

# Parallel Latent Change Modeling of Depression and Pain to Predict Relapse During Buprenorphine and Suboxone Treatment

Stanford Division of Pain Medicine

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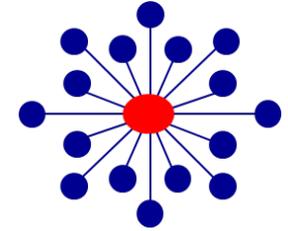


@noelvest

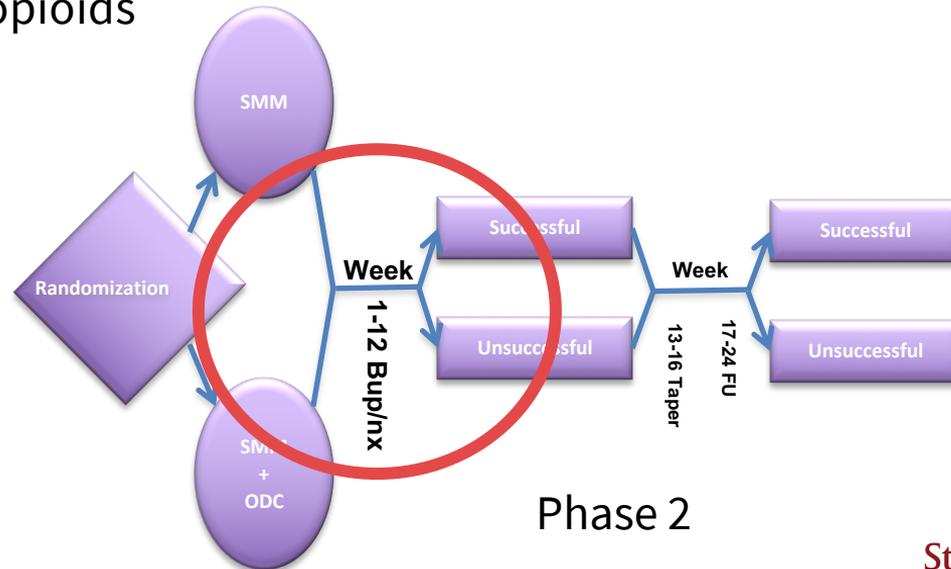
# Background

- Prescription opioid disorder is major public health issue
- Buprenorphine/naloxone treatment is a common modality
- Relapse is a strong predictor of treatment retention but very little is known about what predicts relapse
- Pain and depression have a high co-occurrence and have been shown to increase relapse rates and simultaneous modeling may offer new insights
- Prescription Opioid Addiction Treatment Study (POATS) remains only CTN to address prescription opioid use specifically
- **Goal: Employ latent mixture modeling, and survival analysis to estimate the time to first opioid use (survival) predicted by multi-class latent growth trajectories**

# Methods



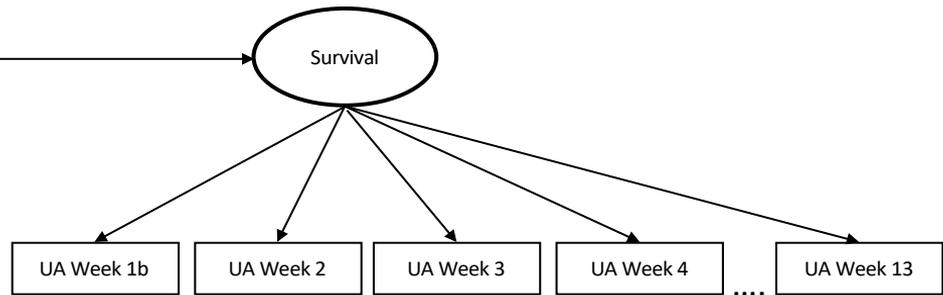
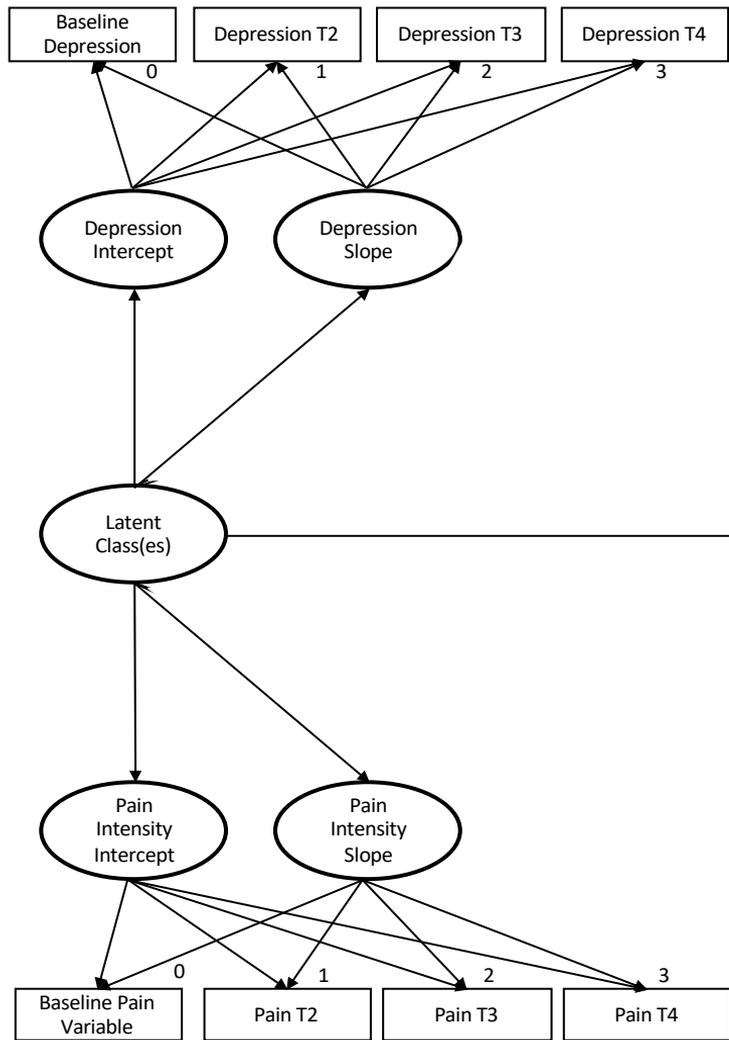
- Clinical Trials Network (CTN-0030) POATS Study
- 359 buprenorphine + naloxone patients
- No difference between SMM and SMM + ODC groups
- Phase 2 Tx success when 3 of final 4 urinalysis were negative for prescription opioids



# Research Design

## Study Variables

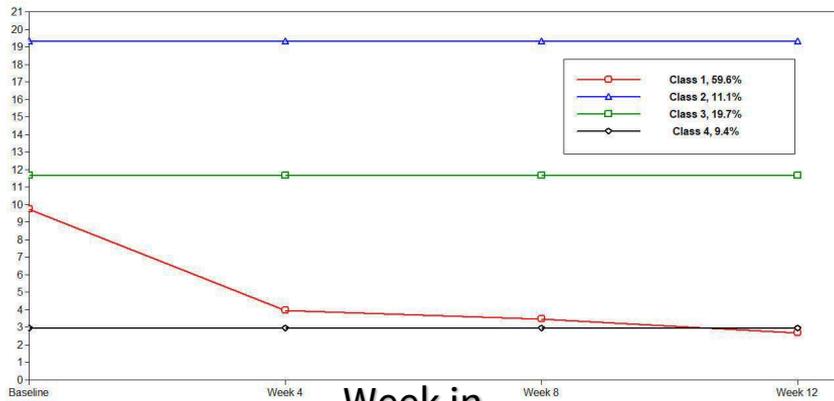
Assessment/Variable of Interest	Baseline	FV PH1	1a	1b	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Urine Drug Screen	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X				
Demographics	X																										
Brief Pain Inventory		X					X				X				X			X				X				X	
Beck Depression Inventory	X	X					X				X				X			X				X				X	



**Model fit indices and estimated class size for LCA and discrete survival analysis.**

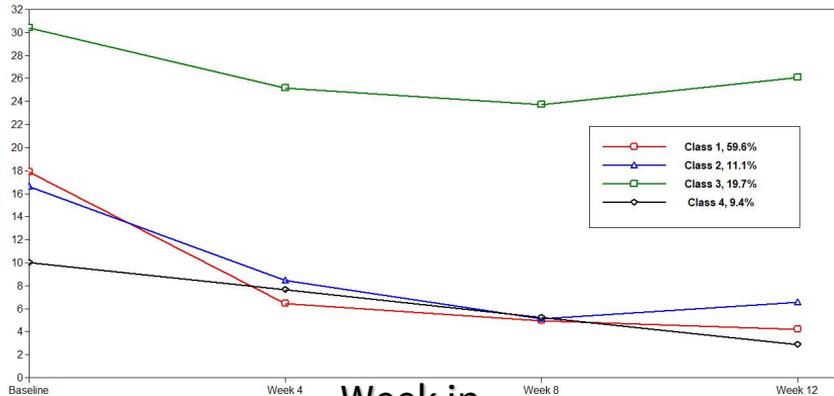
Model	AIC	BIC	$\Delta$ BIC	Class Size	Entropy	LMR LRT	Par.
1 Class	22265	22374		100%			28
2 Class	21518	21666	708	78%, 22%	0.89	753.62***	38
2 Class Revised	21518	21646	20	78%, 22%	0.90	731.71***	33
3 Class	21002	21169	477	62%, 24%, 14%	0.89	509.11**	43
3 Class Revised	21007	21159	10	62%, 23%, 15%	0.89	502.05**	39
4 Class	20795	20986	173	58%, 21%, 11%, 10%	0.90	205.07	49
<b>4 Class Revised</b>	<b>20802</b>	<b>20976</b>	<b>10</b>	<b>58%, 21%, 11%, 10%</b>	<b>0.90</b>	<b>203.92</b>	<b>45</b>
5 Class	20586	20799	177	51%, 17%, 12%, 10%, 10%	0.89	212.27	55
5 Class Revised	20606	20800	-1	57%, 18%, 11%, 9%, 5%	0.90	199.34	50
6 Class	20420	20653	147	46%, 16%, 10%, 10%, 9%, 9%	0.88	158.94	60
6 Class Revised	20440	20654	-1	48%, 13%, 10%, 10%, 10%, 9%	0.88	170.72	55
7 Class	20298	20546	208	44%, 16%, 10%, 10%, 9%, 8%, 3%	0.88	106.98	64
8 Class	20254	20530	16	41, 15, 12, 9, 9, 9, 3, 2	0.88	47.82	71
9 Class	20180	20495†	35	38, 18, 10, 8, 7, 6, 5, 4, 3	0.86	77.03	81
10 Class	20163	20517	-22	41, 11, 8, 8, 7, 6, 6, 6, 4, 2	0.87	54.72	91

Pain Intensity



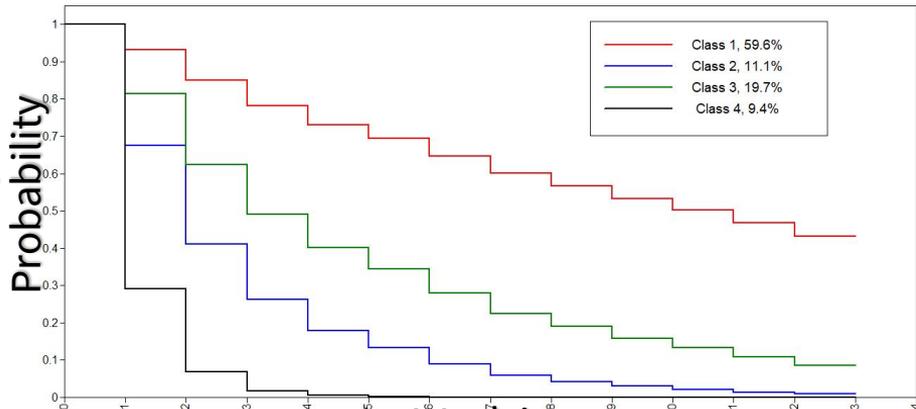
Week in Treatment

Depression

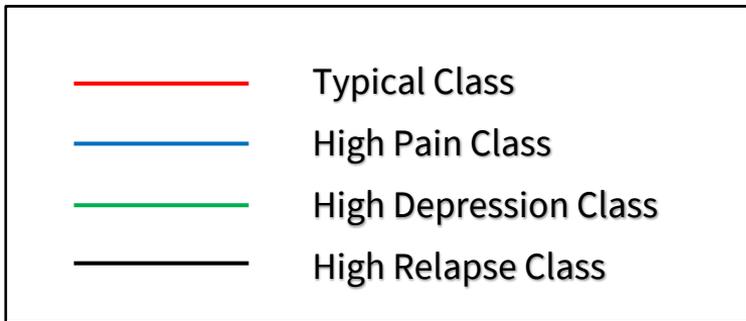


Week in Treatment

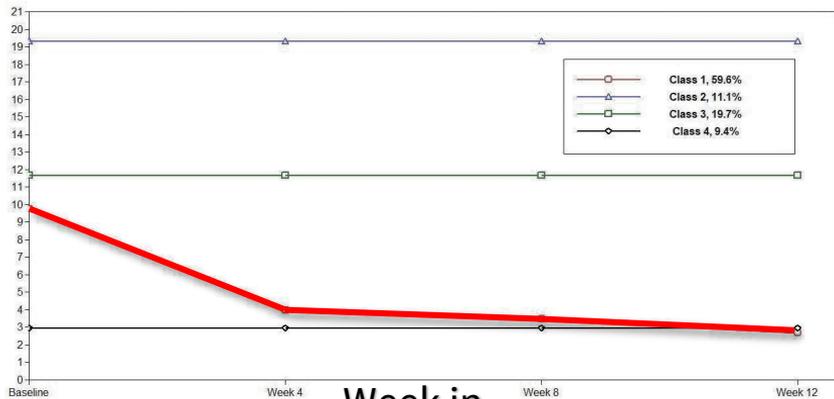
Relapse Probability



Week in Treatment

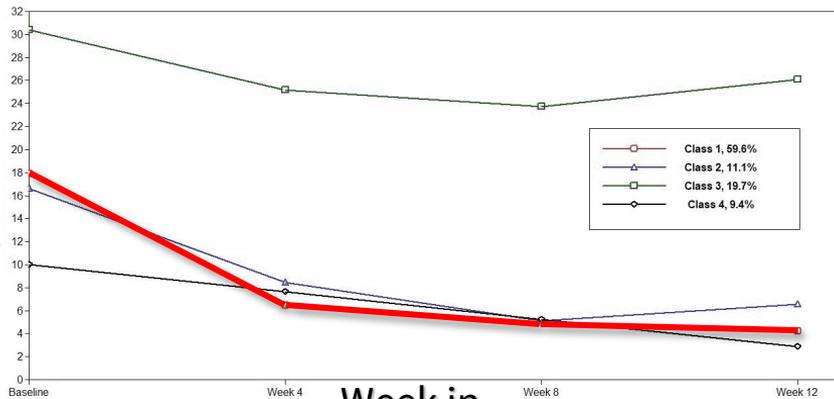


Pain Intensity



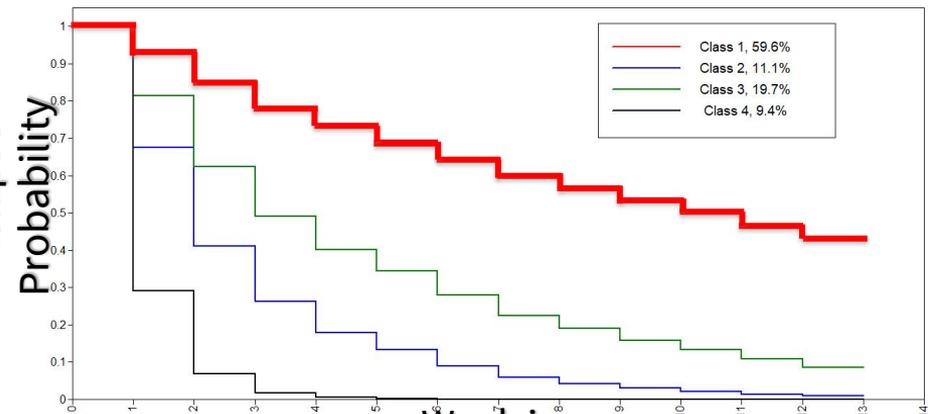
Week in Treatment

Depression



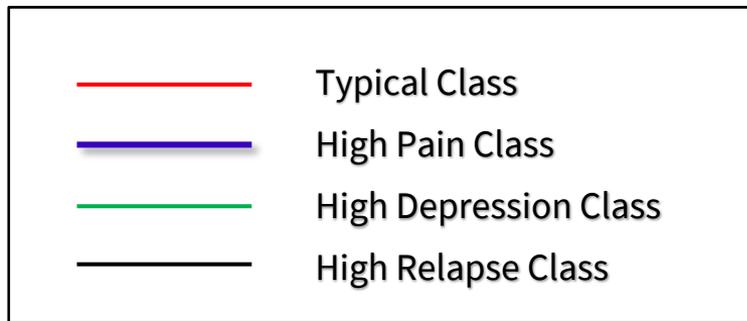
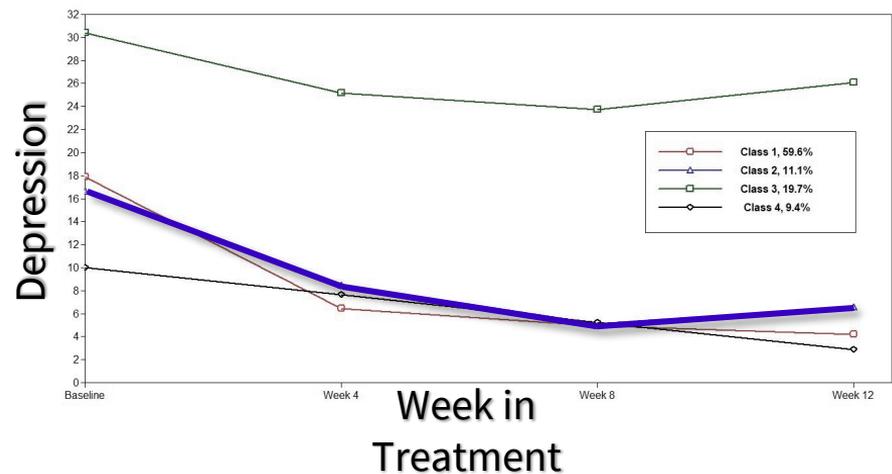
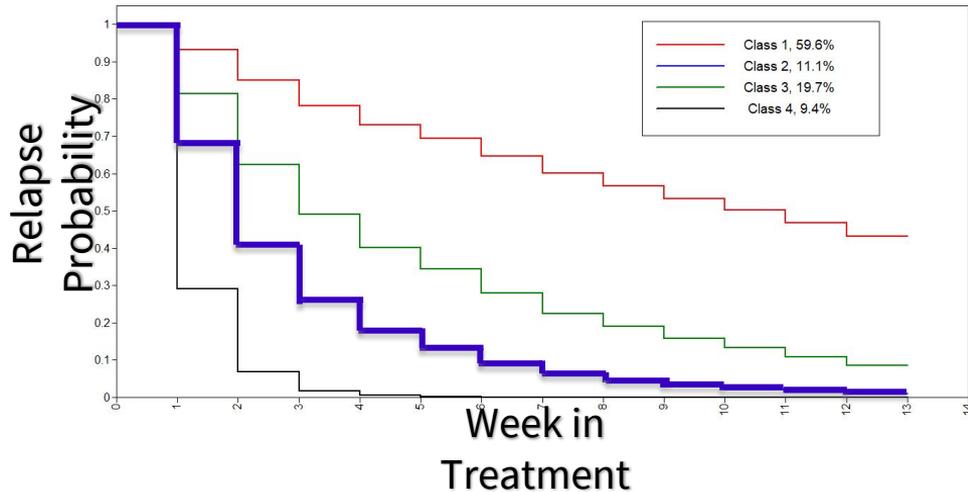
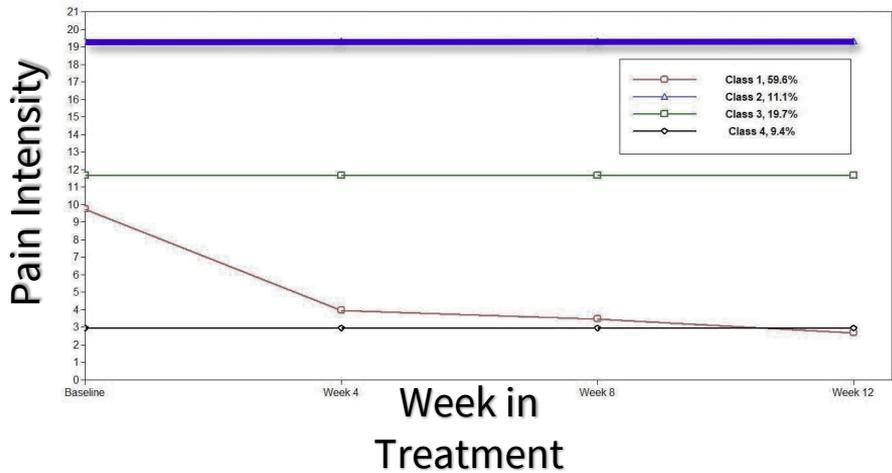
Week in Treatment

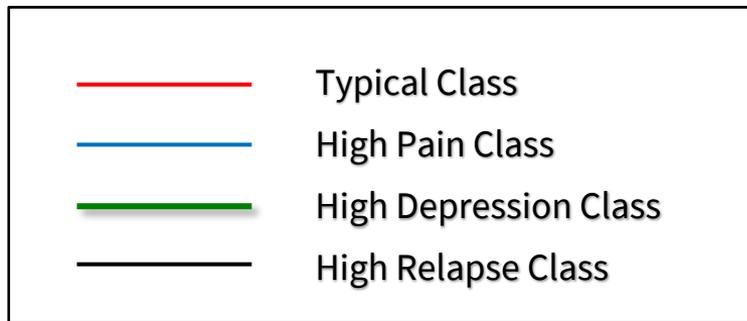
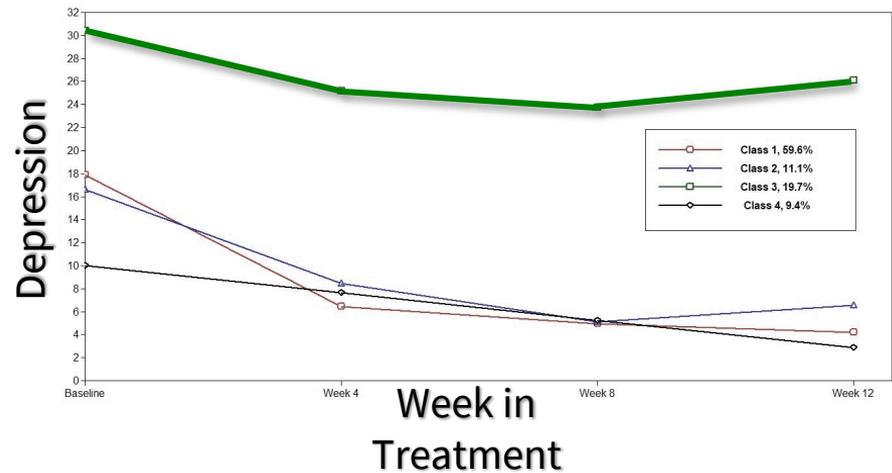
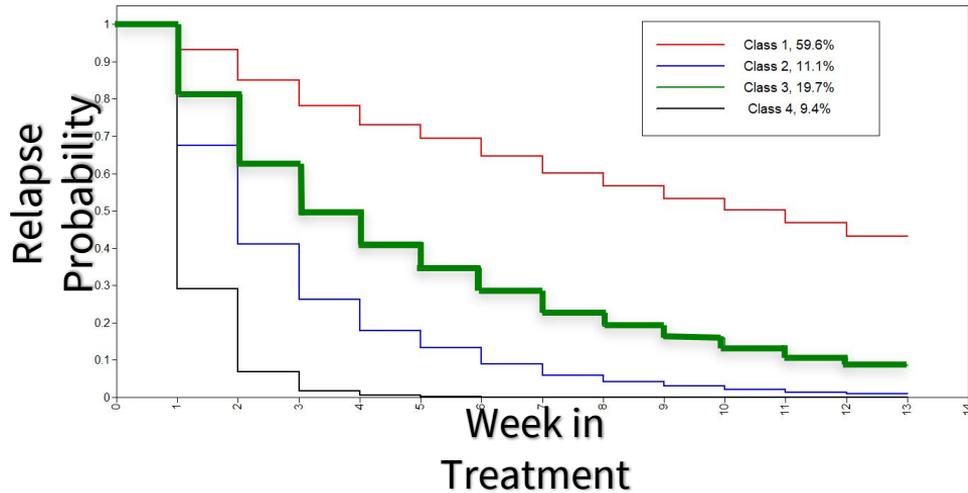
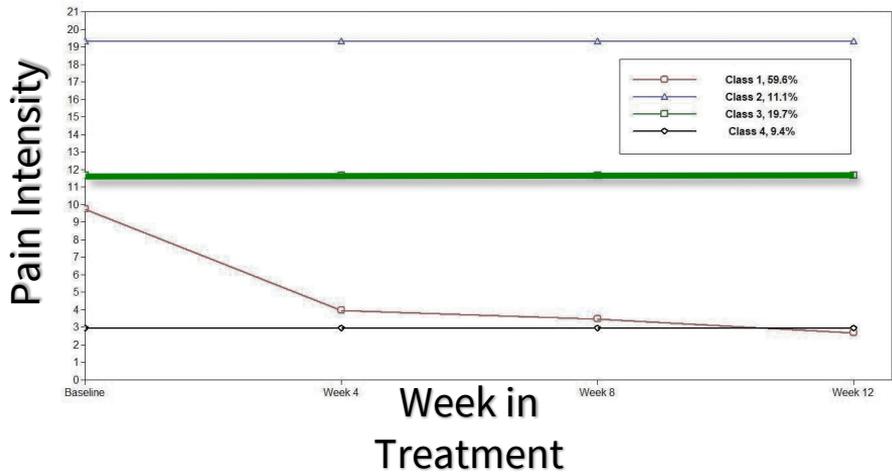
Relapse Probability



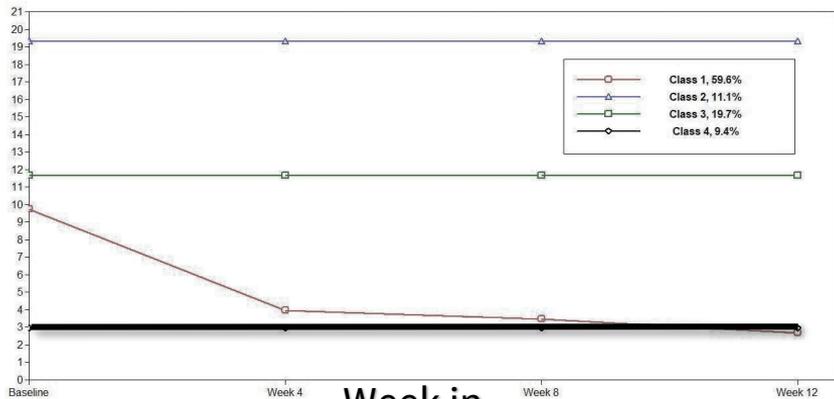
Week in Treatment

	Typical Class
	High Pain Class
	High Depression Class
	High Relapse Class



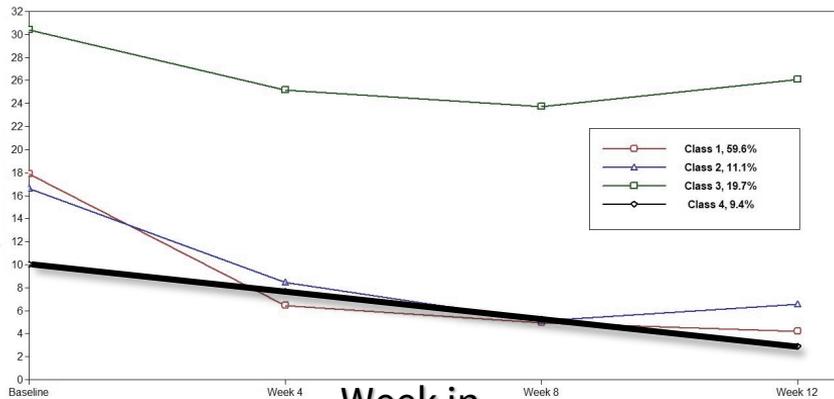


Pain Intensity



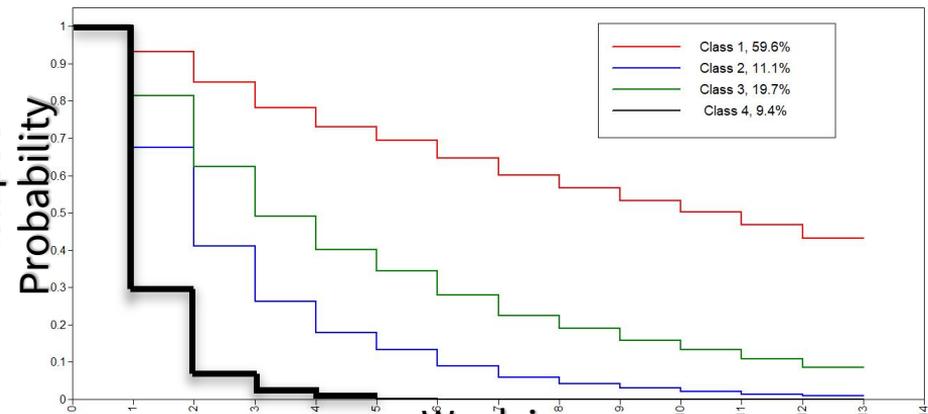
Week in Treatment

Depression



Week in Treatment

Relapse Probability

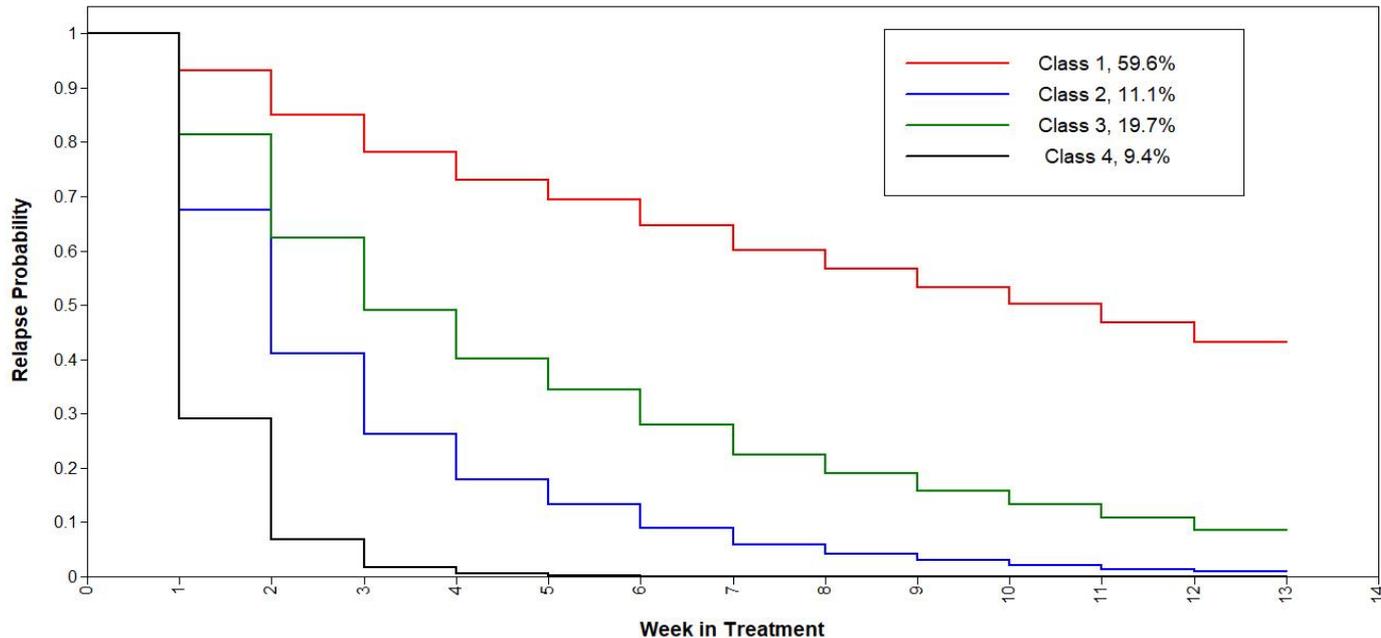


Week in Treatment

	Typical Class
	High Pain Class
	High Depression Class
	High Relapse Class

*Odds Ratio of Survival (No Opioid Use).*

Class Comparison	OR	<i>z</i>	<i>p</i>
Class 1 to Class 2	0.15	-12.48	<0.001
Class 1 to Class 3	0.32	-6.35	<0.001
Class 1 to Class 4	0.03	-30.05	<0.001
Class 2 to Class 3	2.11	1.08	0.277
Class 2 to Class 4	0.20	-2.96	0.003
Class 3 to Class 4	0.09	-8.14	<0.001



Class membership for select demographic variables.

Demographic	Class 1 Typical	Class 2 Chronic/High Pain	Class 3 High Depression	Class 4 High Relapse
Total Individuals in Class	214	40	71	35
Male Gender %	137 (64%)	23 (58%)	23 (33%)	25 (73%)
Age Mean (SD)	32.01 (9.46)	35.14 (9.76)	33.75 (10.34)	30.58 (8.80)
White Race %	197 (92%)	33 (83%)	65 (92%)	30 (88%)
Self-Report Chronic Pain	62 (28%)	36 (90%)	34 (48%)	6 (17%)
Self-Report Lifetime Depression	73 (34%)	13 (33%)	33 (48%)	4 (11%)
Above HS Education %	84 (39%)	30 (75%)	32 (46%)	25 (72%)
Employed Full-Time %	140 (65%)	21 (53%)	34 (49%)	22 (63%)
Ever Used Heroin %	48 (22%)	10 (25%)	22 (31%)	13 (37%)
Phase 2 Treatment Success %	127 (59%)	14 (35%)	34 (48%)	2 (6%)

*Note:* These data were generated for explanatory purposes only. HS = High School; Treatment success = 3 of 4 final urinalysis drug screens were negative for opioid use.

## Conclusions

- Successfully modeled depression, pain, and relapse simultaneously
- Four classes were characterized on pain, depression, and opioid-free survival
- First month it is vital to monitor relapse and subsequent treatment retention
- Future research may allow timely interventions to extend time-to-first use (relapse)
- Model may be extended to other populations
  - › Other SUD treatment
  - › Criminal justice
  - › Post-surgical

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Questions?