CHANGES IN PAIN INTENSITY OVER TIME IN A NATIONAL COHORT OF OLDER VETERANS: Exploring associations of pain scores with prescription opioids

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CIVIC
Center to Improve Veteran Involvement in Care

Disclosure: Steven K. Dobscha MD, FAPM

With respect to the following presentation, there has been no relevant (direct or indirect) financial relationship between the party listed above (and/or spouse/partner) and any for-profit company in the past 24 months which could be considered a conflict of interest.

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Perhaps a more useful disclosure

- This is very much a work in progress…

Today's objectives

- Background
  - Pain in older adults
  - Measurement of pain in VA
- Overview of methods
- Three sets of findings to date
  - Variability in pain scores
  - Predictors of improvements in pain scores over time
  - Examining subgroup of Veterans who initiate prescription opioids
- Next steps

Poll Question 1

- What is your primary role in VA?
  - Student, trainee, or fellow
  - Clinician
  - Researcher
  - Manager or policy-maker
  - Other

Background—pain in older adults

- Approximately 31% of U.S. adults have chronic pain. (Johannes et al., 2010)
- Up to half of Veterans treated in VA care settings have chronic pain. (Cifu et al., 2013; Haskell et al., 2009)
- Older adults are at especially high risk for pain problems. (Patel et al., 2013)
- In older adults, in general, less is known about:
  - The course of pain over time (Reid et al., 2011)
  - Effective pain therapies (Gibson & Lussier, 2012)
  - Factors associated with positive and negative outcomes (Reid et al., 2015)

Older adults and opioids

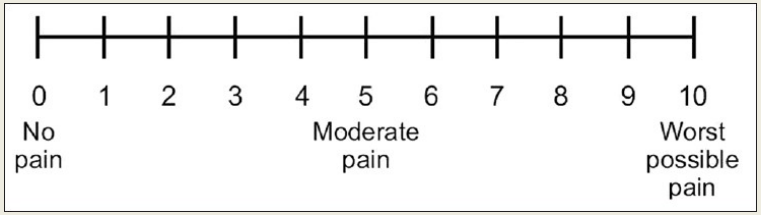
- Little is known about the effectiveness of longer term opioid use. (Deyo et al., 2015)

- Rates of opioid prescribing for older adults has increased in recent years (Thielke et al., 2010)

- Older adults are at greater risk for adverse effects of opioids:
  - Falls (Buckeridge et al., 2010)
  - Cognitive problems (McLachlan et al., 2011)
  - Polypharmacy (Smith & Bruckenthal, 2010)
  - Mortality (West et al., 2015)

Background—measuring pain in VA

- VA's Pain as 5th Vital sign Initiative began in 1998.
- As one part of the initiative, 11-point Numeric Rating Scale (NRS) is administered at almost all outpatient encounters (Jensen 1986)



- Relatively little literature describing use and impact of pain intensity scores in clinical practice
- NRS data are available from Vital Signs Domain in VA's Corporate Data Warehouse. These data have become available to researchers through the VA Informatics and Computing Infrastructure (VINCI)

Prescription opioid use and changes in pain intensity in older Veterans

- NIA: R03-AG042756
- Investigators and Collaborators:
  - Steven K. Dobscha MD
  - Benjamin J. Morasco PhD
  - Anne E. Kovas MPH
  - Dawn M. Peters PhD
  - Kyle Hart MS
  - Bentson H. McFarland MD, PhD
  - J. Luke Williams, MPH
  - Travis Lovejoy PhD

Main Project Aims

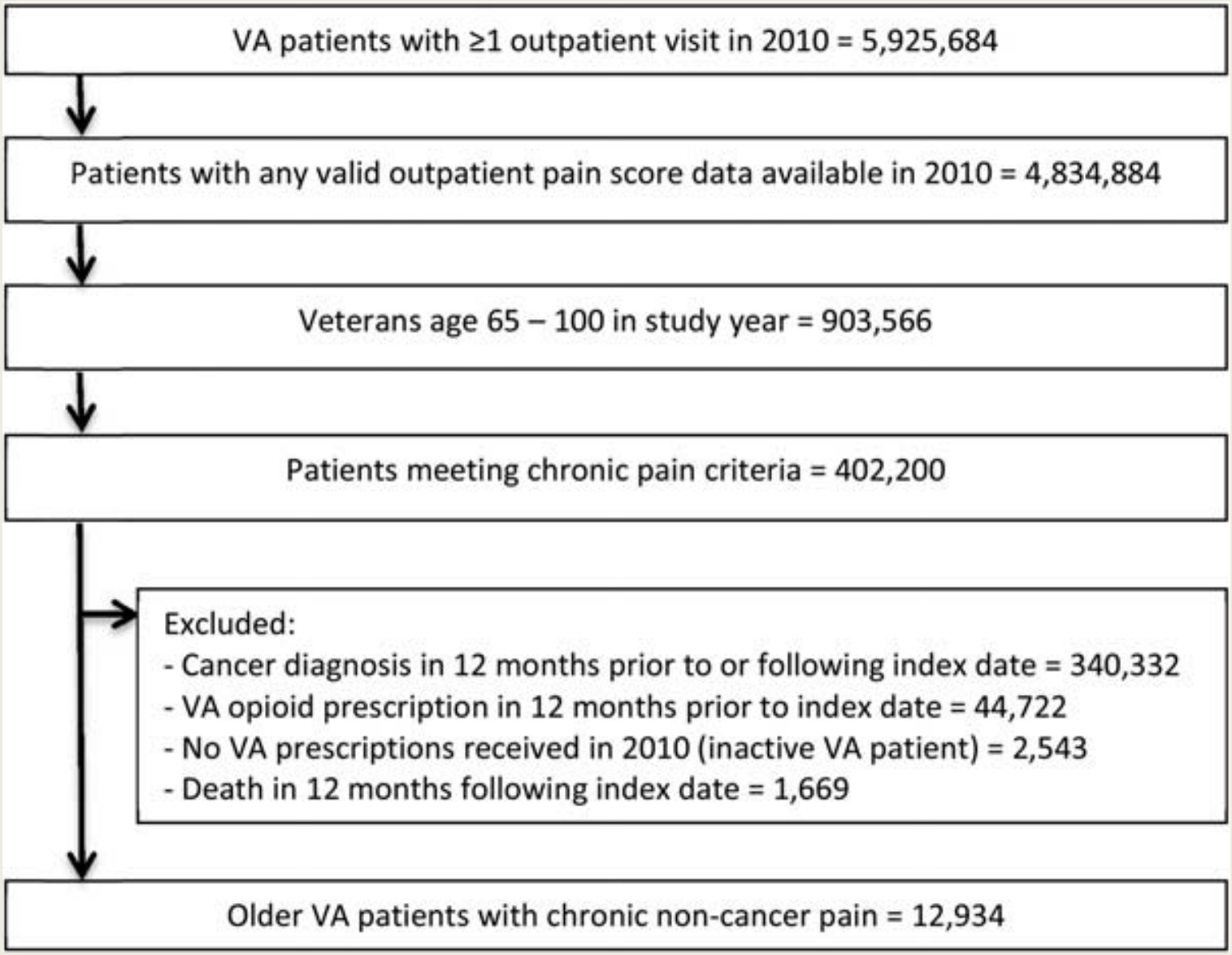
- In a cohort of Veterans 65 years and older treated in the VA who have moderate or greater levels of baseline pain intensity, and who have not been prescribed opioids in the prior 12 months, identify factors associated with changes in NRS scores over time.

- In the subgroup of Veterans who initiate prescription opioids during the study period, identify to what extent opioids (and other factors) are associated with improvements in NRS scores.

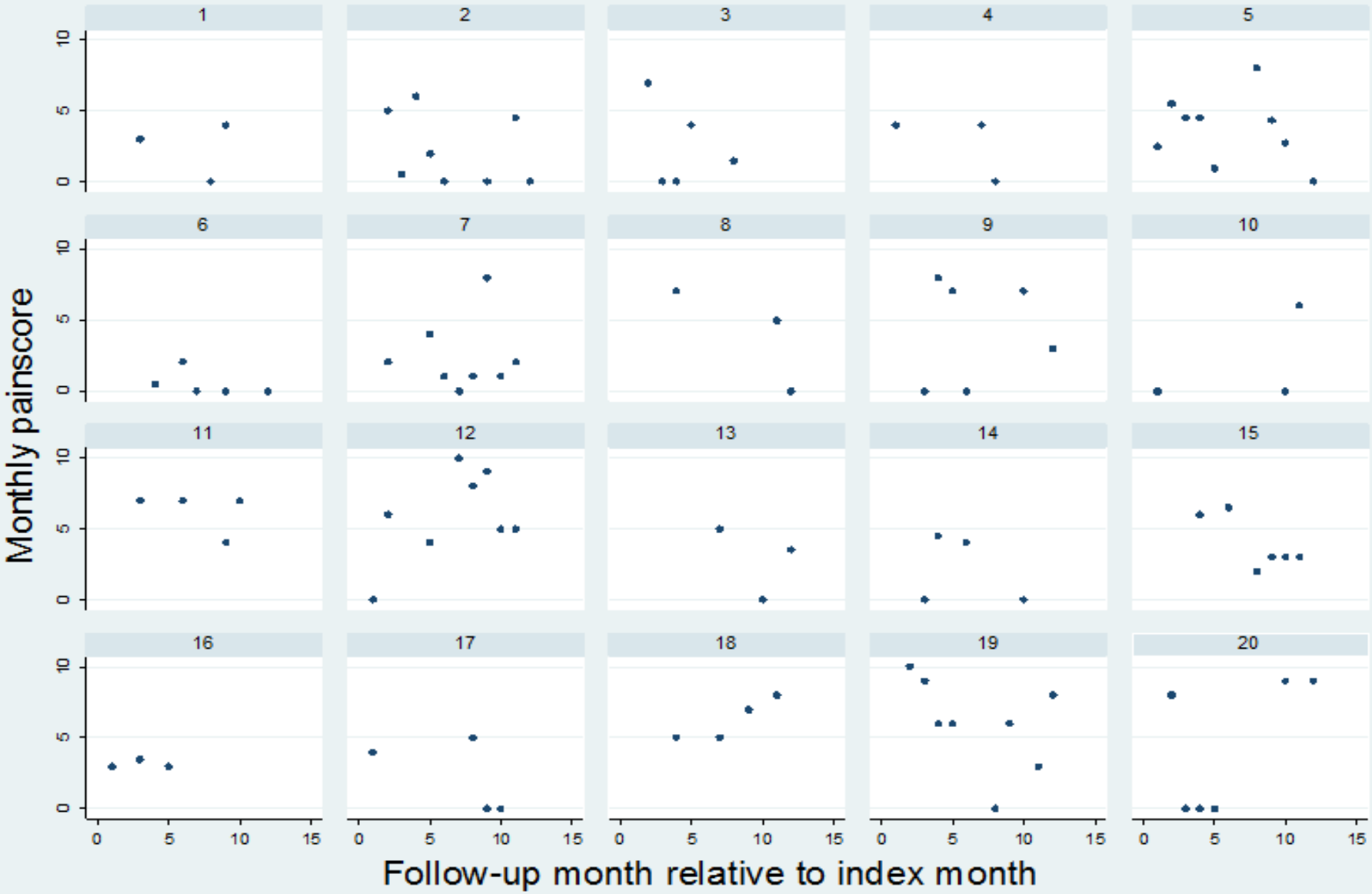
Overview of Approach

- Sample: National cohort of Veterans ≥65 with indicators of chronic pain
- Inclusion criteria:
  - NRS obtained in outpatient care in at least 3 different months in 2010
  - At least 3 average monthly pain scores of 4 or more (qualifying scores)
  - At least one ICD-9-CM pain diagnosis in the 12 months prior to last qualifying pain score—index date (Tian 2013)
- Exclusion criteria:
  - VA opioid prescription in 12 months prior to index date
  - Patients in opioid substitution program and patients with cancer diagnoses in 12 months prior to index date
  - Patients who died in the 12 months after the index date

Defining the sample



Individual trajectories of pain intensity scores



Short-term variability in pain scores

- Main Objective: Describe variability in NRS scores within a one-month timeframe
- Secondary Objective: Explore patient characteristics associated with within-month NRS score variability
- Clinical relevance:
  - Guidelines recommend monitoring treatment response
  - It is unknown how NRS scores may vary over time.
    - If variability is small, singe scores might be helpful;
    - If variability is large, single scores have less utility
  - In practice, clinicians may have only one recent score available
  - We typically don't have other regularly obtained measures to work with

Short term variability approach/analysis

- Focus on subgroup with indicators of chronic pain who had ≥2 NRS scores in each of 2 or more months over 12 months
- Short-term variability measured by averaging, for each individual, the within-month ranges of scores
- Primary outcome: Average range of within-month pain scores (dichotomized as low vs high)
- Analyses excluded pain scores obtained during inpatient, residential, or nursing home stays; also from days with multiple scores that might indicate more acute injury/illness or procedures

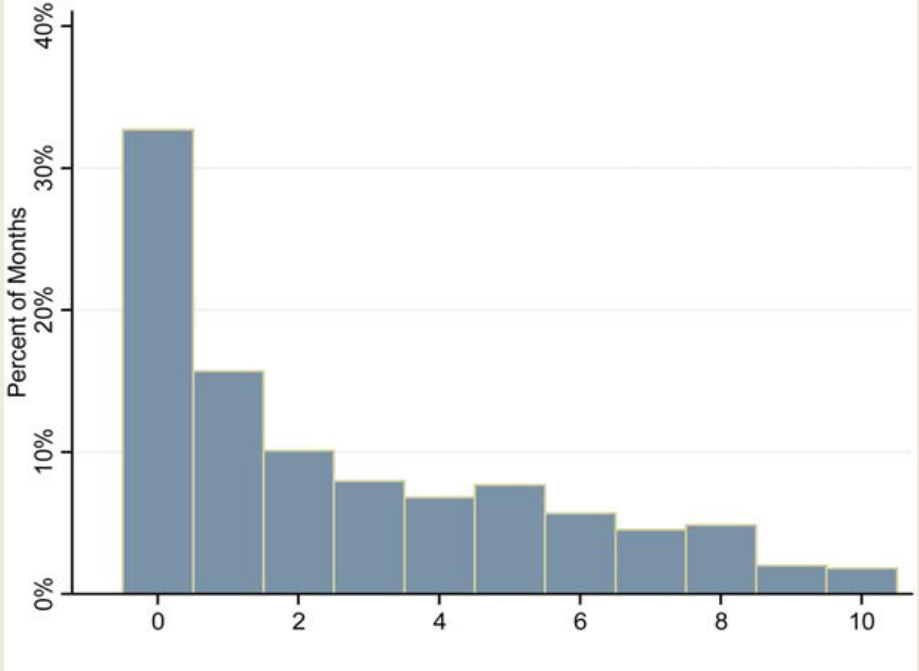
Demographic characteristics of sample

	Short-term variability subgroup (N=4,336)
Age (years): Mean(SD)	73.5 (7.4)
Sex: Male: N (%)	96%
Race/Ethnicity	
White (non-Hispanic)	65%
Black (non-Hispanic)	20%
Hispanic	7%
Other	4%
Unknown	5%
Marital status	
Married	53%
Divorced/Separated	27%
Single/Never Married	6%
Widowed	15%
Percent service-connected disability	
Not service-connected	40%
Less than 50%	13%
50% or more	47%

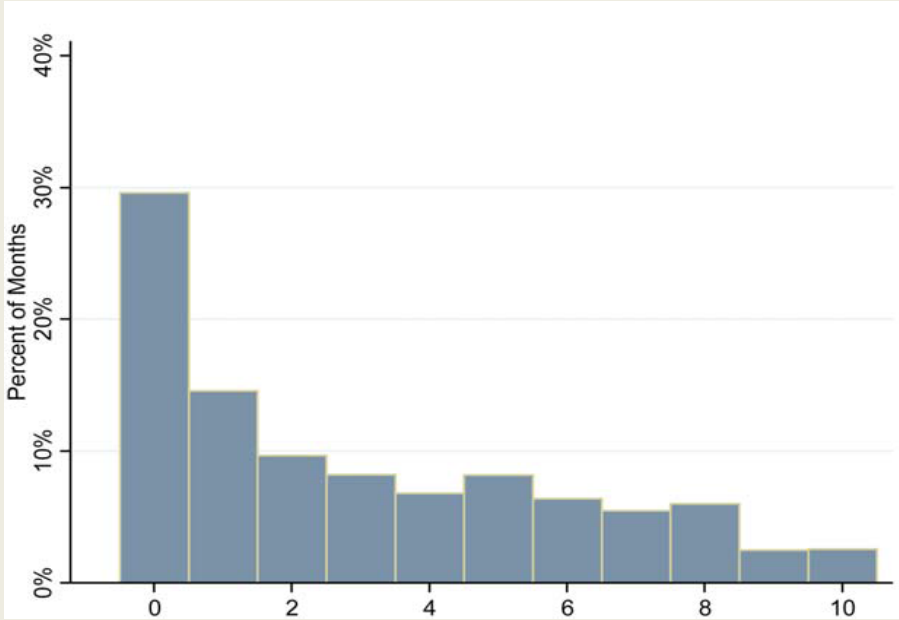
Clinical characteristics of sample

Baseline pain intensity: Mean(SD)	5.3 (1.6)
Selim comorbidity index score	
0–5 N (%)	26%
6–10	48%
11–15	20%
16–24	6%
Major surgery	3%
Mental health diagnosis (except SUD/nicotine)	44%
Nicotine or substance use disorder	17%
Pain diagnoses	
Chronic neck/joint pain	64%
Rheumatism/Arthritis/Gout	67%
Fibromyalgia	5%
Chronic lower back pain	47%
Neuropathies	28%
Headache/Migraine	8%
Other musculoskeletal pain	48%

Distribution of monthly pain score ranges in main study sample



Range in all NRS scores within all months for all individuals who had 2 or more scores in any month



Multivariable model results

- Greater within-month variability associated with:
  - Being black or Hispanic (compared to white non-Hispanic; OR 1.11 [1.04, 1.19] and 1.14 [1.03, 1.27], respectively),
  - Being divorced/separated (compared to married; OR 1.10 [1.03, 1.17])
  - Having higher Selim scores (17% increase in OR [highest vs ref]; p=.002)
  - Having diagnoses of headache/migraine pain (OR 1.11 [1.01, 1.21])
  - Having greater baseline pain intensity (OR 1.02 [1.00, 1.04])
- Significant race/ethnicity and diagnosis associations disappeared in planned sensitivity analysis using $\geq$3 months of data rather than 2
- Magnitudes of most differences were small

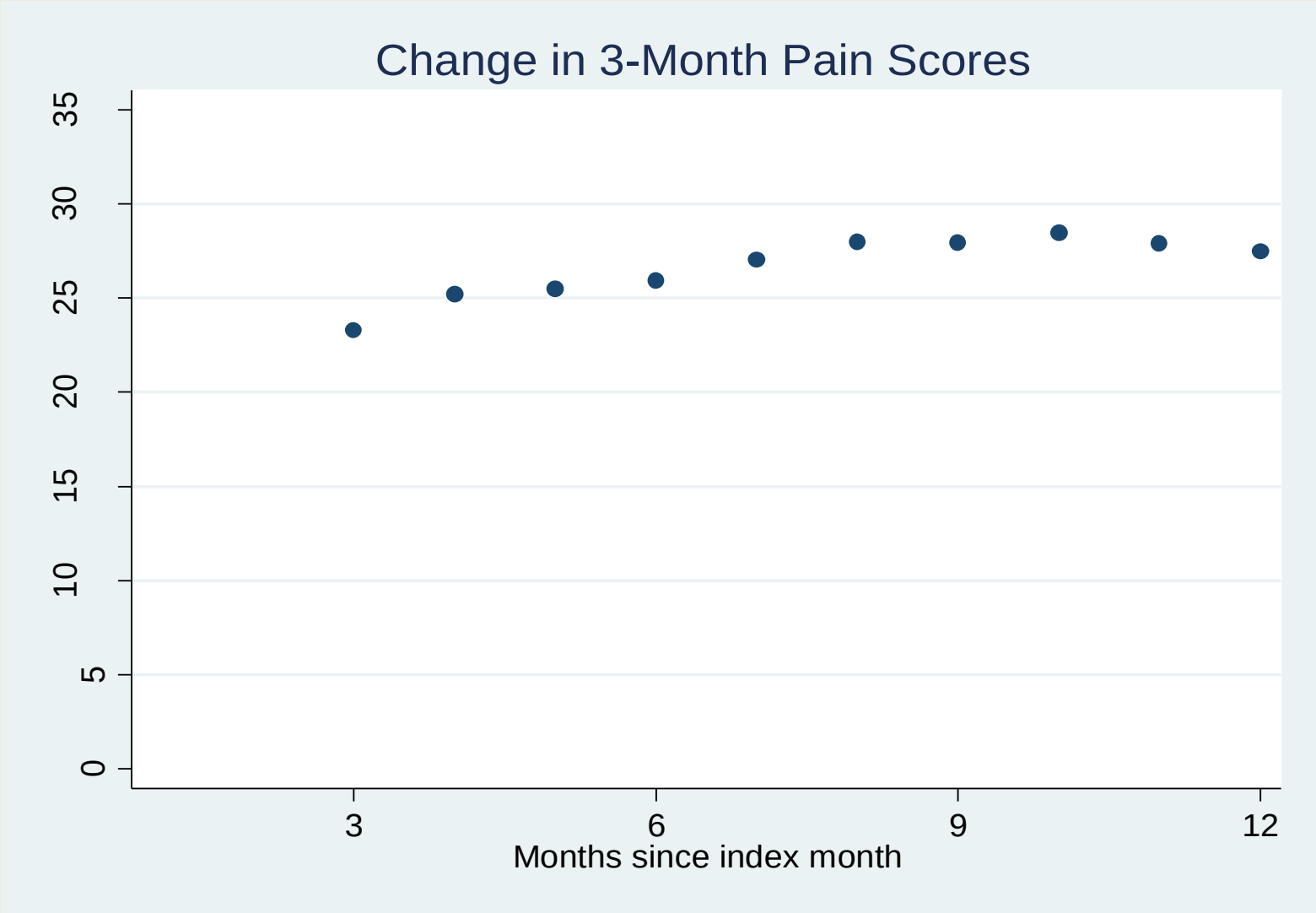
Conclusions—short-term variability

- The majority of patients in the sample had clinically meaningful variation in pain scores within a given month.
- Clinicians should work with more than just one pain score to make decisions
  - Pain scores over time are available in vital signs in CPRS
  - (Info on function/quality of life/satisfaction would be helpful too)
- Results also impact use of NRS scores for research
- We explained little variance in pain score ranges using these data
  - Selim scores are most predictive and suggest that comorbidity level may contribute to *variation* in pain intensity experience
- Factors that predict short term variability may be different than those that predict pain prognosis

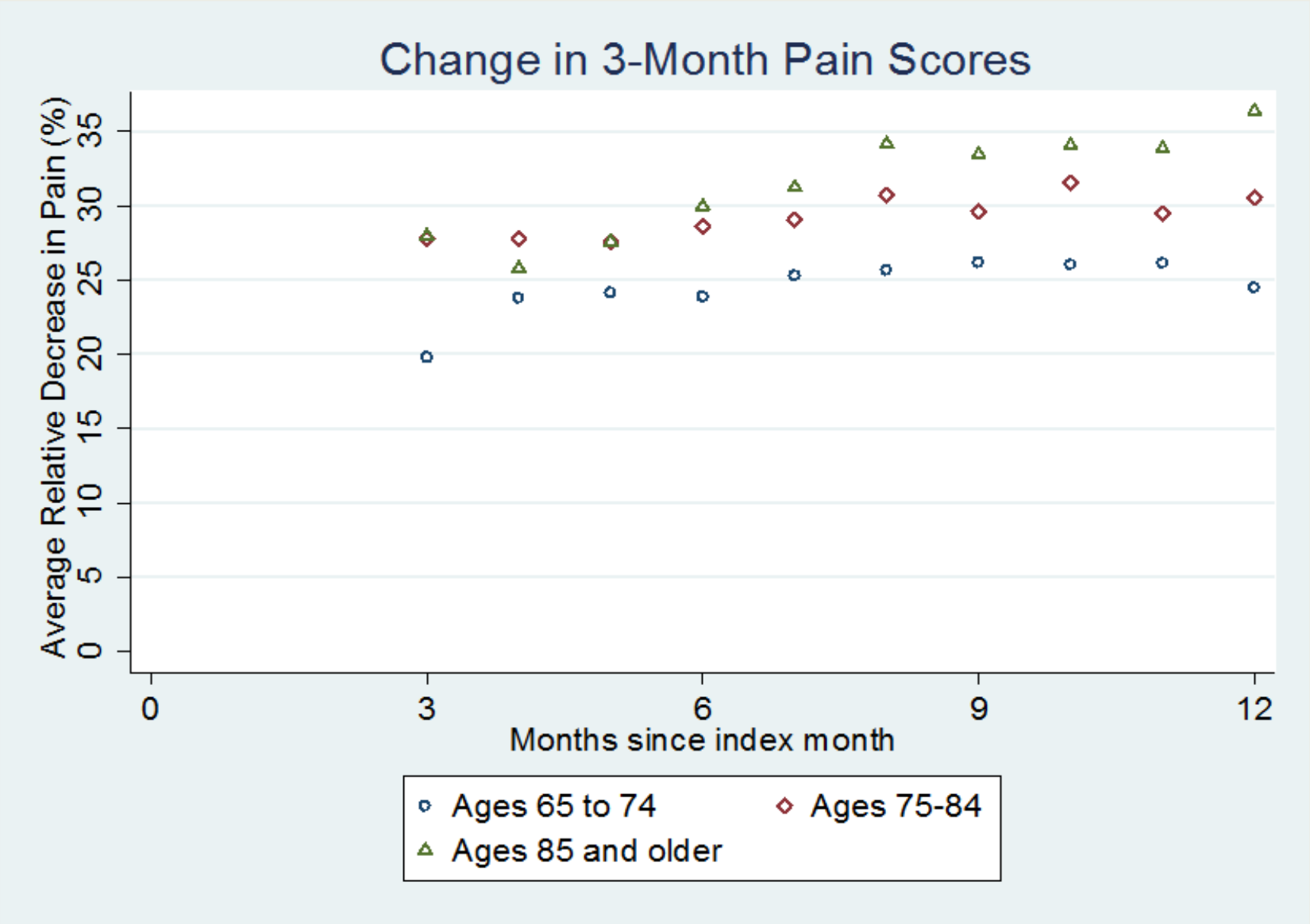
Poll

- What do you think happens to pain scores over time in older veterans?
  - They tend to improve
  - They tend to get worse
  - They tend to stay the same

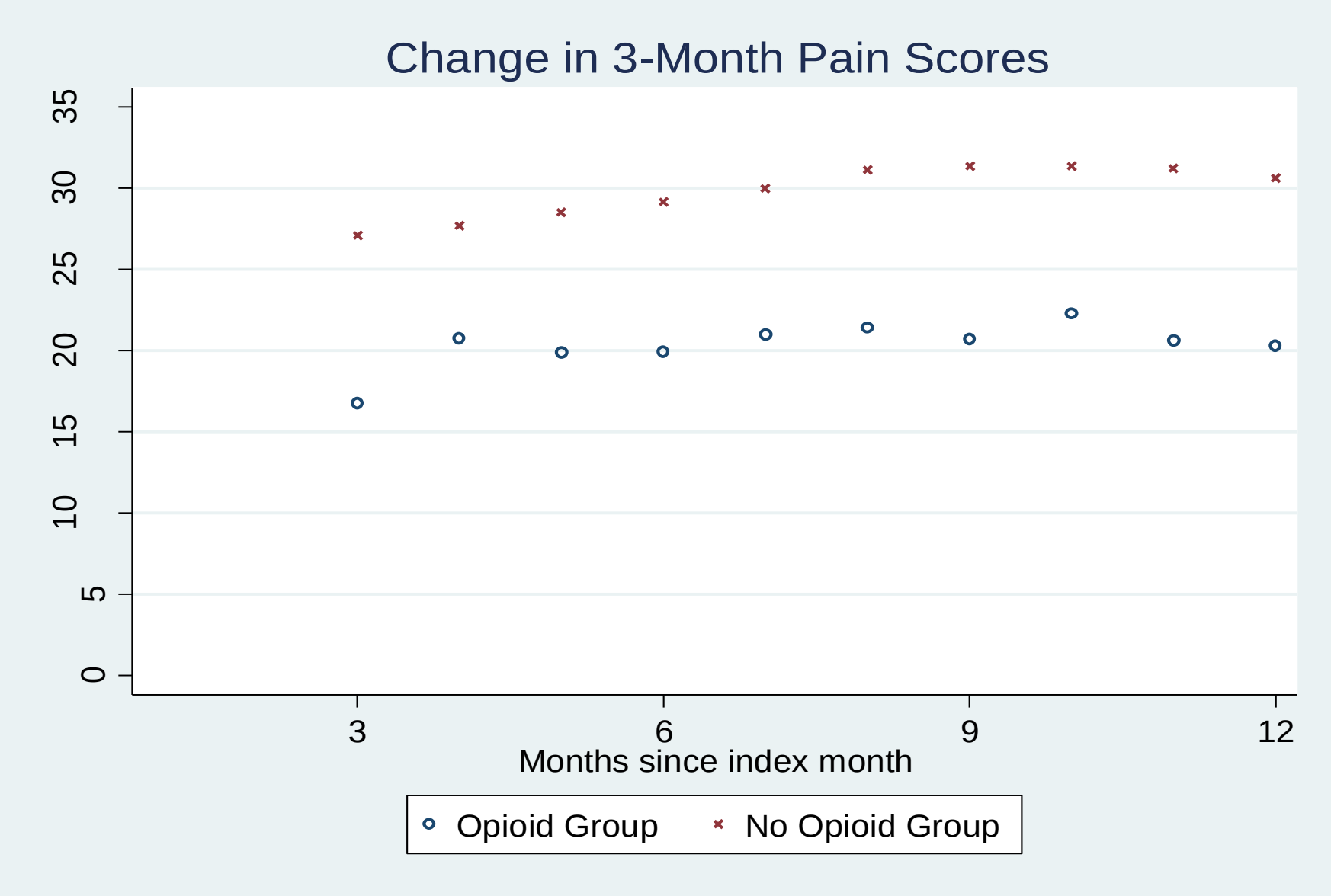
Changes in pain scores over time: Overall group



Changes in pain scores over time by age



Changes in pain scores over time by opioid status



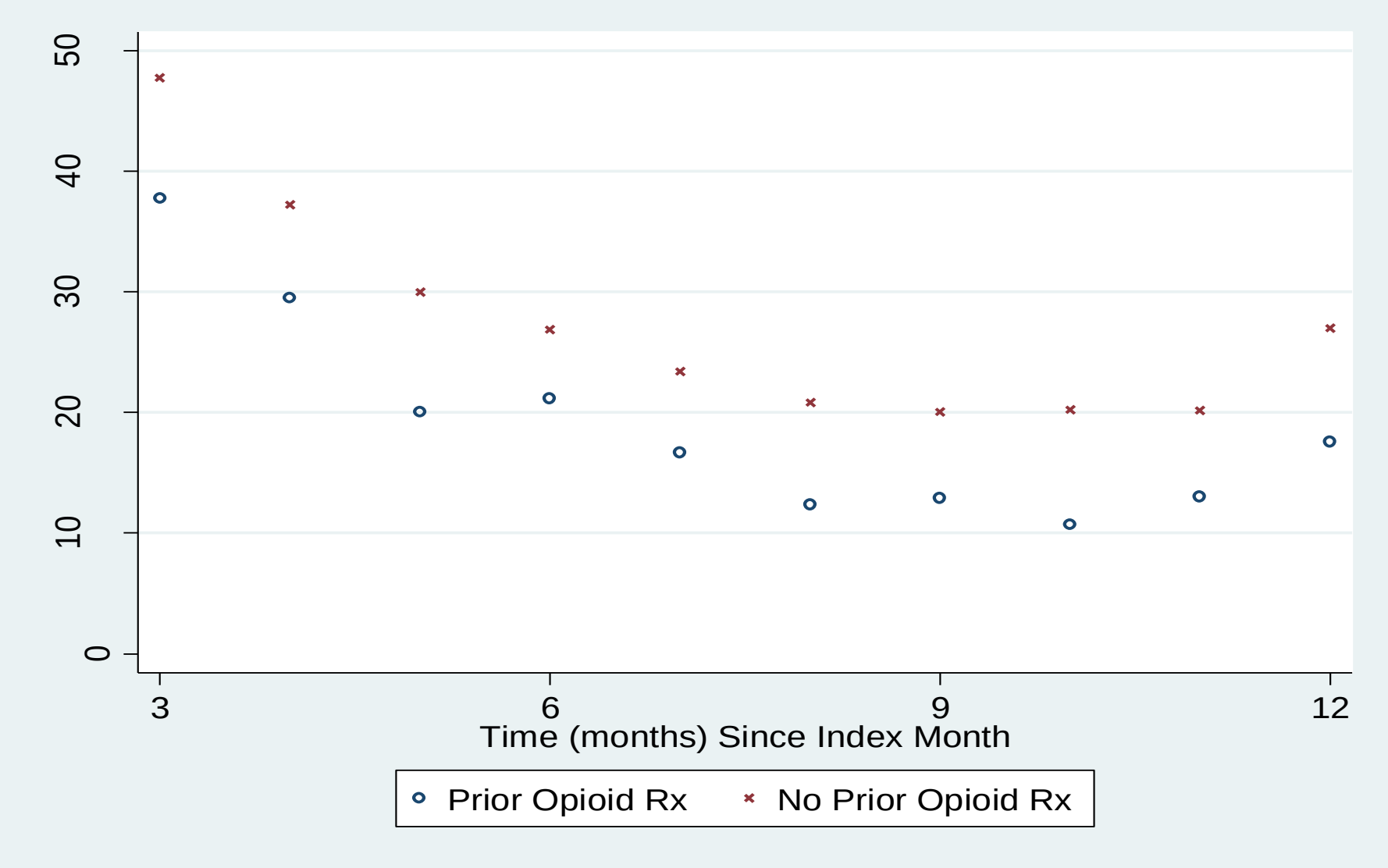
Longitudinal Analysis: Baseline variables significantly associated with 3 month average scores over time

Variable	Coefficient	P value
Baseline NRS score	5.05%	<0.0001
age (reference 65-74)		<0.0001
75-84	2.54%	0.0019
85+	6.18%	<0.0001
Male sex (reference female)	3.97%	0.0358
% service connection (Reference null)		<0.0001
Low	-2.97%	0.0064
High	-7.00%	<0.0001
Prior year diagnosis: Any mental health	-3.57%	<0.0001
Prior year Diagnosis: Rheumatologic	-1.81%	0.0175
Prior year Diagnosis: Fibromyalgia	-4.31%	0.0151
Prior year Diagnosis: Low back pain	-4.85%	<0.0001
Prior year Diagnosis: Neuropathic pain	-4.01%	<0.0001

Survival Analysis: Time to 30% (sustained) improvement from baseline)—significant variables only

Variable	HR	P value
Opioid in prior month (yes/no)	0.68	<0.0001
Baseline average NRS	1.09	<0.0001
Age (reference 65 – 74)		0.0143
75 - 84	1.06	0.0224
85+	1.10	0.0162
% service connected (Reference=Null)		<0.0001
Low	0.95	0.1479
High	0.78	<0.0001
Diagnoses		0.2885
SUD	0.89	0.0112
Any MH diagnosis (except NIC or SUD)	0.88	<0.0001
Fibromyalgia	0.81	0.0004
Lower back pain	0.89	<0.0001
Neuropathies	0.90	0.0001
Other Musculoskeletal	0.94	0.0035

Percentage with sustained improvement by prior-month opioid status



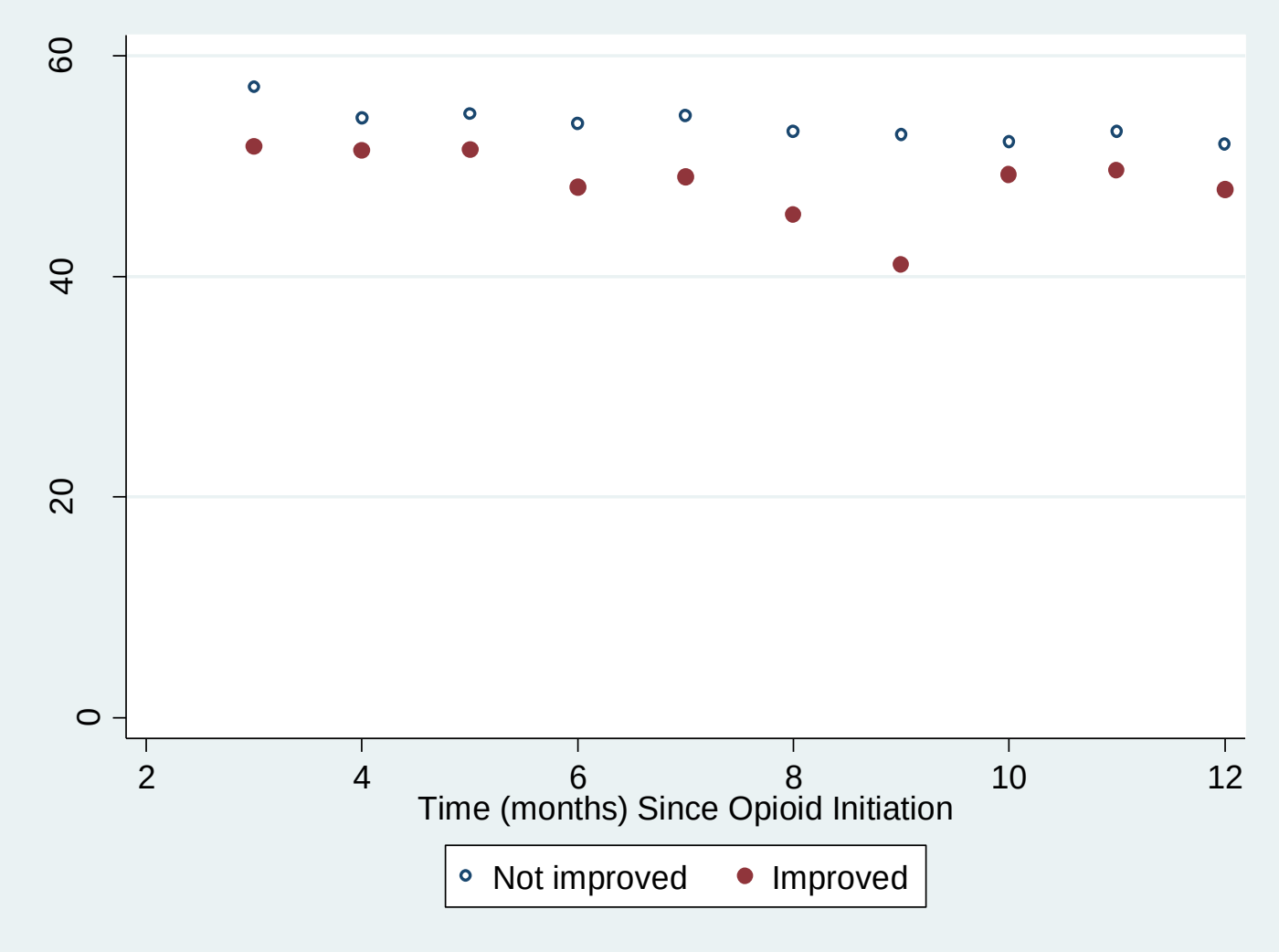
Summary

- Pain intensity scores improve on average over time in older Veterans
- Predictors of improvements in pain scores over time:
  - Higher baseline NRS
  - Older age
  - Not having a service connected disability
  - Absence of mental health (including SUD) diagnosis
  - Not being prescribed an opioid
- It would be very helpful if we could drill down and learn more about what happens after people initiate opioids—does dose matter?

Preliminary analyses: In Opioid initiation subgroup, to what extent opioids are associated with sustained improvements in NRS scores.

Variable	Hazard Ratio	P value
Baseline pain	1.14	<0.0001
Total opioid dose prior month > median	0.77	<0.0001
Age (Ref: 65-74)		
75-84	1.19	0.0013
85+	1.29	0.0034
Selim (ref: 0-5)		
6-10	0.88	0.0258
11-15	0.91	0.2045
16+	1.13	0.2771
%Service Connected (ref=null)		
<=50	0.94	0.3711
> 50	0.88	0.0189
Diagnoses		
Low Back Pain	0.86	0.0015
Headache	0.81	0.0152

Prior month opioid doses and sustained improvement



Summary—opioid initiation subgroup

- Factors associated with improvement in the opioid initiation subgroup mirror those of the larger sample.
- Within the opioid subgroup, higher prior-month opioid doses are associated with less improvement in pain scores over time.
- Overall we are <u>not</u> seeing that, <u>on average</u>, initiation of prescription opioids lead to improved pain intensity within individuals over time

However…

- Important caveat about causality:
  - Even though we adjust for *baseline* pain intensity, people who receive opioid medication prescriptions may have worse pain conditions and/or worse prognosis.
  - We can't assume that opioid medications caused Veterans to do more poorly over time—it is possible that opioid medication might have prevented them from doing worse.
- Options:
  - Propensity score modeling to help adjust for treatment bias due to measureable factors
  - Instrumental variable analysis to help adjust for unmeasured factors

More Discussion

- Overall results consistent with prior observational studies:
  - Eriksen et al (*Pain* 2006): Danish Health and Morbidity Survey (n=1906) showing worse pain intensity/disability in those prescribed opioids for chronic pain (cross sectional analysis)
  - Braden et al (J Pain 2012): Women's Health Initiative cohort study shows baseline opioid use associated with worse subsequent outcomes
  - Ashworth et al (*Pain* 2013): Prospective cohort study of 715 subjects using propensity scores to adjust for opioids. Opioid status at baseline predicted slightly worse disability status.
- *Note*: There are almost no *clinical trials* of opioid therapy for chronic pain (almost all < 16 weeks); so observational studies may be the best we have.

Discussion: Aging and pain

- Limited information in literature on natural history of pain and longitudinal pain treatment outcomes in older persons

- Mixed findings on prevalence/course of pain across age strata (Magni et al, Pain1993; Jakobsson et al, Scan J Rheum 2010; Andersson et al, Clin J Pain 1993; Thomas et al, Pain 2004; Patel et al, Pain 2013)

- As age increases, prevalence and perceptions of pain in various regions of the body change (Riley et al, J Pain 2014). Pain *interference* likely increases (Thomas et al, Pain 2004)—*Note*: we found that the oldest Veterans were more likely to have reduced pain intensity over time, but our study did not examine pain locations or pain interference)

Some key limitations

- Generalizability issues
  - Most analyses restricted to those with multiple pain intensity assessments in a certain time period; results most applicable to those with frequent visits; and likely more ill
  - Although we carefully chose criteria for our chronic pain population, no gold standard—affects sample and ability to compare with other studies
- Limited data are available in VA administrative datasets. For example, no data on functional status or quality of life
- Did not adjust for measured/unmeasured disease severity which might have contributed to opioid treatment bias

Next Steps

- Look at larger group of Veterans, not just older Veterans
- More comprehensive characterization of dose
  - Stratify analyses by opioid use patterns
  - Examine cumulative “burden” over time
- Use propensity score and instrumental variable analyses to attempt to control for measurable and unmeasurable disease severity, respectively that may influence opioid treatment decisions(including opioid dose).
- ? Latent class/group-based trajectory analyses—identify characteristics of group members who are more or less likely to show responses to opioids (or lack of response)