

The Effect of attribution Style to Negative Experience on Perceived Injustice in Individuals with Chronic Pain[†]

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This study aimed to examine the effect of attribution style on negative experiences on perceived injustice on individuals with chronic pain. Participants were divided into chronic pain and non-chronic pain groups according to chronic pain diagnosis criteria, and classified as internal attribution and external attribution groups. All participants performed internal and external attribution tasks and conducted an ultimatum game(UG) to check the degree of perceived injustice. Current studies have shown that people with internal attribution styles in extremely unfair conditions have significantly more perceived injustice than those with external attribution styles in the chronic pain group. On the other hand, in ambiguous unfair conditions, there were no differences between those with external attribution styles and those with internal attribution styles among the chronic pain group. Unlike the non-chronic pain group, chronic pain groups were found to have different perceived unfairness depending on the attribution style in extremely unfair situations. This means that chronic pain with internal attribution styles places more value on absolute benefits than relative losses.

Keywords: Chronic Pain, Perceived Injustice, Attribution Style, Ultimatum Game

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Chronic pain experiences can lead to perceived injustice if deemed unnecessary (Miller, 2001). The ongoing pain experiences on a daily basis can make individuals more sensitive to topics related to injustice, such as individual rights, justice, accusation, and fairness (Mikula, 2003). When an individual with chronic pain becomes aware of unfairness, it feels as if his pain is caused by someone's disregard or injustice around him (Sullivan et al., 2008). These can lead to social and professional dysfunction, resulting in excessive levels of depression and anger compared to the actual degree of pain (Scott & Sullivan, 2012; Scott, Trost, Bernier, & Sullivan, 2013; Prkachin, Schultz, & Hughes, 2007). Furthermore, the more they perceive injustice, the more they can suffer from dysfunction regardless of the degree of actual pain (Sullivan, Scott, & Trost, 2012).

The impact of perceived unfairness can become even more pronounced when experiencing unequal fates such as chronic pain (Gatchel, Peng, Peters, Fuchs, & Turk, 2007). Previous studies examining the impact of evaluations related to unfairness on chronic pain found that perceived injustice to pain was a risk factor for pain control and professional function (Robbins, Ford, & Tetrick, 2012; Sullivan, Davidson, Garfinkel, Siriapaipant, & Scott, 2009). However, relatively little is known about which factors constitute the perceived injustice of chronic pain (Craig, 2004).

Through one previous study, perceived injustice has been conceptualized as a series of perceptions consisting of comprising elements of blame attribution, severity of loss, and irreparability of loss (Miller, 2001). Among three constructs, the cognitive process of blame attribution is known to affect the occurrence and formation of perceived injustice. For instance, if individuals with chronic pain attributes the cause of the pain they experience to external factors, they may experience an increase in pain sensitivity as well as perceived injustice (Mancini, Betti, Panasiti, Pavone, & Aglioti, 2011; McParland, & Whyte, 2008).

In addition to attribution style, the evaluation of fairness is also a factor that can affect the formation and maintenance of perceived injustice (Sullivan et al., 2012). A previous study investigated mediating and moderating variables of the perceived injustice and found the degree of belief about justice as the key variable affecting the perceived injustice construct (Sullivan et al., 2009). According to the social utility model, there are two different approaches in evaluating human fairness. There is 'absolute payoff' that takes into account the absolute amount you will gain and 'comparative payoff' that compares the value of the other party with your own interests (Bolton & Zwick, 1995; Loewenstein, Thompson, & Bazerman, 1989).

The ultimatum game task was used to assess perceived injustices through 'comparative

payoff' approaches(Güth & Kocher, 2014). This task is to confirm whether or not the decision is made fairly in the event of unreasonable results, requiring participants to make decisions based on not only the objective value of the amount presented but also how the proposal was made. For example, when people think the other party earns 'relative gains' as a result of the distribution, even if they earn 'absolute gains' the people who consider the proposal unfair will give up or reject their 'absolute gains'.

A previous study investigated whether or not chronic pain patients responded more strongly to social unfairness compared to healthy individuals without chronic pain through ultimatum game(Timm, Schmidt-Wilcke, Blenk, & Studer, 2021). As a result, the study found that chronic pain patients had significantly lower acceptance rates for ambiguous unfair proposals than healthy individuals. In other words, chronic pain patients perceived ambiguous unfair situations as more injustice. This means that chronic pain patients are more sensitive to cues associated with unfairness when the situation is ambiguous than those who have no pain experience. That is to say, in extremely unfair situation, people with chronic pain and those who have no pain will have no difference in perceived injustice, but in ambiguous unfair situation, people with chronic pain may be more sensitive to perceived

injustice than those who have no pain experience.

So far, research has focused on the independent contribution of attribution style or evaluation of fairness to the link between perceived injustice and pain outcomes. However, there is currently a lack of combined conceptual models dealing with the correlation between these variables. Identifying specific processes linking perceived injustices to negative outcomes could help identify more appropriate interventions for chronic pain patients with high perceived injustices.

To sum up, the current study uses ultimatum games to measure unfairness and examine differences in the impact of chronic pain patients on perceived injustice according to the attribution style. This research hypothesis is as follows. First, under extremely unfair conditions, there is no difference in perceived injustice between chronic pain group and non-chronic pain group. Second, under ambiguous unfair condition, chronic pain group will have higher perceived injustice than non-chronic pain group. Third, under extremely unfair condition, there is no difference in perceived injustice between those who with internal attribution style and external attribution within the chronic pain group. Furthermore, under ambiguous unfair conditions, those who with external attribution style would have a higher perceived injustice than those with internal attribution within

chronic pain group.

Methods

Participants

Participants were young adults diagnosed with chronic pain disorders who were recruited through online advertising and psychology classes at a university in Seoul, South Korea. This study recruited a total of 117 young adults with chronic pain ($N = 58$) or young healthy adults without any chronic pain ($N = 59$). All participants were initially screened using questionnaires that assess the presence of chronic pain, chronic pain diagnosis, pain intensity, and duration of chronic pain. With regard to pain levels, participants were rated on an 11-point scale, ranging from 0 (no pain and is not affected by daily life) to 10 (difficulty of daily life due to extreme pain intensity). The criteria for the chronic pain group include 1) whether chronic pain is diagnosed, 2) the pain duration is more than 3 months, and 3) the average pain grade is more than 5 out of 10 (Andersson, Ejlertsson, Leden, & Rosenberg, 1993). Participants in each group were divided into external attribution style ($N = 59$) and internal attribution style ($N = 58$) using the ratio of scores obtained from the The internality, powerful others and chance scale (IPC; Levenson, 1981). Based on the IPC score, those

in the top 30% on internality (I) score were assigned into the internal attribution style group, and those in the top 30% on powerful others (P) were assigned into the external attribution style group.

All participants completed consent forms and this study was approved by the Chung-Ang University IRB (No. 1041078-201710-HRSB-200-01).

Measures

Pain Intensity Questions. Pain Intensity Questions included five items that evaluate the current degree of pain, pain in the past week, pain in the last three months, and the lowest and highest level of pain in the past week (Lee, Beom, Choi, Wachholtz, & Lee, 2019). Participants rated their scores on an 11-point scale from 0 points (no pain) to 10 points (very serious pain). Examples of question composition are as follows. 1) what is the current degree of pain, 2) the degree of pain in the past week, 3) the degree of pain in the past three months, 4) the lowest level of pain in the past week, 5) the highest level of pain in the past week. Cronbach's alpha of Pain Intensity Questions was .90.

The Pain Disability Index (PDI). The Pain Disability Index (PDI) was developed by Pollard (1984) and translated by Hong (2010). PDI

measures the degree of disability that pain causes in everyday life. PDI consists of seven areas of living(home, entertainment, social life, occupation, sex life, self-management, and life maintenance). A total of 7 items whose responses were rated on an 11-point scale. Examples of questionnaires are as follows. How much of your activity is hindered by the pain? 1) family activities, 2) hobby, leisure etc, 3) party, social gatherings such as invitations to meals, 4) activities directly related to jobs, 5) sex life 6) activities related to independent daily life, such as bath, driving, 7) basic life support behavior such as eating, sleeping, breathing. The higher the score, the greater the pain that interferes with life. In this study, Cronbach's alpha of PDI was .89.

Internality, powerful others and chance scale(IPC). The internality, powerful others and chance(IPC) scales was developed by Levenson(1981) and translated by Bae(2007). IPC consist of 24 items with three subscales corresponding to three dimensions of locus of control. In this study, the measure was used to identify participants with internal attribution style and external attribution style, and only 8 questions for each internality and strong other factors which have interpersonal factors were used. participants rated each item on a 7-point Likert-type scale ranging from strongly disagree (1) to strongly agree (7), with neutral

(4) as the midpoint. The internality(I) scale measures the extent to which one believes that one has control over one's life. The items seem to describe the concept of self-determination(e.g., "my life is determined by my own actions."). The powerful others(P) scale concerns the belief that other persons control the events in one's life(e.g., "getting what I want requires pleasing those people above me."). In this study, Cronbach's alpha of IPC - internality(I) was .87, IPC - powerful others(P) was .91.

Injustice Experiences Questionnaire(IEQ).

The Injustice Experience Questionnaire(IEQ) was used to measure awareness of pain-related injustices(Sullivan et al., 2008). It was translated by two graduate students majoring in psychology who received regular education for more than five years in english-speaking countries. Participants rated 12 items related to the awareness of pain-related injustices on a 5-point scale ranging from 0(absolutely) to 4(always). Previous studies have argued that IEQ contains two factors associated with injustice: "blame / unfairness"(e.g., "everything is so unfair") and "severity / irreparable loss"(e.g., "most people don't understand how serious my condition is."). In this study, Cronbach's alpha of IEQ was .88.

Korean version of the Center for

Epidemiologic Studies Depression Scale(K-CES-D). The Center for Epidemiological Studies(K-CES-D) is a 20 item self-report instrument that measures the severity of depressive symptoms(Radloff, 1977; Chon, Choi, & Yang, 2001). In this instrument, participants were asked how often they felt a certain depressive symptoms during the past week and were asked to rate on 4-point scale ranging from 0(very rare) to 3(always). In this study, Cronbach's alpha of K-CES-D was .92.

Korean version of the State-Trait Anxiety Inventory(K-STAI). K-STAI is a self-report measure that includes 40 items related to state and trait anxiety. Higher scores indicate more intense or more frequent anxiety(Spielberger, Gorsuch, & Lushene, 1970; Kim & Shin, 1978). It consists of a total of 40 items on the 4-point Likert scale ratings ranging from 1(not at all) to 4(very high). In the current study, Cronbach's alpha of state anxiety was .94 and Cronbach's alpha of trait anxiety was .87.

Attribution Manipulation

The purpose of this procedure was not to investigate the contextual or temporary attribution tendency, but to investigate the impact of the unique attribution style of the participant(i.e., internal vs. external attribution style) on the results of the experiment.

Procedural Priming Task. Fenigstein and Levine(1984) invented Procedural Priming Task for direct access to either self-directed or other-directed thinking. It was used to induce internal and external attribution conditions. Participants who primed with self-referent sentences showed a tendency of internal attribution than external attribution, while participants who primed with other-referent sentences showed a tendency of external attribution than internal attribution. After arriving at the laboratory, participants were introduced that the study was aimed at finding out the link between memory performance and visual perception. In line with this cover story, they were asked to assign 20 symbols describing daily activity to 20 phrases describing these activities (check-in mail, getting dressed, making coffee, driving, putting on pajamas, waiting for the bus, bathing, going outside, combing hair, turn off the alarm clock, talking to someone, brushing your teeth, showering, watching television, waking up, walk down the street, sleeping ect.; Neumann, 2000). For example, the symbol of a telephone had to be assigned to the sentence "Make some calls." After this task, they had to generate either self- or other-referential sentences based on the phrases and write them down separately. For example, the phrase "make some calls" had to be turned into either "I make some calls" or "He makes some calls(Mohiyeddini & Schmitt,

1997).” The participant who wrote it in a self-referent sentence will attribute the locus of control to their own self(internal attribution), on the other hand. the participant who wrote it as a other-referent sentence will attribute the locus of control to the outside of the individual (external attribution).

Objective Self-Causal Hypothesis Evaluation. It was performed to confirm attribution manipulation, and participants were asked to imagine themselves in ten different virtual situations(Duval & Wicklund, 1973). Each situation is ambiguous because the responsibility for the result can be imputed to another person in that situation. Examples of the situation are as follows. "One night you had to go to a campus that was a 20-minute walk. you were so tired that you couldn't work all day, and you tried to hitch your car on your way to hiking. Instead of taking you to campus, the man in your car took all your money and left it on the outskirts of the city." The participants were asked to estimate whether the situation was caused by their own behavior or someone else's behavior on a 10-point scale. The closer their response is to 0, the more likely they consider the situation as their own responsibility(internal attribution), and the closer their response is to 10, the more likely participants consider the situation as caused by others(external attribution).

Ultimatum Game Task. The ultimatum game was included to assess perceived injustice. Participants were instructed to play economic games with other participants using an Internet-based platform. They were told that the role of proposers or respondents should be played in different roles depending on conditions. The respondent's role was to decide whether to accept or reject the proposal proposed by the proposer, and the proposer's role was to decide how to share \$10 with the other participant. The proposer may propose according to the distribution ratio set in the game. If participants accepted the proposal, the money was divided as proposed by the proposer, and if they refused, no one received any money. If the respondent accepts, each player will maintain the allocated amount. If they refused the offer, neither of them will receive nothing(Harlé, Allen, & Sanfey, 2010).

All participants played both roles. The roles of proposers and respondents were conducted in 24 tests each, with 12 games taking turns twice to participate in a total of 48 games. In the role of the respondent, a screen with the phrase "the other party is proposing the amount" was presented for three seconds. Then, the amount proposed by the other party appeared for 5 seconds, the message "Would you like to accept / reject the other party's proposal?" appeared on the screen for 10 seconds, and the other party's proposal was considered. Finally, a

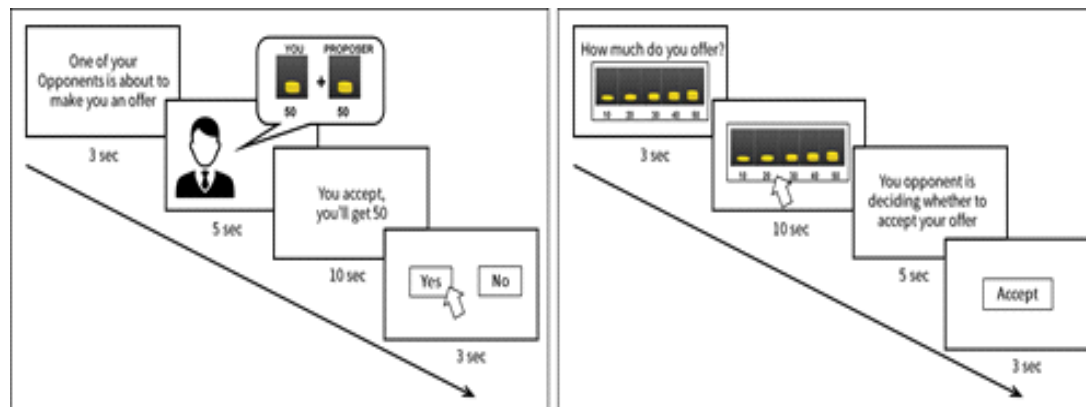


Figure 1. Procedure of responder block and proposer block in ultimatum game

screen that selects Accept or Reject is presented for three seconds, allowing respondents to respond to suggestions. Amounts were proposed at different rates according to the proposed conditions (extremely unfair; \$9 : \$1, ambiguous unfair; \$6 : \$4, fair; \$5 : \$5). In the role of the proposer, a screen showing the amount that can be provided to the other party was presented for three seconds. Afterwards, a screen was presented for 10 seconds to select the amount provided to the other participant. At that time, the participants considered the amount of money provided to the other participant, if a screen was presented for five seconds with the phrase "the opponent is responding to his proposal". As shown in Figure 1, a screen showing the opponent's chosen response (accept / reject) was presented for three seconds to confirm the opponent's reaction. In order to exclude the possibility of negotiation between the participants, the

subjects were guaranteed to be randomly paired with an anonymous partner in each game. Unknown to participants, the game was played over a computer device programmed using Inquisit Software 5.0 for Windows.

Procedure

All participants were invited to the lab and received informed consent. After participants completed their informed consent, the participants were assigned into the attribution manipulation conditions (e.g., internal vs. external attribution; self-reference instructions or other reference instructions). Then, after participants finished writing the modified prime procedure work, they evaluated the causal relationship of the eight ambiguous hypothesis situations in order to check the attribution manipulation work. These task was conducted to identify internal attribution and external attribution

manipulation, regardless of pain group and non-pain group. Lastly, the participants were instructed how to play the ultimatum game and to fill out a self-report questionnaire after the ultimatum game. When the experiment was over, the subjects were briefed on the purpose of the study and reward(10,000 won) for the participation was provided.

Data Analysis

Two-way repeated measure analyses of variance(ANOVAs) were used to assess whether there was a group difference(i.e., chronic pain vs non-chronic pain control group) on the results of each ultimatum game depending on different attribution styles(i.e., external attribution vs. internal attribution). If the results of the distributed analysis were significant, *Scheffé's* post-hoc test was applied to identify which subgroups were different. In the ultimatum game, the ratio of the amount presented and the acceptance rate based on the average amount presented to the other party were used to check how many unfair proposals the participants received and how fair proposals were presented to the other party. To calculate the acceptance rate, the average of 'accept' frequency and 'reject' frequency for each condition was calculated according to the ratio of the proposed amount(i.e., extreme unfair conditions, ambiguous unfair conditions, and fair

conditions). Specifically, for each proposal condition, the acceptance was converted to 1, the rejection was converted to 0, and the response rate of one acceptance and rejection (%) was calculated. The analysis was performed using SPSS 23.0 for Windows.

Results

Group characteristics

The demographic characteristics of the participants($N = 117$) were analyzed by age, gender, pain intensity, and duration of pain. In order to determine whether the four groups differ in demographic information, a one-way ANOVA was conducted according to age and gender. Table 1 indicates no significant difference in age, $F(3, 113) = .65, p = .41, \eta^2 = .00$, gender, $F(1, 113) = .21, p = .64, \eta^2 = .00$. Table 1 also shows pain-related and psychological variables between the two chronic pain groups(internal vs external attribution). Among chronic pain groups, no significant differences were found in pain disability, $F(1, 57) = 1.65, p = .20, \eta^2 = .02$, and pain intensity, $F(1, 57) = .67, p = .41, \eta^2 = .01$. However, there were significant differences between chronic pain group and non-chronic pain group in pain disability, $F(1, 115) = 81.10, p = .00, \eta^2 = .41$, and pain intensity, $F(1, 115) = 72.95, p = .00, \eta^2 = .38$. The depression scale reported by

K-CES-D shows significant differences among the four groups. Subsequently, a post-hoc Scheffé test revealed that the group with internal attribution showed a lower depression score than external attribution within the non-chronic pain group, $p = .00$.

Manipulation Check

In order to manipulate the attribution situation, the purpose-self-cause hypothesis evaluation task was carried out. In the task of checking the attribution manipulation, participants were asked to read a scenario in which the responsibility is ambiguous, choose a score close to "0" if the responsibility belongs

to the individual, and choose a score close to "10" if the responsibility belongs to the situation. If the manipulation is successful, the internal attribution will get a low score and the external attribution will get a high score. As a result of the manipulation check, there was a significant difference between the external attribution ($M = 40.51, SD = 6.81$) and the internal attribution ($M = 19.34, SD = 6.74$), $F(1,116) = 206.96, p = .00, \eta^2 = .36$.

Table 1. Mean (SD) of demographic characteristics of each group

	Chronic pain group		Non-chronic pain group		<i>F</i>
	External Attribution (<i>N</i> = 30)	Internal Attribution (<i>N</i> = 28)	External Attribution (<i>N</i> = 29)	Internal Attribution (<i>N</i> = 30)	
Age (yrs)	21.30 (2.39)	22.28 (2.34)	21.14 (2.08)	21.40 (2.68)	.66
IPC	-7.60 (2.04)	17.62 (4.25)	-9.64 (3.15)	20.30 (3.67)	14.29**
PDI	4.17 (2.58)	3.46 (1.49)	1.17 (1.72)	.52 (.81)	.00
Pain Severity	3.99 (2.02)	4.36 (1.38)	1.63 (1.87)	1.21 (1.67)	1.47
K-CES-D	7.67 (2.20)	6.51 (2.91)	7.25 (3.01)	4.10 (2.90)	7.65*
K-STAI-T	52.23 (8.62)	45.00 (9.49)	50.03 (11.73)	37.43 (9.26)	2.19
K-STAI-S	50.67 (10.62)	43.86 (11.98)	48.00 (12.30)	35.50 (10.96)	1.80

Note. * $p < .05$, ** $p < .001$; Age: years, IPC: The internality, powerful others and chance, PDI: Pain Interfering Index. K-CES-D: Korean version of Center for Epidemiologic Studies Depression Scale, K-STAI-T: Korean version of State-Trait Anxiety Inventory-Trait, K-STAI-S: Korean version of State-Trait Anxiety Inventory-State

Ultimatum game

Acceptance rate in the responder block

Participants choose to pass and fail according to the distribution ratio presented by the other party, and the proposal ratio consisted of three types. Extremely unfair conditions were distributed at a "9:1" rate, which determined whether the participants give 9 dollars to the opponent and whether the participants have 1 dollar, or both reject the amount. Ambiguous unfair conditions were divided by a ratio of 6:4 and fair conditions by a ratio of 5:5. This study conducted group 2(chronic pain, non-chronic pain) × condition 2(attribution style; external, internal) mixed repeated ANCOVA with the item that measured 'severity / irreparable loss' as the covariance and perceived injustice which was measured using the acceptance rate as a dependent variable for each group. The analysis showed a significant effect of two-way

interactions(group × conditions) on acceptance rate differences in extremely unfair condition, $F(1, 112) = 5.48, p = .02, \eta^2 = .04$, but there was no interaction effect on ambiguous unfair conditions and fair conditions. The statistic results are shown in Table 2.

Extreme-Unfair condition

There was an significant interaction effect on the group and condition, $F(1, 112) = 5.48, p = .02, \eta^2 = .04$. In the chronic pain group, the acceptance rate in external attribution style was significantly higher than that of internal attribution style, while in the control group, there was no statistically significant difference in the acceptance rate between internal attribution style and external attribution style. There was significant main effects on the group, $F(1, 112) = 11.42, p = .00, \eta^2 = .09$. Chronic pain group showed significantly higher acceptance rate than the non-chronic pain

Table 2. Mean (SD) of acceptance rate for each condition in ultimatum game

	Chronic pain group		Non-chronic pain group		F	Post-hoc (Scheffé)
	External Attribution ^a (N = 30)	Internal Attribution ^b (N = 28)	External Attribution ^c (N = 29)	Internal Attribution ^d (N = 30)		
Extreme-Unfair condition (%)	.50 (.26)	.24 (.32)	.19 (.28)	.20 (.27)	6.11*	a>b,c,d
Ambiguous- Unfair condition (%)	.70 (.36)	.72 (.36)	.82 (.31)	.77 (.34)	1.64	-
Fair condition (%)	.98 (.10)	.98 (.06)	.97 (.08)	.97 (.90)	1.81	-

Note. * $p < .05$,

group. The results were the same when the 'severity / irreparable loss' analyzed without covariance, $F(1, 113) = 6.11, p = .01, \eta^2 = .51$, leading that perceived 'severity / irreparable loss' didn't affect the acceptance rate for extreme unfair condition. According to a post-hoc Scheffé test, these interactions identified differences between the group and attribution style condition. The external attribution style of the chronic pain group was found to have a higher acceptance rate than other groups, $p = .00$ for chronic pain with internal attribution style, $p = .00$ for non-chronic pain with external attribution style, $p = .000$ for non-chronic pain with internal attribution style). On the other hand, non-chronic pain groups were found to have no significant differences depending on the attribution styles. In other words, individuals with internal attribution style perceived more injustice than external attribution style only in

the chronic pain group, but not in the non-chronic pain group. The graph of these variables is shown in Figure 2.

Ambiguous-Unfair condition

There was no significant interaction between the group and the condition, $F(1, 112) = .67, p = .41, \eta^2 = .00$. In the chronic pain group, there was no significant difference between on the acceptance rate of the external attribution style and internal attribution style, and it was the same in the in the control group. There turned out to be no main effect in group, $F(1, 112) = .82, p = .36, \eta^2 = .00$, and attribution style, $F(1, 112) = .47, p = .49, \eta^2 = .00$, respectively. In other words, there were no statistically significant differences between groups and conditions. There was no significant difference among the four group's acceptance rate in ambiguous unfair conditions (all results from

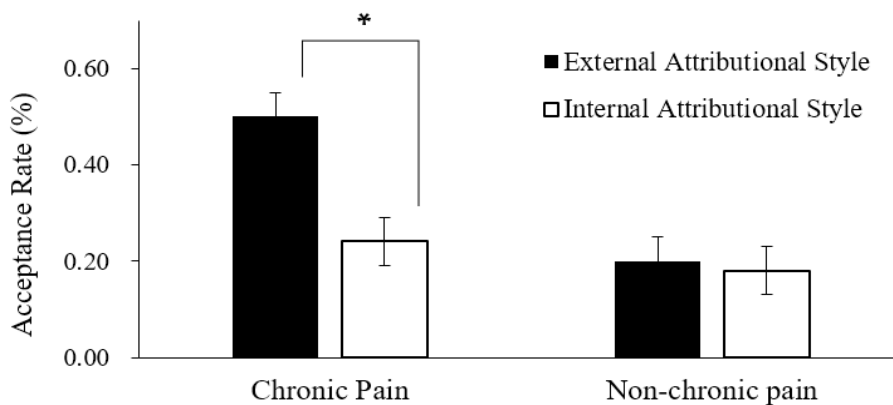


Figure 2. Acceptance rate in Extreme-Unfair condition (* $p < .05$)

post-hoc Scheffé test analysis $p > .05$). Covariance, $F(1, 113) = .37, p = .53, \eta^2 = .00$, showed the same result when the perceived 'severity / irreparable loss' did not affect the acceptance rate for ambiguous unfair conditions. The graph of these variables is shown in Figure 3.

Fair condition

There was no significant interaction between

groups and conditions, $F(1, 112) = 2.01, p = .15, \eta^2 = .01$. In the chronic pain group, there was no significant difference between on the acceptance rate of the external attribution style and internal attribution style, and it was the same in the in the control group. There was no significant main effect between group, $F(1, 112) = 2.12, p = .14, \eta^2 = .01$, attribution style, $F(1, 112) = 1.43, p = .23, \eta^2 = .01$, respectively. In other words, no statistically significant difference was found between groups and

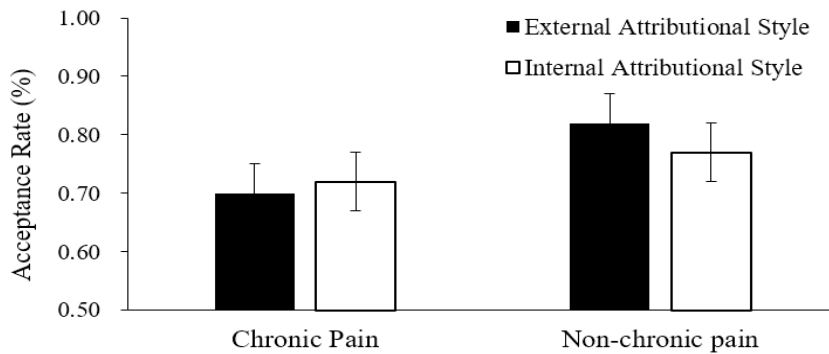


Figure 3. Acceptance rate in Ambiguous-Unfair condition

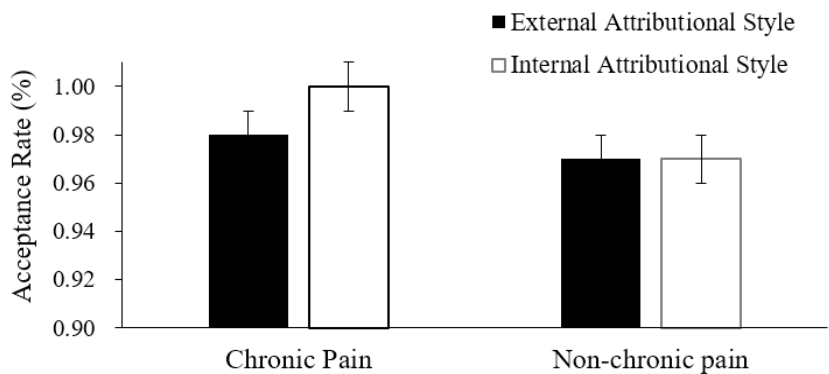


Figure 4. Acceptance rate in Fair condition

conditions. Under fair conditions, there was no significant difference in the acceptance rate among the groups(all results from post-hoc Scheffé test analysis $p < .05$). Covariance ‘severity / irreparable loss’, $F(1, 113) = 1.179$, $p = .280$, $\eta^2 = .011$, did not affect the acceptance rate for fair conditions. The graph of these variables is shown in Figure 4.

Discussion

This study aims to identify the effects of attribution style of chronic pain patients on perceived injustice. Studies have shown that chronic pain patients perceive injustice differently depending on the attribution style. In the present study, we examined whether there was a difference in the impact of the attribution style on the perceived injustice depending on the degree of unfairness.

The result of the present study indicated that the chronic pain group showed a higher acceptance rate than the non-chronic pain group under the extremely unfair conditions of the ultimatum game. This is not congruent with our first hypothesis, this may be due to the significantly high acceptance rate of participants with external attribution style within the chronic pain group of this study. Given this, however, prior research has shown that pain experiences can affect the acceptance rate of ultimatum games. In ultimatum game, the

acceptance rate increased regardless of the fairness of the offer, chronic pain patients might have been more likely to make choices with immediate benefits at the risk of long-term loss compared to participants with no pain experience because(Apkarian et al., 2004), pain experiences lead individuals to realize that their resources are limited and to make less profitable choices even in unfair situations.

The second hypothesis was not supported. There was no significant difference in acceptance rate between chronic pain group and non-chronic pain under the ambiguous unfair conditions of the ultimatum game. This is similar to a previous study that when people experience chronic pain, they can adapt to unfair outcomes with constant exposure to the unfairness of pain experience(McParland, Eccleston, Osborn, & Hezsetine, 2011). Moreover, the chronic pain group may not have been more aware of the unfairness than non-pain group because the task used in the study did not use the injustice caused by the pain.

The third hypothesis was also not supported. Under extremely unfair condition, those who with external attribution style showed a higher acceptance rate than who with internal attribution style. In other words, under extremely unfair conditions, chronic pain participants with internal attribution style perceived the same situations more injustice than those with external attribution style. Those

with internal attribution style can be considered more unfair because they understand that there as on why the other party is treating them unfairly is because of their own actions(Fehr & Schmidt, 2006; Hohman et al., 2018). On the other hand, this can also be considered related to the locus of control, and if an individual contributes their unfair experience to external factors that they cannot control, rather than recognizing that their unfair experience is due to their own internal factors, they experience learned helplessness. As a result, they may have made a choice to accept the unfair proposal given to them, rather than looking closely at the gains or injustices they would gain and making a choice to maximize their gain.

Furthermore, the last hypothesis was not supported. There was no difference between chronic pain participants with external attribution style and those with internal attribution style under ambiguous unfair conditions. These results are not consistent with previous studies(Fehr & Schmidt, 2006; Hohman et al., 2018) that found that chronic pain individuals with external attribution perceived more injustice than those with internal attribution in ambiguous unfair conditions.

Our findings have implications for the assessment and treatment of individuals with chronic pain. First, by exploring and modifying cognitive factors(i.e., attribution styles,

evaluation of unfairness) that form and maintain perceived injustices that are associated with the negative pain outcomes for chronic pain individuals, the results of the present study can help to form a more adaptive cognitive schema. For example, by modifying the attribution method that works inadequately, it will be possible to adjust the perceived unfairness of external experiences. Second, this study found that people with chronic pain tend to seek immediate benefits even though they are likely to suffer long-term losses. This tendency may lead to less future-oriented decisions with clearly negative potential for individual and societal welfare. This is likely to result in people with chronic pain hindering their chances of achieving their potential or reducing their chances of achieving positive rewards.

Nevertheless, some limitations of this study may be suggested. First, differences in the characteristics of participants under internal/external attribution style may have affected the results. The internal attribution group consists of people with high internal attribution scores, and the external attribution group consists of people with low external attribution scores. In other words, participants in internal attribution conditions have a high tendency to return to the inside, but participants in external attribution conditions may have a low external attribution tendency. Therefore, internal attribution characteristics and external

attribution characteristics may not be reflected at the same level. Second, the results of this study may not be generalized to clinical sample because the participants were not recruited in the hospital. Third, the present study did not consider that the various characteristics that chronic pain patients have(e.g., emotional or physical aspects of pain experience, etc) could affect to perceived injustice to environment. In addition, it did not take into account the effects of attribution styles in unfair situations related to pain experience. Finally, the present study might not have reflected individual differences in the degrees of injustice because participants had to choose the criteria presented in the experimental tasks instead of rating the degree of unfairness in an open-ended question.

Future studies should include that have previously identified injustice related to chronic pain have been conducted on patients with chronic pain such as fibromyalgia and musculoskeletal pain recruited by hospitals (Ferrari, 2014; Scott et al., 2016). Because the subjects of this study were suitable for chronic pain diagnosis criteria, differences between the subjects may have affected the results of the experiment. However, patients suffering from chronic pain are suffering from chronic pain due to hospital diagnosis diseases, and the duration, frequency, and intensity of pain meet the diagnosis criteria for chronic pain. Consistent with studies examining perceived injustices in

student groups(Lupfer, Weeks, Doan, & Houston., 2000), decisions were made on unfairness, qualifications, and authority in distributed, procedural, and interpersonal relationships. Therefore, the results of this study on individuals with chronic pain, along with this prior literature, indicate that they have secured validity in identifying the impact of chronic pain on perceived injustice.

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만성통증자의 부정적 경험에 대한 귀인 양식이 지각된 부당함에 미치는 효과

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현재 연구에서는 만성 통증을 가진 개인의 부정적인 경험에 대한 귀인 양식이 지각된 부당함에 미치는 영향을 조사했다. 참가자들은 만성 통증 진단 기준에 따라 만성 통증군과 비통증군으로 나뉘었고, 각각 내부 귀인 양식과 외부 귀인 양식 집단으로 분류되었다. 참가자 전원은 내·외부 귀인 과제를 수행한 후 최후통첩게임(UG)을 실시하여 지각된 부당함의 정도를 확인했다. 본 연구 결과, 만성 통증 집단에서는 극도로 불공정한 상황에서 내부 귀인 양식을 지닌 참가자가 외부 귀인 양식을 가진 참가자보다 지각된 부당함이 유의하게 높은 것으로 나타났다. 반면, 모호하게 불공정한 상황에서는 외부 귀인 양식을 지닌 참가자와 내부 귀인 양식을 가진 참가자 간 유의미한 차이는 나타나지 않았다. 즉, 만성 통증 집단은 통증 경험이 없는 집단과는 다르게, 극도로 불공정한 상황에서 귀인 양식에 따라 지각된 부당함이 다르게 나타나는 것으로 밝혀졌다. 이는 내부 귀인 양식을 지닌 만성 통증자들은 상대적인 손실보다는 절대적인 이득에 더욱 많은 가치를 두고 있다는 것으로 볼 수 있다.

주요어: 만성통증, 지각된 부당함, 귀인양식, 최후통첩게임