Review Article

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COVID-19 Lockdown Stressors and Buffers: A Narrative Review

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ABSTRACT

This narrative review summarizes and critiques the relatively limited literature on the psychological effects of COVID-19 lockdowns in many parts of the world. These have included anxiety, depression, PTSD symptoms, fatigue, and sleep disturbances. Risk factors or predictors have also been studied including the demographics of being young and living alone. Feeling isolated and lonely, stressed, bored, fatigued, and touch deprived have also been predictive. Specific worries about getting the virus and having financial problems were surprisingly less stressful. Although social media was expected to buffer negative effects, those data were mixed including that texting had positive effects, internet had both positive and negative effects, and Facebook time had negative effects. Buffers for stress and psychological problems included spirituality and meditation, touching, exercise, working from home, and other home activities. Methodological problems with these studies included their being self-report surveys that were often not representative of the larger populations and did not include baseline data, limiting any assumptions of causality. Nonetheless, collectively the data will help inform interventions for pandemic lockdowns like those of COVID-19.

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Introduction

The vast COVID-19 literature has derived from research conducted in many parts of the world. A literature search in November 2020 on the term COVID-19 yielded 3,218 published papers. However, only 204 papers could be found when COVID-19 was combined with the term health, and fewer papers appeared when paired with mental health (43 studies) and even fewer were noted when mental health was specified as anxiety (18 papers), depression (6) or sleep disturbances (3). In addition, except for exercise (3 papers), no studies were found on potential buffers for negative mood states and sleep disturbances.

COVID-19 lockdowns have had several negative effects on the psychological well-being of individuals in many parts of the world. These have included anxiety, depression, PTSD symptoms, fatigue, and sleep disturbances. Risk factors or predictors have also been studied including the demographics of being young and living alone. Feelings including isolation and loneliness, feeling stressed, bored, fatigued and touch deprived have also been predictive. Specific worries about getting the virus and having financial problems have been, surprisingly, less stressful, although several scales have been developed to assess those including scales on the fear of getting the virus and being stressed and fatigued by the pandemic. Although social media were expected to buffer negative effects, data on social media have been mixed including that texting has had positive effects, internet has had both positive and negative effects, and Facebook time has had exclusively negative effects. Buffers have been studied including spirituality and meditation, touching, exercise, working from home, and other home activities.

This narrative review includes COVID-19 specific literature that has been published or was in press in 2019-2020 from several

different researchers from many lockdowns in a wide array of countries. Inclusion criteria for this narrative review included peer-reviewed empirical studies in English on psychological problems that have been occurring during COVID-19 lockdowns. The review is divided into sections that reflect the literature including negative emotions and sleep disturbances, stressors specific to the lockdowns, and buffers to the negative effects of the COVID-19 lockdowns.

Negative Emotions and Sleep Disturbances during COVID-19 Lockdowns Anxiety and Depression

Anxiety and depression have been the most frequently studied negative emotions, although stress and PTSD symptoms as well as fatigue and sleep disturbances have also been reported. Most of these studies have focused on the prevalence of these problems. For example, in a sample from China, 35% experienced anxiety, 20% depression and 8% sleep disturbances [1]. Similar levels were reported in another lockdown sample from China for anxiety at 29%, depression at 17%, and stress at 8% [2]. And, in a sample from Italy, similar prevalence data were noted including 33% for anxiety and 24% for depression, although both sleep disturbances and stress were notably more prevalent in this sample at 52% and 50% respectively [3].

In some COVID-19 studies, relationships between these conditions have been explored. For example, in a sample from China, anxiety, depression and comorbid anxiety and depression reportedly occurred in 20% of the sample [4]. Anxiety was associated with sleep disturbances in 38% of another sample [5]. And in a COVID-19 sample from the UK, anxiety was related to fatigue [6]. Anxiety and depression have also been associated with greater stress in a lockdown study from Italy [7]. And, stress, in turn, was

related to sleep disturbances in an Australian survey [8]. Further, in a survey from the China pandemic, sleep problems were related to PTSD symptoms which have been as prevalent as 30% in one other sample [9,10]. Although these studies did not include longitudinal data, at least one COVID-19 study from China reported that there were no decreases in anxiety or depression symptoms across a one month lockdown period, highlighting the significance of these lockdown problems [2]. Standardized measures were invariably used to assess these problems in these studies, for example, the Depression, Anxiety, and Stress Scale by a group in China [2]. But, the degree to which these problems were comorbid or related to each other has rarely been assessed.

During April 2020, a survey was conducted in the U.S. to determine the relationships between these problems. The survey was posted on Facebook linked to Survey Monkey [8]. The respondents (N=260) ranged in age from 18-82 (M=47 years). Gender was distributed 79% female, 18% male and 3% other (non-specified) and ethnicity 68% Non-Hispanic White, 21% Hispanic, 3% Black and 8% other (non-specified). Professions were distributed 35% office worker, 30% academic, 15% managerial, 12% medical and 8% labor. The average income was \$72,572, 28% were unemployed, 69% worked at home, and 23% lived alone. The measures included the PROMIS anxiety, depression, fatigue and sleep disturbances subscales and the PTSD-8 Inventory. Measures that were developed for COVID-19 specific problems and activities included scales on health, social media, connecting, working and stress.

In this Survey Monkey study on a U.S. lockdown, anxiety was reported by 85% of the participants and depression by 70 % [8]. The greater prevalence of anxiety and depression in this U.S. sample may have related to a number of factors including its being a more prolonged survey of a longer lockdown period. All of the psychological problems were significantly correlated with each other. Stepwise regression analysis suggested that depression, stress, PTSD symptoms and fatigue scale scores contributed to 64% of the variance on anxiety scale scores (see Table 1). And, in a similar stepwise regression analysis, 67% of the variance on the depression scale scores was explained by anxiety, stress, PTSD symptoms and fatigue scale scores (see Table 2). These regressions highlighted the effects of anxiety and depression on each other and the effects of stress, PTSD symptoms, and fatigue on both anxiety and depression. Positive correlations between both anxiety and depression and Social Media Scale ratings on internet, Facebook and communications about the virus suggested that those activities may have exacerbated the negative symptoms, while negative correlations with Health Scale ratings on exercise, self-care, and spirituality suggested that those activities may have buffered the effects of anxiety and depression during the U.S. COVID-19 lockdown.

Table 1: Stepwise regression for PROMIS Anxiety Subscale scores

Model	R	R ²	F change value	p level
PROMIS Depression	.77	.59	244.65	.001
Stress	.78	.61	12.61	.001
PTSD-8	.80	.64	10.86	.001
PROMIS Fatigue	.81	.65	5.71	.001

Table 2: Stepwise regression for PROMIS Depression Subscale Scores

Model	R	R ²	F change value	p level
PROMIS Anxiety	.77	.58	244.65	.001
Stress	.79	.62	18.88	.001
PTSD-8	.81	.65	14.05	.001
PROMIS Fatigue	.82	.66	7.48	.001

This U.S. Survey Monkey study, however, had several limitations including that the data were based on a sample of predominantly non-Hispanic white females. Although this ethnic and gender distribution is reputedly representative of Survey Monkey samples, the data would not be generalizable to the larger population. In addition, they were self-report data, although their anonymity may contribute to their veridicality. And, directionality of effects could not be determined from these cross-sectional data. Further, the selection of outcome variables was arbitrary. For example, treating anxiety as an outcome variable in a regression analysis would predictably yield the depression variable as explaining most of its variance and vice versa. Nonetheless, the prevalence data and the regression analyses are suggestive that anxiety and depression and the lockdown stressors of feeling isolated, lonely, and touch deprived are significant lockdown problems that highlight the need for prevention/intervention protocols.

PTSD Symptoms

In an Italian sample, PTSD symptoms have been as prevalent as 30% [9]. In a survey from the China pandemic, sleep problems were related to PTSD symptoms [10]. In the U.S. lockdown survey already described, PTSD was assessed on an inventory that included questions like “I was being reminded of a traumatic experience” and a health scale that included questions on engaging in self-care and exercise [8,11]. In that sample, 28% met the criteria for PTSD. A correlation analysis on the health and PTSD scales suggested that trauma symptoms were negatively related to health behaviors and positively correlated with anxiety, depression, and sleep disturbances [11]. In a multiple regression analysis, anxiety, depression, and sleep disturbances contributed to a significant amount of the variance (48%) on the PTSD symptoms scale scores.

Sleep Disturbances

In an Australian sample, sleep quality was compromised in 41% of the sample [12]. And, in a survey from the China COVID pandemic, sleep problems were related to PTSD [10]. Sleep disturbances have also been reported in an Italian lockdown [13]. In these studies, however, the stressors that specifically related to the lockdowns were not identified.

In the U.S. lockdown survey, stress scale scores and items were significantly correlated with sleep disturbances, as were health, anxiety, depression, fatigue and PTSD symptoms [14]. Stepwise regression analysis revealed that 52% of the variance on the sleep scale scores was explained by fatigue and posttraumatic stress scale scores (see Table 3). Fatigue explained most of the variance noted in the regression analysis on sleep disturbances (40% of the variance). Napping to reduce fatigue might have mediated the fatigue/sleep relationship inasmuch as the napping variable was significantly positively correlated with the sleep disturbance scale scores. However, fatigue and napping were only weakly related ($r=.13$, $p<.05$), and the napping rating on the stress scale

did not differentiate the high and low sleep disturbance groups in the analysis of variance. That the PTSD-8 inventory score added significant variance (12%) in the regression on sleep was not surprising as sleep problems have been related to PTSD in at least two previous studies. For example, in an earlier SARS epidemic, 40% of SARS survivors experienced posttraumatic stress syndrome and 58% had sleep problems [15]. In the more recent COVID-19 sample from China, sleep disturbances were associated with posttraumatic stress syndrome [10]. This association has been reported in other studies. For example, in an Australian Facebook study using the PROMIS scales, PTSD was the most significant contributor to sleep problems, but, surprisingly, inclusion of fatigue in that model attenuated that effect [16]. In the same sample, 15% experienced sleep problems, 12% experienced fatigue and 7% reported a combination of sleep problems and fatigue. Although sleep problems have often been noted to contribute to fatigue, the literature has been limited on the contribution of fatigue to sleep problems.

Table 3: Stepwise regression for Sleep Disturbances Scale

Model	R	R ²	F value	p level
PROMIS Fatigue	.77	.59	244.65	.001
PTSD-8	.78	.61	12.61	.001

Surprisingly, in the U.S. survey, the stress scale scores did not contribute to the variance in the sleep disturbances scale as might be expected even though stress and sleep disturbance scores were significantly correlated ($r=.43, p=.0001$). However, the variables that contributed to the variance on the sleep scale scores had higher correlation coefficients. For examples, the correlation between fatigue and sleep disturbances was higher ($r=.63, p=.0001$) as was the correlation between PTSD and sleep disturbances ($r=.59, p=.0001$). More sophisticated analyses such as mediation/moderation analysis or structural equation models might be used in future studies to understand the interrelationships between these variables. For example, a significant path has been suggested by the correlation between depression and stress ($r=.61$) which, in turn, may contribute to fatigue ($r=.49$), and fatigue, in turn, was highly correlated with sleep problems ($r=.63$) (all correlations at the $p=.0001$).

In addition, further research is needed on underlying mechanisms for both stress and sleep disturbances. Not surprisingly, living alone was related to higher stress scores, but, surprisingly, being younger was correlated with higher sleep disturbance scores given that many studies have reported greater sleep disturbances for older individuals. In a different set of analyses on these COVID-19 data, the younger/living alone group had the most problematic scores on all the variables [17]. These demographic variables may help identify those needing intervention during pandemics like COVID-19. Other potential underlying mechanisms for stress and sleep disturbances in this U.S. Survey Monkey sample may be touch deprivation and the lack of exercise. In another analysis of this dataset, touch deprivation was correlated with both stress and sleep disturbances and with the primary predictor variables for stress and sleep disturbances including depression and fatigue [18]. And, touch has been noted to decrease these problems [19]. Exercise was also inversely related to these problems in an earlier analysis of these COVID-19 data [18]. And, other studies have suggested that exercise can improve sleep and reduce depression

[20,21]. Together those data analyses suggest that touch and exercise may be effective therapies for stress and sleep problems during Pandemics like COVID-19. Others have also recommended physical exercise along with cognitive interventions and relaxation techniques [22]. Surprisingly, the COVID-19 literature so far has not included intervention studies that address these emotional problems and sleep disturbances.

Stressors Specifically Related to COVID-19 Lockdowns

Stressors that specifically relate to COVID-19 lockdowns, as, for example, feeling isolated, lonely, bored, fatigued, touch deprived and worrying about getting the virus and about finances, have rarely appeared in the COVID-19 literature. An exception was research from China that assessed worries about the virus and finances as they related to anxiety levels [4].

Identifying stressors that relate to a lockdown might help inform interventions and identify those who need interventions. In the U.S. lockdown survey already described, a Stress Scale was designed to assess specific stressors related to the COVID-19 lockdown [14]. The COVID-19 related Stress Scale (Cronbach's $\alpha=.78$) included items descriptive of stressors that were anecdotally being experienced during the early stage of the COVID-19 lockdown. These included worrying about the virus, worrying about financial status, feeling isolated, lonely, bored, and touch deprived as well as having "cabin fever" and engaging in excessive snacking, drinking alcohol and napping. These were then included in the Stress Scale for the survey [14]. A factor analysis of that scale yielded three factors that contributed to 56 % of the variance on the Stress Scale score including: 1) Factor 1 that was labeled "Stimulation deprivation" that included the items Feeling Isolated (.86), Feeling lonely (.86), Feeling bored (.74), Getting cabin fever (.70), and Feeling touch deprived (.65) that together explained 34 % of the variance; 2) Factor 2 that was labeled "Worrying" that included the items Worried about finances (.67) and Worried about the virus (.47) that explained 12% of the variance; and 3) Factor 3 that was labeled "Stress behaviors" that included the items Napping (.68) and Snacking (.53) that explained 10% of the variance.

Feeling Isolated and Lonely

In the U.S. lockdown sample, feeling isolated and lonely were among the most frequently described stressors and were, in turn, related to other stressors and to the emotional problems and sleep disturbances already discussed [23]. For these feelings, 81% reported feeling isolated and 68% feeling lonely. Correlation analyses suggested that feeling isolated and lonely were related to each other and were, in turn, negatively related to Health Scale scores and positively related to the Stress Scale scores and negative mood states including anxiety and depression, fatigue, sleep disturbances, and posttraumatic stress symptoms (see table 4). Analyses of variance revealed significant differences between isolated and non-isolated groups as well as between lonely and non-lonely groups on these measures. Only a weak correlation was noted between living alone and loneliness, suggesting that feelings of isolation and loneliness extended to those living with others as well. Positive correlations between both feeling isolated and lonely and time on Facebook and gaming suggested that these social media activities did not compensate for feeling isolated and lonely. Feelings of isolation and loneliness and their associated problems also increased across the lockdown survey period. The lack of touch and exercise suggested that those activities might have alleviated the negative feelings and associated problems.

Table 4: Correlation coefficients for significant relationships between feeling isolated/feeling lonely ratings and scores on COVID-19 Lockdown Activities Survey scales and subscales

Measure	Correlation coefficient	p level
Health Scale Score	-.24/-.26	.000
Social Media Scale	.15/.16	.02
Stress Scale Score	.80/.80	.000
PROMIS Anxiety Subscale Score	.58/.61	.000
PROMIS Depression Subscale Score	.61/.69	.000
PROMIS Fatigue Subscale Score	.50/.53	.000
PROMIS Sleep Disturbance Subscale Score	.40/.43	.000
PTSD-8	.41/.46	.000

As in research prior to COVID-19, feelings of isolation and loneliness were highly correlated [24]. This highly significant correlation in the present study ($r=.82$) might be an artefact of the two items being consecutive items on the survey such that the feeling of isolation (which preceded the question on loneliness) primed the feeling of loneliness. However, this isolation/loneliness relationship had been reported in the pre-COVID literature on chronically lonely individuals [24]. Some of the 68% who reported loneliness in the U.S. lockdown may have been chronically lonely people who continued to be lonely during the lockdown or even slightly lonely people whose loneliness was exacerbated by the lockdown. As already mentioned, the weak correlation between living alone and being lonely in this survey sample suggests that not all people living alone reported being lonely and that loneliness was also being experienced by those living with others. Nonetheless, the previously reported negative effects for living alone are similar to the negative effects reported by those feeling isolated and lonely in this U.S. lockdown sample including stress, anxiety, depression, fatigue, sleep disturbances and PTSD symptoms [17].

Previously reported negative effects of loneliness for chronically lonely pre- COVID people also extend to this COVID-19 lockdown sample including stress, anxiety, depression, fatigue, sleep disturbances and PTSD symptoms [19,25-27]. That loneliness was related to stress was not surprising as loneliness had been previously reported as the most robust factor in a factor analysis on the Stress scale that was designed specifically to tap COVID-related stressors [14].

Although multiple COVID-19 lockdown studies have reported stress, anxiety, and depression as well as sleep disturbances and posttraumatic stress symptoms, none of these studies have assessed loneliness as a potential contributing factor or resulting effect [2,3,7,9,10,12,13]. In the U.S. lockdown survey, feelings of isolation and loneliness were correlated with these negative conditions (statistically significant correlation coefficients ranging from .14-.82) and group differences between those who did and

did not feel isolated or lonely were also significant for all of the conditions. However, because of the cross-sectional nature of the study and the absence of baseline data, directionality of effects could not be determined. These psychological problems could have as easily preceded the feelings of loneliness, and, in turn, predisposed individuals to loneliness during the lockdown, as suggested by non-pandemic trauma leading to loneliness [28]. The latter authors noted that high levels of PTSD predicted loneliness but that they depended on pre-event levels. Or, as others have noted, anxiety could have mediated the effects of loneliness on depression and sleep disturbances [29].

That these problems might be more chronic than acute is suggested by the significant increase in the percentage of individuals experiencing these problems by the end of one month of lockdown versus the end of two weeks of lockdown (see table 5) [23]. Increased prevalence was noted for feeling isolated, lonely, touch deprived, cabin fever, and stress. And their comorbid psychological problems became more prevalent including anxiety, depression, fatigue, sleep disturbances and PTSD symptoms. Further, worrying about getting the virus and financial problems became more prevalent. These data might be expected, as in what some have called “quarantine fatigue”, although, surprisingly, longitudinal data on this increasing prevalence could not be found in the COVID-19 literature. Fortunately, potential buffering activities also increased including connecting with others and exercise.

Table 5: Prevalence (% respondents) for feelings, worries, symptoms and potential buffers at mid-data collection (2 weeks at April 15) and end-data collection (1 month at April 30) and % increase over that time

	Mid (2 weeks)	Mid (2 weeks)	% Increase
Feelings			
Isolated	58	81	40
Lonely	47	68	45
Touch deprived	42	68	62
Bored	45	70	56
Cabin fever	54	76	41
Worries			
Getting virus	50	87	74
Finances	43	72	67
Symptoms			
Anxiety	73	90	23
Depression	46	72	57
Fatigue	68	85	25
Sleep disturbances	71	91	28
PTSD-8	37	53	43
Potential buffers			
Connecting	40	65	63
Exercise	28	52	86

The current data highlight the potential immune compromising effects of feeling isolated and feeling lonely given the literature on their associations with elevated stress hormones (cortisol) and dampened immune function (low natural killer cell number and natural killer cell activity) [6]. And, the compromised immune function related to feelings of isolation and loneliness may, in turn, predispose individuals to the early mortality associated with loneliness. In a meta-analysis on those relationships, the increased likelihood for early mortality was 26% for loneliness, 29% for isolation and 32% for living alone [30]. These mortality data are based on chronic loneliness and isolation which may not pertain to pandemic lockdowns. Some have referred to loneliness in evolutionary theory, as transient as it leads to the re-affiliation motive to reconnect with others [27,31].

Feeling Bored

Boredom has been related to anxiety and depression in the pre-COVID-19 literature. In the U.S. COVID-19 lockdown Survey Monkey study, as many as 68% of 260 respondents reported feeling bored [32]. Data analyses suggested that feeling bored

was significantly correlated with several demographic variables and with virtually every item on every scale of the survey. The demographic correlations suggested that boredom occurred more frequently in males, in those with less schooling, in those not working at home during the lockdown, and in those who were lacking a routine. The correlation analyses and ANOVAs for the scales suggested that those feeling bored engaged in fewer health activities like exercise, self-care and meditating; they spent more time on social media including gaming and Facebook; they engaged in less creative work and hobbies; they scored higher on the Stress Scale including worrying more about the virus and their finances; they reported feeling more isolated, lonely and touch deprived; and they had higher scores on anxiety, depression, fatigue, sleep disturbances, and PTSD scales (see table 6). A regression analysis suggested that 49% of the variance in the boredom scores was explained by the Stress Scale scores. These results are limited by their being self-reported data from a non-representative, cross-sectional sample. Nonetheless, they highlight the negative effects of feeling bored during a COVID-19 lockdown.

Table 6: Mean scale scores for significant ANOVAs for feeling bored versus not feeling bored groups (standard deviations in parentheses)

Measure	Not bored	Bored	F value	p level	eta ²
Health	33.80 (5.44)	30.91 (5.29)	13.03	.001	.06
Social Media	26.03 (4.57)	27.19 (4.10)	3.90	.05	.02
Working	16.39 (3.95)	15.10 (3.23)	7.49	.01	.03
Stress	21.97 (4.22)	29.36 (5.74)	101.22	.0001	.29
Anxiety	8.22 (2.99)	10.57 (3.57)	25.23	.001	.09
Depression	6.17 (2.48)	9.30 (4.06)	39.37	.001	.13
Fatigue	6.84 (2.96)	8.59(3.04)	18.15	.001	.07
Sleep Disturbance	11.96 (4.33)	14.62 (4.42)	19.40	.001	.07
PTSD	12.50 (5.35)	15.32 (5.86)	8.57	.005	.05

Although boredom has been less frequently studied than depression and anxiety during COVID-19 lockdowns, the data from the U.S. lockdown survey highlight the prevalence of boredom (68%). That boredom was positively correlated with virtually every negative item of every scale and negatively related to every positive item also highlights the significant effects of boredom during lockdowns. Its positive correlations with other psychological problems including stress, anxiety, depression, fatigue, sleep disturbances, and PTSD symptoms suggest that it needs to be studied together with those problems that have received more attention in the COVID-19 lockdown literature [33-35]. Of those psychological problems, only the Stress Scale scores entered the stepwise regression on boredom, although as one variable, it explained a modest amount of the variance (49%). This finding was perhaps not surprising since the Stress Scale, which was designed to assess lockdown-related stressors for this survey, was comprised of several items that loaded significantly on the stimulation deprivation factor, the primary factor on the Stress Scale. This factor included feeling isolated and lonely as well as touch deprived and “cabin fever”. These items were highly correlated with feeling bored including feeling isolated ($r=.56$), lonely ($r=.57$), and touch deprived ($r=.30$) as well as having “cabin fever” ($r=.54$). These lockdown-related stressors have been identified as significant problems in analyses of this database including feeling isolated and lonely and feeling touch deprived [18,23]. Surprisingly, lockdown-specific worries were less related to boredom including worries about the virus ($r=.21$) and worries about finances ($r=.18$).

That the highest correlations with boredom were noted on the “stimulation deprivation” factor items is consistent with the boredom literature that addresses inadequate stimulation [36]. In the theory of inadequate stimulation, boredom can result from under-arousal and over-arousal. In the stepwise regression analysis of this study, both depression and fatigue were thought to reflect under-arousal, while stress and anxiety were assumed to reflect over-arousal. Surprisingly, only the Stress Scale contributed to the variance, but for a significant amount of the variance (49%), suggesting that the boredom in this sample was reflecting over-arousal rather than under-arousal. Although these data are suggestive, a laboratory study that included physiological measures would provide a more valid assessment of over-arousal versus under-arousal. And, as in many phenomena, the effects of boredom on arousal may be an inverted U function, suggesting that boredom can have both under-arousal and over-arousal effects, as has been noted in a “two men and clothespins study” where two men spent their entire time handing clothespins to each other as they hung clothing [36]. That “boring” story led to increased heart rate and cortisol in the study participants, suggesting over-arousal, but also decreased skin conductance, suggesting under-arousal [36].

These data analyses also yielded significant correlations between boredom and lockdown activities [32]. Positive correlations were noted between boredom and social media including gaming, Facebook time, and tv. These were surprising findings given that these media are typically considered entertaining and therefore

would be expected to be negatively correlated with boredom. Although, Facebook time has been associated with greater boredom in at least one other analysis of these data [37].

In contrast, those activities that were negatively correlated with boredom, and could be considered buffers to boredom, were working from home, having a routine, and engaging in indoor exercise, meditation, creative projects, and hobbies. The scales that assessed these activities including the Social Media, Health, and Working scales were entered into a stepwise regression on boredom. Although significant, this analysis only explained 14 % of the variance, with Health Scale scores (that included the exercise and meditation items) explaining 11% of the variance in boredom and the Social Media Scale scores adding only 3%. Nonetheless, that boredom in this sample was negatively related to Health activities like exercise is consistent with the definition of boredom as ‘being unable to engage in satisfying activity’ or Jean Paul Sartre’s claim that “humans are overwhelmed by boredom when they have more time but cannot act” [38,39].

Again, there were methodological limitations of the U.S. lockdown survey data including sampling and assessment issues. Being a predominantly non-Hispanic, white female sample, the data were not generalizable to the larger population. Although the self-report data had questionable bias and reliability, they were suggestive of over-arousal effects of boredom that are consistent with at least one laboratory study showing physiological over-arousal of boredom [36]. The direction of these effects, i.e. boredom and stress, cannot be determined given that the data are cross-sectional rather than longitudinal. As in most other studies in the COVID-19 psychological problems literature, no baseline data were available. And, the unpredictable duration of the lockdown as well as the anonymity of the survey precluded the collection of longitudinal data. However, as already mentioned, in another analysis of these data a mid-term sample was compared to the larger end-of-study sample [23]. That analysis suggested that all the psychological problems that were significantly related to boredom in the current data analysis were experienced by a greater percent of the sample by the end of the study including anxiety, depression, PTSD, fatigue, and sleep disturbances (see Table 5). Those increases ranged from 23 to 57%. And the Stress Scale problems increased from 40 to 62% including feeling isolated, lonely, touch deprived, and cabin fever. The feeling bored increase was notable at 56%. But, at least one of the boredom buffers, i.e. exercise, fortunately increased by 86%.

Despite these methodological limitations, these U.S. lockdown survey data suggest that boredom is a significant lockdown problem that has been called over-arousing and under-arousing as well as frustrating and depressing [4,40]. In this sample, boredom was most related to lockdown-specific stressors including feeling isolated, lonely, and touch deprived as well as having cabin fever. That stress scale scores were the only significant predictor but explained a moderate amount of the variance on boredom suggests that at least for this sample, boredom was over-arousing. Although a small amount of the variance in boredom was explained by Health, Social Media and Communication Scale scores, that finding suggests that lockdown boredom may be exacerbated by social media activities and alleviated by health activities. Laboratory and longitudinal studies may further inform the literature on boredom as well as interventions that may alleviate the boredom associated with lockdowns like those of COVID-19.

Fatigue

Fatigue has received very little attention in the COVID-19 literature, although, anecdotally, it has been frequently expressed during lockdowns and especially after several months of the pandemic when it has been increasingly referred to as “pandemic fatigue”. Only a few publications could be found on fatigue in the COVID-19 literature. One research group used the Daily Life Fatigue Scale that included items on physical, mental and social fatigue [41]. In this survey from Poland, women and those who were living alone experienced the most fatigue. However, 85% of the sample was female, and females had less exercise prior to the COVID-19 lockdown which may have contributed to their fatigue. That participants who were living alone experienced more fatigue was not surprising as those living alone during COVID-19 in the U.S. have reported greater isolation and loneliness which may have explained their fatigue [23]. Unfortunately, the authors of the study from Poland did not compare the different types of fatigue that were tapped by their scale including physical, mental and social fatigue. And, as in any survey, access to the internet and self-selection for responses to internet surveys limited these results.

In a second COVID-19 study on fatigue, fatigue was referred to as the reluctance to undertake physical, mental and social activities, and it was said to derive from pandemic-related fear and anxiety [42]. Other forms of COVID-19 fatigue have included social media fatigue as in Facebook fatigue in a study from Finland [43] and research fatigue from participating in many online surveys [44].

Fatigue has also rarely appeared in the pre-COVID literature except as it relates to sleep deprivation, post-sports event fatigue, or caregiver fatigue. There, it has been typically defined as a vague feeling of being tired, weak or exhausted. Fatigue has not been a primary focus but is sometimes listed as a symptom of depression, anxiety, and sleep problems or resulting from sedentary activity and the lack of exercise.

In this U.S. COVID-19 lockdown Survey Monkey study, as many as 75% of the 260 respondents reported feeling fatigued. Correlation analyses suggested that feeling fatigued was significantly correlated with demographic variables and virtually every item on every scale of the survey. The demographic correlations suggested that fatigue occurred more frequently in younger participants, in males, and in those not working at home during the lockdown. The significant correlations for the scales suggested that those feeling fatigued engaged in fewer health activities like exercise and self-care; they spent more time on social media including gaming and Facebook; they engaged in less cooking and creative projects; they scored higher on the Stress Scale including worrying more about the virus and their finances; they reported feeling more isolated, lonely, bored and touch deprived; they did more snacking and napping and expressed more cabin fever; they had lower scores on the Connecting and Working Scales; and they had higher scores on anxiety, depression, sleep disturbances, and PTSD scales.

Although fatigue has been less frequently studied than depression, anxiety, and sleep disturbances during COVID-19 lockdowns, the data from the current survey highlight the prevalence of fatigue (75%) [1-4,9,10]. That Fatigue Scale scores were positively correlated with virtually every negative item of every scale and negatively related to every positive item, highlights the significant effects of fatigue during lockdowns. Its positive correlations with other psychological problems including stress, anxiety, depression, sleep disturbances, and PTSD symptoms suggest that it needs to be studied together with those problems that have received more attention in the COVID-19 lockdown literature [1-4,9,10].

Based on a stepwise regression, the significant predictors of fatigue were depression (explaining 37% of the variance) and anxiety (adding 12% of the variance) which is consistent with the pre-COVID literature (see table 7). The directionality of these data cannot of course be determined in a cross-sectional survey like this. Whether depression, anxiety and sleep disturbances contributed to fatigue suggesting fatigue as a symptom of these problems or fatigue contributed to these mood states is not clear. Fatigue and these mood states may be bi-directional. At the very least, fatigue might be studied alongside these problems or maybe as an early sign of the more serious problems of anxiety, depression and sleep disturbances.

Other scores that were highly related to fatigue included scores on the Stress Scale and the PTSD inventory. PTSD symptoms have been noted in other lockdown literature as well as in this COVID-19 lockdown sample [11]. The stressors that contributed to most of the variance in the Stress Scale scores included feeling isolated and lonely. These are not surprising as they have been noted in other COVID-19 lockdown studies relating to fatigue.

Other Stress Scale items that were highly correlated with fatigue included feeling bored and touch deprived. Those problems have been highlighted in other papers on this lockdown survey, although they have not been typically associated with fatigue. Lack of exercise has also been prevalent in the current sample, suggesting that the more fatigued engaged in less indoor exercise, less outdoor exercise and less outdoor exercise with someone else [45]. These negative relationships highlight the possibility that exercise may ameliorate the effects of fatigue. Other activities that were notably related were not working from home, not cooking and not engaging in creative projects. These too may be buffers to COVID-related fatigue. The relations between fatigue and Facebook time and gaming are consistent with pre- COVID literature that refers to Facebook fatigue or social media fatigue as well as COVID-19 studies.

The demographic variables that were related to fatigue were surprising i.e. being younger and male gender. Being younger is surprising because fatigue is usually associated with older people and being male is inconsistent with at least two previous COVID studies. The younger participants may have experienced more fatigue related to living alone which is consistent with previous data as well as being related to feeling isolated and lonely. The male gender finding may relate to men engaging in less cooking and creative projects and/or engaging in less work from home. In contrast, those activities that were negatively correlated with Fatigue scale scores, and could be considered buffers to boredom, were working from home and engaging in indoor exercise, outdoor exercise and outdoor exercise with someone else as well as self-care, cooking and creative projects.

Touch Deprivation

Feeling touch deprived in the U.S. lockdown sample was experienced by 60% of the participants and correlated with living alone, but only 23% were living alone [18]. This finding suggests that many who lived with others were also feeling touch deprived. Touch deprivation was negatively correlated with Health Scale scores which was not surprising given that touching your kids and your partner were items on the Health Scale and touching was the second most significant component of the factor analysis on the Health Scale (see table 8). Physical health, although not measured here, would also be compromised by touch deprivation, as it would be expected to increase stress hormones and compromise immune function. Several studies have suggested that touch

(moving the skin) stimulates pressure receptors under the skin which, in turn, leads to increased vagal activity, reduced stress hormones (e.g. cortisol), and increased natural killer cells that ward off bacterial and viral cells [46]. These data highlight the need for stimulating pressure receptors via moving the skin, as in touching kids, touching partners/friends and self-touch.

Table 8: Correlation coefficients for significant relationships between feeling touch deprived ratings and scores on COVID-19 Lockdown Activities Survey scales and subscales

Measure	Correlation coefficient	p level
Health Scale Score	-.28	.000
Stress Scale Score	.64	.000
PROMIS Anxiety Subscale Score	.39	.000
PROMIS Depression Subscale Score	.43	.000
PROMIS Fatigue Subscale Score	.30	.000
PROMIS Sleep Disturbance Subscale Score	.27	.000
Posttraumatic Stress Inventory Score	.35	.000

Finding studies on touch deprivation in the literature was difficult, as already mentioned, given that touch deprivation effects have been almost exclusively limited to extreme touch deprivation situations. An exception is a study in which touch was compared on playgrounds and in McDonald's restaurants in Paris and Miami [47]. The children and adolescents in Miami touched their peers less often and they were, in turn, more verbally and physically aggressive than children and adolescents in Paris. Another exception was the absence of touching at airport gates among individuals traveling with each other, suggesting that touch deprivation was occurring before the COVID-19 lockdown [48].

Literature has also been lacking on relationships between touch deprivation and negative mood states. Those that were correlated with touch deprivation in this study included stress, anxiety, and depression, as well as fatigue, sleep disturbances, and posttraumatic stress symptoms. These problems had been frequently reported in several studies on COVID-19 lockdowns [1,8,11-14]. Surprisingly, touch deprivation was not significantly correlated with worries about finances, although it was correlated with worries about getting the virus.

Worries About Getting the Virus and About Finances

Worries about getting the virus and worrying about finances have been associated with negative mood states including anxiety and depression during COVID-19 lockdowns. In the U.S. COVID-19 lockdown survey, 88% reported worrying about getting the virus and 72% reported worrying about their finances. Correlation analyses suggested that worries about the virus and about finances were related to each other and were, in turn, positively related to the Stress Scale scores and to negative mood states including anxiety and depression, fatigue, sleep disturbances, and posttraumatic stress symptoms (see table 9). These problems were common to both types of worries as was the lack of health activities like exercise, self-care, and touching their partners and their children. Some findings were unique to each of the worries. Those who were worried about the virus reported being active on social media, connecting with friends, and engaging in housekeeping,

and paperwork. Being worried about finances was correlated with caregiving, unemployment, less schooling, and more alcohol use. The results of this survey are limited by the self-reported data from a non-representative sample that is cross-sectional. Nonetheless, they highlight the negative effects of worries about the virus and about finances during a COVID-19 lockdown.

Table 9: Correlation coefficients for significant relationships between worrying about the virus and scores on COVID-19 Lockdown Activities Survey scales and subscales

Measure	Correlation coefficient	p level
Social Media Scale Score	.31	.0001
Connecting Scale Score	.13	.04
Working Scale Score	.14	.04
Stress Scale Score	.46	.0001
PROMIS Anxiety Subscale Score	.46	.0001
PROMIS Depression Subscale Score	.26	.0001
PROMIS Fatigue Subscale	.15	.0001
PROMIS Sleep Disturbance Subscale Score	.18	.02
Posttraumatic Stress-8 Inventory	.31	.005

Worrying about the virus increased significantly from 50 to 88% (a 43% increase) across one-month in this U.S. COVID-19 lockdown period (see table 5). Worrying about financial status significantly increased from 43 to 72% (a 40% increase) over the same lockdown period. The increases in these primary worries over this relatively short time period is worrisome especially because of their significant relationships with the more serious psychological and sleep problems.

Both the worries about the virus and the worries about finances were significantly related to scores on the stress, anxiety, depression, fatigue, sleep disturbances and PTSD scales. The associations between these worries and anxiety and depression are consistent with previous literature [4,49,50]. The associations between these worries and stress, fatigue, sleep disturbances and PTSD are unique to this study. Although the correlations between the virus and finances worries were similar for stress (highest for stress), depression (moderate for depression), and fatigue (lowest for fatigue), the coefficients for these two different worries differed on other psychological problems. Higher coefficients were noted for correlations between the worries about the virus and anxiety and PTSD in contrast to higher coefficients being noted for the correlations between worries about finances and sleep disturbances.

Although the virus worry was not associated with demographic variables, the finances worry was significantly related to being unemployed and having less schooling, associations that were not surprising. Although the virus worry was related to worrying about more people and washing hands more frequently, the finances worry was related to less self-touching and less self-care.

Surprisingly, neither worrying about the virus nor worrying about

finances was related to healthy activities like exercise, meditation and touching partners or touching your kids. But, the different worries differed in their relationship to other activities. Worrying about the virus was related to engaging in every form of social media including phoning, texting, Facebook time, messaging about the virus, time on Zoom, watching the news and movies which may have contributed to the psychological problems that have been noted in other samples [13,37]. But connecting with others and engaging in housework and paper work may have ameliorated the sleep disturbances associated with worrying about the virus. In contrast, while worries about finances were related to more caregiving, which may have contributed to financial worries, those worries were not related to any other activities except greater consumption of alcohol.

That the two types of worries were related to each other and to the psychological and sleep problems highlights the significance of both worrying about the virus and worrying about finances. The differences in the correlations between the two types of worries and the problems, i.e. the virus worry being more related to anxiety and to PTSD and the finances worry being more related to sleep disturbances, suggest slightly different profiles for the worries. Different profiles are also suggested by the virus worry being associated with more positive activities (connecting, housework and paper work) and negative activities (social media) and the finances worry being associated with positive activity (caregiving) and negative activity (alcohol consumption). Profile analysis of these different associations for virus and finance worries might help identify those who need intervention and the type of intervention needed.

Even though worries were not related to gender in the current sample, worries may have been inflated in this predominantly female sample (72%). The prevalence of fear about the virus has been greater in women versus men in other samples including Greek and Bangladesh samples [50,51]. And the prevalence of depression was greater in the current sample than in a U.S. census sample of the same time period (73% depression in the current sample versus 24% in the U.S. census sample) [52]. Unfortunately, the census report did not include a gender distribution and it did not indicate whether it was based on a non-lockdown sample in which the prevalence would be expected to be lower. Uneven gender distributions and lockdown versus non-lockdown samples may explain some of the variability in prevalence data. Another contributor to variability could relate to the nature of the assessments of psychological problems and worries. Shorter scales with more explicit questions, as in the current study, may reveal greater prevalence. For example, the one question on virus worry in this sample yielded a prevalence of 88% while the Greek results that were based on the 7-item COVID-19 Fear Scale yielded only 36% [50]. This prevalence difference may also relate to fears being considered greater than worries, resulting in fewer individuals reporting fears (as in the Greek sample) than worries (as in the present sample).

The self-report data are subject to questionable bias and reliability, although they were anonymous, suggesting their veridicality and they are consistent with previous data [4,49,50]. The direction of these effects cannot be determined given that the data are cross-sectional rather than longitudinal. Pre-COVID-19 anxiety and depression may have contributed to these worries just as the worries contributed to those problems, as in bi-directionality. The bi-directionality is exemplified by the Greek survey that suggested that depression and anxiety moderated fear of the virus [50]. Unfortunately, no baseline data were available, as in most other

studies in the literature on COVID-19 psychological problems given that the lockdowns were sudden and their timing was not predictable. And, the unpredictable duration of the lockdown as well as the anonymity of the survey precluded the collection of longitudinal data.

The U.S. Census report did indicate a 3-fold increase in depression and anxiety from pre-COVID 2019 data to March-April 2020 COVID data [52]. And, comparisons between the mid-term sample and the larger end-of-study sample of this survey, suggested an increased prevalence of these problems from the beginning of lockdown periods to data collected one month later (see table 5) [23]. That analysis revealed that the psychological problems that were significantly related to the worries in the current data analysis were experienced by a greater percent of the sample by the end of the one month long survey including anxiety, depression, PTSD, fatigue, and sleep disturbances. The increased prevalence for those problems ranged from 23 to 57% increases. And other stress scale problems besides worries increased from 40 to 62% including feeling isolated, lonely, touch deprived, and cabin fever. For those problems there was at least one buffer, i.e. exercise, which fortunately increased in prevalence by 86%. Unfortunately, however, exercise was not a buffer for the virus and finances worries (or at least not significantly correlated), although caregiving may have been a buffer activity for finance worries, and housework and paper work might have been a buffer for the virus worries.

Despite these methodological limitations, these survey data suggest that worries about the virus and about finances are significant lockdown problems. Their significant relationship to each other and to the same psychological and sleep problems highlight the similar effects of these worries. Their uniquely different relationships suggest the need for profile analyses to help identify the different types of interventions needed as well as inform intervention protocols to reduce worries about the virus and about finances and their related problems during lockdowns like COVID-19.

Young, Living Alone, and Young Living Alone

The effects of age (young versus old) and living status (alone versus with others) were assessed in the U.S. COVID-19 lockdown survey [17]. Both age and living status and their interaction effects were explored via ANOVAs on scales for health, social media use, mood states including anxiety and depression, posttraumatic stress symptoms, fatigue and sleep disturbances. ANOVAs were conducted via a median split on age as well as on a group comparison of young (20-40 years) versus old (60-80 years) individuals (see table 10). The results of these two types of data analyses were consistent on most variables, suggesting that the young versus the old experienced more stress, anxiety, depression, and PTSD symptoms as well as greater fatigue and sleep disturbances. And, they reported fewer health activities. Significant effects were also noted for the alone versus living with others' groups including less engagement in exercise and work from home by the alone individuals as well as more stress, depression, fatigue, and PTSD symptoms.

Table 10: Means for significant ANOVAs for age and living condition based on median split on age. (standard deviations in parentheses)

	Young		Old	
Scales	Yes	No	Yes	No
Health	26.90(4.84)	32.61(5.07)	29.86(5.57)	32.79(5.42)
Working	12.76(3.03)	16.13(3.45)	14.26(2.79)	15.90(3.63)
Stress	30.38(6.81)	26.94(5.71)	27.56(6.86)	26.18(6.53)
Anxiety	11.48(3.84)	10.15(3.58)	8.91(3.09)	9.12(3.56)
Depression	11.76(4.19)	8.08(3.63)	7.88(3.12)	7.62(4.03)
Fatigue	9.60(3.06)	8.15(2.97)	7.62(3.02)	7.49(3.41)
Sleep	15.76(4.71)	14.17(4.44)	12.45(4.16)	12.93(4.56)
PTSD	17.77(5.44)	14.31(6.04)	13.83(5.52)	13.32(5.37)
Effect				
Health - Alone Effect F=22.87,		p=.000	ETA ² =.10	
Working - Alone Effect F=23.71,		p=.000	ETA ² =.09	
Stress - Alone Effect F=6.29,		p=.01	ETA ² =.03	
Anxiety - Young Effect F=11.08,		p=.001	ETA ² =.04	
Depression - Young Effect F=14.51,		p=.000	ETA ² =.06	
Alone Effect F=11.94,		p=.001	ETA ² =.05	
Young By Alone F=8.98,		p=.003	ETA ² =.05	
Fatigue Young Effect F=7.83,		p=.006	ETA ² =.03	
Sleep Young Effect F=11.11,		p=.001	ETA ² =.03	
PTSD Young Effect F=6.02,		p=.02	ETA ² =.03	
Alone Effect F=3.89,		p=.05	ETA ² =.02	

A significant age by living condition interaction effect suggested that the young living alone had the highest depression scores. The experiences that were common to the young, the living alone, and the young living alone were being lonely, depressed and fatigued. These results highlight the importance of prevention/intervention for the young, the living alone, and the young, living alone during lockdowns like COVID-19.

Some of these effects would be expected. For example, the greater use of social media (i.e. internet and Facebook) by the young group is not surprising. Both internet addiction and Facebook addiction have been noted for youth as early as adolescence [53,54]. And, that those living alone were doing less work at home (i.e. cooking and caregiving) was also not surprising. Further, that those living alone gave higher ratings for touch deprivation would be expected. Touch deprivation has been significantly related to not just living alone but also to being isolated and lonely during the COVID-19 lockdown [18].

Feeling isolated and lonely were significant effects for all three groups in these data analyses including the young, the alone and the young alone. The word loneliness, although derived from the word alone, is thought to be equivalent to social isolation in studies on loneliness in pre-COVID samples [31]. And, across the lifespan, loneliness has been reportedly more common in young adults (20-70%) than older adults (11-30%) [27]. Loneliness, in turn, has predicted less physical activity [25]. Those living alone in the current COVID-19 sample were not only less actively working from home, but were also getting less exercise. Less exercise, in turn, has been associated with depression and fatigue [18]. Although 27% of this sample reported engaging in exercise “a lot”, as many as 17% responded “not at all” to the question on outside exercise. And, exercise has been noted to reduce depression in COVID-19 samples [18,20]. Loneliness (social isolation) is thought to increase activation of the hypothalamic pituitary axis [21]. Cortisol, the stress hormone that is then increased, compromises immune function by reducing natural killer (NK) cell number and natural killer cell activity, which in turn kill viral cells, for example, HIV cells [55]. Although, natural killer (NK) cells and NK cell activity have enhanced immune function in HIV, their effects on immune function in COVID-19 are unknown. Exercise would be expected to enhance immune function, via the stimulation of pressure receptors under the skin, in turn increasing vagal activity, decreasing cortisol and increasing NK cell activity [56].

Depression and fatigue were also significant effects for all three groups. The young, alone and the young alone had higher ratings on the PROMIS Depression and Fatigue subscales. Depression explained a significant amount of the variance (52%) in COVID-19 stress in an earlier report on this sample, and both the young and the alone had higher stress scores in the current data analyses [14]. In the earlier report on stress and sleep, fatigue explained 52% of the variance in sleep disturbances [14]. When regressions have been conducted on fatigue and sleep disturbances in a community sample, anxiety, depression, and PTSD contributed to significant variance in both sleep and fatigue, and sleep and fatigue were significantly related [16]. However, direction of effects cannot be determined, as sleep and fatigue could be reciprocally related or at least they could have exacerbated pre-existing conditions in this cross-sectional study.

Fatigue is an ambiguous term, as it could be defined as exhaustion from hard work (which was not happening in this alone sample), but it has also been anecdotally referred to as “quarantine fatigue” during this COVID-19 pandemic. Quarantine fatigue would be expected to worsen over a period of time. And, the Survey Monkey output from this study suggested that the prevalence (percentiles) for all of these problems were higher at the end of the lockdown than those in the middle of the survey data collection, suggesting that “quarantine fatigue” may be contributing to the worsening of these problems (see table 5).

Despite the already mentioned significant variance that fatigue contributed to sleep in the larger COVID-19 data base, sleep

disturbances were only greater for the young in the current data analyses. The young also had uniquely higher PTSD scores. These effects are consistent with the association between sleep disturbances and posttraumatic stress symptoms in a COVID-19 sample in China, although, once again, that was a cross-sectional sample in which directionality of effects could not be determined [10]. The significant association between anxiety and sleep disturbance has also been reported for a younger COVID-19 sample (<35 years) in China, a syndrome that the authors referred to as the “hypochondriac concern about getting the virus” [1]. Although anxiety and particularly “worries” were expressed by the young in this survey, “worry about getting the virus” was a universal concern reported by both the young and old and the living alone and living with others in the current study.

The limitations of this survey are that it is a cross-sectional sample in which causality inferences cannot be made. With the sudden onset of pandemics, pre-existing data are not typically available. This was also a non-representative sample (both on gender and ethnicity) so that the data are not generalizable. Unfortunately, the geographic distribution of the participants may also be unrepresentative, although that is unknown. The data are also based on self-report with its frequently noted problems, although the anonymity of the survey would suggest significant veridicality of the data. Despite these limitations, the significantly greater problems for the young, the alone and the young alone in this sample suggest a high-risk profile that might be used to identify those who are in particular need of prevention/intervention protocols during pandemic lockdowns like COVID-19.

These data suggest that the young, the living alone, and the young living alone are experiencing significantly more loneliness, depression, and fatigue than others during a COVID-19 lockdown. The data also suggest that potential buffers for these problems are meditation, touching their partners and kids, and indoor exercise, outdoor exercise, and outdoor exercise with others. These data may help inform current and future intervention efforts to reduce these problems during COVID-19 and other lockdowns.

Buffers for the Stressors of COVID-19 Lockdowns **Social Media**

Social media including texting, internet use, and Facebook time had differential effects on individuals during the U.S. COVID-19 lockdown [37]. In that survey, as many as 98% of 260 respondents reported texting, 100% using the internet, and 91% spending time on Facebook. The percentiles for those using the different social media “a lot” were 45%, 77% and 42% respectively. Correlation analyses suggested that texting and internet use were positively related to Connecting Scale scores. However, internet use was also positively related to scores on Stress, Anxiety and Depression Scales and Facebook time was positively related to not only scores on Stress, Anxiety and Depression Scales but also to scores on Fatigue, Sleep Disturbance and PTSD scales. ANOVAS based on comparisons between groups reporting no to moderate use versus groups rating “a lot” of use were typically confirmatory of the correlation analyses. These results are limited by their being self-reported data from a non-representative, cross-sectional sample. Nonetheless, they highlight the positive and negative effects of different social media during a COVID-19 lockdown.

Social media had both positive and negative effects in this COVID-19 lockdown survey sample. The texting effects appeared to be primarily positive while those for Internet use were mixed (both positive and negative effects) and those for Facebook were solely negative. That the effects differed across these three forms

of social media was surprising, although they have not been compared in pre-COVID research and they have not been assessed by COVID-19 researchers.

Texting was, as might be expected, related to other social media activities including phoning, internet, Facebook time, Zoom and watching tv. The positive effects of texting included engaging in more health-related activities like exercising with someone else, self-touch, and self-care, as well as connecting with friends, and engaging in more housekeeping. These data were inconsistent with pre-COVID literature which suggested that texting was only associated with negative effects including greater anxiety, depression, and sleep disturbances [57-60]. These inconsistent data may relate to the previous literature being based on excessive use of texting, while only 45% of this COVID-19 sample claimed to be texting “a lot” [59,60].

The only negative effects of texting in this sample were “worrying about the virus” and “feeling touch deprived”. Greater worry about the virus may relate to text messaging more about the virus. Feeling touch deprived was surprisingly unique to this form of social media in this sample. But greater texting has appeared to be associated with less touch even in pre-COVID samples such as an airport gate observation study that is suggesting excessive time on cell phones and virtually no time touching travel partners [48]. Internet use was also not surprisingly related to other forms of social media including texting, Facebook time, watching TV, and communicating about the virus. Both positive and negative effects were noted for internet use. The positive effects included connecting with others and feeling supported. These positive effects are unique to the internet literature, likely because they have not been assessed in previous research. The use of internet by younger adults was consistent with previous literature suggesting negative associations between internet use and age [61,62].

More negative than positive effects were noted for internet use in this COVID-19 sample including greater stress, anxiety, and depression. In addition, those who spent more time on internet did not have a routine, engaged in less outdoor exercise, and did not feel spiritual which could have contributed to their stress. Exercise has alleviated touch deprivation, and feeling spiritual has related to less stress during COVID-19 lockdowns [18,63]. The associations between Internet use and depression and anxiety are consistent with pre-COVID literature, and even with research on Internet addiction [58,61,62,64]. Although this sample was not assessed for Internet addiction, as many as 77% reported using Internet “a lot”. Unfortunately, “a lot” does not accurately quantify time on social media.

Facebook time was reported by 91% this sample, with 42% rating time on Facebook as “a lot”. This prevalence is perhaps not surprising inasmuch as the flyer for this Survey Monkey study was posted on Facebook. Not unlike texting and internet use, Facebook time was related to other social media including texting, Internet use, messaging about the virus, and watching TV and movies. That more users were young and male is consistent with previous data [65,66]. Other contributing demographic factors were having less schooling, having less professional work, not currently working from home, and having no routine, all of which may have confounded the effects of Facebook time.

Facebook time was not only associated with stress and anxiety but was also significantly correlated with depression, fatigue, sleep disturbances and PTSD symptoms (see table 11). These data are consistent with the social stress and insomnia reported by some

and the depression called “Facebook depression”, and “Facebook intrusion” noted by others [65,67,68]. “Facebooking” individuals were also feeling less spiritual, feeling more touch deprived, and engaging in less outdoor exercise which would be expected to exacerbate their stress inasmuch as feeling spiritual and engaging in more outdoor exercise have been noted to alleviate the stressful effects of COVID-19 lockdowns [18,63]. Facebook time was also correlated with some items that were considered healthy including connecting with friends, family members living at home, doing homework with kids, and touching kids. But, unfortunately these activities did not buffer the negative effects of Facebook time.

Table 11: Mean scale scores for significant ANOVAs for a” lot of Facebook” (3 rating) group versus a “no Facebook, a little and moderate Facebook” (0-2) group (standard deviations in parentheses)

Measure	0-2 group	3 group	F	p	eta ²
Social Media	24.90 (3.75)	29.53 (3.39)	101.52	.000	.29
Stress	25.90 (5.93)	28.95 (6.43)	15.24	.000	.06
Anxiety	9.43 (3.62)	10.44 (3.46)	4.93	.03	.02

These data are inconclusive due to limited sampling and assessment issues. The recruitment via Facebook may have contributed to its being a predominantly non-Hispanic, white female sample. This would be considered a non-representative sample even though it may be a representative Survey Monkey sample. The self-report data, as always, are prone to potential reliability problems and bias effects. And, causality or direction of effects cannot be determined from this cross-sectional survey. Longitudinal studies are needed to provide baseline and follow-up data. In addition, daily diaries or recording technology would provide more reliable measures of texting, internet use, and Facebook time.

Nonetheless, these data suggest differential effects of different types of social media during lockdowns that appear to be on a continuum from positive effects for texting to both positive and negative effects for internet use to negative effects for Facebook time. The negative effects of “a lot” of internet and Facebook time including anxiety and depression symptoms are consistent with pre-COVID literature. These negative effects may have been exacerbated by the lack of routine and outdoor exercise which were uniquely assessed in this COVID-19 sample. These survey data also revealed positive, novel effects of texting on health and connecting activities and internet use for connecting with friends. Further research is needed on texting, internet and Facebook effects as they will likely continue being prevalent COVID-19 activities.

Spirituality and Meditation

Spirituality and meditation have been associated with emotional and physical well-being, but studies on their effects are surprisingly missing from the COVID-19 lockdown literature. In the U.S. COVID-19 lockdown survey, 72% of the 260 respondents reported feeling spiritual and 48% meditated [69]. Correlation analyses suggested that spirituality was positively related to health practices and working on projects and negatively related to COVID-related stress, anxiety, depression, fatigue, and sleep disturbances (see table 12). And, meditation was positively related to Health and Working scale scores. Spirituality and meditation may be buffers for these COVID-19 related stressors.

Table 12: Correlation coefficients for significant relationships between feeling spiritual ratings and scores on COVID-19 Lockdown Activities Survey scales and subscales

Measure	Correlation coefficient	p level
Health Scale Score	.55	.0001
Connecting Scale Score	.18	.005
Working Scale Score	.25	.0001
Stress Scale Score	-.25	.02
PROMIS Anxiety Subscale Score	-.17	.008
PROMIS Depression Subscale Score	-.24	.0001
PROMIS Fatigue Subscale Score	-.23	.0001
PROMIS Sleep Disturbance Subscale Score	-.20	.001
Posttraumatic Stress-8 Inventory Score	-.14	.05

As might be expected, spirituality and meditation were significantly correlated. As has been suggested, spirituality is “an individual’s ability to stand outside an immediate sense of time and place to view life from a larger, more objective perspective” [70]. And it could be said that meditation facilitates that process [71]. Surprisingly, however, while 72% of the respondents reported feeling spiritual, only 48% reported engaging in meditation. Nonetheless, neither spirituality nor meditation were related to being worried about the virus or about finances which would be consistent with “standing outside an immediate sense of time and place” [70]. And, both spirituality and meditation were related to connecting with friends and engaging in various kinds of work including creative activities and hobbies and liking being at home during the lockdown which would be consistent with their definitions.

The Sleep Disturbance Scale scores were also negatively related to both the spirituality and meditation variables which is consistent with the pre-COVID literature and with at least one COVID-19 paper on sleep disturbances [14,72,73]. And, meditation has been noted to reduce insomnia [74]. The reduction in sleep disturbances may have, in turn, mediated the relationships between spirituality, meditation, and health.

The specific health variables that related to both spirituality and meditation included indoor exercise (the most frequent being yoga which includes meditation), self-touch (again, yoga as it was given as the most frequent example in the item on self-touch), and self-care. Both exercise and touch have been buffers for COVID-19 stress in previous research [45]. Although self-care was not operationally defined, the respondents may have interpreted self-care as caring for their health. Much of the literature on both spirituality and meditation has focused on their relationships to health [75,76]. One of the potential underlying mechanisms that has been proposed for the meditation-health relationship is that meditation reduces stress and, in turn, suppresses chronic inflammation [77].

Surprisingly, spirituality but not meditation was negatively related to depression. The absence of a relationship between meditation and depression was inconsistent with the literature reviewed above [78,79]. This may relate to the lesser opportunity for group meditation during COVID-19 lockdowns. The negative

relationship between spirituality and depression was consistent with pre-COVID literature [80]. Spirituality was related to reduced depression in 49% of 152 studies in a recent review on the spirituality literature [80]. Different potential underlying mechanisms have been suggested for the spirituality–depression relationship including increased dopamine, serotonin, and oxytocin genes associated with both spirituality and the absence of depression [77]. And spirituality has been positively related and depression negatively related to alpha EEG waves [81]. Further, in a meta-analysis on physiological markers of depression, decreased blood pressure and C-reactive protein were frequently noted [82]. These, in turn, could contribute to the health effects by the associated reduction in stress and inflammation [77].

Spirituality was negatively related to the Stress Scale total scores and its items, and the spiritual and the non-spiritual groups differed on the stress variables. The negative relationship between spirituality and stress was unexpected inasmuch as research on the Stress Scale variables could not be found in the pre-COVID literature on spirituality. Several individual variables contributed to the stress score including feeling isolated, lonely, bored, touch deprived, and having cabin fever. That loneliness was one of the significant stress items was not surprising given that loneliness was previously reported as the most robust factor in a factor analysis on the Stress Scale that was designed specifically to tap COVID-related stress [14]. These data are consistent with other COVID studies suggesting that feeling isolated and lonely and feeling touch deprived are salient COVID-19 lockdown stress symptoms [18,23]. Surprisingly, meditating was not related to those stress variables except for not feeling bored. And meditating was not related to the psychological symptoms that are often comorbid with stress including anxiety, fatigue and PTSD.

Although multiple COVID-19 lockdown studies have reported stress, anxiety, and depression as well as sleep disturbances and posttraumatic stress symptoms none of these studies have assessed spirituality or meditation as potential buffers for these problems [1,3,79,10,12,13]. In the current study, feelings of spirituality and meditating were significantly negatively correlated with these negative conditions (significant *rs* ranging from .14-.82). And, group differences between those who did and did not feel spiritual or did or did not meditate were also highly significant for all of the conditions. However, because of the cross-sectional nature of this study and the absence of baseline data, directionality of effects cannot be determined. These relationships may have preceded the lockdown and could have become stronger during the lockdown as coping mechanisms. Feeling spiritual and meditating were surprisingly prevalent as were the absence of worries about getting the virus and finances. And, these were accompanied by other buffering activities including connecting with friends, self-touch, self-care and exercise. Exercise was also negatively correlated with feelings of isolation and loneliness and was noted to buffer the effects of touch deprivation in a previous analysis of this database [18]. Pre-COVID research has also shown positive effects of exercise on anxiety and sleep disturbances [83,84]. Exercise and additional touch stimulation as in hugging and back rubbing would be expected to enhance immune function via moving the skin and stimulating pressure receptors under the skin, in turn, increasing vagal activity, decreasing cortisol and increasing NK cell activity to ward off viral and bacterial cells [46]. Engaging in these activities may have confounded and compounded the effects of spirituality and meditation. Nonetheless, those experiencing negative mood states and sleep disturbances during lockdowns might be encouraged to engage in meditation, self-touch, and exercise.

Future studies might compare several different groups including those feeling spiritual, those meditating, those feeling spiritual and meditating and those neither feeling spiritual nor meditating. In addition, standardized scales for spirituality and meditation may be used rather than rating scales on those variables. Despite their limitations, these data suggest that both feeling spiritual and meditating are associated with health-related activities and reduction of sleep disturbances. And feeling spiritual in particular was associated with a reduction of stress, depression, anxiety, fatigue, and PTSD symptoms. And, neither those who reported feeling spiritual nor those engaging in meditation were experiencing the typical worries about getting the virus or about finances during this COVID-19 lockdown.

Touching

Touching your kids and your partner, and self-touching have had different effects on individuals during a COVID-19 lockdown. In the U.S. COVID-19 lockdown study, 21% said they were touching their kids a lot, 33 % touching their partner a lot, and 32% self-touching a lot (e.g. yoga and stretching). Correlation analyses suggested that touching partner was related to lower scores on the Stress, Depression, and PTSD Scales and Self-touching was related to lower scores on the Fatigue and Sleep Disturbance Subscales.

Finding literature on the positive effects of touching has been difficult given that touch stimulation effects have been researched primarily as massage therapy effects on chronic psychiatric and medical conditions [10]. Touching your kids and touching partners in the current study shared similar effects. First, they were both, not surprisingly, correlated with each other and associated with less touch deprivation and more exercise with others. Secondly, they both involved similar types of touching including hugging, kissing, backrubs, and cuddling. Thirdly, those who experienced more touching your kids and partners had similar demographics including being a younger age and living with others. They were also both correlated with higher scores on the Health Scale and higher scores on the Working Scale including engaging in more homework, caregiving, and housework.

Touching partners was also correlated with self-touch, and both in turn were associated with higher Health Scale scores. These results were not surprising given that touching others and self-touch have had similar effects including increased vagal activity, decreased stress hormones, and enhanced immune function [10]. Touching partners was negatively correlated with stress, depression, and posttraumatic stress symptoms, suggesting that touching partners was buffering those psychological problems (see table 13) [8,11,12].

Table 13. Correlation coefficients for significant relationships between touching your partner and scores on COVID-19 Lockdown Activities Survey scales and subscales

Measure	Correlation coefficient	p level
Health Scale Score	.48	.001
Working Scale Score	.25	.01
Stress Scale Score	-.16	.05
PROMIS Depression Subscale Score	-.19	.01
PTSD-8 Inventory Score	-.22	.005

Self-touch, on the other hand, appeared to be buffering fatigue and sleep disturbances based on their negative correlations [1,13,14]. This is not surprising given that the most frequent self-touch activities in this survey, i.e. stretching, brushing in the shower, and yoga, have been defined as self-touch activities and have been noted to reduce sleep disturbances in other studies [84]. Self-touch was also related to greater inside exercise, outside exercise, and exercise with others, suggesting that those who engaged in self-touch also engaged in all types of exercise. Pre-COVID research has also shown positive effects of exercise on anxiety and sleep disturbances [20,83]. Exercise, touching your kids, and touching partners, as in hugging and back rubbing, would be expected to enhance immune function via moving the skin and stimulating pressure receptors under the skin, in turn, increasing vagal activity, decreasing cortisol and increasing natural killer cell activity to ward off viral and bacterial cells [19,83].

Unfortunately, because lockdowns like those of COVID-19 were not predictable, no baseline data were available, as is the case for most of the COVID-19 lockdown literature. Even without anticipating this lockdown, data on touching your kids, touching partners, and self-touching would not have been available in the pre-COVID literature.

Despite these methodological limitations, these survey data analyses suggest that all forms of touching including touching your kids, touching partners, and self-touching contributed to health behaviors like exercise and at home activities like cooking, housework, and creative projects. These may have confounded and compounded the positive effects of touching. Nonetheless, these data highlight the positive effects of touching your partners, touching your kids, and self-touching during lockdowns like those of COVID-19.

Exercise

Indoor exercise, outdoor exercise, and outdoor exercise with others have had buffering effects on psychological problems during the COVID-19 lockdown. In the U.S. COVID-19 lockdown study, the most prevalent forms of indoor exercise were yoga and stretching while the most frequent forms of outdoor exercise were walking and running. Correlation analyses suggested that indoor, outdoor, and outdoor exercise with someone else were positively related to scores on the Health Scale and negatively related to scores on the Anxiety, Depression, Fatigue, Sleep Disturbance, and PTSD scales (see table 14). In addition, indoor exercise and outdoor exercise with someone else were positively correlated with scores on the Connecting and Working Scales. The results of these data analyses are limited by the self-reported data from a non-representative, cross-sectional sample. Nonetheless, they highlight the positive effects of exercise during a COVID-19 lockdown.

Table 14: Correlation coefficients for significant relationships between outdoor exercise and scores on COVID-19 Lockdown Activities Survey scales and subscales

Measure	Correlation coefficient	p level
Health Scale Score	.52	.001
PROMIS Anxiety Subscale Score	-.18	.005
PROMIS Depression Subscale Score	-.23	.001
PROMIS Fatigue Subscale Score	-.24	.001

PROMIS Sleep Disturbance Subscale Score	-.21	.001
PTSD-8 Inventory Score	-.22	.005

All three forms of exercise were associated with higher Health Scale scores and lower depression, fatigue and PTSD scores which is consistent with the pre-COVID literature [20,83,85-89]. These findings add to the COVID-19 literature that has so far only associated exercise with reduced anxiety [90,91]. In the current database, an inverse relationship was noted between anxiety and both indoor and outdoor exercise but not for outdoor exercise with others. Those exercising with others may have had lower baseline anxiety scores that did not change with exercise.

Indoor and outdoor exercise were also associated with lower sleep disturbance scores, again consistent with pre-COVID literature [20]. But that relationship was not noted for outdoor exercise with others. Those exercising with others may have had lower baseline sleep disturbance scores because they engaged in more touching their partners and their kids. The facilitating effects of touching on sleep have been noted in the pre-COVID literature [19].

Indoor exercise and outdoor exercise with others were also positively related to the scores on the connecting with others and working on projects scales. These other indoor activities may have confounded and compounded the exercise effects as they would also be expected to contribute to psychological and physical well-being.

Outdoor and indoor exercise have been compared by others in a pre-COVID sample [92]. Those authors noted that outdoor exercise had greater effects on mental and physical health. Both their indoor and outdoor exercise protocols involved walking and running. Their findings may be consistent with the data from the current survey inasmuch as the correlation coefficients for outdoor exercise and mental and physical health variables were greater than those for indoor exercise in this lockdown sample. The outdoor exercise was likely more rigorous as it was most frequently walking and running as opposed to the indoor exercise that was most frequently yoga and stretching. The more rigorous exercise would be expected to have a greater effect on depression via the higher serotonin levels that have been associated with more rigorous exercise like running [93]. However, as already noted, indoor exercise was also associated with other healthy indoor activities including connecting with others and working on creative projects. Further, outdoor exercise with others was significantly associated with less living alone, living with more kids, and more touching partners and kids which would be health enhancing.

These cross-sectional data are limited by not having baseline data on the exercise or the physical and mental health variables to assess change on any of the variables. Not anticipating the timing of lockdowns has limited most of the exercise, physical and mental health studies in the COVID-19 literature. The current sample was also limited by its being primarily Non-Hispanic white females, although it was representative of different age groups. Females engaged in more indoor exercise (yoga and stretching) which was not surprising, but female participants also engaged in more outdoor exercise (walking and running), as did older individuals which were surprising findings. No significant effects were noted for outdoor exercise with someone else.

Other problems with this survey included the self-report data that was dependent on recall but also subject to social desirability bias, although the anonymity of the data would enhance its veridicality. Further, the geographic location of participants was unknown, so that between subjects variability would be expected on the degree of lockdown isolation and constraints on outdoor exercise during the month of the survey. Despite these methodological limitations, these survey data highlight the importance of these types of exercise for psychological and physical well-being.

Working From Home and Other Home Activities

“Working from home”, which is typically defined as taking your employment work home, has been prevalent during COVID-19 lockdowns, although very little research has focused on working from home or on other home activities even though lockdowns have entailed remaining at home for extended periods. These prevalent activities may also be buffers for lockdown stress.

In the U.S. Survey Monkey lockdown study, 69% were “working from home”, and this variable was related to more paper work, being less bored, less touch deprived and generally less stressed. The other prevalent home activities included cooking (97% of survey participants), housekeeping (96%), hobbies (82%), paper work (76%), creative projects (71%), and caregiving (54%). Total scores on the Working Scale that included these activities were positively correlated with scores on the Health Scale (that included exercise, touching family members, self-care, and meditating) as well as connecting with friends (see table 15). These working activities were also associated with more texting and being on Zoom and with less depression and fatigue. These data, in contrast to other lockdown literature, suggest moderate levels of working from home and engaging in healthy activities during a COVID-19 lockdown.

Table 15: Correlation coefficients for significant relationships between Home Activities Scale scores and other scale scores

Measures	Correlation coefficients	p levels
Health Scale Score	.43	.0001
Social Media Scale Score	.17	.006
Connecting Scale Score	.42	.0001
PROMIS Depression Subscale Score	-.17	.005
PROMIS Fatigue Subscale Score	-.14	.01

Working from home appears to have been an active and positive experience for this sample, consistent with data on an Australian sample (see table 16) [94]. That more paperwork was associated with working from home was not surprising as most professions include paperwork. The relationship between working from home and “touching your kids” may have related to multitasking, i.e. working from home and at the same time giving your kids physical affection (or trying to distract them) meeting both their working and caregiving needs. “Touching your kids” more would, in turn, explain the relationship between working from home and feeling less touch deprived.

Table 16: Correlation coefficients for working from home and other variables

Variables	Correlation coefficient	p level
Schooling	.15	.001
Employment	.25	.0001
Income	.15	.04
Touching your kids	.16	.02
Paper work	.25	.0001
Boredom	-.17	.008
Touch deprivation	-.15	.02
Snacking	-.14	.03
Stress Scale Score	-.17	.008

The significant correlation between working from home and being less bored is not surprising given that the pre-COVID employment that was originally chosen and that was now “working from home” was presumably chosen because it was less boring. And the negative relationship to the Stress Scale score could relate to not only being less bored and touch deprived (items on the Stress Scale) but also being employed as well as having a greater income.

Surprisingly, working from home was not related to any other home activities except paperwork, possibly because working from home occupied most of the lockdown hours. The absence of relationships between working from home and other home activities may also relate to other family members who were unemployed taking care of those necessary other home activities including cooking and housework. The greater prevalence of other home activities than working from home, i.e. percentiles in their 90s versus 69% for working from home, suggests that significant multi-tasking was occurring. The absence of significant correlations between working from home and health activities like exercise, is consistent with the reports on increased sedentary activity associated with working from home in the earlier U.S. sample and the samples from India and Spain [95,96,97]. However, even though working from home was not significantly correlated with health activities including exercise and self-care, the prevalence data for exercise and self-care were also high (72 and 95% respectively). The high prevalence data suggest that both health activities and working from home were occurring. The inconsistent findings may relate to the wider variety of home activities assessed in the present study than the simple measures of sitting and working from home that were reported in the COVID-19 studies from the earlier U.S. survey and in the surveys from India and Spain [95-97].

Engaging in other home activities, in contrast to working from home, was highly correlated with the Health Scale and Connecting Scale scores as well as many of the Health Scale activities including exercise, self-care, touching your partner and your kids, and meditating. These have been notable buffers for psychological problems and sleep disturbances in previous analyses of this database including exercise, touching partners and kids and meditation [45,98,63]. In addition, engaging in other home activities was related to social interaction variables including connecting with friends, texting and spending time on Zoom that would also explain their feeling less bored, anxious, and depressed.

Perhaps more importantly, other home activities were negatively correlated with depression and fatigue and all the items on those scales. Other variables that may have confounded and/

or compounded these relationships for other home activities were greater income, living with others, and having more family members and more kids in the household. Living with more family members and kids, in turn, would explain the significant relationships with helping children with homework, caregiving, cooking and housework. Engaging in hobbies and creative projects may have also contributed to the lower levels of depression.

Conclusions

These studies which were mostly based on correlation and regression analyses revealed several stressors as well as potential buffers for COVID-19 stress. The sections of this narrative review reflect their focus as stressors: 1) Young, Living Alone, and Young Living Alone (worst demographic); 2) Isolated and Lonely (worst feelings); 3) Touch Deprivation (most common condition not just for the living alone); 4) Stress and Sleep Disturbances (circular problems); 5) Anxiety and Depression (widely reported COVID-19 symptoms); 6) PTSD (commonly reported lockdown symptoms); 7) Boredom and Fatigue (only problems that related to everything negative on the survey); and 8) Specific worries about the virus and finances (surprisingly less stressful than boredom and fatigue).

The sections on buffers included 1) Social media (that was expected to be a buffer but differed by type of social media including that texting was related to positive effects, internet both positive and negative effects and Facebook time negative effects), 2) Spirituality and Meditation (surprisingly high prevalence at 72% and 48% respectively); 3) Touching Partner and Kids (surprisingly low prevalence for touching partner a lot (37%) and kids a lot (21%); 4) Indoor Exercise, Outdoor Exercise and Outdoor Exercise With Someone Else (the most stress alleviating activities which were not surprising as exercise stimulates pressure receptors under the skin, knocks down stress hormones like cortisol and saves immune cells); and 5) Working from home (which was prevalent at 69% and stress alleviating) and engaging in other activities at home (including cooking, housework, and creative projects at even greater prevalence in the 90 plus percentiles).

Among the most surprising findings was the high prevalence of boredom (68%) and its relationship to stress (stress predicted 49% of the variance in boredom). And, the stressful factors were feeling isolated, lonely, touch deprived, and having “cabin fever”. Touch deprivation was being experienced by some 60%, and exercise was the most effective buffer. But, spirituality, meditation, creative projects and hobbies were also buffer activities (and almost everyone reported housekeeping and cooking). Across the lockdown period, negative feelings increased by 40-62% and negative symptoms by 23-57%, but exercise, fortunately, increased by 86%. Experiences that might be considered buffers for feelings of isolation and loneliness apparently were not buffers in this sample. For example, living with others was only weakly negatively correlated with loneliness ($r = -.18$). Connecting/social support was not correlated with loneliness nor were there differences between the lonely and the not lonely on that scale. Social media was positively correlated, suggesting that those who were lonely engaged in more social media which had more negative than positive effects which is consistent with pre-COVID research [27]. In this earlier study, social media was referred to as “phoneliness”. These potential buffers apparently were not ameliorating feelings of isolation or loneliness. However, as already mentioned, meditation, touching family members, exercise, working from home and other home activities were buffers for the stresses.

Methodological limitations of these studies, as noted for most of the studies, included sampling and assessment issues. Most

of the studies were based on surveys that were representative of the survey platforms, for example Survey Monkey, but not the population samples. They were self-report data which are always subject to questionable bias and reliability, although because of their anonymity, they may be reliable. Unfortunately, no baseline data were available as the lockdowns were not anticipated, so direction of effects could not be determined. The unpredictable duration of the lockdowns as well as the anonymity of the surveys precluded the collection of longitudinal data. Despite these limitations, these studies will hopefully help identify those who need intervention as well as inform lockdown intervention protocols.

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