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Reminders of COVID-19 social distancing can intensify physical pain

Chun-Chia Lee[1], Hui-Ju Wu[2] and Wen-Bin Chiou[3]*
[1]School of Business, Minnan Normal University, Zhangzhou, Fujian, China
[2]Center for Teacher Education, Cheng Shiu University, Kaohsiung, Taiwan
[3]Institute of Education, National Sun Yat-sen University, Kaohsiung, Taiwan

Social distance regulations have been widely implemented to control the global COVID-19 pandemic. Individuals have thus been experiencing social pain through social distance regulations. Prior research has shown that social and physical pains share a common neural alarm system. Hence, COVID-19 social distancing should enhance sensitivity to physical pain. Two laboratory studies were conducted to test the spillover effect of COVID-19 social distancing on physical pain. The findings supported our hypothesis by showing that participants who were reminded of COVID-19 social distancing reported a higher level of pain perception in response to immersion in hot water (Experiment 1, $N = 102$) and expressed a lower pain threshold measured by a pressure algometer than did those of controls (Experiment 2, $N = 140$). This may be the first experimental evidence demonstrating that people primed with COVID-19 social distancing have increased sensitivity to physical pain. Our findings suggest that people might be more likely to experience physical pain under the impact of COVID-19 social distancing. The association between a heightened sense of social disconnection in a global pandemic and increased sensitivity to physical pain should receive more attention.

Many countries have implemented social distance regulations to control the spread of COVID-19 (Parmet & Sinha, 2020). Social connections are important for human survival, the sense of a meaningful life, and well-being. Humans monitor the abundance or scarcity of social connections (Leary, Tambor, Terdal, & Downs, 1995). Under social distance regulations, people have been experiencing a sense of social disconnection more frequently than ever before (Berg-Weger & Morley, 2020; Pietrabissa & Simpson, 2020). On April 1, 2020, the Central Epidemic Command Center (CECC) of Taiwan announced social distancing measures in response to a significant number of COVID-19 cases. These measures included maintaining a social distance of 1.5 m indoors and 1 m outdoors, and prohibition of outdoor activities of more than 500 people and indoor activities of more than 100 people, as well as non-essential events, particularly those related to entertainment. In this paper, social distance regulations (or social distancing) refer to instructions to increase the physical distance, and decrease the frequency of physical contact, between people.

Social disconnection, that is the psychological experience of isolation (Mackinnon, Kehayes, Leonard, Fraser, & Stewart, 2017), is a source of social pain (Eisenberger, 2012,

*Correspondence should be addressed to Wen-Bin Chiou, Institute of Education, National Sun Yat-sen University, 70 Lien-Hai Rd., Kaohsiung 80424, Taiwan (email: wbchiou@mail.nsysu.edu.tw).

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2015; Lieberman & Eisenberger, 2009). Neurological evidence indicates that social and physical pain rely on common neural circuitry (Eisenberger, Gable, & Lieberman, 2007; Eisenberger & Lieberman, 2004; Eisenberger, Lieberman, & Williams, 2003). The overlap between physical and social pain has an evolutionary basis because the pain mechanism, such as a neural alarm system in the anterior cingulate cortex (ACC), is involved in detecting cues that might harm survival, such as physical danger or social disconnection (Eisenberger et al., 2007; Eisenberger & Lieberman, 2004). According to the physical–social pain overlap (Eisenberger, 2012, 2015; Eisenberger & Lieberman, 2004), factors attenuating sensitivity to one type of pain (e.g., social pain) should weaken sensitivity to other types of pain (e.g., physical pain). Previous studies have supported this prediction that social support, which promotes a sense of social connectedness and interpersonal warmth, can have pain-attenuating effects (Eisenberger, 2015). For example, participants receiving interactive support reported lower pain ratings during a cold pressor test compared with control participants (Jackson, Iezzi, Chen, Ebnet, & Eglitis, 2005). Moreover, the mere presence of another supportive individual (McClelland & McCubbin, 2008), viewing a partner's photographs (Master et al., 2009), and thinking about social network sites (Ho, Wu, & Chiou, 2016) could lead to lower pain ratings.

Alternatively, the physical–social pain overlap suggests that factors enhancing the sensitivity to one type of pain should strengthen the sensitivity to the other type of pain. Previous studies have reported activation of neural regions associated with physical pain in people being reminded of a lost loved one (Kersting et al., 2009; O'Connor et al., 2008), seeing rejection-related images (Kross, Egner, Ochsner, Hirsch, & Downey, 2007), re-experiencing romantic rejection (Fisher, Brown, Aron, Strong, & Mashek, 2010; Kross, Berman, Mischel, Smith, & Wager, 2011), or being socially excluded while playing an online tossing game (Eisenberger et al., 2003). Because social rejection and exclusion exacerbate physical pain, social disconnection caused by social distance regulations may promote sensitivity to social pain and thereby potentiate sensitivity to physical pain, as manifested by intensifying perceptions of physical pain or inducing a lower pain threshold. Given that social connections are negatively impacted by implementation of social distancing restrictions (Shah, Nogueras, van Woerden, & Kiparoglou, 2020; Van Orden et al., 2020), it is important to evaluate the relationship between physical and social pain in the context of COVID-19 social distance regulations. Whether a sense of social disconnection induced by social distance regulations enhances sensitivity to physical pain has rarely been examined since the COVID-19 breakout. The current research aimed to fill the gap by testing the possibility that COVID-19 social distancing increases sensitivity to physical pain.

Overview of the current research

Building on the notion of the physical–social pain overlap (Eisenberger, 2012, 2015; Eisenberger & Lieberman, 2004), we contend that a felt sense of social disconnection caused by COVID-19 social distancing (i.e., a source of social pain) could produce a spillover effect on physical pain. Experiment 1 tested whether reminders of social distancing (via a Chinese glossary search task) enhanced physical pain, as evidenced by reporting a higher level of pain perception during a thermal pain sensation task. Experiment 2 tested the hypothesis that priming with social distancing (via recollection of experiences of social distancing) would lead to a lower pain threshold during a pressure pain-sensitivity task.

Experiment 1: COVID-19 social distancing and physical pain perception

Method

In total, 102 college students (mean age = 21.1 years, *SD* = 1.8; 52 females) enrolled at a university in southern Taiwan were recruited to participate in this experiment through campus flyers and posters. All participants had experienced social distancing for COVID-19 before their participation, and were told not to ingest any pain medicine for at least 6 h before their participation. The required sample size was determined for an independent sample t-test under the following conditions: $\alpha = .05$, Cohen's $d = 0.50$ (medium effect size), and power = .80. This study was approved by the Institutional Review Board of our university. Informed consent was obtained for all participants.

Upon arrival, participants were told that they would help us with pilot testing of unrelated tasks (i.e., a cognitive task and a sensation sensitivity task). Every two same-sex participants were randomly assigned to receive either social distancing or neural primes. Identical gender proportions between the two study conditions allowed us to control gender differences in pain perception. Following Bargh, Gollwitzer, Lee-Chai, Barndollar, and Troetschel (2001), we employed a Chinese glossary-search task to prime for COVID-19 social distancing (Lee, Chen, Wu, & Chiou, 2021). Participants were instructed to search for seven target terms embedded in a 9 × 9 array of Chinese characters. Participants under the social distancing condition searched six target terms associated with social distance regulations (*avoiding gatherings*, *city lockdown*, *home quarantine*, *home isolation*, *social distancing*, and *take-out only*). Participants in the neutral condition searched six target terms unrelated to social distance regulations (e.g., *citizen diplomacy*, *Confucianism*, *playing house*, *township office*, *travelling*, *out of the loop*). Hauser, Ellsworth, and Gonzalez (2018) argued that manipulation checks may amplify or negate the effects of manipulation. We conducted a pre-test study ($N = 58$; 32 females) to check on the effectiveness of the manipulation. As predicted, participants primed to social distancing experienced a greater sense of social distancing (i.e., feeling physically distanced; $M = 4.83$, $SD = 1.44$), as rated on a 7-point scale (1 = *not at all*, 7 = *very much*) than those who were not primed ($M = 3.86$, $SD = 1.55$), $t(56) = 2.455$, $p = .017$, 95% confidence interval (CI) of the mean difference [0.18, 1.75], confirming an effect of our manipulation. We used a single-item measure to assess feelings of social disconnection. Immediately following the glossary search, participants were asked to rate their feelings of social isolation (i.e., social disconnection) on a 7-point scale (1 = *not at all*, 7 = *very much*).

Later, participants were asked to help with pilot testing of a pain sensitivity task (Zhou, Vohs, & Baumeister, 2009). Each participant was instructed to immerse the left index and middle fingers in 47°C water for 10 s. Afterwards, participants rated how painful they had experienced this task on a 9-point scale (0 = *not painful at all*, 8 = *very painful*). To avoid participants' disclosing the real purpose to fellow students, the debriefing was administered through e-mail 7 days after the experiment.

Results and discussion

The mean age between the social distancing ($M = 21.3$ years, $SD = 1.7$) and neutral ($M = 20.9$ years, $SD = 1.8$) conditions did not differ significantly, $t(100) = 1.071$, $p = .287$, indicating that our random assignment produced two equivalent groups. Participant age was not associated with reported pain, $r = -.093$, $p = .353$. Therefore, age was not treated as a control variable in subsequent analyses.

Summaries of descriptive statistics for the measures in Experiment 1 are given in Table 1. A two-way (priming condition by gender) analysis of variance (ANOVA) revealed a significant effect of priming on feelings of social disconnection. As intended, participants in the social distancing group felt more socially disconnected ($SD = 1.37$) than did those in the neutral group ($SD = 1.28$), $F(1, 98) = 7.087$, $p = .009$, partial $\eta^2 = .07$, 95% CI of the mean difference [0.17, 1.21]. Felt social disconnection did not significantly differ between female ($M = 4.65$, $SD = 1.44$) and male ($M = 4.58$, $SD = 1.30$) participants, $F(1, 98) = 0.08$, $p = .778$. There was no significant interaction between feelings of social disconnection and gender, $F(1, 98) = 3.164$, $p = .078$. More importantly, we used a two-way ANOVA to compare the pain perception between priming conditions in both genders and found higher pain perception among participants under the social distancing prime condition ($SD = 1.47$) than among those under the neutral condition ($SD = 1.44$), $F(1, 98) = 9.247$, $p = .003$, partial $\eta^2 = .09$, 95% CI of the mean difference [0.31, 1.45]. There were no significant differences in pain between the genders (females: $M = 5.46$, $SD = 1.50$; males: $M = 5.26$, $SD = 1.54$), $F(1, 98) = 0.482$, $p = .489$. The priming effect of social distancing on reported pain did not vary across gender, $F(1, 98) = 0.016$, $p = .899$.

Moreover, we conducted a bootstrap analysis (Preacher & Hayes, 2004) to examine whether felt social disconnection mediated the link between condition (dummy code: 1 = social distancing, 0 = control) and reported pain (see Figure 1). Primed social distancing was associated with a greater sense of felt social disconnection ($B = 0.69$, $SE = 0.26$, $t = 2.612$, $p = .010$), such that a felt sense of social disconnection predicted how much pain participants reported experiencing ($B = 0.66$, $SE = 0.09$, $t = 7.448$, $p < .001$). When we controlled for felt social disconnection, the relationship between social distancing and pain reports ($B = 0.88$, $SE = 0.29$, $t = 3.062$, $p = .003$) was no longer significant ($B = 0.43$, $SE = 0.24$, $t = 1.800$, $p = .075$). The 95% bias-corrected CI [0.11, 0.86] for the indirect effect ($B = 0.45$, $SE = 0.19$; bootstrap resamples = 5000) excluded zero, suggesting that social distancing primes intensified perceptions of physical pain through a heightened sense of social disconnection.

Our first experiment indicated that being reminded of COVID-19 social distancing intensified physical pain perception, as manifested by reporting greater pain during

Table 1. Means and 95% confidence intervals for the measures according to priming condition

	Condition			
	Social distancing		Neutral	
Experiments and measures	Mean	95% CI	Mean	95% CI
Experiment 1 (N = 102)				
Felt social disconnection (1–7)	4.96	[2.80, 3.56]	4.27	[3.91, 4.64]
Reported pain of immersion in hot water (0–8)	5.80	[4.58, 5.35]	4.92	[4.52, 5.33]
Experiment 2 (N = 140)				
Age (years)	34.5	[32.2, 36.8]	36.3	[34.2, 38.3]
PPT of first dorsal interosseous at pre-test (kPa)	363.2	[332.7, 393.7]	347.3	[316.5, 378.1]
Felt social connection (1–7)	5.23	[4.91, 5.55]	4.36	[4.00, 4.71]
PPT of first dorsal interosseous at post-test (kPa)	280.6	[253.2, 308.1]	338.9	[307.5, 370.4]

Note. CI = confidence interval; PPT = pressure pain threshold.
Units or score ranges of the measures are presented in parentheses.

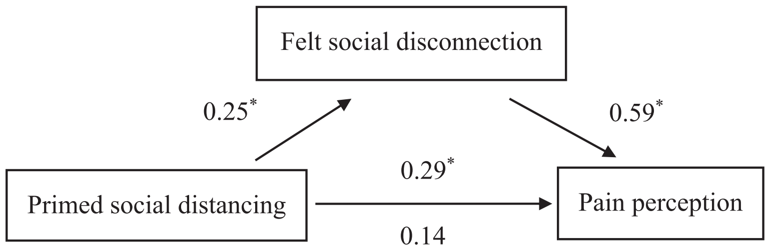

Figure 1. Experiment 1: Effect of social distancing on pain reported in response to immersion in hot water. Values are standardized regression coefficients. In the lower path, the values below and above the arrow are the results of analyses in which the mediator was and was not included in the mediation model, respectively. An asterisk indicates a *p*-value of <.05.

immersion in hot water. This finding lends support to the physical–social pain overlap (Eisenberger, 2012, 2015; Eisenberger & Lieberman, 2004) and also suggests that people's physical pain perception may rely on felt social disconnection from COVID-19 social distancing. In the next experiment, a replication study was conducted to examine the link between social distancing and a heightened sensitivity to physical pain by employing another prime manipulation (i.e., the emotional recall paradigm), using an alternative measure of pain sensitivity (pressure pain threshold), and recruiting a community sample to expand generalizability. Previous studies have reported that the pressure pain threshold varies by age (Lautenbacher, Kunz, Strate, Nielsen, & Arendt-Nielsen, 2005; also see Gibson & Farrell, 2004, for a related review). We included a community sample in our second study so our results regarding the effect of age on pressure-induced pain were generalizable.

Experiment 2: The Link between COVID-19 Social Distancing and Pressure Pain Threshold

Method

The method used to estimate the required sample size in the replication study was identical to that of Experiment 1, except that the statistical power was increased from.80 to.90. We recruited 140 asymptomatic adults (mean age = 35.4 years, *SD* = 9.1; 74 females) from the largest city in southern Taiwan through flyers and online posters. This study was approved by the Institutional Review Board of our university. All participants experienced social distancing recently.

Upon arrival, participants were told they were engaging in pilot testing of a sensation sensitivity task and a self-reflection task. After providing consent, every two same-sex participants were randomly assigned to one of the two study conditions (social distancing vs. neutral) via the block randomization method. The gender proportions between the two study conditions were identical. This was done because prior research has detected gender differences in the pressure pain threshold (PPT) of the first dorsal interosseous muscle (Chesterton, Barlas, Foster, Baxter, & Wright, 2003).

After providing informed consent, participants were first administered a test trial of the pain sensitivity task. A pressure algometer (Type II; Somedic, Solletuna, Sweden) was employed to measure the PPT of the first dorsal interosseous muscle on the dominant hand. The Somedic algometer has demonstrated test-retest reliability (Ohrbach & Gale,

1989) and is reliable over time with repeated measures (Chesterton et al., 2003; Nussbaum & Downes, 1998). The pressure was applied (1) by a single experimenter and (2) at a rate of 30 kPa/s in line with prior research (Balaguier, Madeleine, & Vuillerme, 2016). Participants were instructed to say 'stop' immediately when they felt a discernible sensation of pain, distinct from pressure or discomfort (Fischer, 1987). The experimenter was blinded to the true nature of the study. Participants were unable to see the algometer display. The pre-test PPT was employed primarily for providing the baseline PPT, which could allow us to examine whether equivalent groups in a between-subjects design were created by our random assignment.

After the pre-test PPT, participants were asked to help with an unrelated filler task (actually a priming manipulation of social distancing). They were further told that the filler task was administrated to ensure that they had returned to the baseline level before the actual pain sensitivity task began. The emotional-event recollection technique (Chao, Chen, & Chiou, 2011; Leith & Baumeister, 1996) was employed to prime social distancing experiences (e.g., Chang, Wu, & Chiou, 2021; Lee et al., 2021). Participants under the social distancing condition were instructed to recall a salient and impressive event that made them feel physically distanced caused by the government's social distance regulations around COVID-19. Participants under the neutral prime condition were instructed to recall a routine event before the outbreak of the COVID-19 pandemic. A manipulation check pre-test (N = 56; 30 females) showed that participants under the social distancing prime condition felt a greater sense of social distancing (M = 4.79, SD = 1.50), according to ratings on the same single-item, 7-point scale used in Experiment 1 (1 = *not at all*, 7 = *very much*), than those under the neutral condition (M = 3.75, SD = 1.51), $t(54) = 2.579, p = .013, d = 0.75$, 95% CI [0.23, 1.84], confirming an effect of our manipulation. After the emotional recall task, all participants indicated their sense of social disconnection on a 7-point scale (1 = *not at all*, 7 = *very much*), which was identical to that used in Experiment 1.

Following the priming task, participants performed the actual pain sensitivity task. The post-test PPT was measured from the mid-point of the first dorsal interosseous muscle in the dominant hand. The pressure algometer was immediately retracted by the experimenter as requested by the participant's verbal report. The pressure value (kPa) applied at the retraction moment was recorded. None of the participants accurately suspected how the two tasks were related during probing.

Results and discussion

Summaries of the descriptive statistics for the measures in Experiment 2 are given in Table 1. The difference in the mean age between the social distancing (SD = 9.6 years) and neutral (SD = 8.6 years) conditions was not significant, $t(138) = -1.150, p = .252$. The mean pre-test PPT did not differ significantly between the social distancing (SD = 127.9 kPa) and neutral (SD = 129.2 kPa) conditions, $t(138) = 0.732$, $p = .466$. These findings indicate that the random assignment was satisfactory for creating equivalent groups. Given that the gender proportions were identical between the two conditions, gender was not treated as a control variable in subsequent analyses.

As expected, participants in the social distancing group reported a greater sense of social disconnection (SD = 1.35) than did those in the neutral group (SD = 1.49), $t(138) = 3.617, p < .001, d = 0.61$, 95% CI of the mean difference [0.40, 1.35]. Given that age was associated with the post-test PPT ($r = -0.292$, $p < .001$), it was treated as a covariate in the analysis of covariance on the post-test PPT. Confirming our hypothesis,

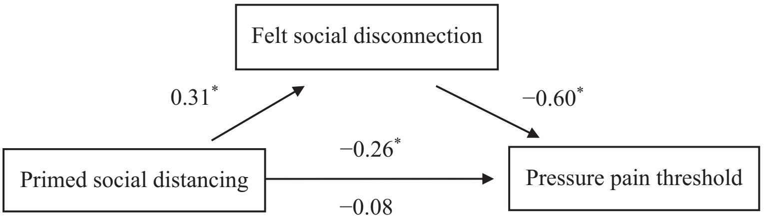

Figure 2. Experiment 2: Effect of social distancing on the pain pressure threshold of the first dorsal interosseous muscle after adjusting for age. Values are standardized regression coefficients. In the lower path, the values below and above the arrow are the results of analyses in which the mediator was and was not included in the mediation model, respectively. An asterisk indicates a p-value of <.05.

the post-test PPT for participants in the social distancing group (adjusted M = 276.7 kPa) was significantly lower than that for those in the neutral group (adjusted M = 342.9 kPa) after controlling for age, $F(1, 137) = 10.949$, $p = .001$, $d = 0.56$, 95% CI of the mean difference [−105.6, −26.6].

We further examined whether felt social disconnection mediated the relationship between condition (1 = social distancing; 0 = neutral) and the post-test PPT while treating age as a covariate (see Figure 2). After controlling for age, primed social distancing was related to a felt sense of social disconnection ($B = 0.91$, $SE = 0.24$, $t = 3.807$, $p < .001$), and felt social disconnection was negatively associated with the post-test PPT ($B = -50.83$, $SE = 5.65$, $t = -8.996$, $p < .001$). The association between primed social distancing and the post-test PPT ($B = -66.12$, $SE = 19.98$, $t = -3.309$, $p = .001$) became non-significant ($B = -19.65$, $SE = 16.70$, $t = -1.177$, $p = .241$) after controlling for felt social disconnection. A bootstrap analysis showed that the indirect effect ($B = -46.33$, $SE = 13.33$, the 95% bias-corrected CI [−75.36, −22.50]; bootstrap resamples = 5000) was significant, indicating that primed social distancing lowered the PPT of the first dorsal interosseous muscle through a greater sense of felt social disconnection.

In short, findings from Experiment 2 replicated the earlier finding that priming with social distancing enhanced sensitivity to physical pain, as indexed by lower PPTs of the first dorsal interosseous muscle. Hence, COVID-19 social distancing may induce a greater sense of social disconnection, leading to heightened sensitivity to physical pain.

General Discussion

Based on the physical–social pain link (Eisenberger, 2015; Eisenberger & Lieberman, 2004), we propose that a sense of social disconnection, caused by social distance regulations to control the coronavirus, enhances sensitivity to physical pain. Evidence from two laboratory experiments supports this prediction by showing that reminding participants of COVID-19 distancing enhanced pain perceptions of immersion in hot water (Experiment 1) and induced lower PPTs of the first dorsal interosseous muscle. The present findings provide support for the physical–social pain link. The enhancement effect of primed social distancing on physical pain sensitivity is in line with prior research on the reduction effect of social support on pain perception (Brown, Sheffield, Leary, & Robinson, 2003; Ho et al., 2016; Jackson et al., 2005; McClelland & McCubbin, 2008). Just as priming with social support or social connection can reduce physical pain sensitivity

(Brown et al., 2003; Ho et al., 2016; Master et al., 2009), the current research indicates that priming with social distancing for the control of COVID-19 may promote sensitivity to physical pain by making one feel socially disconnected. Previous studies on the physical-social pain link have demonstrated that social rejection (Fisher et al., 2010; Kross et al., 2007, 2011), social exclusion (see Eisenberger & Liberman, 2004, for a related review), and thoughts of a lost loved one (Kersting et al., 2009; O'Connor et al., 2008) heightened sensitivity to physical pain. However, we found that merely thinking about social distancing (i.e., physical isolation) was sufficient to induce feelings of social disconnection (i.e., social isolation) and enhance sensitivity to physical pain. We may provide the first experimental evidence that reminding people of COVID-19 social distancing can exacerbate physical pain perception.

Several limitations should be noted in the current research. First, caution should be taken when generalizing the findings from laboratory settings to real life. We did not record the participants' sociodemographic characteristics, except age and gender. Such characteristics may have helped elucidate the relationship between social distancing and physical pain perception. Second, we employed experimentally induced pain as the dependent measure. Evidence from nationwide and global surveys, field experiments, and longitudinal studies may help us understand the unintended effects of social distance regulations on people's perceptions of physical pain. Moreover, the pain-enhancing effect of COVID-19 restrictions is still hypothetical because evidence for its support is based on priming studies. Future studies should test this hypothesis directly by using an experimental design comparing pain sensitivity between quarantined and not-quarantined people. Third, we used a single-item measure to assess the sense of social disconnection, focusing on subjective feelings of isolation. Other mechanisms underlying the effect of social distancing on sensitivity to physical pain (e.g., lack of social support, lack of relatedness, or reduced social interaction) were not assessed. Future studies should use multiple-item scales to evaluate whether other facets of social connection are affected by social distance regulations. The single-item measure used in our study focused only on physical distancing, and did not assess other factors associated with social distance regulations, such as wearing face masks and loss of freedom. Although these factors do not appear to be related to social pain, assessment of specific regulations (e.g., by recalling wearing face masks), or perceived freedom may provide greater insight into the effects of social distance regulations. Additionally, we conducted a pilot study to check the effect of the manipulation on subjective feelings. However, we did not directly evaluate the participants' experience of social distancing, which is a limitation to our study. Finally, the current research only involved asymptomatic individuals. The pain-enhancing effect of COVID-19 social distancing on physical pain might be different or should be more prominent in individuals suffering from pain.

This study suggests a need for more research on pain perception during the global pandemic. Future research should determine whether individuals who are highly sensitive to social pain are more vulnerable to the pain-enhancing effect of social distancing. Similarly, would an individual who is highly sensitive to physical pain suffer more social distress from social distance regulations? Second, pain management could be improved by determining the extent to which social distance regulations for COVID-19 intensify sensitivity to physical pain in vulnerable populations (e.g., hospital or long-term care patients). Specifically, do vulnerable patients experience more severe or frequent physical pain during social distancing? Cross-cultural studies may provide insight into whether different cultures respond differently to social distancing. We hypothesize that the pain-enhancing effect of social distancing is more prominent in 'contact' compared to 'non-contact' cultures (Hall, 1966). Finally, neuroimaging studies (Eisenberger & Liberman, 2004) have indicated that the neurological substrates of physical and social pain are similar. Future studies should perform functional magnetic resonance imaging to determine the relationships of ACC activation with social distancing priming and self-reported social pain. Are neural regions or neurotransmitters other than the ACC and opioid system involved in the pain-enhancing effect of social distancing?

The pain-enhancing effect of social distancing has significant implications for pain management during the COVID-19 pandemic. There is evidence from neuroimaging studies that physical warmth promotes interpersonal warmth (Williams & Bargh, 2008), suggesting a common underlying neural mechanism (Bargh & Shalev, 2012; Inagaki & Eisenberger, 2013). The relationship between physical warmth and interpersonal warmth indicates that experiencing physical warmth can activate perceptions of social warmth. Prior research on the physical–social pain link (Eisenberger, 2015; Eisenberger & Lieberman, 2004) suggests that social warmth may buffer physical pain. Thus, experiencing physical warmth should be able to alleviate physical pain by enhancing feelings of social warmth. Specifically, treatments for increasing physical warmth is worthy of implementation to conquer the pain-enhancing effects of COVID-19 social distancing on physical pain. Moreover, warmth is the most important personality trait in interpersonal perceptions (Cuddy, Fiske, & Glick, 2008). The warm–cold dimension plays a crucial role in social judgement (Fiske, Cuddy, & Glick, 2007). If social distancing can enhance pain sensitivity, a distant patient-care provider relationship would augment the pain-enhancing effect of social distancing. In contrast, this pain-enhancing effect would be attenuated if the health care worker and patient develop a close relationship. Further, it is reasonable to assume that news of emergencies may strengthen the link between physical and social pain, whereas social support can reduce social distress and alleviate physical pain (Brown et al., 2003; Master et al., 2009). Hence, social support should be provided to vulnerable patients, in addition to medical treatments. For example, recollections of people close to the patient reduce the effects of social distancing by instilling a feeling of connectedness (Lasaleta, Sedikides, & Vohs, 2014). In addition, pharmacological agents could be prescribed for people suffering due to COVID-19 social distance regulations.

In conclusion, social distance regulations during the COVID-19 pandemic have made people feel less socially connected and thus lonelier. We proposed that priming people by asking them to think about social distancing would promote sensitivity to physical pain, as an unintended consequence of social distance regulations. The impact of social distance regulations on physical pain is greater than previously thought; social distancing, as a source of social pain, may enhance physical pain. Humans rely on each other to meet their wants and needs, and this social interdependency leads to a strong desire to develop and maintain social connections. People may break social distance regulations to reduce their social pain, thereby risking their health and rendering epidemic prevention measures ineffective. It is important to determine how to minimize the negative impacts of social distancing.

Conflict of interest

The authors declare no competing interests.

Author contributions

Hui-Ju Wu (Methodology; Writing – original draft; Writing – review & editing) Wen-Bin Chiou, Ph.D. (Conceptualization; Formal analysis; Investigation; Methodology; Writing – original draft; Writing – review & editing) Chun-Chia Lee (Conceptualization; Formal analysis; Investigation; Methodology; Writing – original draft).

Supplementary materials

Materials and datasets are available at https://data.mendeley.com/datasets/t7zwk2mckw/draft?a=24882baa-d00a-4187-9368-1d8285b90956.

Data availability statement

https://data.mendeley.com/datasets/t7zwk2mckw/draft?a=24882baa-d00a-4187-9368-1d8285b90956.

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