



Stress can help or hinder novelty seeking: The role of consumer life history strategies [☆]



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ABSTRACT

Previous research shows mixed findings on whether stress increases or decreases novelty seeking. In three studies, using both archival and experimental data, and including more than 61,000 consumers from over 55 different countries, we show that it can do both, albeit for consumers differing in “life history strategies” (LHSs), that is, short-term, impulsive, and reward-sensitive (fast) versus long-term, reflective, and controlled (slow) strategies. We find that stress *increases* (helps) novelty seeking for fast, but *decreases* (hinders) novelty seeking for slow LHS consumers. Moreover, under baseline (low stress) conditions, fast LHS consumers display a lower tendency for novelty seeking than slow LHS consumers. Interestingly, these effects are present for acute stress but not for chronic (pandemic) stress. We discuss the implications of our findings for public policy and positioning strategies, specifying when and for whom novel (versus familiar) products and services might be most effectively and efficiently marketed.

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1. Introduction

“It is in human nature to value any novelty, however slight, in one’s own possession”
—Charles Darwin, 1859, p. 33

According to Gallup’s 2020 Global Emotions Report (Gallup, 2020), 40% of adults worldwide felt stress “a lot of the day yesterday,” moving up from an already impressive 35% in 2019, which, in turn, was again 6 percentage points higher than the 29% reported in 2006. While experiencing stress is evidently on the rise and regarded by many as one of the main “curses of modern life,” its role in consumer judgment and decision-making is surprisingly understudied (see e.g., Duhachek, 2005; Duhachek & Kelting, 2009; Durante & Laran, 2016). Indeed, a literature search of the PsycINFO database, entering the search terms “stress,” “consumer,” and “judgment and decision-making,” returns only a handful of hits. The present paper aims to contribute to this modest body of literature by examining the role of stress in a specific manifestation of consumer judgment and decision-making—novelty seeking (Manning et al., 1995; Steenkamp & Baumgartner, 1992). We define novelty seeking in line with Hirschman’s (1980) description, viz. “inherent novelty seeking: the desire to seek out the new and different” (p. 284). This definition refers to novelty seeking as a broad and domain general tendency to be attracted to and to select new

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and unfamiliar objects, settings, and events. Examples are the desire to buy or try out new products and services, travel to new places, try out new experiences, change to new jobs, adopt new ideas, or show an interest in innovation, research and development, and the latest advancements in science and technology (cf. Allport, 1961; Hirschman, 1980; Lastovicka, 1982; Manning et al., 1995). Novelty seeking is distinct from variety seeking in that the former specifically focuses on a *new, unfamiliar* stimulus, rather than on a large variety or broad range of (either novel or familiar) stimuli as is the case with the latter (cf. Sevilla et al., 2019). Moreover, novelty seeking differs from sensation seeking in that it does not necessarily imply high arousal, experiential consumption as is the case with sensation seeking (cf. Mehta et al., 2017; Zuckerman, 1979).

In the present paper, we address the following question: Does experiencing stress increase or decrease consumers' novelty seeking? Next, we start our reasoning by defining the concept of stress and outlining its general dynamics, followed by relating stress to novelty seeking. Thereafter, we extend our reasoning by proposing a specific moderator—*consumer life history strategies (LHSs)*—that may explain when stress may either increase or decrease novelty seeking.

2. Stress and novelty seeking

To adapt and survive, humans have developed stress response systems that help them to navigate and respond to threats (Rohleder, 2019). Stress is understood as the subjective experience of a real or perceived threat, induced when situational demands exceed consumers' resources to cope with them (McEwen, 2000; Lazarus & Folkman, 1984). Stress disturbs the equilibrium between demands and resources, and consumers seek to restore balance by using evolved stress response mechanisms that engender diverse physiological, psychological, and behavioral responses (Cannon, 1932; McEwen, 2000; Thiel & Dretsch, 2011). Physiologically, stress leads to adaptation via changes in blood glucose, blood pressure, heart rate, and/or inflammatory responses (Sapolsky et al., 2000). These physiological changes prepare the individual for either one of the two main psychological and behavioral responses to the stressor. On the one hand, stress may promote an *approach-oriented* response, stimulating a "fight" response by activating the individual and increasing a generalized sensitivity to potentially rewarding actions, events, and objects (Thiel & Dretsch, 2011). On the other hand, stress may promote an *avoidance-oriented* response, stimulating a "flight or freeze" response (Cannon, 1929; Bracha et al., 2004; Thiel & Dretsch, 2011) in the service of preventing or avoiding further harm by the stressor. Thus, stress can trigger approach responses that make consumers promotion-focused and reward-sensitive, or stress can trigger avoidance responses that make consumers prevention-focused and cost-sensitive (see e.g., Durante & Laran, 2016).

How would this translate to a tendency toward novelty seeking? While prior work provides some evidence on how consumers respond to stress in general (Duhachek, 2005; Durante & Laran, 2016), no studies have yet addressed whether stress increases or decreases consumer novelty seeking. Moreover, there is hardly any research on how stress affects generic human novelty seeking (i.e., moving beyond the consumer behavior sphere, but see below for a few exceptions). Hence, we turn to research on animal behavior, where the matter has been studied more extensively. Interestingly, as argued by Morwitz (2014), findings on animal behavior frequently translate remarkably well to its parallels in human behavior in general, and consumer behavior in particular. In keeping with the approach versus avoidance responses that stress may evoke, these studies suggest opposing effects. These opposing effects are likely rooted in the specific constellation and living conditions of the animals involved, as well as the observation that any novel resource represents two juxtaposed attributes: the promise of reward, and the risk, cost, or threat of an inherently uncertain option (cf. Berlyne, 1960; Hirschman, 1980; Litt et al., 2011).

Indeed, on the one hand, several studies suggest that many animal species respond to stress with *increased* levels of attraction toward unfamiliar objects ('*neophilia*'), thus showing a typical approach-oriented stress response (Forss et al., 2017). More specifically, experiencing stressful and unpredictable conditions increases novelty seeking among various mammals and birds, such as squirrel monkeys, wild boars, eastern chipmunks, great tits, as well as rats and mice (Dingemans et al., 2003; Levine & Mody, 2003; Parker et al., 2007; Montiglio et al., 2014; Toledo-Rodriguez & Sandi, 2011; Vetter et al., 2016). Although inherently uncertain and risky, venturing into uncharted territories may also be rewarding and may have evolved as an adaptive response to certain environmental stressors, such as food scarcity or predator risk, thus serving as an effective stress-coping response in harsh and adverse conditions. Specifically, novelty seeking may help identify novel opportunities, food sources, or more stable and secure habitats (Kashdan et al., 2013; Litman, 2005; Loewenstein, 1994).

Related work on the relationship between stress and reward sensitivity among human samples also suggests that stress may sometimes lead to more novelty seeking among consumers. For example, Berlyne's (1960) classic research shows that venturing into the unknown and being open to and trying out new things can be experienced as inherently rewarding. And active exposure to novel stimuli has been found to associate with the mesolimbic dopamine reward pathway (Bardo & Dwoskin, 2004). Interestingly, a recent meta-analysis of 32 studies, involving 1852 participants has found that stress may increase generalized reward sensitivity as the stress hormone cortisol increases dopaminergic activity (Starcke & Brand, 2016). Consistent with these findings, a recent study has found a positive correlation between levels of stress and novelty seeking in a sample of Korean medical students (An et al., 2012).

On the other hand, a second line of research points to the opposite—stress may sometimes *hinder* rather than *help* novelty seeking. This tendency for *decreased* novelty seeking among various species ('*neophobia*') is likely due to the possibly risky or costly nature of unfamiliar objects and events, thus showing an avoidance-oriented stress response (e.g., Aqueveque, 2016;

Emmerson & Spencer, 2017; Monestier et al., 2017; Walker et al., 2012). These observations align with several findings on human judgment and decision-making. Specifically, Lenow et al. (2017) argue that stress may sometimes lead to perceptions of an environment as being uncertain, and thus may decrease novelty seeking (see also Harms, 2017). Similarly, Litt et al. (2011) observe a decreased preference for novel activities over familiar tasks under conditions of stress.

Summarily, research findings on both animal and human samples mainly focus on *acute* stress (where ad-hoc, immediate, rather than chronic situational demands exceed the organism's coping resources) and show opposing effects. Typically, such opposing findings in a given field may suggest a role for one or more (unobserved) moderator(s), thus boosting the effect for some, while attenuating or reversing it for others (Hayes, 2018). In this research, we aim to reconcile these conflicting findings by highlighting the role of one specific moderator—individual differences in *consumer LHSs* (Del Giudice, 2015; Kaplan & Gangestad, 2005). To date, these moderating effects remain unexamined, and investigating them may elucidate when and why stress may help or hinder the effects of stress on novelty seeking.

3. Types of stress and the moderating role of life history strategies

In line with the literature discussed above, our hypotheses will specifically focus on the moderating role of LHSs in reconciling the opposing effects of *acute* stress. Indeed, compared to acute stress, research shows that *chronic* stress has fundamentally different antecedents and consequences, and is governed by distinct and separate processes (see e.g., Evers et al., 2018; Schneiderman et al., 2005). Acute stressors are time- and space-constrained, and they involve ad-hoc, short-term threats that may exceed one's coping resources, such as imminent job loss, acute resource scarcity, or personal or work-related conflict (next to more “mundane” acute stressors and daily hassles, such as traffic jams, frustrated expectations, or time pressure). In contrast, chronic stressors are long-term challenges that persist in time and space and constitute a pervasive state without a clear indication of when the challenge ends, such as persistent illness, enduring anxieties, or chronic work stressors. Research in biology and developmental psychology shows that, in general, acute stress prompts an acute, immediate, and clearly delineated judgment and decision-making strategy that is rooted in someone's “self-regulatory toolbox.” In contrast, experiencing stress at chronically high levels may lead to habituation, lethargy, anxiety, depression, and learned helplessness, and thus, it will cease from triggering an acute, clearly detectable judgment and decision-making response (see Conrad, 2011; Del Giudice, 2014; Grissom & Bhatnagar, 2009; Durante & Laran, 2016; Lovejoy & Barsyte, 2011; Shonkoff et al., 2012).

Consequently, we expect any moderating role of LHSs on the impact of stress on novelty seeking to be detectable for acute, but not chronic, stress. We explicitly test this notion in Study 2, where we compare (the effects of) acute stress with what may potentially qualify as a specific manifestation of chronic stress—stress experienced in response to the enduring coronavirus disease 2019 (COVID-19) pandemic. While likely starting as an acute stressor, with the pandemic spreading and enduring, this stressor may now be considered more chronic. Notably, for this study, we collected data in December 2020, when the pandemic was already 11 months underway and did not yet show any signs of alleviation, thus suggesting a more chronic stressor. Moreover, our assumption dovetails with recent research (e.g., Qi et al., 2021) that similarly considers this type of stress to be chronic, rather than acute.

Stated formally,

H1. LHS moderates the effects of acute, but not chronic, stress on novelty seeking.

4. Fast versus slow life history strategies

Our proposed moderator, LHS, is based on life history theory (LHT; Del Giudice, 2015; Figueredo et al., 2006; Kaplan & Gangestad, 2005). Notably, LHT provides an integrative framework that may facilitate the understanding of when and why stress may increase or decrease consumer novelty seeking. The theory describes the strategic allocation of resources to different components of life functions: maintenance, growth, and reproduction. Furthermore, LHT highlights that early life conditions shape and calibrate one's adaptive psychological coping responses into integrated, self-regulatory strategies—LHSs—that aim to maximize reproductive potential throughout the lifespan (Ellis & Del Giudice, 2019). Thus, as the label already suggests, the origins of LHSs should be sought in one's life history, referring to early life conditions (and possible later life adjustments; cf. Figueredo et al., 2006). Hence, LHSs are best viewed as responses to potentially stressful early life experiences that people use as self-regulatory behavioral strategies throughout their lifespan to deal with life's main challenges, including stressful events and contexts (see e.g., Nettle & Frankenhuys, 2019; Van Der Linden et al., 2018). In particular, conditions of harshness, unpredictability, and resource scarcity signal that the future is uncertain and thus yield a *fast* LHS. Coping with such stressors affects judgment and decision-making throughout the lifespan, thus inducing fast LHS consumers to adopt a short-term, impulsive, reward-sensitive, approach-oriented judgment, and decision-making strategy characterized by eagerness, risk seeking, and an opportunistic mindset. On the other end of the continuum are *slow* LHS consumers. Their early childhood is typically characterized by the opposite pattern: a relatively comfortable, stable, and predictable environment with abundant resources, signaling a certain and secure future. A slow LHS typically manifests itself in a strategy focused on long-term goals, and a tendency for less appetitive, more reflective, controlled judgment and decision-making characterized by risk aversion and a more deliberative mindset (Del Giudice, 2015; Figueredo

et al., 2006; Griskevicius et al., 2011; Hill et al., 2013, 2016; Kaplan & Gangestad, 2005; Wang et al., 2009). Thus, differences in consumers' exposure to early life stress and unpredictability, translated to individual differences in their LHS, fundamentally shape how consumers perceive and respond to present-day stressors. This renders the construct to be a plausible moderator to account for the conflicting findings on the impact of stress on novelty seeking.

5. How life history strategies moderate the impact of stress on novelty seeking

How may consumer individual differences in LHSs moderate the impact of acute stress on novelty seeking? The research discussed above implies that novel products, services, or events may well represent different stimuli to different types of consumers under conditions of stress. If stress implies a rapidly changing and unpredictable environment with demands exceeding one's present and familiar resources, there may be a need to quickly identify new opportunities and resources of promising, acute reward value (cf. Hirschman, 1980; Lazarus & Folkman, 1984). The animal research discussed earlier indicates that stress can trigger an approach-oriented response that increases promotion-focused reward sensitivity, or stress can trigger an avoidance-oriented response that increases prevention-focused cost sensitivity. Hence, stress may increase the salience of the two main attributes that any novel resource represents: on the one hand, the potential of reward and opportunity (cf. Berlyne, 1960), but on the other hand, the potential of cost, threat, or risk due to its inherent unfamiliarity (cf. Litt et al., 2011). We propose that stress increases both, albeit for different types of consumers.

Given fast LHS consumers' reward-sensitive, eager, opportunistic, approach-oriented judgment- and decision-making strategy, it is plausible to assume that for them, stress increases the potential of reward of novel options. Hence, for fast LHS consumers, we expect stress to *increase* novelty seeking. In contrast, slow LHS consumers' deliberative, risk-averse, and avoidance-oriented decision-making strategy implies that for them, stress may well increase the potential of cost of novel options. Hence, for slow LHS consumers, we expect stress to *decrease* novelty seeking.

Stated formally,

H2. LHS moderates the impact of stress on novelty seeking such that, compared to low stress, high stress *increases* (*decreases*) novelty seeking for *fast* (*slow*) LHS consumers (cf. H1).

In addition, we test the logical implications of our reasoning. If acute stress increases (decreases) novelty seeking for fast (slow) strategists, we expect that the effect should be present (absent) for novel (regular) products. Thus, acute stress might increase (decrease) buying intentions and product trial intentions among fast (slow) LHS consumers for novel products, but not for regular products, as we test in Study 3.

Hence, for our key predictions, we should observe a disordinal, crossover interaction between stress and individual differences in LHSs on novelty seeking, such that the impact of stress is *positive* for fast LHS consumers, but *negative* for their slow LHS counterparts.

6. Baseline differences in novelty seeking as a function of consumer LHSs

Although our research focuses on the moderating role of consumer LHSs in accounting for the opposing effects of stress on novelty seeking, rather than vice versa, the present research also allows us to explore any differences in novelty seeking tendencies between fast and slow LHS consumers under baseline (low stress) conditions. At least two possibilities are discernable. On the one hand, simply extrapolating from the hypothesis stated above, one may assume that under baseline, low stress, conditions, the reward (cost) potential of novel options may be more salient for fast (slow) LHS consumers, albeit less polarized than under conditions of high stress, implying that under baseline conditions, fast LHS consumers may still display a higher default novelty-seeking tendency than slow LHS consumers.

However, there is a second possibility. More specifically, according to Hirschman (1980), a core function of novelty seeking is to build a future psychological resource for self-preservation. Under default, stable conditions, "the consumer may wisely decide to seek information that is not 'useful' now, but may assume great importance in the future" (Hirschman, 1980, p. 284). Thus, under baseline conditions of stability and predictability, novelty seeking may yield future resources or a longer term "insurance" against potential uncertainties in the future. This assumes a salient future time perspective. Research has consistently shown that slow LHS consumers are more future and long-term oriented, while fast LHS consumers are more short-term and present oriented (e.g., Del Giudice, 2015; Figueredo et al., 2006; Griskevicius et al., 2011; Kaplan & Gangestad, 2005). Consequently, the *future* reward potential of novel items under default and low stress conditions may be more salient to *slow*, rather than *fast*, LHS consumers. Thus, if novelty seeking in stable, low-stress environments mainly serves a future benefit, as Hirschman (1980) argues, slow LHS consumers may show a generally higher tendency for novelty seeking under baseline, low-stress conditions than fast LHS consumers. These inferences align with the literature showing that, in general, a slow LHS associates with higher openness to experience (a trait from the Big Five; Goldberg, 1993), and a fast LHS with its opposite. (Figueredo et al., 2006, Figueredo et al., 2014). Hence, it may well be that, in contrast to the first possibility outlined above, under baseline (low stress) conditions, slow LHS would associate with *higher* and fast LHS with *lower* levels of novelty seeking. If so, stress may possibly increase (decrease) novelty seeking for fast (slow) LHS consumers from a lower (higher) baseline level. We will assess the evidence for either of these options in the present studies.

In sum, stress may increase the manifestation of both an approach- and avoidance-oriented response, albeit for different types of consumers: the former for fast, the latter for slow LHS consumers. Hence, under conditions of high (acute) stress, fast LHS consumers are attracted to novel options since they may promise rewards, while slow LHS consumers shy away from them because they may also signal cost or risk; consequently, stress *increases* novelty seeking for fast, but *decreases* novelty seeking for slow LHS consumers. In addition, under baseline, low stress, conditions, we may either observe the same pattern, albeit less polarized, or in keeping with Hirschman (1980), under default conditions, novel options may primarily represent a future “insurance” for future uncertainties. If so, then the attraction to novel resources is a function of a salient future orientation and the stronger long-term future orientation of slow LHS consumers may translate into a higher novelty-seeking tendency under baseline conditions, compared to fast LHS consumers, who have a more salient short-term, present day orientation.

7. The present research

We provided evidence for our notions in three studies, using a combination of archival and experimental data, involving a total sample of over 61,000 consumers, from over 55 different countries, focusing on a variety of stressors and indicators of LHS, and assessing their consequences for various forms of novelty seeking (see Supplementary Material for correlations between all constructs of interest for all studies). In Study 1, we aimed to provide an initial, large-scale test of our notions by blending a large archival dataset, the World Values Survey (WVS; Inglehart et al., 2014) with data from the Fragile States Index (FSI; The Fund for Peace, 2010, 2019), which charts conditions at the state level that are conducive to the development of fast versus slow LHS. We expected stress to be positively related to consumers' novelty seeking for individuals from countries where conditions would foster a fast LHS. In contrast, stress should be negatively related to novelty seeking for consumers from countries that foster a slow LHS. Study 2 extended Study 1 by examining the effects of stress on novelty seeking as a function of consumer LHS under more controlled experimental conditions. In this study, we focused on behavioral intentions to buy a novel (food) product and assessed whether chronic (pandemic) stress would yield similar results as acute stress. Finally, in Study 3, we aimed to confirm the robustness of the postulated effects and extended our research by including another proxy for novelty seeking: the consumption readiness of a novel product. If stress indeed impacts novelty seeking, then we should observe stress to elicit increased (decreased) consumption readiness among fast (slow) LHS consumers for new, but not for regular products.

For Studies 2 and 3, we aimed to collect as many observations as possible, given our time and budget resources. We decided to only analyze the data once data collection had stopped. In Studies 2 and 3, we used participants from a broad range of nationalities (Italian, Greek, Spanish, Portuguese, Polish, Hungarian, Estonian, and others) to obtain a more heterogeneous sample in terms of FSI values (indicative of LHS) and to enable us to assess the robustness of the results. Moreover, for Studies 2 and 3, we performed a power analysis using *G*Power* (Faul et al., 2009) to determine the sample size. We expected a small to medium effect size based on the effect size reported in the meta-analysis of the impact of stress on reward sensitivity (Starcke & Brand, 2016), a large-scale review of meta-analyses on individual difference effects in social and personality psychology (Gignac & Szodorai, 2016), and the effect size of the interaction observed in Study 1. This analysis yielded a sample size of $N = 101$ to detect the critical interaction (using R^2 increase for a fixed multiple regression model, 80% power, and an α -error probability of .05, cf. Luttrell et al., 2017). We used this as a minimum, with more participants included if our budgets would allow. For both studies, the actual sample sizes substantially exceeded this minimum (see below for details).

8. Study 1

In this first, high-powered study, we aimed to provide indicative, global evidence of the impact of stress on consumers' novelty seeking, moderated by LHSs, by blending two archival data sources. We blended the WVS Wave 6 (Inglehart et al., 2014), including individual-level data of respondents across approximately 60 countries, with data from the FSI, an index that measures a state's vulnerability to conflict or collapse, that is, the extent to which a country is faced with and capable of managing cohesive, economic, political, and social pressures (The Fund for Peace, 2010, 2019). The FSI captures a large set of environmental conditions, such as the presence of organized violence, the extent of fair wealth and resource distribution, unemployment rates, government corruption prevalence, and the presence of a functioning public health system (The Fund for Peace, 2010, 2014, 2019; see, e.g., Carlsen & Bruggemann, 2017; Venger & Miethe, 2018). We assumed that in countries with a high (low) vulnerability to conflict or collapse (environments characterized by more (less) harshness, unpredictability, and/or resource scarcity), conditions would foster the development of an LHS on the faster (slower) end of the fast-to-slow continuum. We used the FSI as a proxy for LHS, while acknowledging that the FSI is not identical to LHS, but might be better conceived as a more distal predictor. We associated this proxy with two measures in the WVS: a measure of interest in progress by science and technology (which has been found to be related to novelty seeking, e.g., Harty et al., 1986), and a measure of acute perceived stress. Perceived stress was expected to have a positive relationship with this indicator of novelty seeking for individuals from countries where conditions would foster a fast LHS, while stress was posited to have a negative relationship with novelty seeking for individuals from countries fostering a slow LHS.

8.1. Method

Data sources and participants. Data for the analysis were collected from the WVS (Inglehart et al., 2014) and the FSI (The Fund for Peace, 2010, 2014, 2019). The WVS is the largest social survey project in the world, and it includes face-to-face, nationally representative surveys that have been conducted since 1981 in a large sample of countries. We analyzed data from the most recent completed wave of the survey (Wave 6), collected between 2010 and 2014, in which 60 countries participated¹. The WVS provides individual records and data that have not been aggregated, which fitted our data requirements. The typical sample type in the WVS is a full probability sample of the population aged 18 years and older, with a few countries using 16 years as the lower threshold. We focused on those participants who provided valid answers to all the stress and attitudes toward science and technology-related items. This resulted in an initial sample of 64,255 respondents.

Stress. As an indicator of acute perceived stress, we used a measure composed of six items in the WVS, reflecting the extent to which the respondent worried in the present moment about various stressors, such as losing one's job, a war involving one's country, and the inability to give his or her children good education (see the Supplementary Material, for a full listing of the items). Because this measure asked participants to think about the salience of various forms of stress in the present moment, it qualified as a measure of acute stress.

Valid responses were provided on a four-point scale ranging from 1 (very much) to 4 (not at all). Responses of "Don't know/ No answer" were treated as missing data. We reversed the scoring, such that a higher score would indicate higher levels of acute stress ($M = 2.84$; $SD = 0.88$; Cronbach's $\alpha = .88$).

Life history strategies. The data from the WVS were merged with data from the FSI (The Fund for Peace, 2010, 2014, 2019). This index aims to assess a state's vulnerability to conflict and collapse, and it ranks all sovereign states with membership of the United Nations that have sufficient data available for the analysis. The ranking is based on the sum of 12 indicators of a state's vulnerability to volatility, unpredictability, harshness, and conflict, grouped into 4 categories: cohesion, economic, political, and social. The scores of the indicators are the result of content analysis, quantitative data analysis, and qualitative reviews. Examples of the cohesion category include ratings on the extent of state-organized and/or guerrilla violence in a given country, whether wealth is evenly distributed or concentrated in the hands of only a few, and whether resources are fairly distributed. Economic category examples include whether there are slums and ghettos in a given country, the size of its gross domestic product, and unemployment rates. Political category examples include the rate of government corruption, and the extent to which elections are free and fair. Finally, social category examples include whether supply and distribution of food is adequate, and what the status of a country's public health system is. See The Fund for Peace (2019) for an overview of all the indicators, downloadable via: <https://fundforpeace.org/2019/04/10/fragile-states-index-2019/>).

Each indicator has been scored on a scale from 0 to 10, resulting in a possible range of 0–120. A higher FSI score indicates a higher rate of volatility, unpredictability, harshness, and conflict across the various indicators listed above. Research suggests that the FSI converges with other well-known country-based indices of development, integrity, and conflict, such as the World Bank's World Governance Indicators and the Human Development Index, and it has shown high predictive validity when forecasting actual environmental conditions of harshness, unpredictability, and conflict (e.g., Venger & Miethel, 2018). As differences between living conditions in terms of harsh and unpredictable environments are the cornerstones of the development of a fast versus slow LHS, and given the relative stability of the scores on most indicators over time for most countries (the yearly change rate for countries typically varies between 0 and 3 points; see The Fund for Peace, 2019), we considered higher (lower) FSI scores to be associated with the development of a faster (slower) LHS. Thus, the FSI was used as a state-based proxy for LHS.

We merged the data from the WVS and the FSI by assigning the total score on the latter to the participants of every country included in our WVS dataset. Because the WVS's Wave 6 data collection started in 2010, we used the FSI of the year 2010 for our analysis. As there were no total FSI scores available for three countries (Taiwan, Palestine, and Hong Kong), we did not include these countries in any further analysis. Therefore, the final sample for our analysis consisted of 60,997 respondents (49.6% female, $M_{\text{age}} = 40.93$ years, $SD_{\text{age}} = 15.95$) from 57 countries with an average FSI of 68.51 ($SD = 22.94$, range 10.9–110.2). To align the reporting of the present study with the next two studies, we reversed the scores on this index such that lower (higher) scores indicated faster (slower) LHS².

Novelty seeking. Next, as an indicator of novelty seeking, we used a measure of interest in progress by science and technology from the WVS composed of six items. Example items are: "Science and technology are making our lives healthier, easier, and more comfortable" and "It is not important for me to know about science in my daily life" (reversed; see the Supplementary Material for a full listing of the items). Valid responses were provided on a 10-point scale ranging from 1 = "Completely disagree/ A lot worse off" to 10 = "Completely agree/ A lot better off". Responses of "Don't know/ No answer" were

¹ Note: All the three studies included additional items that were included either because of being an intrinsic part of the archival data set or for exploratory purposes. As they were not focal to the present investigation, we did not analyze these data.

² Note: the FSI scores used here as a proxy to LHS do not equate with (acute) stress. Indeed, the correlation between FSI and our stress measure is .23, and it correlates .34 with a WVS measure composed of 4 items reflecting exposure to possible objective environmental stressors encountered in the last 12 months (insufficient nourishment, experience with crime, insufficient medical care and insufficient income). This suggests that the constructs are related but not identical, nor substitutable.

treated as missing data. We reversed the scoring of three items, such that a higher score indicated a more positive attitude toward science and technology ($M = 6.63$, $SD = 1.40$; Cronbach's $\alpha = .54$).

Negative mood. To control for negative moods, we used the WVS variable: *feelings of unhappiness*. Participants were asked to indicate their level of unhappiness using a scale ranging from 1 (very happy) to 4 (not at all happy; $M = 1.84$, $SD = 0.74$).

8.2. Results

The multilevel structure of our dataset, with respondents nested in countries, violated the assumption of independence across observations. The intraclass correlation coefficient for our outcome measure (novelty seeking) was .13, indicating the need to account for clustering by country in estimating the effects (Kreft & De Leeuw, 1998). Accordingly, we used a mixed-model linear regression to test our predictions. We regressed novelty seeking on acute stress, LHS, and their interaction. We observed a significant effect of acute stress on novelty seeking, indicating that stress was associated with more novelty seeking ($B = 0.45$, $SE = 0.02$, $t(61486,07) = 20.65$, $p < .0001$, unstandardized regression coefficients reported throughout). In addition, a significant effect of LHS indicated that a slower LHS was related to more novelty seeking ($B = 0.02$, $SE = 0.003$, $t(56,92) = 6.39$, $p < .0001$). More importantly, in line with H2, the interaction between perceived stress and LHS was significant and qualified these effects ($B = -0.007$, $SE = 0.0003$, $t(61396,44) = -21.33$, $p < .0001$)³.

To assess whether this interaction effect was indeed of the disordinal, crossover type as we expected, we conducted a floodlight analysis to probe the interaction using the SPSS PROCESS macro (cf. Krishna, 2016; Spiller et al., 2013; Hayes, 2018). A crossover interaction would be evinced by two (rather than one) Johnson–Neyman (JN) points within the range of observed values on the moderator variable, LHS, indicating that the effect of stress would be significant and positive for one range of values, and significant and negative for another range of values. The results of this floodlight analysis confirmed that the interaction was indeed of the crossover type (JN values: 63.46 and 67.53, with 64% of the sample scoring below and 29% above both values, respectively).

Additional simple slope (spotlight) analyses confirmed H2, that is, acute stress was positively related to novelty seeking for fast LHS consumers ($B = 0.32$, $SE = 0.015$, $t(60993) = 21.01$, $p < .0001$; evaluated at -2 SD from the mean), but negatively related to novelty seeking for slow LHS consumers ($B = -0.28$, $SE = 0.014$, $t(60993) = -20.04$, $p < .0001$; evaluated at $+2$ SD, see Fig. 1)⁴. Moreover, converse simple slopes analyses revealed that under baseline (low stress) conditions (evaluated at -2 SD from the mean), slow LHS consumers displayed higher novelty seeking than their fast LHS counterparts ($B = 0.014$, $SE = 0.0005$, $t(60993) = 27.6$, $p < .0001$). This indicates that stress moves fast LHS consumers up from a baseline state of lower novelty seeking, while stress moves slow LHS consumers down from a baseline state of higher novelty seeking. Finally, we examined whether negative mood, rather than acute stress, could provide an alternative explanation for the effects found. However, including *feelings of unhappiness* as a covariate did not change the strength or direction of any of the results, and, thus, it can be ruled out as an alternate account.

8.3. Discussion

Thus, in line with our predictions, we found support for H2. Experienced stress was positively related to novelty seeking among fast LHS consumers and negatively related to novelty seeking among slow LHS consumers. In addition, we observed that under baseline, low-stress conditions, the tendency for novelty seeking was higher for slow than fast LHS consumers. Thus, stress appears to help or hinder novelty seeking, albeit for different types of consumers. While this study used a high powered design, and showed that stress was associated with novelty seeking as a function of LHS, it is inherently limited by its exploratory and correlational nature. As with any cross-sectional data (and especially pre-existing archival data), this study potentially has an infinite number of possible extraneous variables that may also be responsible for the obtained effects. Moreover, our use of FSI is only a rudimentary approximation of LHS, as it does not directly capture the actual strategies, but rather a more distal predictor of them. More generally, it is largely unavoidable that constructs from archival data may not map exhaustively on the constructs of interest in a study that uses them because secondary data are (by definition) collected independent of the focal research hypotheses. Still, archival data can serve as a more “crude” proxy for the constructs of interest and can empirically support the theoretical notions by illustrating their “real-life” relevance.

To eliminate the measurement endogeneity issues, to be able to use operationalizations with established construct validity, and to directly test for causality, we designed experimental Studies 2 and 3, where we manipulated the independent variables, measured LHS directly at the individual level using a validated scale, and randomly assigned participants to conditions.

³ Note: Results were virtually identical when using non-nested, OLS-based regression, using the SPSS PROCESS macro (Hayes, 2018, Model 1): effect acute perceived stress: $B = 0.43$, $SE = 0.02$, $t(60993) = 21.84$, $p < .0001$; effect LHS: $B = 0.02$, $SE = 0.001$, $t(60993) = 26.80$, $p < .0001$; interaction stress*LHS: $B = -0.007$, $SE = 0.0003$, $t(60993) = -23.07$, $p < .0001$.

⁴ Note: In this and the next two studies, results did not change when including participants' education level and household disposable income. Thus, the findings proved to be robust when controlling for participants' current SES.

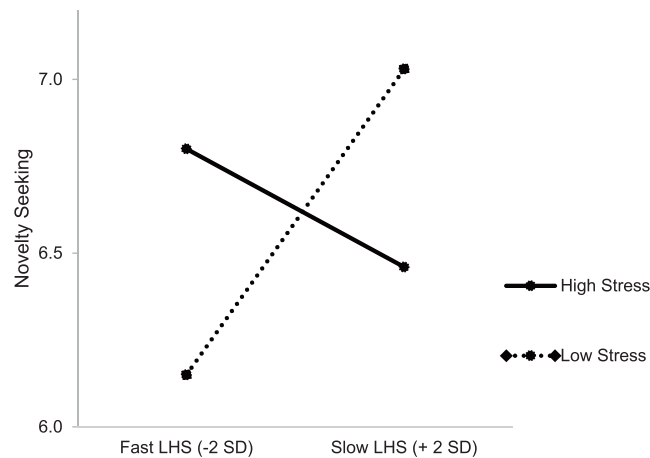


Fig. 1. Impact of Acute Perceived Stress on Attitude Toward Novelty Seeking (Interest in Progress by Science and Technology) as a Function of LHS (Study 1).

9. Study 2

In Study 2, we aimed to replicate and extend the previous findings. Thus, we set out to replicate the effect of stress on novelty seeking as a function of consumer LHS using a more controlled, experimental design, including a direct indicator of consumer novelty seeking, viz. intentions to buy a novel food product. Furthermore, we directly assessed individual differences in LHS using a validated measure to examine whether any results would converge with the country-based proxy used in Study 1. Moreover, the present study aimed to assess the extent to which the effects generalized to chronic (pandemic) stress. We predicted that consumer LHS would moderate the impact of acute, but not chronic stress on novelty seeking (H1), such that, high stress (compared to low stress) would lead to increased (decreased) novelty seeking among consumers with a fast (slow) LHS (H2).

9.1. Method

Participants and design. We used Prolific Academic's online participant pool to recruit participants from a broad range of nationalities (Italian, Greek, Spanish, Portuguese, Polish, Hungarian, Estonian, and others) in exchange for a small monetary compensation to provide robust evidence for our notions. We did not analyze the responses of 69 participants who indicated poor to moderate English language knowledge. In addition, we excluded nine participants who did not consume crisps (the focal dependent variable, see below). Thus, we used the responses of a sample of 328 participants ($M_{age} = 23.53$, $SD_{age} = 6.10$, 37.5% females), which was well above the minimum sample size threshold of $N = 101$ suggested by the G^* Power analysis (see earlier). The study used a design with acute stress (low versus high) as a between-subjects factor and individual differences in LHS as a continuous, measured independent variable. Novelty seeking (intentions to buy a novel food item) was the main dependent variable.

Procedure and measures. After providing informed consent, the participants were informed that the survey they were to complete contained multiple unrelated parts. The first part involved a reading task, which was presented as a task to understand how people read news articles. Participants were randomly assigned to carefully read one of two articles, adapted from Durante et al. (2015) with see also Griskevicius et al., (2013), which were presented as appearing in the Sunday edition of *The Guardian*. The participants were given instructions to visualize the material as vividly as possible, and they were told that they would be asked a few questions about it later.

Participants in the high stress condition read an article that was titled "Tough Times Ahead: The New Economics of the 21st Century." It described an unpredictable and unstable societal and economic climate, with large-scale job losses, a sharp economic downturn, a volatile world with conflicts and (trade) wars, and imminent resource scarcity. In the low-stress condition, participants read a control article that was similar in length and style and was titled "The Little Stable Things of Today: The Modern Life of the 21st Century," describing typical days in the lives of Western working professionals who had successfully adapted to the presence of an increase in daily hassles and thus mainly experienced life as stable and peaceful (see Supplementary Material for the full text of both articles). Immediately after reading the article, the participants spent several minutes writing about their thoughts and feelings about the article.

After this task, the participants were told that, as a part of a separate study, we were interested in their evaluation of a novel product (crisps) that had recently been introduced by a food production company. The crisps were introduced with an advertisement, including a short description and picture, and were explicitly labelled as new and innovative. More specifically, they were introduced as: "Featherlight Microcrisps are paper-thin potato crisps that are flavored with sea salt. Innovative technology in air-drying and baking makes these crisps feather-light and thin." (see Supplementary Material for full

description). A separate online pretest ($N = 404$, using the Prolific Academic platform) showed that participants rated the novel crisps as more innovative ($M = 4.44$, $SD = 1.61$) than regular crisps ($M = 3.90$, $SD = 1.68$, $t(403) = 7.17$, $p < .0001$). After reading the information about the product, we measured novelty seeking by asking the participants to indicate their intention to buy this novel food item on the [Putrevu & Lord \(1994\)](#) 3-item measure, using 7-point Likert scales with the following items: “I will definitely buy this product,” “I will purchase this product the next time I need such a product,” and “It is very likely that I will buy this product” (1 = totally disagree, 7 = totally agree, $M = 4.19$, $SD = 1.55$, Cronbach's $\alpha = .92$).

In addition, the participants completed the Mini-K, a validated, 20-item measure assessing individual differences in LHSs, using 7-point Likert scales ([Figueredo et al., 2006](#)). Example items include: “I often make plans in advance,” “I avoid taking risks,” and “While growing up, I had a close and warm relationship with my biological mother” (1 = strongly disagree, 7 = strongly agree). Scores on the items were averaged to create an overall LHS index with lower scores indicating a faster LHS ($M = 4.72$, $SD = 0.73$; Cronbach's $\alpha = .80$, see [Figueredo et al., 2006](#) for a full listing of the items).

We assessed pandemic stress, suggesting that it qualified as a particular type of chronic stress, using a single-item 7-point scale asking participants to indicate how stressed they felt about the COVID-19 pandemic situation (1 = not stressed at all, 7 = very stressed, $M = 4.27$, $SD = 1.80$). In addition, to assess whether pandemic stress indeed qualified as a form of chronic stress, we administered a separate 4-item instrument to measure chronic stress, using 5-point scales asking to indicate the frequency of stressful feelings and thoughts during the last 6 months ([Cohen & Williamson, 1988](#)). An example item is: “In the last 6 months, how often have you felt that you were unable to control the important things in your life?” (0 = Never, 4 = Very Often; $M = 3.03$, $SD = 0.75$; Cronbach's $\alpha = .75$). In line with our assumptions, our measures of pandemic and chronic stress correlated significantly ($r = .201$, $p < .01$; see also Supplementary Material for correlations between all constructs of interest for all studies). Moreover, participants also answered an item to check the acute stress manipulation (“How stressed did you feel after you read the article at the beginning of the survey?” 1 = “not stressed at all,” 7 = “very stressed,” $M = 4.27$, $SD = 1.80$; cf. [Durante & Laran, 2016](#)), and answered demographic-related questions (age, gender, education, and income level).

9.2. Results

Manipulation checks. The manipulation of acute stress was successful as the news article on the unpredictable and unstable societal and economic climate indeed elicited significantly more stress than the control article ($M_{\text{stress}} = 4.93$, $SD_{\text{stress}} = 1.32$ versus $M_{\text{control}} = 2.98$, $SD_{\text{control}} = 1.75$; $F(1, 326) = 128.29$, $p < .0001$). Moreover, the acute stress manipulation did not affect our measures of pandemic ($F(1, 326) = 3.44$, $p = .07$, n.s.) or chronic stress ($F(1, 326) = 0.34$, $p = .56$, n.s.).

Target analysis. Next, to test our main hypothesis, we examined whether we could replicate the main finding of Study 1 on novelty seeking (intentions to buy the novel food item). Using a PROCESS Model 1 analysis with 10,000 bootstrap samples ([Hayes, 2018](#)), we first tested the effects of acute stress (low versus high), LHS, and their interaction on the intention to buy the novel food item. We observed a significant effect of acute stress on intentions to buy the novel food item, indicating that high acute stress (compared to low) predicted higher levels of intentions to buy ($B = 3.11$, $SE = 1.10$, $t(324) = 2.82$, $p = .0051$). In addition, an effect of LHS suggested that a slower LHS increased the intention to buy the novel food item compared to a faster LHS ($B = 0.62$, $SE = 0.16$, $t(324) = 3.92$, $p = .0001$). Importantly, the interaction between acute stress and LHS was also significant ($B = -0.68$, $SE = 0.23$, $t(324) = -2.94$, $p = .0035$). A floodlight analysis (cf. [Hayes, 2018](#); [Krishna, 2016](#); [Spiller et al., 2013](#)) confirmed that the interaction was indeed of the disordinal, crossover type (JN values: 3.77 and 5.13, with 9% of the sample scoring below and 28% above both values, respectively).

Additional simple slopes (spotlight) analyses converged with the previous results and confirmed H2. That is, the impact of acute stress on novelty seeking was again *positive* for fast LHS consumers ($B = 0.89$, $SE = 0.38$, $t(324) = 2.36$, $p = .02$), but *negative* for slow LHS consumers ($B = -1.10$, $SE = 0.38$, $t(324) = -2.91$, $p = .0039$; evaluated at $-/+2$ SD, see [Fig. 2](#)). Conversely, under baseline (low stress) conditions, fast LHS consumers displayed lower novelty seeking than their slow LHS counterparts ($B = 0.62$, $SE = 0.16$, $t(324) = 3.92$, $p = .0001$), suggesting that stress increased their otherwise lower tendency for novelty seeking while stress decreased the otherwise higher tendency for novelty seeking for their slow LHS counterparts.

In addition, in this study, we examined the extent to which the other type of stress—pandemic stress (considered a form of chronic stress)—would yield similar results to acute stress. H1 assumes that the effects of acute stress will not generalize to chronic (pandemic) stress. To test for this possibility, we performed three separate analyses: (1) testing the interaction of acute stress and LHS on novelty seeking (see above); (2) testing the interaction of the pandemic stress measure and LHS on novelty seeking; and (3) if pandemic stress indeed qualified as chronic stress, the results of analysis (2) should converge with results using the chronic stress measure; hence, we also tested the interaction of the chronic stress measure and LHS on novelty seeking. The interaction effect observed for analysis (1) appeared to be specific for acute stress since similar regression analyses using the pandemic and chronic stress measures did not yield any significant interaction effects with LHS on novelty seeking (for pandemic stress: $B = -0.03$, $SE = 0.06$, $t(324) = -0.48$, $p = .63$, n.s.; for chronic stress: $B = -0.23$, $SE = 0.16$, $t(324) = -1.46$, $p = .15$, n.s.). In addition, neither the effect of pandemic nor chronic stress was significant (pandemic stress: $B = 0.15$, $SE = 0.29$, $t(324) = 0.50$, $p = .62$, n.s.; chronic stress: $B = 0.995$, $SE = 0.74$, $t(324) = 1.34$, $p = .18$, n.s.). These results provide indicative support for H1, that is LHS moderates the effects of acute, but not chronic (pandemic) stress on novelty seeking.

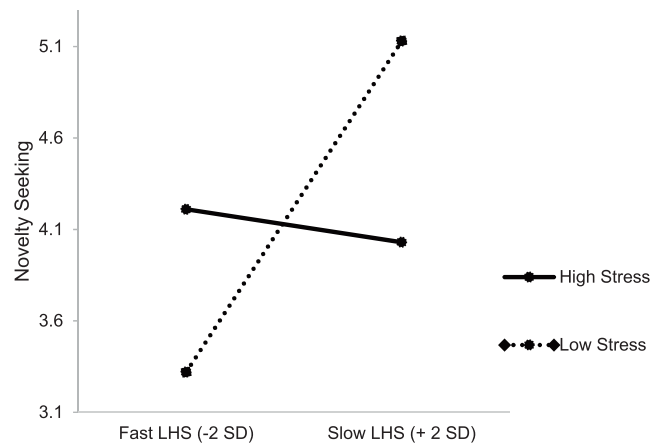


Fig. 2. Impact of Acute Stress on Novelty Seeking (Intentions to Buy) as a Function of LHS (Study 2).

9.3. Discussion

Overall, the results of the present study replicated and extended the previous findings and provided support for H1 and H2. In line with the secondary data analysis of Study 1, and using a more controlled (experimental) design with an acute stress manipulation and validated measures for novelty seeking and LHS, we replicated our key finding that high acute stress (compared to low acute stress) could help or hinder novelty seeking as a function of consumer LHSs. More specifically, stress increased (decreased) novelty seeking for fast (slow) LHS consumers. These effects were present for acute stress but not for chronic (pandemic) stress. Moreover, we found that under baseline (low acute stress) conditions, fast LHS consumers displayed lower levels of novelty seeking than their slow LHS counterparts. In sum, the results indicate that consumers with a fast strategy become more novelty seeking when experiencing acute stress, thus elevating their otherwise low tendency to do so, while their slow LHS counterparts show the opposite pattern.

The observation that the effects translate into differential intentions to buy a novel product that is not directly related to the source of stress suggests that the acute stress-induced increase versus decrease in novelty seeking as a function of LHS goes beyond simple instrumental coping to deal with the source of stress itself (Duhachek, 2005). Indeed, the results suggest a more generic mindset that is activated by acute stress and is compatible with the general psychological “make-up” of fast versus slow LHS consumers.

10. Study 3

In this study, we aimed to find converging evidence for the notion that acute stress can help or hinder novelty seeking, as moderated by consumer LHSs, by showing that the (conditional) effect is present for novel products but absent for regular products, as per H2. That is, if the intention to buy novel food items is indeed attributable to differential acute stress among fast versus slow LHS consumers, then we should observe the previously found crossover effects of stress and LHS *only* for new and innovative products, but not for regular products, something the present study explicitly tested. Moreover, the present study extended the previous studies by including another indicator of novelty seeking—the trial intention of a (novel) product. While willingness to buy shows the inclination to spend monetary resources on a good, trial intention associates with a readiness to actually consume the product. Therefore, while both variables may reflect novelty seeking in consumer behavior, they tap into different aspects of novelty seeking—one reflecting novelty seeking in terms of willingness to devote financial resources and another reflecting novelty seeking in terms of readiness to consume.

10.1. Method

Participants and design. The sample consisted of 196 participants of various nationalities from Prolific Academic’s online participant pool in exchange for a small monetary payment ($M_{\text{age}} = 25.95$, $SD_{\text{age}} = 7.21$, 31.6% female)⁵. The study had a 2 (acute stress: high versus low) \times 2 (type of product: novel versus regular) between-subjects factorial design with individual differences in LHS as a continuous independent predictor and intentions to buy and trial intentions of the product as the main dependent variables.

Procedure and measures. The procedure was similar to that of Study 2. First, the participants completed an informed consent form. Immediately after reading either the acute stress inducing or control article, the participants were asked to

⁵ Note: Using the same data-screening approach as in Study 2 did not change the pattern of results and is not discussed further.

spend several minutes writing, in as much detail as possible, about their thoughts and feelings about the article. After the reading task, the participants were told that, as part of a separate study, we were interested in their product preferences.

The participants were presented with an advertisement for a cereal bar, which was either described as novel or regular. In both conditions, the ingredients were identical, and the novel product condition stressed the novelty and innovativeness of the bar throughout the description, which was absent from the regular product condition (see Supplementary Material for the full product descriptions). We felt this would provide a particularly “conservative” test of our notions, without the risk of introducing confounds.

The participants were asked to indicate their intention to buy the product on the same scale as that used in Study 1 (Putrevu & Lord, 1994; 3-item 7-point Likert scale: 1 = totally disagree, 7 = totally agree, $M = 3.76$, $SD = 1.65$, Cronbach's $\alpha = .93$). Additionally, we measured the trial intention of the product using a 2-item 7-point Likert scale (cf. Aqueveque, 2016; 1 = totally disagree, 7 = totally agree, $M = 4.84$, $SD = 1.41$, $r = .50$): “If somebody gives me this product, I will try it” and “Overall, I am very interested in trying this product.”

Similar to Study 2, the participants completed the 20-item Mini-K, using 7-point Likert scales (Figueredo et al., 2006). The items were averaged to create an overall LHS index with lower scores indicating a faster LHS ($M = 4.43$, $SD = 1.09$; Cronbach's $\alpha = .83$). Moreover, in this study, we included state-level FSI scores to assess their correlation with the validated Mini-K scores. Mini-K scores correlated significantly and negatively with the FSI scores (Spearman's $\rho = -.16$, $p = .02$), thus attesting to the relevance of FSI as a proxy for LHSs (given sufficient variance in the nationalities of the participants in the study). Similar to the previous study, the participants also completed the same acute stress manipulation check item ($M = 3.36$, $SD = 1.86$), a manipulation check of type of product (“This cereal bar is an innovative product” 1 = totally disagree, 7 = totally agree, $M = 2.88$, $SD = 1.69$), and demographic questions (e.g., age, gender, education, and income level).

10.2. Results

Manipulation checks. Similar to the previous study, the acute stress manipulation was successful, as the results of the manipulation check showed that the stress-eliciting news article again induced significantly more acute stress than the control article ($M_{stress} = 4.15$, $SD_{stress} = 1.85$ versus $M_{control} = 2.77$, $SD_{control} = 1.65$, $F(1, 194) = 30.62$, $p < .0001$). In addition, the manipulation of the product type was successful as participants rated the novel product as more innovative ($M = 3.19$, $SD = 1.76$) than the regular product ($M = 2.56$, $SD = 1.55$, $F(1, 194) = 6.99$, $p = .009$).

Target analysis. Next, to test our hypothesis that high acute stress (compared to low acute stress) may lead consumers with a fast (slow) LHS to engage in more (less) novelty seeking, we regressed intentions to buy on stress (high versus low), type of product (novel versus regular), and LHS, using PROCESS model 3 (Hayes, 2018). The analysis yielded a two-way interaction between acute stress and product type ($B = 4.13$, $SE = 2.01$, $t(188) = 2.05$, $p = .04$). The analysis also yielded the predicted three-way interaction, indicating that the type of product (novel versus regular) moderated the interaction between acute stress and LHS ($B = -1.07$, $SE = 0.44$, $t(188) = -2.43$, $p = .016$). No other effects were significant. Follow-up analyses showed that the acute stress * LHS interaction was only significant for the novel product condition ($B = -1.17$, $F(1, 188) = 13.44$, $p = .0003$) but not for the regular product condition ($B = -0.11$, $F < 1$).

To further probe whether the acute stress * LHS interaction for novel products was indeed of the crossover type, we conducted a floodlight analysis (cf. Spiller et al., 2013). This analysis again confirmed that there were two JN values within the range of observed values for LHS, marking the regions where the effect of acute stress on the intention to buy the novel food item was significant and of opposite sign (JN values: 3.41 and 4.72, with 17% of the sample scoring below and 45% above these values, respectively).

In line with the previous findings, the impact of stress on novelty seeking was moderated by consumer LHS, such that the impact of acute stress on intentions to buy the novel product was indeed positive for fast LHS consumers ($B = 2.24$, $SE = 0.76$, $t(188) = 2.94$, $p = .004$) but negative for slow LHS consumers ($B = -2.88$, $SE = 0.78$, $t(188) = -3.69$, $p = .0003$; evaluated at $-/+2$ SD, see Fig. 3, Panel A). That is, high acute stress enhanced (reduced) the intention to buy the novel food item for fast (slow) LHS consumers (compared to low acute stress).

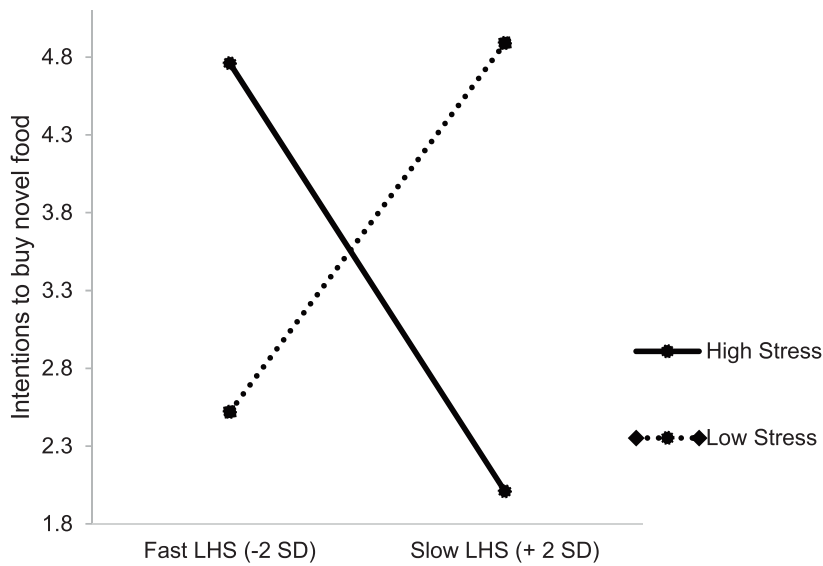
Converse simple slopes analyses also converged with the previous results and showed that under default (low acute stress) conditions, slow LHS consumers displayed higher novelty seeking (intentions to buy the novel product) than their fast LHS counterparts ($B = 0.54$, $SE = 0.16$, $t(188) = 3.09$, $p = .002$).

The results on our trial intention measure converged with these findings. That is, for this dependent variable, only the three-way interaction was significant ($B = -0.84$, $SE = 0.37$, $t(188) = -2.26$, $p = .025$)⁶, and follow-up analyses also showed that the acute stress*LHS interaction was only significant for the novel food item ($B = -0.99$, $F(1, 188) = 13.11$, $p = .0004$), but not for the regular one ($B = -0.14$, $F < 1$). The floodlight and spotlight analyses also yielded evidence for a crossover interaction (JN values: 3.28 and 4.68, with 17% of the sample scoring below and 46% above these values, respectively).

Again, the impact of acute stress on the trial intention of the novel food item was positive for fast LHS consumers ($B = 1.83$, $SE = 0.65$, $t(188) = 2.82$, $p = .005$), but negative for slow LHS consumers ($B = -2.48$, $SE = 0.67$, $t(188) = -3.72$, $p = .0003$; evaluated at $-/+2$ SD, see Fig. 3, Panel B). Additionally, converse simple slopes analyses again converged with

⁶ Note: a post-hoc analysis of the observed effect sizes of the critical interaction for each of the three studies (Study 1: $r = .09$, Study 2: $r = .16$, Study 3: $r = .17$ and $.16$, respectively) confirmed that they fell within the range of what Funder and Ozer (2019) labeled “small” to “medium” effect sizes (or “small” to “typical,” according to Gignac and Szodorai, 2016).

Panel A: Impact of Acute Stress on Intentions to Buy Novel Food as a Function of LHS



Panel B: Impact of Acute Stress on Trial Intentions of Novel Food as a Function of LHS

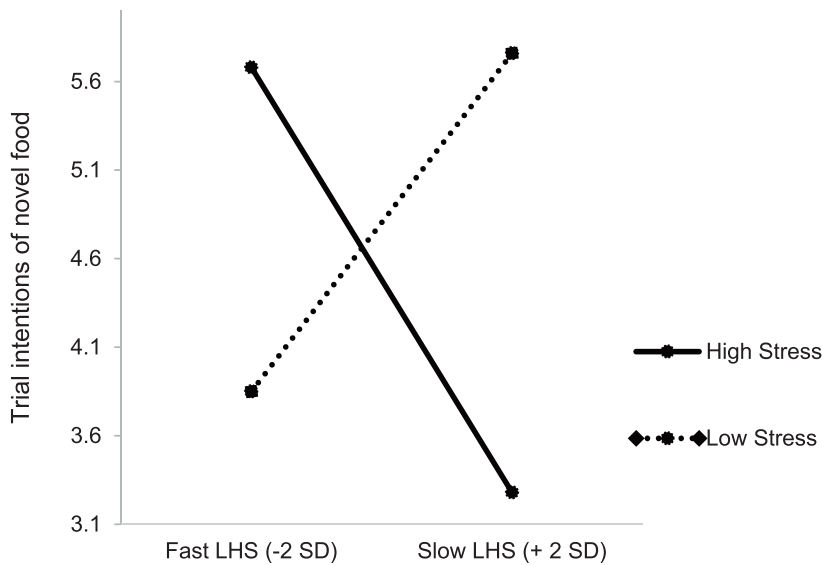


Fig. 3. Impact of Acute Stress and LHS for Novel Products (Study 3). Panel A: Impact of Acute Stress on Intentions to Buy Novel Food as a Function of LHS. Panel B: Impact of Acute Stress on Trial Intentions of Novel Food as a Function of LHS.

the previous results and showed that under baseline (low acute stress) conditions, slow LHS consumers displayed higher novelty seeking (trial intentions for the novel product) than their fast LHS counterparts ($B = 0.44, SE = 0.15, t(188) = 2.92, p = .004$)⁷.

⁷ Conversely, although not hypothesized, under high stress conditions, fast LHS consumers tended to display higher novelty seeking than their slow LHS counterparts, although the effects were less consistent (Study 1: $B = -0.009, SE = 0.0006, t(60993) = -14.36, p < .00001$; Study 2: $B = -0.06, SE = 0.16, t(324) = -0.35, p = .73, n.s.$; Study 3: Intentions to Buy: $B = -0.63, SE = 0.27, t(188) = -2.36, p = .02$; Trial Intentions: $B = -0.55, SE = 0.23, t(188) = -2.41, p = .02$). Yet, a meta-analysis across all studies (see Supplementary Material) indicated that fast LHS consumers did display significantly higher novelty seeking than their slow LHS counterparts under these conditions ($M r = -.03, Z = -7.43, p < .0001$).

10.3. Discussion

Thus, the present results extend and converge with the findings of the previous two studies by demonstrating that the crossover interaction between acute stress and consumer LHSs on intentions to buy, as well as trial intentions, is particular to novel products and does not extend to regular products. Thus, acute stress does not increase (decrease) an undifferentiated appetitive motivation for fast (slow) LHS consumers, but specifically targets the motivation to explore and try out novel stimuli.

11. General discussion

The present research aimed to contribute to the modest body of literature examining the role of stress in consumer judgment and decision-making. In particular, we aimed to reconcile conflicting findings on the relationship between stress and consumer novelty seeking by focusing on a perspective rooted in evolutionary biology and psychology. Following LHT (Kaplan & Gangestad, 2005), we proposed that consumer LHSs—short-term, impulsive, and reward-sensitive (fast) versus long-term, reflective, and controlled (slow) self-regulatory strategies—might moderate individual responses to stress. We found that stress increased (decreased) novelty seeking for fast (slow) LHSs. Conversely, under baseline, low-stress conditions, we observed that fast LHS consumers display lower novelty-seeking tendencies than their slow LHS counterparts. In summary, we found that acute stress moves fast LHS consumers up from a baseline state of low novelty seeking, while it moves slow LHS consumers down from a baseline state of high novelty seeking.

The results of a high-powered study, blending two archival datasets, as well as two more controlled experiments, showed that acute stress is both positively and negatively related to novelty seeking. More specifically, Study 1, merging data from the WVS (Inglehart et al., 2014) with data from the FSI (The Fund for Peace, 2010; 2019) provided global evidence for the interaction of acute stress and LHSs (proxied by FSI scores) on novelty seeking. On a total sample of approximately 61,000 consumers from 57 countries worldwide, we showed that acute stress was positively related to novelty seeking among consumers from countries with conditions conducive to the development of a fast LHS. Conversely, acute stress was negatively related to novelty seeking among consumers from countries with conditions that facilitate the development of a slow LHS.

To address the limitations inherent to cross-sectional, correlation-based studies, the next two studies used a validated measure of LHS, focused on more specific indices of novelty seeking, and used more controlled experimental designs. In Study 2, in line with Hypotheses 1 and 2, we observed that acute stress increased (decreased) novelty seeking among fast (slow) LHS consumers and that these effects were present for acute stress but not for chronic (pandemic) stress. Additionally, we observed that the baseline (low stress) levels of novelty seeking were lower among fast compared to slow LHS consumers. Finally, Study 3 tested the robustness of the effects and showed that acute stress elicits increased (decreased) novelty seeking among fast (slow) LHS consumers, for novel but not for regular products.

In sum, these findings reconcile the mixed previous findings on the stress–novelty seeking relationship and show the promise of using a perspective informed by evolutionary theorizing (i.e., LHT). It should be noted that we do not claim that the observed moderation of the stress–novelty seeking relationship by LHSs constitutes the final or even only answer in reconciling the equivocal “state of the science” on the issue. It may well be that additional moderators, such as the duration and/or intensity of the stress or additional environmental factors (e.g., social support) may also contribute to our understanding of the issue, either in isolation or in conjunction with LHSs.

The present findings point to an interesting counterpoint to the prevailing notion of what a fast LHS may imply in terms of behavioral self-regulation. While both slow and fast LHSs constitute strategies that have evolved to cope with prevailing environmental conditions, a wealth of studies suggests that a slow LHS typically yields choices and decisions that are more beneficial in terms of self-regulation, while the behavioral outcomes of a fast LHS in today’s modern society are sometimes considered to be maladaptive or even harmful. Indeed, studies have associated a fast LHS with challenges in self-regulation, such as low inhibitory control (Deater-Deckard et al., 2019), an increased tendency for risk taking (Wang et al., 2009; Griskevicius et al., 2011), higher risk of substance abuse and obesity (Del Giudice, 2015; Maner et al., 2017), and impaired executive functioning (e.g., Ayoub et al., 2009; Fernald et al., 2011). However, a few recent papers point to a “bright side” of a fast LHS in terms of self-regulation, arguing that growing up in a stressful environment enhances some cognitive functions as a coping response to stress, such as greater skill in task shifting (Mittal et al., 2015) and better working memory performance in volatile environments (Young et al., 2018). The current work adds to this body of research by showing that another potentially beneficial response to stressful conditions may be for fast LHS consumers to engage in novelty seeking. Although inherently uncertain, such novelty seeking (either through consumption or otherwise) may also be inherently rewarding (cf. Berlyne 1960), which may also function as a “mood repair” strategy to combat the aversive experience of stress. Moreover, it may lead to the identification of new opportunities and innovative ways of handling stressful conditions (Litman, 2005; Loewenstein, 1994; Kashdan et al., 2013), thereby promoting increased resilience to cope with the challenges of modern living (cf. Goodman et al., 2017). Thus, novelty seeking may constitute both an emotion- and a problem-focused coping strategy for fast LHS consumers in dealing with the experience of acute stress (cf. Lazarus & Folkman, 1984; Duhachek, 2005).

11.1. Managerial and policy implications

The results of the present research reveal important factors driving novelty seeking under acute stress conditions and have several implications for marketers and policymakers. Our findings can be particularly useful for segmentation, positioning/communication, and store environment strategies.

First, regarding market segmentation, our results suggest that managers might look beyond traditional metrics and consider assessing an additional key variable—LHSs. To identify consumers with a fast versus slow LHS, firms can use the Mini-K measure featured in Studies 2 and 3 and include it in their regular marketing research efforts. Internationally operating brands and firms could also consider using the FSI, which we used in Study 1. Possibly, and assuming relative stability of environmental factors contributing to the development of differential LHSs, “markers” for fast vs slow LHSs may also be identified at smaller geographical levels, such as towns or zip-code areas (e.g., prevalence of crime, divorce, structural unemployment, or average income). If so, marketers may be able to identify highly specific geographical areas where fast versus slow LHS consumers might be more or less represented and adapt their location or positioning strategies accordingly.

Second, for positioning/communication strategies, we offer a deeper understanding of the conditions that point to when and for whom novelty seeking is more pronounced (see also, Vandecasteele & Geuens, 2010). Specifically, marketing messages for novel products and services can be adapted depending on the harshness of the environments in which they are marketed (see above) and using different positioning strategies in different contexts for different LHS consumers. In contexts where acute stress is prevalent, novel products should target fast LHS consumers by highlighting the reward value of the novel product. For example, one of the most innovative global restaurant chains, Subway, frequently introduces new menu varieties, such as “New Potato Bites,” using “here and now” promotions, including “instant win” games or “Buy One Sandwich Now, Get One Sandwich Free” offerings, that emphasize their acute reward value. Subway restaurants located in geographical areas where markers suggest a high prevalence of fast LHS consumers might spike their marketing efforts for such new products, particularly when times are more stressful (e.g., when media report an upcoming economic downturn or political turmoil). Conversely, when times are stable and calm (i.e., under “baseline” conditions), such promotions might be more effective for geographical areas where a slow LHS is more prevalent. Conversely, under these baseline conditions, Subway restaurants that target fast LHS consumers may now rely more on their “classic” offerings, such as the “Steak and Cheese Sandwich,” given the lower baseline novelty-seeking tendency of these consumers. Similarly, Nestlé recently introduced its new “KitKat Green Tea Matcha” edition in Europe and also emphasized that while new, it was borne out of a long tradition of “powdered green tea that has been enjoyed for centuries in Japan, often as part of an elaborate tea ceremony” (Nestlé, 2019). Hence, this KitKat variety was positioned as novel, yet with a strong traditional accent. In keeping with the basic reasoning above, under baseline, low stress conditions, Nestlé may tailor its positioning to fast LHS consumers by downplaying the novelty while highlighting the traditional aspect and vice versa for slow LHS consumers. However, when times turn volatile and acute stress levels increase, the converse appeals might be more effective for fast and slow consumer segments, respectively.

Third, companies introducing novel products and targeting slow versus fast LHS consumers may consider actively *managing* acute stress levels in their sales points or store environments to fit the key segments. Prior research suggests that store atmospherics, such as fast-paced music strongly increases spending under high-density in-store crowding conditions (Knoeflerle et al., 2017). Both crowdedness and fast upbeat music may be potential sources of acute stress. Several companies, such as Abercrombie and Fitch or Trader Joe’s, play loud, fast-paced music as such music helps consumers make quick and impulsive decisions (The Stylist, 2017). The implication of this study’s findings is that such atmospherics would be most effective when targeting fast LHS consumers with novel or slow LHS consumers with trusted and familiar offerings.

Finally, our research has important implications for policymakers who aim to protect vulnerable consumers. Public policy can curb exploitative marketing actions by evaluating acute stress levels intentionally induced by companies to pressure consumers. One example of an efficient public policy is the Unfair Commercial Practices Directive, approved by the European Union in 2005 (European Union, 2020). This directive bans many misleading and aggressive practices aimed at inducing acute stress to pressure consumers into buying without deliberation, for instance, by the fraudulent use of limited offers or persistent and unwanted solicitations via telephone or email. Our research shows that such public policy measures are timely and relevant, and they should be adopted by more states globally. Banning aggressive commercial practices that induce acute stress to persuade consumers is particularly relevant in protecting fast LHS consumers, especially as they tend to be more prone to reward-sensitive, short-term, impulsive decision-making, which frequently does not serve their long-term interests and well-being.

11.2. Future research directions

The current research provides evidence that the responses of fast versus slow LHS consumers diverge in their exposure to acute stress. This points to additional future research possibilities. In our research, we exposed participants to relatively neutral (food) products whose novelty was rather subtle. However, not all innovations and novel products are subtle or positively perceived (Nguyen & Chaudhuri, 2019). Research on disruptive (radical) versus incremental innovations shows that people can shy away from innovations that are too radical, and the market acceptance of these innovations is typically low (e.g., Alexander & Van Knippenberg, 2014; Danneels & Kleinschmidt, 2001). Hence, future research might explore whether the present effects generalize to these more radical innovations.

In addition, future research may also consider further exploring the stress*LHS interaction for acquiring and consuming products that serve different functions. To the extent that the fast-to-slow LHS continuum maps onto the impulsive–reflective continuum suggested by various authors (cf., Del Giudice, 2015), it may well be that stress may not always lead to more novelty seeking for fast and less for slow LHS consumers, but rather that both fast and slow LHS consumers may be motivated to try out novel products that differ in function, in line with their psychological make-up. One potentially fruitful direction for research would be to explore how differential novelty seeking translates into choices between experiential versus material products, vice versus virtue products, or indulgent (hedonic) versus healthy novel products for consumers with different LHSs.

Finally, the practical constraints imposed on us in the present research forced us to use an efficient, validated, and highly condensed measure to assess individual differences in the fast-to-slow LHS continuum—the 20-item Mini-K scale (Figueredo et al., 2006). This precluded any detailed additional analyses delving deeper into the (rich) dimensional structure of the LHS continuum. Thus, future research may want to build on the present findings by using the full measurement instrument wherefrom the Mini-K scale is derived—the 199-item Arizona Life History Battery (Figueredo, 2007; Figueredo et al., 2014). Doing so might enable researchers to establish whether the present effects are attributable to an overall factor (as the theory would imply, see Figueredo et al., 2006, Richardson et al., 2017) or whether specific facets within the construct drive the effects.

Appendix A. Supplementary material

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ijresmar.2022.02.003>.

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