RESEARCH PAPER

Chronic Pain and Affective Experiences Associated with Daily Stressors and Uplifts

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Abstract

People with chronic pain often report greater reactivity to stress than those without pain. This finding is consistent with the kindling hypothesis, which states that continued exposure to stressors only heightens negative affect and dampens positive affect. Yet, people with chronic pain may also respond more positively to enjoyable activities, or uplifts, as well. Chronic pain is related to lower levels of well-being, and the fragility of positive affect model explains how individuals with lower levels of well-being often exhibit stronger, more positive responses to daily uplifts than their less distressed peers. Our study used the National Study of Daily Experiences to assess daily stressors, positive uplifts, and positive and negative affect across eight days among those with and without chronic pain. Participants ($n_{ChronicPain}$=658, n_{NoPain}=1,075) were predominately Non-Hispanic White (91%), 56% female, and averaged 56 years old. Results revealed that people with chronic pain had lower levels of daily positive affect and higher levels of negative affect, yet the two groups did not vary in their stressor-related negative and positive affect. In contrast, having chronic pain was related to a greater increase in positive affect and greater decreases in negative affect on days with positive uplifts. Findings suggest that intervention efforts focusing on uplifts may be particularly helpful for people who report chronic pain.

Keywords Chronic Pain · Uplifts · Stressors · Positive Affect · Negative Affect

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Chronic pain is a pervasive and persistent condition experienced by roughly 20 to 25% of U.S. adults, and it is also associated with high levels of distress (Crofford, 2015; Dahlhamer et al., 2018, Whitten & Cristobal, 2005). Anywhere from a quarter to half of people with chronic pain have clinical levels of depression and anxiety (Asmundson & Katz, 2009; Day, 2019; Mills et al., 2019). One contributing factor to greater distress may be that chronic pain prevents people from engaging in enjoyable daily life activities (Bjornsdottir et al., 2013). A number of studies document chronic pain's associations with exposure and reactivity to daily stressors, but less research has considered the importance of daily positive events, also referred to as uplifts, for chronic pain (Davis et al., 2004; Zautra et al., 2005). The current study examined chronic pain, daily stressors and uplifts, and affect, focusing on the frequency of daily uplifts and stressors and their associated fluctuations in affect (both negative and positive) among adults ranging from 34 to 84 years old.

1 Daily Stressors, Stressor-Related Affect and Chronic Pain

Pain is associated with functional limitations and discomfort (Bjornsdottir et al., 2013), which may create more stressors when engaging in daily activities (Breivik et al., 2006). In addition to their frequency, chronic pain may also influence how people respond to stressors. The kindling hypothesis predicts that continual exposure to stressors increases sensitization to stressors and results in greater stressor-related affect, defined as greater increases in negative affect and greater decreases in positive affect in response to a stressor (Post, 1992). Because chronic pain by definition is a type of chronic stressor, researchers argue that having chronic pain increases sensitivity to stressors (Monroe & Harkness, 2005). A literature review examining stress responses to 21 types of daily stressors found that chronic pain was related to greater stressor-related negative affect but unrelated to changes in positive affect (Davis et al., 2004).

2 Uplift-Related Affect

The above predictions refer to stressors but living with chronic pain may also decrease or prevent engagement in many enjoyable activities (Davis et al., 2006), and lead to greater time alone (e.g., Breivik et al., 2006). Also referred to as "pleasant activities" or "daily positive events" in the literature, uplifts include such activities as sharing a laugh with a friend, a positive interaction at work, or engaging in leisure activities (Charles et al., 2010; Kanner et al., 1981). With some notable exceptions (e.g., Zautra et al., 2005), few studies have examined responses to uplifts among those with chronic pain. Among healthy adults, daily uplifts are related to same-day higher positive affect but unrelated to negative affect (Charles et al., 2010; Sin et al., 2015, 2017). The fragility of positive affect hypothesis states that some people are more emotionally responsive to uplifts, such that they show greater gains in happiness than others (Ong & Ram, 2017). For example, people with lower well-being gain the biggest emotional benefits from uplifts compared to those with higher well-being

(Bylsma et al., 2011; Grosse Rueschkamp et al., 2018; Hill et al., 2022). Because people with chronic pain have higher rates of distress than those without chronic pain, they may be more reactive to not only stressors (as predicted by the kindling hypothesis), but also to uplifts (as predicted by the fragility of affect hypothesis). Alternatively, pain may interfere with people's ability to enjoy uplifts, leading to smaller increases in positive affect in response to uplifts. Our study aims to answer the question of how exposure to daily stressors and uplifts, and the emotions associated on days they occur, vary based on the presence of chronic pain.

3 The Current Study

The current study examined how daily affective experiences among adults with and without chronic pain are related to daily stressors and uplifts. Consistent with the kindling hypothesis, we hypothesized that chronic pain is associated with higher negative affect and lower positive affect on days when stressors occur, compared to their reported negative and positive affect on stressor-free days. For daily uplifts, we hypothesized that people with chronic pain may have greater fragility of positive affect and thus may experience greater positive affect and less negative affect on days with an uplift versus on days without an uplift, compared to people without chronic pain. Our analyses also allow, however, for us to examine whether an alternative hypothesis would instead be supported, where pain may interfere with one's enjoyment of uplifts, leading to less change in affect (less of an increase in positive affect or decrease in negative affect) in response to uplifts.

4 Method

4.1 Participants and Procedure

Study participants were enrolled in the second wave of the Midlife in the United States Study (MIDUS II; Radler, 2014; Ryff et al., 2007; Ryff & Almeida, 2009), which consisted of a telephone interview and self-administered questionnaires assessing behavioral, psychological, and social factors related to physical and mental health and well-being. A random subset of participants were recruited for the National Study of Daily Experiences (NSDE II) substudy. NSDE II participants ($N=2,022$) completed 15-20-minute telephone interviews across eight consecutive days about their thoughts, emotions, and activities that had occurred in the prior 24 h, providing 14,912 daily diaries for a 92% adherence rate. Data collection for MIDUS II surveys and self-administered questionnaires were conducted between 2004 and 2006, and, between 2004 and 2009 for NSDE II. MIDUS data collection, including the NSDE substudy is reviewed approved by the IRBs of the Education and Social/Behavioral Sciences and Health Sciences at the University of Wisconsin, Madison. The current study was deemed exempt from the University Institutional Review Board. The data can be publicly accessed through the Inter-university Consortium for Political and

Social Research (ICPSR) at the University of Michigan (https://www.icpsr.umich.edu/web/ICPSR/studies/4652?archive=ICPSR&q=MIDUS).

4.2 Measures

4.2.1 Chronic Pain

Participants responded either yes (1) or no (0) to the question "Do you have chronic pain? That is, do you have pain that persists beyond the time of normal healing and has lasted anywhere from a few months to many years?") from the MIDUS II self-administered survey.

4.2.2 Stressors

In the NSDE (Almeida et al., 2002; Almeida, 2005), participants were asked each day whether they had experienced any of seven different types of stressors in the last 24 h: an argument; avoided an argument; stressor at work, school, or volunteer position; stressor at home; discrimination; network stressor (i.e., stressor happened to a close friend or relative); or any other stressor. A dichotomized variable was created for each day to indicate whether any stressor did (1) or did not (0) occur, and the person-mean number of daily stressors was calculated to adjust for average level of stressors in the models.

4.2.3 Uplifts

NSDE asked about five different types of daily uplifts that paralleled the stressor items. Participants endorsed whether they experienced any of the following in the past 24 h: a positive social interaction; a positive event at work, school, or at a volunteer position; a positive event at home; anything positive happen to a close friend or relative; or anything else that most people would consider particularly positive (see Sin & Almeida 2018 for further description). A dichotomized variable was created for each day to indicate whether any uplift did (1) or did not (0) occur, and the person-mean number of daily uplifts was calculated to adjust for average level of uplifts in the models.

4.2.4 Negative and Positive Affect

Negative and positive daily affect was assessed in NSDE from a scale adapted from the Positive and Negative Affect Schedule (Kessler et al., 2002; Mroczek & Kolarz, 1998; Watson et al., 1988). Respondents reported how much of the time over the past 24 h they felt a series of positive (*in good spirits, cheerful, extremely happy, calm and peaceful, satisfied, full of life, close to others, like you belong, enthusiastic, attentive, proud, active*, and *confident*) and negative (*restless or fidgety, angry, frustrated, ashamed, upset, afraid, jittery, irritable, everything was an effort, hopeless, lonely, nervous, worthless*, and *so sad that nothing could cheer you up*) affective experiences. Items were rated on a Likert-type scale, ranging from 0 (none of the time) to 4

(all of the time). Positive and negative affect scores were averaged separately for each of the eight days. Within-person reliability for positive affect was 0.86 and between-person reliability was 0.99. Within-person reliability for negative affect was 0.77 and between-person reliability was 0.97 (Scott et al., 2015).

4.2.5 Demographic Variables

Participants reported their date of birth, gender, marital status, race/ethnicity, highest level of education (ranging from no school/some grade school to completing a doctoral degree), work status (working/not working) in the MIDUS II self-administered questionnaire. Total household income was captured by taking the reported amount from wages, pension, social security, and other government assistance for all members of the household and converted it into a standardized z-score.

4.2.6 Chronic Conditions

To differentiate chronic pain from having a chronic condition, we included number of other chronic physical conditions in our models. Participants endorsed whether they had any of 30 types of physical conditions (e.g., cancer, heart problems, autoimmune disorders, diabetes, hay fever, digestive conditions). Chronic physical conditions were summed and ranged from zero to five or more (Piazza et al., 2007).

5 Analytic Strategy

We ran multi-level models using SAS version 9.4 (PROC MIXED) to examine how daily affect (with separate models for positive and negative affect) are related to daily stressors and positive events (within-person factors) and whether these associations are moderated by chronic pain (between-subject factor). Covariates included variables associated with chronic pain and daily affect: age, gender, ethnicity, education, income, and work status, and number of comorbid chronic conditions. We also controlled for the person-mean number of daily stressors and daily uplifts across interview days. Within-person predictors were centered on the person-means, and between-person predictors were centered on the grand means. For positive and negative affect, we first ran a full model with all variables as main effects, and then we entered the interactions between chronic pain and daily events. In both multi-level models, random slopes were included for daily uplifts and stressors to allow the within-person relationship between the daily events and affect to vary between persons.

6 Results

Beginning with 2,022 cases, participants were excluded if they had missing data on chronic pain (n=289), resulting in 1,733 with chronic pain data. In addition, people were excluded who were missing information on household income (n=47), work

status (n=8), race/ethnicity (n=5), education (n=4) and marital status (n=2), leaving a final sample of 1,667. Participants who had missing data for chronic pain (n=289; 5.8% of the sample) tended to be younger (M_{sample} = 56.59, $M_{missing}$ = 54.16), less educated (Sample=71% some college or more, Missing=67% some college or more), had a lower household income (M_{sample} = \$71,129.40, $M_{missing}$ = \$50,879.70), and were less likely to be Non-Hispanic White (Sample=90.91%, Missing=85.32%). There were no differences in gender, work status, or marital status. The present study sample averaged 56 years old (M=56.24; SD=12.20; range: 34–84) and were primarily Non-Hispanic White (90.91%) and married (72%), with 56% female, 63% employed, 70% having completed some college or more, and with an average household income of \$70,660. Table 1 provides descriptive statistics for the sample by chronic pain status.

As indicated by the results of t-tests comparing people with and without chronic pain presented in the table, people with chronic pain had a greater number of chronic conditions, a greater number of stressors, and higher daily negative affect and lower levels of positive affect. Contrary to prior research (e.g., Zautra et al., 2005), the number of daily uplifts did not vary between those with and without chronic pain. While

Table 1 Demographic Characteristics by Chronic Pain Status

	Chronic Pain (N=658)		No Chronic Pain (N=1,075)		t-Test/ Chi-Square	p-values
	N	%	N	%		
Gender					55.10	<0.0001
Female	398	60.5	581	54.0		
Male	260	39.5	494	46.0		
Ethnicity[1]					25.40	0.0001
White/Caucasian	598	91.0	973	90.50		
Black/African American	21	3.20	31	2.90		
Latinx	23	3.50	31	2.90		
Education					15.17	<0.0001
College Degree or Greater	225	34.20	484	45.20		
Marital Status					62.62	<0.0001
Married	450	68.60	804	74.80		
Not Married	208	31.40	271	25.20		
Work Status					333.23	<0.0001
Working	346	52.90	732	68.40		
Not Working	312	47.10	343	31.60		
	M	**SD**	**M**	**SD**		
Age	57.91	12.12	55.78	12.12	-10.07	<0.0001
Household Income[2]	63,102.61	55,395.17	75,954.66	58,989.11	12.74	<0.0001
# of Chronic Conditions	2.89	1.71	1.69	1.51	1687.75	<0.0001
# of Stressors	0.55	0.46	0.51	0.46	-2.51	0.012
# of Uplifts	1.14	1.14	1.13	0.66	-0.79	0.427
Negative Affect	0.23	0.28	0.18	0.24	-11.55	<0.0001
Positive Affect	2.63	0.75	2.78	0.67	11.98	<0.0001

Note. Ethnicity[1]=2.30% (Chronic Pain) and 3.4% (No Chronic Pain) accounts for Asian, Native American/Alaska Native, and 'Other' ethnicities; Household Income[2]=Value represents U.S. dollars.

the average number of daily uplifts was not robustly different, the variation around the mean was almost twice as large for the group with chronic pain compared to the group without chronic pain.

6.1 Daily Events and Chronic Pain Predicting Negative Affect

We first examined whether negative affect would be higher on days when people reported a stressor and lower on days with an uplift, and whether these associations varied by chronic pain status. In a multi-level model with negative affect as the outcome, same-day stressor occurrence, having chronic pain, higher person-mean number of stressors, and lower person-mean number of daily uplifts were associated with higher daily negative affect.

We next examined interactions with chronic pain for both stressors and uplifts. Only the interaction between chronic pain and the occurrence of an uplift was significant, indicating that people with chronic pain have greater decreases in negative affect on days when they experience an uplift, relative to those without chronic pain. Figure 1 displays the results for negative affect on days with an uplift by chronic pain status. Refer to Table 2 for the final model with both interactions included.

We used post-hoc simple slope analysis to test each of the slopes within the chronic pain by uplift interaction. Negative affect on non-uplift days was higher among people with chronic pain compared to people without chronic pain. On days when uplifts occur, however, the simple slopes for negative affect were similar across the groups ($M_{ChronicPain} = 0.22$, $M_{NoPain} = 0.24$). For adults with chronic pain, negative affect was lower on days with an uplift than on days without an uplift, $b = -0.018$, $95\% \ CI = (-0.034, -0.002)$, $p = .03$. Contrary to expectations, among those without chronic pain,
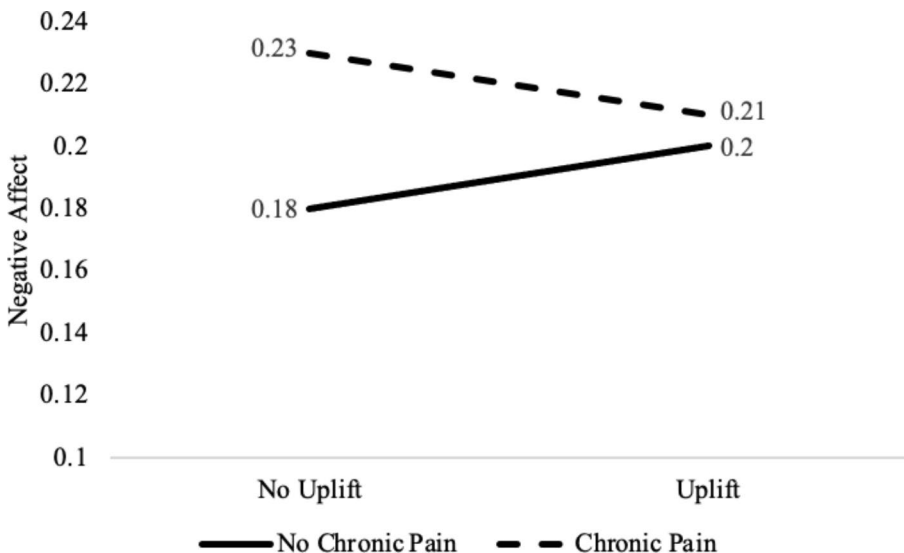
Fig. 1 Interaction between Pain and Daily Uplifts for Negative Affect
Note: Both slopes were significantly different from zero ($p < .001$).

Table 2 Daily Uplifts and Chronic Pain as Predictors of Daily Negative Affect

Fixed Effects (Intercept, slopes)	γ (SE)	t	p	CI_{95}[a] Lower	Upper
Intercept	0.058 (0.021)	2.74	0.006	0.017	0.100
Age	-0.002 (0.000)	-4.63	<0.001	-0.003	-0.001
Gender*	-0.004 (0.010)	-0.41	0.68	-0.024	0.016
Ethnicity	0.000 (0.005)	0.09	0.93	-0.010	0.011
Education	-0.006 (0.002)	-2.78	0.01	-0.010	-0.002
Household Income	-0.005 (0.005)	-0.91	0.36	-0.016	0.006
Marital Status*	0.038 (0.012)	3.23	0.001	0.015	0.060
Work Status*	0.037 (0.012)	2.99	0.003	0.013	0.060
Chronic Conditions	0.012 (0.003)	3.76	<0.001	0.006	0.019
Experiencing a Stressor	0.155 (0.007)	22.69	<0.001	0.142	0.169
Average Number of Stressors	0.205 (0.013)	15.95	<0.001	0.180	0.231
Experiencing an Uplift	0.018 (0.006)	2.72	0.01	0.005	0.030
Average Number of Uplifts	-0.056 (0.009)	-6.54	<0.001	-0.073	-0.039
Chronic Pain*	0.044 (0.014)	3.20	0.001	0.017	0.071
Chronic Pain x Experiencing an Uplift	**-0.035 (0.010)**	**-3.42**	**<0.001**	**-0.056**	**-0.015**
Chronic Pain x Experiencing a Stressor	**0.007 (0.011)**	**0.63**	**0.53**	**-0.015**	**0.028**
Random Effects	σ (SE)	z	p		
Intercept	0.028 (0.001)	18.90	<0.001		
Experiencing a Stressor	0.008 (0.001)	10.28	<0.001		
Experiencing an Uplift	0.002 (0.001)	2.49	0.006		
Residual	0.038 (0.001)	64.06	<0.001		

Note. N=1,667. All estimates are from the final interaction model. * Reference group is 1 representing the presence of the variable (i.e., marital status=married, work status=working, etc.)

negative affect was significantly higher on days when an uplift occurred compared to days when it did not occur, $b=0.018$, 95% CI = (0.005, 0.030), $p<.01$. We also ran the models separately by chronic pain status, and the sample without chronic pain again showed a small but significant increase in negative affect on days when an uplift occurred, $b=0.019$, 95% CI = (0.007, 0.031), $p<.01$.

6.2 Daily Events and Chronic Pain Predicting Positive Affect

In models examining daily positive affect, a greater average number of uplifts and experiencing an uplift predicted greater positive affect, whereas a greater average number of stressors and encountering a daily stressor predicted lower positive affect. Chronic pain was related to lower daily positive affect. Older age, being female, higher education level, being married, and having fewer chronic conditions were all significantly associated with greater positive affect.

Table 3 shows the results of the full model with both interaction terms. Chronic pain moderated the within-person relationship between uplifts (but not stressors) and positive affect. Post-hoc simple slope analysis revealed that both people with and without pain had significantly higher levels of positive affect on days when a stressor occurred, but the increase in positive affect was steeper for those with chronic pain [chronic pain: $b=0.13$, 95% $CI = (0.095, 0.159)$, $p<.001$; no chronic pain: $b=0.05$, 95% $CI = (0.024, 0.075)$, $p<.001$]. The significant interaction between daily uplifts and chronic pain on positive affect is presented on Fig. 2.

7 Discussion

The relationship between chronic pain and stress experiences has been a primary focus of prior research, but less attention has focused on the role of chronic pain in daily uplifts (Davis et al., 2004, 2006; Zautra et al., 2005). This study examined the frequency of daily uplifts and stressors and their associations with daily affect among people with and without chronic pain. Consistent with prior research, we found that people with chronic pain generally experience lower levels of daily positive affect and higher levels of daily negative affect than those without chronic pain (Zautra et al., 2001, 2005). Yet, we also found that people with chronic pain have more pronounced fluctuations in affect on days when uplifts occur versus on days without uplifts, compared to those without chronic pain. Contrary to our hypotheses, chronic pain did not moderate the link between daily stressors and affect. This result suggests that a more holistic understanding of daily experiences for people living with chronic pain must go beyond a sole focus on stressors.

7.1 Chronic Pain Moderates Daily Affect and Uplifts

People with chronic pain generally have lower daily levels of positive affect than those without pain, a finding replicated in this study. Yet on days when uplifts occurred, people with chronic pain reported similar levels of positive affect as those without chronic pain. These findings underscore the importance of understanding the context of daily experiences. People with chronic conditions experience poorer emotional regulation (Ong & Ram, 2017; Smyth & Arigo, 2009), and research on the fragility of positive affect suggests that there are individual differences in how easily one's positive affect is influenced by environmental contexts. The fragility of positive affect theory may be especially relevant for those with chronic pain because pain reflects an additional vulnerability which already makes it difficult to maintain positive affect

Table 3 Daily Events and Chronic Pain as Predictors of Daily Positive Affect

Fixed Effects (Intercept, slopes)				CI_{95}	
	γ (SE)	t	p	Lower	Upper
Intercept	3.04 (0.066)	45.77	<0.001	2.91	3.17
Age	0.011 (0.002)	6.91	<0.001	0.008	0.014
Gender	0.081 (0.032)	2.52	0.01	0.018	0.145
Ethnicity	-0.001 (0.017)	−0.009	0.93	-0.034	0.031
Education	-0.016 (0.007)	-2.37	0.02	-0.030	-0.003
Household Income	0.010 (0.018)	0.54	0.59	-0.025	0.045
Marital Status	-0.083 (0.037)	-2.26	0.02	-0.155	-0.011
Work Status	-0.087 (0.039)	-2.26	0.02	-0.163	-0.011
Chronic Conditions	-0.062 (0.010)	-6.06	<0.001	-0.083	-0.042
Experiencing a Stressor	-0.142 (0.010)	-12.56	<0.001	-0.164	-0.120
Average Number of Stressors	-0.460 (0.039)	-11.74	<0.001	-0.537	-0.383
Experiencing an Uplift	0.050 (0.013)	3.85	<0.001	0.024	0.075
Average Number of Uplifts	0.211 (0.027)	7.89	<0.001	0.159	0.264
Chronic Pain	-0.122 (0.038)	-3.24	0.04	-0.196	-0.048
Chronic Pain x Experiencing an Uplift	**0.078 (0.021)**	**3.75**	**<0.001**	**0.037**	**0.118**
Chronic Pain x Experiencing a Stressor	**-0.007 (0.018)**	**-0.38**	**0.71**	**-0.043**	**0.029**
Random Effects	σ(SE)	z	p		
Intercept	0.360 (0.014)	25.95	<0.001		
Experiencing a Stressor	0.011 (0.002)	4.87	<0.001		
Experiencing an Uplift	0.011 (0.003)	4.50	<0.001		
Residual	0.134 (0.002)	65.26	<0.001		

Note. N=1,667. All estimates are from the final interaction model. * Reference group is 1 representing the presence of the variable (i.e., marital status=married, work status=working, etc.)

(Finan et al., 2009). Our findings are consistent with this concept, revealing that for people with chronic pain, uplifts were related to one's daily affect more so than for people without chronic pain.

The utility of positive affect has been highlighted in positive psychology intervention research. Some studies show that increasing positive psychological states relates to better health outcomes, including improved psychological well-being and better
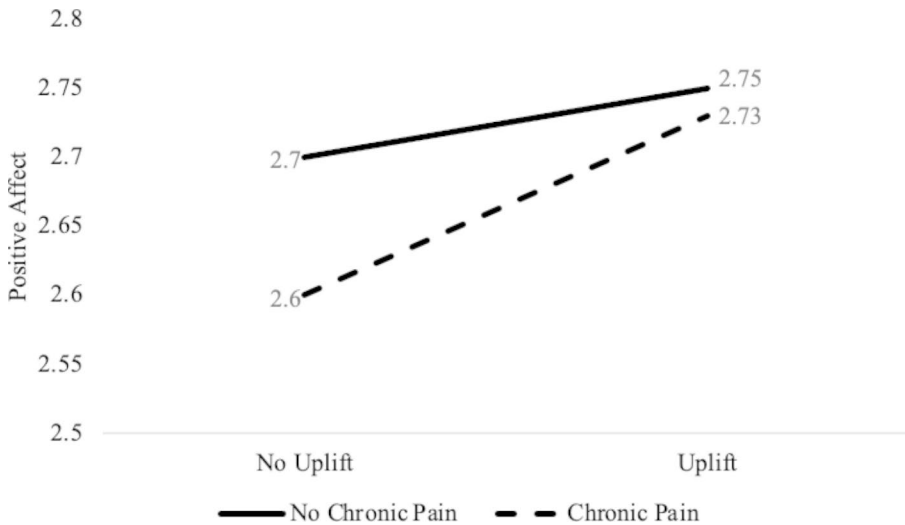
Fig. 2 Interaction between Pain and Uplifts for Positive Affect
Note. Both slopes were significant different from zero ($p<.001$).

self-reported physical health (Addington et al., 2020; Huffman et al., 2016; Moskowitz et al., 2017; Ong et al., 2022; Park et al., 2016). Researchers have also found that higher positive affect can be protective and act as a buffer for the ill-effects of negative affect or of pain severity (Finan & Garland, 2015; Müller et al., 2022; Zautra et al., 2005). Findings from the current study provides evidence that more future positive psychological interventions could include components such as encouraging the engagement in uplifts for people with chronic pain (Moskowitz et al., 2019).

Chronic pain also moderated the relation between uplifts and daily negative affect. On days when an uplift occurred, people with chronic pain experienced a significant decrease in their negative affect. According to the Dynamic Model of Affect (Zautra et al., 2001), positive and negative inputs are posited to become more inversely related during times of stress. An implication of the bipolarity of positive and negative inputs is that positive events would be more beneficial for reducing negative affect during stressful circumstances (consistent with Klaiber et al. (2021) and Finan et al. (2010)), whereas positive events would be less related to negative affect in the absence of stress. Alternatively, positive events might possess stress-buffering properties. When positive events occur during times of elevated stress such as the COVID-19 pandemic, they could have a more important role in decreasing negative affect (Klaiber et al., 2021). In addition, days with more positive interpersonal events buffer the impact of negative interpersonal events on daily negative affect (Finan et al., 2010).

Paradoxically, we found that the occurrence of an uplift was related to higher levels of negative affect among people who did not report chronic pain. Perhaps uplifts take place in different contexts for those with versus without chronic pain. One possibility is that for those without chronic pain, busy days may be those where multiple stressors, uplifts, and daily responsibilities are co-occurring. A few stud-

ies have found that uplifts could be associated with transient negative impacts. For example, Sin and colleagues (2017) found that uplifts disrupted same-night sleep among healthy adults, although those who experienced more uplifts generally experience better sleep on average. Cumulatively, these findings help to fill the gap in research on both the affective benefits and costs of uplifts, while pointing to the need to better understand the contexts and meaning underlying these events.

7.2 Chronic Pain, Daily Affect, and Stressors

Although we found that chronic pain moderated the associations between daily uplifts and daily affect, our findings were not the same for stressor-related negative and positive affect. The kindling hypothesis predicts greater stressor-related fluctuations in affect for people who are already under greater stress (Monroe & Harkness, 2005; Post, 1992). However, the current study did not find greater stressor-related negative affect among those with chronic pain. In line with the Dynamic Model of Affect, we would have expected to find that chronic pain acts as a stressor and therefore increases sensitivity to additional stressors (Davis et al., 2004; Monroe & Harkness; Zautra et al., 2001). Perhaps instead of sensitization occurring among people with chronic pain, habituation to repeated stressors may be occurring (Grissom & Bhatnagar, 2009). This habituation to stressors may be occurring through the hypothalamic pituitary adrenal axis, something we did not examine in this current study.

7.3 Limitations and Future Directions

We utilized data from a large national daily diary study in the U.S., however, participants did not enroll in the study based on their diagnosis of a pain condition. This study used an observational design, so causality cannot be inferred. Another limitation is that we used a community sample who self-reported their chronic pain status. Thus, pain levels may not be as high and they may have fewer pain-related functional limitations, compared to patient populations. MIDUS did not have an assessment of pain severity, which has been shown in past research to predict greater affective reactivity to stressors (Davis et al., 2004; Sturgeon & Zautra, 2016). Our reliance on self-report also did not allow us to assess whether there may have been different thresholds for events to be classified as either positive or negative for people with and without chronic pain. Our hypotheses were based on theories of affective responses to stressors and/or uplifts, but we cannot rule out the possibility that on days when people experience higher negative affect and lower positive affect, they are more likely to report stressors and less likely to report uplifts.

   Future studies using ecological momentary assessment could help to better understand the time ordering and directionality of associations between daily events and affect. Future studies should examine whether our findings in this predominantly white sample generalize to other races/ethnicities. We also did not include information about appraisals and other aspects of uplifts (e.g., whether they were planned, their desirability) or stressors (e.g., degree of risk the stressor posed), nor did we assess pain severity, which could help to further understand the context of affective experiences (Davis et al., 2006). In addition, the current study did not examine pos-

sible mechanisms that may explain associations between daily uplifts and pain which could influence the results. For example, in the context of living with chronic pain, understanding how functional limitations influence daily experiences may be particularly interesting to examine among people living with chronic pain. Finally, we did not assess physiological processes, such as inflammatory markers that may be related to pain but are also related to uplifts (Sin et al., 2015).

7.4 Conclusion

Our findings on the association between daily uplifts, stressors, and affect among people with and without chronic pain adds to the current body of research on chronic conditions. In particular, the findings demonstrate the importance of uplifts for bolstering positive affect and for reducing negative affect among people with chronic pain. Future research using fine-grained naturalistic assessments and intervention methods could reveal whether increasing daily uplifts may help to foster better emotional experiences among people living with chronic pain, which in turn might promote better physical and social functioning and quality of life.

Declarations

Ethical Approval　Not applicable.

Informed Consent　Not applicable.

Conflict of interest　We have no conflicts of interest to disclose. Results from this study were presented at the 2020 Gerontological Society of America Virtual Conference.

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