



**UW Center for  
Tobacco Research and Intervention**

UNIVERSITY OF WISCONSIN  
SCHOOL OF MEDICINE AND PUBLIC HEALTH

# **Smoking Cessation Treatment Reach and Effectiveness: A Report Card on Progress and Challenges**

Baker, T. B., & McCarthy, D. E. (2021). Smoking treatment: A report card on progress and challenges. *Annual Review of Clinical Psychology, 17*, 1-30.  
doi: 10.1146/annurev-clinpsy-081219-090343.

**Danielle E. McCarthy, Ph.D. & Timothy B. Baker, Ph.D.**  
**October 7, 2021**

# Disclosure & Acknowledgements

- TBB, DEM have received grants from NIH
- TBB, DEM were investigators on an NIH-funded trial that received free active and placebo varenicline from Pfizer
- TBB has also consulted with NCI regarding Smokefree.gov and SmokefreeTXT
- Acknowledgements
  - Daniel M. Bolt
  - Stevens S. Smith
  - Wendy Theobald
  - UW-CTRI

# Tobacco Control as a Top 10 Public Health Achievement

## What is Public Health?: Public Health Achievements

[This is Public Health](#)

**Public Health Achievements**

[Further Reading](#)

[Need More Help?](#)

### Ten Great Public Health Achievements -- Worldwide

Ten Great Public Health Achievements --- Worldwide, 2001-2010

- Reductions in Child Mortality
- Vaccine-Preventable Diseases
- Access to Safe Water and Sanitation
- Malaria Prevention and Control
- Prevention and Control of HIV/AIDS
- Tuberculosis Control
- Control of Neglected Tropical Diseases
- Tobacco Control
- Increased Awareness and Response for Improving Global Road Safety
- Improved Preparedness and Response to Global Health Threats

— From CDC, [Morbidity and Mortality Weekly Report](#), June 24, 2011.

### Ten Great Public Health Achievements -- United States

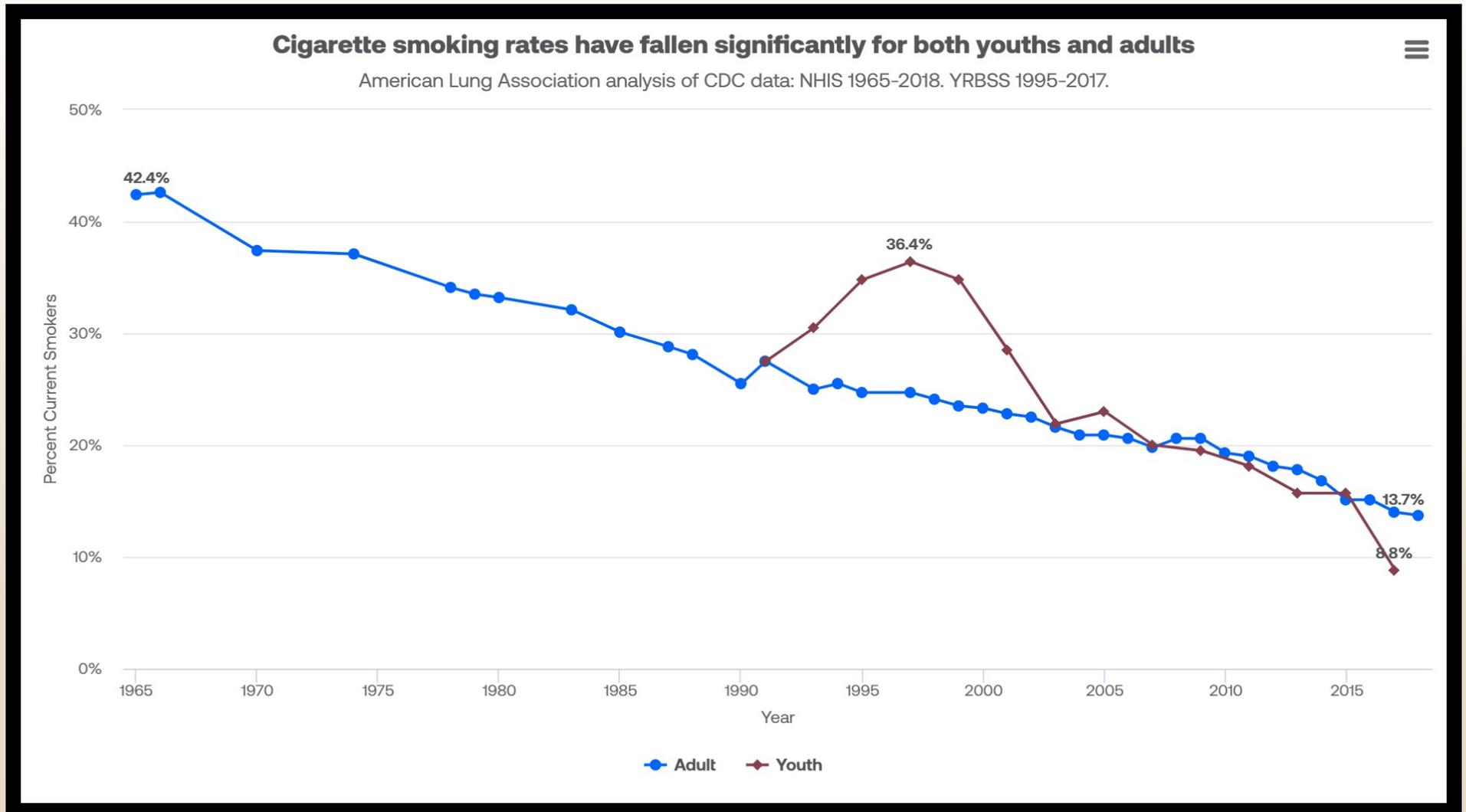
Ten Great Public Health Achievements -- United States, 2001-2010

- Vaccine-Preventable Diseases
- Prevention and Control of Infectious Diseases
- Tobacco Control
- Maternal and Infant Health
- Motor Vehicle Safety
- Cardiovascular Disease Prevention
- Occupational Safety
- Cancer Prevention
- Childhood Lead Poisoning Prevention
- Public Health Preparedness and Response

— From CDC, [Morbidity and Mortality Weekly Report](#), May 20, 2011.

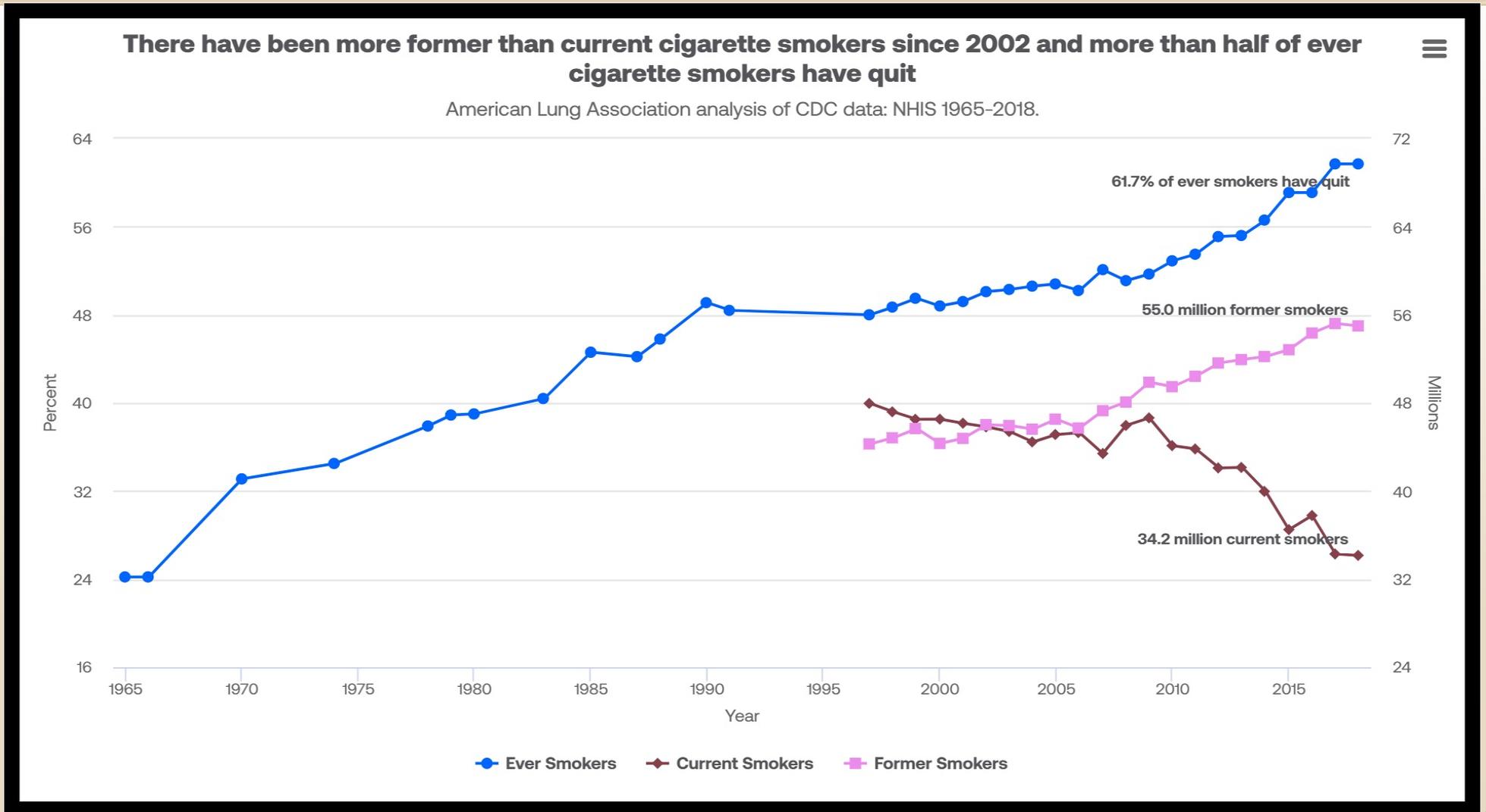
<https://guides.lib.berkeley.edu/publichealth/whatisph/achievements>

# Tobacco Control as a Top 10 Public Health Achievement



<https://www.lung.org/research/trends-in-lung-disease/tobacco-trends-brief/overall-tobacco-trends>

# Tobacco Control as a Top 10 Public Health Achievement



<https://www.lung.org/research/trends-in-lung-disease/tobacco-trends-brief/overall-tobacco-trends>

# Triumphs in Tobacco Control

- Policy changes (Levy et al., 2004; 2010; USPHS Surgeon General, 2020)
- Evidence-based cessation therapies
- Increased reach (vs. F2F groups, etc.)
  - Quitlines (1-2% reach)
  - Digital and mHealth
  - Proactive/opt-out approaches

# And yet...



World Health Organization

Health

Topics



Countries



Newsroom



Emergencies



Data



About

WHO

## Key facts

- Tobacco kills up to half of its users.
- Tobacco kills more than 8 million people each year. More than 7 million of those deaths are the result of direct tobacco use while around 1.2 million are the result of non-smokers being exposed to second-hand smoke.
- Over 80% of the world's 1.3 billion tobacco users live in low- and middle-income countries.

## Leading cause of death, illness and impoverishment

## AI for Quitting Tobacco Initiative



Meet Florence – the digital health worker to help you quit tobacco

Q&As

<https://www.who.int/news-room/fact-sheets/detail/tobacco>



UW Center for  
Tobacco Research and Intervention  
UNIVERSITY OF WISCONSIN  
SCHOOL OF MEDICINE AND PUBLIC HEALTH

# Limited population impact of treatments

---

- Treatments have low reach
- Relapse rates are high
- We know little about how treatments work or how best to use them

# Cessation Treatment Report Card

Domain	Pharmacotherapy Grade	Psychosocial Tx Grade
Reach		
Effectiveness		
Mechanisms		
Treatment planning and matching		

# Reach: Pupil trying, but needs to improve

- 68% adults who smoke want to stop and 55% attempt to quit annually (Babb et al., 2017)
- Most quit attempts are made without evidence-based treatment (Babb et al., 2017)
  - 29% use any medication
  - 7% use any counseling
  - 5% use both (4% use quitlines)

# Reach: Promising Directions

- Health system changes (e.g., eReferral, Fiore et al., 2019)
- Digital/mobile interventions (Borelli et al., 2015; Graham et al., 2020)
- Direct outreach
  - Opt out (Richter & Ellerbeck, 2015)
  - Warm handoffs (Richter et al., 2016)
  - Incentives (Fraser et al., 2017)
  - Media campaigns (Maciosek et al., 2020; Murphy-Hoefer et al., 2018)
  - Motivation-phase treatment (e.g., medication sampling (Carpenter et al., 2020))

# Cessation Treatment Report Card

Domain	Pharmacotherapy Grade	Psychosocial Tx Grade
Reach	C	D
Effectiveness		
Mechanisms		
Treatment planning and matching		

# Effectiveness: Pharmacotherapy

- Strengths

- 7 first-line medications (Cahill et al., 2013; Fiore et al., 2008)
  - 5 NRT formulations
  - Varenicline
  - Bupropion
- Comparative effectiveness (Cahill et al., 2013; Lindson et al., 2019)
  - Combination NRT or varenicline vs. monotherapy (cf Baker et al., 2016; McCarthy & Versella, 2019)

- Challenges

- Adherence (enter e-cigarettes) (Hollands et al., 2019; Schlam et al., 2018, 2020)
- Population effectiveness (Leas et al., 2018; Pierce & Gilpin, 2002)

# Effectiveness: Pharmacotherapy

- Promising Phase-Based Treatments (Baker et al., 2012)
  - Motivation phase (Cook et al., 2016; Moore et al., 2009)
  - Preparation treatment (Bohadana et al., 2020; Lindson & Avery, 2011; Lindson et al., 2019; Piper et al., 2016)
  - Extended treatment (Killen et al., 2006; Schlam et al., 2016)
  - Relapse prevention (among abstainers) (Livingstone-Banks et al., 2019; Schnoll et al., 2015)
  - Chronic care (Ellerbeck et al., 2009; Joseph et al., 2011)
- Effects generally modest; combined effects unclear

# Cessation Treatment Report Card

Domain	Pharmacotherapy Grade	Psychosocial Tx Grade
Reach	C	D
Effectiveness	B-	
Mechanisms		
Treatment planning and matching		

# How do medications affect abstinence?

- Pharmacotherapy
  - Craving reduction (Bolt et al., 2012; Brandon et al., 2011; Ferguson et al., 2006)
  - Reduced reward from smoking (Lu et al., 2017; West et al., 2008)
  - Reduced anhedonia/withdrawal (Cook et al., 2016; Schassburger et al., 2015)
  - Non-specific effects on confidence and motivation (McCarthy et al., 2010)

# Cessation Treatment Report Card

Domain	Pharmacotherapy Grade	Psychosocial Tx Grade
Reach	C	D
Effectiveness	B-	
Mechanisms	B	
Treatment planning and matching		

# Treatment Planning & Matching

- Matching treatment based on NMR
  - Slow metabolism → better NRT response (Chenowith et al., 2016)
  - Fast metabolism → greater benefit from varenicline than NRT (Lerman et al. 2015)
- rs16969968 nicotinic receptor gene, among those of African-American ancestry (Chen et al., 2020)
  - GG genotype → greater benefit from NRT than varenicline
  - GA/AA genotype → reverse pattern
- Effectiveness in real-world use not yet known

# Cessation Treatment Report Card

Domain	Pharmacotherapy Grade	Psychosocial Tx Grade
Reach	C	D
Effectiveness	B-	
Mechanisms	B	
Treatment planning and matching	C-	

# Effectiveness: Psychosocial Treatment

- Strengths
  - Counseling ( $\geq 10$  min) better than none (Fiore et al., 2008; Lancaster & Stead, 2017)
    - Multiple modalities, formats, and counselors work
    - Effect sizes small to moderate (e.g., RR 1.34, smaller if with medication RR=1.14; Lancaster & Stead, 2017)
    - More is better, to a point ( $\sim 90$  min, Fiore et al., 2008; Lancaster & Stead, 2017)

# Effectiveness: Psychosocial Treatment

- Dominant model=CBT/skills/coping training
  - Quitline model ([www.naquitline.org](http://www.naquitline.org))
  - TTS model (<https://cttp.org/accredited-programs>)
  - Grounded in behavioral research
    - Identify triggers/CS
    - Avoid
    - Cope
- Skill training similar to active controls
  - ACT has similar effects (Bricker et al., 2018)

# 5 RCTs of Skills Training (ST) vs. control

Study	N	ST sessions	Control (C)	Outcome	Results
<b>Digiusto &amp; Bird 1995</b>	137	4 group	5 group sessions	7-day PPA @6mo	ST=33% C=40%
<b>Jorenby et al. 1995</b>	504	Indiv.:3 15-min Group: 8 1-h	Minimal support/self-help	7-day PPA @6mo CO <10 ppm	Indiv.=32% Group=26% C=25%
<b>McCarthy et al. 2008</b>	463	8 10-min 1-on-1	Med. mgmt.	7-day PPA @12mo CO <8 ppm	ST=16.2% C=16.6%
<b>Mermelstein et al. 2003</b>	771	6 15-min calls	6 15-min calls	7-day PPA @12mo CO <8 ppm, sal. cot.<10 ng/ml	ST=30% C=33%
<b>Zelman et al. 1992</b>	116	6 60-75-min group	6 60-75-min educ./support groups	Cumulative survival @12mo	ST=33% C=38%

# Effectiveness: Psychosocial Treatment

- Promising strategies in need of more support
  - Incentives (Cahill et al., 2015; Fraser et al., 2017)
    - Abstinence (OR 1.49) (Notley et al., 2019)
    - Increase reach (Tong et al., 2018)
    - Treatment utilization (OR 1.72, mediation via increased call completion) (Fraser et al., 2017)
  - Digital
    - Great potential for reach, but effect sizes modest (Do et al., 2018; Taylor et al., 2017; Whittaker et al., 2016)
    - Rigorous trials needed (Whittaker et al., 2019; see Bricker et al., 2020)

# Effectiveness: Psychosocial Treatment

- Areas in need of improvement
  - Identifying active components
  - Building packages with additive or synergistic effects (Graham et al., 2020)
  - Comparative effectiveness

# What if less is more?

(Baker, Bolt, & Smith, 2021)

	<b>Study 1 Schlam et al., 2016 (N=513)</b>	<b>Study 2 Fraser et al., 2014 (N=1034)</b>	<b>Study 3 Cook et al., 2016 (N=517)</b>
Main effects	+	+	+
2 components on	-	-	-
3 components on	-	-	-
4 components on	-	-	-
5 components on	-	-	-

# Effectiveness: Psychosocial Treatment

- Fraser et al., 2014 2<sup>5</sup> factorial experiment
  - Smokefree.gov vs. control website
  - Motivational e-mails for 12 weeks vs. none
  - 5 NCI Quitline calls vs. none
  - NCI Clearing the Air vs. control booklet
  - 2-week nicotine mini-lozenge starter kit vs. none
- Sub-additive effects
  - e.g., adding e-mail messages to web support decreased web support effects

# Cessation Treatment Report Card

Domain	Pharmacotherapy Grade	Psychosocial Tx Grade
Reach	C	D
Effectiveness	B-	C
Mechanisms	B	
Treatment planning and matching	C-	

# Mechanisms: Psychosocial Treatment

- Does skill training really teach skills?
  - Strengths:
    - Grounded in theory and evidence (Carter & Tiffany, 1999; Perry et al., 2014; Robinson & Berridge, 2008; Shiffman et al., 1996)
    - Some evidence coping can be taught (Zelman et al., 1992)
  - Areas for growth
    - Skill application and effectiveness in real-world settings or when most needed (Brandon et al., 1990; Drobles et al., 1994; Sayette, 2016)
    - Limited evidence that treatments affect targets (e.g., coping, craving) (McCarthy et al., 2010)

# Cessation Treatment Report Card

Domain	Pharmacotherapy Grade	Psychosocial Tx Grade
Reach	C	D
Effectiveness	B-	C
Mechanisms	B	D
Treatment planning and matching	C-	

# Treatment Planning and Matching

- Most counseling approaches involve some degree of tailoring
  - Triggers
  - Values
  - Motives
  - Social support
- Personalization may augment other digital intervention features (Graham et al., 2020)
- Evidence for matching to treatment package or components lacking

# Cessation Treatment Report Card

Domain	Pharmacotherapy Grade	Psychosocial Tx Grade
Reach	C	D
Effectiveness	B-	C
Mechanisms	B	D
Treatment planning and matching	C-	C-

# Conclusions

- Tobacco control triumphs are real, but not due to treatment
- Much work remains
  - Connecting the many people who want to quit with treatment
  - Enhancing effectiveness
  - Integrating theory and application; specifying and testing mechanisms
  - Adapting to the changing tobacco and technology context

# Thank you

UNIVERSITY of WISCONSIN-MADISON

LOCATIONS

QUIT LINE: 800-784-8669

QUIT LINE: REGISTER ONLINE

UW-CTRI RESEARCH STUDIES

MEDICATIONS



**UW-CTRI**

UW Center for Tobacco Research and Intervention

Search

[Home](#)

[About](#) ▾

[Quit Line](#)

[Smokers](#) ▾

[Vaping](#)

[Researchers](#) ▾

[Clinicians](#) ▾

[Employers](#) ▾

[Policy](#) ▾

[Español](#) ▾

Findings: Opt-Out Strategy Helps More Inpatients Get Tobacco Treatment

[Click here](#) »



**UW Center for  
Tobacco Research and Intervention**

UNIVERSITY OF WISCONSIN  
SCHOOL OF MEDICINE AND PUBLIC HEALTH