Off" by Taylor Swift
"Single Ladies" by Beyonce
"Boom Boom Pow" by The Black Eyed Peas
"Wannabe" by Spice Girls
"Toxic" by Britney Spears
"I Will Always Love You" by Whitney Houston
"Call Me Maybe" by Carly Rae Jepsen
"Uptown Funk" by Mark Ronson ft. Bruno Mars
"Happy" by Pharrell Williams
"All of Me" by John Legend
"Thank U, Next" by Ariana Grande
"Wonderwall" by Oasis
"Like a Virgin" by Madonna
"Somebody That I Used to Know" by Gotye ft. Kimbra
"Rolling in the Deep" by Adele
"Old Town Road" by Lil Nas X ft. Billy Ray Cyrus

APPENDIX E: STIMULI USED IN STUDIES 2A, 2B, AND 3

Snacks and pretested ratings (0 = Not at all, 5 = Like very much). For distribution/density plots, see web appendix A.

Items	*N*	Mean	Std. deviation
Twinkies	152	2.24	1.55
Twizzlers	152	2.25	1.53
Jelly Bellies	152	2.25	1.66
Fruit Roll	152	2.50	1.48
Ritz	152	2.60	1.30
Butterfingers	152	2.62	1.53
Welch's Fruit Snacks	152	2.66	1.52
Goldfish	152	2.69	1.47
Haribo Gummy Bears	152	2.73	1.60
Chex Mix	152	2.73	1.44
Skittles	152	2.76	1.58
Sun Chips	152	2.95	1.51
Snickers	152	3.16	1.56
Lays chips	152	3.16	1.23
Doritos	152	3.26	1.36
Cheetos	152	3.29	1.41
Oreos	152	3.41	1.38
M&Ms	152	3.43	1.38
Kit Kat	152	3.49	1.26
Reese's Peanut Butter Cups	152	3.58	1.48
Overall average	152	2.89	0.78

Average rated snack box items.

Items	*N*	Mean	Std. deviation
Haribo Gummy Bears	152	2.73	1.60
Chex Mix	152	2.73	1.44
Skittles	152	2.76	1.58
Sun Chips	152	2.95	1.51
Snickers	152	3.16	1.56
Overall average	152	2.86	0.96

Above-average rated snack box items.

Items	*N*	Mean	Std. deviation
Skittles	152	2.76	1.58
Doritos	152	3.26	1.36
Oreos	152	3.41	1.38
M&Ms	152	3.43	1.38
Kit Kat	152	3.49	1.26
Overall average	152	3.27	0.97

APPENDIX F: STIMULI USED IN STUDY 4 (PRETEST REPORTED IN WEB APPENDIX A)

Options shown in the horizontal mystery condition.

APPENDIX G: STIMULI USED IN STUDY 6 (PRETESTS REPORTED IN WEB APPENDIX A)

Masks in low-differentiation condition (left) and high-differentiation condition (right).

APPENDIX H: ANCILLARY STUDIES A–D (MATERIALS IN WEB APPENDIX F)

ANCILLARY STUDY A: NEGATIVE MYSTERY OUTCOMES

To test our effect in a negative domain, 100 US AMT workers (47% female, 2% non-binary or other; M_{age} = 38.30, SD = 12.47) saw a list of 20 disgusting flavors of Jelly Beans and then made a choice between a bag of Jelly Beans with a non-mystery, disgusting flavor (a randomly displayed option selected from the 20 options) and a bag of Jelly Beans with a mystery, disgusting flavor. Sixty-three percent of participants preferred the mystery option over the non-mystery option (63% vs. 50%; χ^2 (1, N = 100) = 6.76, p = .009).

ANCILLARY STUDY B: QUALITATIVE HORIZONTAL AND VERTICAL UNCERTAINTY

This study manipulates horizontal and vertical uncertainty via the degree of perceived superiority using different car classes (https://aspredicted.org/tw3yx.pdf). A total of 296 Prolific respondents (56.1% female, 3% non-binary or other; M_{age} = 32.53, SD = 11.80) were randomly assigned to one of three conditions in which they indicated their preference between a certain and uncertain option. In a *horizontal* uncertainty condition, participants chose between a certain standard rental car (a randomly displayed option from the following nine options: Ford Fusion, Chevrolet Malibu, Honda Accord, Nissan Sentra, Kia K5, Subaru Legacy, Toyota Camry, VW Jetta, or Mazda 6) and a mystery standard car to be selected from the same set of nine cars. In an *implicit vertical* uncertainty condition, participants chose between a randomly displayed standard car and a mystery car that could be one of the following options: Ford Fiesta, Chevrolet Spark, Honda Fit, VW Jetta, Subaru Legacy, Nissan Sentra, Mazda CX-30, Toyota RAV 4, or Kia Sorento. In an *explicit vertical* uncertainty condition, the options were the same as in the implicit vertical condition, but the class of the car (Economy, Standard, Premium, respectively) was highlighted (see web appendix F for stimuli). In the horizontal uncertainty condition, 62% of participants preferred the mystery over the non-mystery option (62% vs. 50%; χ^2 (1, N = 100) = 5.76, p = .016). The choice share for mystery was lower in the implicit (43%; χ^2 (1, N = 199) = 6.88, p = .009) and explicit (47%; χ^2 (1, N = 197) = 4.23, p = .04) vertical uncertainty condition, which did not differ from 50% or each other (χ^2s < 1.70, ps > .19).

ANCILLARY STUDY C: ANCILLARY ANALYSIS: HORIZONTAL VERTICAL CONTINUUM

One hundred AMT workers indicated their willingness to be surprised (1 = prefer to choose; 5 = prefer surprise) across the 16 product categories used in Spiller and Belogolova (2016). Using the mean surprise ratings for each category and the perceived objectivity rank of each category in Spiller and Belogolova revealed a positive

	Willingness to be surprised	Rank (S&B 2016)
Search engine	1.69	1
Smartphone	1.93	7
Laptop	2.07	3
Sedan	2.24	8
Soda	2.29	13
Burger	2.42	12
Clothes	2.44	5
Shoes	2.49	9
Beer	2.60	10
TV	2.63	4
Moisturizer	2.69	15
Mail service	2.75	6
Digital camera	2.77	2
Gas	2.84	11
Credit card	2.90	16
Hotel	3.04	14

correlation between these two metrics ($r(16) = 0.517$, $p = .04$), suggesting that the more options in a category are perceived to be a matter of taste (i.e., higher perceived objectivity rank), the higher the willingness to be surprised.

ANCILLARY STUDY D: VACCINES

This study manipulates horizontal and vertical differentiations via perceived consensus for a timely product: vaccines. One hundred Prolific workers (67% female, 2% nonbinary; $M_{age} = 32.15$, SD = 11.71) were asked to imagine deciding on a vaccine option in the future (be it because they have not received the recommended vaccines/boosters or a new booster is recommended in the future). They chose between a certain vaccine (Moderna or Pfizer, randomly displayed) and an uncertain one that could be one of two vaccines manipulated to be either horizontally differentiated (either Moderna or Pfizer) or vertically differentiated (either Johnson & Johnson or Moderna; either Johnson & Johnson or Pfizer). They were told that the uncertain item would have possible scheduling benefits (e.g., earlier availability at their preferred location) but that both vaccines had equal likelihood of being administered. Participants indicated their preference between the two options on a bipolar scale (−3 = much prefer (certain); +3 = much prefer (uncertain)). Participants preferred the uncertain option over the certain option in the horizontal condition ($M = 0.88$, SD = 2.15; different from midpoint; $t(1,59) = 3.19$, $p = .002$). Moreover, the preference for the uncertain option was greater in the horizontal condition than in the vertical condition ($M = -0.22$, SD = 2.42; $t(1,98) = 2.40$, $p = .02$), which did not differ from midpoint ($t < 1$). Supporting our assumptions about product differentiation, rankings of the vaccines showed that Moderna and Pfizer were perceived as objectively similar ($p = .13$; i.e., horizontally differentiated), but both were perceived superior to Johnson & Johnson ($ps < .001$; i.e., vertically differentiated).

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