



## Research Article

# Attitudes and Beliefs of College Students towards Pain Management Modalities: Theory of Planned Behavior Approach

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### Abstract

**Background:** Chronic pain exhibits a burdening onset and duration in young adults. It is critical to understand appropriate pain management decision-making. **Objective:** To investigate the associations of attitudes and beliefs of college students with their intention and behavior toward pain management modalities using the Theory of Planned Behavior (TPB). **Methods:** In this cross-sectional online survey study, we recruited college students (age $\geq$ 18 years) at West Virginia University, Morgantown, West Virginia, United States. We examined four pain management modalities: Over-the-Counter (OTC) pain medications, prescription pain medications ( $R_x$ ), mindfulness therapy, and yoga/exercise. Likert scales were used to assess TPB constructs (attitude, Subjective Norm [SN], Perceived Behavior Control [PBC], intention, and behavior). We analyzed the associations of the TPB constructs with both intention and behavior toward pain management modalities using multiple linear regression. **Results:** Of the 364 returned surveys, 227 were completed and analyzed. Attitude was found to be significantly associated with the intention to use all pain management modalities, while PBC was significantly associated with the intentions to use  $R_x$ , mindfulness, and yoga/exercise ( $R_x$ :  $\beta = 0.38$ ; 95%CI= 0.28, 0.84;  $p < 0.001$ , mindfulness:  $\beta = 0.27$ ; 95%CI=0.07, 0.76;  $p = 0.019$ , and Yoga/exercise:  $\beta = 0.35$ ; 95%CI=0.25, 0.85;  $p < 0.001$ ). Furthermore, the intention to use pain management modalities consistently predicted all behaviors (OTC:  $\beta = 0.49$ ; 95%CI=0.32, 0.76;  $p < 0.001$ ,  $R_x$ :  $\beta = 0.47$ ; 95%CI=0.17, 0.58;  $p < 0.001$ , Mindfulness:  $\beta = 0.62$ ; 95%CI=0.40, 0.72;  $p < 0.001$ , Yoga/Exercise:  $\beta = 0.59$ ; 95%CI=0.42, 0.84;  $p < 0.001$ ). **Conclusion:** College students' attitude and PBC were the top predictors of intention to choose pain management modalities, and intention predicted behavior. Research with robust study design is needed to confirm our study findings.

**Keywords:** Attitudes; OTC; Pain; Subjective norm; PBC; Theory of planned behavior

## Introduction

Physical pain is an indiscriminate symptom that impacts the health and well-being of more than 20.4% of all ages and races in the United States. Globally, it affects almost half of the world's population, regardless of sex and race [1,2]. Physical pain arises from many different etiologies and may have acute, chronic, or idiopathic presentations. Additionally, how pain is treated is immensely based on location, onset, intensity, and duration factors. The physical burden associated with pain is notoriously high. As many as 48.9 million individuals are classified as disabled due to chronic pain [3]. These disabilities could eventually lead to various healthcare-related concerns, including sedentary lifestyles and the potential inability to accomplish essential activities of daily life [4]. The loss of function and independence from pain can thus ultimately impact the quality of life of these individuals. It may harm the prognosis of other comorbidities and, in some people, reduce life expectancy [5]. Physical pain is not limited to clinical burden but also immensely impacts pain sufferers' economic situation. For example, in the US alone, more than \$560 billion are lost each year to managing pain and lost productivity [6].

Furthermore, patients who experience their pain at a younger age may expect the costs of managing this pain to grow as they age exponentially. However, despite these daunting statistics, many studies indicate that the early identification, diagnosis, and deployment of proper pain management strategies may reduce the burdens of pain [7].

A multitude of pain management modalities exist. However, not all these modalities carry the same benefit for all individuals. Some of them have been reported to be ineffective for some people. Moreover, some pain treatments (such as prescription pain medication) may result in harmful effects over time without proper clinician monitoring [8,9]. A handful of studies have established reasons for selecting specific modalities over others, but most of these trials were conducted in older patients and those receiving palliative care [10-13].

Young adults (15-34 years), primarily college-aged individuals, are known to be physically active, making them more prone to injuries, such as localized musculoskeletal pain and back/spinal pain [7]. This age group may have different attitudes and beliefs in treating their aches compared to older adults. Moreover, acute injuries in college-age students can develop into chronic pain disorders [14]. Appropriate pain management in early adulthood can improve clinical outcomes and overall well-being later in life.

Therefore, this study aims to examine college students' attitudes and beliefs toward their intention and behavior in pain

management modalities. This information may help effectively minimize the physical, emotional, mental, and financial burdens of physical pain young adults suffer. The findings may also be used to target effective pain management strategies among college students experiencing pain.

## Methods

### Theoretical framework

Our study utilized the Theory of Planned Behavior framework by Ajzen [15] to assess college students' attitudes, beliefs, intentions, and behaviors of using specific pain management modalities. In this theoretical framework, Perceived Behavioral Control (PBC), attitude, and Subjective Norm (SN) can predict an individual's intention to use pain management modalities. Also, individuals are believed to be capable of acting on their intentions (behavior, in our case: use of pain management modalities) when they have adequate PBC. This theory also postulates that intention (in our case: intention to use pain management modalities) is a predictor of behavior [15-17].

### Study Design, Participants, and Procedures

We adopted a cross-sectional study design with convenient sampling using an online survey. The survey consisted of structured questions on demographics, education, healthcare provider (pain specialist and Primary Care Physician) visits, pain interference in the past 30 days, and experience of pain more than 30 days. Attitude, SN, and PBC were assessed using Likert scales for intention and behavior toward pharmacological pain treatments (over-the-counter (OTC) and prescription pain medications) and non-pharmacological (mindfulness therapy and yoga/exercise).

As there is no standard TPB questionnaire available [16], we developed a set of questions based on standard methods and procedures for TPB measures designed by Fishbein and Ajzen [18]. In this study, all items of TPB constructs were measured on four pain management modalities: (1) Over-The-Counter pain medication; (2) prescription pain medication (any medication prescribed by a physician and controlled and filled by a pharmacist); (3) mindfulness therapy; and (4) yoga/exercise. On the front page of our survey, we defined pain as physical discomfort or suffering caused by illness or injury.

The questionnaire was developed using Qualtrics service (an online survey development and dissemination software suite). The questionnaire readability was determined to be on an 8th-9th grade level with an approximate score of 60 based on the Flesch-Kincaid readability scale [19]. The ethics of our study was approved by WVU's Institutional Review Board (IRB) as exempt (protocol #1902448962).

We recruited college students 18 years of age and older who were able to read and write in English by posting the link to the

Qualtrics questionnaire on WVU listserves and social media sites. We obtained online informed consent from each respondent before they started the survey.

## Measures

### Dependent variables

**Intention to use pain management modalities:** We measured the intention to use the pain management modalities by asking 1 question: “Do you intend to use any of the following modality/(ies) to manage your pain in the future?” with a five Likert-type response scale from 1 (“definitely not”) to 5 (“definitely yes”).

**Behavior of using pain management modalities:** We assessed the behavior utilizing three items inquiring how often the respondents had used the pain management modality/(ies) to manage their pain in the past 4 weeks, 6 months, and 12 months. The answers were

categorized as “Never”, “Rarely”, “Sometimes”, “Often”, and “Always”. Key explanatory variables (predictors).

### Key Independent Variables (Predictors of Interaction and Behavior)

**Predictors of intention:** Attitude, subjective norm, and perceived behavior control were investigated as intention predictors. Originally, the attitude construct was measured with 6 items/questions, the subjective norm 4 items, and the PBC 4 items (Appendix). Respondents were expected to choose one of the five Likert scale Answers. During the analysis phase, we had to drop 2 question items since they did not satisfy the psychometric properties tests using Principal Component Analyses.

**Predictors of behavior:** PBC and Intention (Items: listed under the PBC and Intention constructs).

*List of items/questions of attitude, subjective norms, and perceived behavioral control from the survey.*

#### A. Attitude (4 items were taken; 2 were dropped)

1. It is wise to always use the following pain management strategy/(ies) whenever I feel pain.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
OTC Pain Medication	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Prescription Pain Medication	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mindfulness therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Yoga/Exercise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

2. The following pain management strategy(ies) will relieve my pain (*dropped*)
3. The following pain management strategy (ies) is/are necessary for managing my pain.
4. I don’t think the following pain management strategy/(ies) will help manage my pain. (*dropped*)
5. The following strategy/(ies) are at least somewhat helpful for managing pain, if it does not relieve it completely.
6. Using the following strategy/(ies) to manage my pain is convenient for me

#### B. Subjective Norm (All items were taken)

1. My family thinks that the following pain management strategies are acceptable for managing pain.
2. My spouse/partner thinks that the following pain management strategies are acceptable for managing pain. (If applicable)
3. My friends think that the following pain management strategies are acceptable for managing pain.
4. My peers/classmates think that the following pain management strategies are acceptable for managing pain.

#### C. Perceived Behavioral Control (All item were taken)

1. I am confident that I can manage my pain with the following strategy (ies).
2. It is simple for me to handle my pain with the following pain management strategy (ies).
3. If I am in pain, I would be able to financially afford to manage my pain by using the following pain management strategy (ies).
4. If I am in pain, I would have sufficient time to manage my pain by using the following pain management strategy (ies).

### Other explanatory variables

Sociodemographic and educational data about the participants' sex, age, race, ethnicity, marital status, college level, health science field, and highest education earned were collected. Personal pain information was also included, such as pain interference in the past 30 days and experience of pain for more than 30 days, Primary Care Physician and pain specialist visits, and experiences using OTC, prescription medications, and non-medication pain management.

### Statistical analysis

The analyses were based on the statistical procedures recommended for the theory of reasoned action and TPB studies [20]. Since we adjusted the questionnaire items from the TPB questionnaire construction by Fishbein and Ajzen [18], we conducted the factorial analysis and internal reliability of our survey items. The resulting Cronbach's alpha levels for internal consistency were appropriate for social research standards.

We conducted descriptive and correlation analyses to assess demographic, educational, and pain information and TPB construct correlations. All multi-question constructs were analyzed using means. Multiple linear regression models were performed to examine potential significant predictable associations between attitude, subjective norms, and PBC with intentions. Furthermore,

a separate model was developed to observe if intention and PBC could predict the behavior of college students concerning the four pain management modalities. All statistics were evaluated with IBM SPSS Statistics 28.0 with a significance set at  $p \leq 0.05$ .

### Results

Of the 364 returned surveys, 227 were completed and were included for analysis. Table 1 depicts the respondents' demographics, educational characteristics, and pain information. Of all participants, the mean age was 24.8, and most respondents were female (69.2%), white (89.0%), and non-Hispanic (89.3%). A majority of the respondents (53.3%) were enrolled in undergraduate programs and had health insurance (98.2%). For a more comprehensive analysis in terms of controlling potentially confounding variables, we also collected other information related to the pain having been experienced before. An overwhelming majority of the study participants (77.5%) reported experiencing pain in the past 30 days before the time of survey administration. The intensity of pain experienced by this group was primarily mild (48.5%) and moderate (17.6%). As many as 37.9% of the respondents reported experiencing pain persisting for more than 30 days. From the data, we found that 90.3% of students have used OTC pain medication, only 38.8% have used prescription pain medications, and only 53.7% have tried non-medication pain treatment modalities.

**Table 1:** Descriptive of Demographics, Educational Degree, and Pain Information of Study's College Students.

		Frequency (N)	Percent (%)
<b>Age</b>	18-25	163	71.8
	26-33	36	15.9
	34-41	16	7.0
	42-49	7	3.1
	≥50	5	2.2
	<b>Sex</b>	Male	70
Female		157	69.2
<b>Race</b>	White	202	89.0
	Other	25	11.0
<b>Ethnicity</b>			

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		Frequency (N)	Percent (%)
	Hispanic	8	3.5
	Non-Hispanic	219	96.5
<b>Marital Status</b>			
	Married	40	17.6
	Other	187	82.4
<b>College Level</b>			
	Undergraduate	121	53.3
	Graduate	106	46.7
<b>Health Sciences Field</b>			
	Yes	67	29.5
	No	160	70.5
<b>Health Insurance</b>			
	Yes	223	98.2
	No	2	0.9
	Unsure	2	0.9
<b>Have experienced physical pain for more than 30 days</b>			
	Yes	176	77.5
	No	51	22.5
<b>Frequency of pain interference with daily activity in the past 30 days</b>			
	Not at all	45	19.8
	A little bit	110	48.5
	Moderately	40	17.6
	Quite a bit	19	8.4
	Extremely	7	3.1
<b>Have experienced physical pain for more than 30 days</b>			
	Yes	86	37.9
	No	141	62.1
<b>Rate of average pain for more than 30 days (if ever) experienced</b>			
	Mild (1-3)	18	7.9
	Moderate (4-6)	59	26.0
	Severe (7-10)	9	4.0

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		Frequency (N)	Percent (%)
<b>Frequency of pain interference (if ever) with daily activity for more than 30 days</b>			
	Not at all	7	3.1
	A little bit	31	13.7
	Moderately	28	12.3
	Quite a bit	13	5.7
	Extremely	7	3.1
<b>Physical pain experienced can be very burdensome</b>			
	Strongly disagree	36	15.9
	Somewhat disagree	32	14.1
	Neutral	41	18.1
	Somewhat agree	91	40.1
	Strongly agree	27	11.9
<b>Physical pain experienced made unable to concentrate</b>			
	Strongly disagree	24	10.6
	Somewhat disagree	32	14.1
	Neutral	40	17.6
	Somewhat agree	107	47.1
	Strongly agree	24	10.6
<b>Physical pain experienced could prevent from doing daily activities</b>			
	Strongly disagree	35	15.4
	Somewhat disagree	43	18.9
	Neutral	22	9.7
	Somewhat agree	98	43.2
	Strongly agree	29	12.8
<b>Have used OTC pain medication</b>			
	Yes	205	90.3
	No	22	9.7
<b>Have used prescription pain medication</b>			
	Yes	88	38.8
	No	139	61.2
<b>Have used non-medication pain therapy in the past</b>			
	Yes	122	53.7

		Frequency (N)	Percent (%)
	No	105	46.3
<b>Frequency of primary care physician visit or other healthcare providers for pain management</b>			
	Never	90	39.6
	Rarely	77	33.9
	Sometimes	51	22.5
	Very often	9	4.0
	Always	0	0.0
<b>Have been referred to a pain specialist</b>			
	Yes	23	10.1
	No	204	89.9
<b>Note:</b> Based on 227 eligible respondents aged 18 years or older completed the survey until the intention and behavior questions.			

Summary statistics for each TPB construct are shown in Table 2. College students' attitudes were the most favorable toward OTC pain medication (mean=3.54) across all pain modality groups. The same trend was also found in subjective norms, where OTC pain medications were the most preferable (mean=4.04), followed by yoga/exercise (mean=3.48). PBC was very favorable in OTC pain medication (mean=4.03) and moderately favorable in prescription medication and yoga/exercise (mean=3.35). Intention and behavior were very favorable for OTC pain medication (mean=4.26; mean=3.14), moderately favorable for yoga/exercise (mean=3.66; mean=2.60), and less favorable for mindfulness therapy (mean=2.98; mean=1.86). Regarding behavior, prescription pain medication was the least favorite of all pain treatment modalities (mean=1.51). All constructs were deemed reliable (intention excluded) based on internal consistency testing. Bivariate analysis results are shown in Appendices. A correlation was observed between attitude, subjective norms, and PBC with intention and behavior. All correlative interactions appeared to be significant.

**Table 2:** Summary Statistics (Mean) and Cronbach's Alpha of Theory of Planned Behavior Construct Scales.

	Mean	Cronbach's Alpha (Reliability test)
<b>OTC Pain Medication</b>		
Attitude	3.54	0.720
Subjective Norms	4.04	0.698
Perceived Behavioral Control	4.03	0.809
Intention	4.26	-
Behavior	3.14	0.956
<b>Prescription Medication</b>		
Attitude	2.58	0.739
Subjective Norms	3.18	0.760
Perceived Behavioral Control	3.00	0.746
Intention	2.53	-
Behavior	1.51	0.938



<b>Mindfulness Therapy</b>		
Attitude	3.01	0.805
Subjective Norms	3.18	0.684
Perceived Behavioral Control	3.05	0.759
Intention	2.98	-
Behavior	1.86	0.970
<b>Yoga/Exercise</b>		
Attitude	3.30	0.802
Subjective Norms	3.48	0.665
Perceived Behavioral Control	3.35	0.744
Intention	3.66	-
Behavior	2.60	0.960
<b>Note:</b> Based on 227 eligible respondents aged 18 years or older completing the survey until the intention and behavior questions. The intention construct has no reliability test/Cronbach's alpha because there was only one question about college student's intention to use pain management strategies.		

Multivariate analysis is shown in Tables 3 and 4. Attitude and PBC were the two significant predictors of intention, except in OTC pain medications. PBC was not significant in predicting the intention ( $\beta=0.04$ ; 95%CI=-0.25, 0.35;  $p=0.742$ ). Interestingly, the construct of subjective norms was only significant in the prescription pain medication ( $\beta=0.16$ ; 95%CI=0.01, 0.44;  $p=0.045$ ). In the second regression model, where behavior was the outcome, we revealed that intention consistently predicted pain management behaviors, and the PBC was only significant in predicting the behavior of yoga/exercise ( $\beta=0.33$ ; 95%CI=0.23, 0.88;  $p=0.001$ ). All models showed acceptable effect sizes with adjusted R<sup>2</sup> values of 50-60%.

**Table 3:** Associations between TPB constructs with Intention using Multiple Linear Regression.

Predictors of Intention	Coefficient ( $\beta$ ) (95% CI)		p-value	Adjusted R <sup>2</sup>
<b>OTC Pain Medication</b>				53.2%
Attitude	0.53	(0.42,0.92)	<0.001	
Subjective Norms	0.01	(-0.28,0.31)	0.915	
Perceived Behavioral Control	0.04	(-0.25,0.35)	0.742	
<b>Prescription Pain Medication (RX)</b>				64.8%
Attitude	0.34	(0.22,0.83)	<0.001	
Subjective Norms	0.16	(0.01,0.44)	0.045	
Perceived Behavioral Control	0.38	(0.28,0.84)	<0.001	
<b>Mindfulness</b>				54.6%
Attitude	0.58	(0.50,1.17)	<0.001	
Subjective Norms	-0.10	(-0.50,0.18)	0.360	
Perceived Behavioral Control	0.27	(0.07,0.76)	0.019	



<b>Yoga/Exercise</b>				61.3%
Attitude	0.49	(0.40,0.97)	<0.001	
Subjective Norms	0.02	(-0.23,0.28)	0.850	
Perceived Behavioral Control	0.35	(0.25,0.85)	<0.001	

**Notes:** Variables controlled: Sex, age, race, ethnicity, marital status, college level, health science field, highest education level earned, pain interference in the past 30 days and experience of pain more than 30 days, Primary Care Physician, and pain specialist visits, and having used to OTC, prescription medications, and non-medication pain management.

**Table 4:** Associations between TPB constructs with Behavior using Multiple Linear Regression.

<b>Predictors of Behavior</b>	<b>Coefficient* (95% CI)</b>		<b>p-value</b>	<b>Adjusted R<sup>2</sup></b>
<b>OTC Pain Medication</b>				55.2%
Perceived Behavioral Control	0.16	(-0.06, 0.53)	0.118	
Intention	0.49	(0.32, 0.76)	<0.001	
<b>Prescription Pain Medication (RX)</b>				51.8%
Perceived Behavioral Control	0.02	(-0.26, 0.30)	0.888	
Intention	0.47	(0.17, 0.58)	<0.001	
<b>Mindfulness</b>				67.2%
Perceived Behavioral Control	0.16	(-0.02, 0.47)	0.072	
Intention	0.62	(0.40, 0.72)	<0.001	
<b>Yoga/Exercise</b>				64.5%
Perceived Behavioral Control	0.33	(0.23, 0.88)	0.001	
Intention	0.59	(0.42, 0.84)	<0.001	

**Note:** Variables controlled: Sex, age, race, ethnicity, marital status, college level, health science field, highest education level earned, pain interference in the past 30 days and experience of pain more than 30 days, Primary Care Physician, and pain specialist visits, and having used to OTC, prescription medications, and non-medication pain management.

## Discussion

The present study examined the attitude and beliefs of college students toward pain management modalities using the TPB. The main findings highlighted the most important predictors associated with the use of pain management modalities. Our research suggested that attitude was a key factor in predicting college students' intention to use most of the pain management modalities, except for OTC. PBC was also a significant predictor of intention to use prescription pain medications, mindfulness therapy, and yoga/exercise.

In this study, a great number of students (77.5%) reported pain in the past 30 days prior to taking the survey. This number is consistent with the self-reported acute pain prevalence in other studies that range from 40% to 90% among college individuals. Some plausible explanations for this high number are that college-age students are prone to acute pain due to certain conditions, i.e., dysmenorrhea [21,22] and orofacial pain [23]. College individuals are known to be physically active [24], using a considerable amount of time on their phone [25] and computer [26], that makes them more vulnerable to musculoskeletal pain.

This study employed the TPB framework to assess how college students perceive pain management modalities because college students are regarded as mature and independent individuals capable of performing an action at a specific time and place [15]. The TPB explains the actions of pain management over which college students can exert self-control. The TPB framework postulates that three constructs can predict intentions: attitude toward a particular activity, subjective norm (subjective views of surrounding people on an

action), and Perceived Behavioral Control (PBC) (beliefs about the resourcefulness or capability of performing an activity). Also, this theory states that, together with intention, PBC may influence behavior directly [15-17].

Attitude in the TPB model refers to an individual's positive or negative assessment of the intention to do a certain behavior [15]. It usually involves assessing the consequences of performing the behavior. According to our findings, college students are more likely to consider their personal assessment of the effectiveness of a specific pain management modality when intending to use it. Of all pain management modalities, we observed higher means of TPB constructs toward intention to use OTC and a statistically significant association between attitude and OTC use intention. These findings were consistent with a study that showed attitude as the most important predictor of OTC purchase intention [27].

Almalak and colleagues reported that 80.0% of students used OTC products to manage their pain [28]. This high percentage of OTC pain medication use can be attributed to the PBC regarding the OTC pain medication and individual pain experience, leading to intent to self-medicate [29]. Brabas and colleagues also reported that OTC users feel confident about their skills in effectively managing pain [30]. In our study, compared to the OTC medication, the constructs of TPB were less favorable to the prescription painkillers. Negative attitudes concerning prescription pain medications have arisen from apprehension and emotional distress. McCracken and colleagues found a strong association between concerns about prescription pain medications and measures of emotional distress and disability, suggesting that these concerns may add significantly to the pain burden [31]. Vargas-Schaffer reported that individuals had relatively higher negative attitudes (39.7%) compared to positive attitudes (32.2%) towards opioids (i.e., one of the commonly prescribed pain drugs) which might also partially explain the negative attitude towards prescription pain medication in college students responding to our study [32].

TPB constructs were also found to have a higher mean for yoga/exercise than mindfulness therapy. Williams and Hartvigsen found that yoga and exercise improved pain levels and reduced the need for OTC pain medication and prescription pain medication [33,34]. Previous studies have reported that a positive attitude can lead to engaging in healthy behaviors of yoga and exercise [35-37]. On the other hand, a negative attitude toward mindfulness therapy was found in WVU college students. A plausible explanation for this finding was due to the misconceptions about mindfulness, which included associating it with religious activities, meditation, prayer, or reminiscence [38].

In our analysis, the SN was only associated with the intention to use prescription pain management modality. Our findings are

consistent with Sheeran, et al., who found that attitude predicts intention better than the subjective norm in the general context of college students' decision-making [39]. Another possible explanation for this finding is that higher PBC tends to enhance the association between attitude and intention while decreasing the importance of subjective norms [40].

We examined whether PBC and intention predicted pain management modality behavior in a separate analysis. PBC was significant in predicting yoga/exercise behavior and was not associated with the other pain modalities. Furthermore, intention predicted pain management behavior across all modalities in college students. Thus, taken together, these findings confirmed that intention rather than PBC shaped the behavior [15,16].

This study has several strengths. Using a well-established theoretical framework and guided analytical methods guarantees robust findings. Our study showed that the TPB constructs performed well with outcomes. We also incorporated various explanatory factors in the analyses to purify the associations between the TPB constructs and the outcomes (intention and behavior). This exceptional step corroborated the models being tested. As pain is a subjective and multidimensional concept, we collected the pain information using valid survey intensity-pain scales [41]. This method of measurement is a common practice in pain-related survey studies [42-44]. However, limitations existed. Considering the nature of the survey study, there was a possibility of recall and social desirability biases. The study's small sample size could decrease the effect size's flexibility and statistical power [45]. Although reporting bias could be associated with the pain data collected, studies suggest that getting pain information from the individual experiencing the pain is still the best source of information [41,43]. Pain may be assessed using physiological markers; however, the objective assessment has a multitude of challenges and is impractical to be conducted in survey studies [46].

## Conclusion

College students' attitude and PBC were the top predictors of intention to choose pain management modalities, and intention predicted behavior. Research with robust study design is needed to confirm our study findings.

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## Ethics Approval

The ethics of our study was approved by West Virginia University's Institutional Review Board (IRB) as exempt (protocol #1902448962).

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## Appendices

### Appendix 1: Pearson Correlations between the Constructs and Intention for Each Pain Management Modality.

<b>A. OTC Pain Medication</b>		
		Intention (OTC)
Attitude	Pearson Correlation	0.665**
	Sig. (2-tailed)	<0.001
	N	227
Subjective Norms	Pearson Correlation	0.345* c
	Sig. (2-tailed)	<0.001
	N	227
Perceived Behavioral Control	Pearson Correlation	0.511**
	Sig. (2-tailed)	<0.001
	N	227
** Correlation is significant at the 0.01 level (2-tailed).		

<b>B. Prescription Pain Medication (RX)</b>		
		Intention (RX)
Attitude	Pearson Correlation	0.724**
	Sig. (2-tailed)	<0.001
	N	227
Subjective Norms	Pearson Correlation	0.512**
	Sig. (2-tailed)	<0.001
	N	227
Perceived Behavioral Control	Pearson Correlation	0.670**
	Sig. (2-tailed)	<0.001
	N	227
** Correlation is significant at the 0.01 level (2-tailed).		

<b>C. Mindfulness Therapy</b>		
		Intention (Mindfulness)
Attitude	Pearson Correlation	0.747**
	Sig. (2-tailed)	<0.001
	N	227
Subjective Norms	Pearson Correlation	0.442**
	Sig. (2-tailed)	<0.001
	N	227
Perceived Behavioral Control	Pearson Correlation	0.322**

<b>C. Mindfulness Therapy</b>		
		Intention (Mindfulness)
	Sig. (2-tailed)	<0.001
	N	227
**Correlation is significant at the 0.01 level (2-tailed).		

<b>D. Yoga/Exercise</b>		
		Intention (Yoga/Exercise)
Attitude	Pearson Correlation	0.725**
	Sig. (2-tailed)	<0.001
	N	227
Subjective Norms	Pearson Correlation	0.374**
	Sig. (2-tailed)	<0.001
	N	227
Perceived Behavioral Control	Pearson Correlation	0.590**
	Sig. (2-tailed)	<0.001
	N	227
**Correlation is significant at the 0.01 level (2-tailed).		

**Appendix 2:** Pearson Correlations between the Constructs and Intention for Each Pain Management Modality.

<b>A. OTC Pain Medication</b>		
		Behavior (OTC)
Perceived Behavioral Control	Pearson Correlation	0.347**
	Sig. (2-tailed)	<0.001
	N	227
Intention	Pearson Correlation	0.690**
	Sig. (2-tailed)	<0.001
	N	227
**Correlation is significant at the 0.01 level (2-tailed).		

<b>B. Prescription Pain Medication (Rx)</b>		
		Behavior (RX)
Perceived Behavioral Control	Pearson Correlation	0.379**
	Sig. (2-tailed)	<0.001
	N	227
Intention	Pearson Correlation	0.615**
	Sig. (2-tailed)	<0.001
	N	227
**Correlation is significant at the 0.01 level (2-tailed).		

<b>C. Mindfulness Therapy</b>		
		Behavior (Mindfulness)
Perceived Behavioral Control	Pearson Correlation	0.528**
	Sig. (2-tailed)	<0.001
	N	227

<b>C. Mindfulness Therapy</b>		
		Behavior (Mindfulness)
Intention	Pearson Correlation	0.726**
	Sig. (2-tailed)	<0.001
	N	227
**Correlation is significant at the 0.01 level (2-tailed).		

<b>D. Yoga/Exercise</b>		
		Behavior (Yoga/Exercise)
Perceived Behavioral Control	Pearson Correlation	0.549**
	Sig. (2-tailed)	<0.001
	N	227
Intention	Pearson Correlation	0.743**
	Sig. (2-tailed)	<0.001
	N	227
**Correlation is significant at the 0.01 level (2-tailed).		