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## Pain Acceptance Among Retired National Football League Athletes: Implications for Clinical Intervention

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### Abstract

Over 80% of National Football League (NFL) retirees experience daily pain. Pain acceptance is an important psychological construct implicated in the intensity of chronic pain, though these findings have not been extended to NFL retirees. Therefore, the current study examined the association between pain acceptance and pain intensity among former NFL athletes. NFL retirees ( $N = 90$ ) recruited from 2018 to 2019 completed questionnaires that assessed pain, substance use, and NFL career information. Multiple linear regression examined the association between current pain acceptance and pain intensity while adjusting for other risk factors of pain. NFL retirees reported average scores of 33.31 ( $SD = 10.00$ ), and 2.18 ( $SD = 2.40$ ) on measures of pain acceptance and pain intensity, respectively. After covariate adjustment, greater pain acceptance ( $\beta = -0.538$ ,  $p < .001$ ) was associated with lower pain intensity. These findings can further inform the behavioral and mental health care of retired NFL athletes.

### Keywords

behavioral health; NFL; opioid use; pain intensity

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National Football League (NFL) participation carries substantial risk of injury and medical complications, including musculoskeletal injuries, repetitive head trauma, and muscle

overuse (Kerr et al., 2012; Weir et al., 2009). These exposures can often lead to long-term negative health consequences in retirement, including pain (Churchill et al., 2018; Grashow et al., 2019; Mannes et al., 2019; Plessow et al., 2020; Roberts et al., 2019). Up to 80% of retired NFL players experience daily pain, with most rating this pain as moderate to severe (Cottler et al., 2011; Weir et al., 2009). Among NFL retirees, pain is associated with insomnia, financial difficulties, substance use, physical inactivity, depressive symptoms, and low quality of life (Mannes, Dunne, et al., 2020; Mannes, Ferguson, et al., 2020; Schwenk et al., 2007). Despite a wealth of empirical knowledge demonstrating the high rates of daily pain and its negative consequences among NFL retirees, studies have yet to delineate between the physical and psychological risk factors of pain intensity in this group.

Much of the older biomedical literature examined chronic pain from a physical medicine point of view, though researchers and clinicians now conceptualize pain from a biopsychosocial perspective, which posits that biological, social, and psychological factors contribute to disease etiology (George & Engel, 1980; Miaskowski et al., 2020). Psychological factors are particularly salient in explaining pain intensity and outcome. Observational and behavioral intervention studies demonstrate that chronic pain is influenced by not only physiological mechanisms, but also cognitive, behavioral, and emotional factors (Beverly et al., 2016; Gatchel et al., 2007). In patients with low back pain and osteoarthritis, conditions prevalent among retired NFL athletes, physical sequela explain only a modest amount of the variance in pain perception (Linton & Shaw, 2011; Weir et al., 2009). Among the first comprehensive reviews to examine biopsychosocial correlates of chronic pain, Gatchel et al. (2007) posited that psychological factors contributed to the transition from acute to chronic pain, and were strongly associated with chronic pain intensity. More recent systematic reviews have identified psychological predictors of chronic pain development and maintenance (Edwards et al., 2016). Among them, pain acceptance is a strong correlate of pain severity and is particularly amenable to clinical intervention (Hughes et al., 2017).

Pain acceptance, that is, a willingness to experience pain and participation in value-consistent behaviors despite ongoing pain, is an important cognitive experience implicated within the biopsychosocial model of chronic pain (Hayes, 2004; Hofmann & Asmundson, 2008). Pain acceptance is a multidimensional construct comprised of several interrelated processes, including activity engagement (involvement in life activities despite pain), pain willingness (acknowledging that avoidance of pain is impractical for adapting to it), thought control (belief that pain can be improved by modifying one's thoughts), and chronicity (recognizing that the pain may not change; Hayes, 2004). Findings from behavioral interventions indicate that enhanced pain acceptance is an important predictor of reduced pain intensity and positive chronic pain treatment outcomes (Kratz et al., 2017; Probst et al., 2019; Veehof et al., 2016).

Recent evidence supports the need for further investigation of psychological pain-related factors among NFL retirees as they may affect the physical and mental health functioning of this population (Mannes, Ferguson, et al., 2020). Although relationships between pain acceptance and intensity are well studied among other clinical populations, these findings have not been extended to NFL retirees. Therefore, the purpose of the present study was

to examine the association between pain acceptance and pain intensity among former NFL athletes. We hypothesized that current pain acceptance would be negatively associated with current pain intensity among this sample of retired NFL athletes, even after accounting for previous and concurrent medical factors and measures of physical functioning.

## Methods

### Participants and Procedures

The methods have been previously described (Mannes, Ferguson, et al., 2020). Briefly, members of the Retired NFL Players Association who played American football between 1967 and 2004 were initially recruited in a 2010 retrospective cohort study (Cottler et al., 2011) and recontacted for follow-up in 2018–2019 via telephone. Trained research assistants attempted to contact each NFL retiree at least twice with a previously provided telephone number; messages were left for those unavailable if they had an active voicemail. If contact was made with an NFL retiree, a University of Florida Institutional Review Board approved standardized script was read that provided information on the content, rationale, and duration of the study. The University of Florida Institutional Review Board approved use of participant provided verbal consent to enroll study participants. After consent was obtained, research assistants administered study questionnaires that assessed sociodemographic characteristics; NFL career information; substance use; and various physical, functional, and psychological aspects of pain. Information was entered into Research Electronic Data Capture software (Vanderbilt University, Nashville, TN) and subsequently deidentified and replaced with the identification number that was assigned to each player during initial data collection in 2010. Participants were not compensated for study participation. Of the 644 former NFL athletes participating in the baseline study, research assistants made contact with 132 retirees and 90 participated and completed all study measures.

### Measures

**Current Pain Intensity**—Pain intensity was measured using a numeric rating scale (0 = *no pain* to 10 = *pain as bad as you can imagine*). This scale has demonstrated good validity and reliability (Ferreira-Valente et al., 2011).

**Pain Acceptance**—The Chronic Pain Acceptance Questionnaire 8 measured current pain acceptance (Fish et al., 2010). The Chronic Pain Acceptance Questionnaire 8 consists of eight Likert scale items ranging from 0 (*never true*) to 6 (*always true*), which comprise two subscales. One subscale assesses Activity Engagement, or the behavior of participating in one's valued activities despite pain, and the other subscale measures Pain Willingness, or the ability to accept pain without attempting to control or avoid it. Both scale scores range from 0 to 24, yielding a total score of 0–48. The Chronic Pain Acceptance Questionnaire 8 has been validated in multiple samples of people with chronic pain, and demonstrates high internal consistency and test–retest reliability (Baranoff et al., 2014; Fish et al., 2010). We defined pain acceptance as a continuous variable, with higher scores indicating greater (better) pain acceptance.

## Covariates

Sociodemographic, medical, substance use, and NFL career characteristics from baseline (2010) and follow-up (2019) were considered. Baseline covariates included pain intensity related to any NFL injury (0 = *no pain* to 10 = *pain as bad as you can imagine*) and perceived physical impairment (none, mild, moderate, and severe). Follow-up covariates included sociodemographic characteristics (age, race [White and non-White], marital status [nonmarried and married], and education [high school, college, graduate school, or equivalent]), concussions (cumulative total of diagnosed and undiagnosed), and NFL career information (total games played, years since NFL retirement, and NFL position, including offense lineman/defensive lineman, quarterback, running back/linebacker, wide receiver/defensive back, or fullback/tight end). Any past 12-month opioid use (no and yes) and binge drinking (no and yes) were also assessed. Binge drinkers were dichotomized based on consumption of more than five alcoholic beverages on 1 occasion in the past 30 days (National Institute on Alcohol Abuse and Alcoholism, 2004).

## Statistical Analyses

All analyses were performed in IBM SPSS (version 25; IBM, Armonk, NY). Univariate descriptive statistics assessed sample sociodemographic characteristics, medical information, substance use, and pain factors. Pearson and point biserial correlations examined the bivariate relationships between study variables and phi coefficients were calculated for bivariate analyses between two dichotomous variables. A multiple linear regression model assessed the association between pain acceptance and pain intensity. The multivariate model included age, race, and variables associated with current pain acceptance (i.e., opioid use and 2010 physical impairment) and current pain intensity (i.e., 2010 pain intensity), in bivariate analyses ( $p < .05$ ). No multicollinearity was observed in multivariate analyses, as all variance inflation factor values were  $< 2.0$  (Hair et al., 2006).

## Results

### Sociodemographics, NFL Career, Substance Use, and Pain

The sample ( $N = 90$ ) had a mean age of 57.68 ( $SD = 9.94$ ) years and was mostly White (64.4%) and college educated (89.1%). Retirees represented all nonspecial teams (i.e., kickers and punters) positions, and offense lineman/defensive lineman (31.1%) was the most common. Retirees had an average of 90.53 ( $SD = 55.45$ ) NFL games played, and 28.83 ( $SD = 8.68$ ) years since NFL career retirement.

Approximately 26.7% and 23.3% of the sample reported past 30-day binge alcohol use and past 12-month opioid use, respectively. Retired athletes sustained an average of 30.41 ( $SD = 49.11$ ) concussions over the span of their professional careers. Many retirees had mild (35.5%) and moderate (34.4%) physical impairment in 2010, and had an average pain intensity of 5.52 ( $SD = 2.15$ ). Retirees yielded an average score of 33.31 ( $SD = 10.00$ ) and 2.18 ( $SD = 2.40$ ) on measures of current pain acceptance and current pain intensity, respectively (Table 1).

## Bivariate Relationships Between Pain Acceptance, Pain Intensity, and Covariates

Pearson correlations demonstrated significant associations between current pain acceptance and current pain intensity,  $r(88) = -.565, p < .001$ , and 2010 physical impairment,  $r(88) = -.327, p < .001$ . In addition to pain acceptance, current pain intensity was associated with 2010 pain intensity,  $r(88) = .219, p < .05$ , 2010 physical impairment,  $r(88) = .262, p < .05$ , and past 12-month opioid use,  $r(88) = .312, p < .01$  (Table 2).

## Association Between Pain Acceptance and Pain Intensity

Multiple linear regression analysis was used to examine the association between current pain acceptance and current pain intensity, controlling for covariates (i.e., opioid use, 2010 physical impairment, 2010 pain intensity, age, and race). Pain acceptance ( $\beta = -0.565, p < .001$ ) was negatively associated with pain intensity prior to covariate adjustment. The multiple regression model was significant,  $F(6, 74) = 8.73, p < .001$ , and accounted for 36.7% of the variance in pain intensity. Pain acceptance ( $\beta = -0.538, p < .001$ ) remained negatively associated with pain intensity in the adjusted model (Table 3).

## Discussion

This study examined the relationship between current pain acceptance and pain intensity among retired NFL athletes. Findings demonstrated that pain acceptance was negatively associated with pain intensity, while 2010 pain intensity, 2010 perceived physical impairment, and concussions did not predict pain intensity. To our knowledge, this investigation is the first to assess the association between pain acceptance and pain intensity among retired NFL athletes and builds on previous literature by further elucidating the psychological correlates (i.e., pain acceptance) of pain among this population.

Pain is thoroughly studied among elite athlete populations (Hainline, Derman, et al., 2017; Hainline, Turner, et al., 2017), though the examination of pain acceptance and its influence on pain intensity is limited in this group. However, findings from this study are in line with those demonstrating an association between pain acceptance and pain intensity among chronic pain patients (Kratz et al., 2017; Probst et al., 2019; Veehof et al., 2016). There are several possible cognitive and behavioral explanations for the negative association between pain acceptance and pain intensity. For example, NFL retirees with greater pain acceptance may be less likely to ruminate or have catastrophic thoughts related to pain (e.g., “this pain will never get better”), which are cognitive processes associated with psychological distress and more severe pain (de Boer et al., 2014; Mannes, Ferguson, et al., 2020; Vowles et al., 2008). Furthermore, pain acceptance can enhance pain self-efficacy, that is, the confidence to effectively manage pain, which is associated with decreased pain severity and increased functioning (Ahlstrand et al., 2017; Karasawa et al., 2019). Increasing pain acceptance may also lead to more frequent use of problem focused coping strategies of pain management, including exercise, which is an effective intervention for mitigating the negative physical and psychiatric effects of chronic pain (Kratz et al., 2017).

Notably, this sample of retired NFL athletes had considerably greater pain acceptance compared to adult chronic pain samples (Åkerblom et al., 2015, 2020; Scott et al., 2019;

Serbic & Pincus, 2017). Given the high rate of serious orthopedic injuries experienced by NFL athletes during their careers, many of which occur in young adulthood, NFL retirees may have developed early expectancies of living with pain and subsequent acceptance of it (Peerdeman et al., 2016). Moreover, NFL retirees may be accustomed to living with pain and have developed resilience, a trait implicated in positive chronic pain health outcomes (Sturgeon & Zautra, 2010). Interestingly, neither 2010 pain intensity nor perceived physical impairment was associated with current pain intensity after accounting for pain acceptance. The attenuation of pain in former NFL athletes between 2010 ( $M = 5.52$ ) and 2019 ( $M = 2.18$ ) is an important direction of future clinical research and could explain this finding, as retirees experiencing high pain intensity at baseline may have received intervention(s) to remediate it.

### Clinical Implications

Emotional, behavioral, and cognitive experiences influence pain perception, and previous studies have demonstrated that pain acceptance is an important treatment target for improving functioning in each of these domains (Hughes et al., 2017; Veehof et al., 2016). Interdisciplinary, nonpharmacological treatment approaches adapted to the biopsychosocial framework are now considered among the most effective interventions for chronic pain (Dowell et al., 2016; Gatchel et al., 2014). Cognitive behavioral therapy is among the most frequently used behavioral interventions for treating the negative psychological consequences of chronic pain (Hofmann & Asmundson, 2008). Acceptance and commitment therapy (ACT), a derivative of cognitive behavioral therapy, has shown to be especially effective for increasing pain acceptance through improving psychological flexibility, or the capacity to attune to thoughts and feelings while engaging in activities aligned with personal values (Hughes et al., 2017). ACT may be a particularly relevant treatment for NFL retirees, since pain in this group interferes with employment, social relationships, and fitness/exercise, which are areas that have likely been central to the identity of many NFL athletes during their adolescence and early adulthood (Schwenk et al., 2007). Value exploration and committed action, which are two of the six core principles of ACT, may assist NFL retirees with identifying activities of interest and creating a plan and goals to pursue these hobbies. Furthermore, ACT incorporates various mindfulness and relaxation exercises that are efficacious for improving mood, pain catastrophizing, pain intensity, pain self-efficacy, and quality of life among adults with migraine (Wells et al., 2021). Therefore, ACT may be particularly effective treatment for NFL retirees with a history of concussion and continued symptoms of migraine and headache (Seng et al., 2018).

Historically, “playing through pain” and managing injury by “rubbing some dirt on it” was common practice among NFL athletes, and several anecdotal reports provided by participants in this study elucidated rapid return to play despite painful, potentially serious injuries. The use of opioids for chronic pain management was previously considered routine care, and 52% of NFL athletes that played football prior to 2007 used narcotic analgesics (Cottler et al., 2011; Rosenblum et al., 2008). Among older NFL retirees, opioid use remains prevalent, as nearly 24% of this sample reported use. Consistent with broader scientific and clinical community perspectives (Dowell et al., 2016), the NFL and NFL

Players Association enacted initiatives that reinforced safe opioid prescribing practices and adopted a multidisciplinary approach to pain management (NFL, 2019). The NFL also created the Joint Pain Management Committee, which is an interdisciplinary group of medical professionals that oversees the implementation and dissemination of evidence-based treatments for chronic pain, including psychotherapies (NFL, 2019). In part, these initiatives aim to educate current NFL athletes about a holistic approach to pain management. These modifications to the pain management protocol are particularly important since the process of pain acceptance may begin in the course of an athlete's career during instances of injury rehabilitation (Agnew & Drummond, 2015). However, among older retirees, it is possible that the widespread use of opioids during their NFL career has likely reinforced views that opioids are an effective treatment for chronic pain, which may result in hesitancy to pursue treatments viewed as "untraditional," such as ACT. Psychotherapy recommendation, normalization, and referral by a retiree's health care team may facilitate help seeking among this older cohort of former NFL athletes (Hainline, Derman, et al., 2017). For retirees that remain apprehensive to pursue psychotherapy as a chronic pain treatment strategy, brief ACT can enhance pain acceptance and yield improvements in sleep, diet, and physical activity (Barreto et al., 2019; Barreto & Gaynor, 2019). One-session ACT interventions provide the flexibility for implementation into primary care, physical therapy, and orthopedic medicine settings where NFL retirees might utilize routine medical services (Strosahl et al., 2012).

### Limitations and Strengths

Study limitations are noted. First, the sample size was relatively modest compared to other larger, epidemiological studies involving NFL retirees (Churchill et al., 2018; Cottler et al., 2011; Kerr et al., 2012; Plessow et al., 2020; Roberts et al., 2019). Furthermore, pain acceptance and pain intensity were collected in 2019, limiting the ability to assess the temporality of the observed association. However, this study was able to account for potential confounding variables collected in 2011, including pain intensity and perceived physical impairment. Finally, there is a possibility of self-report bias pertaining to substance used data. Despite these limitations, this study identified pain acceptance, a modifiable, psychological factor, as a possible risk factor of more severe pain intensity among a sample of NFL retirees. These findings can be used to inform the behavioral and mental health care of retired NFL athletes.

### Conclusion

In 2019, the NFL and its Players Association mandated that each NFL team employ a behavioral health clinician to provide psychological treatment for current NFL athletes. The NFL has also developed the Total Wellness Program to disseminate mental health treatment among its cohort of former players. Several resources offered within this program include community psychotherapy referral, behavioral telehealth, personal health coaching, and NFL Life Line, which is a free support telephone line for current and retired NFL athletes. Findings from this study provide these initiatives with important clinical information and suggest interventions that enhance pain acceptance may be useful for mitigating the negative health consequences of pain among retired NFL athletes. Future research should continue

to study psychosocial aspects of pain and health outcomes among NFL retirees, as these investigations are likely important for further elucidating the psychological and behavioral mechanisms of physical pain and emotional distress experienced by this population.

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**Table 1**

Demographic Characteristics, Career Information, Substance Use, Health and Pain Among Retired NFL Athletes ( $N = 90$ )

| Variable                      | <i>M (SD) or n (% of total)</i> |
|-------------------------------|---------------------------------|
| Sociodemographics             |                                 |
| Age                           | 57.68 (9.94)                    |
| Race/ethnicity                |                                 |
| White, non-Hispanic           | 58 (64.4)                       |
| Non-White                     | 32 (35.6)                       |
| Education                     |                                 |
| High school                   | 10 (11.1)                       |
| College                       | 80 (89.9)                       |
| Substance use                 |                                 |
| Past 30-day binge alcohol use |                                 |
| No                            | 66 (73.3)                       |
| Yes                           | 24 (26.7)                       |
| Past 12-month opioid use      |                                 |
| No                            | 69 (76.7)                       |
| Yes                           | 21 (23.3)                       |
| NFL career information        |                                 |
| NFL position                  |                                 |
| QB                            | 6 (6.7)                         |
| OL/DL                         | 28 (31.1)                       |
| FB/TE                         | 11 (12.2)                       |
| LB/RB                         | 20 (22.2)                       |
| WR/DB                         | 25 (27.8)                       |
| NFL career duration (games)   | 90.53 (55.45)                   |
| Years of retirement from NFL  | 28.83 (8.68)                    |
| Health and pain               |                                 |
| Concussions                   | 30.41 (49.11)                   |
| Current pain intensity        | 2.18 (2.40)                     |
| 2010 pain intensity           | 5.52 (2.15)                     |
| 2010 physical impairment      |                                 |
| None                          | 14 (15.56)                      |
| Mild                          | 32 (35.56)                      |
| Moderate                      | 31 (34.44)                      |
| Severe                        | 12 (13.33)                      |
| Current pain acceptance       | 33.31 (10.00)                   |

*Note.* NFL = National Football League; OL = offense lineman; DL = defensive lineman; QB = quarterback; WR = wide receiver; DB = defensive back; FB = fullback; TE = tight end; RB = running back; LB = linebacker.

**Table 2**  
 Bivariate Associations Between Pain Acceptance, Pain Intensity, and Covariates (*N* = 90)

| Variables                          | 2       | 3     | 4       | 5     | 6     | 7      | 8      | 9      | 10    | 11     | 12      | 13      |
|------------------------------------|---------|-------|---------|-------|-------|--------|--------|--------|-------|--------|---------|---------|
| 1. Pain acceptance                 | -.565** | -.103 | -.327** | .094  | .154  | -.018  | -.044  | -.147  | -.127 | .047   | -.140   | -.012   |
| 2. Pain intensity                  |         | .219* | .262*   | -.011 | -.108 | .000   | -.019  | .312** | .113  | -.034  | .130    | -.114   |
| 3. 2010 pain intensity             |         |       | .365**  | .043  | -.022 | .027   | .027   | .134   | .094  | .016   | .176    | -.412** |
| 4. 2010 physical impairment        |         |       |         | -.021 | .101  | .066   | -.113  | .183   | .082  | .067   | -.122   | -.077   |
| 5. Concussions                     |         |       |         |       | -.053 | -.009  | -.161  | -.038  | .054  | -.029  | -.010   | -.119   |
| 6. Career duration                 |         |       |         |       |       | .312** | -.263* | .029   | -.176 | .558** | -.073   | -.014   |
| 7. Retirement duration             |         |       |         |       |       |        | -.187  | .166   | -.137 | .931** | -.354** | .176    |
| 8. NFL position <sup>d</sup>       |         |       |         |       |       |        |        | -.124  | .087  | -.230* | .448**  | -.011   |
| 9. Opioid use <sup>b</sup>         |         |       |         |       |       |        |        |        | .024  | .140   | -.245*  | -.069   |
| 10. Binge alcohol use <sup>b</sup> |         |       |         |       |       |        |        |        |       | -.171  | -.133   | .019    |
| 11. Age                            |         |       |         |       |       |        |        |        |       |        | -.330** | .183    |
| 12. Race <sup>c</sup>              |         |       |         |       |       |        |        |        |       |        |         | -.180   |
| 13. Education <sup>d</sup>         |         |       |         |       |       |        |        |        |       |        |         |         |

Note. Bold values indicate significance at *p* < .05. NFL = National Football League; OL = offense lineman; DL = defensive lineman; QB = quarterback; WR = wide receiver; DB = defensive back; FB = fullback; TE = tight end; RB = running back; LB = linebacker.

<sup>a</sup>0 = OL, DL, TE, RB, and LB; 1 = QB, WR, and DB.

<sup>b</sup>0 = no and 1 = yes.

<sup>c</sup>0 = non-White and 1 = White.

<sup>d</sup>0 = high school and 1 = college.

\* *p* < .05.

\*\* *p* < .01.

**Table 3**

Multiple Linear Regression Examining the Association Between Pain Acceptance and Current Pain Intensity ( $N = 90$ )

| Variable                    | <i>B</i>      | <i>SE</i>    | $\beta$       | <i>t</i>     | <i>p</i>        | <i>R</i> <sup>2</sup> |
|-----------------------------|---------------|--------------|---------------|--------------|-----------------|-----------------------|
|                             |               |              |               |              |                 | <b>0.367</b>          |
| Pain acceptance             | <b>-0.130</b> | <b>0.023</b> | <b>-0.538</b> | <b>-5.55</b> | <b>&lt;.001</b> |                       |
| Opioid use (use vs. no use) | <b>1.26</b>   | <b>0.523</b> | <b>0.228</b>  | <b>2.40</b>  | <b>.019</b>     |                       |
| 2010 physical impairment    | -0.129        | 0.286        | -0.047        | -0.451       | .654            |                       |
| 2010 pain intensity         | 0.146         | 0.113        | 0.129         | 1.28         | .202            |                       |
| Age                         | -0.007        | 0.023        | -0.02         | -0.290       | .773            |                       |
| Race (non-White vs. White)  | 0.633         | 0.514        | 0.125         | 1.23         | .222            |                       |

*Note.* Bold values indicate significance at  $p < .05$ . Model accounted for current pain acceptance, opioid use, 2010 pain intensity, 2010 perceived physical impairment, age, and race.

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