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When the Personal and the Collective Intersects: Memory, Future Thinking, and Perceived Agency During the COVID-19 Pandemic

Meymune Nur Topçu[1, 2] and William Hirst[3]
[1] Department of Psychology, MEF University
[2] Department of Psychological and Brain Sciences, Washington University in St. Louis
[3] Department of Psychology, The New School

Do collective crises have an impact on the characteristics of mental time travel for individuals and collectives? The COVID-19 pandemic provides a unique context to address this question due to the intersection it created between the personal and the collective domains. In two studies ($N = 273$), we examined the valence and perceived agency involved in memory and future thinking for personal and collective domains. The second study also included a longitudinal component with 43 participants completing both studies. In research done prior to the pandemic, a valence-based dissociation between personal and collective events was consistently observed in Western samples. We wanted to see if these patterns changed during different stages of the pandemic. In the first study, participants no longer exhibited the usual positivity bias for the personal future, while in the second study, they did not exhibit the usual negativity bias for the collective future. The second aim of the current article was to assess the agency people attribute to themselves and their nation over events and how that relates to valence. People always attributed more agency to themselves over positive events than negative events in both personal and collective domains. Perceived nation agency, however, was associated with positivity in the collective domain but with negativity in the personal domain. Longitudinal analyses confirmed these patterns. Taken together, these results indicate that a collective crisis that has immediate and profound effects on personal lives can alter the patterns observed for mental time travel, especially for the future.

Public Significance Statement
This research suggests that collective crises like the COVID-19 pandemic can have an impact on the rate of positive or negative events we expect to happen in our own future and in our nation's future. In addition, the research also shows that we attribute more agency to ourselves over positive than negative personal and national events, and we attribute more agency to our nation over positive than negative national events.

Keywords: future thinking, collective memory, perceived agency, valence, COVID-19

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A now substantial body of research shows that remembering the past and imagining the future are intricately related (Schacter et al., 2017; K. K. Szpunar, 2010). Although such mental time travel (MTT) was originally studied as it applied to personal memories and prospections, there is also a relation between collective memories and prospections, referred to as *collective mental time travel* (Merck et al., 2016; P. M. Szpunar & Szpunar, 2016; Topçu & Hirst, 2020; see Topçu & Hirst, 2022, for a review). Building on the now burgeoning psychological study of collective memory (Hirst et al., 2018; Roediger & Wertsch, 2008), collective future thinking is treated as "the act of imagining an event that has yet to transpire on behalf of, or by, a group" (P. M. Szpunar & Szpunar, 2016, p. 378). Extant research in psychology has mostly explored people's ability to imagine future events "on behalf of" their group. In doing

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Meymune Nur Topçu https://orcid.org/0000-0001-8796-2170
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Correspondence concerning this article should be addressed to Meymune Nur Topçu, Department of Psychology, MEF University, Huzur Mah Maslak Ayazağa Cad., No. 4/A, 34396 Sarıyer, İstanbul, Türkiye. Email: topcum@mef.edu.tr

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that, researchers mainly focused on (a) the correspondence and comparison between collective remembering and collective future thinking (Topçu, 2021; Topçu & Hirst, 2020) and (b) the similarities and differences between personal and collective MTT (Deng et al., 2022; Shrikanth et al., 2018; Yamashiro & Roediger, 2019).

The present article is concerned with the second issue. Multiple studies have documented a dissociation between personal and collective MTT, with personal MTT characterized by a positivity bias and collective MTT characterized by a negativity bias (Shrikanth & Szpunar, 2021; Shrikanth et al., 2018). Most of the studies documenting this dissociation have been done with samples from the so-called Western, educated, industrialized, rich, and democratic (WEIRD) countries (Henrich et al., 2010). In such countries, many events that impact the collectivity do not have a marked effect at the personal level. A presidential election, for instance, might not substantially change the way most people live their daily lives, even if they consider it as an important collective event. Even a traumatic collective event such as the 9/11 terrorist attacks did not affect the way New Yorkers remember and organize their personal past (N. R. Brown et al., 2009). As Neisser (1982) noted, in most instances, personal history and History writ large do not intersect. The two unfold to a reasonable degree along different paths.

There are a few studies of personal and collective MTT that have failed to show the aforementioned dissociation between personal and collective MTT or demonstrate an attenuated dissociation (Hirst & Topçu, 2023). One such study involved a sample from a non-WEIRD country, China, in which Deng et al. (2022) did not observe a dissociation in valence biases. One underlying factor for not observing the dissociation pattern might be the closer connection between what happens at the collective level and their impact on the personal level. In such instances, it might be more difficult to have a clear-cut distinction between "personal history and History writ large" (N. R. Brown et al., 2016). In a recent article, Liu and Szpunar (2023) suggested that one of the reasons why researchers observe a dissociation between the cognition of personal and collective events largely in Western countries might be the relative separation of personal and collective domains in those countries. Whatever, the explanation of the results, the differences across studies indicate that the dissociation between personal and collective MTT may be contextually dependent.

This contextual dependence does not need to rest on comparisons across countries. Rather than comparing across countries, the present study examines the contextual dependency of personal and collective MTT by examining MTT at different phases of the COVID-19 pandemic. During COVID-19, the collective event, that is, the pandemic, led to a host of dramatic changes in people's daily lives, in both WEIRD and non-WEIRD countries. At its height, national efforts to combat the spread of the virus placed severe personal restrictions. During this time period, the collective event clearly impacted personal lives. After the introduction of an effective vaccine, the pandemic gradually lost its effect on the personal domain. People began to live their lives without undue consideration of what was happening at the collective level. Whereas there have been multiple studies examining MTT during the COVID pandemic (Burnett et al., 2023; Yamashiro et al., 2022), the present study is the first to systematically compare MTT at different stages of the pandemic. Such a comparison might provide insight on the way context might shape and reshape the dissociation between personal and collective MTT.

The COVID-19 pandemic also allows us to explore another factor posited to affect the extent of the dissociation between personal and collective MTT: perceived agency. Topçu and Hirst (2020) have shown that positive future thinking is associated with greater self- and national agency. That is, if people believe that they or the nation can influence the future, they are more likely to think of the future as more positive than if they believe that they or the nation can have only minimal influence. One might expect that beliefs about self and national agency varied as the COVID pandemic peaked and as the vaccines became widely adopted. Examining personal and collective MTT during the pandemic, then, may not only allow one to understand how context might shape the dissociation between personal and collective MTT, but also how beliefs about self- and national agency might do so as well.

The Contextual Nature of MTT

A Valence-Based Dissociation

As indicated, a robust positivity bias has been consistently observed in personal memories and future prospections for nonclinical populations, especially in Western countries (Berntsen & Bohn, 2010; Kahneman et al., 2004; MacLeod, 2016), whereas several studies have observed a negativity bias for collective mental time travel. Studies using a fluency task, for instance, suggest that people have more ready access to negative collective events, in contrast to their more ready access to positive personal events (Shirkanth et al., 2018; Shrikanth & Szpunar, 2021). In one set of studies American and Canadian participants were asked to list things that they or their country are excited or worried about for various time frames (e.g., next week, next year, 40 years from now). Participants had 1 min to list as many things as possible for each prompt. The analysis of the number of events revealed a valence-based dissociation: People expected more positive than negative events to happen for themselves whereas they expected more negative than positive events to happen for their country (Shrikanth et al., 2018). The same pattern was observed when participants were asked to remember positive and negative events that happened in their lives or in their nation for different time frames (e.g., last week, year, 5–10 years ago; Shrikanth & Szpunar, 2021).

Yamashiro and Roediger (2019) partially replicated this *valence-based dissociation*. They again observed a negativity bias for the collective future, but for the personal future, participants listed an equal number of positive and negative events. In that study, unlike Szpunar and colleagues' studies, the time frame was not specified for future event prompts. As research on cultural life scripts reveal, people are inclined to think more about characteristically negative events for the distant personal future, like the death of parents, or one's own death (Berntsen & Rubin, 2004). In Yamashiro and Roediger's (2019) study, participants might have included such events for the personal future inasmuch as the time frame is unspecified. Shrikanth et al.'s (2018) third experiment provides support for this explanation, in which they also failed to find a positivity bias for the personal future when participants were instructed to imagine events for 40 years into the future.

Context Effects and the Valence-Based Dissociation

The contextual nature of the valence-based dissociation between personal and collective MTT has been based in large part on the

finding that the negativity bias of collective future thinking is not observed among Chinese participants. In research measuring personal and collective MTT in American and Chinese participants, using a fluency task, Deng et al. (2022) replicated the "standard" dissociation observed by Shrikanth and colleagues for American participants: Participants exhibited a positivity bias for the personal past and future, whereas they exhibited a negativity bias for the collective past and future. However, Deng et al. (2022) failed to find a negativity or positivity bias for their Chinese participants' personal or collective future. They concluded that the valence-based dissociation between personal and collective future thinking may not be universal.

Topçu and Hirst (2020) went one step further and suggested that at least the strength of the valence-based dissociation may be methodologically specific. Many collective MTT studies employ a fluency task, in which participants have 1 min to list as many things as possible to prompts such as national events you find exciting or worrying, with the number of generated items as the dependent variable. Topçu and Hirst asked participants to write 10 or 15 events that involved the United States in the last 1 to 50 years and might involve the United States in the next 1 to 50 years. Unlike the fluency task, there was no time limit. Moreover, participants were not asked to generate events of a particular valence. Rather, after generating whatever events they choose to remember or imagine, participants rated events in terms of valence on a scale of −3 to 3. Average valence scores were significantly below zero for past events, indicating a negativity bias when remembering the collective past. Participants, however, did not exhibit any bias when imagining the collective future. Moreover, the comparison of the negative scores observed for the collective past events and the neutral scores of the collective future events was significant, which might indicate a relative optimism about the collective future (Topçu & Hirst, 2020). In a recent study using a similar methodology with American, Chinese, and Turkish samples for three timeframes, a negativity bias was again not observed for the collective future, across all three samples (Mert et al., 2023). Finally, again using a similar methodology, Hacıbektaşoğlu et al. (2022) replicated the pattern of relative optimism in a study that probed for the two most important past and future collective events in a Turkish sample: Participants viewed the collective future to be less negative than the collective past.

Viewed together, these studies suggest that when asked to evaluate the degree of valence of events, whether people exhibit a negativity bias or relative optimism may depend on context, here captured in the cultural setting of the participants and the methodologies used to assess MTT. The question for us is whether COVID might provide a context that also influence the valence-based dissociation between personal and collective MTT using a fluency task.

MTT and COVID-19

The Center for Disease Control and Prevention (CDC) reported the first case of COVID-19 in the United States on January 20, 2020, after which the disease started to spread rapidly across the country. On March 11, 2020, the World Health Organization declared COVID-19 a pandemic. On March 15, 2020, states across the United States started to issue shutdown orders, social distancing measures, and mask mandates (Centers for Disease Control and Prevention, 2022). Despite these strict measures, as of September 2023, the total number of deaths in the United States was over a million (Centers for Disease Control and Prevention, 2023).

Social restrictions had a dramatic impact on people's emotional experiences and daily lives, even for uninfected individuals. There was an increase in anxiety and sadness-related words in tweets in the first 5 weeks of the outbreak across 18 countries (Metzler et al., 2023) and an effect on mental health attributable to social distancing (Tull et al., 2020; Vindegaard & Benros, 2020). When people had less social contact and when they perceived greater changes in their daily lives arising out of the pandemic, they were more likely to exhibit symptoms of anxiety and depression (Benke et al., 2020). Interestingly, some scholars have suggested that lockdowns may have broken down people's previous perceptions of time by blurring the temporal and spatial distinction between work and home, and between public and private (Erll, 2020; Kattago, 2021). As Kattago (2021) argued, "the very idea of the future tense as a state of intention and anticipation has become deeply uncertain" (p. 1402).

Perhaps not surprising, several studies have examined MTT during the COVID pandemic. As might be expected, people's imaginations about the future became largely restricted to COVID-related events. For instance, in a cross-cultural study conducted at the early stages of the pandemic, participants were asked to list three "remarkable" events that happened in the world and in their country since the disease first appeared, as well as three events for the future (Öner et al., 2022). Although the questions targeting the future did not make any reference to the pandemic, over 80% of people's responses for both past and future prompts included COVID-related events. People rated their images of the national and global future to be more positive than past national/global events that happened since the pandemic started, replicating the relative optimism effect observed in other studies (Öner et al., 2022).

Using the same cross-cultural data set, a parallel pattern was discovered for spontaneous past and future thoughts in the personal domain (Cole et al., 2022). Participants were asked to indicate the frequency with which memories and future events about the pandemic automatically come to their mind. The pandemic dominated people's spontaneous past and future thoughts, which was especially more prominent in countries that experienced more severity and governmental stringency due to the pandemic (Cole et al., 2022). People were also more likely to characterize these pandemic-related spontaneous thoughts as negatively valenced. Thus, the usual positivity bias for the personal past and future was reversed for pandemic-related events. Despite this negativity bias, people still rated future spontaneous thoughts to be less negative than past spontaneous thoughts (Cole et al., 2022).

As to the valence-based dissociation between personal and collective MTT, in another pandemic-related research, Yamashiro et al. (2022) included both personal and collective events in a study using the fluency task. At the early stages of the pandemic, they asked participants to list positive and negative past and future events for the personal and collective domains without specifying a time frame. They observed the usual positivity bias for the personal past, which disappeared for the personal future. In the collective domain, they found a negativity bias for both past and future events. Interestingly, they also found an increased negativity for the future compared to the past in both the personal and collective domains (Yamashiro et al., 2022).

Using a similar fluency paradigm, Burnett et al. (2023) replicated the collective negativity bias, with people listing more negative

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collective events than negative personal events. Interestingly, unlike Yamashiro et al. (2022), they found a future-oriented positivity bias for collective events, with people listing more positive events for the national future than the national past. This future-oriented positivity bias, however, was not present for personal events, as there was no difference between the number of positive events listed for the future and the past. Together with Yamashiro et al.'s (2022) finding of increased negativity for the personal domain, this pattern indicates that the usual optimism bias observed for the personal future compared to the personal past (Berntsen & Bohn, 2010; Newby-Clark & Ross, 2003) disappeared during the height of the COVID-19 pandemic.

Finally, Niziurski and Schaper (2023) collected data during the first lockdowns in Germany and in the United States. They asked participants to remember one positive and one negative past personal event and to imagine one positive and one negative future personal event associated with the pandemic. Later, participants rated these events using an adaptation of the Autobiographical Memory Questionnaire (Rubin et al., 2003). Based on the responses to this questionnaire, it appears that positive past and future events were rehearsed more, had more emotional impact, and had a greater sense of reliving than negative ones. Interestingly, although for the past prompts, the positive event was rated as more emotionally impactful than the negative events, the opposite was true for future prompts. Participants felt that negative future events were more emotionally intense than positive future events. They also rehearsed future events more than past events, which was more pronounced for negative events.

In a related study, Ford et al. (2021) presented participants with positive and negative aspects of the pandemic and then asked participants to rate them considering their own experiences in the past few months. Their analysis showed that participants focused more on the negative aspects than the positive ones, which was more pronounced for younger participants (Ford et al., 2021). These results indicate a heightened focus on negative aspects for future events during the pandemic.

These studies repeatedly show a negativity bias during the COVID pandemic, but the studies themselves generally took place at the beginning or at the height of the pandemic. However, as noted, the course of the pandemic was long and there were dramatic changes at the collective and personal level at different phases of the pandemic. Initially, there was little medical knowledge about the virus causing COVID nor any clear understanding of how to tackle it therapeutically. But with time, effective vaccines were found, efforts were made to vaccinate the public, and as a result, the incidents of infection declined and along with it the social restrictions meant to prevent the spread of the virus.

Given these changes at both the personal and collective levels, a single probe on MTT during the pandemic may not allow one to fully understand how COVID, and more generally, context, can influence MTT. It may be that, as the vaccines became available, MTT might be less characterized by a negativity bias, but by relative optimism. That is, how the valence-based dissociation manifests may depend on the context in which MTT is taking place: a negativity bias for both personal and collective MTT at the height of the pandemic and a relative optimism as vaccines became a reality.

The present set of two studies explores this possibility longitudinally, in that we collected data at different points during the pandemic on the same participants. It is not merely a matter of assessing participants at different times, but at radically different stages of the pandemic, thereby setting up a situation in which we can compare the same person's MTT in different contexts. The first data collection (Study 1) occurred during a time when the disease had rapidly spread across the United States and when lockdown orders were in place in most states. There was a lot of uncertainty around the trajectory of the pandemic and around the precautionary measures people need to take to protect themselves (e.g., the debate around whether or not to wear medical masks; Netburn, 2021). During the data collection for Study 2, which happened exactly 1 year after Study 1, the rates of infections and deaths were still high, but over 200 million Americans has already received their first vaccine shot (Centers for Disease Control and Prevention, 2023). As a result, the uncertainty and panic present at the early stages of the pandemic may have subsided. In order to incorporate a longitudinal component, the sample of the second study consisted of both new participants and participants who had completed the first study. The first study could be viewed as a replication of the prior work on MTT during COVID, in that it took place around the same time period as the other studies. Study 2 is a departure from the extant literature in that it allows us to see the role of the different context on MTT, that is, one in which the pandemic is out-of-control, and no solution is in sight and one in which a medical solution is present and beginning to have an effect.

Context Effects and Perceived Agency

In discussing the changes that happened in the course of the pandemic, one also needs to take into account the changes that might have happened in people's perception of agency. Bandura (2006) viewed humans as agentic organisms capable of influencing their environments and producing change in their circumstances. Accordingly, personal agency enables people to have causal effects on their lives (Bandura, 1998). In this conception of agency, people's belief in self-efficacy plays a central role, which refers to the belief that one "can produce desired effects by their actions" (Bandura, 1998, p. 52). Human agency is not, however, limited to the exercise of self-agency. It also involves collective agency, which originates in "people's shared beliefs in their collective power to produce desired results" (Bandura, 2000, p. 75). There is a large and complex literature on group agency (see List & Pettit, 2011). It is generally agreed that people talk as if groups have agency, as when they state that "the United States made the decision to enter the war after the bombing of Pearl Harbor." A group agent is often treated as a group that has: (a) a representational state that depict how things are in the environment, (b) a motivational state that specifies how it requires things to be in an environment, and (c) the capacity to process its representational and motivational state, allowing the "agent" to intervene suitably in the environment whenever the environment fails to match a motivational state. Moreover, just as is the case for self-agency, a group can be more or less agentic. That is, it may be more or less inclined to "intervene suitably" and may vary in the efficacy of its intervention.

We are interested here in perceived agency, that is, the degree to which an individual believes that they themselves or the collectivity to which they are a member has a capacity to "intervene suitably," that is, to change the environment. Our claim is that perceived agency is not only relevant for the way people process and evaluate present events but can also be relevant for the way they remember

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and imagine past and future events. In particular, we assume that an agent would be motivated to "intervene suitably" in a way that would promote a positive reshaping of the environment. If one perceives that an entity has agency, then one would expect that entity would work to affect a more positive future, as well as having done so in the past. That is, whether there is a negativity bias or a relative optimism when considering the future may depend on the extent to which one views oneself or a relevant group as agentic.

Topçu and Hirst (2020) examined this relation between agency and valence as it applied to collective MTT. Along with ratings of valence, these researchers also asked participants to evaluate how much they themselves, other-people, and the nation had caused or will cause each remembered and imagined event. Participants expected themselves and their nation to have more agency over future national events than the agency they and their nation had over past national events.

Moreover, and critical to the discussion of the role of valence in collective future thinking, as participants attributed more agency to their nation in the nation's future, they expected the nation's future to be more positive than the nation's past. Thus, an increased attribution of agency to the nation was related to an increase in the positivity of national future events (Topçu & Hirst, 2020). A similar pattern was observed in the personal domain, with a relation between perceived self-agency and the valence of personal past and future events (Topçu & Hirst, 2019). These studies, however, were conducted in the United States when there was a relative degree of separation between personal lives and collective events. Moreover, they did not examine how agency might change as the context in which MTT is taking place changes.

Specifically, how might the COVID pandemic affect both perceived self- and national agency? And if there is an effect, how do changes in perceived agency relate to valence biases documented in the MTT literature? As suggested, perceived agency might have changed radically throughout the pandemic. During the height of the COVID-19 pandemic, people were often obliged to follow governmental orders concerning social distancing, isolation, and mask mandates, which limited their ability to move around and interact freely. These restrictions might have decreased their perception of self-agency over their personal lives. The restrictions may also have increased the perception of national agency over both personal and collective events, relative to prepandemic periods. However, the collective agency exhibited by the nation in imposing these restrictions may have offered little solace as to the prospect of a positive outcome. At the beginning of the pandemic, there was still a lot of uncertainty around how to contain the spread, as evidenced in the debates around masks, restrictions, and effective treatment methods (Netburn, 2021). With no agreed-upon road map in prospect, one might have concluded that the nation had an increased agency over personal lives but did not have the capacity of "processing its representational and motivational state" to "intervene suitably" to produce a positive outcome.

In contrast, after the introduction of the vaccine, there may have been an increased understanding that the nation had the pandemic "under control," and had acquired the capacity to "intervene suitably." That is, we might find that perceptions of both self- and national agency and how they relate to valence change over the course of the pandemic. After the introduction of the vaccine and the gradual lifting of social restrictions, sense of self-agency might have increased over both personal and collective events. In the case of national agency, the case might be more complicated. Sense of national agency over personal events might have decreased with the lifting of precautionary restrictions. But due to the availability of vaccines, national agency might now be associated with greater positivity in the personal domain as opposed to the beginning of the pandemic. Sense of national agency over national events, however, might have increased after the introduction of the vaccine, and since now the nation has the "tools" to "intervene suitably," its agency might be more strongly associated with positivity. The longitudinal design of the current research, then, would enable us to test not only the changes that occur in perceived agency over time but also to test Topçu and Hirst (2020) claimed that the greater the perceived agency, the more likely a relation with positivity to be observed.

There is not much research that focuses directly on perceived agency during the pandemic. Research on perceived control can, however, be relevant. To explore the controllability of COVID-related goals during the pandemic, Clayton McClure and Cole (2022) asked participants to write a personal goal/concern related to the COVID-19 pandemic. They also asked them to write about a personal goal/concern unrelated to the pandemic. Moreover, participants rated the degree to which they feel that they have control over actualizing these goals. People felt that the goals related to the pandemic were uncontrollable, whereas goals unrelated to the pandemic were (Clayton McClure & Cole, 2022). This result indicates that people felt a decreased sense of control over personal events pertaining to the pandemic. Research also indicates that, during the pandemic, increased perceived control is associated with reduced hopelessness (Kiral Ucar et al., 2022) and greater life satisfaction (Zheng et al., 2020). There is, however, no research that we know of that explores in the same study perceived agency reflected in memories and future projections for personal and collective domains across the pandemic. Thus, findings concerning perceived agency in Studies 1 and 2 would go beyond what currently exists in the literature on MTT and COVID-19.

Present Research

The present research, then, examines valence biases and perceived agency for personal and collective, or more specifically, national MTT during different stages of the COVID-19 pandemic. As reviewed above, there has been previous studies on remembering and future thinking in the context of the pandemic. The present study extends this work by explicitly comparing the valence-based dissociation between personal and national MTT at different stages of the COVID-19 pandemic by using a longitudinal design. The main question here is whether the nature of the valence-based dissociation change through different stages of the pandemic.

The present research also examines perceived agency and its relation to the valence of events. We focus on the agency people attribute to themselves and their nation over personal and national events. We aim to see if perceived self-agency and perceived nation agency at different stages of the pandemic is related to the valence biases people exhibit in MTT at these different stages.

In the studies reported herein, we used the fluency task employed in previous research to elicit positive and negative past and future events for the personal and national domains (MacLeod et al., 1997; Shrikanth et al., 2018; Shrikanth & Szpunar, 2021). Inasmuch as negativity biases are often observed using the fluency task, the presence of relative optimism using this task would underscore the importance of considering context. After writing events in response

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to prompts, participants evaluated their first three responses for each prompt in terms of perceived agency attributed to the self and nation. They also evaluated the degree to which the event is related to the pandemic.

As noted, we collected data at different points during the pandemic in order to test whether the observed patterns change over time as the course of the pandemic changed. The first data collection (Study 1) happened during a time when the disease had rapidly spread across the United States and when lockdown orders were at place in most states, whereas Study 2 took place when a substantial number of American had been vaccinated (Centers for Disease Control and Prevention, 2023).

Study 1

Study 1 explored whether COVID-19 influenced the valence-based dissociations and perceived agency patterns in MTT established in the pre-COVID literature. We preregistered six hypotheses for the first study (https://doi.org/10.17605/OSF.IO/YA4V6). We based these on the findings of the pre-COVID studies of Shrikanth et al. (2018) and Shrikanth and Szpunar (2021). We expected to replicate previous studies that did not examine MTT in the context of the COVID pandemic and show that, participants provide (a) more responses for personal than national prompts and (b) more responses for positive than negative prompts. We also expected (c) to replicate the overall valence-based dissociation.

However, as we suggested above, it is possible that what these researchers found pre-COVID may not apply as the COVID pandemic was unfolding. Following the studies on COVID and MTT, we also expected (d) the valence-based dissociation to be attenuated. To examine this possibility, we asked participants to project back 1 month or 6 months when remembering the past and project 1 month or 6 months when imagining the future. We predicted that the attenuation should be present for responses written for the time period closer to data collection than the more distant time period, since the closer time period involved a time when the pandemic was started to be recognized as a serious crisis and might still be around in the future. We expected this pattern because we speculated that during the more immediate phase of the pandemic, there would be an increase in negativity in the personal domain, reducing the strength of the valence dissociation between personal and national domains. The extant work on MTT and COVID suggest that we will find support for these four hypotheses. That is, the 6-month might resemble, and thereby replicate, what is found in the MTT literature in a non-COVID setting, while the 1-month condition might resemble, and thereby replicate, what is found in the COVID literature to date.

A substantial departure from this COVID literature is our interest in the relation between perceived agency and MTT. We expected (e) perceived self-agency to be related with positivity in the personal domain and (f) perceived nation agency to be related with positivity in the national domain. Such results would provide further support for Topçu and Hirst's (2020) claims about the role of agency in MTT, but now in the unique setting of the COVID pandemic. Given the testing period for this study, the early phase of the COVID pandemic, we might expect low levels of both self- and nation agency, which if our hypothesis is correct, might account for any observed negativity, especially in the personal domain.

In addition to these preregistered hypotheses, we also planned to conduct exploratory analyses on the degree to which participants' responses are related to the pandemic. We wanted to see if participants' tendency to list COVID-related events changed as a factor of domain, valence, temporality, and time. More specifically, would participants list more COVID-related events when they list personal versus collective events; positive versus negative events; past versus future events; and 1-month versus 6-month events? Answering these questions would provide us with a potential explanation for the predicted changes that might happen in patterns of valence and perceived agency.

Method

Transparency and Openness

The preregistered design, hypotheses, analyses, as well as the logic for determining the sample sizes, exclusion, and inclusion criteria of the study, can be found at https://doi.org/10.17605/OSF.IO/YA4V6. Data materials and data files are publicly available at Open Science Framework and can be accessed at https://osf.io/bs7e2/?view_only=d60b601aca7140d281223425164b4ac0

Participants

The data is collected through the web-based recruitment platform, Amazon Mechanical Turk (Buhrmester et al., 2011), between the dates April 22 and May 1, 2020. Since we expected a three-way interaction between domain, valence, and time, we used the $\eta_p^2 = .23$ value from Shrikanth et al.'s (2018) second study to calculate the effect size needed for the power analyses. The G*Power program (Faul et al., 2007) indicated that 64 participants would be needed to replicate the Domain × Valence × Time interaction in Shrikanth et al. (2018; $f = .55$ at $\alpha = .05$ and $1–\beta = .80$; number of measurements: 16). We included past events along with future events in our design and aimed to detect three-way interactions. Additionally, we planned to collect longitudinal data. Considering the dropout rate and the participants who will be eliminated due to exclusion criteria, we decided a priori to collect data from 200 participants.

Since this study is online, we included six attention checks and excluded participants who failed in more than two attention checks (preregistered criteria). In total 202 participants from the United States undertook the study and 71 were eliminated according to this criterion before any kind of data analyses. Out of 131 participants who passed at least four attention checks, 12 participants were excluded prior to data analyses, due to a failure to follow the instructions (e.g., writing exclusively personal events in response to national event prompts, etc.).

The remaining sample consisted of 119 participants (57 female, 59 male, one other, two undeclared). Age range was 19–75 with a mean age of 40.91 ($SD = 13.04$). 70% of the participants identified as White Americans, 12% as Asian Americans, 11% as Black Americans, 3% as Hispanic/Latino, and 3% as other. Participants received $3 for their participation in the study. The institutional review board at The New School approved both studies for ethical standards.

Materials

All the following measures were within subject.

Past and Future Tasks. To solicit memories and future imaginations we used the fluency task of Shrikanth et al. (2018) and

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Shrikanth and Szpunar (2021), which they had adapted from MacLeod et al. (1997). For the personal domain, participants were asked to list positive and negative events and occurrences that happened or might happen in their lives. For the national domain, they were asked to list positive and negative events or occurrences that happened or might happen in the United States. There were two timeframes for each prompt that covered 1 month ago/next 1 month and 6 month ago/next 6 months, which made a total of 16 prompts to solicit events.

For each prompt, participants were given 1 min to list as many things as possible. After the 1 min elapsed, they automatically proceeded to the next prompt. Prompts were blocked as the following fashion: personal past, national past, personal future, and national future. The order of these blocks was counterbalanced. Within each block there were four prompts: positive 1-month, positive 6-month, negative 1-month, negative 6-month. The order of prompts within each block were also counterbalanced (see Figure 1 in Supplemental Materials for a visual representation).

Perceived Agency. After completing the past and future tasks, participants were asked to assess the events they wrote in response to each prompt in terms of the agency they attributed to (a) themselves (self-agency) and (b) their nation as a group (nation agency).[1] Self-agency for past and future events was measured through the following question: "At the time of this event, how much do you think that the event was caused/might be caused by you?" (adapted from Roseman et al., 1990). Nation agency was measured using the following question:

> Some people think groups act as a collectivity. So, it is not an individual or a small set of individuals that act but the group as a whole. Keeping this in mind, at the time of this event how much do you think that the event was caused/might be caused by America as a nation? (Topçu & Hirst, 2020, p. 567).

Participants used a Likert-type scale that ranged from 1 (*not at all*) to 7 (*very much*) to answer these questions.

To keep the study within a reasonable timeframe, participants were presented with only the first three events they had written for each prompt. We decided to focus on the first three events because previous research shows that people, on average, list three responses for each fluency prompt (Shrikanth et al., 2018). If participants wrote fewer than three events, they were instructed to select the N/A option for the nonresponses (i.e., when they did not list any event). As a precaution, we also inspected the data to make sure participants did not provide agency evaluations for nonresponses. If they did, their evaluations for that nonresponse were deleted.

Events were presented in a blocked fashion. There were eight blocks with the two timeframes falling in the same block resulting in six responses in each block (personal past positive, personal past negative, national past positive, national past negative, personal future positive, personal future negative, national future positive, national future negative). The blocks were presented in random order. The order of the agency questions within each block was also randomized across participants (see Figure 2 in Supplemental Materials for a visual representation of the design).

COVID Relation. After the completion of the perceived agency questions, participants assessed whether their responses were related to the Coronavirus crisis or not. Again, they were presented with only their first three responses for each prompt. There were three options to assess COVID relation: not related, somewhat related, related. Queries were presented in four blocks (personal past, national past, personal future, and national future). The presentation of blocks was in random order.

Political Identification and Demographics. Participants indicated whether they considered themselves as a Republican, a Democrat, an Independent, or something else. Finally, participants answered demographic questions on gender, year of birth, education, work, and ethnicity.[2]

Results

Data Preparation

For each past and future prompt, the total number of unique responses were calculated, following the procedure by Shrikanth et al. (2018). Incomplete, repeated, or incoherent responses were not included in the total count. For past national events, we also excluded responses that did not fall into the designated timeframes (1 month and 6 month). Shrikanth et al. (2018) had also excluded national events that were written in response to the personal prompts, but they indicated that this exclusion did not lead to a difference in explored patterns. The COVID-19 pandemic, however, creates a unique context in which it is difficult to determine whether a response such as "coronavirus" or "lockdown" is a collective or a personal event. Since in the present study, we were interested in the intersection between the personal and the collective, we decided to report the results with all events included in response to personal prompts. We did, however, also conduct the analysis with variables that reflect the exclusion of national events written in response to personal prompts. These analyses did not lead to substantial differences in the observed patterns, but they are reported in the Supplemental Materials.[3]

Composite perceived self- and nation agency scores for each prompt were calculated by averaging agency ratings for the first three responses in each prompt. Bootstrapping is administered when appropriate, using tests statistics with the number set at 1,000 to address nonnormal distributions in the data (Efron & Tibshirani, 1993). Bootstrapped confidence intervals are generated for correlations and difference scores in within-subjects' comparisons, and they are reported when a different pattern is observed (Loftus & Masson, 1994). To detect outliers, z-scores are calculated for each variable. When participants' z-score exceed the absolute value of 3.29 (Field, 2013), the analyses are done with and without them. If there is a

[1] Participants also evaluated circumstance-agency (agency they attribute to circumstances beyond anyone's control) and government-agency (agency they attribute to the U.S. government). Because these two measures are not central to the current research, their analysis is not included in the article.

[2] Before the political identification and demographics questions, participants completed questions on their feelings, precautionary practices, media attendance, and so forth during the COVID-19 pandemic. These questions were included for exploratory purposes and their analysis is presented in the Supplemental Materials.

[3] Each analysis was also reconducted with political identification as an additional factor. In response to the question about party affiliations, 43% identified as a Democrat, 29% as a Republican, 25% as an Independent, and 3% as something else. There were only minimal effects of political identification, and these effects are reported in the Supplemental Materials. All analyses were reconducted with age added as a covariate. The main findings involving the preregistered hypotheses did not change when age was added as a covariate.

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change in observed patterns, the analysis is reported without the outliers and stated as such.

Valence

We undertook a 2 (Temporality: Past and Future) × 2 (Domain: Personal and National) × 2 (Valence: Positive and Negative) × 2 (Time: 1 Month vs. 6 Months) repeated-measures analysis of variance (ANOVA; see Table 1 for means and standard deviations for each variable). There was a main effect of domain, $F(1, 118) = 32.17$, $p < .001$, $\eta_p^2 = .21$, as participants wrote more events for the personal prompts compared to national prompts, $M_{diff} = 0.39$, $p < .001$, [0.25, 0.52], $d = 0.52$, which is consistent with what the pre-COVID literature found. The main effect of valence was also significant, $F(1, 118) = 16$, $p < .001$, $\eta_p^2 = .13$. However, unlike what emerged in the pre-COVID literature, participants responded with more events for the negative than the positive prompts, $M_{diff} = 0.26$, $p < .001$, [0.13, 0.38], $d = 0.38$. Although it did not figure in our hypotheses, we also found a main effect of temporality, $F(1, 118) = 93.82$, $p < .001$, $\eta_p^2 = .44$, with participants writing more events for future prompts compared to past prompts, $M_{diff} = 0.57$, $p < .001$, [0.45, 0.68], $d = 0.88$. There was also a main effect of time, $F(1, 118) = 4.35$, $p = .039$, $\eta_p^2 = .04$, with more events written for the 6-month prompts than the 1-month prompts, $M_{diff} = 0.12$, $p = .039$, [0.01, 0.24], $d = 0.19$.

There were a series of two-way interactions, the details of which are reported in the Supplemental Materials. Here, we will only focus on the preregistered two-way interaction between domain and valence, that is, the valenced-based dissociation. As founded in the pre-COVID literature, the interaction was significant, $F(1, 118) = 86.31$, $p < .001$, $\eta_p^2 = .42$. Participants responded with more positive than negative events for the personal prompts, $M_{diff} = 0.24$, $p = .005$, [.08, 0.40], $d = 0.26$, while they responded with more negative than positive events for the national prompts, $M_{diff} = 0.75$, $p < .001$, [0.59, 0.91], $d = 0.86$.

Interestingly, the time frame of the MTT did not matter, inasmuch as the expected three-way interaction between domain, valence and time was not significant, $F(1, 118) = 0.25$, $p = .619$, $\eta_p^2 = .002$. This result is contrary to our expectations. We did, however, find a significant three-way interaction between domain, and valence, and temporality, $F(1, 118) = 16.95$, $p < .001$, $\eta_p^2 = .13$. Participants remembered more positive than negative events for their personal past, $M_{diff} = 0.28$, $p = .005$, [0.08, 0.48], $d = 0.26$, and more negative than positive events for the national past, $M_{diff} = 1.11$, $p < .001$, [0.89, 1.34], $d = 0.88$, again, providing support for the presence of a valence-based dissociation (Shrikanth & Szpunar, 2021; see Figure 1). For the personal future, on the other hand, the numbers of positive and negative events were equal, $M_{diff} = 0.20$, $p = .084$, [−0.03, 0.42], $d = 0.16$, whereas for the nation's future they imagined more negative than positive events, $M_{diff} = 0.39$, $p < .001$, [0.19, 0.59], $d = 0.36$ (see Figure 1). At least for the personal future, this finding is contrary to what has been found in most studies to date in the future thinking literature. It indicates, as predicted, at least for future thinking, an attenuation of the valence-based dissociation between domain and valence, that is, the often found difference between the valence ratings associated with personal and collective future thinking was smaller when future thinking was taking place during the COVID pandemic than when it took place in pre-COVID settings, which replicates other studies conducted during COVID-19 (Yamashiro et al., 2022).

Valence and Perceived Agency

In studying the relation between valence and perceived agency, we had initially planned to conduct correlations between agency ratings and the number of positive and negative responses. In hindsight, we realized that this would lead to a circular analysis since these two variables measure different characteristics for the same responses. So, we decided that a more grounded approach would be the comparison of perceived agency ratings for positive and negative responses in personal and collective domains. Such an analyses would enable us to determine if people assign more agency to themselves and/or their nation over positive events than negative ones. The preregistered correlational analysis is, however, reported in the Supplemental Materials.

Table 1
Number of Listed Events as a Function of Temporal, Domain, Time, and Valence

	Study 1 (N = 119)		Study 2 (N = 197)	
	Positive	Negative	Positive	Negative
Event prompt	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Personal past	**7.57 (2.80)**	**7.01 (2.82)**	**8.26 (3.18)**	**6.97 (2.62)**
1 month	**3.79 (1.61)**	**3.47 (1.61)**	**3.90 (1.76)**	**3.22 (1.44)**
6 months/5–10 years	3.78 (1.64)	3.54 (1.74)	**4.37 (1.80)**	**3.75 (1.66)**
Collective past	**4.93 (2.16)**	**7.15 (2.49)**	**5.17 (2.16)**	**5.51 (2.09)**
1 month	**2.57 (1.41)**	**3.66 (1.44)**	2.78 (1.21)	2.96 (1.20)
6 months/5–10 years	**2.36 (1.23)**	**3.50 (1.72)**	2.39 (1.32)	2.55 (1.39)
Personal future	8.15 (2.96)	7.76 (3.19)	**9.23 (3.26)**	**8.30 (3.52)**
1 month	3.82 (1.60)	3.70 (1.85)	**4.41 (1.81)**	**3.92 (1.86)**
6 months/5–10 years	4.34 (1.73)	4.06 (1.77)	**4.82 (1.85)**	**4.38 (2.04)**
Collective future	**7.26 (2.42)**	**8.04 (2.80)**	7.54 (2.70)	7.72 (2.96)
1 month	**3.44 (1.36)**	**4.01 (1.72)**	3.57 (1.53)	3.68 (1.53)
6 months/5–10 years	3.82 (1.44)	4.03 (1.47)	3.97 (1.59)	4.04 (1.85)

Note. Boldface indicates a significant difference between positive and negative responses for that variable.

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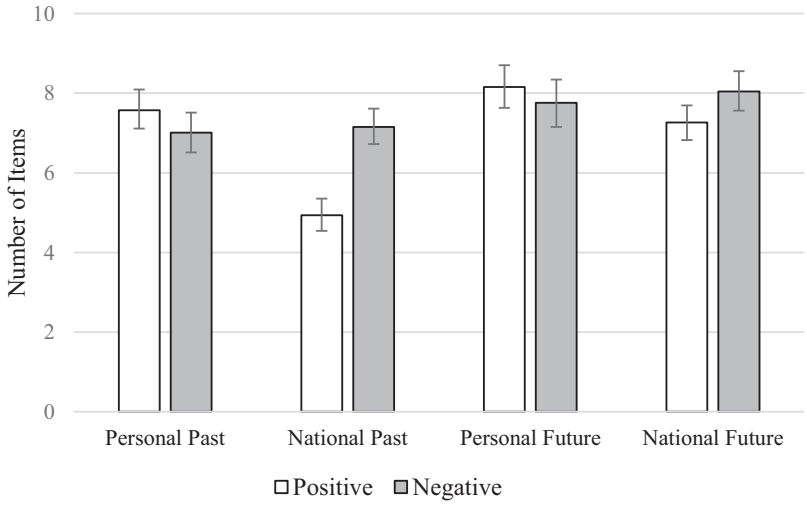
Figure 1

Mean Number of Positive and Negative Events Participants Listed That Happened in the Personal and National Past and Might Happen in the Personal and National Future in Study 1



Note. Error bars reflect 95% confidence intervals.

Separate 2 (Temporality: Past and Future) × 2 (Domain: Personal and National) × 2 (Valence: Positive and Negative) × 2 (Time: 1 Month vs. 6 Months) repeated-measures ANOVAs were conducted on self-agency and nation agency scores (see Table 2 for means and standard deviations for each variable). Because we are interested in the relation between perceived agency and valence, we only report interactions that involve valence. The analyses of remaining significant interactions can be found in Supplemental Materials.

Self-Agency. With respect to the self-agency, based on prior research, we first wanted to explore whether a perception of self-agency was greater for positive over negative events and for personal over national events. The ANOVA on self-agency revealed main effects for domain, valence, and temporality, $F(1, 94) = 12.74$, $p < .001$, $\eta_p^2 = .12$; $F(1, 94) = 312.60$, $p < .001$, $\eta_p^2 = .77$; $F(1, 94) = 179.17$, $p < .001$, $\eta_p^2 = .66$, respectively. Not surprisingly, participants attributed more self-agency for personal over national events, $M_{diff} = 2.09$, $p < .001$, [1.85, 2.32], $d = 1.82$, as well as for past over future events, $M_{diff} = 0.24$, $p < .001$, [0.11, 0.38], $d = 0.37$. They also attribute more self-agency for positive over negative events, $M_{diff} = 1.07$, $p < .001$, [0.91, 1.23], $d = 1.38$. This result confirms our preregistered hypothesis.

The two-way interactions between temporality and domain, $F(1, 94) = 3.98$, $p = .049$, $\eta_p^2 = .04$; temporality and valence, $F(1, 94) = 18.98$, $p < .001$, $\eta_p^2 = .17$; and domain and valence, $F(1, 94) = 97.68$, $p < .001$, $\eta_p^2 = .51$, were significant. These two-way interactions were informed by a three-way interaction between temporality, domain, and valence, $F(1, 94) = 9.014$, $p = .003$, $\eta_p^2 = .09$. Close examination of these interactions revealed that participants attributed more agency to themselves for past over future positive personal events, $M_{diff} = 0.79$, $p < .001$, [0.44, 1.15], $d = 0.45$. They also attributed more agency to themselves over past than future positive national events, but the difference was smaller, $M_{diff} = 0.19$,

Table 2

Self-Agency and Nation Agency Scores as a Function of Temporal, Domain, Time, and Valence for Study 1 and Study 2

	Study 1				Study 2			
	Self-agency ($N = 95$)		Nation agency ($N = 94$)		Self-agency ($N = 171$)		Nation agency ($N = 165$)	
	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative
Event prompt	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Personal past 1 month	**4.72 (1.73)**	**2.84 (1.80)**	**2.22 (1.41)**	**2.85 (1.60)**	**5.32 (1.47)**	**3.13 (1.65)**	1.79 (1.20)	1.73 (1.04)
Personal past 6 months/5–10 years	**5.15 (1.57)**	**2.57 (1.58)**	**1.61 (1.14)**	**2.32 (1.54)**	**5.60 (1.17)**	**2.96 (1.64)**	1.56 (0.97)	1.49 (0.92)
National past 1 month	**1.72 (1.23)**	**1.41 (1.26)**	**4.44 (1.56)**	**3.68 (1.57)**	**1.42 (.86)**	**1.20 (0.78)**	**4.64 (1.50)**	**4.17 (1.62)**
National past 6 months/5–10 years	**1.89 (1.47)**	**1.38 (1.22)**	**4.48 (1.76)**	**3.63 (1.57)**	**1.53 (1.04)**	**1.19 (0.69)**	**4.78 (1.41)**	**4.20 (1.75)**
Personal future 1 month	**4.18 (1.86)**	**2.85 (1.61)**	**2.65 (1.64)**	**3.03 (1.57)**	**5.19 (1.37)**	**3.25 (1.60)**	1.74 (1.09)	1.92 (1.27)
Personal future 6 months/5–10 years	**4.10 (1.84)**	**2.64 (1.60)**	**2.74 (1.71)**	**3.20 (1.50)**	**5.04 (1.39)**	**3.26 (1.64)**	1.77 (1.07)	1.93 (1.33)
National future 1 month	**1.59 (1.19)**	**1.36 (1.09)**	**4.47 (1.48)**	**4.17 (152)**	**1.52 (1.07)**	**1.16 (0.57)**	**4.97 (1.36)**	**4.28 (1.52)**
National future 6 months/5–10 years	**1.64 (1.20)**	**1.36 (1.03)**	**4.82 (1.42)**	**4.20 (1.61)**	**1.54 (1.01)**	**1.17 (0.61)**	**5.19 (1.34)**	**4.52 (1.49)**

Note. Boldface indicates a significant difference between positive and negative responses for that variable.

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$p = .048$, [0.002, 0.37], $d = 0.21$. That is, at least during the COVID pandemic, participants believed that they have less agency over the future than the past—as it applies both to positive personal and national events. However, this belief holds more strongly when it comes to personal events than national events, perhaps because participants believe they have less ability to shape positive national events than they do in shaping positive personal events. These results are, again, supportive of our preregistered hypothesis.

Interestingly, when considering negative events, the same pattern was not found. There was no difference between past and future events, Absolute $M_{\text{diffs}} < .04$, ps $> .59$, either in the personal or national domain. This result may arise in part because, as noted above, for both personal and national past and future events, people attributed more agency to themselves over positive than negative events (see Figure 2).

The two-way interaction between valence and time was also significant, $F(1, 94) = 7.96$, $p = .006$, $\eta_p^2 = .08$, which was informed by a three-way interaction between temporality, valence, and time, $F(1, 94) = 4.225$, $p = .043$, $\eta_p^2 = .04$. Participants attributed greater agency to themselves over past positive events that happened within the last 6 months than in the last month, $M_{\text{diff}} = 0.30$, $p = .004$, [0.10, 0.51], $d = 0.31$. For past negative events and all future events, there was no difference between timeframes, absolute $M_{\text{diffs}} < .16$, ps $> .08$. One possible interpretation of this result is that any positive event that occurred during the onset of the pandemic might be considered serendipitous rather than something one brought about through one's own agency.

Nation Agency. For nation agency, the ANOVA yielded main effects for temporality and domain, $F(1, 93) = 43.536$, $p < .001$, $\eta_p^2 = .32$; $F(1, 93) = 201.47$, $p < .001$, $\eta_p^2 = .68$[4] (Table 2). In contrast to self-agency, participants attributed more nation agency, not surprisingly, for national events over personal events, $M_{\text{diff}} = 1.66$, $p < .001$, [1.43, 1.89], $d = 1.46$ and to their nation in the future over its past, $M_{\text{diff}} = 0.52$, $p < .001$, [0.36, 0.66], $d = 0.68$ (Table 2). This latter finding suggests that, at least at the time this study was done, people had little faith that the nation had agentically acted to shape the past, but presumably had hopes that they might do so in the future.

The interaction between domain and valence was significant, $F(1, 93) = 48.55$, $p < .001$, $\eta_p^2 = .34$. For national events, participants assigned more national agency over positive than negative events, $M_{\text{diff}} = 0.63$, $p < .001$, [0.34, 0.93], $d = 0.43$. This result confirms our preregistered hypothesis (see Figure 3). On the other hand, for personal events, participants attributed more national agency over negative than positive events, $M_{\text{diff}} = 0.55$, $p < .001$, [0.32, 0.77], $d = 0.52$. It would appear that participants believed that the nation can act in a way that is more likely to negatively affects one's personal life than to positively affect it, whereas it can act in a way that positively affects the "life" of the nation. This attitude might reflect the actions the nation took during the early part of COVID.

The above interaction was informed by a three-way interaction between temporality, domain, and valence, $F(1, 93) = 5.86$, $p = .017$, $\eta_p^2 = .06$. The dissociation between domain and valence was observed for both past, personal $M_{\text{diff}} = 0.68$, $p < .001$, [0.39, 0.96], $d = 0.48$; national $M_{\text{diff}} = 0.80$, $p < .001$, [0.45, 1.16], $d = 0.46$ and future events, personal $M_{\text{diff}} = 0.42$, $p = .009$, [0.10, 0.73], $d = 0.28$; national $M_{\text{diff}} = 0.46$, $p = .005$, [0.15, 0.78], $d = 0.30$, but the effect was more pronounced for past events (see Figure 3).

COVID Relation

Were the events participants listed COVID-related? To address this question, we calculated the proportions of events that participants indicated to be not related, somewhat related, and related to the COVID-19 pandemic. Here, we will focus on the proportions of events *related* to the COVID-19 pandemic (Table 3). We entered the proportion of COVID-related events into a 2 (Temporality: Past and Future) × 2 (Domain: Personal and National) × 2 (Valence: Positive and Negative) × 2 (Time: 1 Month vs. 6 Months) repeated-measures ANOVA.

The main effects of temporality, $F(1, 118) = 92.90$, $p < .001$, $\eta_p^2 = .44$; domain, $F(1, 118) = 159.97$, $p < .001$, $\eta_p^2 = .58$; valence, $F(1, 118) = 161.16$, $p < .001$, $\eta_p^2 = .58$; and time, $F(1, 118) = 55.62$, $p < .001$, $\eta_p^2 = .32$, were significant. Not surprisingly, participants listed more COVID-related events for the future compared to the past, $M_{\text{diff}} = .15$, $p < .001$, [.12, .18], $d = 0.91$, for the national domain compared to the personal domain, $M_{\text{diff}} = .25$, $p < .001$, [.21, .29], $d = 1.16$, for negative than positive prompts, $M_{\text{diff}} = .18$, $p < .001$, [.16, .21], $d = 1.13$, and for 1 month compared to 6 months, $M_{\text{diff}} = .11$, $p < .001$, [.08, .14], $d = 0.68$.

The two-way interactions between temporality and valence, domain and valence, temporality and time, and valence and time were significant, $F(1, 118)$s > 4.26, ps $< .012$, $\eta_{ps}^2 > .04$. The three-way interaction between temporality, domain, and valence was also significant, $F(1, 118) = 8.22$, $p = .005$, $\eta_p^2 = .06$. Since all these interactions were informed by a four-way interaction between temporality, domain, valence, and time, $F(1, 118) = 5.91$, $p = .017$, $\eta_p^2 = .05$, we report the pair-wise comparisons for the full interaction. For all past prompts, participants wrote more COVID-related events for the last 1 month compared to the last 6 months, when COVID 19 had not yet become a central concern to the public, past personal positive, $M_{\text{diff}} = .25$, $p < .001$, [.18, .32], $d = 0.68$; past personal negative, $M_{\text{diff}} = .24$, $p < .001$, [.16, .32], $d = 0.54$; past national positive, $M_{\text{diff}} = .26$, $p < .001$, [.19, .34], $d = 0.63$; past national negative, $M_{\text{diff}} = .13$, $p = .001$, [.05, .21], $d = 0.30$. As one might expect given the unknown trajectory of the pandemic at the time of testing, we did not find a difference between time frames for any of the future prompts, $M_{\text{diffs}} < .06$, ps $> .130$.

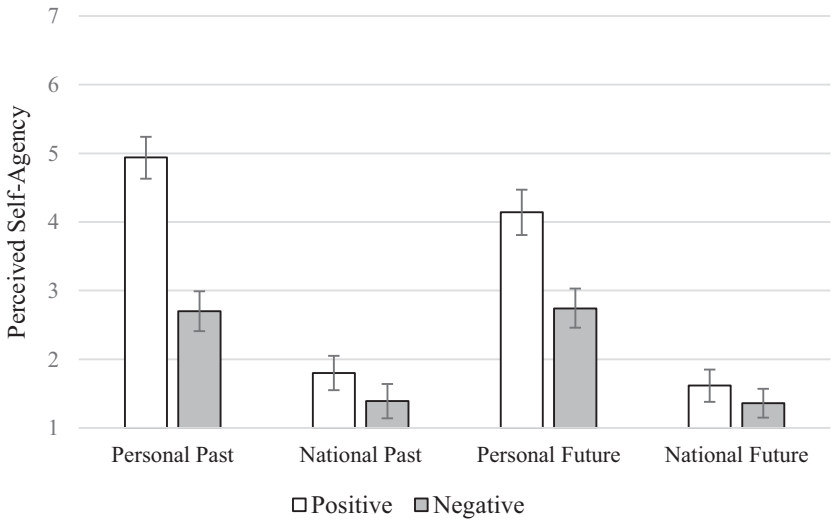
Discussion

As indicated in the introduction, we are interested in how the context of the pandemic might change previously established MTT patterns, specifically, the valence of events and the perceived agency. The results underscored the dramatic effect the pandemic had on MTT, thereby largely supporting the extant work to date on MTT during the pandemic. Unlike previous studies, participants had an overall negativity bias, in that they listed more events for the negative prompts than the positive ones. However, a more fine-grain analysis found that, although the standard valence-based dissociation was still present, it was attenuated. As in prior research, participants exhibited an overall positivity bias for the personal domain and a negativity bias for the national domain. However, unlike this prior research

[4] When political identification was added as an additional factor, there was a two-way interaction between valence and political ID and a three-way interaction between domain, valence, and political ID. For the sake of brevity, these effects are reported in the Supplemental Materials.

Figure 2

Mean Scores of Perceived Self-Agency Attributed Over the First Three Events Listed for Each Prompt as a Factor of Temporality, Domain, and Valence in Study 1



Note. Error bars reflect 95% confidence intervals.

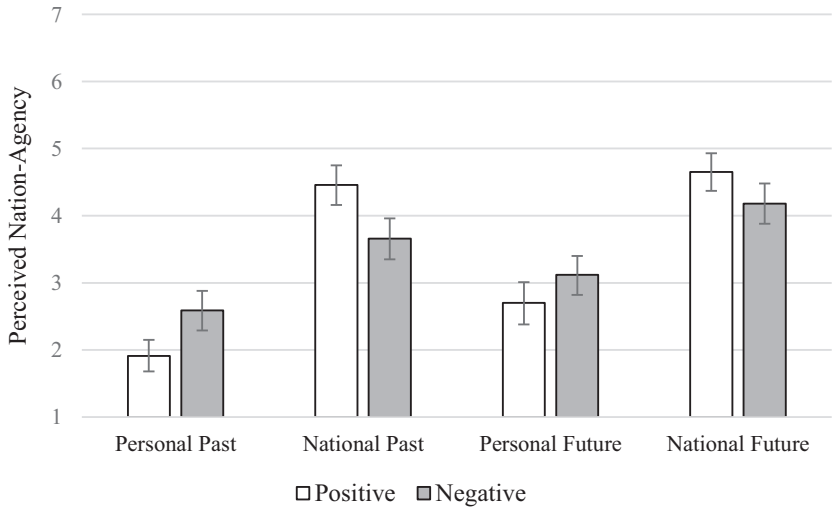
(Deng et al., 2022; Shrikanth et al., 2018), but in line with Yamashiro et al. (2022), which was conducted during the pandemic, the usual positivity bias for the personal domain was only observed for the past but not for the future. That is, participants listed an equal number of positive and negative events for their personal future.

We probably see this change in the characteristics of future thinking, especially personal future thinking, because of the negativity associated with the pandemic. We did not observe a change in the expected pattern for acts of remembering possibly because the timeframes we probed for included a period before the pandemic (6 months ago), while the future might reasonably have included only time periods in which the pandemic will continue to dominate people's lives (1 month and 6 months from now).

The analyses of COVID-related events support this speculation. In general, participants listed more COVID-related events for the future than the past. Moreover, participants listed more COVID-related events for the last 1 month compared to the last 6 months. There was no difference between the prevalence of COVID-related events for the next 1 month and next 6 months in both personal and national domains. When considered together with the finding that

Figure 3

Mean Scores of Perceived Nation Agency Attributed Over the First Three Events Listed for Each Prompt as a Factor of Temporality, Domain, and Valence in Study 1



Note. Error bars reflect 95% confidence intervals.

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Table 3
The Proportion of COVID-Related Events as a Function of Temporal, Domain, Time, and Valence for Study 1 and Study 2

	Study 1 (N = 119)		Study 2 (N = 197)	
	1 month	6 months	1 month	5–10 years
Event prompt	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Personal past positive	**.36 (.35)**	**.10 (.24)**	**.17 (.27)**	**.03 (.10)**
Personal past negative	**.58 (.37)**	**.34 (.33)**	**.19 (.27)**	**.05 (.16)**
National past positive	**.60 (.35)**	**.34 (.35)**	**.53 (.33)**	**.05 (.33)**
National past negative	**.75 (.32)**	**.62 (.37)**	**.32 (.29)**	**.05 (.15)**
Personal future positive	.38 (.37)	.33 (.36)	**.15 (.26)**	**.05 (.17)**
Personal future negative	.56 (.39)	.62 (.38)	**.19 (.27)**	**.10 (.20)**
National future positive	.73 (.33)	.71 (.31)	**.51 (.34)**	**.19 (.26)**
National future negative	.78 (.30)	.77 (.29)	**.42 (.33)**	**.22 (.28)**

Note. Boldface indicates a significant difference between Time 1 and Time 2 responses for that variable.

participants were more likely to list COVID-related events in response to negative than positive prompts, these observations can explain why the usual bright personal future envision in most studies is clouded by the pandemic and the troublesome future it presents.

In our preregistered hypothesis, we had expected the attenuation in valence-based dissociation to happen for the timeframe that covers the last and next month but not for the timeframe that covers the last and next 6 months. We probably did not observe such difference because the timeframes were not mutually exclusive. The last/next 6 months also comprises the last/next month, which might have made it difficult to detect the expected difference between time frames. We should emphasize that the attenuation of the valence-based dissociation still happened for future events, indicating that collective crises that influence personal lives can affect the patterns of valence in MTT.

Another issue of interest we raised in the Introduction was the relation between perceived agency and valence in the context of the pandemic. As noted, unlike the work on valence, there has been no research to date on how the relation between perceived agency and MTT played out during the COVID pandemic. In both personal and national domains, participants always attributed more agency to themselves when listing positive rather than negative events. This relation between positivity and self-agency is intuitive for the personal domain and replicates previous work (Topçu & Hirst, 2019). The pattern for national events, however, is noteworthy. Although participants believed that they have minimal levels of agency over national events, they still thought that they have more self-agency over positive than negative national events. A similar relation between self-agency and positivity in national events was observed in a study conducted before the pandemic (Topçu & Hirst, 2020), suggesting that this pattern might not be due to the pandemic.

For nation agency, we observed a dissociation: Participants attributed more agency to the nation when it came to positive and less so to negative national events, whereas they attributed more agency to the nation when it came to negative and again less so to positive personal events. Thus, in the early stages of the pandemic, an increase in the nation's agency was associated with negativity in the personal domain, but with positivity in the national domain. The association with positivity in the national domain replicates previous patterns (Topçu & Hirst, 2020). The relation between nation agency and negativity in the personal domain, however, is a novel finding. This pattern might be due to the perceived unexpected increase in the nation's capacity to affect personal lives during the pandemic and the negative impact of the national actions. For instance, participants may have viewed the precautionary measures imposed on their personal life negatively.

Study 2

In the second study, we wanted to test whether the patterns we observed for valence and perceived agency in the first study persisted at a different stage of the pandemic. The first study was conducted during the early stages of the pandemic, when its impact was direct and dramatic. The second study, on the other hand, was conducted a year later when vaccines had become widely available. We collected data from both the participants who completed the first survey and those who did not. As far as we know, no one has longitudinally studied MTT at these two stages of the COVID pandemic. At this new stage of the pandemic, we expected the positivity bias to be stronger than it was in the first study, especially for the personal domain. But we still expected an attenuation of the valence-based dissociation as the effects of the pandemic on personal lives and the nation had not totally subsided.

In the first study, we did not find a difference between timeframes and speculated that this might be due to the overlap of the two timeframes. With this in mind, in the second study, we used nonoverlapping time frames. We did not change the first timeframe (1 month), so that it would be comparable with the first timeframe in Study 1. For the second timeframe, we wanted participants to be able to remember events from a prepandemic period and imagine events from a—presumably—postpandemic period. Therefore, the second timeframe covered 5–10 years into the past and future. We suspected that most people would expect the pandemic to subside by this latter timeframe. Although we expected to find the usual Domain × Valence interaction, we also expected the valence-based dissociation to be attenuated for the first pandemic-related timeframe (when negativity about both personal and collective life will dominate) but not for the more sanguine second timeframe.

In the second study, we also wanted to test whether the results concerning perceived agency and positivity observed in Study 1 was a reliable pattern that persisted at different stages of the pandemic. We were particularly interested in exploring whether nation agency continued to be related to positivity in the national domain and with negativity in the personal domain.

Method

Participants

The data were collected exactly 1 year after the data collection of Study 1. We recruited participants through Amazon Mechanical Turk between April 30th and May 11th, 2021. We used the $\eta_p^2 = .13$ value from the first study for the significant Temporality × Domain × Valence interaction to calculate the effect size needed for the power analysis. The G*Power program (Faul et al., 2007) indicated that a total of 127 participants would be needed to replicate the three-way interaction in Study 1 ($f = .39$ at $\alpha = .05$ and $1–\beta = .80$; number of measurements: 16).

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All participants from Study 1 were sent the link for the second study and 44 out of 119 participants completed it. One participant was eliminated for failing to follow the instructions, leaving 43 returning participants (18 male, 25 female). The turn-out rate was 36%.

We also collected data from 244 new participants, in order to provide additional support for any findings from the longitudinal phase of this study. As in Study 1, we included six attention checks in the study and excluded participants who failed in more than two attention checks (preregistered criteria). Seventy participants were eliminated according to this criterion before any kind of data analyses. Out of the 174 who passed more than three attention checks 20 were eliminated before data analysis for not following instructions, leaving 154 new participants (79 male, 74 female, one other).

In total, there were 197 participants (99 female, 97 male, one other). Age range was 24–76 with a mean age of 41.63 ($SD = 12.35$). 74% of the participants identified as White Americans, 11% as Asian Americans, 8% as Black Americans, 6% as Hispanic/Latino, and 1% as other. Participants received $4 for their participation in the study.

Materials

The materials and procedure were identical to Study 1. The only difference was in the second time frame. As in Study 1, participants were asked to list personal and national events for 1 month for the first timeframe, but unlike Study 1, they were asked to list events for 5–10 years into the past and future for the second time frame.

Results

For preliminary analyses, we treated old and new participants as separate groups. We conducted all the analysis with a between-subjects variable that reflects those two groups. The variable did not interact with the analyses of interest, indicating that taking the survey the first time or the second time did not influence the observed patterns. Therefore, we collapsed the two groups in subsequent analyses, except in the longitudinal ones.

Valence

A 2 (Temporality: Past and Future) × 2 (Domain: Personal and National) × 2 (Valence: Positive and Negative) × 2 (Time: 1 Month vs. 5–10 Years) repeated-measures ANOVA was administered on the number of events (see Table 1). The main effects for temporality, $F(1, 196) = 266.56$, $p < .001$, $\eta_p^2 = .58$; domain, $F(1, 196) = 184.52$, $p < .001$, $\eta_p^2 = .48$; valence, $F(1, 196) = 17.98$, $p < .001$, $\eta_p^2 = .08$; and time, $F(1, 196) = 21.87$, $p < .001$, $\eta_p^2 = .10$, were significant. As in Study 1, participants wrote more events for future prompts than past prompts, $M_{diff} = 0.86$, $p < .001$, [0.76, 0.96], $d = 1.15$, for personal prompts than national prompts, $M_{diff} = 0.85$, $p < .001$, [0.73, 0.98], $d = 0.96$, and for the more distant time frame (5–10 years) than the closer one (1 month), $M_{diff} = 0.23$, $p < .001$, [0.13, 0.32], $d = 0.34$. Unlike Study 1, they responded with more events to the positive prompts than negative ones, $M_{diff} = 0.21$, $p < .001$, [0.11, 0.31], $d = 0.30$. The general negativity bias observed in Study 1 was reversed to the usual positivity bias in Study 2, which can be attributed to the less negative prospect of the pandemic.

These main effects were qualified by a series of two-way interactions. Again, we will only report the Domain × Valence interaction included in our preregistered hypotheses. The pair-wise comparisons for the other two-way interactions can be found in the Supplemental Materials. The Domain × Valence interaction was significant, $F(1, 196) = 66.32$, $p < .001$, $\eta_p^2 = .25$. As expected, participants responded with more positive than negative events for the personal domain, $M_{diff} = 0.56$, $p < .001$, [0.41, 0.70], $d = 0.56$, whereas they responded with more negative than positive events for the national domain, $M_{diff} = 0.13$, $p = .029$, [0.01, 0.24], $d = 0.16$. This valence-based dissociation is not just consistent with Study 1, but with most of the other work on personal and collective MTT (Deng et al., 2022; Shrikanth et al., 2018; Shrikanth & Szpunar, 2021).

As in Study 1, the predicted interaction between domain, valence, and time was not significant, $F(1, 196) = 0.32$, $p = .575$, $\eta_p^2 = .002$, even though, unlike Study 1, there was no overlap across timeframes. The three-way interaction between temporality, domain, and valence found in Study 1 was trending in this study, $F(1, 196) = 2.92$, $p = .089$, $\eta_p^2 = .02$ (Figure 4). Although the effect did not reach significance, we conducted pair-wise comparisons to see if the patterns observed in Study 1 were similar in Study 2. For the past, participants in Study 2 wrote more positive than negative events in response to personal prompts, $M_{diff} = 0.65$, $p < .001$, [0.47, 0.82], $d = 0.52$, whereas they wrote more negative than positive events in response to national prompts, $M_{diff} = 0.17$, $p = .029$, [0.02, 0.32], $d = 0.16$. For the future, again, participants listed more positive than negative events in the personal domain, $M_{diff} = 0.46$, $p < .001$, [0.27, 0.66], $d = 0.33$, they, however, listed an equal number of positive and negative events in the national domain, $M_{diff} = -0.09$, $p = .249$, [−0.24, 0.06], $d = -0.08$. In Study 1, we found that participants listed more negative than positive events in the national domain. Participants attitude about the nation's future appear to be changing in Study 2.

Valence and Perceived Agency

To test if the results on perceived agency and valence in Study 1 replicated in Study 2, we conducted 2 (Temporality: Past and Future) × 2 (Domain: Personal and National) × 2 (Valence: Positive and Negative) × 2 (Time: 1 Month vs. 5–10 Years) repeated-measures ANOVAs separately on self-agency and nation agency (see Table 2). As in Study 1, we only report interactions that involve valence. The analyses of remaining significant interactions can be found in Supplemental Materials.

Self-Agency. The ANOVA on self-agency yielded main effects for domain and valence, $F(1, 170) = 1568.30$, $p < .001$, $\eta_p^2 = .90$; $F(1, 170) = 466.83$, $p < .001$, $\eta_p^2 = .73$. As expected, participants attributed more self-agency over personal than national events, $M_{diff} = 2.88$, $p < .001$, [2.74, 3.02], $d = 3.02$, and over positive than negative events, $M_{diff} = 1.23$, $p < .001$, [1.12, 1.34], $d = 1.65$ (Table 2; Figure 5).

The two-way interactions between temporality and valence, $F(1, 170) = 7.64$, $p = .006$, $\eta_p^2 = .04$, and domain and valence, $F(1, 170) = 307.03$, $p < .001$, $\eta_p^2 = .64$, were significant, which were informed by a three-way interaction between temporality, domain, and valence, $F(1, 170) = 16.81$, $p < .001$, $\eta_p^2 = .09$. As in Study 1, participants attributed more self-agency over past than future personal positive events, $M_{diff} = 0.34$, $p < .001$, [0.16, 0.53], $d = 0.28$. For personal negative events, and for national positive and

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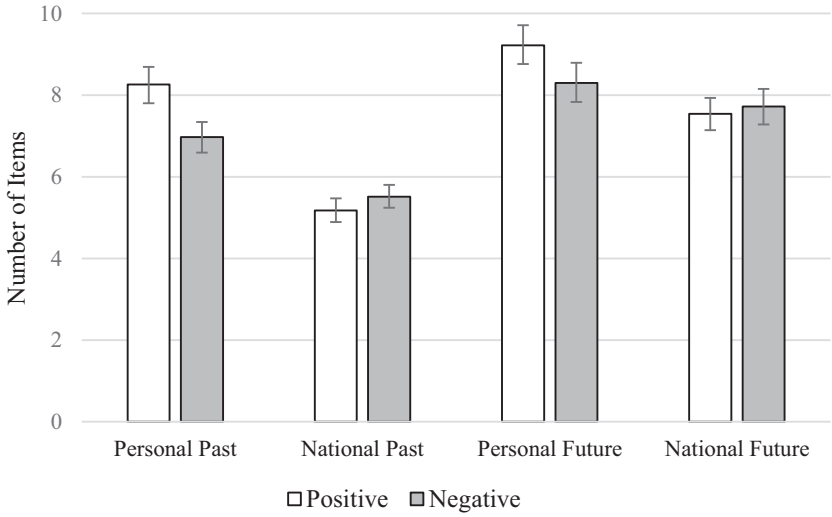
Figure 4

Mean Number of Positive and Negative Events Participants Listed That Happened in the Personal and National Past and Might Happen in the Personal and National Future in Study 2



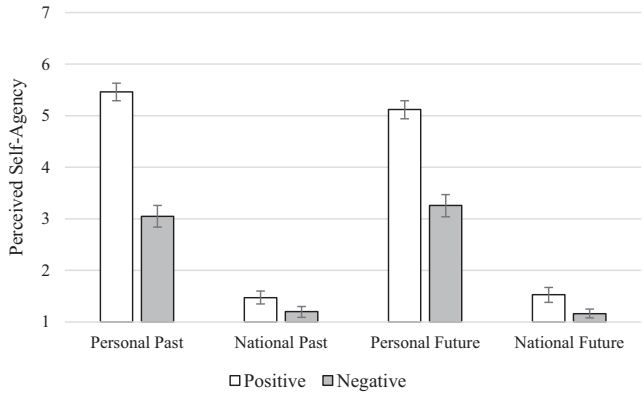
Note. Error bars reflect 95% confidence intervals.

negative events, the differences between temporal directions were not significant, absolute $M_{diffs} < 0.21$, $ps > .08$. That is, participants saw their self-agency influencing the positive, personal past, but not the negative personal past or future. It did not matter whether one was referring to past or future national events, self-agency had a similar influence.

The three-way interaction between temporality, valence, and time was also significant, $F(1, 170) = 8.59$, $p = .004$, $\eta_p^2 = .05$. For past positive events, participants attributed more self-agency over events that happened 5–10 years ago than events that happened 1 month ago, $M_{diff} = 0.20$, $p = .004$, [0.06, 0.33], $d = 0.22$. This finding probably reflects the helplessness people felt during the pandemic, at least when compared to their attitudes for 5–10 years ago. The four-way interaction between temporality, domain, valence, and time, $F(1, 170) = 4.267$, $p = .040$, $\eta_p^2 = .02$, revealed that this effect was again only present for personal past positive events, $M_{diff} = 0.28$, $p = .010$, [0.07, 0.49], $d = 0.20$. The differences between time frames were not significant for any of the other comparisons, absolute $M_{diffs} < 0.17$, $ps > .22$.

Figure 5

Mean Scores of Perceived Self-Agency Attributed Over the First Three Events Listed for Each Prompt as a Factor of Temporality, Domain, and Valence in Study 2



Note. Error bars reflect 95% confidence intervals.

Nation Agency. The ANOVA on nation agency yielded significant main effects for temporality, $F(1, 164) = 25.23$, $p < .001$, $\eta_p^2 = .13$; domain, $F(1, 164) = 1294.48$, $p < .001$, $\eta_p^2 = .89$; and valence, $F(1, 164) = 22.189$, $p < .001$, $\eta_p^2 = .12$. Participants attributed more national agency over future than past events, $M_{diff} = 0.24$, $p < .001$, [0.15, 0.34], $d = 0.39$, over national than personal events, $M_{diff} = 2.85$, $p < .001$, [2.70, 3.01], $d = 2.81$, and over positive than negative events, $M_{diff} = 0.27$, $p < .001$, [0.16, 0.39], $d = 0.37$ (Table 2). The latter two results are, as one might expect: The actions of a nation are more likely to influence national than personal events. Moreover, as we observed for self-agency, any actions are designed to, and can hopefully result in, positive outcomes.

The two-way interaction between domain and valence was significant, $F(1, 164) = 39.94$, $p < .001$, $\eta_p^2 = .20$. National agency was equal for positive and negative personal events, $M_{diff} = 0.06$, $p = .392$, [−0.07, 0.18], $d = 0.07$, whereas national agency was greater for positive over negative national events, $M_{diff} = 0.60$, $p < .001$, [0.43, 0.78], $d = 0.5$; see Figure 6. This result underscores the claim that national agency is more likely to affect national events and this agency is more likely to try to yield positive outcomes.

COVID Relation

We conducted a 2 (Temporality: Past and Future) × 2 (Domain: Personal and National) × 2 (Valence: Positive and Negative) ×

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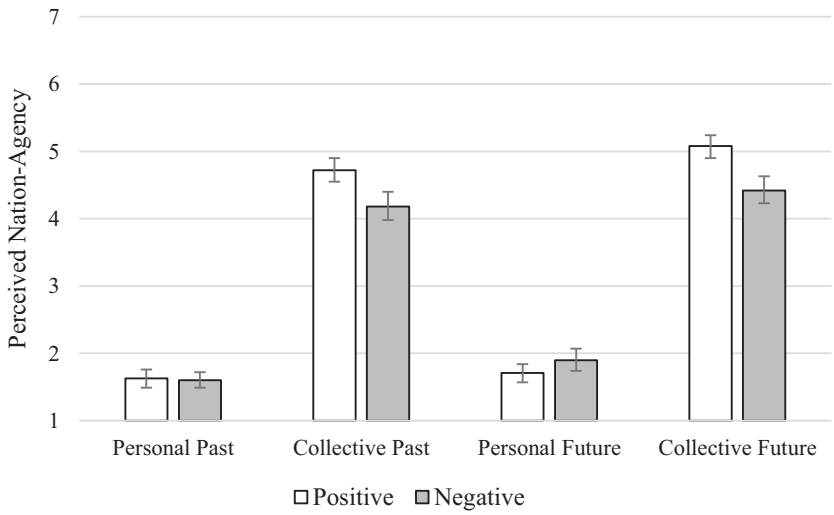
Figure 6

Mean Scores of Perceived Nation Agency Attributed Over the First Three Events Listed for Each Prompt as a Factor of Temporality, Domain, and Valence in Study 2



Note. Error bars reflect 95% confidence intervals.

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2 (Time: 1 Month vs. 5–10 Years) repeated-measures ANOVA on the proportion of COVID-related events (Table 3).[5]

The main effects of temporality, $F(1, 196) = 37.73$, $p < .001$, $\eta_p^2 = .16$; domain, $F(1, 196) = 227.46$, $p < .001$, $\eta_p^2 = .54$; valence, $F(1, 196) = 5.06$, $p = .026$, $\eta_p^2 = .02$; and time, $F(1, 196) = 435.52$, $p < .001$, $\eta_p^2 = .69$, were significant. Participants listed more COVID-related events for the future compared to the past, $M_{diff} = .05$, $p < .001$, [.04, .07], $d = 0.43$, for the national domain compared to the personal domain, $M_{diff} = .17$, $p < .001$, [.15, .19], $d = 1.11$, for 1 month compared to 5–10 years, $M_{diff} = .22$, $p < .001$, [.20, .24], $d = 1.53$. Although the patterns were the same with Study 1 for temporality, domain, and time, it was reversed for valence. Now, participants listed more COVID-related events for positive than negative prompts, $M_{diff} = .02$, $p = .026$, [.002, .04], $d = 0.15$.

The two-way interaction between temporality and domain was significant, $F(1, 196) = 32.30$, $p < .001$, $\eta_p^2 = .14$. For the personal domain, there was no difference between past and future responses, $M_{diff} = .01$, $p = .224$, [−.01, .03], $d = 0.07$, whereas for the national domain, participants listed more COVID-related events for the future than the past, $M_{diff} = .10$, $p < .001$, [.07, .12], $d = 0.53$, an unsurprising result given that one of the probes specifically targets a pre-COVID time frame.

The interaction between temporality and time was also significant, $F(1, 196) = 26.55$, $p < .001$, $\eta_p^2 = .12$. For the first time frame (1 month), there was no difference between past and future responses, $M_{diff} = .01$, $p = .328$, [−.01, .04], $d = 0.07$, whereas participants listed more COVID-related events for 5–10 years into the future than 5–10 years into the past, $M_{diff} = .95$, $p < .001$, [.08, .11], $d = 0.68$. The present of COVID-related responses to the 5–10 year future probe suggests that participants feared that COVID might not go away, even in the distant future.

There was also a two-way interaction between temporality and valence $F(1, 196) = 9.53$, $p = .002$, $\eta_p^2 = .05$. For past responses, participants listed more COVID-related events for positive than negative prompts, $M_{diff} = .04$, $p < .001$, [.02, .06], $d = 0.29$, whereas for future responses, there was no difference between positive and negative prompts, $M_{diff} = .003$, $p = .832$, [.−.02, .03], $d = 0.02$.

The two-way interactions between domain and valence, domain and time, and valence and time were significant, $F(1, 196)$s > 25.07, ps $< .001$, $\eta_p^2 > .11$, which were informed by a three-way interaction between domain, valence, and time, $F(1, 196) = 37.82$, $p < .001$, $\eta_p^2 = .16$. For personal events that happen in 5–10 years (past and future), participants listed more COVID-related events for negative than positive prompts, $M_{diff} = .03$, $p = .009$, [.02, .05], $d = 0.27$. However, they listed an equal number of COVID-related events for positive and negative prompts for personal events that happen in 1 month (past and future), $M_{diff} = .03$, $p = .065$, [−.002, .06], $d = 0.13$. For national events that happen in 1 month (past and future), they listed more COVID-related events for positive than negative prompts, $M_{diff} = .15$, $p < .001$, [.11, .20], $d = 0.52$. Participants listed an equal number of COVID-related events for positive and negative prompts for national events that happen in 5–10 years, $M_{diff} = .01$, $p = .421$, [−.02, .04], $d = 0.06$.

Longitudinal Analyses

We will now present the longitudinal comparisons for participants who were in both Study 1 and Study 2 ($N = 43$). Since the longer timeframe in Study 1 (6 months) and Study 2 (5–10 years), were drastically different, we confined our analyses to the consistent timeframe across both studies—that is, 1 month before or after the assessment. Also, we only report significant results that involve Study as a variable, since we are interested in the comparison of participants' responses in Study 1 versus Study 2.

[5] When political identification is added as an additional factor, it interacted with valence and time. Since the results do not reveal substantial changes in patterns, they are reported in Supplemental Materials.

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Valence. We entered number of events into a 2 (Temporal: Past and Future) × 2 (Domain: Personal and National) × 2 (Valence: Positive and Negative) × 2 (Study: S1 vs. S2) repeated-measures ANOVA.

The two-way interaction between study and temporal was significant, $F(1, 42) = 10.74$, $p = .002$, $\eta_p^2 = .20$. Participants wrote more responses to past prompts in Study 1 compared to Study 2, $M_{diff} = 0.45$, $p = .004$, [0.15, 0.76], $d = 0.46$.

The interaction between study and valence was also significant, $F(1, 42) = 4.57$, $p = .038$, $\eta_p^2 = .10$. There was no difference between studies for the number of positive events, $M_{diff} = 0.06$, $p = .582$, [−0.17, 0.30], $d = 0.08$. Consistent with the emerging picture, participants, however, listed more negative events in S1 compared to S2, $M_{diff} = 0.38$, $p = .041$, [0.02, 0.75], $d = 0.32$.

The Domain × Valence interaction was significant, $F(1, 42) = 19.93$, $p < .001$, $\eta_p^2 = .32$, revealing an overall valence-based dissociation, with participants listing more positive than negative events for the personal domain, $M_{diff} = 0.28$, $p = .038$, [0.16, 0.55], $d = 0.33$ and more negative than positive events for the national domain, $M_{diff} = 0.44$, $p < .001$, [0.20, 0.69], $d = 0.56$. This interaction, however, was informed by a three-way interaction between domain, valence, and study, $F(1, 42) = 4.07$, $p = .050$, $\eta_p^2 = .09$. In Study 1, participants listed an equal number of positive and negative events for the personal domain, $M_{diff} = 0.26$, $p = .131$, [−0.08, 0.59], $d = 0.23$, while they listed more negative than positive events for the national domain, $M_{diff} = 0.73$, $p < .001$, [0.45, 1.01], $d = 0.79$. In Study 2, on the other hand, participants again listed an equal number of positive and negative events for the personal domain, $M_{diff} = 0.31$, $p = .071$, [−0.03, 0.66], $d = 0.28$, but also for the national domain, $M_{diff} = 0.15$, $p = .379$, [−0.19, 0.49], $d = 0.13$. Please note that in Study 2 the difference between positive and negative events in the personal domain was trending toward a positivity bias. The failure to reach significance is probably because of the reduced power ($1–\beta = .44$) due to a limited sample size ($N = 43$). Overall, however, these longitudinal analyses confirm that changes occurred in the valence-based dissociation from Study 1 to Study 2.

To make sure the changes we observed in the longitudinal analysis are substantiated with a larger sample size, we also conducted the same analysis with nonoverlapping participants. The result of this cross-sectional analysis is reported in Supplemental Materials. Here, it is succinct to say that the changes observed in the valence-based dissociation across two studies—with a disappearance of the positivity bias for the personal domain in the first study and the disappearance of the negativity bias in the national domain in the second study were reconfirmed by this cross-sectional analysis.

Perceived Agency. A 2 (Temporal: Past and Future) × 2 (Domain: Personal and National) × 2 (Valence: Positive and Negative) × 2 (Study: S1 vs. S2) repeated-measures ANOVA was first conducted on self-agency scores.

The main effect for study was significant, $F(1, 40) = 6.67$, $p = .014$, $\eta_p^2 = .14$. Participants attributed more self-agency over events they listed in S2 compared to that of S1, $M_{diff} = 0.25$, $p = .014$, [0.06, 0.45], $d = 0.41$. The interaction between study and domain, $F(1, 40) = 21.49$, $p < .001$, $\eta_p^2 = .35$, revealed that this effect was only true for personal events, $M_{diff} = 0.64$, $p < .001$, [0.31, 0.98], $d = 0.61$.

The interaction between study and valence was also significant, $F(1, 40) = 4.36$, $p = .043$, $\eta_p^2 = .10$. Participants attributed more self-agency over positive events in S2 compared to S1, $M_{diff} = 0.44$, $p = .003$, [0.16, 0.72], $d = 0.50$. The increased self-agency in Study 2 may account for the decrease in negative events.

Nation agency scores were also entered into a 2 (Temporal: Past and Future) × 2 (Domain: Personal and National) × 2 (Valence: Positive and Negative) × 2 (Study: S1 vs. S2) repeated-measures ANOVA. There was a main effect of Study, $F(1, 38) = 5.35$, $p = .026$, $\eta_p^2 = .12$. Participants attributed more national agency for events they listed in S1 compared to those they listed in S2, $M_{diff} = 0.28$, $p = .026$, [0.04, 0.54], $d = 0.37$. We can better understand this main effect by examining the two-way interactions between study and domain, $F(1, 38) = 34.22$, $p < .001$, $\eta_p^2 = .47$, and study and valence, $F(1, 38) = 7.04$, $p = .012$, $\eta_p^2 = .16$, which were informed by a four-way interaction between study, temporal, domain, and valence, $F(1, 40) = 10.51$, $p = .002$, $\eta_p^2 = .22$.

In the case of past events, the difference between S1 and S2 was only significant for personal negative events, $M_{diff} = 1.44$, $p < .001$, [0.81, 2.07], $d = 0.75$. In S1, compared to S2, participants felt that the nation had more agency over negative personal events that happened in the last month. At the time of S1, there was no medical solution to COVID-19, only social restrictions. At the time of S2, restrictions were still present, but a medical solution now existed, so participants might have associated nation agency less with negativity in Study 2 in the personal domain.

In the case of future personal events, participants again attributed more agency to their nation at S1 compared to S2 over negative events, $M_{diff} = 1.24$, $p < .001$, [0.79, 1.70], $d = 0.89$, but also positive ones, $M_{diff} = 1.00$, $p < .001$, [0.47, 1.53], $d = 0.62$. These results indicate that participants felt that the nation had more agency over their immediate personal future—both positive and negative events—when the pandemic was just starting, whereas they felt that the nation has minimal control over personal events when the pandemic's effects started to wane.

Interestingly, for future national events, there is an opposite pattern. Participants attributed more agency to their nation over positive future national events at S2 compared to S1, $Md_{iff} = 0.62$, $p = .045$, [0.02, 1.22], $d = 0.33$, indicating that participants felt that the nation now has more agency over positive future events as the solutions to prevent the spread of the pandemic were more explicit and attainable.

COVID Relation. To see if the frequency of mentioning COVID-related events changes from Study 1 to Study 2, we entered the proportion of COVID-related events into a 2 (Temporality: Past and Future) × 2 (Domain: Personal and National) × 2 (Valence: Positive and Negative) × 2 (Study: S1 vs. S2) repeated-measures ANOVA.

The main effect of study was significant, $F(1, 42) = 89.83$, $p < .001$, $\eta_p^2 = .68$. In S1, 64% of all the responses were related to the pandemic, whereas in S2, only 33% of the listed events were related to the pandemic, $M_{diff} = .31$, $p < .001$, [.24, .38], $d = 1.43$.

The two-way interaction between study and valence was significant, $F(1, 42) = 23.16$, $p < .001$, $\eta_p^2 = .36$, which was informed by a three-way interaction between study, temporal, and valence, $F(1, 42) = 6.39$, $p = .015$, $\eta_p^2 = .13$. In S1, for both past and future responses, participants listed more COVID-related events in response to negative prompts than positive ones, past, $M_{diff} = .22$, $p < .001$, [.10, .33], $d = 0.58$; future, $M_{diff} = .09$, $p = .014$, [.02, .17], $d = 0.39$. In S2, on the other hand, participants listed more COVID-related past events in response to positive prompts compared to

negative ones, $M_{diff} = .10$, $p = .035$, [.01, .19], $d = 0.33$. This may reflect the introduction of the vaccine. There was no difference for future events in S2, $M_{diff} = .01$, $p = .839$, [−.07, .08], $d = 0.03$.

Discussion

The second study aimed to track similarities and changes in observed patterns during a different context of the pandemic. As we expected, unlike Study 1, participants exhibited the standard positivity bias by listing more events to positive prompts than negative ones. This reversal of the general negativity bias in Study 1 to a general positivity bias in Study 2 might be due to the more distant second timeframe selected for this study, which presumably covered a period beyond the COVID-19 pandemic. It could also be due to the circumstances in which the data were collected: The first data collection happened at the beginning of the pandemic, when the numbers were surging, while the second happened when the effects of the pandemic had started to wane.

More importantly, as in Study 1, an attenuation of the valence-based dissociation was observed for future events, but this time as a result of a change in the valence biases for national events. As the effects of the pandemic waned, participants started to re-exhibit the usual positivity bias for the personal future, which had disappeared at the beginning of the pandemic in Study 1. Interestingly, however, the often-observed negativity bias for the national future disappeared in the second study. Again, this may be because of the change in the way people viewed the pandemic, specifically, due to the relative positivity people experienced as vaccinations started to become widely available. Longitudinal analyses of valence-based dissociation patterns confirm these findings: Participants who were in both studies exhibited a negativity bias for the national domain in Study1, which disappeared in Study 2.

The attenuation of the dissociations between valence and domain we found did not emerge when moving from 5–10 years to 1 month, even though it was present when moving from past to future. This absence was not due to a decreased positivity in the personal domain, but rather to an increased positivity in the national domain for the future, which, as noted, may reflect the changing nature of the COVID pandemic. As to why we did not find differences in the valence-based dissociation when comparing timeframes, even though they differed substantially, this failure might reflect perceptions present at the time of Study 2. Participants might have projected these perceptions for national events—which was probably more positive due to the waning of the pandemic—into the future, whether it be 1 month or 5–10 years into the nation's future. Whatever the explanation, it is clear that the COVID-19 pandemic had an effect on the strength of the dissociation.

The analyses of the number of COVID-related events confirm our speculation that, in Study 2, (a) people are less preoccupied with the pandemic and (b) people are more optimistic about the pandemic's trajectory. In Study 1, 64% of all the events were COVID-related events, whereas in Study 2 this figure dropped to 33%. More importantly, in contrast to Study 1, participants in Study 2 listed more COVID-related events in response to positive prompts than negative ones, which was especially pronounced for the national domain. These results indicate that people probably expected positive national events to unfold as vaccination became more widespread, isolation measures end, and a "return to normal" seems possible. This optimism may have attenuated the negativity bias for collective future events.

How about perceived agency? As in Study 1, self-agency ratings were higher for positive events than negative ones, in both personal and national domains. So, even when participants attributed quite low levels of agency to themselves over national events, they still thought that they have more agency over positive national events than negative ones. Longitudinal analyses revealed that participants attributed more agency to themselves over personal events in Study 2 than in Study 1, which was especially more prevalent for positive events. It appears that participants felt they had more agency over their personal lives when a vaccine was available and the effects of the pandemic started to wane, when compared to the time when the pandemic had just started. This increase in self-agency from Study 1 to Study 2, and its association with positivity, might be the underlying reason for the return of the positivity bias for personal events in Study 2.

As in Study 1, nation agency was related to positivity in the national domain, in that participants assigned more agency to the nation over positive than negative national events. Longitudinal analyses revealed that, perceived nation agency increased in Study 2 compared to Study 1 for positive future national events. Considering the relation between nation agency and positivity in the national domain, this increase might be one of the reasons why the negativity bias for the national domain disappeared in the second study.

In addition, nation agency was no longer related to negativity in the personal domain in Study 2. Unlike Study 1, participants attributed equal levels of agency to the nation over positive and negative personal events. With the vaccines becoming available across the country, people might have associated any national agency with a relative positivity, even in the personal domain. Moreover, longitudinal analyses revealed that, overall, participants attributed lower levels of agency to the nation over personal events in Study 2 than in Study 1, which might explain why the dissociation in nation agency disappeared in the first place. Given the relation between nation agency and negativity in the personal domain in Study 1, this decrease in nation agency might be another underlying reason for the return of the positivity bias in the personal domain in Study 2.

Taken together, the analyses of perceived agency indicate that greater perceived self-agency is associated with more positive events in both domains, whereas greater perceived nation agency is associated with more positive events for the national domain. It is also important to note that the extent of perceived self- or nation agency changed from Study 1 to Study 2 as the circumstances of the pandemic changed, which might provide an explanation for the changes that happened in valence patterns.

General Discussion

In the present research, we explored patterns of valence and perceived agency for personal and collective MTT during COVID-19. Previous research has consistently demonstrated that certain public events can affect the way people represent and organize their autobiographical memory, especially when the events "dramatically alter the fabric of daily life" (N. R. Brown et al., 2016; N. R. Brown & Lee, 2010, p. 133). The COVID-19 pandemic provided a novel context in which a public event had a direct, dramatic, and prolonged impact on people's daily lives in countries across the world (N. R. Brown, 2021). We aimed to explore both the patterns that persisted and the patterns that

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changed in mental time travel during this unique context. We specifically focused on the valence and perceived agency of remembered and imagined events. The longitudinal design of the study enabled us to test whether the patterns we observed in the cross-sectional comparison of the two studies were present within-individuals.

The findings in both studies show that the context in which people engage in MTT matter. When collective contexts change in a dramatic way that affects personal and national circumstances, changes in patterns of valence and perceived agency for MTT also occur. The present research does not only unravel the changes that happen in MTT with changing contexts, but also show that some patterns remain stable even under dramatically different circumstances. In that sense, the present findings go beyond the specific pandemic context and points at what patterns are more resilient to change while others are open to the influence of circumstances.

One resilient pattern was the overall valence-based dissociation between personal and collective cognition (Deng et al., 2022; Shrikanth et al., 2018; Shrikanth & Szpunar, 2021). In both studies, positive events were more prevalent in the personal domain, while negative events were more prevalent in the collective domain. Despite these persistent patterns, there were also certain changes that can be attributed to the pandemic.

In the first study, which was conducted during the early stages of the pandemic, the valence-based dissociation was present for past events, whereas for future events it was attenuated due to the disappearance of the positivity bias for the personal future (Burnett et al., 2023; Yamashiro et al., 2022). In the second study, which was conducted a year later, there was again an attenuation of the valence-based dissociation in future events. This time, however, the usual positivity bias for the personal future was observed while the negativity bias for the collective future disappeared. These patterns indicate that there was a heightened focus on the negative consequences of the pandemic during the early stages, which is in line with other studies (Cole et al., 2022; Ford et al., 2021; Metzler et al., 2023; Niziurski & Schaper, 2023; Tull et al., 2020). This focus on negativity, however, gave way to a positive outlook in both personal and collective domains a year later. Longitudinal analyses provide direct support for the changes that happened in the valence-based dissociation patterns.

There could be two pandemic-related explanations for the change from a focus on negativity to one on positivity. The first one is that people were less preoccupied with the pandemic 1 year later than they were during the height of the crisis when everything was more ambiguous, which led to the return of the usual positivity bias in the personal domain. The second is that people have a relatively more optimistic outlook on the trajectory of the pandemic due to the increase in vaccinations. The study-specific and longitudinal analyses of COVID-related events are in line with these explanations.

The analyses of people's perceptions and behaviors involving the pandemic also support these explanations. The longitudinal results reported in the Supplemental Materials indicate that people were less scared, less worried, and more indifferent about COVID-19 in Study 2 than in Study 1. They also engaged in less social distancing, and spent less time thinking, communicating, and following the news about the pandemic. Importantly, they thought that the nation has more control in preventing the spread of COVID-19 and that they were more efficient in protecting themselves from infection in Study 2 than in Study 1. These results indicate that in the second study, people's perceptions, valence, and perceived agency patterns reflected a slow but steady return to normality.

We should note that in our preregistered hypotheses we expected the attenuation to happen for the timeframe within the pandemic period but not for the timeframe beyond the pandemic period. Findings did not support this prediction. This result could be due to people's preoccupation with the present circumstances. When mentally travelling into the past or the future, people might be projecting their present perceptions on the past and future, which could cloud their memories and future imaginations (Ross, 1989). Nevertheless, we do not argue that timeframe does not have any effect on MTT. In fact, we think that indicating the timeframe in survey prompts is important when exploring personal and collective MTT, if only because of the drastically unmatched span of individual and collective "lives." Providing the same timeframes when eliciting personal and collective events provides a reference point for temporal distance, which might enable a more accurate analyses of valence biases.

In both studies, the attenuation in valence-based dissociation happened because of a change in valence patterns for the future not for the past. Using Koselleck's (2004, p. 259) terminology, the future as the "horizon of expectation" was characterized by a relative disappearance of positive expectations for the personal domain at the early stages of the pandemic and by a relative disappearance of negative expectations for the collective domain at the later stages of the pandemic. Since there were no noticeable changes in valence biases for the past as the "space of experience" (Koselleck, 2004), the present research can provide a starting point to discuss whether collective crises that intersect the personal and the collective might have more impact on how people perceive the future rather than how they remember the past, even when that past encompasses the crisis period.

Taken together, the findings on valence biases underline the critical need to consider the circumstances in which people engage in MTT. The present study suggests that even when a valence-based dissociation is present, its strength might depend on context, in this case a crisis that drastically affects both domains. Deng et al. (2022) made a similar point with respect to culture, showing that Chinese participants do not show valence biases in both personal and collective domains that American participants do. It remains an open question as to whether the cultural differences Deng et al. found could be attributed not to cultural differences between Americans and Chinese, or to the different circumstances existing in China and the United States.

What might be the underlying reason for the effects of context on valence biases? A novel contribution of the present research was the exploration of perceived agency in personal and collective MTT using the fluency paradigm. The main assumption was that when people view themselves or the nation as agentic, they also will assume that they or their nation will strive, respectively, for a more positive personal or collective future. Previous research revealed that as people attributed more agency to their nation over collective events, they evaluated those collective events to be more positive (Topçu & Hirst, 2020). In the same study, there was also a significant relation between the agency people attribute to themselves over collective events and the positivity they associate with the events (Topçu & Hirst, 2020). Another study that only focused on personal events found a similar relation between

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perceived self-agency and the valence of events: As people viewed themselves to have more control over events, they also viewed the event to be more positive (Topçu & Hirst, 2019). There is no research before this study, that we know of, that explores the role of perceived self- and nation agency in both personal and collective MTT in a single study.

In the present research, we were able to replicate and extend these previous findings using the fluency paradigm in the unique context of the COVID-19 pandemic. Exploring perceived agency during the pandemic is especially interesting, because the unexpected changes that happened at both personal and collective levels interfered with people's sense of agency. In both studies, people thought that their agency was/will be greater over positive events than negative events and this was true for both personal and collective domains. Although the pattern between perceived self-agency and valence was same across studies, longitudinal analyses showed that overall perceived self-agency over personal events increased in the second study. People felt more agentic in their personal lives as the effects of the pandemic started to wane, which might explain why the positivity bias for the personal future was not observed in the first study but was present in the second one.

The analyses on perceived nation agency revealed a novel dissociation between personal and collective cognition during the pandemic. In both studies, people attributed more agency to their nation over positive than negative collective events (Topçu & Hirst, 2020). They, however, thought that the nation had more agency over negative than positive *personal* events in Study 1, but not in Study 2. Longitudinal analysis revealed that the difference in the personal domain probably disappeared because of a general decrease in perceived nation agency over personal events in the second study. This decrease can be explained by the pandemic losing its impact over personal lives.

A similar longitudinal analysis, however, showed an increase in perceived nation agency over positive future collective events. These changes in perceived nation agency across different stages of the pandemic can be another underlying reason for the return of the positivity bias for the personal future and disappearance of the negativity bias for the collective future. Unlike self-agency, the increase or decrease of perceived nation agency has differential effects on the valence of personal and collective events.

There were also certain limitations in the present research that should be addressed in subsequent studies. We used different modalities for valence and perceived agency by measuring valence biases through the number of positive and negative events and by measuring perceived agency through participants' evaluations of those events. A more layered and detailed analyses of the relation between these two constructs would have been possible by asking participants to evaluate the degree of positivity/negativity of their responses. Another limitation in both the current and previous MTT research is the nonexperimental design of the studies, which do uncover important patterns in MTT but do not enable researchers to make causal inferences. Experimental designs are needed to substantiate the observed relations between perceived agency and valence in MTT. Finally, although there has been some cross-cultural work on personal and collective MTT (Deng et al., 2022; Mert et al., 2023; Öner et al., 2022; Yue et al., 2023), the extant literature is largely built-upon data coming from WEIRD populations. More studies that take culture into account are necessary for a thorough understanding of the factors involved in MTT in both crisis and noncrisis situations (Liu & Szpunar, 2023).

Constraints on Generality

In this study, our aim was to explore the effects of context, that is, the different stages of the pandemic, on the valence and perceived agency of personal and national events. Most previous studies exploring the dissociation between personal and collective mental time travel have been conducted with North American samples. To be able to compare the patterns during the pandemic with the patterns observed in prepandemic studies, we also decided to collect data in the United States. This decision, however, imposes a constraint on the generality of our findings. We emphasize that our findings apply to a North American sample that has access to online crowd sourcing platforms. As noted, to ensure generalizability, future studies should aim to collect data both from populations other than North Americans, and from populations that might not have access to the internet.

Conclusion

The present research showed that the relation between valence, perceived agency, and personal and collective mental time travel can be context specific. The valence-based dissociation found in Shirkanth et al. (2018) is not always robust even in WEIRD countries (Hirst & Topçu, 2023). Certain public events that intersect personal and collective domains, like the COVID-19 pandemic, can alter the patterns of differences between personal and collective MTT, especially for future thought. An underlying factor when explaining both the usual valence biases and the alterations that happen during crisis periods is the perceived agency people assign to themselves and their social groups. Borrowing Koselleck (2004) terminology again, the future as "the horizon of expectation" might be more open to the influence of agency than the past "as the sense of experience."

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