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The Relationship Between Chronic Pain and Stress, Anxiety, and Depression in College Students

The Relationship Between Chronic Pain and Stress, Anxiety, and Depression in College Students

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Abstract: The purpose of this study was to measure chronic pain levels as they relate to stress, anxiety, and depression in college students. This is a non-experimental, correlational research design, using a survey methodology. Eighty-four participants, over the age of 18, were recruited (men = 33.3%, women = 66.6%) to participate in this study. The participants were asked to complete a questionnaire which was a compilation of the *Chronic Pain Grade Questionnaire* (CPGQ) (Von Korff et al., 1992), the *Perceived Stress Scale* (Wickrama et al., 2013), the *Beck Anxiety Inventory* (BAI) (Beck et al., 1988), the *Beck Depression Inventory-II* (BDI-II) (Beck et al., 1996), and several demographic questions. The hypotheses for this study predicted that chronic pain would have a significant correlation with stress, anxiety, and depression. The results showed that chronic pain had a significant positive correlation with anxiety and depression, but not stress. Women reported higher chronic pain, stress, and anxiety on average as compared to men. Chronic pain, stress, anxiety, and depression's dependence on participant age did not show any significance. The results were inconclusive, and more research is needed.

Keywords: Chronic pain, anxiety, stress, depression, college students, and comorbidities

Chronic pain is a major problem in the medical field. The percentage of the U.S. adult population suffering from chronic pain in 2016 was 20.4% according to the Center for Disease Control and Prevention (Dahlhamer et al., 2018). Another major problem noted by the medical and psychological fields is mental illness. In 2017, it was estimated that 46.6 million adults suffered from mental illnesses in the United States (National Institute of Mental Health, 2019). These two categories of disorders are not mutually exclusive. In fact, some of the causes of chronic pain have psychological origins (Dahlhamer et al., 2018). The intricate relationship between chronic pain and mental illness has been the subject of many research studies as researchers attempt to understand their onsets and specific factors that maintain the comorbidity (Brennstuhl et al., 2015; Schmaling & Nounou, 2019). Such knowledge allows for increased awareness and better treatment methods for patients suffering from this comorbidity (Brennstuhl et al., 2015; Jordan & Okifuji, 2011).

The following sections will include summaries and analysis of the studies conducted

on mental illness and its relationship to chronic pain before delving into the current study. This review is organized using a thematic principle as follows: General Mental Disorders and Chronic Pain along with Anxiety/Depression and Chronic Pain and finally College Students, Chronic Pain, and Mental Illness. The sources in this literature review were gathered from EBSCO-Host through Mckee Library and nationally verified organizations' websites. The main key terms used were *mental illness, chronic pain, anxiety, depression, and persistent pain.*

General Mental Disorders and Chronic Pain

Before diving into specific mental disorders and how they relate to chronic pain, an overview of how the two variables relate can provide information on specific subcategories that show a promising relationship or those that have been neglected in research. Of the mental illnesses examined in the following articles, depression and anxiety were shown to be the two mental disorders that correlated the most with chronic pain (Birgenheir et al., 2013). This finding is also seen in Phillips et al.'s (2016) study comparing the comorbidity between two veteran groups. Mood disorders, anxiety disorders, and PTSD were the most common illnesses among participants (Phillips et al., 2016). Of those with mental illnesses, 62% also suffered from pain, with the most prominent mental disorders being mood and anxiety disorders (Phillips et al., 2016).

Anxiety's prominence in the comorbidity is further verified by Tegethoff et al.'s (2015) study centering around the comorbidity's prevalence and touching on its onset. This study is one of the few that focuses solely on children and adolescents. A little over a quarter of the participants (25.9%) showed evidence of the mental illness-chronic pain comorbidity, with anxiety disorders being the most prominent mental illness (17.4%) and headaches being the most prominent pain area (19.49%) (Tegethoff et al., 2015). A study by Yang and Haldeman (2019) examined financial worry and its relationship to chronic pain; they found that the more financial worries people had, the higher the percentage of chronic pain (Yang & Haldeman, 2019). Analyzing the specific symptoms that are associated with chronic pain can help researchers understand which aspects of a mental illness have a greater influence on chronic pain.

Anxiety, Depression, and Chronic Pain

Anxiety and depression are common mental illnesses, and it is not surprising that they have a frequent comorbidity with chronic pain. Jordan and Okifuji's (2011) study focused on anxiety's role in this comorbidity by explaining how various anxiety disorders affect chronic pain. The authors listed several reasons why anxiety serves as a causal factor to chronic pain including avoidance, maladaptive cognitions, and attentional biases (Jordan & Okifuji, 2011). Anxiety's role in the comorbidity is further analyzed in Rogers et al.'s (2018) study examining how worry and rumination affect the anxiety/depression-pain comorbidity in college students. It was found that social anxiety, depression, and anxiety arousal correlated with pain intensity, while worry and rumination provided a partial explanation to the depression/anxiety-pain comorbidity (Rogers et al., 2018).

Depression's relationship with chronic pain is explored in a 2019 study by Schmaling and Nounou where the onset relationship between chronic pain and major depression disorder and dysthymic disorder is measured. However, it appears both variables are risk

factors for each other's onset (Schmaling & Nounou, 2019). Patten et al. (2013) revealed that physical pain is tied to negative emotions and cognitions, while major depressive disorder is tied to worse physical pain (Patten et al., 2013). Depression seems to have an effect on the pain level (Patten et al., 2013). The depression-pain comorbidity's trend in the inpatient population was analyzed by Orhurhu et al. (2019). Using the National Inpatient Sample from 2010-2015, the researchers concluded that the comorbidity's presence varied from 22.6%-23.1% with an average of 22.9% (Orhurhu et al., 2019).

College Students, Chronic Pain, and Mental Illness

This study focuses on the college student population. As such, research surrounding this group provides vital precursor evidence to compare the results of this current study to. A study by Auerbach et al. (2016) focuses on the prevalence of mental illness among college students. This study found that though college students had a lower prevalence when compared to non-students of a similar age, the difference was minimal and less than 2%. Of the students that suffered from mental illness, a majority of the conditions pre-dated their entrance to college with the exception of panic attacks (Auerbach et al., 2016). This prevalence is further emphasized by the 40% of American college students who suffer from mental illness according to statistics by Statista. Of the disorders, anxiety (31%) and depression (27%) made up the most common illnesses (Elflein, 2022).

Chronic pain is also a problem among college students, though it is less discussed compared to mental illness. A study by Serbic et al. (2021) examined the effect of chronic pain on college students' life in academia. In a study similar to the current one, Serbic et al. found chronic pain to be associated with lower psychological, social, and academic wellbeing among students. It was also found that anxiety and depression acted as a risk factor for chronic pain (Serbic et al., 2021). This study further emphasizes the relationship between chronic pain and mental illness among the specified population.

This literature review was based on articles mainly from the EBSCOHost database, which could limit the type of studies gathered. Few of the studies in this literature review solely focused on a younger generation of participants, with most having an adult population or a wide range of ages (Mehrban et al., 2014; Tegethoff et al., 2015). Sample issues including size, demographics, and section discrepancies were also a limitation in several studies (Kascakova et al., 2020; Mehrban et al., 2014; Rogers et al., 2019).

Statement of the Problem

The purpose of this study was to determine whether levels of pain are significantly correlated with levels of stress, anxiety, or depression. This study will benefit clinicians and counselors treating patients with either chronic pain or anxiety and depressive disorders. It can alert them to possible factors that may co-exist. This study will also benefit people who suffer from chronic pain, anxiety, or depression, as it can alert them to co-occurring problems.

Definition of Terms

The following terms are operationally defined for this study:

1. Participants' levels of chronic pain were measured using the self-report *Chronic*

Pain Grade Questionnaire (CPGQ) (Von Korff et al., 1992). The items were measured using an 11-point Likert scale in which 0 = no pain or disability and 10 = *extreme pain or disability*.

2. Participants' levels of stress were measured using a revised version of the *Perceived Stress Scale* (Wickrama et al., 2013), which uses a 5-point Likert scale in which 0 = *never* and 4 = *very often*.

3. Participants' anxiety was measured using the *Beck Anxiety Inventory* (BAI) (Beck et al., 1988), which uses a 4-point Likert scale in which 0 = *never* and 3 = *severely*.

4. Participants' depression was measured using the *Beck Depression Inventory-II* (BDI-II) (Beck et al., 1996), which uses a 4-point Likert scale in which 0 = *not sad* and 3 = *extremely sad*.

5. Gender was measured using a portion of the demographic questionnaire created by the researcher. For example, 1 = *male*, 2 = *female*, 3 = *non-binary*.

6. Age was measured using a portion of a demographic questionnaire created by the researcher. For example, the participant wrote how old they are in years.

Hypothesis

Three research hypotheses guided this study:

1. There will be a significant correlation between chronic pain levels and levels of stress.

Null hypothesis: There will be no correlation between chronic pain levels and levels of stress.

2. There will be a significant correlation between chronic pain levels and levels of anxiety.

Null Hypothesis: There will be no correlation between chronic pain levels and levels of anxiety.

3. There will be a significant correlation between chronic pain levels and levels of depression.

Null hypothesis: There will be no correlation between chronic pain levels and levels of depression.

Research Questions

Three research questions were addressed in this study:

1. What are students' average chronic pain levels?

2. Are there chronic pain and anxiety, stress, or depression differences as a function of gender?

3. Are there chronic pain and anxiety, stress, or depression differences as a function of age?

Methods

Participants

Eighty-four participants were recruited through convenience sampling. Each participant was at least 18 years of age, and all the participants were students at Southern Adventist University. The students were recruited at various locations on campus: McKee Library, the Promenade, and the Student Center. All participants were

offered a chance to participate in a drawing to win a gift card as an incentive. All participants were treated in accordance with the Ethical Principles of Psychologists and Code of Conduct of the American Psychological Association (American Psychological Association, 2010).

Materials

The questionnaires used for this study included the *Chronic Pain Grade Questionnaire* (CPGQ) (Von Korff et al., 1992), the *Perceived Stress Scale* (Wickrama et al, 2013), the *Beck Anxiety Inventory* (BAI) (Beck et al., 1988), and the *Beck Depression Inventory-II* (BDI-II) (Beck et al., 1996). In addition, a demographic questionnaire was created by the researcher to measure age and gender. All of these questionnaires used a self-report methodology to measure participants' chronic pain level, anxiety level, depression level, stress level, and demographics. The *Chronic Pain Grade Questionnaire* (CPGQ) (Korff et al., 1992) contained a Cronbach's alpha of 0.74 (Korff et al., 1992, as cited in Physiopedia, 2020). The *Perceived Stress Scale* (Wickrama et al, 2013) has an internal consistency of 0.62 (Demkowicz et al., 2020). The *Beck Anxiety Inventory* (BAI) (Beck et al., 1988) had a coefficient alpha of 0.91 and a test-retest reliability of 0.65, while the *Beck Depression Inventory* (BDI) (Beck et al., 1961) had an alpha coefficient of 0.81 and an internal consistency rating of around 0.86 (Bardhoshi et al., 2016; Beck et al., 1988, as cited in BDI, 2020).

Design and Procedure

This study was completed using a descriptive correlational research design. Eighty-four participants—all students over the age of 18 attending Southern Adventist University—filled out the surveys given. Students were recruited by visiting locations on Southern's campus, including the Promenade, the Student Center, and McKee Library.

At these sites, the researcher approached students, introduced themself, and asked if they were willing to participate in a study for the researcher's Research, Design, and Statistics II class. The same process was carried out at the beginning of class if the professor allowed the researcher to ask the students or through email if the professor decided to send an email. During this time, all students were informed of the incentive (a chance to win a $25 gift card) for completing the surveys. The researcher also answered any general questions the students had without compromising the study. The researcher then presented a QR-code that the participants could scan on their phones (see Appendix B). This took them to the link of the survey.

Before beginning the survey, the students agreed to an informed consent form (see Appendix C) found on the link if they still wished to participate in the study. The students then answered the demographic questions created by the researcher (see Appendix B). They went on to complete the *Chronic Pain Grade Questionnaire* (CPGQ) (Korff et al., 1992), the *Perceived Stress Scale* (Wickrama et al, 2013), the *Beck Anxiety Inventory* (BAI) (Beck et al., 1988), and the *Beck Depression Inventory-II* (BDI-II) (Beck et al., 1996) (see Appendix D). Once the participants completed the questionnaire, they were thanked for their participation. The researcher's contact information also appeared at the end of the questionnaire if the participants wished to contact the researcher or ask any questions. The data was then scored, coded, and entered into Statistical Package for Social Sciences (SPSS) to be analyzed.

Data Analysis

After data collection, the questionnaires were scored and coded in SPSS as follows:

1. Participants' level of chronic pain was measured using the self-report *Chronic Pain Grade Questionnaire* (CPGQ) (Von Korff et al., 1992). The scores were recorded using an 11-point Likert scale to show the level of the participants' chronic pain, with 0 equaling the lowest value and 10 equaling the highest value.
2. Participants' levels of stress were measured using a revised version of the *Perceived Stress Scale* (Wickrama et al., 2013). The scores were recorded using a 5-point Likert scale that showed participants' stress level, with 0 being the lowest value and 4 being the highest.
3. Participants' anxiety was measured using the *Beck Anxiety Inventory* (BAI) (Beck et al., 1988). The scores were recorded using a 4-point Likert scale with 0 being the lowest value and 3 being the highest.
4. Participants' depression was measured using the *Beck Depression Inventory-II* (BDI-II) (Beck et al., 1996). The scores were recorded using a 4-point Likert scale with 0 being the lowest value and 3 being the highest.

Demographic variables will be coded as follows:

1. Gender: 1 = *male*, 2 = *female*, 3 = *non-binary*.
2. Age: 18 = *eighteen*, 19 = *nineteen*, 20 = *twenty*, 21 = *twenty-one*, 22 = *twenty-two*, 23 = *twenty-three*, etc.

PHASE 1: Descriptive statistics were calculated for all major variables. Mode was used for gender and age.

PHASE 2: Statistical Inference:

1. There will be no correlation between chronic pain levels and levels of stress.
2. There will be no correlation between chronic pain levels and levels of anxiety.
3. There will be no correlation between chronic pain levels and levels of depression.

Three research questions were addressed in this study:

1. What are students' average chronic pain levels? This question was answered by finding the mean and standard deviation of the scores on the chronic pain questionnaire.
2. Are there chronic pain and anxiety, stress, or depression differences as a function of gender? This question was answered using an independent t-test.
3. Are there chronic pain and anxiety, stress, or depression differences as a function of age? This question was answered using a one-way MANOVA.

Results

The study consisted of 84 participants (33.3% male, 66.6% female). See Figure 1 for distribution of gender. Chronic pain had an overall average score of 25.04 (*SD* = 21.7). Perceived stress had an average rating of 9.18 (*SD* = 3.3) for the psychological competency component and 21.43 (*SD* = 5.) for the psychological vulnerability component. The highest possible score for psychological competency was 20, while the highest possible score for psychological vulnerability was 28. Anxiety level had an average rating of 18.75 (*SD* = 12.1), which fell into the low anxiety category. Depression levels had an average rating of 17.74 (*SD* = 10.6), which fell into the mild depression category. See Table 1 for descriptive statistics on major variables.

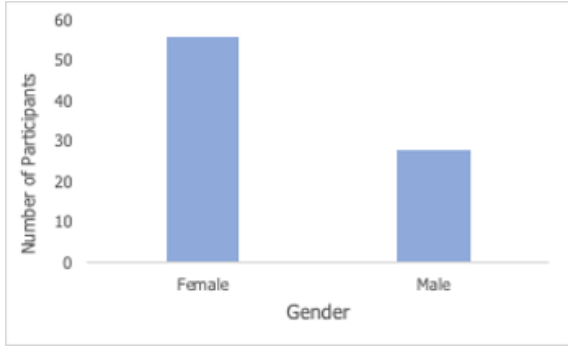

Figure 1. Bar Graph of Demographic Results for Gender

Table 1

Descriptive statistics for the variables measured

	N	*Minimum*	*Maximum*	*Mean*	*Std. Deviation*
Gender	84.00	1.00	2.00	1.67	0.47
Age	84.00	18.00	24.00	20.00	1.44
CPG	84.00	0.00	130.00	25.04	21.70
PSS	84.00	14.00	43.00	30.61	4.64
BAI	84.00	0.00	52.00	18.75	12.06
BDI	84.00	0.00	46.00	17.74	10.64

The Relationship Between Chronic Pain and Stress

The first research hypothesis predicted that chronic pain and stress would have a significant correlation. To determine the relationship between chronic pain and stress, a Pearson's *r* correlation was used. The analysis showed that the correlation was slightly positive, but not statistically significant [$r(82) = .111$, $p = .314$, ns.]. There is insufficient evidence to support the claim of a significant correlation between chronic pain and stress. Therefore, the results are inconclusive, and more research is needed.

The Relationship Between Chronic Pain and Anxiety

The second research hypothesis predicted that chronic pain and anxiety would have a significant correlation. To determine the relationship between chronic pain and anxiety, a Pearson's *r* correlation was used. The analysis showed that the correlation was positive and statistically significant [$r(82) = .542$, $p < .01$]. There is sufficient evidence to support the claim of a significant correlation between chronic pain and anxiety. Not only were the results significant, but the correlation was also positive, suggesting that

higher levels of chronic pain correlate with higher levels of anxiety.

The Relationship Between Chronic Pain and Depression

The third research hypothesis predicted that chronic pain and depression would have a significant correlation. To determine the relationship between chronic pain and depression, a Pearson's *r* correlation was used. The analysis showed that the correlation was positive and statistically significant [$r(82) = .371$, $p = .01$]. There is sufficient evidence to support the claim of a significant correlation between chronic pain and anxiety. Not only were the results significant, but the correlation was also positive, suggesting that higher levels of chronic pain correlate with higher levels of depression.

Chronic Pain in College Students

The first research question asked what the average chronic pain level was among college students. The average chronic pain level was 25.04 ($SD = 21.7$). The maximum score a participant could have was 160. The scores were added differently than usual for this questionnaire. The number of disability days was added to the score, with one day equaling one point, instead of the days being categorized on a 0-3 point scale. This was done due to the variability in scores for the participants.

Chronic Pain, Stress, Anxiety, Depression, and Gender

The second research question asked if there were chronic pain and stress, anxiety, or depression differences as a function of gender. When it came to differences in chronic pain and gender, men had an average of 15.14 ($SD = 12.4$) while women had an average of 29.98 ($SD = 23.7$). To analyze this difference, an independent samples t-test was used. The t-test showed that there was a significant difference [$t(82) = -3.1$, $p < .05$]. When it came to differences in stress and gender, men had an average of 28.25 ($SD = 5.2$) while women had an average of 31.79 ($SD = 3.9$). To analyze this difference, an independent samples t-test was used. The t-test showed that there was a significant difference [$t(82) = -3.2$, $p < .05$]. When it came to differences in anxiety and gender, men had an average of 12.14 ($SD = 9.4$) while women had an average of 22.05 ($SD = 11.9$). To analyze this difference, an independent samples t-test was used. The t-test showed that there was a significant difference [$t(82) = -3.8$, $p < .05$]. When it came to differences in depression and gender, men had an average of 14.86 ($SD = 11.5$) while women had an average of 19.18 ($SD = 9.9$). To analyze this difference, an independent samples t-test was used. The t-test showed that there was not a significant difference [$t(82) = -1.8$, $p = .079$]. Therefore, the results are inconclusive, and more research is needed. See Table 2 for statistics regarding the independent samples t-test over this relationship.

Table 2

Data from independent samples t-test

	F	*Sig.*	*t*	*df*	*Sig. (2 tailed)*
CPG	2.42	0.12	-3.10	82.00	0.00
BAI	2.25	0.14	-3.83	82.00	0.00
BDI	0.80	0.37	-1.78	82.00	0.08
PSS	4.31	0.04	-3.19	42.56	0.00

Note. $n = 84$

Chronic Pain, Stress, Anxiety, and Depression and Age

The third research question asked if there were chronic pain and stress, anxiety, or depression differences as a function of age. The average age of participants was 20 years old ($SD = 1.4$). See Figure 2 for distribution of age. The ages ranged from 18 to 24. The one-way MANOVA reported a Wilks' Lambda of $F(24) = .939$ ($p = .549$, ns.). This means that chronic pain, stress, anxiety, and depression showed no statistically significant dependency on age of the participants. Therefore, the results are inconclusive, and more research is needed spanning a wider range of ages.

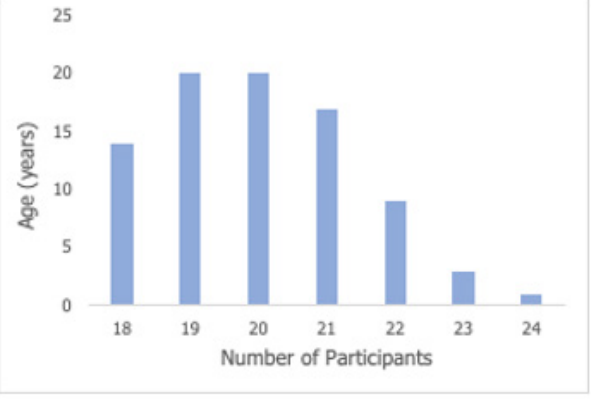

Figure 2. Bar Graph of Demographic Results for Age

Discussion

The purpose of this study was to measure chronic pain levels in relation to stress, anxiety, and depression in students at Southern Adventist University. The first hypothesis theorized that chronic pain and stress would have a significant correlation. The second research hypothesis theorized that chronic pain and anxiety would have a significant correlation. The third research hypothesis theorized that chronic pain and depression would have a significant correlation. The first research question asked what the average chronic pain level was among college students. The second research question asked if there were chronic pain and stress, anxiety, or depression differences

as a function of gender. The third research question asked if there were chronic pain and stress, anxiety, or depression differences as a function of age.

Hypotheses 2 and 3 were statistically significant, and both had positive correlations. This indicates that as chronic pain level increases, anxiety or depression level increases as well. The first research question was answered with average chronic pain level being 25.04 (*SD* = 21.7). The second research question regarded the variables as a function of gender. All variables except depression showed that women had a statistically significant difference compared to men. This means that women experience more chronic pain, stress, and anxiety compared to men. In regard to pain, this could be due to women's lower tolerance compared to men (Calandra, 2001). Depression did not show any statistically significant difference in regard to gender. This means it was not clear which gender experiences higher levels of depression. The third research question regarded the variables as a function of age. The results showed that there was no significant dependency for chronic pain, stress, anxiety, and depression on age. The results of this research study are in line with previous research and uphold the three hypotheses. The literature explained that higher levels of chronic pain are related to higher levels of certain mental illnesses or symptoms such as stress, anxiety, or depression.

Limitations and Weaknesses

The primary weakness of this study was sample size. The inadequate sample size could have played a role in the results being statistically significant. Another limitation was the use of convenience sampling, which limited the representation of the sample. A third limitation was the measurement for chronic pain. Participants were asked to list how many days pain kept them from pursuing their usual activities in the past six months, and it is possible that they put a number that was not accurate. Some participants also guessed in regard to the number of days, while others put a range instead of a single number. This prevents results from making accurate conclusions about the relationship. This measurement was also calculated differently. A participant's score places them in a grade for pain. However, due to participants' scores being on the lower end of the spectrum, they would all be categorized into one or two grades. To get a more accurate correlation, participants were not sorted into categories and instead the raw sum of their scores was used.

Importance of Study

The topic of the relationship between chronic pain and stress, anxiety, and depression is important because if the results support the hypothesis, it can provide information to patients and practitioners about other possible co-occurring factors. This study could benefit people who suffer from chronic pain and/or stress, anxiety, depression; practitioners and psychologists; and researchers interested in the topic.

Agenda for Future Research

Future research should strive to include a larger sample size, ideally chosen from random assignment. This would ensure that the results would be more generalizable. Future research should also use an instrument that measures chronic pain on a scoring system similar to anxiety, depression, and stress. The original scoring system for this chronic pain measurement involved various conditions which would sort participants

into different categories of pain rather than a simple addition of scores. Due to the variability of disability days participants recorded, the scores were summed to better represent the variation in chronic pain and its effect on participants. Future research should also focus on getting an equal amount of male and female participants to get a better understanding if one gender is more affected than the other. Future research should also compare other mental illnesses with chronic pain such as PTSD, OCD, or social anxiety to see if they show correlations among the young adult population.

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