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Sense of control and likelihood of prescription drug misuse 10-years later among middle-aged and older adults

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ABSTRACT

Objectives: Sense of control (i.e. one's beliefs about their ability to influence life circumstances) has been linked to various psychological outcomes. However, it is unknown if sense of control is protective against prescription drug misuse (PDM). The present study sought to evaluate if sense of control is associated with reduced odds of PDM 9 to 10 years later among a sample of middle-aged and older adults.

Methods: Data were evaluated from participants ($M = 54$ years, $SD = 10.86$; $N = 2{,}108$) of the second and third waves of the *Midlife in the United States* study. Logistic regression models were used to assess whether baseline sense of control (Wave 2) predicted odds of PDM 9 to 10 years later (Wave 3).

Results: Findings revealed that greater sense of control at baseline was related to reduced odds of subsequent PDM ($OR = 0.78$; 95% CI: 0.64, 0.95), adjusting for baseline PDM, sociodemographic characteristics, health behaviors, psychological factors, number of prescription medications, and health. When assessing the subscales of sense of control separately, constraints (OR = 1.19; 95% CI: 1.00, 1.42), but not mastery (OR = 0.96; 95% CI: 0.80, 1.12), was predictive of odds of subsequent PDM. Further, being female was associated with greater odds of PDM (OR = 1.46; 95% CI: 1.02, 2.09), but did not moderate the association between sense of control and PDM.

Conclusions: Sense of control may be a novel and viable target for interventions (e.g. using mobile phone apps) aimed at mitigating prescription drug misuse.

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Prescription drug misuse; sense of control; perceived control; constraints; mastery

Introduction

Prescription drug misuse (PDM), defined as taking medications without a prescription or in a manner unintended by the prescriber (i.e. higher doses, for longer periods, or mixing medications) is associated with an increased likelihood of drug overdose and premature mortality (Jones & McAninch, 2015; Wysowski, 2007). Not surprisingly, PDM is a growing public health concern in the United States (Simoni-Wastila & Yang, 2006). In 2020, the prevalence of PDM among individuals aged 12 and older was 5.8% (NIDA, 2022). Although overall rates of PDM tend to decline after young adulthood (Schepis et al., 2020), the proportion of older adults making up substance use admissions doubled from 2000-2012, with an increasing proportion of these admissions being for prescription drugs (Chhatre et al., 2017). Further, PDM rates among older adults are also expected to increase due to the rapid aging of the population (Schepis & McCabe, 2016). Although PDM is a problem across the lifespan (Schepis et al., 2020), older adults compared to younger adults may be particularly vulnerable to the harmful effects of PDM due to higher rates of prescription medication use and age-related changes in drug disposition (e.g. slower drug metabolism and excretion), higher drug sensitivity, and a greater number of comorbid conditions (Bowie & Slattum, 2007; Dowling et al., 2008; Veehof et al., 2000). As such, there is a need for identifying potentially modifiable factors that may decrease the risk of PDM in adulthood.

Accumulating research suggests that some psychological factors are associated with a range of improved physical and mental health outcomes (e.g. reduced mortality risk; Cohen et al., 2016; Howell et al., 2007) and health behaviors, including reduced PDM (Cortis et al., 2017; Schwarzer & Renner, 2000). For example, one study found that middle-aged and older adults with the highest sense of life purpose compared to individuals in the lowest quartile were less likely to initiate combined PDM or illicit drug use 10 years later (Kim et al., 2020). Another psychological factor that may be associated with PDM is sense of control, which is also referred to as perceived control, control beliefs, learned helplessness, or locus of control (Lachman et al., 2011). Sense of control refers to expectancies surrounding one's influence over life circumstances and one's ability to achieve desired outcomes. Specifically, sense of control is comprised of perceptions about one's ability (i.e. mastery) and barriers (i.e. constraints) to achieving outcomes (Lachman & Agrigoroaei, 2010).

Numerous studies have reported that greater sense of control specific to substance use behaviors (e.g. ability to say 'no' when offered substances; perceptions of accessibility of substances) is associated with reduced likelihood of drug misuse, and 12-step recovery programs assert that individuals with substance use disorders lack control over their substance use (Nash, 2020). Yet, there is limited literature assessing the protective effects of a more general measure of sense of control (i.e. one's beliefs about their ability to influence life circumstances) against substance misuse. Notably, research

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consistently indicates that sense of control is an independent predictor of a wide range of psychological and physical health outcomes (Lachman et al., 2011). For instance, perceiving high levels of sense of control in circumstances of little actual control (i.e. illusory control) may protect one's well-being (Taylor & Brown, 1988). Further, sense of control is modifiable through interventions, including through the use of mobile phone apps, increasing predictability of one's environment, encouraging participation in decision-making, and directing attention to context and circumstances within one's control (Msetfi et al., 2016; Msetfi et al., 2018; Rodin, 1989; Tennstedt et al., 1998). Thus, sense of control may be a novel and promising target for prevention efforts to reduce the likelihood of PMD, particularly among middle-aged and older adults.

Theory of planned behavior

The Theory of Planned Behavior (TPB; Ajzen, 1991) may help to explain associations between general measures of sense of control and reduced likelihood of PDM. The TPB has been utilized to explain associations between sense of control and various health and behavioral outcomes (McEachan et al., 2011). This model posits that the primary determinant of engaging in a behavior is behavioral intention, which is determined by three components: 1) perceived behavioral control over the behavior, 2) subjective norms (i.e. perception of social pressure and normative beliefs), and 3) attitudes (i.e. favorable or unfavorable evaluations of the behavior) (Ajzen, 1991). In particular, perceived behavioral control is defined as one's perceptions of control over behavior when considering both internal (e.g. mastery) and external factors (e.g. barriers or constraints). For example, engaging in smoking behavior may be influenced by one's perceptions of both their ability to smoke and their access to cigarettes. Thus, perceived behavioral control plays an important role in shaping one's behavioral intention to engage in substance use (Armitage et al., 1999; Conner et al., 1999; Marcoux & Shope, 1997; Marks Woolfson & Maguire, 2010; Norman, 2011; Schlegel et al., 1992; Topa & Moriano, 2010).

Mastery and constraints

Sense of control is composed of two subscales: mastery and constraints. Mastery refers to confidence or self-efficacy in one's ability to carry out goals, while constraints refer to perceptions of barriers outside of one's control preventing them from reaching their goals (Lachman & Weaver, 1998b). Research indicates that mastery and constraints are differentially associated with health outcomes and behaviors (Infurna & Mayer, 2015). For instance, greater constraints compared to mastery is more strongly associated with longitudinal mental and physical health decline (e.g. greater negative affect and functional impairment; Infurna & Mayer, 2015). Another study found that both mastery and constraints are predictive of depressive symptoms and life satisfaction (Lachman & Weaver, 1998a). Thus, the subscales of sense of control may be differentially associated with risk of substance use behaviors. A review by Cooke and colleagues (2016) found that mastery specific to alcohol use is strongly associated with greater alcohol consumption, while constraints over consuming alcohol is not significantly associated with alcohol consumption (Cooke et al., 2016). Accordingly, there is need for not only assessing whether the composite measure of sense of control is associated with PDM but also whether each subscale of sense of control is associated with PDM.

Biological sex differences

Despite mixed findings, studies have documented biological sex and gender differences in levels of sense of control and rates of PDM. Thus, associations between sense of control and PDM may also vary by biological sex. For example, women report lower levels of sense of control, particularly levels of mastery, than men (Cassidy, 1997; Cassidy & Davies, 2003; Specht et al., 2013). When considering rates of PDM, some studies have documented higher rates of PDM among women (Finlayson & Davis, 1994; Simoni-Wastila & Strickler, 2004), which may be explained by women taking more medications than men, including abusable medications (Fernández-Liz et al., 2008; Roe et al., 2002; Simoni-Wastila, 2000). In contrast, several recent studies have documented higher rates of PDM among men (e.g. Back et al., 2010; Han et al., 2019; Silver & Hur, 2020) or no sex differences in rates of PDM (e.g. McHugh et al., 2021). Despite these biological sex and gender differences in sense of control and PDM, no research to our knowledge has examined whether the associations between sense of control and subsequent PDM vary by biological sex.

Current study

The current study examines the association between baseline sense of control and the risk of PDM 9 to 10 years later among a sample of middle-aged and older adults. We also examine whether the two subscales of sense of control at baseline (mastery and constraints) are differentially associated with the risk of subsequent PDM. Further, we evaluate potential biological sex differences in the association between sense of control and PDM. The specific research hypotheses are as follows: (1) Baseline sense of control will be associated with lower risk of PDM 9 to 10 years later among middle-aged and older adults; (2) Higher levels of mastery and lower levels of constraints will be associated with reduced likelihood of subsequent PDM; and, (3) Biological sex will moderate the association between baseline sense of control and subsequent PDM, such that females will report lower levels of sense of control, a higher likelihood of PDM, and a stronger association between sense of control and odds of PDM.

Methods

Sample

Participants were from the second and third waves of the survey of Midlife Development in the United States (MIDUS), which is a national study of non-institutionalized middle-aged adults with telephone access. Data for MIDUS II was collected between 2004-2006 ($N = 4,963$; age range: 28-84), and data for MIDUS III was collected 9 to 10 years later between 2013-2014 ($N = 3,294$; age range: 39-93). In both waves, participants completed a 45-minute phone survey interview and a mail-in self-administered questionnaire. Participant compensation at each wave included pre-incentives ($10 in MIDUS II, $12 in MIDUS III), $25 for completing the phone survey, and $25 for completing the self-administered questionnaire. Participants with complete data on all relevant measures from both the phone survey

interview and the self-administered questionnaire at both MIDUS II and III were included in the final analyses ($N = 2,108$).

Measures

Sense of control

Sense of control was assessed in MIDUS II using the MIDUS sense of control scale (Lachman & Weaver, 1998b), which is composed of two subscales (personal mastery and perceived constraints). Using a 7-point Likert scale ranging from 1 (*Strongly agree) to* 7 (*Strongly disagree*), participants rated how much they agreed with four items assessing mastery (e.g. 'I can do just about anything I really set my mind to') and eight items assessing constraints (e.g. 'There is little I can do to change the important things in my life'). The continuous composite sense of control scale was formed by reverse-coding the mastery items and taking the mean of the 12 items of the two subscales ($\alpha = 0.87$), such that higher scores reflected greater endorsement of sense of control. To create the individual subscales, the mastery and constraints items were recoded so that higher scores reflected greater endorsement of mastery ($\alpha = 0.74$) and constraints ($\alpha = 0.85$). There was a moderate correlation between mastery and constraints ($r = -0.52$). All analyses used mean-centered composite sense of control, mastery, and constraints variables. To ease the interpretability of the findings, we also created a quartile measure of the composite sense of control scale with the reference group being the highest quartile of sense of control (*Q*1: 1-5, *Q*2: 5.01-5.75, *Q*3: 5.76-6.33, *Q*4: 6.34-7).

Prescription drug misuse

PDM was measured in both MIDUS II and III with questions developed by the Substance Abuse and Mental Health Services Administration for use in the National Survey on Drug Use and Health (NSDUH, 1994). Participants responded (yes/no) to whether they used any of the following prescription substances (i.e. sedatives, tranquilizers, stimulants, painkillers, and depressive medications) in the past 12 months without a doctor's prescription, in larger amounts than prescribed, or for a longer period than prescribed. Participants who endorsed misusing any of the five prescription drug categories were coded as engaging in PDM (1 = yes, 0 = no). 10% of participants ($n = 211$) at MIDUS III endorsed any PDM in the past 12 months.

Covariates

Consistent with existing literature on sense of control and PDM, study covariates included: sociodemographic indicators, physical health factors, current cigarette use, alcohol-related problems (i.e. negative physical, psychological, and social consequences of alcohol use), previous PDM, and psychological health factors. All covariates were assessed via self-report in MIDUS II. Sociodemographic characteristics included: 1) age (continuous, mean-centered); 2) self-reported race (1 = white, 0 = non-white); 3) biological sex (1 = female, 0 = male); 4) marital status (1 = married/cohabitating; 0 = single, divorced, widowed); 5) income (quartiles: $0-$3,999; $4,000-$29,999; $30,000-$59,999; $60,000-$200,000+); 6) health insurance (1 = yes, 0 = no); 7) employment status (1 = employed, 0 = unemployed), and 8) education (1 = no school/grade school to 12 = doctoral degree) that was dichotomized (1 = college degree, 0 = less than a college degree). Physical health factors included: 1) past 12-month hospital stay (1 = yes, 0 = no); 2) number of prescription medications (range: 0-12); 3) chronic pain (1 = yes, 0 = no); and 4) number of chronic conditions (range: 0-19). Past 12-month alcohol-related problems (1 = at least one alcohol-related problem endorsed, 0 = no alcohol-related problems endorsed) were measured using six items from the Alcohol Dependence scale of the Composite International Diagnostic Interview Short Form (CIDI-SF; Kessler et al., 1998). Cigarette use was measured using a single dichotomous item asking, 'Do you smoke cigarettes regularly now?' (1 = yes, 0 = no). Previous PDM was assessed with the same items asked in MIDUS III (1 = yes, 0 = no). Psychological health factors included: 1) life purpose [7-item purpose in life subscale from the Ryff Psychological Well-being scale (range: 10-49; mean-centered) (Ryff & Keyes, 1995)]; 2) neuroticism (range: 1-4; mean-centered); and 3) depression (1 = yes, 0 = no), which was measured using the CIDI-SF (Kessler et al., 1998).

Analytic strategy

All statistical analyses were conducted using R version 3.6.1. Descriptive statistics were computed followed by bivariate analyses (i.e. chi-squared tests, two sample t-tests) of the study variables. The remainder of the analyses were conducted using logistic regression analysis to assess the likelihood of PDM 9 to 10 years later. First, we assessed if sense of control at baseline predicted reduced odds of subsequent PDM 9 to 10 years later after adjusting for all covariates. For ease of interpretability, we also ran the model with the quartiles of the sense of control variable. We then evaluated if subscales of sense of control (mastery and constraints) were differentially associated with odds of subsequent PDM. Next, we tested whether biological sex moderated the association between the continuous sense of control variable and odds of subsequent PDM. Finally, we assessed whether the findings of the first three research questions were consistent when the sample was separated into those who engaged in baseline PDM versus those who did not engage in PDM at baseline.

Results

Demographics and descriptive statistics

Demographic characteristics by PDM status are summarized in Table 1. Participants were on average 54 years ($SD = 10.86$ years; range: 30-84), 94% white, 56% female, and 46% college educated. PDM was endorsed by 10% of participants at baseline ($n = 211$). Individuals who reported PDM in MIDUS III, compared to those who did not, reported lower levels of sense of control ($t(251.6) = 6.11$; $p < .001$), greater neuroticism ($t(255.7) = -6.57$; $p < .001$), lower purpose in life ($t(253.4) = 4.65$; $p < .001$), greater number of prescription medications ($t(243.5) = -5.53$; $p < .001$), and a greater number of chronic conditions ($t(237.5) = -5.02$; $p < .001$). In addition, individuals who reported PDM at MIDUS III were more likely to be female ($X2(1) = 13.12$; $p < .001$), have lower income ($X2(3) = 10.63$; $p = .014$), report previous PDM ($X2(1) = 127.25$; $p < .001$), have chronic pain ($X2(1) = 11.71$; $p < .001$), have depression ($X2(1) = 30.06$; $p < .001$), report current cigarette use ($X2(1) = 9.45$; $p = .002$), and report alcohol-related problems ($X2(1) = 14.28$; $p < .001$). Participants who engaged in PDM at MIDUS III were also less likely to be college-educated ($X2(1) = 14.32$; $p < .001$) or to have health insurance ($X2(1) = 9.42$; $p = .002$). There were no differences in age ($p = .36$), race ($p = .77$), employment status ($p = .17$), past year hospital stays ($p =$

Table 1. Participant characteristics by PDM status 9–10 years later.

Variables	No PDM ($n = 1,897$) *M* (*SD*) or *n* (%)	Yes PDM ($n = 211$) *M* (*SD*) or *n* (%)
Age, *M* (*SD*)	54.01 (10.9)	53.3 (10.76)
Female, *n* (%)	1033 (54)	143 (68)
College educated, *n* (%)	903 (48)	71 (34)
White race, *n* (%)	1777 (94)	196 (93)
Married or cohabitating, *n* (%)	1471 (78)	159 (75)
Health insurance, *n* (%)	1795 (91)	188 (89)
Employed, *n* (%)	1141 (60)	116 (55)
Income, *n* (%)		
Quartile 1	467 (25)	60 (28)
Quartile 2	460 (24)	67 (32)
Quartile 3	488 (26)	39 (18)
Quartile 4	482 (25)	45 (21)
Number of chronic conditions, *M* (*SD*)	2.17 (2.17)	3.19 (2.87)
Number of prescription meds, *M* (*SD*)	1.34 (1.53)	2.07 (1.83)
Hospital stay, *n* (%)	200 (11)	28 (13)
Chronic pain, *n* (%)	634 (33)	96 (45)
Depression, *n* (%)	165 (9)	44 (21)
Alcohol-related problems, *n* (%)	384 (20)	67 (32)
Cigarette use, *n* (%)	245 (13)	44 (21)
Neuroticism, *M* (*SD*)	2.02 (0.62)	2.32 (0.64)
Purpose in life, *M* (*SD*)	39.48 (6.6)	37.14 (6.99)
Baseline PDM, *n* (%)	122 (6)	63 (30)
Sense of control, *M* (*SD*)	5.67 (0.95)	5.22 (1.03)
Mastery, *M* (*SD*)	5.79 (1)	5.56 (1.04)
Constraints, *M* (*SD*)	2.40 (1.1)	2.95 (1.2)

.27), nor marriage status ($p = .53$) between those who endorsed PDM versus those who did not.

Sense of control and subsequent prescription drug misuse

When examining the associations between sense of control and subsequent PDM (Table 2), significant covariates included being female (*OR* = 1.46; 95% *CI*: 1.03, 2.09), college education (*OR* = 0.66; 95% *CI*: 0.47, 0.93), number of prescription medications (*OR* = 1.14; 95% *CI*: 1.03, 1.26), baseline PDM (*OR* = 4.52; 95% *CI*: 3.07, 6.60), alcohol-related problems (*OR* = 2.18; 95% *CI*: 1.52, 3.12), and neuroticism (*OR* = 1.35; 95% *CI*: 1.03, 1.77). Covariates remained consistent in the model with the quartiles of sense of control (Supplementary Table 1). For the continuous, mean-centered measure of sense of control, every unit increase in sense of control was associated with 22% reduced odds of PDM 9 to 10 years later (*OR* = 0.78; 95% *CI*: 0.64, 0.95). Compared to the highest quartile of sense of control, individuals in the lowest quartile of sense of control had 2.10 times greater odds of PDM (*OR* = 2.10; 95% *CI*: 1.21, 3.70).

Sense of control subscales and subsequent prescription drug misuse

We examined associations between the two sense of control subscales (i.e. mastery and constraints) and subsequent PDM (Table 3). Significant covariates included being female (*OR* = 1.96; 95% *CI:* 1.02, 2.09), college education (*OR* = 0.67; 95% *CI:* 0.47, 0.93), number of prescription medications (*OR* = *1.14; 95% CI:* 1.03, 1.26), baseline PDM (*OR* = 4.50; 95% *CI:* 3.06, 6.58), alcohol-related problems (*OR* = 2.17; 95% *CI:* 1.51, 3.10), and neuroticism (*OR* = 1.35; 95% *CI:* 1.03, 1.76). Constraints, but not mastery, was significantly predictive of longitudinal odds of PDM ($p = .019$). Every unit increase in constraints above the average was associated with 19% greater odds of PDM (*OR* = 1.19; 95% *CI*: 1.00, 1.42); however, mastery was not significantly predictive of odds of PDM (*OR* = 0.96; 95% *CI*: 0.80, 1.12).

Sense of control and subsequent prescription drug misuse by biological sex

We also examined whether the association between sense of control and subsequent PDM varied by biological sex. There was a significant main effect of biological sex predicting the odds of subsequent PDM, with females demonstrating greater odds ($p = .037$). However, biological sex did not significantly moderate the associations between sense of control ($p = .89$), mastery ($p = .42$), or constraints ($p = .77$) and subsequent PDM. Despite these findings, a two-sample t-test revealed a significant difference in the endorsement of sense of control by biological sex ($t(2091.3) = 4.64$, $p < .001$), with females endorsing a lower average level of sense of control (*M* = 5.54, *SD* = 1.02) than males (*M* = 5.73, *SD* = 0.88). There were also significant differences in the endorsement of mastery ($t(2089.4) = 2.62$, $p = .009$) and constraints ($t(2102.1.4) = -5.18$, $p < .001$), with females reporting a lower average level of mastery (*M* = 5.72, *SD* = 1.06) and a higher average level of constraints (*M* = 2.57, *SD* = 1.06) compared to males (*M* = 5.83, *SD* = 0.92; *M* = 2.32, *SD* = 0.92, respectably).

Secondary analyses

We conducted secondary analyses in which we re-ran the original analyses of the first three research questions separately for those who did not endorse baseline PDM versus those who did endorse baseline PDM (Table 4). First, the continuous measure of sense of control was significantly predictive of odds of PDM among participants without baseline PDM (*OR* = 0.75; 95% *CI*: 0.60, 0.93). When looking at the sense of control subscales, constraints, but not mastery, was significantly associated with odds of PDM among those without baseline PDM (*OR* = 1.24; 95% *CI*: 1.02, 1.51). Finally, biological sex did not significantly moderate the relationships between PDM and sense of control ($p = .87$), constraints ($p = .54$), or mastery ($p = .54$).

Among those who did report baseline PDM, the continuous measure of sense of control was not significantly predictive of PDM (*OR* = 0.82; 95% *CI*: 0.53, 1.27). Further, neither mastery ($p = .81$) nor constraints ($p = .54$) was predictive of PDM among those who did report baseline PDM. Finally, biological sex did not significantly moderate the relationships between PDM and sense of control ($p = .081$), constraints ($p = .15$), or mastery ($p = .077$).

Discussion

In a national community-based sample of middle-aged and older adults, there was a longitudinal association between greater baseline sense of control and reduced odds of PDM 9 to 10 years later. This association was maintained even after controlling for a wide range of sociodemographic, health, and health behavior covariates and baseline PDM status. Furthermore, when evaluating the independent effects of the subscales of sense of control, reduced constraints, but not greater mastery, was significantly associated with reduced odds of subsequent PDM. This suggests that constraints may be the

Table 2. Logistic regression analysis of the association between sense of control and prescription drug misuse.

	Continuous sense of control			
Variable	*B*	*SE*	Odds ratio (95% *CI*)	*p*-value
Age	0.003	0.01	1.00 (0.99, 1.02)	0.74
Female	0.38	0.18	1.46 (1.02, 2.09)	0.037
College educated	−0.41	0.17	0.66 (0.47, 0.93)	0.018
Married or cohabitating	0.21	0.19	1.23 (0.86, 1.80)	0.27
White	0.16	0.32	1.17 (0.65, 2.26)	0.61
Employed	0.08	0.21	1.09 (0.73, 1.64)	0.68
Insured	−0.26	0.29	0.77 (0.44, 1.39)	0.37
Income[a]				
Quartile 2	0.11	0.24	1.11 (0.69, 1.79)	0.67
Quartile 3	−0.44	0.29	0.65 (0.36, 1.14)	0.14
Quartile 4	0.10	0.29	1.10 (0.62, 1.95)	0.73
Chronic conditions	0.01	0.04	1.01 (0.94, 1.08)	0.81
Prescription meds	0.13	0.05	1.14 (1.03, 1.26)	0.008
Hospital stay	−0.03	0.17	0.97 (0.68, 1.34)	0.87
Chronic pain	0.06	0.17	1.06 (0.76, 1.48)	0.72
Depression	0.14	0.23	1.15 (0.73, 1.80)	0.54
Baseline PDM	1.51	0.19	4.52 (3.07, 6.60)	<0.001
Alcohol-related problems	0.78	0.18	2.18 (1.52, 3.12)	<0.001
Cigarette use	0.11	0.22	1.11 (0.72, 1.68)	0.62
Neuroticism	0.30	0.14	1.35 (1.03, 1.77)	0.029
Purpose in life	0.01	0.01	1.01 (0.98, 1.04)	0.61
Continuous sense of control	−0.28	0.10	0.76 (0.62, 0.92)	0.005

[a]Lowest income quartile (Quartile 1) used as the reference category.

Table 3. Logistic regression analysis of associations between sense of control subscales and prescription drug misuse.

	Sense of control subscales			
Variable	*B*	*SE*	Odds ratio (95% *CI*)	*p*-value
Age	0.003	0.01	1.00 (0.99, 1.02)	0.72
Female	0.38	0.18	1.46 (1.02, 2.09)	0.039
College educated	−0.41	0.17	0.67 (0.47, 0.93)	0.019
Married or cohabitating	0.22	0.19	1.24 (0.86, 1.82)	0.25
White	0.17	0.32	1.19 (0.66, 2.30)	0.58
Employed	0.09	0.21	1.09 (0.73, 1.64)	0.68
Insured	−0.26	0.29	0.77 (0.44, 1.40)	0.38
Income[a]				
Quartile 2	0.11	0.24	1.12 (0.69, 1.80)	0.66
Quartile 3	−0.43	0.29	0.65 (0.36, 1.15)	0.14
Quartile 4	0.10	0.29	1.11 (0.62, 1.95)	0.73
Chronic conditions	0.008	0.04	1.01 (0.94, 1.08)	0.83
Prescription meds	0.13	0.05	1.14 (1.03, 1.26)	0.007
Hospital stay	−0.04	0.17	0.96 (0.67, 1.32)	0.80
Chronic pain	0.06	0.17	1.07 (0.76, 1.48)	0.71
Depression	0.15	0.23	1.16 (0.73, 1.80)	0.53
Baseline PDM	1.50	0.19	4.50 (3.06, 6.58)	<0.001
Alcohol-related problems	0.78	0.18	2.17 (1.51, 3.10)	<0.001
Cigarette use	0.10	0.22	1.10 (0.72, 1.67)	0.64
Neuroticism	0.30	0.14	1.35 (1.03, 1.76)	0.031
Purpose in life	0.007	0.01	1.01 (0.98, 1.04)	0.65
Mastery	−0.05	0.09	0.95 (1.80, 1.13)	0.57
Constraints	0.21	0.09	1.23 (1.03, 1.47)	0.019

[a]Lowest income quartile (Quartile 1) used as the reference category.

predominant driver of this association between sense of control and subsequent PDM and should thus be a primary target of prevention efforts. Finally, despite biological sex differences in sense of control and the endorsement of PDM, biological sex did not moderate the association between sense of control and subsequent PDM.

Sense of control was associated with reduced odds of PDM. Endorsing high levels of sense of control in circumstances in which individuals have little actual control (i.e. illusory control) may serve to protect wellbeing by acting as a protective bias (Taylor & Brown, 1988). Several studies have thus identified connections between higher ratings of sense of control and better psychological health outcomes. For instance, Msetfi and colleagues (2018) identified that participants without depression overestimated their sense of control compared to participants with mild depression (Msetfi et al., 2018). As such, the influence of sense of control on PDM may be mediated through other psychological health indicators (e.g. well-being, depression). Sense of control may also relate to PDM through stress and coping pathways, as adulthood often accompanies numerous stressful life events (e.g. personal illnesses, deaths of friends and family members; Hardy et al., 2002). Maladaptive coping becomes more common in older adulthood (Diehl et al., 2014), and substances are often used to cope with stress (e.g. Mauro et al., 2015). Accordingly, it may be that adults with higher levels of sense of control may be able to cope with these stressors more adaptively, such as through positive health behaviors (e.g. physical activity; Infurna & Mayer, 2015). Finally, it is unknown whether these global measures of sense of control are linked with sense of control specific to substance use behaviors. If so, sense of control may act through changing intentions surrounding PDM, as described in the Theory of Planned Behavior (Ajzen, 1991). Future studies should thus further examine these possible mechanisms through which sense of control may relate to the likelihood of PDM.

Perceptions of constraints, but not mastery, was predictive of odds of subsequent PDM. Based on this finding, it appears that one's beliefs in external barriers in life is more related to the risk of PDM than one's beliefs about their ability to achieve desired outcomes. This is in accordance with previous studies that have documented stronger effects of constraints than mastery on mental and physical health outcomes (Infurna & Mayer, 2015). Mastery and constraints were only moderately correlated, which indicates that while mastery and constraints are related to one another, they capture different aspects of sense of control. It may be that perceiving greater constraints in one's life is an indicator of a helpless orientation when faced with difficulties or challenges, which may translate into engaging in fewer health-promoting behaviors and more health-risk behaviors (Lachman & Weaver, 1998a). Based on study findings, interventions targeting PDM among middle-aged and older adults may be more effective if they specifically focus on reducing perceptions of constraints or barriers instead of on improving levels of mastery.

There were three main biological sex findings. First, females reported lower average levels of sense of control, higher levels of constraints, and lower levels of mastery compared to males, which is consistent with existing literature on sex and gender differences in sense of control (Cassidy, 1997; Cassidy & Davies, 2003; Specht et al., 2013). Females also demonstrated greater odds of PDM compared to males, which is in accordance with most, but not all, of the literature on sex and gender differences in PDM (e.g. Simoni-Wastila & Strickler, 2004). Finally, the association between sense of control and subsequent PDM did not vary by biological sex. Based on this finding, although females demonstrate higher rates of PDM and lower levels of sense of control than males, we did not find evidence that the protective effects of sense of control and PDM differ by biological sex. For this reason, the promotion of sense of control in PDM prevention efforts may be beneficial for both males and females.

Limitations and future directions

The study had numerous strengths. Data were from a large national sample of middle-aged and older adults and spanned

Table 4. Logistic regression analysis of associations between sense of control and prescription drug misuse by baseline prescription drug misuse status.

	No baseline prescription drug misuse ($n = 1,923$)				Yes baseline prescription drug misuse ($n = 185$)			
Variable	*B*	*SE*	Odds ratio (95% *CI*)	*p*-value	*B*	*SE*	Odds ratio (95% *CI*)	*p*-value
Age	−0.002	0.01	1.00 (0.98, 1.01)	0.88	0.03	0.02	1.03 (0.99, 1.07)	0.16
Female	0.53	0.21	1.70 (1.14, 2.56)	0.010	−0.38	0.44	0.69 (0.28, 3.52)	0.40
College educated	−0.35	0.20	0.71 (0.48, 1.04)	0.078	−0.70	0.40	0.50 (0.22, 1.08)	0.082
Married or cohabitating	0.18	0.22	1.19 (0.78, 1.86)	0.43	0.37	0.41	1.45 (0.66, 3.27)	0.36
White	0.74	0.45	2.09 (0.93, 5.66)	0.10	−0.89	0.58	0.41 (0.13, 1.29)	0.13
Employed	0.21	0.25	1.23 (0.76, 2.02)	0.40	−0.17	0.43	0.85 (0.37, 1.96)	0.70
Insured	−0.37	0.35	0.69 (0.36, 1.41)	0.29	−0.05	0.59	0.95 (0.30, 3.11)	0.94
Income[a]								
Quartile 2	−0.02	0.29	0.98 (0.55, 1.74)	0.95	0.05	0.51	1.05 (0.38, 2.90)	0.92
Quartile 3	−0.52	0.34	0.60 (0.30, 1.16)	0.13	−0.80	0.63	0.45 (0.13, 1.52)	0.20
Quartile 4	0.05	0.33	1.05 (0.54, 2.02)	0.88	−0.29	0.67	0.75 (0.20, 2.81)	0.67
Chronic conditions	0.005	0.05	1.01 (0.92, 1.10)	0.91	0.07	0.07	1.07 (0.93, 1.24)	0.37
Prescription meds	0.18	0.06	1.20 (1.07, 1.33)	0.001	−0.14	0.13	0.87 (0.67, 1.10)	0.26
Hospital stay	0.08	0.19	1.08 (0.72, 1.55)	0.68	−0.08	0.36	0.92 (0.43, 1.82)	0.81
Chronic pain	0.13	0.19	1.14 (0.78, 1.65)	0.50	−0.26	0.40	0.77 (0.35, 1.69)	0.52
Depression	0.21	0.27	1.23 (0.71, 2.07)	0.45	0.05	0.45	1.06 (0.43, 2.53)	0.90
Alcohol-related problems	0.91	0.21	2.49 (1.65, 3.75)	<0.001	0.36	0.40	1.43 (0.65, 3.12)	0.37
Cigarette use	−0.18	0.27	0.84 (0.48, 1.39)	0.51	0.83	0.43	2.29 (0.98, 5.40)	0.055
Neuroticism	0.35	0.16	1.41 (1.03, 1.93)	0.030	0.19	0.29	1.22 (0.69, 2.15)	0.50
Purpose in life	−0.00	0.02	1.00 (0.97, 1.03)	0.97	0.04	0.03	1.04 (0.98, 1.11)	0.19
Continuous sense of control	−0.29	0.11	0.75 (0.60, 0.93)	0.01	−0.20	0.22	0.82 (0.53, 1.27)	0.37
Sense of control Subscalesb								
Mastery	−0.05	0.10	0.95 (0.79, 1.16)	0.63	−0.05	0.21	0.95 (0.63, 1.44)	0.81
Constraints	0.22	0.10	1.24 (1.02, 1.51)	0.030	0.13	0.22	1.14 (0.74, 1.76)	0.54

[a]Lowest income quartile (Quartile 1) used as the reference category.
[b]Sense of control subscales coefficients calculated in separate model.

across a 9 to 10-year period. We were able to control for a wide range of factors that may have confounded the study findings, including the participants' PDM at baseline. Another strength was the secondary analysis examining the associations between sense of control and PDM by baseline PDM status. These results revealed that the association between sense of control and subsequent PDM is only significant among those who did not have PDM at baseline; therefore, sense of control may be a particularly ideal target for prevention efforts. However, there were also several study limitations. Although we were able to control for a wide range of health, sociodemographic, and behavioral covariates, including baseline PDM, there may be other variables that were unaccounted for in the analyses. It is also important to note that all study variables were assessed via self-report measures, which are subject to social desirability and recall biases and the underreporting of PDM behavior (Althubaiti, 2016). Further, because of the racial homogeny of the MIDUS sample (94% white), these study findings may not be generalizable to more racially and ethnically diverse samples. Future studies of more representative samples should thus examine potential mechanisms and assess if the associations are invariant across other sociodemographic characteristics that may influence sense of control and risk of PDM (e.g. age, education).

Conclusion

Results of this study identified a longitudinal association between greater baseline sense of control and reduced odds of PDM 9 to 10 years later among a sample of middle-aged and older adults. Several studies suggest that sense of control is modifiable through interventions (Msetfi et al., 2016; Msetfi et al., 2018; Tennstedt et al., 1998). Together, these findings suggest that improvements in sense of control, and specifically in reducing constraints, may be one promising target for interventions targeting the prevention of PDM among middle-aged and older adults. Furthermore, because sense of control is associated with a range of other health outcomes (e.g. well-being and mortality; Hong et al., 2021), interventions targeting sense of control may have positive diffusion effects on various additional health and behavioral outcomes.

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The authors report there are no competing interests to declare.

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