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The within-day relation between lonely episodes and subsequent clinical pain in individuals with fibromyalgia: Mediating role of pain cognitions ☆

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ABSTRACT

Objective: This daily diary study of individuals with fibromyalgia (FM) examined whether morning increases in loneliness relate to worsened evening bodily pain through afternoon negative pain cognitions.
Methods: 220 participants with FM completed electronic diaries 4 times a day for 21 days to assess loneliness, negative pain cognitions, bodily pain, and social enjoyment. Multilevel structural equation modeling was used to examine within-person relations of morning increases in loneliness, afternoon negative pain cognitions, and evening pain, controlling for morning pain.
Results: On mornings when individuals experienced higher than their usual levels of loneliness, they experienced higher levels of afternoon maladaptive pain cognitions, which in turn predicted increases in evening pain above the level of morning pain. Afternoon maladaptive pain cognitions fully mediated the relations between morning loneliness and evening pain.
Conclusions: Lonely episodes are associated with subsequent increases in negative patterns of thinking about pain, which in turn predict subsequent increases in bodily pain within a day. Because pain cognitions mediate the loneliness–pain link, FM interventions may benefit from addressing individuals' vulnerability to maladaptive cognitions following lonely episodes.

When individuals feel socially disconnected, they experience a sense of loneliness that is associated with poorer psychological and physical health [1–3]. The social pain of loneliness has also been linked to the experience of physical pain. For example, loneliness is associated with chronic back pain [4] as well as chronic pain among cancer patients [5]. Further, exacerbations in one type of pain are accompanied by increases in the other [6–8], at least in part due to their shared neurobiological underpinnings [6]. Although links between loneliness and physical pain have been established, the mechanisms driving these connections have not been fully elaborated. Examining these links may be important in informing our understanding of ongoing adaptation to chronic pain.

Beyond their common neurobiological pathways [6], one plausible mechanism linking loneliness and physical pain is via maladaptive cognitions regarding the experience of pain and other stressors. To date, no research has examined the link between loneliness and cognitions in people with chronic pain. Data from healthy individuals indicates that loneliness is associated with lower levels of perceived control and self-efficacy and higher levels of rumination about a lack of control in stressful situations [9–11]. Among people with chronic pain, similar types of negative cognitions regarding pain increase risk for poor outcomes. For example, pain-related catastrophizing, which involves the belief that pain is overwhelming and unbearable, is linked with higher levels of pain and disability in individuals with a chronic pain condition [12,13]. This is especially true when self-efficacy for managing pain is low [14]. In fact, maladaptive cognitions regarding pain are more potent predictors of physical functioning among individuals with chronic pain than are objective indicators of disease, such as inflammation [15,16]. Further, negative pain cognitions are a key target of behavioral interventions for chronic pain [17,18].

Accruing evidence has linked loneliness, maladaptive cognitions, and poor functioning, but the extent to which these associations hold in chronic pain populations has yet to be examined. One avenue forward is to focus on dynamic experiences in everyday life through the intensive examination of within-day experiences of individuals in chronic pain [19]. A previous study by our research group using daily diary data from *a subset of 118* individuals with fibromyalgia (i.e., *the earliest enrollees*) *from the current sample* reported associations between daily exacerbations in loneliness and increases in daily bodily pain [20]. The current study builds upon these previous findings by examining cognitive mechanisms that unfold across the day linking lonely episodes with increases in bodily pain, *and doing so in a much larger sample*. The

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primary goal of the current study is to assess the dynamic relations between lonely episodes, maladaptive pain cognitions, and clinical pain as they unfold over time within a day among individuals with chronic pain. This approach provides a means of elaborating the role of cognition in the process whereby loneliness impacts pain by establishing temporal ordering of the experiences of loneliness, cognitions, and pain. Electronic diary reports measured loneliness and clinical pain in the morning, pain cognitions in the afternoon, and clinical pain at the end of day. Data were collected for 21 days in 220 individuals with chronic pain due to fibromyalgia (FM), a chronic pain condition of unknown etiology characterized by widespread pain, fatigue, and affective disturbance [21–23]. Three hypotheses were tested (depicted in Fig. 1): 1) days of higher than usual morning loneliness will predict higher levels of afternoon maladaptive pain cognitions; 2) days of higher than usual levels of afternoon maladaptive pain cognitions will predict higher levels of pain at the end of that day; and 3) afternoon maladaptive pain cognitions will mediate the relation between morning loneliness and end-of-day pain. The hypotheses were tested controlling for morning clinical pain.

Methods

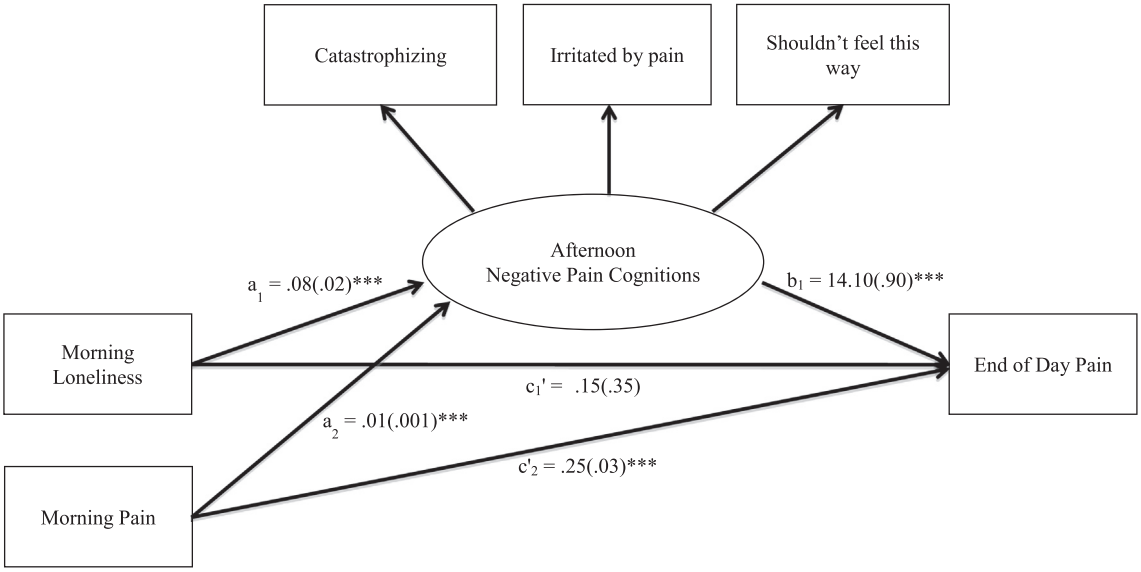
Participants

Individuals with chronic widespread pain were recruited from the Phoenix metropolitan area using newspaper advertisements, online postings, and flyers distributed in physician offices to participate in an ongoing a randomized trial of psychological treatments for FM. Individuals were eligible for participation if they: (1) were between the ages of 18 and 72 years; (2) reported that they had pain for three months or more in at least three of four quadrants of the body, or in two quadrants of the body and substantial sleep disturbance and fatigue; (3) reported pain in at least 11 of 18 tender points during a tender point exam (described below), consistent with diagnostic criteria for FM established by the American College of Rheumatology [23]; (4) did not have any autoimmune pain disorders; (5) were not currently enrolled in other research trials or receiving psychotherapy for pain or mood problems; and (6) were not pursuing litigation related to their pain condition. Seven hundred and sixteen individuals were initially screened by phone. Of those screened, 444 did not meet inclusionary criteria, primarily due to lack of interest and/or time to complete the study requirements. The remaining 272 completed the screening process by undergoing a tender point exam conducted by a research nurse during a home visit. These individuals reported pain in at least 11 of 18 tenderpoints, consistent with the American College of Rheumatology criteria for fibromyalgia [23], and were enrolled in the study. Two hundred and twenty of those enrolled proceeded to complete the initial diary assessments. The majority of the 52 individuals who dropped after enrollment and provided an explanation for their withdrawal cited time constraints as the primary reason. The sample for the current study comprised 220 individuals who were enrolled in the study and completed the pre-intervention diaries (described below).

Procedure

All procedures were approved by Institutional Review Board at Arizona State University. Interested individuals were initially screened by phone regarding their age, pain and fatigue levels, co-morbid autoimmune disorders, and involvement in other research protocols, psychotherapy, and litigation. Individuals who passed initial screening received a home visit from a registered nurse who consented them and administered a tender point exam using a dolorimeter that delivered 4 kg of pressure to each of 18 tender points and 3 control points [23]. To qualify for study enrollment, participants had to report experiencing pain in response to pressure on at least 11 of 18 tenderpoints.

Upon enrollment, participants completed an initial questionnaire packet that included measures of physical health, emotional health, and bodily pain. Participants were subsequently interviewed by phone regarding depressive symptoms and exposure to traumatic life events, and then completed pre-intervention assessments that included: (1) a laboratory assessment of physiological and affective responses to pain and emotion stimuli; (2) 21 days of diary reports regarding interpersonal events, loneliness, pain, fatigue, sleep quality, mood, and coping; and (3) questionnaires regarding current symptoms and physical and emotional functioning. Participants were then randomly assigned to one of three 7-week treatment conditions. Following completion of treatment, they underwent post-intervention assessments identical to those in pre-assessment, and completed six- and twelve-month follow-up questionnaires. The current study drew on pre-intervention diary assessment data.



Note: Coefficients are displayed with standard errors in parentheses. * $p < .05$. ** $p < .01$. *** $p < .001$.

Fig. 1. Morning loneliness predicting end of day pain mediated by afternoon negative pain cognitions. Note: Coefficients are displayed with standard errors in parentheses. *p < .05. **p < .01. ***p < .001.

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