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# Priming Need–Frustrating Memories Sparks Conspiracy Beliefs: A Self-Determination Theory Perspective

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## ABSTRACT

**Objective:** Memories shape perceptions and decisions in uncertain situations through their encoded levels of autonomy, competence, and relatedness satisfaction or frustration. This research investigated their predictive value on COVID-19 conspiracy theories endorsement, when triggered by freedom-restrictive contexts.

**Method:** Study 1 ($N = 141$) randomly exposed participants to a control, moderate, or high freedom-restrictive vignette before describing a memory. Participants reported their endorsement of COVID-19 conspiracy theories a week later. Study 2 ($N = 213$) asked participants to describe a memory after reading a freedom-restrictive vignette. A week later, a yoked control design randomly assigned participants to either be primed with their own memory or with someone else's memory before reacting to a bogus conspiracy theory.

**Results:** Study 1 revealed a predictive association specifically between autonomy-frustrating memories triggered by freedom-restrictive vignettes and COVID-19 conspiracy theories endorsement. Study 2 showed that priming autonomy-frustrating memories situationally increased the likelihood of endorsing a bogus conspiracy theory, becoming angered by it, and expressing willingness to disseminate it, compared to a non-primed group and a group primed with autonomy-satisfying memories.

**Conclusions:** This research highlights the role of autonomy-frustrating memories in endorsing conspiracy theories, suggesting that such endorsement can emerge from the interplay between the individual (memories) and the environment (triggering cues).

Extreme societal events—such as wars, climate-related catastrophes, or virus outbreaks—can trigger beliefs in conspiracy theories (CTs; Uscinski and Parent 2014; van Prooijen and Acker 2015). These events often lead to swift societal shifts, which profoundly affect and challenge the establishment, the status quo, and the social norms (van Prooijen and Douglas 2017). Such destabilizing circumstances can create psychological discomfort. Researchers argue that CTs emerge, in part, as a coping mechanism to manage feelings of uncertainty, lack of control, and the need for closure (e.g., Bowes et al. 2023; Smallman 2018; van Prooijen and Jostmann 2013). Most empirical studies on CTs focus on stable person-level variables, using correlational designs to link these traits to beliefs in CTs. However, this approach often overlooks within-person processes; that is, how specific cognitions can be triggered by a specific extreme situation. Indeed, two individuals sharing the same personality traits will not perceive and react similarly in the same situation.

There is thus a need to better understand *how* extreme event-related situations interact with individuals' unique perception of them to influence the endorsement of CTs (Stojanov and Halberstadt 2020).

The present research suggests using a memory perspective, coupled with Self-Determination Theory (Ryan and Deci 2017), to investigate how specific autobiographical memories of past events are triggered by extreme social events to guide individuals towards CTs. In recent history, the COVID-19 pandemic provided a unique opportunity to investigate this potential motivational process in real time within the context of an extreme societal crisis (van Prooijen and Acker 2015).

## 1 | About Conspiracy Theories

Five key parameters distinguish CTs: pattern, agency, coalition, threat, and secrecy (van Prooijen and van Vugt 2018). CTs detail a pattern of causal relationships between events, people, and objects. They imply agency by vilifying ill-intentioned people who form a coalition that has a deliberate and threatening plan. This coalition is usually composed of people in positions of authority (e.g., governments, celebrities) or people subject to negative stereotypes (e.g., immigrants, women; van Prooijen and van Vugt 2018). Secrecy is always implied in these narratives, making it difficult to disprove them (van Prooijen and Douglas 2018).

Research pertaining to CTs has highlighted multiple person-level constructs associated with endorsement of such narratives, including uncertainty (van Prooijen and Jostmann 2013), system identity threat (i.e., perceiving social change as a threat to core values and identity; Federico et al. 2018), powerlessness (Abalakina-Paap et al. 1999), and lack of control (Whitson and Galinsky 2008). For instance, Abalakina-Paap et al. (1999) argued that powerlessness was positively correlated with endorsement of CTs because these narratives simultaneously provide an explanation as to why a person feels powerless and an outgroup to blame for this feeling of powerlessness. Using an experimental design, Whitson and Galinsky (2008) manipulated participants' sense of personal control (i.e., participants either recalled a situation in which they had or did not have control) and showed that inducing a lack of control increased conspiracy perceptions. They suggested that lacking control creates a need for structure and that CTs "return the world to a predictable state." Overall, a broad variety of other significant correlates of CT beliefs have emerged in the past two decades (e.g., need for closure, ambiguity intolerance, lower self-esteem, need for uniqueness; for complete meta-analysis see Bowes et al. 2023). Douglas et al. (2017) proposed to group these constructs into three motives to endorse CTs: epistemic, existential, and social motives. Epistemic motivation refers to the desire to competently predict one's environment and have a stable understanding of it. Existential motivation translates into the desire to feel safe and in control of one's environment. Social motivation corresponds to the need to belong and maintain a positive perception of the self and the in-group (Douglas et al. 2017). Little empirical research has directly examined those motives as their exact measurement is unclear. However, these motivational constructs strongly reflect the three basic psychological needs defined by Self-Determination Theory (SDT). SDT has cumulated over 50 years of empirical background on how those three needs, when frustrated, can motivate certain compensatory behaviors (Ryan and Deci 2017). To this extent, SDT appears as a fruitful perspective to understand CTs.

## 2 | Self-Determination Theory

SDT considers the needs for autonomy, competence, and relatedness to be universal and fundamental to fulfill for human growth and well-being (Chen et al. 2015; Ryan and Deci 2017). Their satisfaction varies from one individual to another depending on their environment and their social context. When one of those needs is frustrated, people instinctively try to regain satisfaction (Sheldon and Gunz 2009). Autonomy satisfaction corresponds to a sense of volition and acting authentically based on your own desires, values, and personal interests. Autonomy frustration refers to a perception of being controlled and restrained from acting/thinking congruently with one's will. Competence satisfaction translates into a sense of mastery and efficacy, while competence frustration refers to an undermined sense of mastery, a feeling of ineffectiveness, or even a feeling of failure. Lastly, relatedness satisfaction is described as a sense of social connection, significance, and contribution to a person or group. The frustration of relatedness translates into a loss of connection when one is socially rejected or ostracized. Those three needs are therefore considered as the fundamental motivators that lead people to act on their environment and sustain objectives (Ryan and Deci 2017; Sheldon and Gunz 2009).

Studies using an SDT framework have shown that need satisfaction is associated with positive outcomes (Sheldon et al. 2011), including well-being, compassion, and better internal resources, such as resilience, to face stressful events (Chen et al. 2015; Chirkov et al. 2005; Neufeld and Malin 2019; Ryan and Deci 2000, 2017; Sheldon et al. 2011). On the opposite hand, frustration of those needs is associated with maladjustment and unhappiness (Bartholomew et al. 2011; Chen et al. 2015). Frequent need frustration hinders the development of internal resources and has behavioral consequences (Sheldon 2011; Ryan and Deci 2017). For instance, need frustration during the COVID-19 pandemic was found to negatively affect sleep quality and life satisfaction, as well as to predict depressive and anxiety symptoms (Vermote et al. 2022). Moreover, studies have linked long-term need frustration with loss of motivation, defensive functioning, aggressive attitude, and oppositional behaviors of "resistance to engage in the socially requested activity" (Deci and Ryan 1985; van Petegem et al. 2012; Vansteenkiste and Ryan 2013).

Indeed, need frustration motivates the individual to compensate for those needs. When attempts to repair the needs fail and need frustration is repeatedly experienced, a maladaptive compensatory process can unfold (Deci and Ryan 2000; Vansteenkiste and Ryan 2013). Through this compensatory process, people tend to endorse extrinsic goals rather than goals stemming from their own internal values and preferences (Ryan and Deci 2017; Sheldon and Kasser 2008), obstructing authentic satisfaction of the needs (Vansteenkiste and Ryan 2013). This compensatory process is marked by attempts to accommodate chronic need frustration and can lead to the development of a black-and-white perception of the

world, as well as rigid and oppositional behaviors as a means to cope (Deci and Ryan 2000; Vansteenkiste and Ryan 2013).

Endorsement of CTs may be a manifestation of co-occurring compensatory reactions involving oppositional behaviors and rigid cognitive patterns (Vansteenkiste and Ryan 2013). Oppositional behaviors relate to defiant and even hostile defensive reactions following threats of control from perceived authority figures (Vansteenkiste and Ryan 2013). Based on prior research linking oppositional reactions among adolescents to controlling caregiving figures (e.g., van Petegem et al. 2015; Vansteenkiste et al. 2014), such authority figures can be conceptually extended to governments and public health institutions in the broader societal context, as these entities may also demand compliance with rules in a controlling manner. Additionally, rigid cognitive patterns can arise as a reaction to need frustration (Vansteenkiste and Ryan 2013). They entail a persistence in inflexible, critical, and dichotomized thinking patterns as a means to "provide a sense of structure, predictability, and security" (Vansteenkiste and Ryan 2013). Consequently, the repeated frustration of one or multiple needs could be the root of what sets in motion the pursuit of CTs, via this compensatory process.

Still, we all face aversive events that frustrate these needs and not all of us endorse CTs. Case in point, the COVID-19 pandemic was an extreme event experienced collectively, but while some experienced it as need-frustrating and endorsed CTs, others did not seek an alternative narrative. That is because a situation's need-frustrating nature is not determined by its face value, but by our subjective perception, which is shaped by our own personal past experiences (Philippe, Koestner, Lecours, et al. 2011).

### 2.1 | On Memories

Our past experiences are encoded within episodic and autobiographical memories. Memory encoding goes beyond the factual details of a past experience; it also comprises cognitive-affective elements that reflect how the initial situation was experienced (Conway et al. 2004). For instance, these cognitive-affective elements include the emotional valence (i.e., whether the situation was perceived as positive or negative), but also the need-satisfying or need-frustrating quality of the experience (Philippe, Koestner, Beaulieu-Pelletier, et al. 2011). The levels of need satisfaction and frustration encoded within a memory are a distinct construct from that of general everyday need satisfaction and frustration (Philippe, Koestner, Beaulieu-Pelletier, et al. 2011). General everyday levels of need satisfaction and frustration are part of semantic self-knowledge structures, which translate into a conceptual understanding of the self and the world (e.g., I am a good person, the government tries to control me), rather than specific memories on which people rely to determine how to react to a specific situation (Philippe and Bernard-Desrosiers 2017; Philippe, Koestner, Beaulieu-Pelletier, et al. 2011). As such, memories hold a predictive value to determine how one will perceive, interpret, and act in a given situation, beyond stable person-level variables like standard personality traits or motivational-cognitive dispositions (e.g., need for closure, powerlessness; Bowes et al. 2023; Philippe, Koestner, Beaulieu-Pelletier, et al. 2011; Stojanov and Halberstadt 2020). Indeed, memory activation, but most importantly the activation of their encoded cognitive-affective elements, is useful in our daily life as it helps us determine how to navigate novel situations.

Memories are triggered when the new situation faced shares similarities with past events encoded as memories, such as a common emotion, an overlapping theme (e.g., being controlled, feeling alone), or a surface feature (e.g., the same location or person; Brown and Schopflocher 1998; Philippe 2022; Rasmussen et al. 2015). This activation process usually occurs outside of consciousness so that we can quickly and momentarily appraise and react to our environment (Conway 2009; Philippe, Koestner, Lecours, et al. 2011). Memory activation serves a directive function (Pillemer 2003) in that its encoded cognitive-affective information is used and processed by the brain to direct perceptions and intentions (Kuwabara and Pillemer 2010; Merson and Pezdek 2019), induce emotional reactions (Philippe, Koestner, Lecours, et al. 2011, 2012), guide decision-making (Philippe 2022), as well as inform behavioral responses (Biondolillo and Pillemer 2015; Gino and Desai 2012) in a given situation. For instance, Biondolillo and Pillemer (2015) demonstrated that memory valence influences exercise behavior. They assigned participants to either recall a positive memory, a negative memory, or no memory (i.e., control). After a week, those who recalled a positive memory reported having exercised more than controls, while those who recalled a negative memory reported intermediate levels of exercise activity. Philippe, Koestner, Lecours, et al. (2011) further showed the role of need-frustrating memories on emotional reactions and demonstrated that the impact of need-frustrating memories is theme-specific. In one experiment, the authors asked participants to recall either a memory of being treated unfairly or a memory of having committed a mistake, and, 2 weeks later, to view a film excerpt on the theme of unfairness. Greater need frustration in the unfair treatment memory—but not in the mistake memory—predicted stronger anger reactions to the film excerpt on unfairness.

If the activated memories are characterized by need frustration, they are more likely to trigger a compensatory motive to defend the person's integrity. In certain instances, as was previously explained, this defensive reaction could take the form of both oppositional-defiant behaviors and rigid thinking patterns (Vansteenkiste and Ryan 2013). Over time, certain need-frustrating memories may become chronically activated (Philippe et al. 2012), fueling the defensive reaction of opposing the normative narrative and rejecting it, while also rigidly seeking and endorsing alternative ones, as is reflected in the endorsement of CTs.

Applied to the COVID-19 pandemic, several novel situations (e.g., two-meter distancing, mandatory vaccine passport, closure of non-essential businesses) may have triggered memories of past events also characterized by restricted freedoms (e.g., unjustified treatment in school, excessively controlling boss, ostracization). If these triggered memories were need frustrating, then the COVID-19-related restrictive situations may have been interpreted as unfair and alienating, provoking a defensive and oppositional reaction (Vansteenkiste and Ryan 2013), particularly in locations where the sociosanitary measures were not proportional to the epidemiological situation (Waterschoot et al. 2023). For some, it may have prompted a search for an alternative narrative to compensate,

potentially resulting in the endorsement of CTs—as these narratives justify experiencing these events as need frustrating. Over time, the repetitive activation of these memories may have crystallized into stable beliefs in CTs.

## 3 | Needs, Memories, and Conspiracy Theories—An Integrative Model

Overall, it is theorized that events occurring during a societal crisis trigger memories, because both share overlapping features. If the triggered memories are need-frustrating, the current event will then be interpreted as such and will lead the person to try to compensate for that lack of need satisfaction as a defensive reaction. Such compensation can manifest as minimizing or denying the external reality of the current event and finding a different explanation for it that could simultaneously explain both the past and current need-frustrating experiences. Beliefs in CTs often fulfill these criteria and provide compensation for the frustrated needs. If this theoretical conceptualization holds true, then reminders of a societal crisis that restrict freedom should trigger need-frustrating memories that are predictive of beliefs in CTs. Similarly, priming of these memories should increase beliefs in CTs.

## 4 | Context of the Present Research

This research was conducted amidst the COVID-19 pandemic. It therefore specifically pertains to CTs related to COVID-19 to increase the external validity of the research (van Prooijen and Acker 2015). At the time this research took place, the Government of Quebec enforced strict freedom-restricting sociosanitary measures (e.g., closed gyms, curfews, limited traveling between regions, vaccination passports to enter establishments). Apart from the great number of COVID-19-related deaths, freedom restriction was the most important aspect of this public health crisis that had significant consequences on the population across all ages. This research therefore focused on reminders of freedom-restrictive situations reflecting the COVID-19 pandemic in the province of Quebec (Canada).

## 5 | Present Research

The present research had two purposes. First, we intended to show that need-frustrating memories triggered by freedom-restrictive situations are the ones predictive of endorsement of CTs. Second, we suggest that the mere activation of these memories will make individuals more inclined to endorse CTs, including new CTs. Study 1 investigated the association between need-frustrating memories and COVID-19 CTs beliefs using a prospective quasi-experimental design. Based on the results of Study 1, Study 2 used an experimental design and assessed whether priming individuals with a need-frustrating memory (vs. a control memory) associated with freedom restriction would momentarily increase individuals' propensity to endorse a bogus COVID-19-related CT. Overall, we hypothesized that memories triggered by restricted freedoms and that were encoded as need-frustrating would predict beliefs in COVID-19 CTs and increase the likelihood of endorsing COVID-19 CTs when primed.

Data from the two studies is available in open access at the following link in the Files section: https://doi.org/10.17605/OSF.IO/JPXY3.

## 6 | Study 1

Study 1 examined the relationship between need-frustrating memories activated by situations involving freedom restriction and the endorsement of COVID-19 CTs. We posited that reminders of COVID-19-related freedom restrictions would trigger need-frustrating memories in some individuals, and that the level of need frustration in these memories would, in turn, predict COVID-19 CTs endorsement. To test this hypothesis, participants were randomly assigned to read one of three vignettes depicting either no restriction, moderate restriction, or high restriction of freedom. They were then asked to recall a memory in response to the vignette. Accordingly, if the moderate and high restriction vignettes were to activate need-frustrating memories, these memories would be specifically predictive of CTs endorsement. However, the need-frustrating memories activated by a non-restrictive vignette were not expected to be predictive of CTs endorsement. Therefore, we did not expect a main effect of vignette condition on CTs endorsement. Rather, we hypothesized an interaction between memory need frustration and vignette condition in the prediction of CTs endorsement, such that there would be an effect for memory need frustration in the moderate and high freedom restriction vignette conditions, but not in the non-restrictive vignette condition. Importantly, participants were not instructed to recall a specific type of memory. Instead, we examined naturally emerging memories to explore how specific contextual cues (i.e., the vignettes) influence memory activation and subsequent belief endorsement.

Since we did not know whether all three needs (autonomy, competence, relatedness) or only some of the three needs would show the expected effect, we tested each need separately. We controlled for everyday levels of need frustration (referred to as general autonomy, competence, and relatedness) to isolate the specific role of memory need frustration on CTs endorsement. We further controlled for trait reactance as this person-level characteristic was associated with anti-masks attitudes and other negative attitudes towards the COVID-19 virus during the pandemic (Taylor and Asmundson 2021). Controlling for trait reactance ensured that the effect was likely driven by need frustration in specific memories triggered by a specific context and not by a more general reactive personality. Finally, memory valence was also controlled for to demonstrate that this memory characteristic is not relevant in the context of this research.

## 7 | Method

### 7.1 | Participants and Design

A quasi-experimental design with a prospective measure of COVID-19 CTs beliefs was used. Because memory retrieval can induce a powerful situational mood priming effect (Philippe et al. 2015), CTs endorsement was assessed in a separate survey 1 week later. This guaranteed that no situational priming effect was involved and it isolated the specific,

potentially cumulative, and stable influence of need frustration in memories on CTs endorsement. Based on past studies investigating the effect of activating memories (Houle et al. 2018; Philippe et al. 2012), a small-to-medium effect size was expected ($f^2 = 0.075$). A power analysis indicated that a minimum of 132 participants was necessary to conduct multiple regression analyses with 12 predictors (power = 0.80, alpha = 0.05).

Overall, this study included 141 participants from the general population in Quebec (Canada). Participants were 39.88 years old on average (SD = 10.02). Overall, 95.0% of the sample identified as White. A total of 61.7% of the sample identified as female and 38.3% identified as male. Household income was reported in the following brackets: less than $30,000 (13.5%), $30,000 to $69,999 (25.6%), $70,000 to $109,999 (33.3%), and $110,000 or more (20.5%). Education level was reported as follows: high school diploma or less (12.1%), college or vocational training (42.6%), bachelor's degree or university certificate (32.6%), or graduate degree (12.8%).

## 7.2 | Procedure and Materials

### 7.2.1 | Recruitment Method

Recruitment took place online via advertisements on social media (between June and September 2021). Sociosanitary measures during this recruitment period varied and included mandatory mask wearing in public places, a ban on gatherings of more than nine guests within a residential setting, mandatory three-day isolation in a government-designated hotel upon arrival in the country via air travel, or mandatory proof of vaccination to enter non-essential public spaces (Institut national de santé du Québec 2022). Participants were invited to complete two online surveys at a one-week interval. All participants were informed about the content of the study and provided their informed consent prior to completing the first online survey. To encourage participation, participants were entered into a draw of three prizes of $125 after completing the first survey. All participants received a $15 e-transfer after completing the second survey.

Participants were randomly assigned to read one of three vignettes during the first survey. Each vignette depicted the same situation, but personal freedom restrictions varied (i.e., control, moderate, and high restriction). Afterwards, participants reported the first spontaneous memory elicited by the vignette. COVID-19 CTs endorsement was assessed in a separate survey a week later. This study was approved by the *Research Ethics Committee for Student Projects of the Université du Québec à Montréal*.

### 7.2.2 | Inclusion Criteria

Participants had to be over the age of 18. A total of 266 participants completed the first survey, but 28 of them were excluded from analyses as they did not properly complete the study (i.e., they did not report a memory or did not follow the memory instructions properly). An additional 30 participants were excluded as they incorrectly answered both quality check questions that were inserted in the first survey to verify proper completion. Of the 208 participants invited to complete the second survey, 67 participants did not complete it (dropout rate of 32%). Final sample included 141 participants.

## 7.3 | Measures

Participants answered a demographic questionnaire including gender, age, and socio-economic status.

### 7.3.1 | Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS)

The BPNSFS (Chen et al. 2015) assesses everyday satisfaction and frustration for autonomy, competence, and relatedness (e.g., "I feel insecure about my abilities.") via 24 items. Participants rated each item on a 5-point Likert scale ranging from 1 (Completely false) to 5 (Completely true). Satisfaction items were reverse scored. An average score representing global frustration levels was calculated for each need. The BPNSFS has good construct validity (Chen et al. 2015). In this study, the Cronbach's alphas were adequate, varying between 0.80 and 0.88.

### 7.3.2 | Hong Psychological Reactance Scale

This scale assesses trait reactance via 11 items (e.g., "I consider advice from others to be an intrusion"; Hong and Faedda 1996). Each item is rated on a 5-point Likert scale ranging from 1 (Strongly disagree) to 5 (Strongly agree). An average score is calculated. Higher scores represent a higher individual propensity for reactance. The scale has adequate construct validity (Shen and Dillard 2005). For this sample, the Cronbach alpha was adequate (0.83).

### 7.3.3 | Vignettes

Participants were randomly assigned to read one of three vignettes. All vignettes depicted the same situation where a person named Alex walks into a grocery store without a mask to buy flour. Mask wearing in close spaces was mandatory in the province of Quebec when the study took place. The severity of the consequence for this oversight varied among the vignettes. The high restriction vignette ended with the grocery employee refusing to let Alex purchase the flour, as well as screaming and harassing Alex. The moderate one depicted the employee refusing to let Alex purchase the flour and escorting Alex out of the grocery store. The last vignette (control) described no consequence for Alex who purchased the flour from the employee. Participants completed a manipulation check question to assess the vignettes' effectiveness. They rated "Do you consider that Alex's rights and freedoms have been restrained?" based on a 4-point Likert Scale from 1 (Not at all) to 4 (A lot).

Afterwards, participants recalled and described a personal episodic memory that came to mind after reading the vignette based on the recall procedure from Philippe, Koestner,

Beaulieu-Pelletier, and Lecours (2011). Participants reported an event that occurred on average 10.5 months earlier. All instructions are accessible in the codebook available on OSF: https://doi.org/10.17605/OSF.IO/JPXY3.

#### 7.3.4 | Emotional Valence

Participants appraised on a 7-point Likert scale from −3 (Strongly negative) to 3 (Strongly positive) the emotional valence of their memory via the item "Thinking back to the memory you just described, please indicate whether the event/moment of this memory represents a negative or a positive memory."

#### 7.3.5 | Memory Need Frustration

Participants completed nine items assessing memory levels of need satisfaction and frustration (Philippe, Koestner, Beaulieu-Pelletier, et al. 2011). This scale has shown adequate evidence of validity (Philippe, Koestner, Beaulieu-Pelletier, et al. 2011). Participants rated the items on a 7-point Likert scale ranging between −3 (Strongly disagree) and 3 (Strongly agree). Sample items include "I felt obliged to do or think in certain ways" for autonomy, "I felt competent or capable" for competence, and "I felt alone" for relatedness. Satisfaction items were reverse scored to compute an average score reflecting memory-specific frustration levels for each need. The Cronbach alphas were acceptable given they were calculated based on only three items per need (McNeish 2018; autonomy's $\alpha = 0.61$, competence's $\alpha = 0.79$, relatedness's $\alpha = 0.53$). Still, given the low internal consistency of these subscales, we assessed the factorial validity of the scale. A Principal Axis Factoring using a Promax rotation explored the three-factor structure of the scale. All factor loadings were superior to 0.40 and all items loaded on the adequate factor, except for one relatedness item which loaded on the autonomy factor. When removing this item, the three-factor structure was maintained, and the results of the study did not change (see syntax provided on OSF).

#### 7.3.6 | COVID-19-Related Conspiracy Beliefs (C19-CB)

This scale was administered in the second survey and was created for the purpose of this study. It assessed endorsement levels of seven statements reflecting COVID-19 CTs beliefs. These statements reflect common CTs that lacked evidence to support them and that widely circulated at the time recruitment took place (e.g., "The government exaggerates the number of detected COVID-19 cases and COVID-19-related deaths."; Agence France-Presse 2020; Duong 2020; Goodman and Carmichael 2020; Spring & Wendling, 2020). Participants reported how true they considered the statements to be based on an 11-point Likert scale ranging from 0 (0%—definitely false) to 10 (100%—definitely true). An average score was calculated. The scale had an excellent Cronbach alpha (0.95).

A Principal Axis Factoring analysis confirmed the one-factor structure of the scale. The sampling adequacy had a value of 0.93 based on the Kayser–Meyer–Olkin measure. One factor was extracted with an Eigen value of 5.11. The factor explained 73% of the variance and all factor loadings were superior to 0.40.

### 7.4 | Analyses

One-way ANOVAs and post hoc Bonferroni tests were performed to examine unexpected experimental group differences on general need frustration, trait reactance, memory need frustration, and COVID-19 CTs endorsement. One-way ANOVAs and post hoc Bonferroni tests were also conducted on freedom restriction perception to confirm that the three vignettes adequately manipulated freedom restriction. Linear hierarchical regressions were executed with COVID-19 CTs endorsement as the outcome. Each memory-specific need (autonomy, competence, and relatedness) was analyzed in a separate model, for a total of three models and the experimental groups were tested as a moderating factor using orthogonal contrasts. First, control variables (i.e., general autonomy, competence, and relatedness frustration, as well as trait reactance, age, gender, and socioeconomic status) were added in Step 1. Memory need frustration (each need examined separately) and orthogonal contrasts were added in Step 2. Specifically, a first contrast examined whether the control group differed in comparison to the moderate and high severity groups (i.e., +2, −1, −1). A second contrast analyzed whether the moderate group was significantly different from the high severity group (i.e., 0. +1, −1). Interaction terms were also constructed between these contrasts and each need frustration in memories (i.e., Memory Need × Contrast 1, Memory Need × Contrast 2) and added at Step 3. Analyses were conducted using SPSS version 27.

## 8 | Results

The sample had a median score of 5.00 on the C19-CB. One-way ANOVAs showed no unexpected group differences on the variables assessed before exposure to the vignette (see Table 1), suggesting random assignment was successful. There were marginally significant differences for autonomy frustration levels in memories, such that participants in the control group tended to report slightly less autonomy frustration in memories than in the two other groups. However, these differences were non-significant after applying a Bonferroni correction. The manipulation check showed significant group differences for perceptions of freedom restriction. Participants assigned to the moderate and high restriction conditions significantly perceived more freedom restrictions than those in the control condition (see Table 1). See Table A in Supporting Information for correlations among all study variables.

### 8.1 | General Need Frustration, Trait Reactance, and Demographics

Linear hierarchical regressions showed that at Step 1, endorsement of COVID-19-related CTs was positively predicted by general autonomy frustration, $t(133) = 4.13$, $p < 0.001$, but negatively predicted by general competence frustration, $t(133) = -4.56$, $p < 0.001$. Trait reactance also positively predicted COVID-19 CTs endorsement, $t(133) = 3.78$, $p < 0.001$. Age, gender, and

**TABLE 1** | Group differences by vignette severity: trait measures, perceived freedom restriction, and endorsement of COVID-19 conspiracy theories.

| | Control group ($N=50$) | | Moderate group ($N=47$) | | High group ($N=44$) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *M* | SD | *M* | SD | *M* | SD | df | *F* | $\eta^2$ | *p* |
| General Autonomy Frustration | 2.65[a] | 0.64 | 2.56[a] | 0.67 | 2.75[a] | 0.81 | 2 | 0.887 | 0.013 | 0.414 |
| General Competence Frustration | 1.92[a] | 0.79 | 1.82[a] | 0.65 | 1.72[a] | 0.65 | 2 | 0.887 | 0.013 | 0.414 |
| General Relatedness Frustration | 1.79[a] | 0.68 | 1.82[a] | 0.67 | 1.81[a] | 0.78 | 2 | 0.032 | <0.001 | 0.969 |
| Memory Autonomy Frustration | −0.29[a] | 1.42 | 0.40[a] | 1.93 | 0.42[a] | 1.69 | 2 | 2.791 | 0.039 | 0.065 |
| Memory Competence Frustration | −0.82[a] | 1.62 | −0.98[a] | 1.63 | −0.85[a] | 1.77 | 2 | 0.122 | 0.002 | 0.886 |
| Memory Relatedness Frustration | 0.31[a] | 1.25 | 0.38[a] | 1.43 | 0.49[a] | 1.62 | 2 | 0.197 | 0.003 | 0.821 |
| Trait reactance | 2.64[a] | 0.69 | 2.79[a] | 0.73 | 2.59[a] | 0.74 | 2 | 0.948 | 0.014 | 0.390 |
| Freedom restriction perception | 1.68[a] | 1.04 | 2.79[b] | 1.27 | 2.80[b] | 1.32 | 2 | 13.617 | 0.165 | <0.001 |
| COVID-19 CTs (T2) | 3.95[a] | 3.11 | 5.00[a] | 3.45 | 4.56[a] | 3.57 | 2 | 1.191 | 0.017 | 0.307 |

*Note:* A Bonferroni correction was applied to the analyses to control for multiple comparisons when examining group differences. Means that are significantly different share a different superscript.
Abbreviations: CTs = conspiracy theories; T2 = Time 2.

**TABLE 2** | Autonomy Frustration in Memory on Endorsement of COVID-19 Conspiracy Theories.

| | Unstandardized $\beta$ | SE | Standardized $\beta$ | *t* | *p* |
|---|---|---|---|---|---|
| Step 1 | | | | | |
| General Autonomy Frustration | 1.794 | 0.434 | 0.374 | 4.134 | <0.001 |
| General Competence Frustration | −1.954 | 0.428 | −0.406 | −4.562 | <0.001 |
| General Relatedness Frustration | −0.342 | 0.430 | −0.071 | −0.796 | 0.428 |
| Trait reactance | 1.413 | 0.374 | 0.300 | 3.778 | <0.001 |
| Age | 0.033 | 0.025 | 0.098 | 1.340 | 0.183 |
| Gender[a] | 0.021 | 0.521 | 0.003 | 0.039 | 0.969 |
| Socioeconomic status | −0.318 | 0.306 | −0.076 | −1.038 | 0.301 |
| Step 2 | | | | | |
| Memory Autonomy Frustration | 0.547 | 0.260 | 0.162 | 2.102 | 0.037 |
| Contrast 1[b] | −0.110 | 0.174 | −0.047 | −0.631 | 0.529 |
| Contrast 2[c] | 0.362 | 0.307 | 0.086 | 1.180 | 0.240 |
| Step 3 | | | | | |
| Memory Autonomy Frustration × Contrast 1 | −0.403 | 0.191 | −0.156 | −2.106 | 0.037 |
| Memory Autonomy Frustration × Contrast 2 | −0.175 | 0.289 | −0.044 | −0.605 | 0.546 |

[a]0 = female, 1 = male.
[b]+2 = control group, −1 = moderate restriction group, −1 = high restriction group.
[c]0 = control group, +1 = moderate restriction group, −1 = high restriction group.

socioeconomic status were unrelated to COVID-19 CTs endorsement (see Table 2, as well as Tables B and C in Supporting Information).

### 8.2 | Memory Autonomy Frustration

Inclusion of memory autonomy frustration and of the orthogonal contrasts in the regression model, at Step 2, showed that memory autonomy frustration positively predicted endorsement of CTs. At Step 3, a significant interaction term for Memory Autonomy X Contrast 1 was found, $t(128) = -2.11$, $p = 0.037$, indicating that the relationship between memory autonomy frustration and endorsement of COVID-19 CTs for the moderate and high restriction groups significantly differed from that of the control group (Table 2). The more the memory reported was encoded as autonomy frustrating, the higher was endorsement of COVID-19 CTs for the moderate and high restriction groups a week later, $t(128) = 2.89$, $p = 0.005$ (see Figure 1). The association between memory autonomy frustration and endorsement of COVID-19 CTs was not significant for the control group, $t(128) = -0.62$, $p = 0.539$. Finally, the moderate and high restriction groups did not differ from each other, as shown by the non-significance of the interaction term between memory autonomy frustration and the second contrast.

### 8.3 | Memory Competence and Relatedness Frustration

The main effects and interaction terms for memory competence and relatedness with the vignette conditions were not significant (see Tables B and C in Supporting Information).

### 8.4 | Emotional Valence

Controlling for memory valence in all three regression models did not significantly change the initial results, confirming that emotional valence was not driving the effect observed (see Tables D–F in Supporting Information).

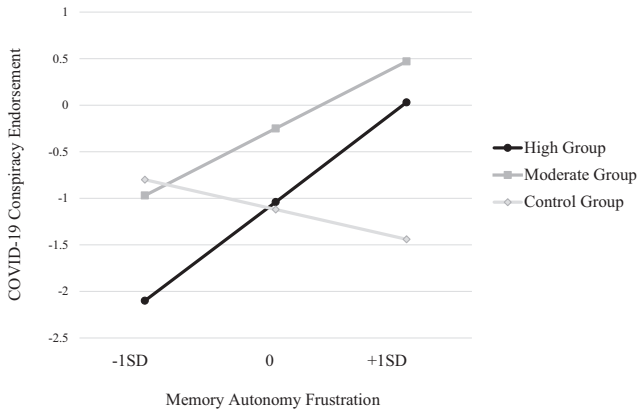


**FIGURE 1** | Influence of Memory Autonomy Frustration as a function of the experimental conditions on endorsement of COVID-19 conspiracy theories.

## 9 | Discussion

Overall, Study 1 showed an association between levels of autonomy frustration in memories activated by situations moderately and severely restricting freedoms and COVID-19 CTs endorsement. However, the frustration of competence and relatedness in memories was not predictive of CTs endorsement. Therefore, it appears that the frustration of the need for autonomy in memories is particularly key to CTs endorsement. The frustration of the need for autonomy in life in general was also independently associated with the endorsement of COVID-19 CTs. Conversely, lower levels of competence frustration in life in general were associated with the endorsement of such CTs. Trait reactance was a significant predictor of CTs endorsement, but also one independent of the memories activated by the context. These results indicate that above general need experiences in one's life and trait reactance, memories that are frustrated in terms of autonomy and that are triggered by a restrictive context have an additional predictive value for the endorsement of CTs within that context.

## 10 | Study 2

Based on Study 1's results, Study 2 sought to look into the causal relationship of autonomy-frustrating memories and CTs endorsement in the context of COVID-19. Specifically, Study 2 examined the situational impact of priming autonomy-frustrating memories on people's reaction towards a new, albeit bogus, COVID-19 CT created for the purpose of the study. We expected that priming an autonomy-frustrating memory typically triggered by a freedom-restrictive context would directly increase participants' tendency to agree with, be angered by, and be willing to disseminate a new COVID-19 CT, compared to those primed with their own autonomy-satisfying memories or compared to those not primed with their own memory.

All participants read the high freedom-restrictive vignette from Study 1 and subsequently described a memory. A week later, participants were randomly assigned to either be primed with their own memory (experimental condition) or with another participant's memory (yoked control condition). In each condition, we also separated participants who described a need-satisfying memory from those who described a need-frustrating memory to isolate the effect of need frustration. After the priming procedure, participants read a bogus CT and reacted to it (i.e., levels of agreement, anger, and willingness to disseminate it). Although the use of a yoked control design means that individual differences are automatically controlled for, general autonomy frustration was still controlled for to ensure that the specific role of memory autonomy frustration was isolated.

## 11 | Method

### 11.1 | Participants and Design

Study 2 used an experimental design involving a memory priming procedure. We used a subliminal priming procedure to mimic the way episodic autobiographical memories

typically contribute to decision-making, that is, by being activated outside of conscious awareness (Conway 2009; Philippe 2022). This adaptive system prevents us from becoming consciously overwhelmed by a flood of memories before making a decision or taking action. Based on Philippe and Bernard-Desrosiers (2017) who employed the same priming procedure, a small effect size was expected ($f^2 = 0.07$). To ensure sensitivity, we used a smaller effect size ($f^2 = 0.04$) for our power analysis (power = 0.80, alpha = 0.05). The power analysis indicated a minimum sample size of 199 participants was necessary for a multiple regression analysis including 4 predictors.

A total of 213 participants from the general population in Quebec (Canada) completed the study. Participants were aged 44.77 years on average (SD = 12.75). Overall, 94.4% of the sample identified as White. A total of 42.7% of the sample identified as female and 56.8% identified as male. In this sample, household income was reported in the following brackets: less than $30,000 (23.5%), $30,000 to $69,999 (28.7%), $70,000 to $109,999 (23.0%), and $110,000 or more (19.7%). Education level was reported as follows: high school diploma or less (17.8%), college or vocational training (48.9%), bachelor's degree or university certificate (24.0%), or graduate degree (9.4%).

## 11.2 | Procedure and Materials

### 11.2.1 | Recruitment Method

Recruitment took place online via advertisements shared on social media (between June and August 2022). This period coincided with the beginning of the 7th wave of COVID-19, but also with the official end of the state of emergency (initially declared in March 2020). The Government of Quebec also lifted the mask mandate for multiple public spaces (e.g., public transportation, closed spaces) between May and June 2022. The government reinstated random screenings for COVID-19 for flight passengers in July 2022 and launched a new vaccination campaign in August 2022. A 5- to 10-day isolation was still recommended when screening positive for COVID-19. Participants were invited to complete two online surveys at one-week interval. All participants were informed about the content of the study and provided their informed consent prior to the completion of the first survey. Because this study entailed that participants were exposed to false information, a debrief about the deception procedure was added at the end of the second phase. An additional email explaining the deception procedure was sent to all participants at the end of the study. To encourage participation, participants received a $5 e-transfer for completing the first phase and a $10 e-transfer for completing the second phase. This study was approved by the *Research Ethics Board for Students Projects of the Université du Québec à Montréal.*

### 11.2.2 | Memory Priming Procedure

During the week between the two study phases, six keywords were extracted from every memory narrative for the priming procedure. The keywords were extracted from the memory description provided by each participant in the first phase. The keywords selected had no emotional value, leaving out words like sad, upset, or happy. Instead, the keywords focused on the factual and perceptual surrounding of the memory (e.g., chair, ski, friends; Philippe and Bernard-Desrosiers 2017). Selecting such keywords ensures that a participant primed with keywords from their own memory would be primed with its associated characteristics (i.e., autonomy frustration for the purpose of this study), activating the memory and its directive function. Conversely, a participant primed with someone else's memory keywords would not be primed with any memory characteristic or emotion, as the keywords would not reflect any particular memory for them.

Next, participants were randomly yoked based on their level of need satisfaction or need frustration in memory. That is, if one participant had described a need-satisfying memory, this participant was yoked to another participant who had also described a need-satisfying memory. The same yoking procedure was applied for participants having described need-frustrating memories. Each pair of participants then had one participant randomly assigned to the experimental condition and the other one assigned to the control condition. As such, each participant in the experimental condition was yoked to one participant in the control condition who had described the same level of need satisfaction or need frustration in their memories. Participants in the experimental condition were repeatedly primed with the six keywords extracted from their own memory. Participants in the control condition were not primed with their own memory, but with the keywords from their yoked participant's memory instead, resulting in them not being primed with their personal memory. Using such a yoked control design ensured that participants in the experimental and control conditions would be matched on their level of need-satisfying or need-frustrating memory and that the keywords used to prime participants would be the same for both conditions. Given that participants were randomly assigned to the priming or control conditions, all individual differences are controlled for via this experimental design.

The subliminal priming procedure was administered at the beginning of the second phase and executed via the "Bunny and Lion Task" (BLT). This task was presented to participants as a fun task to evacuate their daily thoughts and was completed in four blocks. Participants first practiced the task (15 s). They were then asked to do three more blocks of 20 s each. For the first block, participants counted the number of times the words "LION" and "BUNNY" appeared separately under the images of a lion and a bunny plush. For the second block, the words "BUNNY" and "CAT" were counted. For the final block, the words "BEAR" and "LION" were counted. These words were randomly and quickly interchanged with (1) other animal names (e.g., GOAT), (2) nonwords (e.g., JRODOL), and (3) the six memory keywords (depending on the participant). This dual task serves as a cognitive load that monopolizes participants' attention, thus highly reducing the possibility of consciously perceiving the priming keywords. Moreover, the animal words and nonwords were each presented for 1000 ms, while the memory keywords were presented for 60 ms, which is enough time to prime a memory but not enough for a person to perceive the keywords. All words were written in capital letters in a blue text of 30-point font size.

### 11.2.3 | Inclusion Criteria

Participants had to be over the age of 18 years. A total of 370 participants completed Phase 1. Those who did not properly describe a memory ($n = 32$) in Phase 1 and who did not provide their email ($n = 25$) were not contacted for Phase 2. Those who did not answer correctly the two quality check items inserted to validate proper completion of the surveys were excluded ($n = 16$). Of the 297 participants invited to complete Phase 2, 74 did not complete the survey. Of those who completed Phase 2, the participants who made more than three mistakes in the BLT were excluded ($n = 7$) to ensure all respondents completed the task according to the instructions and were adequately primed. A funneled debriefing was used at the end of the survey to ensure that participants were subliminally primed (Philippe and Bernard-Desrosiers 2017). Participants were asked to report the words they had seen and could recall from the BLT other than the animal words and nonwords. One participant was excluded as they commented that they had read and recognized one of the priming keywords. A second participant was excluded from analyses as they took significantly longer to complete the priming task (i.e., more than 3SD above the mean time). Finally, one participant was an outlier, as the residuals' scatterplot of the regression model tested showed it at more than 3SD. This was further confirmed by the analysis of influential points in the regression model tested using multivariate dfbetas, which was at more than SE × 2/SQRT($n$) (Goldstein-Greenwood 2022). Final sample included 213 participants.

## 11.3 | Measures

Participants answered the same demographic questionnaire as in Study 1. They also answered the eight items assessing general autonomy satisfaction and frustration from the BPNSFS (Chen et al. 2015). General autonomy satisfaction items were reverse scored to compute an average of general autonomy frustration. In Study 2, the Cronbach's alpha for general autonomy frustration was adequate (0.78). After reading the high restriction vignette, participants were asked to spontaneously recall and describe an episodic memory using the same procedure as in Study 1. Participants reported an event that occurred on average 2 years and 7 months prior to the study. Following memory description, participants rated their memory's autonomy frustration levels via the same three items as in Study 1 ($\alpha = 0.64$).

One week later, participants completed the BLT. They subsequently read the bogus CT and reacted to it. The bogus CT was introduced under the format of a Twitter post and was created by the authors of this paper to ensure that no participant would have prior knowledge about that theory (see complete instructions and bogus Twitter post in the codebook document via this OSF link: https://doi.org/10.17605/OSF.IO/JPXY3). The Twitter post warned users of a new CT related to COVID-19. After reading the bogus Twitter post, participants were asked "Do you agree with what the person wrote?" and rated the item on a 4-point Likert Scale from 0 (Not at all) to 3 (A lot). Due to a floor effect observed for this item, the ratings were recoded in a Yes or No format to conduct more effective analyses, with 0 (Not at all) considered as No and the ratings of 1 (A little) to 3 (A lot) considered as Yes. Participants also rated how angry they were about the information on the Twitter post on a 4-point Likert Scale from 0 (Not at all) to 3 (A lot). Lastly, participants rated their willingness to disseminate the Twitter post information via two items (i.e., "How much would you like to share this Twitter message on a social network (e.g., Twitter, Facebook, etc.)?" and "How much would you like to warn people around you about the fact that pharmaceutical companies sell vaccines made of water and sugar?"). Again, the items were rated on a 4-point Likert Scale from 0 (Not at all) to 3 (A lot). An average of both ratings was calculated ($\alpha = 0.80$).

## 11.4 | Analyses

Independent Samples $T$-Tests were performed to examine experimental group differences in general autonomy frustration and memory autonomy frustration. Next, a multivariate logistic hierarchical regression was conducted on the item about agreement with the bogus CT. Linear hierarchical regressions were conducted on anger elicited by the bogus CT and willingness to disseminate the information as outcomes. The same model was used on all three outcomes. Memory autonomy frustration and priming conditions were entered in the first step. At the second step, the interaction term for Memory Autonomy × Priming Condition was added. Even though we used a yoked control design, additional analyses including general autonomy frustration as a control variable in a third step were performed on the three outcomes to further confirm the specific role of memory autonomy frustration. Results from these additional analyses are reported in Supporting Information (https://doi.org/10.17605/OSF.IO/JPXY3). Analyses were performed using SPSS version 27.

# 12 | Results

Independent Samples $T$-Tests showed no group differences for general autonomy frustration, $t(211) = -0.37$, $p = 0.714$ and memory autonomy frustration, $t(211) = 0.82$, $p = 0.412$.

## 12.1 | Agreement

Results of the logistic regression analysis at Step 2 showed a significant Memory Autonomy × Priming Condition interaction ($p = 0.031$). Simple effects analysis of this interaction revealed that for every 1-point increase in memory autonomy frustration levels for the primed condition, the odds of agreeing with the bogus CT increased by a factor of 1.62 ($p = 0.023$). This was not the case for the control condition ($p = 0.46$; see Table 3 and Figure 2).

## 12.2 | Anger

The linear hierarchical regression showed a significant interaction term for Memory Autonomy × Priming Condition, $t(209) = 2.36$, $p = 0.019$ (See Table 3). Simple effects analysis showed that in the priming condition, the more the memory primed was autonomy frustrating, the more the participants were angered by the bogus CT, $t(209) = 3.60$, $p < 0.001$ (see Figure 2). No such association was found in the control condition, $t(209) = 0.28$, $p = 0.78$.

**TABLE 3** | Memory autonomy frustration by priming conditions on reactions to bogus conspiracy theory.

| | Unstandardized β | SE | Wald | OR | p |
|---|---|---|---|---|---|
| Agreement | | | | | |
| Step 1 | | | | | |
| Memory Autonomy Frustration | 0.167 | 0.144 | 1.355 | 1.182 | 0.244 |
| Priming Condition[a] | 0.380 | 0.283 | 1.799 | 1.463 | 0.180 |
| Step 2 | | | | | |
| Memory Autonomy × Priming Condition | 0.634 | 0.294 | 4.635 | 1.884 | 0.031 |

| | Unstandardized β | SE | Standardized β | t | p |
|---|---|---|---|---|---|
| Anger | | | | | |
| Step 1 | | | | | |
| Memory Autonomy Frustration | 0.205 | 0.076 | 0.184 | 2.710 | 0.007 |
| Priming Condition[a] | 0.159 | 0.151 | 0.071 | 1.053 | 0.294 |
| Step 2 | | | | | |
| Memory Autonomy × Priming Condition | 0.352 | 0.150 | 0.222 | 2.356 | 0.019 |
| Willingness to disseminate information | | | | | |
| Step 1 | | | | | |
| Memory Autonomy Frustration | 0.015 | 0.012 | 0.085 | 1.230 | 0.220 |
| Priming Condition[a] | 0.021 | 0.025 | 0.059 | 0.855 | 0.393 |
| Step 2 | | | | | |
| Memory Autonomy × Priming Condition | 0.056 | 0.025 | 0.220 | 2.297 | 0.023 |

*Note:* $N = 213$.
[a]0 = control condition, 1 = priming condition.

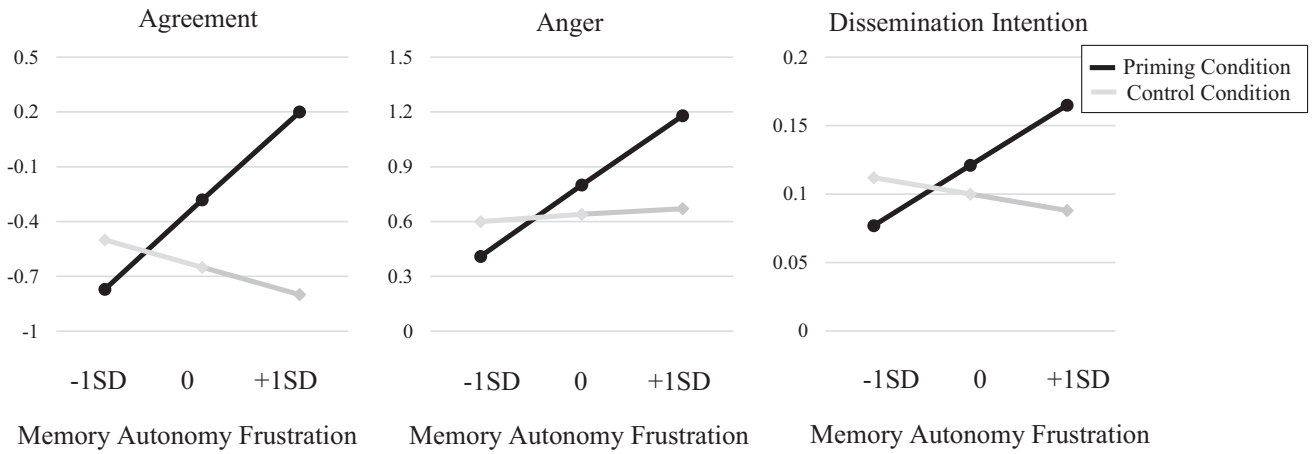


**FIGURE 2** | Memory Autonomy Frustration × Priming Conditions interaction on bogus conspiracy theory.

### 12.3 | Willingness to Disseminate Information

Given the residuals of that variable were positively skewed, the outcome was transformed using a logarithmic equation. The linear hierarchical regression carried out showed a significant interaction term for Memory Autonomy × Priming Condition, $t(209) = 2.30$, $p = 0.023$ (see Table 3). Simple effects analysis showed that in the priming condition, the more the memory primed was autonomy frustrating, the more the participants reported being willing to disseminate the bogus CT, $t(209) = 2.50$, $p = 0.013$ (see Figure 2). No such association was found for the control condition, $t(209) = -0.74$, $p = 0.46$.

### 12.4 | Additional Analyses

Significance of the Memory Autonomy × Priming Condition interaction was maintained after controlling for general autonomy frustration for the outcomes of agreeing with the bogus CT ($p = 0.045$), being angered by it ($p = 0.021$), and being willing to disseminate it ($p = 0.030$). General autonomy frustration was not a significant predictor of any of the three outcomes (see Table G in Supporting Information, https://doi.org/10.17605/OSF.IO/JPXY3).

## 13 | Discussion

Study 2 added to the results of Study 1 regarding the association between memory autonomy frustration and endorsement of CTs. It showed that situationally priming an autonomy-frustrating memory increases a person's tendency to agree with a new CT, to be angered by it, and to be willing to disseminate it compared to a person not primed or primed with an autonomy-satisfying memory. These results underscore the direct role of autonomy-frustrating memories in the process of endorsing more and more CTs. Triggering of autonomy-frustrating memories seems to activate a defensive reaction that translates into an openness to new non-normative narratives, in this case COVID-19-related CTs, and amplifies an anger reaction when exposed to such new and alternative narratives. These results add to our understanding of the motivational process involved in the endorsement and spread of CTs.

## 14 | General Discussion

The present research investigated the motivational process that leads to the endorsement of CTs. Specifically, we looked into whether the activation of need-frustrating memories by reminders of freedom-restricting situations would predict higher endorsement of COVID-19-related CTs and whether priming those memories would predict agreement with a new (bogus) CT, would elicit heightened anger, and would influence people's willingness to disseminate the CT.

The results revealed that it is specifically autonomy-frustrating memories triggered by situations highly or moderately restricting freedoms that impact the endorsement of CTs, with increased memory autonomy frustration being associated with higher stable endorsement of COVID-19-related CTs. Results further showed that situationally activating autonomy-frustrating memories leads individuals to endorse a new CT, to be angered by it, and to be willing to circulate it. Memories characterized by competence or relatedness frustration were not found to predict endorsement of CTs. However, lower everyday levels of competence frustration were related to CT endorsement, while increased everyday levels of autonomy frustration were associated with higher endorsement of CTs. Trait reactance was also associated with greater endorsement of CTs.

Overall, beyond a person-level view of the endorsement of CTs, the present studies also bring into focus the importance of considering the way specific past experiences have been encoded in memory. Specifically, the results cast light on the direct role autonomy-frustrating memories activated by a freedom-restrictive environment play in the endorsement of CTs during an extreme societal event such as the COVID-19 pandemic. This process can at the very least partially explain *how* individuals dive into CTs and spread them as part of a compensatory mechanism and why this is more likely to occur throughout extreme societal events that restrict individuals' freedom.

## 15 | Trait Reactance

Trait reactance refers to one's general tendency to perceive their freedom of choice as restrained and threatened by external influences and to subsequently become motivated to regain control over their actions by defyingly engaging in them (Brehm 1966; Hong and Faedda 1996). Individuals high in trait reactance are therefore more likely to exhibit oppositional reactions when they experience their autonomy as undermined, including rejecting rules and regulations, or denying threats (Brehm 1966; van Petegem et al. 2015). Finding that trait reactance was associated with greater endorsement of COVID-19 CTs is congruent with past research pertaining to the COVID-19 pandemic. For instance, reactance was associated with increased anti-masks attitudes (Taylor and Asmundson 2021), as well as "denial of COVID-19 as a public health threat" (McGuire and Ball 2022). Endorsing COVID-19-related CTs entails a denial of the information communicated by public health officials and a rejection of the normative narrative. As reactance has been linked with increased propensities to be in a state of autonomy frustration and to defy parental requests among adolescents (van Petegem et al. 2015), endorsing CTs could be conceptualized as a defensive and oppositional reaction among adults prone to reactance (Brehm 1966; Vansteenkiste and Ryan 2013).

## 16 | General Competence Frustration

Feelings of failure, uncertainty, and inefficacy reflect competence frustration (Chen et al. 2015; Ryan and Deci 2017), whereas reduced uncertainty and increased sense of mastery are associated with lower frustration (Ryan and Deci 2017). Extreme societal crises can undermine the need for competence by generating complex, large-scale consequences (e.g., financial, social, or psychological consequences) on individuals (Douglas et al. 2017; Leman and Cinnirella 2013). During the COVID-19 pandemic, rapidly evolving and sometimes conflicting information provided by official authorities (Capurro et al. 2021) likely contributed to uncertainty and diminished feelings of efficacy. In this context, endorsing CTs may have provided some individuals with a more coherent and definite understanding of the sanitary situation, thereby serving as a strategy to alleviate competence frustration and facilitate meaning-making (Douglas et al. 2017). Others may have perceived themselves as independently knowledgeable prior to the pandemic, already holding distrustful beliefs towards scientific and political institutions (e.g., beliefs such as vaccines being harmful, the existence of the deep state, or Pizzagate; Douglas et al. 2017). For these individuals, reliance on alternative information sources may have sustained their sense of competence during the crisis without their sense of competence being initially frustrated (Gagliardi 2025; Ryan and Deci 2017) and COVID-19 CTs may simply have integrated

a pre-existing conspiracist mindset. This shows that, in certain circumstances, one need may be protected (competence) at the expense of another need (greater autonomy frustration). This exemplifies well why balanced need satisfaction has been found important for well-being (Sheldon and Niemiec 2006).

## 17 | General Autonomy Frustration

Autonomy frustration translates into the perception of being coerced, controlled, and forced to act and think incongruently with our own will and values (Ryan 1995; Ryan and Deci 2017). Few studies have investigated the association between constructs reflecting general autonomy frustration and CTs endorsement (Stojanov and Halberstadt 2020). These existing studies investigated multiple person-level sub-forms of autonomy frustration, such as perceptions of powerlessness and lack of personal control or political control (e.g., Abalakina-Paap et al. 1999; Kofta et al. 2020; Rothschild et al. 2012; Sullivan et al. 2010; Whitson and Galinsky 2008). Finding a positive association between general everyday autonomy frustration and beliefs in COVID-19 CTs in Study 1 is therefore congruent with these past studies. This finding supports the notion that those with general conceptions of their self as lacking control and volitional power seem drawn to CTs, possibly in a failed attempt to see themselves as having some degree of agency. Indeed, CTs offer the illusion of unveiling a structured world in which the individual has pseudo-control as they can "predict" the future, providing the impression of protecting their sense of autonomy (Leonard and Philippe 2021; van Prooijen and Douglas 2017; Whitson et al. 2019). Still, this finding does not explain *how* the motivational compensatory process of endorsing CTs takes place for a specific individual. To our knowledge, no prior research has dug deeper into this question and looked at it as an interaction between the individual and environmental stimuli.

## 18 | Autonomy-Frustrating Memories as a Key Variable

The present research showed that autonomy-frustrating memories may lie at the motivational root of believing in CTs, by mobilizing a person to endorse a CT, react angrily to it, and show willingness to disseminate it. Indeed, autonomy-frustrating memories hold a distinct motivational value. When triggered by shared characteristics with an environmental cue, such memories serve the function of quickly assessing the situation and guiding decision-making about how to react (Brown and Schopflocher 1998; Klein et al. 2002). Study 2 supports this notion by consistently showing that general autonomy frustration was not a predictor for the situational reactions to a bogus CT. Using an experimental design, Study 2 demonstrated the in situ influence of activating autonomy-frustrating memories and differentiated its motivational effect from that of general autonomy frustration. Specifically, it is the activation of autonomy-frustrating memories and not general levels of autonomy frustration that seems to drive one's reactions to CTs in a specific moment (i.e., agreement, anger, and willingness to disseminate a CT). Hence, although two individuals may hold similar levels of autonomy frustration in their everyday life, it is their activated autonomy-frustrating memories that will impact their reactions in each moment. Autonomy-frustrating memories have a practical role in that they warn of a situation that poses a potential threat to one's integrity (Bélanger et al. 2019; van Prooijen 2020). The activation of these autonomy-frustrating memories can therefore trigger an oppositional reaction to protect one's integrity (Philippe 2022), serving a goal-approach function to address situations perceived as alienating and unjust (Pillemer 2003; Vansteenkiste and Ryan 2013), and neutralize the threat. Such neutralization can take multiple forms, including the endorsement of alternative narratives to the status quo to compensate and justify both the past and current autonomy-frustrating experiences triggered.

Periods of swift societal changes, like the COVID-19 pandemic, entail experiencing unprecedented and unforeseen challenging situations, such as those related to sociosanitary measures, which restricted personal freedoms to hinder the spread of the virus (Maison et al. 2021). It is hence no surprise that these unprecedented situations were appraised via the activation of memories of past events to inform decision making (Rasmussen et al. 2015). Our results showed that certain people react to these restrictive freedom situations with a defensive nature due to the activation of autonomy-frustrating memories, guiding them to sometimes question, deny, or reject the status quo and endorse alternative non-normative narratives (i.e., COVID-19 CTs in the context of the present research). We further showed that priming these memories directly increased participants' risk of agreeing, being angered, and being willing to spread a new CT as a compensatory means to protect themselves. With time, the repetitive activation of these autonomy-frustrating memories may turn chronic, crystalizing the defensive reaction, and stabilizing CTs endorsement so as to defend oneself and cope against perceived control and coercion (Douglas et al. 2017; Philippe 2022; Rasmussen et al. 2015; Ryan and Deci 2017; van Prooijen 2020). As an attempt to further accommodate for chronic autonomy-frustrating experiences, people may start embracing the behaviors and recommendations outlined by CTs (e.g., avoid vaccination, endorse non-normative political engagement, make donations to certain organizations, etc.). For instance, beliefs in CTs were found to negatively affect identified motivation towards vaccination during the COVID-19 pandemic (Van Oost et al. 2022). This compensatory process would contribute to further obstructing authentic satisfaction of the need for autonomy (Vansteenkiste and Ryan 2013), as the person would not be adopting self-determined/autonomous goals resulting from their own internal values and preferences (Ryan and Deci 2017; Sheldon and Kasser 2008).

## 19 | Usefulness of Conspiracy Theories

CTs are enticing alternative narratives to a status quo marked by perceived alienating situations, as they justify and explain a person's defensive and oppositional reaction in such situations by blaming a vilified outgroup that threateningly acts in secret (Abalakina-Paap et al. 1999; Douglas et al. 2017; van Prooijen and van Vugt 2018; van Prooijen 2020). From an evolutionary standpoint, some have suggested that CTs serve to "increase people's chances of self-preserving by removing the threat associated with the hostile coalition" (van Prooijen and van Vugt 2018). CTs' usefulness therefore translates into the protection of a

sense of autonomy by shaping the environment into an unambiguous and organized system (Landau et al. 2015). By offering an alternative explanation, albeit a complicated one, of what is "truly" going on, CTs justify the perception of autonomy frustration and make the world a predictable place (Douglas et al. 2017; van Prooijen 2020). This explanation provides a compensatory satisfaction of autonomy (Douglas et al. 2017), as it creates the illusion of being able to predict the future, feel in control of the environment, and have a sense of influence over the world (Greenaway et al. 2013; Nyhan and Zeitzoff 2018; Rothschild et al. 2012; Sullivan et al., 2010; Whitson and Galinsky 2008).

## 20 | Limitations

The present research is subject to limitations. First, the sample was recruited using a non-probabilistic method and the participants represent a specific population, that is, mostly white French speaking Québécois who experienced specific sociosanitary measures during the COVID-19 pandemic. The results are therefore to be generalized with high caution. Second, there is a selection bias as some people who endorse COVID-19-related CTs might have been too mistrusting of the scientific community to participate in the research. Third, the CTs assessed are specifically related to COVID-19, limiting the generalizability of the results. Fourth, various covariates were not considered in our models. Future studies should consider including other potential covariates known to be linked with endorsement of CTs (e.g., lower self-esteem or need for uniqueness; Bowes et al. 2023), as they could also moderate the effect of memories on CTs. Fifth, this research captured the short-term, but not the long-term effects of memory activation on believing in CTs. Longitudinal studies examining autonomy-frustrating memories' impact on endorsement of CTs would provide a better understanding of the direction of the effect in real-world settings. Moreover, we encourage researchers to investigate the predictive impact of autonomy-frustrating memories on the endorsement of alternative CTs in other societal contexts. We suspect that the memories chronically activated during the pandemic, as well as those formed and encoded during this period, are still triggered by situational contexts in the present day and affect people's endorsement of certain CTs in the long term. Sixth, the research designs used in this research consider that the memories recalled by the participants were frequently spontaneously activated in their everyday lives outside of their consciousness (Conway 2009; Philippe 2022). Future research could further consider sampling the naturally occurring thought flow processes following exposure to vignettes. This would allow for the determination of whether participants also consciously recall autonomy-frustrating memories when they engage in their thought flow, and if so, to test whether those consciously recalled memories are predictors of endorsement of CTs compared to other thoughts.

## 21 | Conclusion

Our findings make a relevant contribution to understanding CTs by showing a compensatory motivational mechanism through which these narratives are endorsed and disseminated by individuals. While other studies showed that decreased personal control increases conspiracy beliefs in multiple contexts (e.g., climate change, political conflict; Nyhan and Zeitzoff 2018; Rothschild et al. 2012), the present research shows how individuals interact with their environment during this process.

It is important to question our society's own responsibility in exacerbating the activation of autonomy-frustrating memories among people prone to it. Indeed, individuals, the media, and the press vilified the individuals who expressed vaccine hesitancy during the COVID-19 pandemic. Moreover, due to heightened stress during this period, certain individuals had vivid controlling reactions (e.g., screaming, bullying) when witnessing others not following COVID-19 sociosanitary restrictions (consciously or not). Based on the concept of mutual radicalization (Moghaddam 2018), this may have reinforced the activation of autonomy-frustrating memories and pushed individuals to further endorse CTs, diving deeper into these narratives. This leaves the question of whether we, as individuals part of society, also represent contributing factors to this process.

### Author Contributions

**Marie-Jeanne Leonard:** study conceptualization and design, data collection, data preparation, formal data analysis, data interpretation, writing of manuscript, review, and editing. **Frederick L. Philippe:** study conceptualization and design, funding acquisition, data interpretation, revision of manuscript, supervision.

### Disclosure

Both studies and their analysis plans were not preregistered.

### Ethics Statement

The two studies part of this research were approved by the Research Ethics Committee for Student Projects of the Université du Québec à Montréal.

### Conflicts of Interest

The authors declare no conflicts of interest.

### Data Availability Statement

Data from this research is available at the following link the in Files section:https://doi.org/10.17605/OSF.IO/JPXY3.

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## Supporting Information

Additional supporting information can be found online in the Supporting Information section. **Data S1:** jopy70032-sup-0001-supinfo01.docx. **Data S2:** jopy70032-sup-0002-supinfo02.zip.