Dreaming and the COVID-19 Pandemic: A Survey in a U.S. Sample

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This study analyzes the responses of 3,031 U.S. adults who, in early May of 2020, completed an online survey regarding their dreams and the COVID-19 outbreak. The results indicate that those people most strongly affected by the pandemic also reported the strongest effects on their dream life (heightened dream recall, more negatively toned dreams, and pandemic-related dreams). Pronounced negative effects of the pandemic on dreaming were also found to be more likely among women and people with higher levels of education. These findings support the notion that changes in the frequency, tone, and contents of dreaming can help identify specific people who may be most at risk for mental health problems during the COVID-19 outbreak.

Keywords: dream recall, dream emotions, COVID-19 pandemic

The COVID-19 outbreak starting in December 2019 in China has become a global crisis of mental health as well as physical health (Torales, O'Higgins, Castaldelli-Maia, & Ventriglio, 2020; Wang, Horby, Hayden, & Gao, 2020). Based on the continuity hypothesis of dreaming (Domhoff, 2018; Schredl, 2003), one would expect that dreams are also affected by the pandemic. Previous research has found negative effects of collective disasters on individual dreams, including populations impacted by the 1989 San Francisco Earthquake (Wood, Bootzin, Rosenhan, Nolen-Hoeksema, & Jourden, 1992), 1991 Oakland Firestorm (Siegel, 1996), Hurricane Iniki in 1992 (Pagel, Vann, & Altomare, 1995), Hurricane Andrew in 1992 (David & Mellman, 1997), and the September 11, 2001, terrorist attack (Bulkeley & Kahan, 2008; Hartmann & Basile, 2003). Several important differences distinguish the COVID-19 outbreak from these disasters: (a) The pandemic is not limited to a single discrete location, but is truly global in scope, (b)

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it involves an ongoing crisis with anxious uncertainty about the future and is not limited to a single event, (c) it involves a threat invisible to the naked eye, potentially present anywhere, and (d) governmental efforts to contain the pandemic have required sudden, painful disruptions of social behavior and personal mobility in almost all countries in the world, resulting in massive changes of daily routines like home offices, home schooling, loss of jobs, financial problems, and so forth.

Combining these invasive effects on everyday life with the continuity hypothesis, one would expect the COVID-19 outbreak to generate a significant rise in disturbed sleep and nightmarish dreaming. Indeed, Zhang et al. (2020) and Pappa et al. (2020) have shown that medical staff involved in the pandemic countermeasures are suffering often from insomnia. In addition, H. Wang, Xia, et al. (2020) found that about 38% of their population-based Chinese sample (N = 1,599) reported COVID-19 related dreams and that more distressed persons were more likely to report pandemic-related dreams. Lastly, Gupta Madhulika (2020) has described a case series of patients who experienced posttraumatic symptoms based on previous traumas but aggravated by the current COVID-19 outbreak. Besides these two studies, the effect of the COVID-19 pandemic on dreaming has not been studied systematically.

The aim of the present study is to explore the effects of the pandemic on an adult American sample. It was expected that those people who have been most affected regarding their physical health, mental health, and social life will be those who report more negatively toned dreams and also more COVID-19 related dreams. The implications of this study's findings for the assessment of public mental health during the pandemic will be discussed.

Method

Participants

Overall, 3,031 Americans 18 years and older in age (1,680 women, 1,351 men) completed the online survey. The mean age of the sample was 49.54 ± 17.69 years (range: 18 to 92 years). The ethnicity of the sample was as follows: White (N = 2,144), Black (N = 342), Hispanic (N = 342), and other ethnicities (N = 203) with Asian (N = 101), Native American (N = 28), Mixed (N = 33), Other (N = 40), and Middle Eastern (N = 1). Educational background was elicited in six categories: no high school (N = 132), high school graduate (N = 883), some college (N = 680), 2-year college (N = 345), 4-year college (N = 626), and postgraduate (N = 365).

Research Instrument

The questionnaire included several questions eliciting associations between dreaming and the COVID-19 pandemic. The first question was "To what extent has the frequency that you wake up remembering a dream increased or decreased in the last month (i.e., since early April 2020)?" The five categories were as follows: +2 = *increased a lot*, +1 = *increased somewhat*, 0 = *stayed the same*, −1 =

decreased somewhat, and −2 = *decreased a lot*. The next question was: "Have you ever had a dream relating to the Coronavirus (COVID-19) outbreak, or the social/economic disruptions caused by the outbreak?" with "Yes, I have (Please describe a dream of this type, even if it is just a fragment, in as much detail as you can remember, including the settings, characters, actions, thoughts, and emotions)" and "No, I haven't". The last dream-related question was about dream emotions: "Since the beginning of the Coronavirus (COVID-19) outbreak, has the tone in your dreams become more positive, negative, or about the same as usual?" with 2 = *much more positive*, +1 = *somewhat more positive*, 0 = *about the same as usual*, −1 = *somewhat more negative*, and −2 = *much more negative*.

Lastly, the participants were asked about the impact of COVID-19: "Have you been personally impacted by the Coronavirus (COVID-19) outbreak in any of these ways?" Please select all that apply. The areas were as follows: physical health (you or family/friends have gotten sick), employment (lost job, furlough, drastically altered workplace), finances (lost wages, savings), social (cancelled trips, gatherings), and mental health (anxiety, stress, depression). The participants were also provided with the alternatives "none of these" and "prefer not to say."

Procedure

The survey was conducted using an online interview administered by YouGov, a public opinion and data company, to members of its panel over 2 million individuals who have agreed to take part in surveys. E-mail messages were sent to panelists selected at random from the base sample of U.S. adults. The message invited them to take part in a survey and provided a generic survey link. Once a panel member clicked on the link they were sent to the survey for which they were most required, according to the sample definition and quotas. The responses for this survey were gathered between May 5 and May 7, 2020. At this time, there were over 1 million confirmed COVID-19 cases in the United States, and about 80,000 COVID-19-related deaths. The lockdown was nationwide including social distancing, avoiding nonessential travel, cancelling sports and other events, closing schools and universities, wearing cloth face covers, and so on.

Statistical Analysis

Statistical procedures were carried out with the SAS 9.4 software package for Windows. Ordinal regressions (cumulative logit analyses) were used for analyzing the effect of different predictors on dream sharing frequency.

Results

Most participants reported that they have been affected by the COVID-19 pandemic (Table 1); 64 participants chose "prefer not to say." For roughly six in 10 who answered the question, the effect on social relationships were a problem, where about one third reported effects on mental health, finances, and employment

Table 1
Affected by COVID-19 Pandemic (N = 2,967)

Category	*N*	Percent
Physical health (you or family/friends have gotten sick)	368	12.40
Employment (lost job, furlough, drastically altered workplace)	814	27.44
Finances (lost wages, savings)	882	29.73
Social (cancelled trips, gatherings)	1741	58.68
Mental health (anxiety, stress, depression).	1058	35.66
None of these	628	21.17

status. Direct contact with the virus or with people having the virus was relatively rare (Table 1). Summing up the answers across all domains yielded the following distribution: 2.70% were affected in all five domains, 7.11% in four domains, 14.93% in three domains, 23.09% in two domains, 31.01% in one domain, and 21.17% were not affected at all. Interestingly, younger persons with high education were more affected by the pandemic (Table 2). In addition, females were more affected than males, whereas Black persons reported less impact than White persons.

About 29% of the participants reported an increase in dream recall due to COVID-19, whereas about 7.5% reported a decrease (Table 3); this difference is significant (Wilcoxon signed-ranks test: $z = -16.4$, $p < .0001$, effect size = 0.624). Dream emotions shifted more often to being more negative as a consequence of the pandemic (Table 3), and again this effect was significant (Wilcoxon signed-ranks test: $z = 7.7$, $p < .0001$, effect size = 0.282). Overall, 247 persons (8.15%) reported that they had at least one dream related to the COVID-19 pandemic. The dream reports could be grouped into several categories, such as becoming sick, a loved one becoming sick, and adapting to COVID-19 measures like social distancing or wearing masks (Table 4). Some reports were about nightmares that were not directly related to the pandemic. Persons who reported a COVID-19 dream were also reporting a stronger shift toward negative dream emotions ($r = -.222$, $p < .0001$, $N = 3031$) and more likely a change in dream recall ($r = .176$, $p < .0001$, $N = 3,031$).

All three variables (change in dream recall, change in dream emotions, and having a COVID-19 dream) were related to the "being affected" sum score (Table 5). The more affected the more dream recall increased, the more negative dream

Table 2
Ordinal Regression Analysis for the Sum Score of Being Affected by COVID-19 (N = 2,967)

Variable	Being affected by COVID-19 ($R^2 = .0437$)		
	β	χ^2	*p*
Age	−.2096	122.6	<.0001
Gender (1 = m, 2 = f)	.0779	18.1	<.0001
Education	.2023	117.6	<.0001
Ethnicity: Black vs. White	−.1467	20.8	<.0001
Ethnicity: Hispanic vs. White	.0272	0.7	.3962
Ethnicity: Others vs. White	.0535	2.4	.1181

Note. β = Standardized estimates.

Table 3
Changes in Dream Recall and Dream Emotions (N = 3,031)

Category	Change in dream recall (%)	Change in dream emotions (%)
Increased a lot/much more positive	8.87	2.14
Increased somewhat/somewhat more positive	20.19	5.21
Stayed the same/about the same as usual	63.44	77.27
Decreased somewhat/somewhat more negative	4.12	12.01
Decreased a lot/much more negative	3.37	3.37

emotions become, and the more likely to dream about COVID-19. Change in dream recall was also related to younger age and higher education, whereas women were more likely to report a change of dream emotions toward the negative than men (Table 5). Also, women were more likely to report a COVID-19 dream, and higher education was also related to reporting a COVID-19 dream (Table 5). Looking at the five different domains of possible pandemic effects, the strongest relationship to dream changes were seen for self-reported negative effects of the pandemic on mental health (Table 6). Physical health being affected was related to

Table 4
Topics of COVID-19 Dreams (N = 247)

Category	*N*	%	Examples
Measures (social distancing, wearing masks etc.)	83	33.60	In a crowded area where some people were not wearing masks and observing social distancing. We had a chance to go somewhere for a social event, but the whole time I was worried that we should be social distancing.
Being sick/loved ones being sick	74	29.96	I wake up remembering that someone I loved has dies from coronavirus and I feel guilty that it was not me. I had a dream that a lot of my friends and family died.
Nightmares not related directly to COVID-19	38	15.38	My dreams include my husband and work friends and grandchildren - trapped in boxes that are getting smaller. It is panic and claustrophobic. I was standing on a large gold platter. There was a ring of fire surrounding me. I noticed that the fire was not hot and there was no smoke. It was not hot where i was but I was fully surrounded by fire.
Financial problem/losing job	4	1.62	I dreamed that I could not find employment due to this virus. People wanted to rehire their employees that were laid off or furloughed. They weren't hiring any new employees. I had a dream that I lost my job.
Positive dreams	4	1.62	A gathering of my family and sharing laughter with them. God gave me a dream as a reminder to keep praying and not give up.
Other topics, e.g. politics	27	10.93	Anger at the President and his administration for having zero sense of urgency, human compassion, or empathy while tens of thousands are sick or dying - in the United States and around the world. I had a dream that they were probing everyone to see if they had the disease and if they probe went off you were infected and we were sent away to be killed.
Don't remember exact content	17	6.88	—

Table 5
Ordinal Regression Analysis for the Dream Variables (N = 2,967)

Variable	Change in dream recall (R^2 = .0437)			Change in dream emotions (R^2 = .0487)			Having a COVID-19 dream (R^2 = .0990)		
	β	χ^2	*p*	β	χ^2	*p*	β	χ^2	*p*
Age	−.1150	28.0	<.0001	−.0358	2.0	.1586	.0039	0.0	.9239
Gender (1 = m, 2 = f)	−.0038	0.0	.8533	−.1039	17.8	<.0001	.1184	9.0	.0026
Education	.0551	6.7	.0094	−.0409	2.7	.1002	.1838	22.2	<.0001
Ethnicity: Black vs. White	.0291	0.6	.4221	−.0173	0.2	.6858	.0543	0.6	.4251
Ethnicity: Hispanic vs. White	−.0158	0.2	.6633	.0197	0.2	.6460	.0005	0.0	.9945
Ethnicity: Others vs. White	−.0273	0.5	.4806	.0040	0.0	.9267	−.0529	0.5	.4594
Being affected (Sum score)	.1551	52.8	<.0001	−.2324	84.9	<.0001	.3259	77.1	<.0001

Note. β = Standardized estimates.

dream recall changes and dreaming about COVID-19. The restrictions regarding social interactions were related to more negatively toned dreams and slightly more COVID-19 dreams. Finances and work-related effects were not related to the three dream variables (Table 6).

Discussion

Overall, the findings indicated that nearly eight in ten of the participants reported effects of the pandemic of their everyday-life and subjective well-being. They also reported a significant increase in dream recall and more negatively toned dreams due the pandemic itself and the counteracting measures of the government. The more the persons were affected, especially their mental health, the more likely they reported changes in their dream life (more recall, more negative dream emotions) and more likely a COVID-19 related dream.

Table 6
Ordinal Regression Analysis for the Dream Variables (N = 2967)

Variable	Change in dream recall (R^2 = .0523)			Change in dream emotions (R^2 = .0677)			Having a COVID-19 dream (R^2 = .1208)		
	β	χ^2	*p*	β	χ^2	*p*	β	χ^2	*p*
Age	−.1087	24.0	<.0001	−.0362	1.9	.1636	.0032	0.0	.9382
Gender (1 = m, 2 = f)	−.0083	0.2	.6894	−.0896	13.1	.0003	.1014	6.5	.0107
Education	.0651	9.1	.0026	−.0482	3.6	.0577	.1970	24.0	<.0001
Ethnicity: Black vs. White	.0271	0.6	.4567	−.0279	0.4	.5458	.0640	0.9	.3511
Ethnicity: Hispanic vs. White	−.0191	0.3	.6000	.0117	0.1	.7854	.0122	0.0	.8604
Ethnicity: Others vs. White	−.0223	0.3	.5649	.0073	0.0	.8735	−.0566	0.6	.4326
Physical health affected	.1117	30.9	<.0001	−.0378	2.5	.1117	.1020	11.0	.0009
Employment status affected	.0266	1.4	.2373	.0008	0.0	.9749	.0163	0.2	.6801
Finances affects	.0314	2.0	.1589	−.0343	1.7	.1892	.0472	1.5	.2243
Social interactions affected	.0071	0.1	.7517	−.0721	7.3	.0070	.0952	4.3	.0375
Mental health affected	.1101	20.8	<.0001	−.2434	82.7	<.0001	.2950	53.3	<.0001

Note. β = Standardized estimates.

The aim of the present survey was to obtain a representative sample of the US citizens. The YouGov online sample includes a wide cross-section of the American population, including a variety of ages, ethnicities, and social backgrounds. No sample is perfect, especially in a country as diverse as the United States, but the large number of participants in this survey and their detailed responses offer a relatively broad and inclusive view of American public sentiment at this particular point in time. Thus, the result of the regression analysis (using the raw, unweighted survey data) seems to be quite valid. Age, gender, and education were used as covariates in the analysis to account for possible confounding effects as these variable are associated with dream characteristics (Schredl, 2018), for example, women tend to report higher dream recall than men (Schredl & Reinhard, 2008b).

The significant increase in dream recall might be explained by three factors. First, for many people their sleep patterns have changed dramatically during the pandemic. This might be especially true among young adults, who are sleeping longer (Cellini, Canale, Mioni, & Costa, 2020) and thus were able to recall more (Schredl & Fulda, 2005; Schredl & Reinhard, 2008a). Second, the combination of more negatively toned dreams and more dreams relating to the pandemic should result—according to the salience hypothesis of dream recall (Cohen & MacNeilage, 1974)—in higher dream recall. Lastly, one of the symptoms of insomnia is more frequent nocturnal awakenings, which has been found to correlate with increased dream recall (Schredl, Schäfer, Weber, & Heuser, 1998); thus, the increase in insomnia prevalence due to the pandemic (Pappa et al., 2020; Zhang et al., 2020) might have also increased dream recall. The pattern of factors associated with the increase in dream recall support all three arguments as the increase was related to younger age, female gender, and higher education (people more likely to have shifted to working in home offices?), in addition the effects of the pandemic on physical and mental health.

Whereas 15% of the sample reported a shift toward negative emotions, it is worth noting that 7% reported a shift toward more positive dream emotions since the COVID-19 outbreak. Taken together with the 92% of participants who did not report a COVID-19 dream, one can conclude that dream life at this point of the pandemic is clearly affected but not in the majority of persons. However, the people whose dream lives have been most negatively impacted are also those who have been personally effected on a physical level (either they or a significant other caught the virus), on a social level (suffering from the social restrictions), and/or a mental level (depression, anxiety, etc.). This shows that changes in dreaming can help to identify those persons who may be suffering the most due to the pandemic. Interestingly, heath-related dreams were most often reported by persons with health-related worries, not necessarily by those being ill (Schredl, Adam, Beckmann, & Petrova, 2016). This would indicate that the continuity of dreams is not restricted in the sense of reflecting only actual waking life events, but perhaps more strongly the inner world of emotions and thoughts that are related to these life events (Bulkeley & Domhoff, 2010; Schredl, 2012).

Truly positive COVID-19 related dreams were rare in this sample. Such dreams included the desire to enjoy social gatherings or receiving help from a source of religious faith. The vast majority of the dreams were negative. More than one third of them included threatening content, for example, being severely ill, losing loved ones to the disease (COVID-19 related nightmares), or nightmares

that represent waking-life worries of being restricted in an extreme form (nightmares not related to COVID-19). Another third of the dreams included worries about social distancing, especially the threat posed by people who fail to comply with safe social distancing practices. The prevalence in dreams of socially related content is consistent with the Social Simulation Theory (Revonsuo, Tuominen, & Valli, 2015), and also with the findings of psychological anthropologists who have closely studied how individual dreams interact with cultural realities, especially in times of crisis or change (Hollan, 1989; Mageo, 2019; Sheriff, 2017; Tedlock, 1987). Seen from a social perspective, the dream reports cast a worrisome light on the interpersonal tensions that have arisen during the pandemic era.

Conclusion

To summarize, this study has found that by early May of 2020 the majority of the U.S. population had been impacted in some way by the pandemic, and that those people most strongly affected also reported the strongest effects on their dream life (heightened dream recall, more negatively toned dreams, and pandemic-related dreams). Pronounced negative effects of the pandemic on dreaming were also found to be more likely among women and people with higher levels of education. These findings support the notion that changes in the frequency, tone, and contents of dreaming can help identify specific people who may be most at risk for mental health problems during the pandemic.

Dreaming may have further value, in addition to providing a means of assessing public mental health. It may also offer a simple, low-cost intervention and source of practical help. Talking about dreams enables the expression of complex feelings, memories, and concerns that cannot be easily articulated in other ways (Cartwright, 2011; Hartmann, 2011; Hill & Knox, 2010; Kramer, 2007; Pesant & Zadra, 2004). In describing a distressing dream, the individual creates an externalized version of the experience, which allows for a more reflective response to its frightening contents (Hill et al., 2001). In this way, the simple act of responding to a survey by describing a bad dream may for some people have a cathartic effect. It would be very interesting to design surveys that provide sensitive feedback, trustworthy information, coping strategies for nightmares (e.g., a simplified version of the imagery rehearsal therapy [Krakow & Zadra, 2010]), and links to health care service to help those suffering from the negative effects of the pandemic in general, and on their dreams in particular. It seems worthwhile to develop new methods for using this natural healing resource.

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