

Modeling cessation treatment for smokers with depression

Commercial Tobacco and Behavioral Health
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Jamie Tam, MPH, PhD

Assistant Professor
Department of Health Policy and Management
jamie.tam@yale.edu



Why model tobacco use and mental health?

- Project future health outcomes for surveillance assessment
- Simulate intervention scenarios difficult to evaluate in real world
- Identify conditions for greatest health gains and guide decision-making
- Explicit modeling of underlying dynamics can improve understanding of the drivers of disparities

Smoking and Major Depression

- Adults with past year major depressive episode make up ~7-8% of adult population (17+ million adults)
 - Higher smoking rates
 - Lower quit ratios
 - Depression increasing, especially among young adults
- National Survey on Drug Use and Health (NSDUH)
 - Annual cross-sectional data 2005-2018
 - Tobacco use
 - Major Depressive Episodes
 - Mental health service use



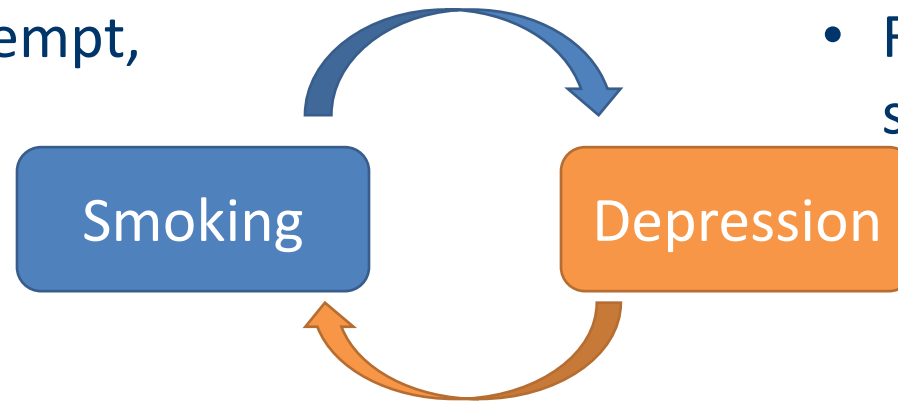
Interaction effects

Smoking increases risk for:

- Depression symptoms
- Suicide ideation, attempt, completion

Smoking cessation:

- Alleviates mood
- Reduces depression symptoms



Shared underlying genetic, neurobiological, environmental factors

Depression:

- Increases risk for smoking initiation
- Reduces odds of successful quitting

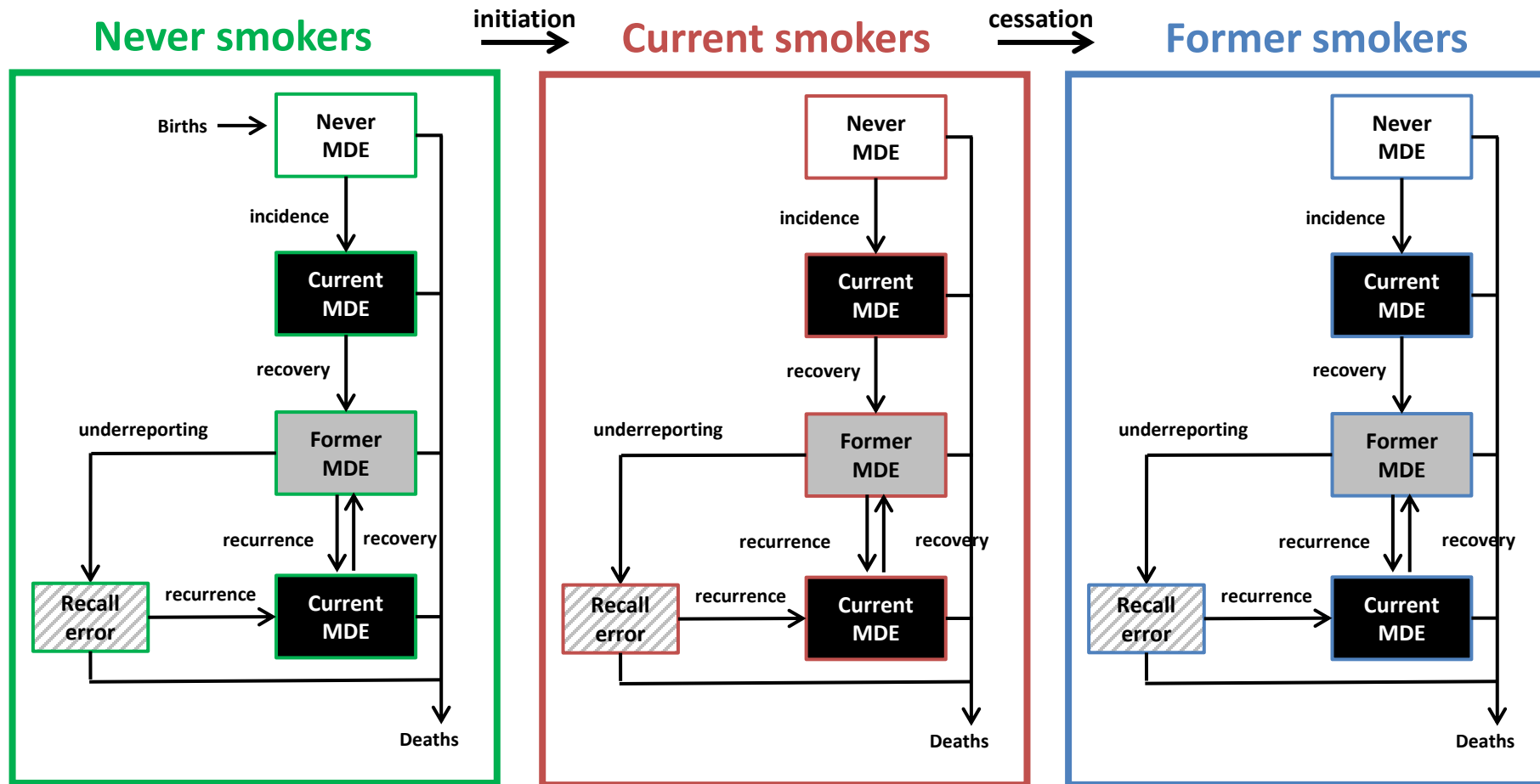
Definitions

- Never smoker
 - Smoked less than 100 cigarettes in their lifetime
- Current smoker
 - Has smoked at least 100 cigarettes in their lifetime and has smoked part or all of a cigarette within the past year
- Former smoker
 - Smoked at least 100 cigarettes in their lifetime but has not smoked at all within the past year

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 - Smoked at least 100 cigarettes in their lifetime but has not smoked at all within the past year
- Never MDE
 - No lifetime history of MD episode
- Current MDE
 - Past year Major Depressive Episode
 - Includes 1st MD episodes and subsequent recurring episodes
- Former MDE
 - No MD episode in the past year, but lifetime history of at least one episode
- Recall error (respondents who are Never MDE)
 - No reported history of MD episode
 - But modeled as Former MD

Major depression and smoking model



Cessation in mental health settings

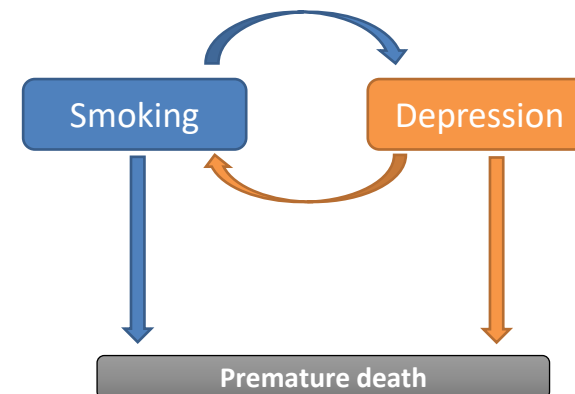
- Tobacco control advocates have long called for integrating cessation treatment in mental health settings
 - Long-term benefits of doing so have never been estimated
- Only 37.6% of private and public mental health settings report offering smoking cessation counseling
 - 25.2% of settings report offering NRT
- Providers do not always offer smoking cessation treatment to patients with mental health conditions
 - Concerns that quitting could negatively impact mental health
 - Systematic review found cessation likely reduces depressive symptoms
- Many smokers with depression do not use mental health services

(Taylor, 2019; Cavasoz-Rehg, 2014 ; Das, 2017; Marynak, 2018; Prochaska, 2010; Secades-Villa, 2017; Taylor, 2014)

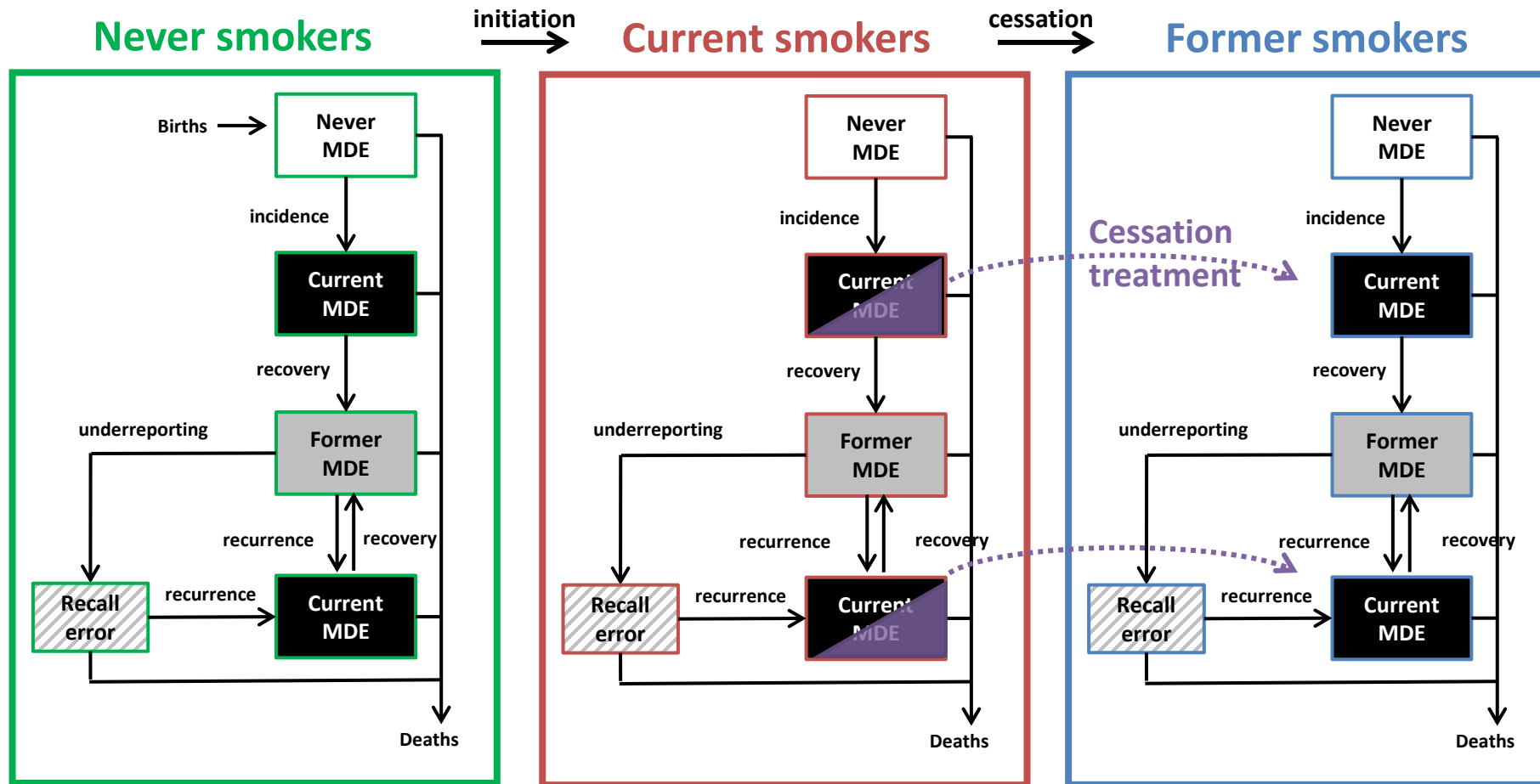
Cessation treatment interventions

- Systematic review of cessation treatment RCTs among smokers with MD
- **Any Treatment**
 - Risk Ratio = 1.137
(95% CI: 1.001-1.291)
- **Pharmacological Treatment**
 - Risk Ratio = 1.588
(95% CI: 1.230-2.049)
- **Hypothetical Treatments**
 - 100% increase, 150% increase, 200% increase

- ***What if cessation treatment was available for all of these patients starting in 2020?***
- ***What if this was combined with increased mental health service utilization?***



MDS model with intervention

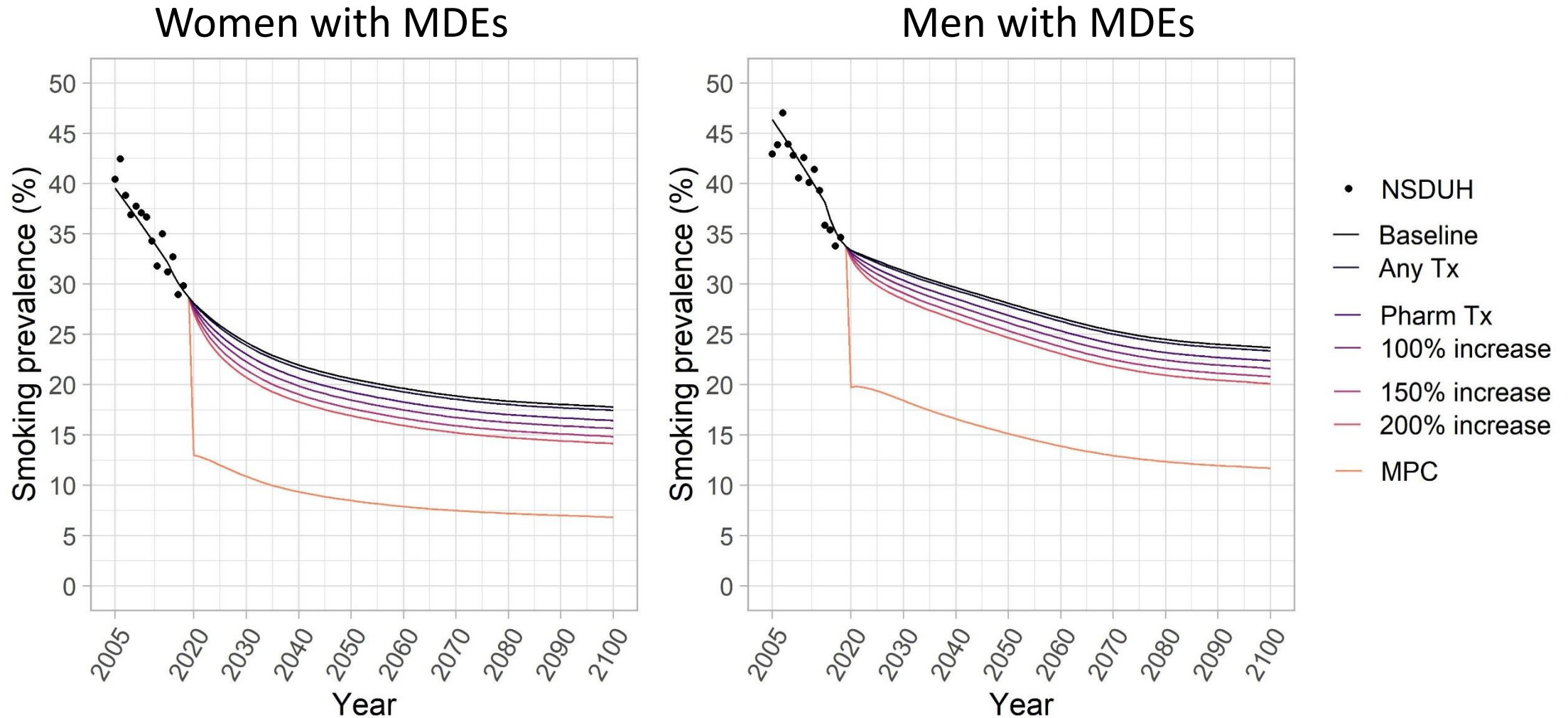


Men	51.3%
Women	65.8%

Maximum Potential Cessation (MPC)

- Compare best case '*treatment*' scenario with best case '*cessation*' scenario
- What are the health benefits gained if 100% of smokers with MD using mental health services immediately quit in 2020?
- Under each intervention scenario, how much harm is avoided as a percent of the MPC?

The Major Depression and Smoking (MDS) Model



Intervention outcomes for adults with current MDE, 2020-2100

2020-2100	Mental health service utilization	Cessation treatment intervention (% of MPC)					
		Any Tx	Pharm Tx	100% increase	150% increase	200% increase	MPC
Premature deaths avoided (thousands)	No change from baseline	32 (4%)	125 (15%)	196 (23%)	268 (32%)	327 (39%)	835
	Increase by 10%	35 (4%)	137 (15%)	215 (24%)	292 (33%)	356 (40%)	887
	Increase by 20%	39 (4%)	150 (16%)	233 (25%)	317 (34%)	385 (41%)	935
	100%	53 (5%)	203 (18%)	314 (28%)	422 (38%)	509 (46%)	1110
Life years gained (millions)	No change from baseline levels	0.14 (4%)	0.54 (14%)	0.85 (23%)	1.16 (31%)	1.42 (38%)	3.7
	Increase by 10%	0.15 (4%)	0.59 (15%)	0.93 (23%)	1.27 (32%)	1.55 (39%)	4.0
	Increase by 20%	0.17 (4%)	0.65 (15%)	1.01 (24%)	1.38 (33%)	1.68 (40%)	4.2
	100%	0.23 (5%)	0.89 (18%)	1.38 (27%)	1.86 (37%)	2.25 (44%)	5.1

Conclusions

- Providing cessation treatment to smokers with depression would reduce smoking-related mortality
- Health gains from cessation interventions are modest even under highly optimistic treatment scenarios
- Cessation treatments need to be much more effective and much more accessible
- Other strategies should complement treatment interventions
 - Prevention efforts remain largely unexplored
- Smoking and depression can and should be addressed together

Limitations

- Simplifies various aspects of depression etiology at the individual level
- Assumes depression rates remain constant 2016-2100
 - Unclear how this could change with COVID-19 pandemic
- Other sociodemographic factors not integrated
 - co-occurring psychiatric disorders
- Excludes homeless, institutionalized, imprisoned populations
- Former smoker mortality rates do not account for time since quit
- Future research should explore effects of e-cigarettes

Thank you!

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RESEARCH ARTICLE

The Potential Impact of Widespread Cessation Treatment for Smokers With Depression

Jamie Tam, PhD,¹ Kenneth E. Warner, PhD,² Kara Zivin, PhD,^{2,3,4} Gemma M.J. Taylor, PhD,⁵
Rafael Meza, PhD^{6,7}

Contact:

jamie.tam@yale.edu

Model R code:

<https://github.com/jamietam>



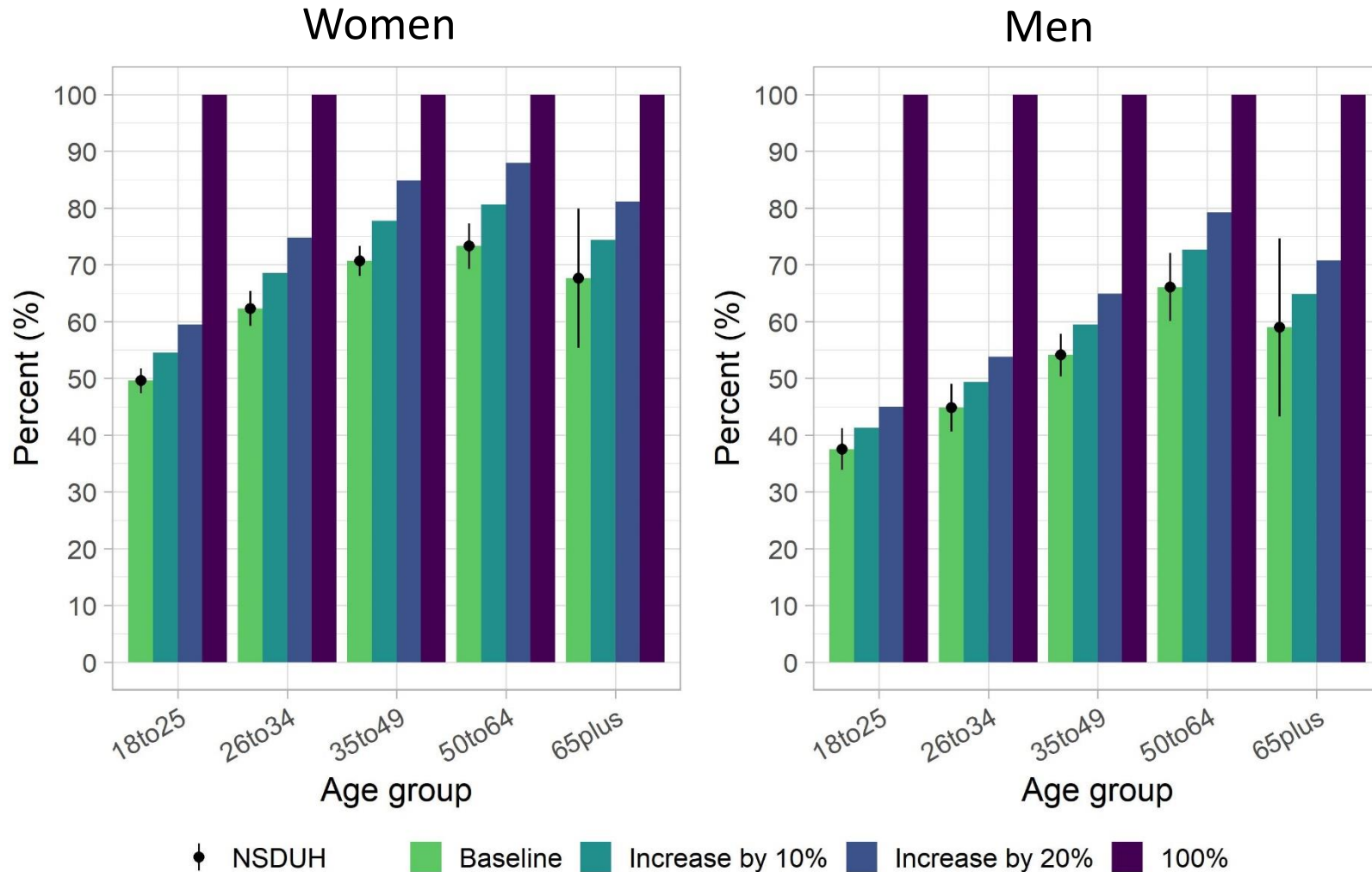
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on Drug Abuse

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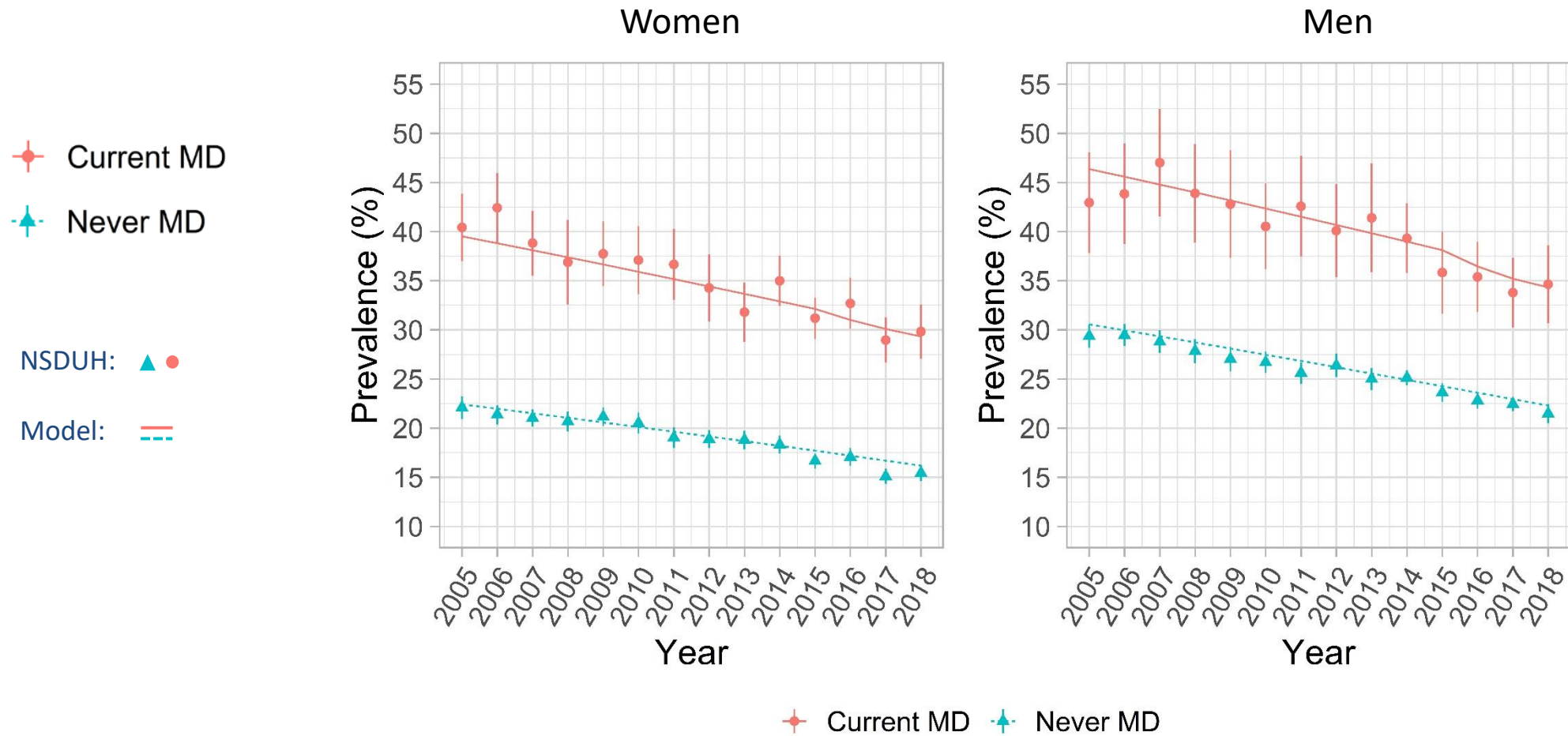
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Mental health service utilization

Proportion of smokers with MDEs who saw or talked to a health professional about their depression



Calibrated MDS model, Never vs. Current MDE population



- Dots (Triangles) = NSDUH estimates of smoking prevalence among adults with current MD (and never MD) with confidence intervals
- Lines = Model estimates of smoking prevalence among adults with current MD (solid) and never MD (dashed).