

# Effects of Workplace Variables on Workers Intentions to Misuse Prescription Opioids

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**Objective:** Workers in industries with high rates of opioid dispensing as well as those with high rates of non-fatal work-related injuries are at greater risk for opioid misuse, which can lead to addiction, overdose, or death. **Methods:** Using secondary cross-sectional data collected from 856 healthcare workers, this pilot study examines a conceptual model for workers' intentions to seek out prescription opioids and intentions to use opioids at higher doses over longer periods.

**Results:** Results showed significant protective effects of beliefs, injunctive and subjective norms, and behavioral control on intentions to seek out opioids. On intentions to use higher doses over a longer time, knowledge, beliefs, behavioral control, patient-provider communication, workplace safety, and workplace autonomy had significant protective effects. **Conclusions:** Findings from this study could be used to inform future multilevel interventions to prevent opioid misuse among employee populations.

**Keywords:** opioids, nurses, knowledge, beliefs, attitudes, behavioral control, patient-provider communication, normative beliefs

## LEARNING OUTCOMES

- Describe factors associated with risks for opioid misuse among healthcare workers.
- Identify future research needed to better understand and address risks for opioid misuse among workers in high-risk industries.

Of all accidental opioid overdose deaths, 57% occur after a work-related injury.<sup>1</sup> Workers compensation claims suggest up to 85% of prescribed pain medications are opioids.<sup>2</sup> Industries with high rates of workers' compensation-related opioid dispensing (ie, construction, extraction/mining, agriculture/forestry/fishing, and public safety)<sup>3,4</sup> as well as those with the highest rates of nonfatal work-related injuries

(ie, nursing, residential care, and public safety)<sup>5</sup> have higher risks for opioid misuse that can lead to addiction and/or lethality by overdoses.<sup>6</sup>

In addition to the associated risks of injury and opioid dispensing, other workplace factors have been thought to influence substance misuse such as exposure to safety concerns, working long hours, and having low job control or autonomy.<sup>7-11</sup> Consideration of these workplace factors calls for interventions and research to apply a social ecological model framework to examine interpersonal, organizational, or community factors<sup>12,13</sup> that play a role in opioid misuse among workers in industries with high risks for injury or opioid dispensing. Research on the relationship between opioid misuse and workplace factors such as these may also align the National Institute for Occupational Safety and Health's (NIOSH) Total Worker Health goals to inform policies, programs, and practices that address opioid misuse across the lifespan.<sup>14</sup>

Although 70% of employers report negative consequences of opioid misuse (eg, absenteeism, poor performance, turnover), few employers offer opioid prevention<sup>15,16</sup> or feel prepared to address opioid-related concerns.<sup>17</sup> Although 46% of workplaces responding to the most recent national survey indicated offering some health promotion programming, only 14.4% of workplaces were offering any programming related to alcohol/drug use.<sup>18</sup> Among those that do offer some form of alcohol/drug use programming, it is uncertain whether they consider or address multiple levels of the social ecological model. However, the national survey does suggest that few workplaces implement comprehensive initiatives that intervene at various levels within the workplace.<sup>18</sup>

There are relatively few published research studies that have examined psychosocial factors associated with opioid use and misuse, including assessments of compliance with regimens and the disposal of unused prescriptions. Much of the published research has a focus solely on general knowledge about opioids,<sup>19</sup> knowledge of the proper and safe use of opioids,<sup>20-24</sup> opioid dependence, tolerance, withdrawal, tapering, addiction,<sup>25</sup> and overdose.<sup>25-27</sup> To our knowledge, only one published study examined variables from the Theory of Planned Behavior,<sup>28</sup> which included intentions, attitudes, subjective norms, perceived behavioral control, and descriptive norms, as well as salient beliefs such as behavioral beliefs, normative beliefs, and control beliefs. Moreover, the research that examined the Theory of Planned Behavior noted that all variables included in their analysis yielded significant predictive relations with misuse.<sup>28</sup> This study proposes a conceptual model for intentions to seek out prescription opioids and intentions to use higher doses for longer periods as a way to assess risk and guide intervention development.

## CONCEPTUAL MODEL

Findings from prior research generally support the need for providing information about intentions to use or misuse prescription opioids and to examine individual and workplace level influences on intentions. Guided by the Social Ecological Model,<sup>12</sup> we examine a conceptual model for opioid use that includes constructs from the Theory of Planned Behavior at the individual level, patient-provider communication at the interpersonal level, and organizational level factors such as perceived workplace safety and perceived workplace autonomy. Only one study from our search of the literature specifically addressed the role of patient-provider communication,<sup>29</sup> a construct that

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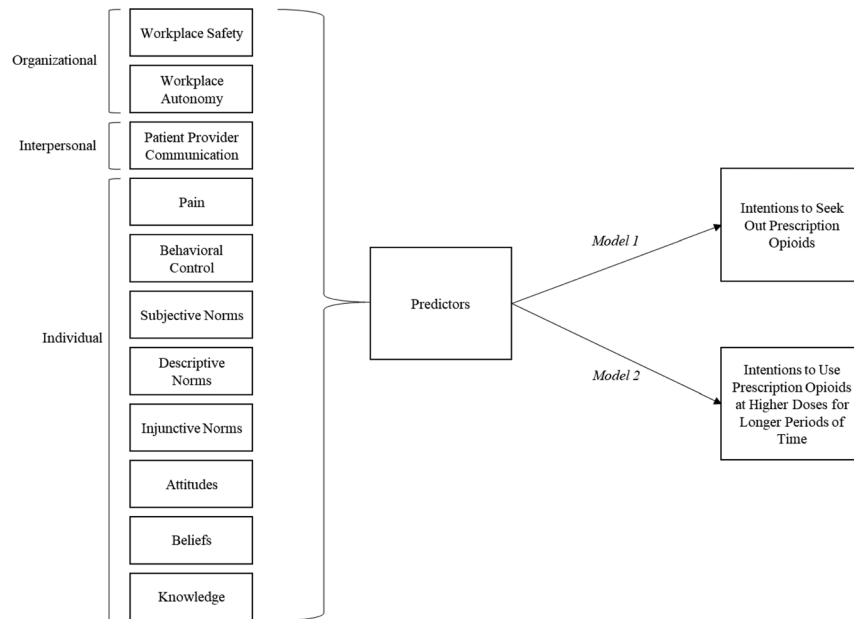
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Ethical Considerations: University of North Carolina Greensboro, IRB-FY22-411. G.W. led all aspects of analyses and writing for this manuscript. W.B.H. contributed significantly to the factoring of scales and writing. S.R. contributed significantly to the analyses, writing, and table presentation. Q.M.T. contributed to the analyses, writing, and table presentation. S.H. contributed to the writing and editing of the manuscript. J.M. contributed to the writing and editing of the manuscript. D.W. contributed to the writing and editing of the manuscript.

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**FIGURE 1.** Conceptual model for intentions to use prescription opioids and intentions to use higher doses over longer periods.

we believe to be central to decisions regarding opioid use and misuse. We believe the inclusion of individual, interpersonal, and organizational level variables will refine conceptual models for opioid misuse in the workplace with an intentional focus on integrating a Total Worker Health approach. The conceptual model shown in Figure 1 includes two outcomes representing intentions to seek out prescription opioids and intentions to use opioids at higher doses for longer periods. This study examines the effects of predictors on each of the two outcomes presented to compare effects on seeking out prescription opioids and intentions to use higher doses over longer times.

## METHODS

### Sample

This pilot study used secondary cross-sectional data collected from healthcare workers during a Phase I SBIR Project funded by the National Institute on Drug Abuse in 2020–2021. Data were gathered using convenience sampling with healthcare professional listservs to email study information with consent and survey links. Originally, 1319 workers responded to our survey; however, approximately 35% of our sample did not complete questions related to the predictors and outcomes to be assessed in this study. After removing individuals who did not complete all items of interest for this study, we had a sample size of 856 healthcare workers.

### Measurement

Using secondary data, our pilot study was limited to the variables included in the Phase I SBIR Project survey. The survey included demographic questions such as age, gender, and race/ethnicity, as well as workplace characteristics such as industry and arrangement/class. Specific to the individual level constructs proposed in the conceptual model, the survey included scales to assess opioid-related knowledge, beliefs, attitudes, perceived behavioral control, injunctive norms, subjective norms, descriptive norms, and pain. At the interpersonal level, the survey included items to assess patient-provider communication. At the organizational level, there were scales to assess healthcare workers' perceptions of workplace safety and autonomy. The scales used to measure constructs at the individual, interpersonal, and organizational

level are described in detail below, followed by a description of the two outcome variables included in the conceptual model.

### Individual Level Predictors

Knowledge was assessed with seven variables measuring how much individuals know about each of the following using a continuous Likert scale ranging from “nothing at all” to “most everything”: (1) opioid addiction, (2) safe use of prescription opioids, (3) communicating with providers, (4) self-monitoring pain, (5) stopping use of opioids, (6) diversion or sharing of prescription opioids, and (7) opioid disposal. The final continuous scale, computed with an average across all items, had a Cronbach  $\alpha$  of 0.871.

Beliefs were assessed with three items measuring level of agreement with the following belief statements about using prescription opioids: (1) the most effective way to manage pain and injury, (2) enjoyable, and (3) safe. This continuous scale had a Cronbach  $\alpha$  of 0.766 and was reverse-coded to allow for higher scores to represent less agreement with the statements about prescription opioids.

Attitudes were measured with six Likert items measuring (1) how good or bad using prescription opioids are when in pain, (2) how good or bad it is to use prescription opioids to work through pain, (3) how important or unimportant it is to use prescription opioids when in pain, (4) how important or unimportant it is to use prescription opioids to work through pain, and (5) how pleasant or unpleasant it is to use prescription opioids when in pain, or (6) to use them to work through pain. This continuous scale had a Cronbach  $\alpha$  of 0.826 and was reverse-coded to allow for higher scores to represent less favorable attitudes about prescription opioids.

Injunctive norms was measured with four Likert items about groups of people that would be in favor of using prescription opioids for pain management including (1) friends, (2) family, (3) coworkers, and (4) managers. The Cronbach  $\alpha$  for injunctive norms was 0.940. This continuous scale was reverse-coded to allow for higher values to represent less favorable norms about prescription opioids.

Descriptive norms was measured with four Likert items that asked for estimations of the percentage of workers in the same industry who have (1) used more prescription opioids than were prescribed in the past year, (2) used a prescription opioid for pain in the past year, (3) routinely use a prescription opioid for pain, and (4) initiate conversations

with providers about medications. The Cronbach  $\alpha$  for these items was 0.760. This continuous scale was reverse-coded to allow for higher values to represent less perceived use of opioids among workers in the same industry.

Subjective norms was a scale made up of two items on a Likert scale from strongly agree to strongly disagree: (1) it is typical for workers in this industry to use prescription pain medication to work through pain, and (2) it is typical for workers in this industry to use prescription opioids to manage pain. The Cronbach  $\alpha$  for this scale was 0.888. This continuous scale was reverse-coded to allow for higher values to represent lower perceptions about typical use.

Behavioral control was measured with four items that included (1) how easy or difficult it would be to refuse a prescription opioid for pain, (2) how easy or difficult it would be to use pain management options other than prescription opioids, (3) the extent to which there would be pressure to take opioids to continue caring for family, and (4) the extent to which there would be pressure to take opioids to continue working well. Items 3 and 4 were reverse-coded to allow for higher values to represent less pressure. This continuous scale had a Cronbach  $\alpha$  of 0.841.

Pain was assessed with a two-item scale including the presence of pain and the intensity of pain. Presence of pain was measured by asking if pain has been present every day for the past 12 months. Intensity of pain was measured by asking to describe the level of pain. The Cronbach  $\alpha$  for this continuous scale was 0.704.

**Interpersonal Level Predictors**

Patient-provider communication was measured with six Likert items that included: (1) communicating with my provider will result in safer pain management, (2) how good or bad communicating with provider is, (3) how important or unimportant communicating with provider is, (4) how pleasant or unpleasant communicating with provider is, (5) how easy or difficult it would be to communicate with provider, and (6) the extent to which you can choose to initiate conversations with provider. With all six items included in the continuous scale, we had a Cronbach  $\alpha$  of 0.765.

**Organizational Level Predictors**

Workplace safety included four items in the scale. The first item asked to rate how safe the workplace feels. The second item asked to rate the level of agreement with the statement “my employer values my health and safety as much as the quality of my work.” The last two items refer to physical and emotional strain at work with Likert scale response options ranging from never to always. The Cronbach  $\alpha$  for this continuous scale was 0.631.

Workplace autonomy also included two items in the scale. The first item asked how much pressure there would be to return to work quickly after an injury with Likert responses ranging from none to a lot. The second item asked the level of agreement with the statement “if you had to leave work for an injury, your coworkers would feel let down.” The Cronbach  $\alpha$  for this continuous scale was 0.628.

**Outcome Variables**

The two outcomes measured in the survey—both at the individual level—included intentions to seek out an opioid for pain management (ie, intentions to use opioids) and intentions to use the lowest dose of prescription opioids for the shortest amount of time. Both outcome variables were measured on a continuous Likert scale from strongly disagree to strongly agree. For this study, we reverse-coded the second outcome variable to allow for higher responses to represent being less likely to use prescriptions opioids at the lowest dose for the shortest amount of time. Using prescription opioids at higher doses or for longer periods may put someone at risk for misuse, tolerance, and addiction.<sup>30</sup>

**Analysis**

Descriptive statistics were used to summarize characteristics of the sample using frequencies and mean  $\pm$  SD. Linear regression models were used to assess pathways of the hypothesized conceptual model, including the potential mediation of intentions to seek out prescription opioids. Variance inflation factors (VIFs) were used to assess multicollinearity of the models. Model 1 tested the relationship between predictor variables on intentions to seek out prescription opioids. Model 2 tested the relationship between predictors and intentions to use higher doses for longer periods. Demographic variables were included as controls in both regression models. Two-sided *P*-values were considered statistically significant at *P* < 0.05 for all analyses conducted. All analyses were performed using SPSS v28.<sup>31</sup>

**RESULTS**

Table 1 describes our sample characteristics including age, gender, race/ethnicity, reported pain, prior prescription opioid use, and intentions to misuse opioids. Almost 78% of the sample were female. The average age of the sample was 39. Just over 77% were White, and only 11% identified as Hispanic. The majority of the sample (76%) were permanent full-time employees. Table 2 describes the average score for each predictor and outcome scale used in the regression analyses. The average estimate for the outcomes of interest in this pilot study were 4.26 for intentions to use prescription opioids and only 1.64 for intentions to use higher doses over longer periods.

Table 3 shows results from our two multiple linear regression models. Model 1 shows a significant negative effect of beliefs (*B* = -0.196, *P* < 0.001), injunctive norms (*B* = -0.134, *P* = 0.001), subjective norms (*B* = -0.104, *P* = 0.013), and behavioral control (*B* = -0.634, *P* < 0.001) on intentions to seek out prescription opioids. These significant negative effects suggest a protective effect such that increases in beliefs that prescription opioids are not enjoyable, safe, or effective are associated with decreased intentions to seek out opioids. As injunctive norms increased, representing less favorable norms

**TABLE 1.** Descriptive Statistics for Sample (n = 856)

Characteristic	n (%) or Mean $\pm$ SD
Gender	
Female	667 (77.9)
Male	185 (21.6)
Other	2 (0.2)
Missing	2 (0.2)
Age	39.36 $\pm$ 11.485
Race/ethnicity	
African American	75 (8.8)
American Indian/Alaska Native	8 (0.9)
Asian	60 (7.0)
Pacific Islander	6 (0.7)
White	661 (77.2)
Other	16 (1.9)
Prefer not to answer	28 (3.3)
Missing	2 (0.2)
Hispanic	98 (11.4)
Missing	3 (0.4)
Job arrangement	
Permanent full-time	653 (76.3)
Permanent part-time	119 (13.9)
Independent contractor/consultant/freelance	33 (3.9)
On call only	10 (1.2)
Temporary employee	6 (0.7)
Student/intern	26 (3.0)
Other	8 (0.9)
Missing	1 (0.1)

SD, standard deviation.

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about opioids, intentions to seek out opioids decreased. Increases in subjective norms, suggesting lower estimated typical use of opioids, were associated with lower intentions to seek out opioids. Feeling more behavioral control was associated with lower intentions to seek out opioids. We also found Asian individuals to be significantly more likely than White individuals to have higher intentions to seek out prescription opioids ( $B = 1.190, P < 0.001$ ) and part-time workers were significantly less likely than full-time workers to have higher intentions to seek out prescription opioids ( $B = -0.483, 0.041$ ).

Model 2 shows a significant protective effect of knowledge ( $B = -0.099, P = 0.008$ ), beliefs ( $B = -0.129, P = 0.001$ ), behavioral control ( $B = -0.186, P < 0.001$ ), patient-provider communication ( $B = -0.573, P < 0.001$ ), workplace safety ( $B = -0.077, P = 0.017$ ), and workplace autonomy ( $B = -0.130, P < 0.001$ ) on intentions to use higher doses over longer times. With this outcome, the two workplace factors included in the model were significant protective factors such that increased feelings of safety and autonomy at work were associated with lower intentions to use higher doses over longer times, when controlling for all other predictors and demographic variables in the model. The largest effect on intentions to use higher doses over longer periods was patient-provider communication. In other words, the more comfortable one feels with patient-provider communication about prescription opioids, the lower their intentions to use higher doses over longer periods, when controlling for multilevel predictors and demographic variables in the model. Males were slightly more likely than females ( $B = 0.369, P = 0.022$ ) to have higher intentions to use higher doses over longer times, controlling for all other variables in the model. We also found that contract workers were significantly less likely than full-time workers ( $B = -1.122, P < 0.001$ ) to have higher intentions to use higher doses over longer times.

**DISCUSSION**

This study examined individual, interpersonal, and workplace level factors' relationships on intentions to seek out prescription opioids and intentions to use higher doses of prescription opioids over longer periods. Beliefs, injunctive and subjective norms, and behavioral control each had a significant negative effect on intentions to seek out prescription opioids. As negative beliefs, less favorable norms, lower typical use norms, and behavioral control increased, intentions to use prescription opioids decreased. These results align with similar studies applying the Theory of Planned Behavior to understand intentions and behavior with alcohol and other drugs as well.<sup>28,32-34</sup> There were no significant effects of interpersonal or organizational level predictors on intentions to seek out prescription opioids.

**TABLE 2.** Mean Scale Scores for Predictors and Outcomes (n = 856)

Scales Used in Regression Analysis	Mean ± SD
Intentions to use prescription opioids <sup>a</sup>	4.26 ± 3.31
Intentions to misuse prescription opioids <sup>a</sup>	1.64 ± 2.12
Beliefs Scale <sup>b</sup>	5.51 ± 2.45
Attitudes Scale <sup>b</sup>	4.50 ± 1.75
Behavioral Control Scale <sup>b</sup>	6.22 ± 2.47
Social Norms Scale <sup>b</sup>	4.72 ± 2.47
Injunctive Norms Scale <sup>b</sup>	4.93 ± 2.80
Descriptive Norms Scale <sup>b</sup>	5.89 ± 1.86
Patient-Provider Communication Scale <sup>b</sup>	8.12 ± 1.39
Knowledge Scale <sup>b</sup>	6.24 ± 1.78
Pain Scale <sup>b</sup>	7.31 ± 1.51
Workplace Autonomy Scale <sup>b</sup>	4.23 ± 2.47
Workplace Safety Scale <sup>b</sup>	5.39 ± 1.90

<sup>a</sup>Scales range from 1-7.  
<sup>b</sup>Scales range from 1-10.

**TABLE 3.** Linear Regression on Intentions to Seek out Opioids, Intentions to Use Higher Doses Over Longer Periods, and Mediation Effects of Intentions to Seek out Opioids (n = 856)

	Model 1			Model 2		
	Intentions to Seek Out Prescription Opioids			Intentions to Use Higher Dose Over Longer Periods		
Knowledge	0.074	0.054	0.171	-0.099	0.037	0.008*
Beliefs	-0.196	0.058	<0.001*	-0.129	0.040	0.001*
Attitudes	-0.017	0.070	0.810	-0.079	0.049	0.106
Injunctive Norms	-0.134	0.041	0.001*	0.009	0.028	0.744
Descriptive Norms	-0.038	0.051	0.454	0.046	0.036	0.201
Subjective Norms	-0.104	0.042	0.013*	0.023	0.029	0.437
Behavioral Control	-0.634	0.052	<0.001*	-0.186	0.036	<0.001*
Pain	0.053	0.063	0.401	-0.038	0.044	0.391
Provider Communication	-0.105	0.071	0.136	-0.573	0.049	<0.001*
Safety	0.023	0.046	0.620	-0.077	-0.032	0.017*
Autonomy	0.002	0.035	0.945	-0.130	0.024	<0.001*
Gender <sup>a</sup>						
Males	-0.100	0.231	0.665	0.369	0.161	0.022*
Other	1.002	1.607	0.533	1.721	1.117	0.124
Race <sup>b</sup>						
Asian	1.190	0.317	<0.001*	-0.183	0.220	0.407
Black/African American	0.047	0.291	0.872	0.156	0.202	0.439
American Indian/Alaska Native	0.570	0.837	0.496	-1.055	0.582	0.070
Pacific Islander	0.852	1.025	0.406	-1.053	0.712	0.140
Other	-0.244	0.578	0.673	0.073	0.402	0.856
Prefer not to answer	-0.458	0.473	0.333	0.272	0.329	0.408
Hispanic/Latino/Spanish	-0.198	0.303	0.514	0.319	0.210	0.129
Age	0.008	0.007	0.250	-0.006	0.005	0.262
Job arrangement <sup>c</sup>						
Part-time	-0.483	0.236	0.041*	0.129	0.164	0.432
Contract/freelance	0.912	0.483	0.059	-1.122	0.335	<0.001*
On-call	1.464	0.789	0.064	0.983	0.548	0.073
Temporary	0.843	0.932	0.366	-0.277	0.648	0.669
Student	0.494	0.489	0.312	0.329	0.340	0.332
Other	-0.472	0.858	0.582	0.113	0.596	0.850

Notes: Numbers presented are: slope, standard error, P value. Model 1  $R^2 = 0.568$ . Model 2  $R^2 = 0.501$ .  
 \*Significant P values.  
<sup>a</sup>Referent group was female.  
<sup>b</sup>Referent group was White.  
<sup>c</sup>Referent group was full-time employees.

Beliefs, behavioral control, and knowledge were the individual level predictors that had a significant negative effect on intentions to use higher doses over longer times. We also saw significant associations of patient-provider communication on intentions to use higher doses over longer times. Interestingly, patient-provider communication appeared to have the largest protective effect, while controlling for all other variables. This supports results from earlier research suggesting that patient-provider communication can reduce patient anxiety, overprescribing, or underutilization of prescribed opioids.<sup>29</sup>

Although we did not see any significant effects of workplace factors on intentions to seek out prescription opioids, workplace factors did have significant associations with intentions to use higher doses over longer periods. Feeling more support for safety and experiencing less pressure to return to work quickly may also have some protective effect against intentions to misuse opioids. These factors were measured as employees' perceptions of safety and autonomy at work, rather than direct observations of safety and autonomy in the workplace. Therefore, it may also be important to examine directly observed workplace safety measures in addition to workers' perceptions of workplace safety.

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However, initial results suggest that there may be a need to address workplace level factors to reduce risks of opioid misuse and that interventions could benefit from expanding to include multilevel intervention components. In addition, in alignment with NIOSH goals,<sup>14</sup> future research should consider exploring additional workplace-related factors that may influence intentions or behaviors of misuse with prescription opioids.

The measures included in this project expand the variables that should be considered when explaining why people intend to use opioids. It should be noted that the measurement of these variables assess preconsciously states. That is, before survey administration, most people do not consciously assess their intentions, knowledge, beliefs, attitudes, or levels of communication with their healthcare providers. However, they can readily respond to the prompts provided in these surveys, and their responses are entirely coherent.

The use of secondary data for this study presented limitations for the constructs we were able to include in our models. Model 2, with all predictors included in the model, explained only 53.5% of the variance in intentions to use prescription opioids. Furthermore, model 4 only explained 47.3% of the variance in intentions to misuse opioids. So, it is clear that this is not a comprehensive model due to the limitations of the secondary data used to examine intentions to use and misuse prescription opioids.

## CONCLUSIONS

This study, guided by the social ecological model<sup>12</sup> and NIOSH Total Worker Health goals,<sup>14</sup> examined the effects of individual level Theory of Planned Behavior constructs, interpersonal level patient-provider communication, and perceptions of organizational level workplace safety and workplace autonomy on intentions to use prescription opioids and intentions to misuse prescription opioids. Although no significant effects of patient-provider communication, workplace safety, or workplace autonomy were observed with intentions to use prescription opioids, these all had significant effects on intentions to misuse prescription opioids, while controlling for all other factors in the model. This suggests that preventing misuse requires different approaches than addressing or reducing the use of prescription opioids in the first place. A multilevel approach may be necessary, particularly when addressing intention to misuse prescription opioids among those working in industries with high risks of injury and opioid dispensing.

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