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Distortions in Time Perception During Collective Trauma: Insights From a National Longitudinal Study During the COVID-19 Pandemic

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Objective: During the protracted collective trauma of the COVID-19 pandemic, lay of distorted perceptions of time (e.g., time slowing, days blurring together, uncertainty about the future) have been widespread. Known as "temporal disintegration" in psychiatric literature, these distortions are associated with negative mental health consequences. However, the prevalence and predictors of temporal disintegration are poorly understood. We examined perceptions of time passing and their associations with lifetime stress and trauma and pandemic-related secondary stress as COVID-19 spread across the United States. ***Method:*** A probability-based national sample (N = 5,661) from the NORC AmeriSpeak online panel, which had completed a mental and physical health survey prior to the pandemic, completed two surveys online during March 18–April 18, 2020, and September 26–October 16, 2020. Distorted time perceptions and other pandemic-related experiences were assessed. ***Results:*** Present focus, blurring weekdays and weekdays together, and uncertainty about the future were common experiences reported by over 65% of the sample 6 months into the pandemic. Half of the sample reported time speeding up or slowing down. Predictors of temporal disintegration include prepandemic mental health diagnoses, daily pandemic-related media exposure and secondary stress (e.g., school closures, lockdown), financial stress, and lifetime stress and trauma exposure. ***Conclusion*:** During the first 6 months of the COVID-19 pandemic, distortions in time perception were very common and associated with prepandemic mental health, lifetime stress and trauma exposure, and pandemic-related media exposure and stressors. Given that temporal disintegration is a risk factor for mental health challenges, these findings have potential implications for public mental health.

Clinical Impact Statement

This study documents the prevalence and early predictors of distortions in perceived time during an unprecedented, protracted collective trauma—the COVID-19 pandemic. Our findings document common distortions in time perception during a collective trauma and describe how trauma-related secondary stress may exacerbate these distortions. Known as "temporal disintegration" in the psychiatric literature, these distortions have been linked with mental health symptoms. To the extent that they are associated with mental health disorders (e.g., depression, anxiety), they may be an important risk factor to target with early interventions to prevent the mental health sequelae of collective trauma.

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The COVID-19 pandemic has been an extraordinary collective trauma that has triggered a cascade of protracted secondary stress and trauma exposures (e.g., economic downturn, social discord, widespread grief/loss), making 2020 one of the most stressful years in recent U.S. history (American Psychological Association, 2021; Silver et al., 2021). In the days and weeks following the U.S. president's emergency declaration in March of 2020, states began implementing stay-at-home orders, lockdowns, and social distancing measures to stem the tide of rising COVID-19 infections and deaths, and international borders were closed. As businesses shuttered their doors, unemployment claims across the country rose sharply. Uncertainty about the future was a distinguishing feature of the pandemic's acute period (cf. Rettie & Daniels, 2021), giving rise to a perfect storm of secondary stress and trauma exposure that dramatically upended daily life.

Against this backdrop, many people's time perspective (TP; i.e., our view of time as it spans from our past into the future; Lewin, 1942) shifted as they focused on the immediate, present danger of the COVID-19 pandemic and future plans became uncertain (Holman & Grisham, 2020; Ogden, 2020). The flow of time passing was disrupted as people coped with an unpredictable and novel threat (Grondin et al., 2020; Ogden, 2020). Studies of convenience samples recruited through email, social media, and listservs suggested that many people experienced time slowing down, stopping, and/or speeding up as they coped with the challenges of the pandemic (see Droit-Volet et al., 2020; Grondin et al., 2020; Ogden, 2020). Such a pattern was previously identified in the clinical literature and coined "temporal disintegration" (TD), where sequential thinking is impaired and the present seems disconnected from the continuity of time (Melges, 1982, p. 135).

Clinically depressed individuals often report experiencing time moving more slowly than nondepressed people (Blewett, 1992; Ratcliffe, 2012), and depressed individuals also tend to have a very limited view of the future (Ghaemi, 2007). Many clinical patients who have experienced trauma also report a foreshortened sense of the future (Terr, 1983). These changes in the continuity or pace of time's flow from past to present and future may affect people's TP (see Holman & Silver, 1998) by limiting the degree to which they are able to move past a traumatic experience to envision a future for themselves. However, how the disruptions in temporal sequencing seen in traumatized clinical patients translate to the general population, especially in the context of coping with an ongoing collective trauma, has received limited research attention.

Given the importance of future orientation for well-being and morale (Heidegger, 1962; Nuttin, 1985), especially when coping with adversity (Lewin, 1942), the shift away from future orientation that often accompanies TD may increase risk for trauma-related (Lavi & Solomon, 2005) and depressive symptoms (Zhang et al., 2009). Indeed, TD has been associated with heightened psychological distress in both the acute aftermath of collective trauma and over time (Holman & Silver, 1998). However, rigorous studies examining the prevalence of and psychosocial factors predicting TD are quite rare (cf. Holman & Silver, 1998); studies examining TD during an unfolding, protracted collective trauma are even rarer.

The COVID-19 pandemic presented a unique opportunity to conduct such a study. Given the limited research addressing TD in the context of collective trauma, we drew from experimental research on time perception, community-based studies of time perception during trauma, and studies on the psychosocial predictors of response to collective trauma to better understand the prevalence and predictors of TD in a large probability-based, general population sample during the early stages of the pandemic.

Experimental Research on Time Perception

Interest in perceptions of time and their role in human experience has a long history in psychology (e.g., James, 1890; Lewin, 1942) and has led to a great deal of research. Most time perception research has been experimental, using stimuli of varied, but short, durations (milliseconds to seconds) to understand how different perceptual, attentional, and, more recently, emotional experiences impact estimates of time's duration (see Grondin, 2010, for a review). Samples used in these studies are typically quite small and highly selective (e.g., students, volunteers, experimenters, psychiatric patients; e.g., Angrilli et al., 1997; Blewett, 1992; Toren et al., 2020; Tse et al., 2004), and the procedures used are qualitatively distinct from real-world trauma exposures, leaving in question the ecological validity and applicability of the findings for understanding how time perceptions operate during collective trauma. Nonetheless, this body of research suggests that the allocation of attentional resources (Tse et al., 2004; Zakay, 1989), contextual changes and complexity (Block, 1989; Grondin, 2010), and emotional arousal (Droit-Volet, 2013) are each linked to subjective experiences of the duration of time passing.

Given the contextual complexity and potential emotional arousal characteristic of traumatic experiences, this literature could be interpreted to suggest that perceived time would pass more slowly during trauma, an experience that has been documented in prior field studies (Holman, 2015; Holman & Silver, 1998). Although experimental research has not addressed the impact of trauma on time perception or TD directly, experimental and quasi-experimental work documents altered time perception in individuals viewing highly arousing and threatening images (Droit-Volet et al., 2010), in those who feared death during a highly stressful event (Noyes & Kletti, 1977), and among individuals with posttraumatic stress disorder relative to controls (Ahmadi et al., 2019; Vicario & Felmingham, 2018), suggesting that TD may have clinical implications for survivors of individual trauma. However, sample sizes in these studies are typically very small, and they tell us little about the prevalence and predictors of TD in the general population. Moreover, the psychological impact of TD following a collective trauma remains understudied. Thus, to understand the

prevalence and predictors of TD, population-based research is needed. That is, TD must be studied in the broader population following real exposures to collective trauma. The COVID-19 pandemic, a collective trauma of unprecedented magnitude that disrupted countries around the globe and resulted in the deaths of millions of people, provided an ideal context in which to conduct such a study.

Prior studies identified several experiences that may be associated with TD during collective trauma. In the aftermath of a massive wildfire, residents who lost their homes reported higher TD than those who did not (Holman & Silver, 1998), suggesting that direct exposure to the immediate impact of traumatic stress is associated with greater likelihood of experiencing TD. Respondents who had been directly exposed to chronic trauma (e.g., domestic violence) also reported higher TD following the wildfire (Holman & Silver, 1998). In the context of COVID-19, these findings suggest that in addition to the impact of the pandemic itself, lifetime trauma (e.g., domestic violence, loss of loved one) and ongoing secondary stress (e.g., job loss, school closures) may sensitize people and leave them preoccupied with the present at the expense of future plans and, in so doing, encourage TD. Extensive exposure to media coverage of the pandemic is yet another stressor that may keep people immersed in pandemic stress or trauma (see Garfin et al., 2020; Thompson et al., 2019). Together, these collective trauma exposures may make the immediate threat of the deadly, invisible virus more salient and keep people focused on the present trauma.

The Current Study

The continually evolving nature of the pandemic, the ongoing stress and trauma associated with it, and the known association between preexisting mental health disorders and distortions in time perception make prospective analyses essential. In the current study, we surveyed a large, probability-based, national sample of NORC AmeriSpeak online panelists twice during the first 6 months of the COVID-19 pandemic to examine these associations prospectively over time. Importantly, prepandemic mental and physical health data were available for this sample. The primary research goal was to examine the prevalence and early predictors of TD experienced during the pandemic.

Method

Sample, Design, and Procedures

Respondents for this two-wave study were randomly drawn from the NORC AmeriSpeak online panel, a probability-based panel of 35,000 U.S. households who were selected at random from across the United States. The AmeriSpeak panel is the only probability panel in the United States that uses random door-to-door interviewing to recruit its participants (Dennis, 2020). Unlike typical internet panels, in which people who already have internet access can choose to opt in, no one can volunteer for the AmeriSpeak panel. Sample demographics are presented in online Supplemental Table 1.

The Wave 1 survey was fielded to a sample of 11,139 panelists in three consecutive 10-day cohorts beginning the evening of March 18, 2020 (5 days after the U.S. president's declaration of a national emergency) and continuing until the evening of April 18, 2020 (Holman et al., 2020). Participants received an email stating that the survey was available online and completed it anonymously. Most respondents (86.4%) completed the survey within the first 3 days of receiving the survey invitation. Almost 44% completed the survey on a computer, about 54% completed it on a smartphone, and the remainder completed it on a tablet (or did not provide a response). NORC compensates AmeriSpeak panelists with points worth a cash equivalent (in this case $4). When the fielding period ended, 6,598 panelists completed surveys (59.2% completion rate); 84 cases (1.3%) were removed from the final sample due to unreliable survey completion times (under 6.5 min) or extensive missing data (> 50% of questions), leaving $N = 6,514$ panelists (58.5% participation rate).

The Wave 2 survey was fielded approximately 6 months later (September 26 to October 16, 2020) to everyone from Wave 1 who was available and remained in the AmeriSpeak panel (6,501 panelists). Of these, 5,722 completed the Wave 2 survey (88% completion rate), with most respondents (80.1%) completing it within the first 4 days of data collection. Sixty-one cases were removed for speeding through the survey or excessive missing data, leaving a total of 5,661 (87% completion rate) respondents in the Wave 2 sample. Participants provided informed consent when they joined the NORC panel and were informed that their identities would remain confidential. All data were collected in a manner consistent with the ethical standards for the treatment of human subjects, and all procedures for this study were approved by the Institutional Review Board for Human Subjects Research of the University of California, Irvine.

Measures

Temporal Disintegration (Wave 2)

At Wave 2, we examined distortions in time perception using a seven-item index of TD symptoms experienced over the past 6 months that included the following items: "felt as though time had slowed down or stopped," "felt unsure about what time or day it was," "felt as though time was speeding by," "found yourself focused on the present moment," "found yourself forgetting what just happened or feeling unclear about the order of events you just experienced," "felt like weekdays and weekends have been the same," and "felt uncertain about the future." Responses across items ranged from 1 (*never*) to 5 (*all the time*); scale reliability was acceptable ($\alpha = .72$). Composite scores were computed by averaging responses across items.

To adjust for acute psychological processes that may have predisposed individuals to experience TD during the pandemic, we included a Wave 1 measure of future uncertainty as a covariate. This two-item measure assessed uncertainty about the future experienced in the past week (i.e., "feel that your future is uncertain" and "feel as though you have no future"). Responses across items ranged from 1 (*not at all*) to 5 (*a great deal*). Responses across these two items were averaged ($\alpha = .79$).

Demographics and Health Information (Pre-Wave 1)

Upon entering the AmeriSpeak panel, NORC collects demographic information from participants including age, race/ethnicity, education, gender, geographic region of residence, and household size. Demographic characteristics of the sample are provided in the

results below. They also collect and periodically update health information. Pre-COVID health data were collected on the entire sample between 2017 and 2019. Specifically, 56% of the sample completed the pre-COVID health assessment in 2019, 25% completed it in 2018, and 19% completed it in 2017, so the entire sample had completed assessments of their mental and physical health before the pandemic began. Participants reported whether a doctor had ever diagnosed them with several physical and mental health ailments. Prior mental health diagnoses were coded as 0 (no prior mental health diagnosis) or 1 (prior anxiety, depression, or any other emotional, nervous, or psychiatric diagnosis). Prior physical health diagnoses were coded as a count of eight possible prior diagnoses (i.e., high cholesterol, hypertension, diabetes/high blood sugar, heart disease, stroke, cancer, lung disease, and other diagnoses).

COVID-19 Exposures (Waves 1 and 2)

Wave 1 COVID-19 Exposures. Participants completed a checklist to report their degree of exposure to the COVID-19 outbreak. Ten items reflected personal exposures: direct or indirect disease exposure (e.g., "I/someone close to me was diagnosed with coronavirus"); two items reflected work exposures (e.g., "my job requires in-person interaction and I am still working"); and six items reflected community-wide outbreak-related impacts (e.g., "my community has been instructed to 'shelter in place'"). Seven items reflected COVID-19-related secondary stressors (e.g., lost job, canceled travel plans).

Wave 1 Media Exposure. We assessed media exposure to the COVID-19 pandemic using participants' reports of the number of hours per day (0 to 11+) spent in the previous week engaging with each of three sources of media coverage of the outbreak: traditional media (i.e., TV, radio, and print news), online news, and social media (e.g., Facebook, Reddit, Twitter). The COVID-19-related media coverage score reflected a sum of total daily hours of media exposure across these three sources. Because participants could simultaneously engage with multiple sources, the maximum score was 33.

Wave 2 COVID-19 Exposures. Six months into the pandemic, we collected information about the extent to which respondents had been exposed to the coronavirus ranging from no exposure to being on a ventilator in the hospital, dichotomized as 0 = no sickness or 1= some level of sickness. Other COVID-related exposures were assessed as a count of six financial exposures (e.g., lost wages, job, health care) and a count of nine secondary stressors (e.g., unable to get a COVID-19 test, cared for a relative sick with COVID-19, lack of access to resources for school or work).

Non-COVID Stress/Trauma Exposures (Wave 2)

At Wave 2, participants were given a checklist to indicate whether they ever experienced any of eight negative life events (e.g., experienced a tragedy or disaster in your community, experienced physical, emotional, or sexual abuse, bereavement). Participants also indicated when they experienced each event (prepandemic or during pandemic). Two variables were created: a count of events before the pandemic (lifetime) and a count of events since its onset (recent).

Analytic Strategy

The prevalence of individual TD items was examined using a weighted proportions command in Stata 16.1 (Stata Corp, College Station, TX). Correlates of TD were examined using a weighted ordinary least squares regression approach using the structural equation modeling command. Missing data were estimated in the analysis using the maximum likelihood with missing values estimation option within the structural equation modeling framework; thus, the final analytic sample was 5,661 respondents. All variables were standardized.

Statistical weights were calculated to account for sampling design, attrition from Wave 1 to Wave 2, and deviations between the final sample and U.S. census benchmarks. Weights were constructed in two phases. First, panel base sampling weights were computed based on the probability of initial selection into the AmeriSpeak panel, subsampling of some nonrespondents for in-person follow-up, and unknown eligibility and nonresponse. These panel weights were then matched against external population totals from the Current Population Survey (Census Division). Second, study-specific base sampling weights were derived using a combination of the final panel weight and the probability of selection from the AmeriSpeak panel into our study sample at Wave 1. This weight also accounts for survey nonresponse and again was adjusted to U.S. census benchmarks (based on age, sex, education, race/Hispanic ethnicity, Census Division, and the following sociodemographic interactions: Age × Gender, Age × Race/Ethnicity, and Race/Ethnicity × Gender). Extreme weights were trimmed and then reranked to population totals. The Wave 2 weight accounted for attrition from Wave 1 to Wave 2 by matching the final Wave 2 sample to the U.S. census benchmarks at the time of the Wave 1 survey. This process facilitates more robust population-based inferences.

Transparency and Openness

The analyses for this study were not preregistered. Data code and study materials are available upon request from the corresponding author.

Results

The weighted sample demographics included 52% female-identified respondents who were ages 18–34 (29%), 35–49 (25%), 50–64 (25%), and over 65 (21%); racial/ethnic identification included White (64%), Black (12%), Hispanic (16%), Asian/Pacific Islander (3%), and other (5%); respondents with a college degree comprised 34% of the sample, while another 57% had completed high school; 39% had incomes between $30,000 and $75,000, and 34% had incomes over $75,000. Respondents lived in the Northeast (17%), Midwest (21%), South (38%), and West (24%). See Table 1 for weighted descriptive statistics of model variables.

Temporal Disintegration

Table 2 presents weighted descriptive statistics of the responses to each of seven TD items. Being focused on the present moment, feeling like weekdays and weekends have been the same, and feeling uncertain about the future were common experiences reported by 65% or more of the Wave 2 sample. Half of the sample reported feeling as though time was speeding up (50.4%); at least half also reported feeling as if it was slowing down (55.2%). Less

Table 1
Weighted Descriptive Statistics for Key Model Variables

Variables	*M*	*SD*	Min	Max
Wave 1				
Any pre-COVID mental health diagnosis	.18	.38	0	1
Pre-COVID physical health ailments	1.04	1.23	0	8
Household size	2.86	1.54	1	6
Personal COVID exposure	.12	.40	0	5
Community stressors	4.95	1.44	0	6
Work exposure	.30	.46	0	1
Personal secondary stressors	1.38	1.21	0	7
Media exposure	7.06	6.84	0	33
Future uncertainty	1.76	.96	1	5
Wave 2				
Temporal disintegration	2.65	.74	1	5
Lifetime stress or trauma (prepandemic)	2.51	1.96	0	8
Recent stress or trauma (during pandemic)	.26	.63	0	8
Ever sick with COVID-19	.05	.22	0	1
Financial stressors	.65	1.05	0	6
Personal secondary stressors	1.37	1.34	0	9

Note. *N* varies across variables due to missing data; *n* ranges from 5,640 to 5,650. Min = minimum; max = maximum.

common experiences included uncertainty about the time or day (46.4%), and forgetting events just experienced (35.2%).

Correlates of Temporal Disintegration

We then examined the demographic and psychosocial correlates of the Wave 2 composite measure of TD (see Table 3). Controlling for feeling uncertain about the future (measured at Wave 1), positive associations with TD were found for gender (women reported more TD than men), COVID-related media exposure, prior mental health diagnosis (those with a mental health diagnosis had higher TD than those without), and prepandemic non-COVID stress and trauma exposure. COVID-related work exposure at Wave 1, age (respondents 45–59 reported less TD than the youngest respondents), and region (Midwest respondents reported less TD than those in the Northeast) were all negatively associated with TD. Concurrent Wave 2 positive correlates of TD included COVID-related secondary and financial stressors.

Discussion

This prospective study of a large nationally representative sample of Americans surveyed at the onset of the pandemic and 6 months later offers unique insight into the prevalence and early predictors of distortions in time perception experienced during a significant collective trauma. Two key findings emerged from this study: (a) Distortions in time perception consistent with trauma-related TD identified in previous studies (Holman, 2015; Holman & Silver, 1998) were common during the first 6 months of the pandemic, and (b) several forms of early and concurrent pandemic-related stress and trauma were associated with TD 6 months into the pandemic. Our findings extend prior work on TD during collective trauma (Holman & Silver, 1998) by demonstrating that it was common in a large representative sample of Americans in the context of coping with a protracted collective trauma.

These findings also extend experimental research by documenting, in an ecologically valid study, that our experience of time may be distorted when exposed to a high-arousal, complex experience like the pandemic (see Block, 1989; Droit-Volet, 2013). We document perceived shifts in our subjective experience of time passing under societal conditions broadly consistent with the processes experimental work has identified as predictors of altered time perception: Our attentional resources were being taxed (see Tse et al., 2004; Zakay, 1989), the context and complexity of our lives had suddenly changed (see Block, 1989; Grondin, 2010), and the unknown of the pandemic was raising anxiety (see Droit-Volet, 2013).

We also found widespread reports of common experiences related to time perception like being focused on the present, the blurring of temporal markers (weekdays/weekends), feeling as though time was moving more slowly or quickly than usual, losing track of sequences in time, and experiencing uncertainty about the future. Indeed, more than 50% of respondents reported experiencing most of the TD items at least sometimes. The commonality of these experiences during the pandemic likely reflects changes to our usual schedules, loss of temporal landmarks that provide external boundaries for our experience of time, as well as the subjective, internal experiences that color our experience of time passing (Grondin et al., 2020). By characterizing these different experiences during the pandemic, we provide translational evidence consistent with some experimental research findings indicating that a shared and protracted collective trauma may affect our subjective experience of time passing.

This study also offers a unique perspective on cognitive responses to the COVID-19 pandemic by examining the demographic, prospective, and concurrent correlates of TD. We identified several demographic and prepandemic experiences linked to increased TD. Young (18–29 year olds vs. 45–59 year olds) and female respondents were more likely to report higher TD. Prepandemic mental health status, a potential confound likely to color

Table 2
Weighted Descriptive Statistics for Items Measuring Temporal Disintegration (Wave 2)

Item	*M*	*SD*	% sometimes or more
Found yourself focused on the present moment?	3.10	1.01	76.9
Felt like weekdays and weekends have been the same?	2.93	1.24	65.7
Felt uncertain about the future?	2.92	1.19	64.7
Felt as though time had slowed down or stopped (e.g., the past few months have dragged on)?	2.60	1.20	55.2
Felt as though time was speeding by (e.g., the past few months have flown by)?	2.54	1.20	50.4
Felt unsure about what time or day it was (e.g., the hours/days blurred together)?	2.37	1.19	46.4
Found yourself forgetting what just happened or feeling unclear about the order of events you just experienced?	2.09	1.06	35.2

Note. Sample size varies across items due to missing data; *n* ranges from 5,640 to 5,650.

Table 3
Standardized Regression Analysis of Prospective and Concurrent Correlates of Temporal Disintegration Experienced in the Past 6 Months

Variables	*b*	*SE*	95% CI LL	95% CI UL
Demographics				
Gender (0 = male)	.11***	.02	.07	.14
Age (0 = 18–29)				
30–44	−.04	.02	−.09	.01
45–59	−.06*	.02	−.11	−.01
60+	.01	.03	−.04	.07
Education (0 = high school diploma)				
Some college	.01	.05	−.08	.10
BA or above	.02	.04	−.06	.10
Race/ethnicity (0 = White)				
Black, non-Hispanic	−.01	.02	−.04	.03
Other, non-Hispanic	.02	.02	−.01	.06
Hispanic	.04	.02	−.001	.09
Region (0 = Northeast)				
Midwest	−.05*	.02	−.09	−.01
South	−.02	.02	−.07	.03
West	−.01	.02	−.06	.03
Household size	−.03	.02	−.06	.01
Prepandemic measures				
Pre-COVID mental health diagnosis	.08***	.02	.04	.11
Pre-COVID physical health diagnosis	.02	.02	−.02	.06
Lifetime stress or trauma (prepandemic)	.06***	.02	.03	.09
Wave 1 measures				
Future uncertainty	.30***	.02	.26	.34
Personal COVID exposure	.003	.02	−.03	.03
Community stressors	.05*	.02	.01	.10
Work exposure	−.07***	.02	−.10	−.03
Personal secondary stressors	.002	.02	−.04	.05
Media exposure	.08***	.02	.04	.12
Wave 2 measures				
Recent stress or trauma (during pandemic)	.03	.02	−.004	.07
Ever sick with COVID-19 (0 = no)	.01	.02	−.02	.04
Financial stressors	.11***	.02	.08	.15
Personal secondary stressors	.21***	.02	.17	.24

Note. N = 5,661. CI = confidence interval; LL = lower limit; UL = upper limit.
* $p < .05$. *** $p < .001$.

time perception (Blewett, 1992; Melges, 1982; Simeon et al., 2007), was a strong predictor of TD 6 months into the pandemic. Prepandemic lifetime stress and trauma exposure were also positively associated with TD (see Holman & Silver, 1998, for a similar finding). We identified several pandemic-related experiences associated with increased TD that reflect the degree to which the pandemic disrupted our daily routines, including engaging in more COVID-related media, experiencing more financial and secondary stress due to the pandemic (e.g., school and work closures, shortages of basic necessities), and early work-related exposure to COVID (which buffered against the experience of TD over time). Given prior evidence (Holman & Silver, 1998), TD is likely associated with poor mental health sequelae during the pandemic. Future research needs to examine whether TD is prospectively associated with mental health status in the context of coping with collective trauma. Insofar as this is the case, knowing who is most vulnerable to experiencing TD may provide guidance for the allocation of mental health resources.

Limitations and Contributions

We acknowledge that this study had some limitations. Due to time and space limitations within the survey, we did not measure TD during the first wave of data collection. Thus, our analyses are unable to directly account for changes in TD that may have occurred within participants over time. Instead, our measure examined *perceived* shifts in the flow of time during the first 6 months of the pandemic. Nonetheless, we did capture respondents' sense of an uncertain future (an aspect of TD) at Wave 1, and we controlled for this in our analyses. Our measure of TD was also modified from its original version to fit the unique experiences linked to the pandemic. This may have contributed to it having a slightly lower reliability coefficient ($\alpha = .72$) than it had in previous studies (alphas .82–.88; e.g., Holman & Silver, 1998). While an alpha of .72 is generally considered acceptable (Bland & Altman, 1997), it would have been ideal had it been above .80. We also were not able to measure respondents' broader TP (i.e., our view of time as it spans from our past into the future, Lewin, 1942) and examine its connection with TD. Examining the TD-TP link is an important step for understanding how perceived shifts in the flow of time may affect how we integrate our past, present, and future experiences into a coherent TP when coping with collective trauma.

Despite these limitations, the current study has many strengths. We began with a large, nationally representative sample of Americans for whom mental and physical health data were collected before the pandemic began. Moreover, the initial survey was conducted within days of the national emergency declaration, making it an acute assessment of responses to the pandemic; we followed up longitudinally 6 months later and achieved strong sample retention. Furthermore, we controlled for exposure to many ongoing forms of stress and trauma experienced during each phase of the pandemic—getting COVID-19, loss of a loved one, work exposures, job loss and economic hardship, school closures, and more. We also included indirect, and media-based exposures to the pandemic, lifetime and ongoing exposure to non-COVID stress or trauma, and size of household, all of which could serve as confounding variables in the analyses.

Taken together, these findings provide further evidence that our experience of time may shift in the context of coping with collective trauma and raise important questions about the role of time in our lives. For example, our experience of time's flow may help shape how we relate to our social environment (see Carstensen et al.,1999; DeWall et al., 2006). Conversely, the nature and quality of our social relationships may also help shape how we perceive time (Holman & Zimbardo, 2009). Thus, in the context of a pandemic that produced tremendous social isolation and loneliness (Killgore et al., 2020; Li & Wang, 2020; Philpot et al., 2021; Zhang et al., 2021), future research should examine the pattern of associations between TD and loneliness over time. Indeed, longitudinal research that carefully teases apart how perceived time, the social environment, and mental health are connected over time could help identify risk and resilience processes that impact how people cope with collective trauma.

Psychology has long held that maintaining a future orientation is essential for well-being and morale (Heidegger, 1962; Kooij et al., 2018; Nuttin, 1985), especially in the context of coping with adversity (Lewin, 1942; Melges, 1982). To the extent that TD reflects feelings of having a foreshortened uncertain future (Terr,

1983) and contributes to an imbalance in TP (See Boniwell & Zimbardo, 2015; Stolarski et al., 2020), it may undermine mental well-being. Assessing TD and TP in future research is important to better understand how they are linked and may be associated with mental health. For example, if TD is negatively associated with balanced TP, focusing on rebalancing TP and promoting more flexible coping could prove useful for individuals at risk for experiencing high TD (cf. Sword et al., 2014). Future research should also examine the psychological processes underlying how we experience time passing during collective trauma (e.g., threat appraisal, world views), the potential shifts in TD across time during protracted collective traumas like the pandemic, and how they may be associated with well-being. Moreover, as a consistent and growing body of evidence connects trauma-related mental health with physical health disorders (Cohen et al., 2015; Koenen et al., 2017), it is important to understand the utility of conducting early posttrauma assessments of TD to identify individuals at risk for downstream mental *and* physical health sequelae as this could inform development of early interventions to prevent trauma-related disorders.

Conclusion

The protracted unfolding of the COVID-19 pandemic—an unprecedented collective trauma—altered many Americans' perceptions and experiences of the passage of time, disconnecting us from our imagined futures and blending days and weeks together into endless "blursdays" (Oxford University Press, 2020), disrupting the continuity of time to which we are accustomed. We document these experiences of time during the first 6 months of the pandemic and demonstrate how several different types of ongoing stress and trauma were associated with TD in a probability-based nationally representative sample. Our findings shed light on this understudied yet common psychological phenomenon and suggest new avenues for research examining risk and resilience during protracted collective traumatic events.

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