

# Using Health Information Technology to Spur Improvements in Psychological Approaches to Improve Health

Anupam Goel

November 14, 2019

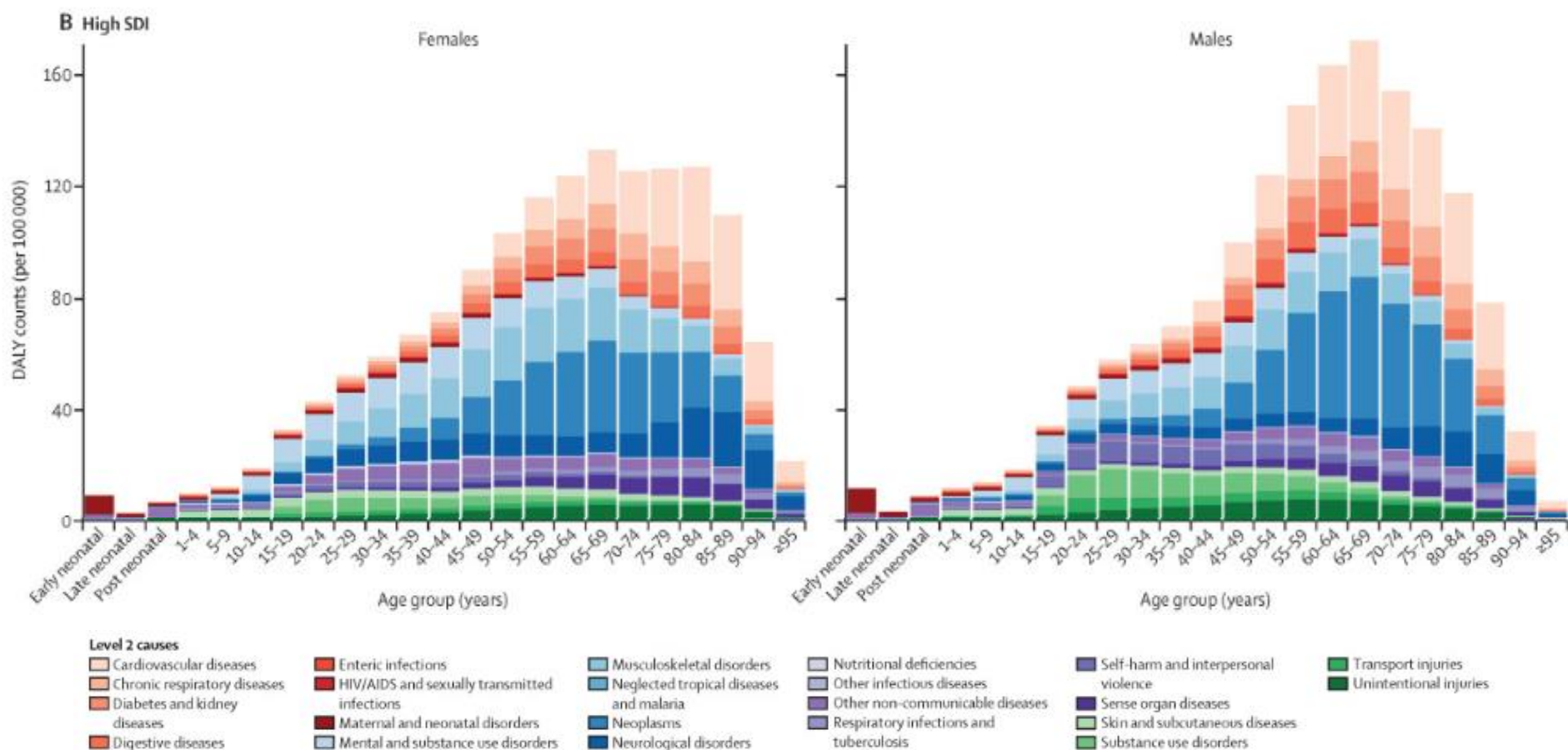
$$\text{DALY} = \text{YLL} + \text{YLD}$$

DALY = Disability-Adjusted Life Year

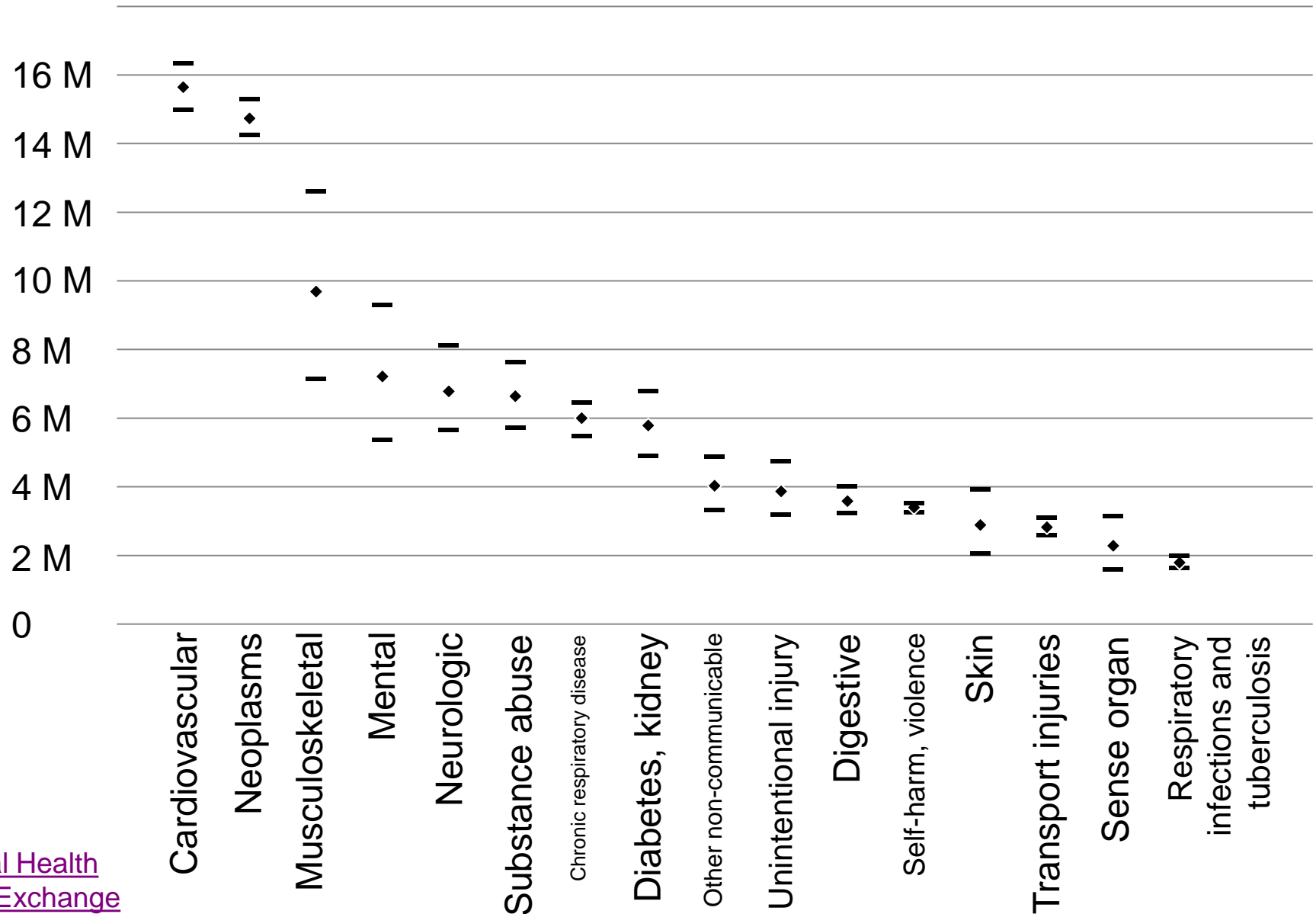
YLL = Years of Life Lost

YLD = Years Lost due to Disability

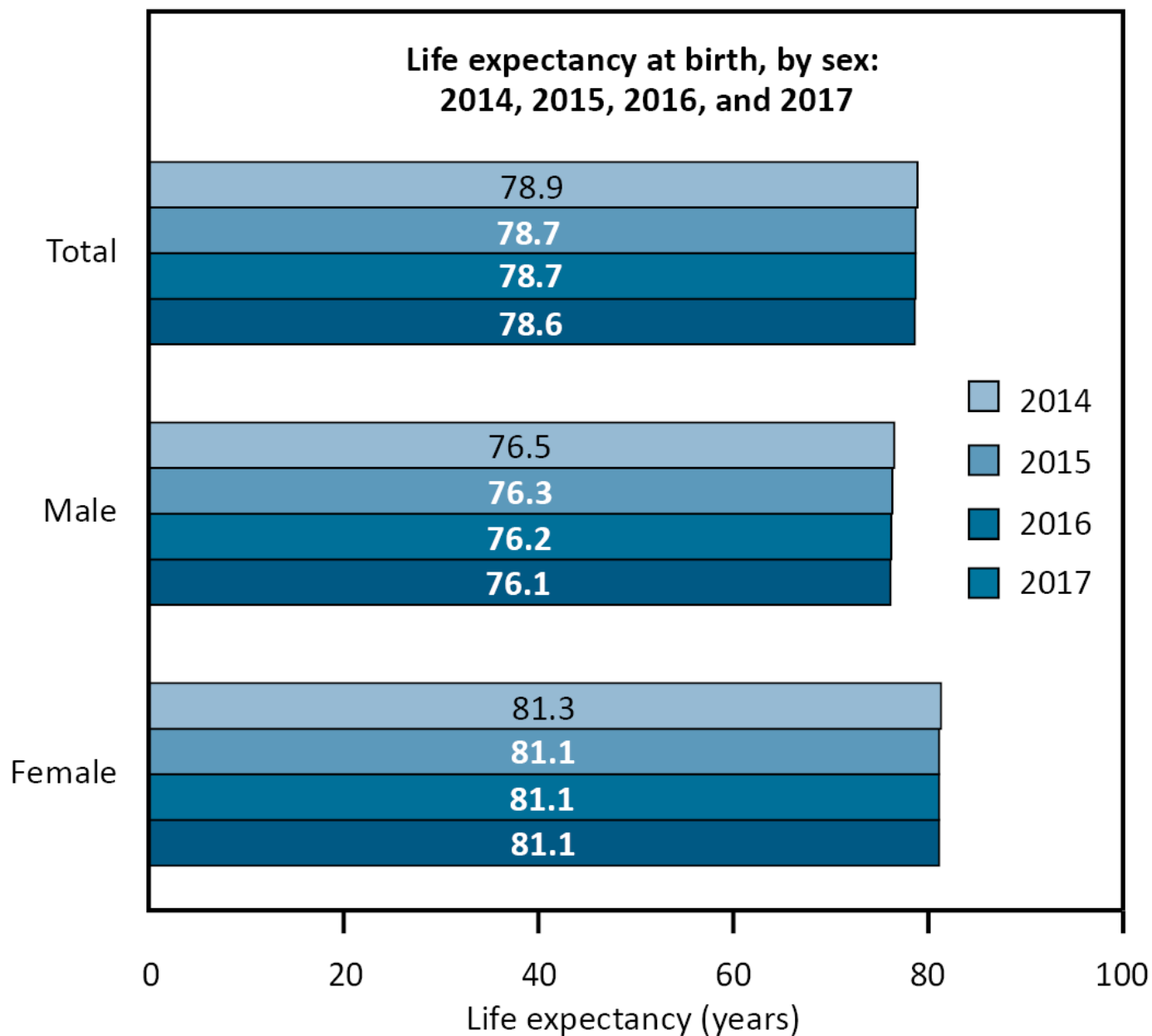
# DALYs by level 2 causes by age and sex for high socio-demographic index countries, 2017



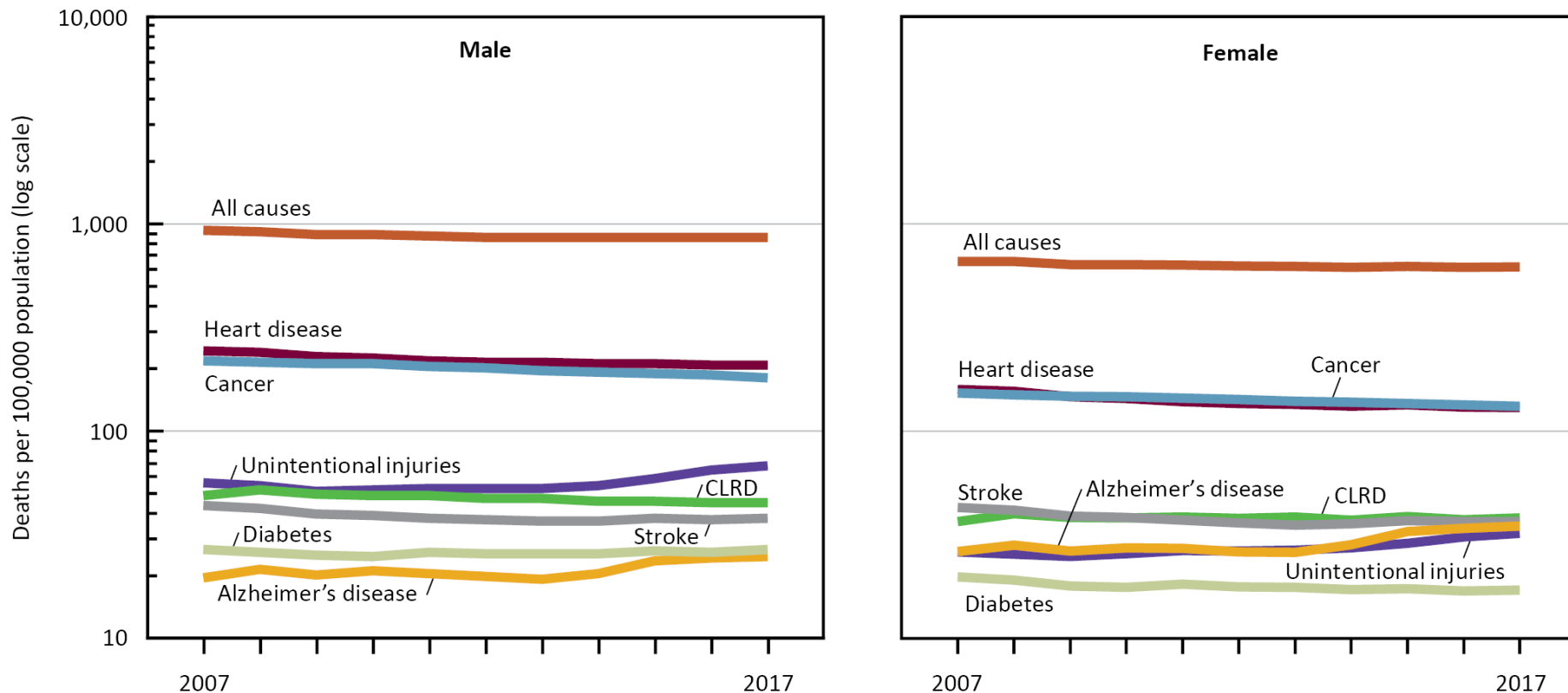
# Leading causes of Disability-Adjusted Life Years, US, Both sexes, All ages



<b>Risk Factor for people living in the United States</b>	<b>2007 DALYs (in 10,000s)</b>	<b>2017 DALYs (in 10,000s)</b>
<b>High body-mass index (metabolic)</b>	953	1,170
<b>Tobacco (behavioral)</b>	1,130	1,100
<b>Dietary risks (behavioral)</b>	955	1,050
<b>High fasting plasma glucose (metabolic)</b>	768	972
<b>High systolic blood pressure (metabolic)</b>	718	804
<b>Drug use (behavioral)</b>	403	673
<b>Alcohol (behavioral)</b>	361	419
<b>High LDL cholesterol (metabolic)</b>	405	399
<b>Low bone density (metabolic)</b>	53.8	73.0
<b>Childhood maltreatment (behavioral)</b>	36.3	38.5
<b>Intimate partner violence (behavioral)</b>	30.4	30.1

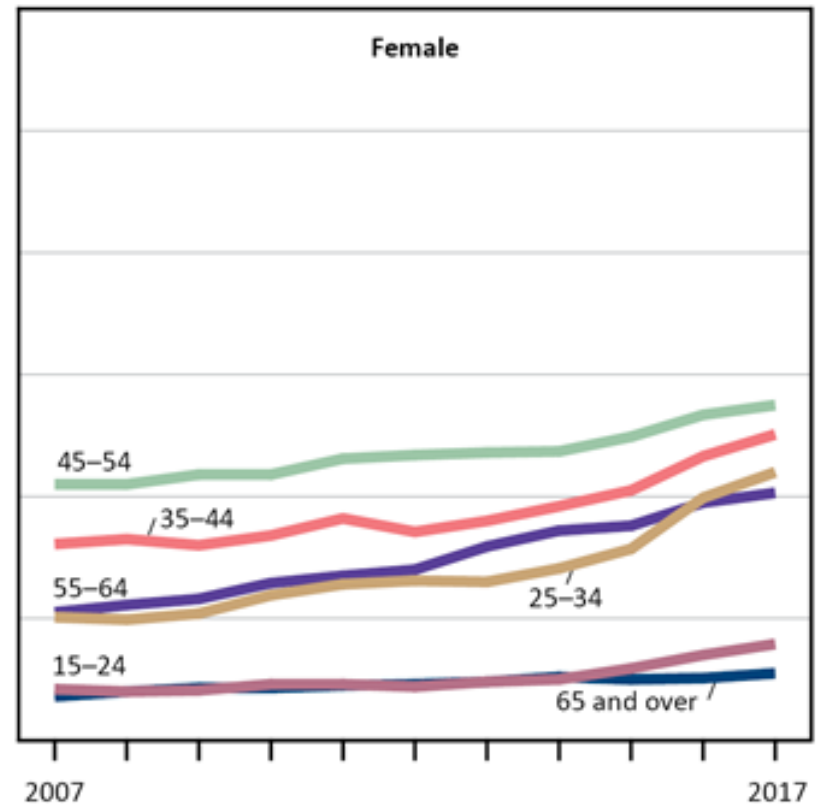
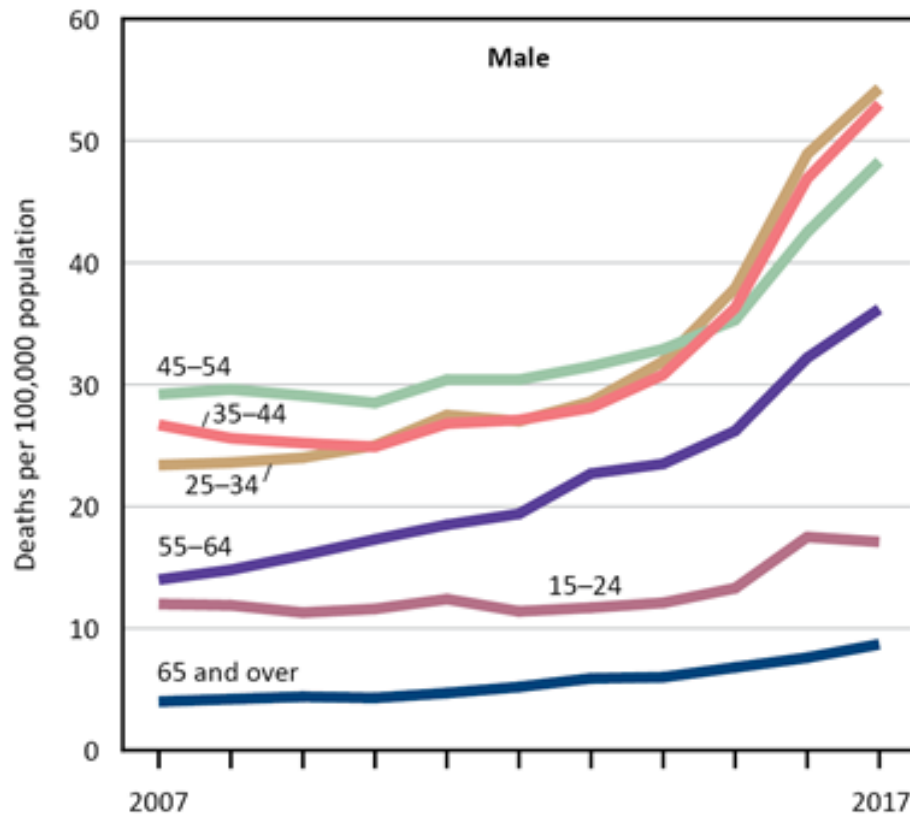


## Age-adjusted death rates for selected causes of death for all ages, by sex: United States, 2007-2017\*



\*Unintentional injuries include drug overdoses.

## Drug overdose death rates among persons aged 15 years and over, by sex and age: United States, 2007-2017\*

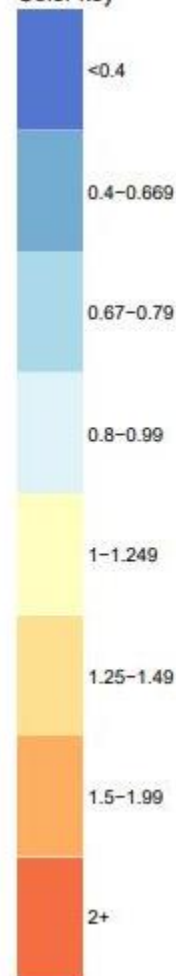


\*87% unintentional, 7% suicide, <1% homicide.



Male						Female				
	1	2	3	4	5	1	2	3	4	5
High-income	Smoking 0.65	BMI 0.83	FPG 0.86	Alcohol 0.64	SBP 0.54	Smoking 0.98	BMI 0.91	FPG 0.93	SBP 0.59	Drugs 2.84
High-income North America	BMI 1.3	Smoking 0.65	Drugs 3.67	FPG 1.18	SBP 0.66	BMI 1.5	Smoking 1.21	FPG 1.33	Drugs 6.37	SBP 0.81
Canada	Smoking 0.59	BMI 0.87	FPG 0.88	SBP 0.5	Drugs 1.76	Smoking 1.16	BMI 1.04	FPG 0.87	SBP 0.58	Drugs 3.15
Greenland	Smoking 1.22	Alcohol 0.99	SBP 0.61	FPG 0.82	BMI 0.8	Smoking 3.84	BMI 0.83	SBP 0.55	FPG 0.71	Alcohol 1.45
United States	BMI 1.35	Drugs 3.89	Smoking 0.66	FPG 1.21	SBP 0.68	BMI 1.55	Smoking 1.22	FPG 1.38	Drugs 6.73	SBP 0.83

Color key



### Summary of Americans' Experience With Drinking and Drug Abuse as Family Problems

	<b>U.S. adults</b>
	%
Drinking, only, a cause of trouble in family	18
Drugs, only, a cause of trouble in family	10
Drinking and drugs both causes of trouble in family	18
Neither	54

GALLUP, 2018-2019

Never Enough  
Never Enough  
Never Enough  
Never Enough  
Never Enough  
Never Enough  
Never Enough  
Never Enough  
Never Enough  
Never Enough  
Never Enough

The Neuroscience and  
Experience of Addiction

Judith Grisel

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# Opioids Are an Equal-Opportunity Killer

The crisis brings misery to all races, parties and classes. My son died after taking a Xanax pill laced with fentanyl.

By Eric Bolling

Mr. Bolling created the Eric Chase Foundation to raise awareness about the opioid epidemic.

Oct. 29, 2019, 11:06 a.m. ET



Nicole Xu

Opinion section, New York Times

“My view is that Americans can band together to go deeper into this crisis, right to the core issue: how we treat pain. Pain is the body’s reaction to injury, chronic problems and disease. Everyone is susceptible to pain of some kind. It’s a unifying human experience.”



# Treatments

- Detoxification (if needed)
- Medications (varies by drug class)
- Counseling
  - Cognitive behavioral therapy
  - Motivational interviewing
  - Community reinforcement
  - Contingency management
  - Behavioral family therapy
  - 12-step facilitation

# Why Parents Make a Difference

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Having a warm, supportive relationship with children is linked to:



Strong Social Skills



Better Judgement



Increased Self-Control



Improved School  
Performance



Better Emotional  
Regulation



Resilience



Self-Confidence



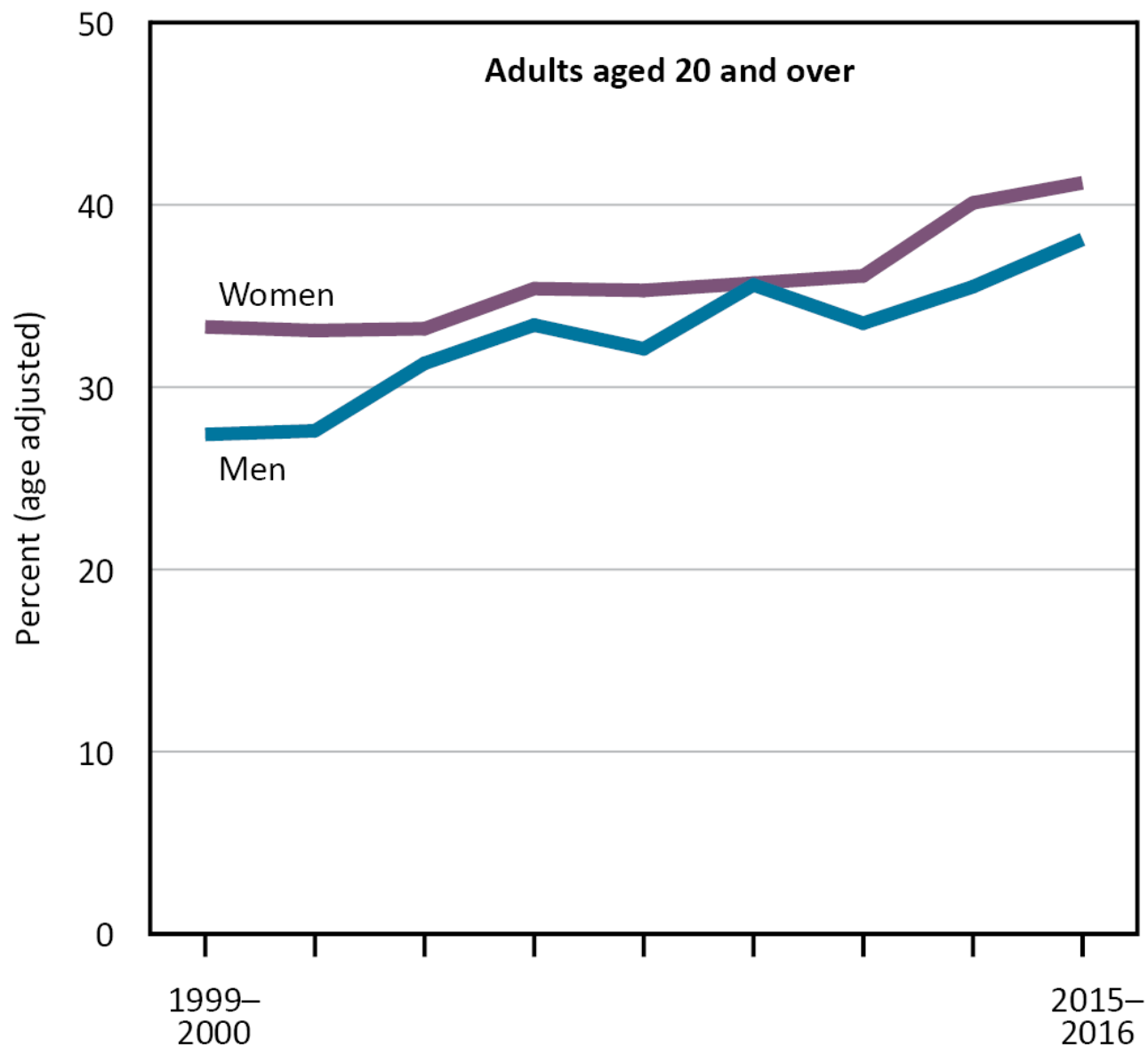
Decreased Substance  
Use

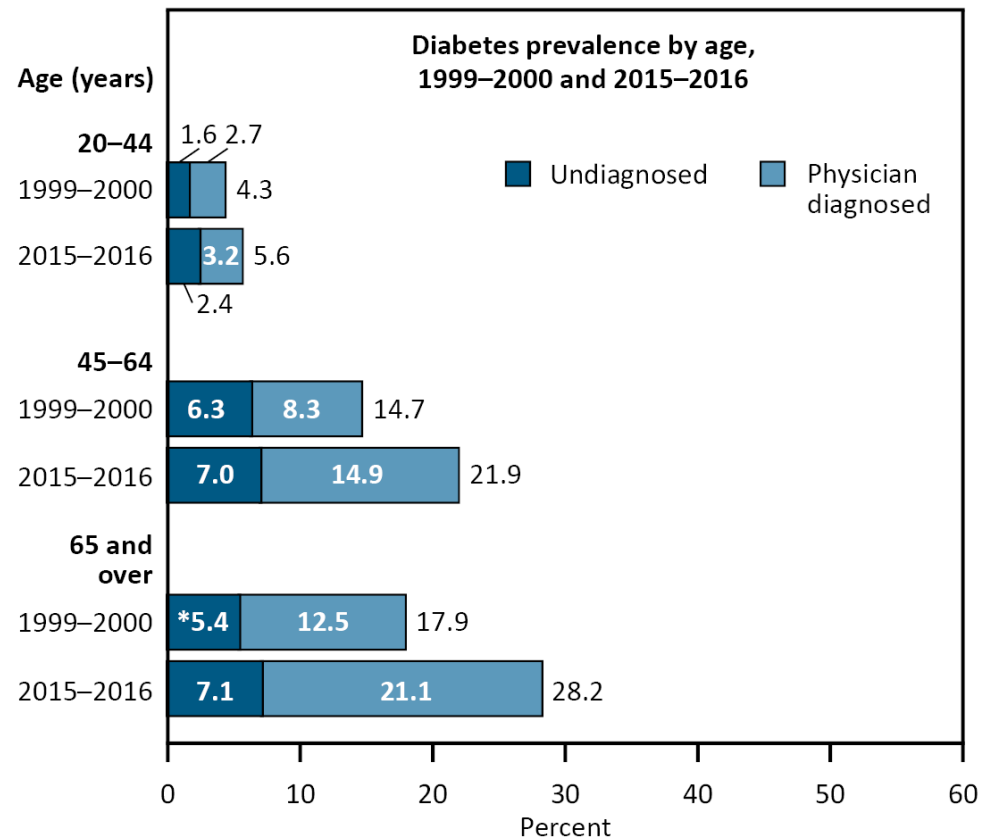
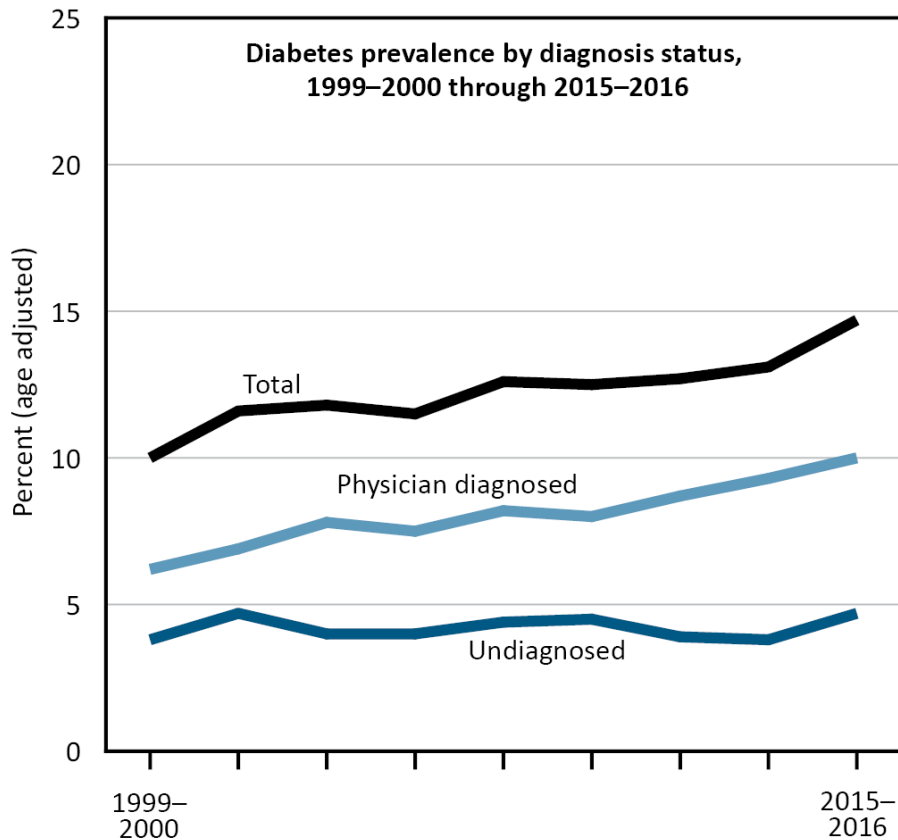


Center on Addiction, [February 2016](#)



## Obesity among adults, by sex, 1999-2000 through 2015-2016





# Mediators/predictors of medium/long-term weight control ( $\geq 12$ months)

Putative mediators (categories)	All analyses		
	Number of studies	Times tested	Effect, %
↓ Controlled motivation for PA	1	8	0
↑ Self-regulation skill use	6	6	83 <sup>a</sup>
↑ Body image/self-worth	4	34	62*
↑ Self-efficacy/barriers	6	28	68*
↑ Autonomous motivation for PA	2	8	100*
↑ Flexible restraint	2	5	60
↑ Positive outcome expectations/beliefs	3	6	50
↓ Eating disinhibition	3	16	38*
↑ Cognitive restraint (total)	4	8	50*
↓ Perceived hunger	3	5	20*
↑ Coping mechanisms	1	2	0

Forming  
healthy  
behaviors

Mental  
illness

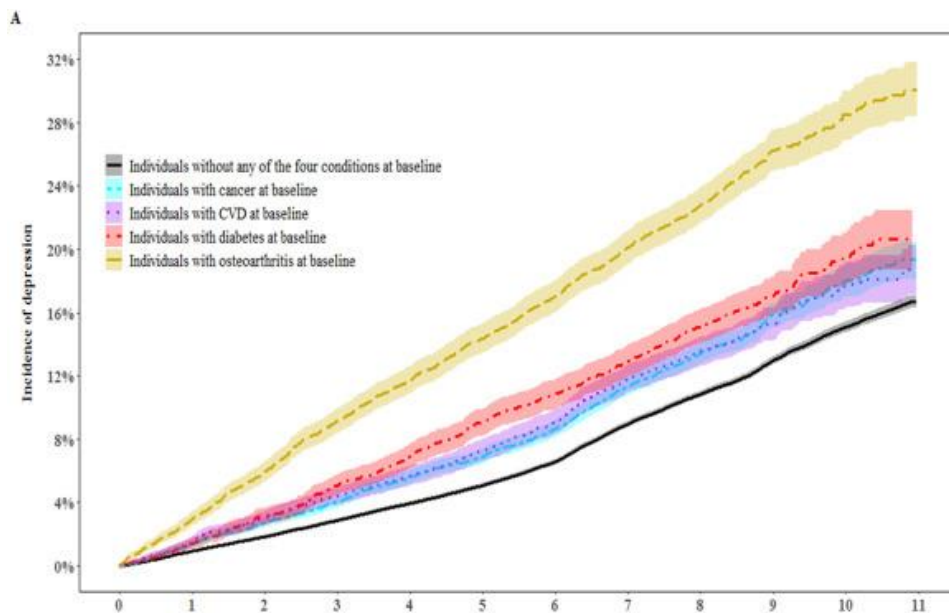
Pain  
management

Medication  
adherence

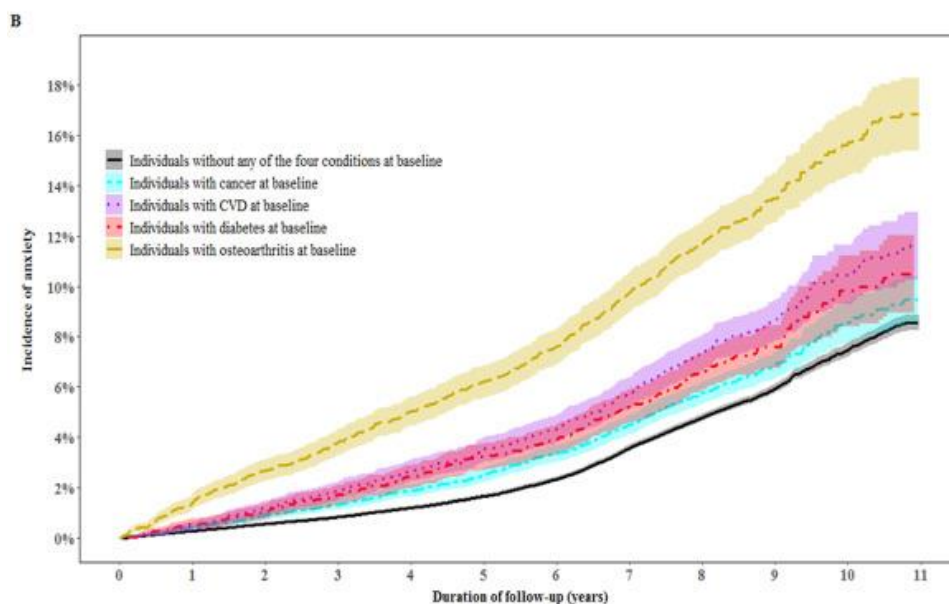
Changing  
addictive  
behaviors

# Incidence of Medication-Treated Depression and Anxiety Associated with Long-Term Cancer, Cardiovascular Disease, Diabetes and Osteoarthritis in Community-dwelling Women and Men

- 115,094 patients with long-term cancer, cardiovascular disease, diabetes and/or osteoarthritis 45-64 years old free of depression, anxiety and Parkinson's at baseline
- Followed patients for eight years to identify incident depression and anxiety



## Depression



## Anxiety

\*Adjusted for age, gender, country of birth, income, education, family history of conditions, hypertension, dyslipidemia, asthma, BMI and psychological distress

# Online interventions making a difference

Intervention	Target	Result	Source
Web-based guided self-help (cognitive-behavioral and problem-solving therapy with an online trainer)	Prevent major depression among adults with subthreshold depression	NNT at 12 months 5.9 (3.9-14.6)	<a href="#">JAMA 2016.5.3</a>
Internet-delivered behavioral intervention that includes motivational incentives, as a clinician-extender	Substance use disorders	Higher abstinence rate (OR 1.62, 1.12-2.35)	<a href="#">Am Journal Psychiatry 2014.12</a>
Multiple modules of contingency management via Internet	Illicit substance use	Increase in abstinence (OR 1.62 [1.12-2.35])	<a href="#">Am J Psychiatry 2014.6</a>
Smartphone-based monitoring, information, communication, and support services	Alcohol dependence	Fewer risky drinking days (mean difference 1.37 (0.46-2.27))	<a href="#">JAMA Psychiatry 2014.5</a>

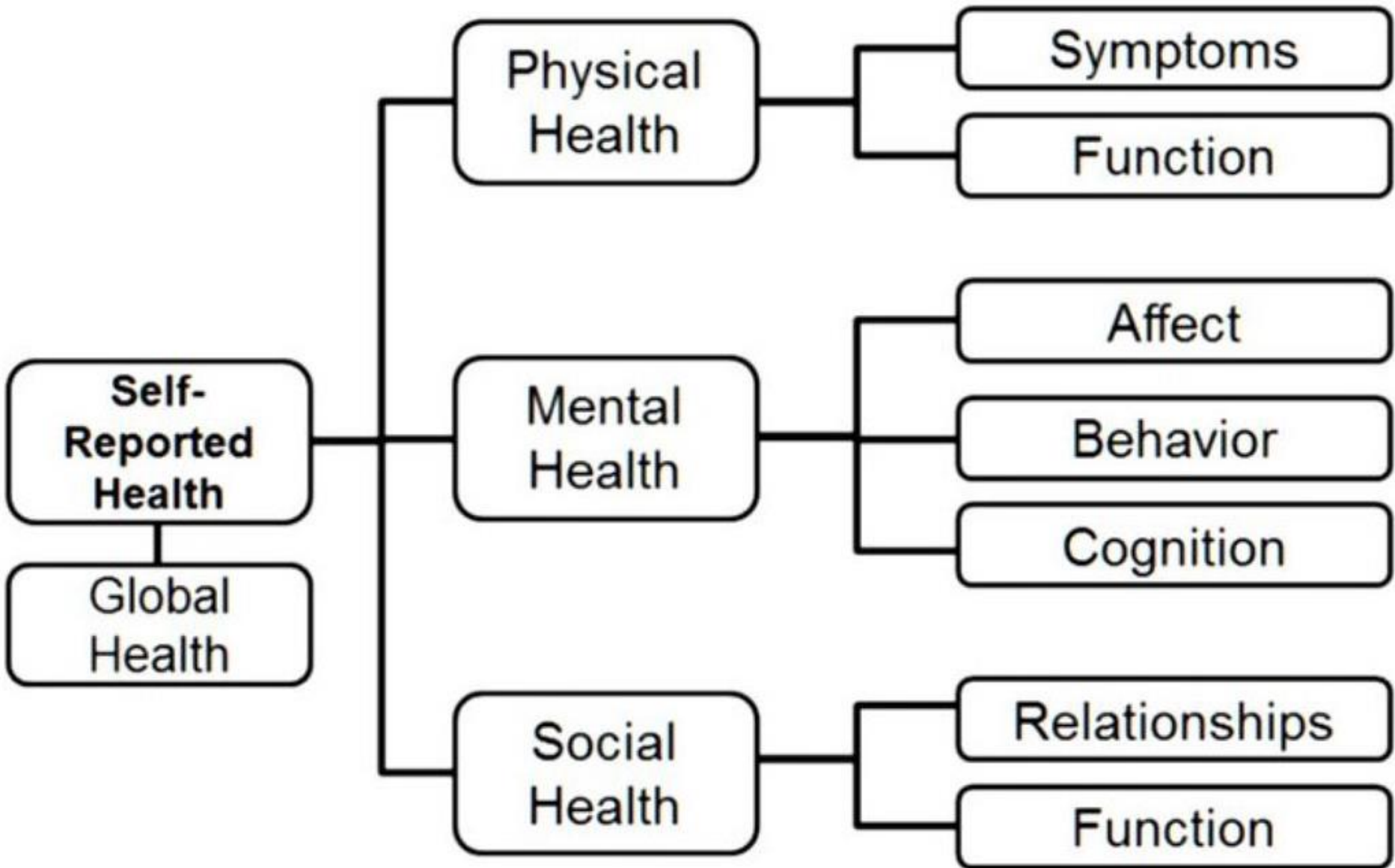
# Online interventions with unclear effectiveness

Intervention	Target	Result	Source
Mobile phone text messaging and app-based	Active smokers	Greater quit rates than minimal smoking cessation, but perhaps not more effective than more intensive efforts	<a href="#">Cochrane Review 2019.10.22</a>

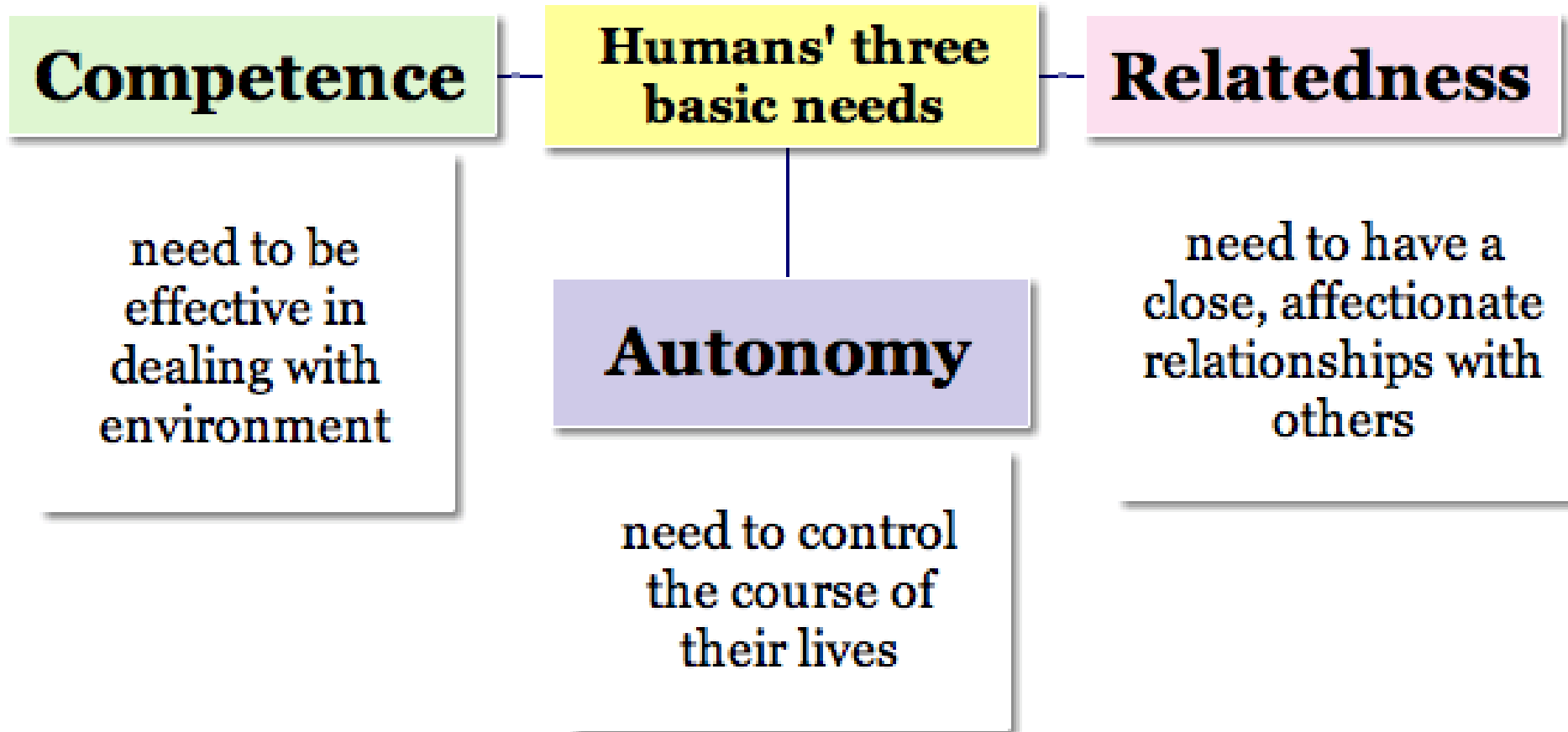


# Online interventions that are not effective

Intervention	Target	Result	Source
Web-based alcohol screening and brief intervention	College students scoring $\geq 4$ on AUDIT-C	No change in overall drinking	<a href="#">JAMA 2014.3.26</a>
Web-based cognitive behavioral therapy	Cocaine, marijuana, opioid, alcohol, or other stimulant abuse or dependence and who spoke Spanish as their preferred or principal language	No reduction in days of their primary substance use by week over time	<a href="#">American Journal of Public Health 2018.11</a>
Group-based, manual-guided sessions on patient engagement in health care and the use of health IT resources, as well as facilitated communication with physicians,	Outpatient addiction treatment clinic	No improvement	<a href="#">JAMA Psychiatry 2016.8</a>

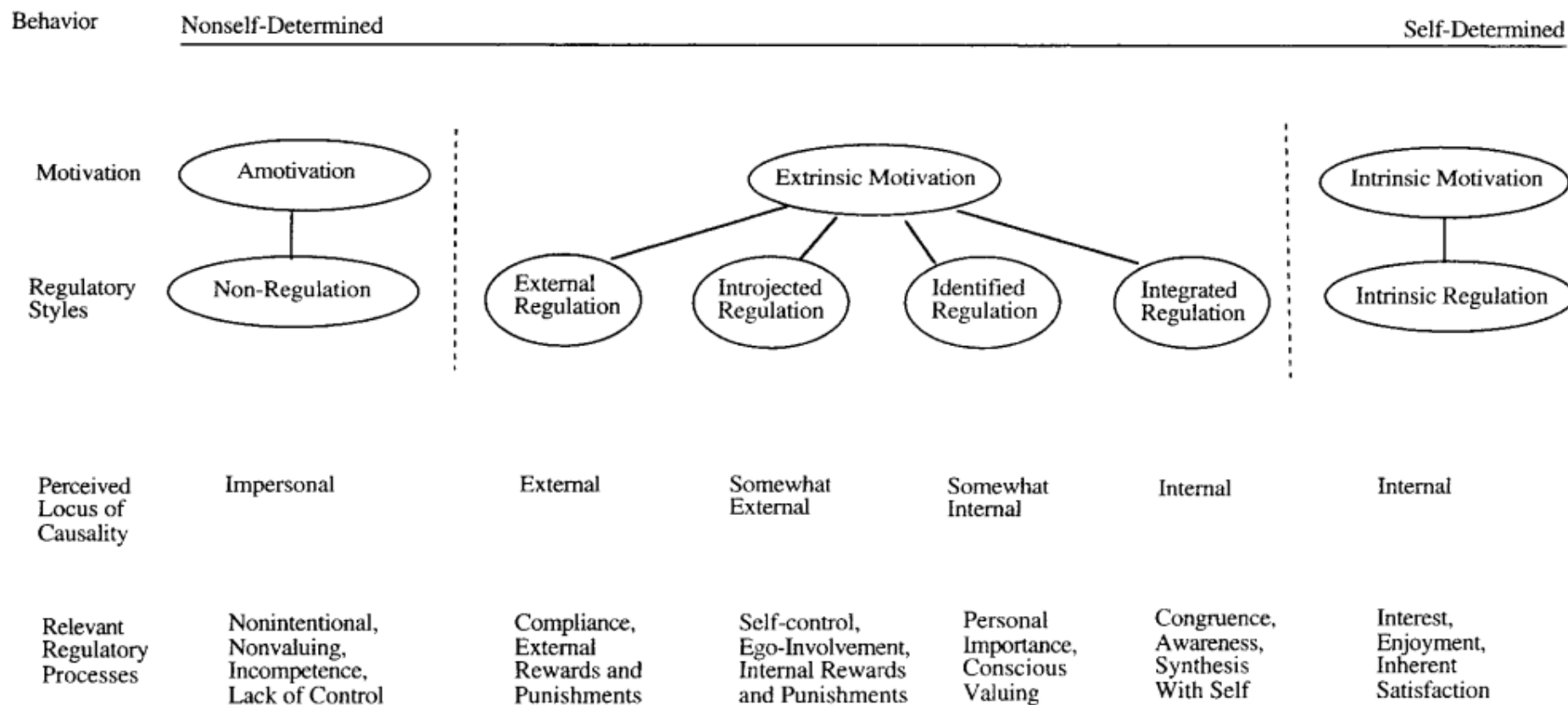


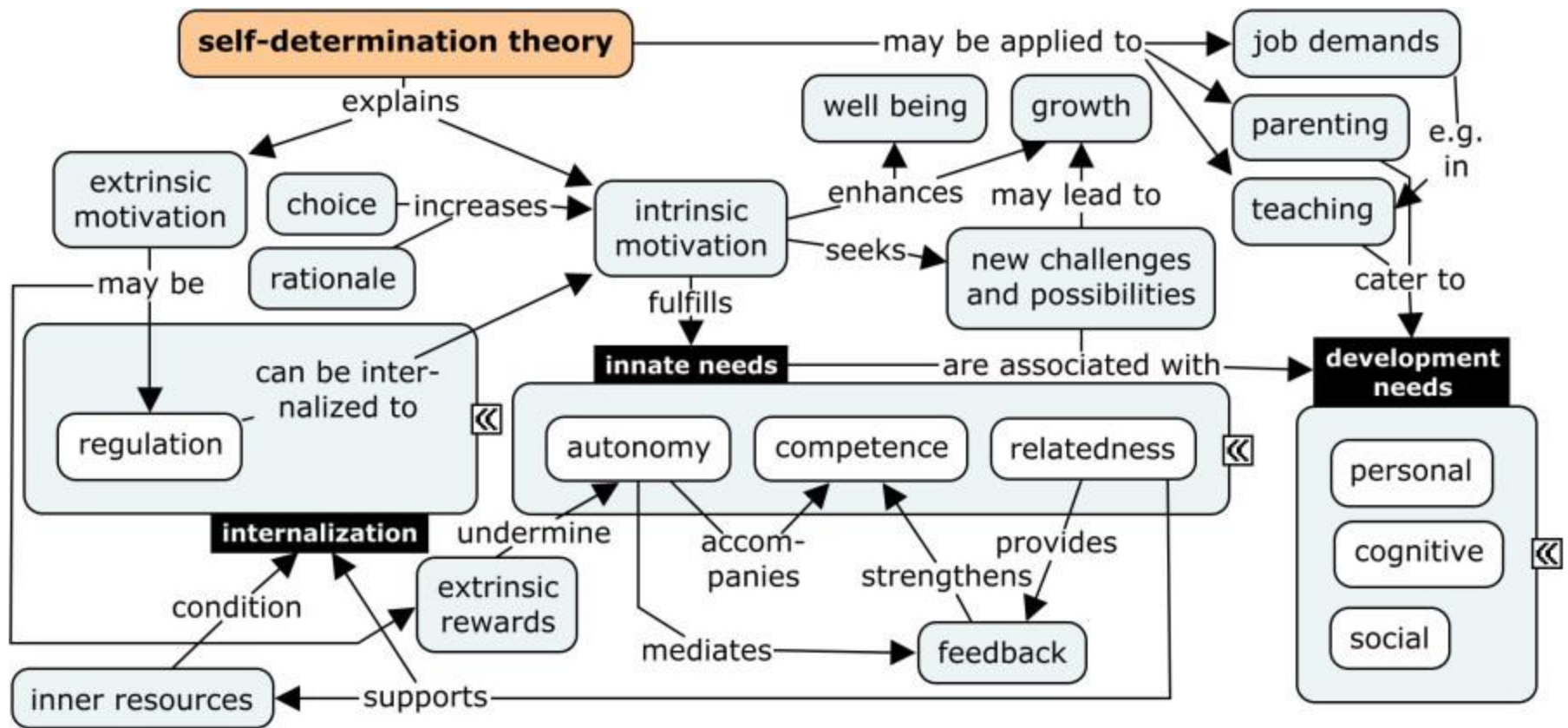
# Self-Determination Theory

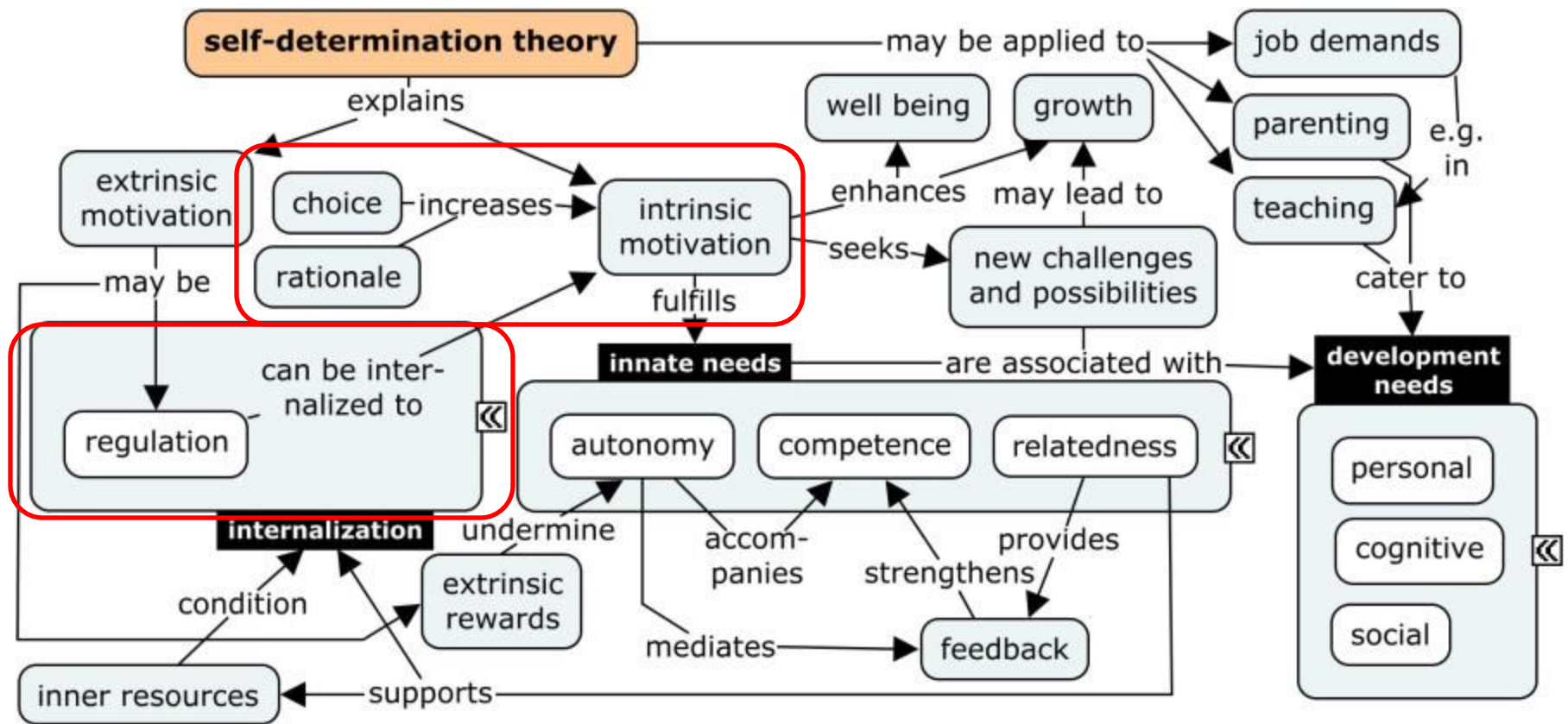


**Figure 1**

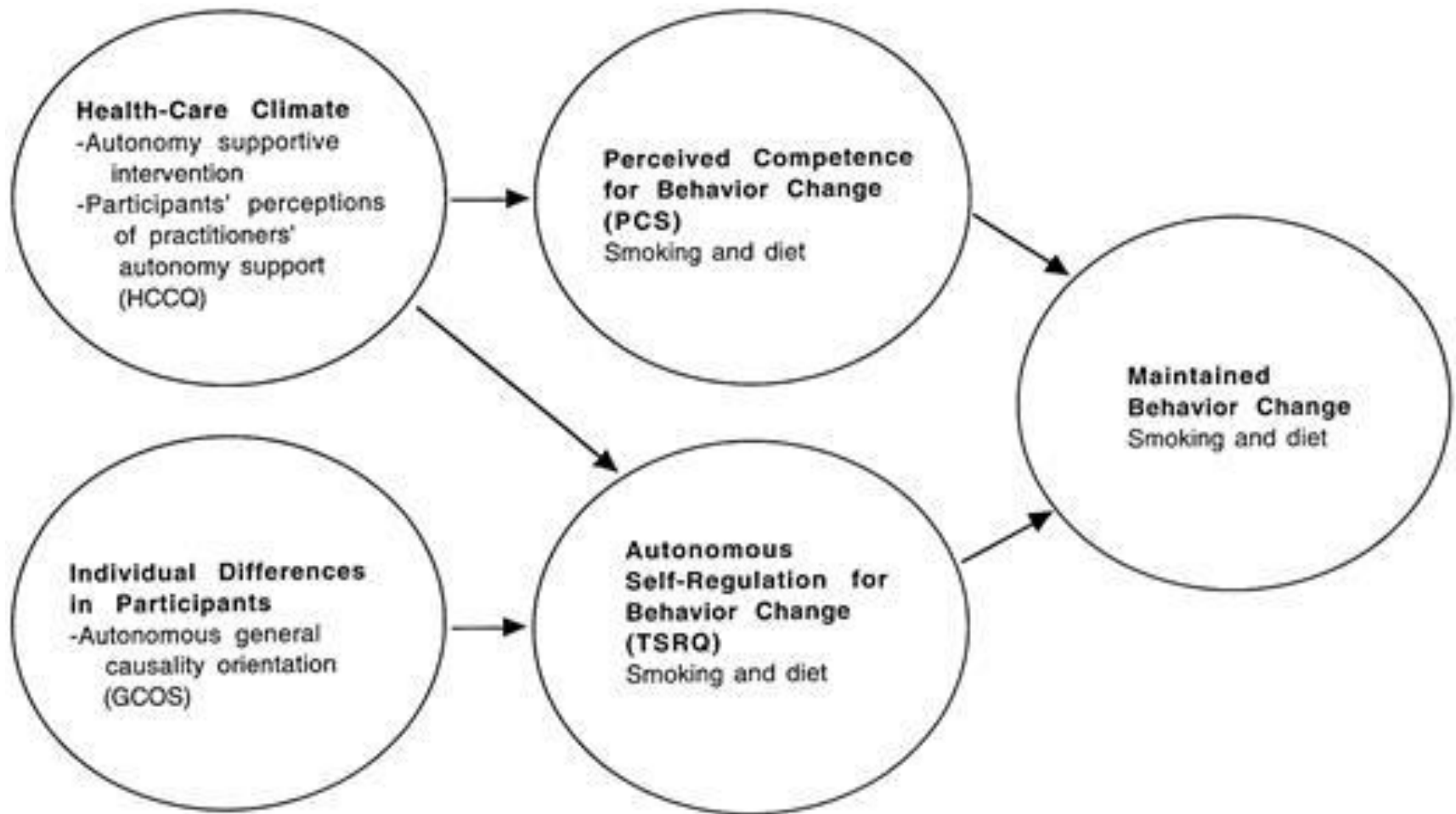
*The Self-Determination Continuum Showing Types of Motivation With Their Regulatory Styles, Loci of Causality, and Corresponding Processes*







# Self-determination, smoking, diet and health





# Three factors promoting internalization (by subsequent self-regulation of behavior)

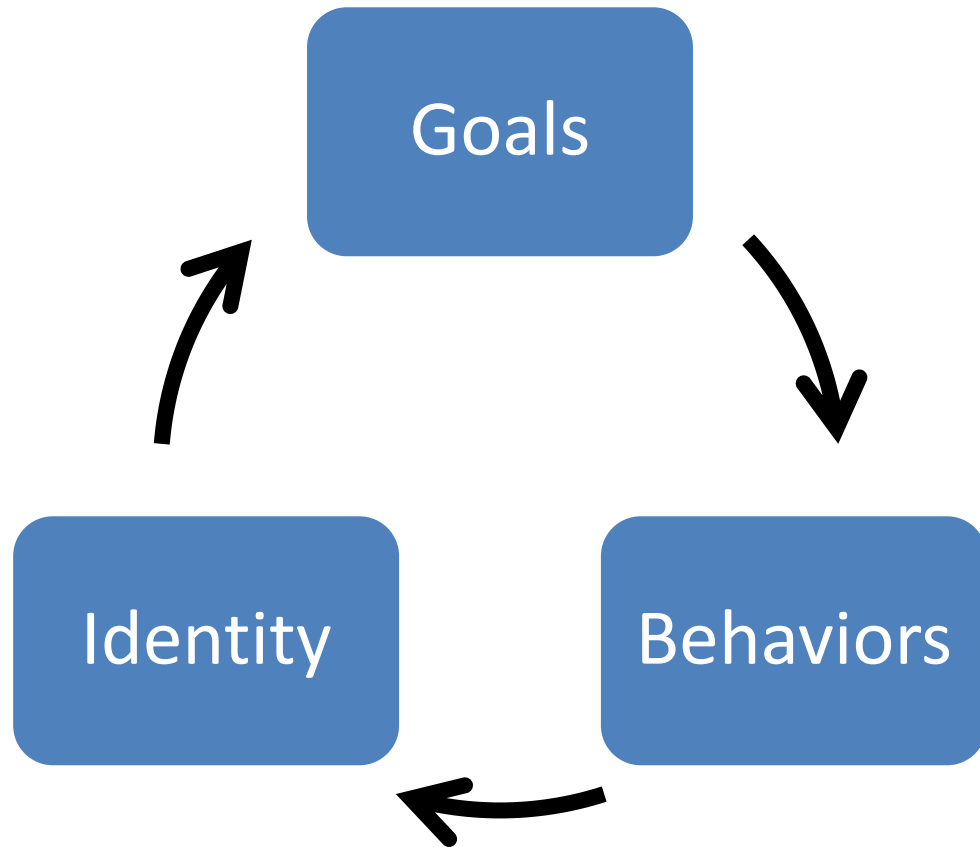
- Providing a meaningful rationale
- Acknowledging the behavior's feelings
- Conveying choice

*When social context supports self-determination, integration tends to occur.*

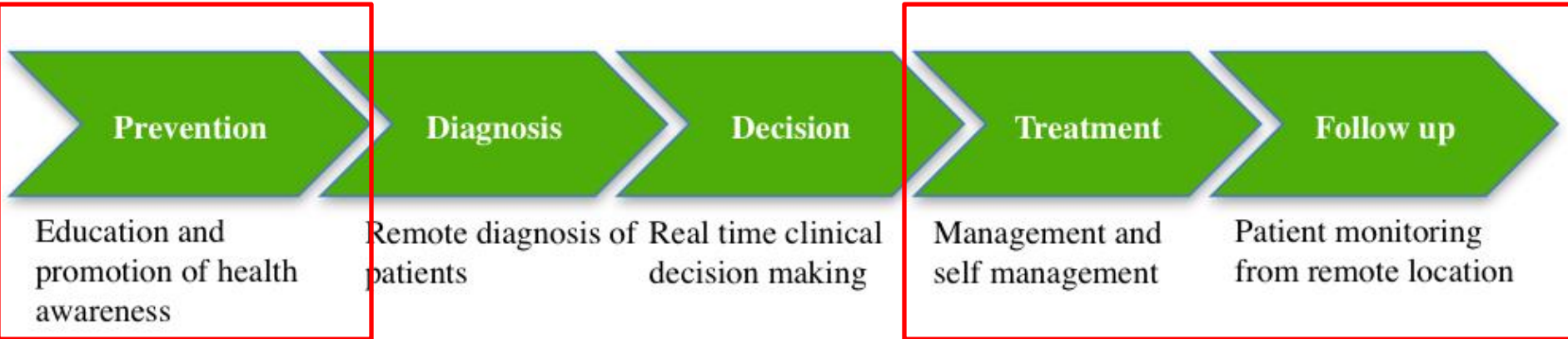


# Encouraging self-determination

- Self-awareness and self-knowledge
- Goal-setting ability
- Problem-solving skills
- Decision-making skills
- Ability to self-advocate
- Ability to create action plans to achieve goals
- Self-regulation and self-management skills







# Lay health worker-delivered psychological intervention for depression and anxiety

- Intervention: six sessions of individual problem-solving therapy delivered by trained, supervised lay health workers with up to six text messages
  - If necessary, referral to supervisor trained in mental health to reassess and manage the case
  - After four sessions, invited to optional six-session peer support program

Outcome	Mean (95% CI)		Analysis	
	Intervention (n = 260)	Control (n = 261)	Adjusted Mean Difference (95% CI) <sup>a</sup>	P Value
<b>Continuous</b>				
Primary				
SSQ-14 score	3.81 (3.28 to 4.34)	8.90 (8.33 to 9.47)	-4.86 (-5.63 to -4.10)	<.001
Nonprespecified secondary				
PHQ-9 score	4.50 (3.95 to 5.05)	11.01 (9.78 to 12.24)	-6.36 (-6.45 to -5.27)	<.001
Tertiary				
GAD-7 score	3.74 (3.27 to 4.21)	9.46 (8.68 to 10.24)	-5.73 (-6.61 to -4.85)	<.001
WHODAS 2.0 score	4.87 (4.32 to 5.42)	11.05 (9.56 to 12.54)	-6.08 (-7.46 to -4.71)	<.001
EQ-5D score	0.85 (0.83 to 0.87)	0.72 (0.68 to 0.76)	0.12 (0.08 to 0.17)	<.001

Abbreviations: GAD-7, Generalized Anxiety Disorder 7-item Scale; PHQ-9, 9-item Patient Health Questionnaire; SSQ-14, Shona Symptom Questionnaire; WHODAS 2.0, World Health Organization Disability Assessment Schedule version 2.0.

<sup>a</sup> Adjusted for age, sex, human immunodeficiency virus status, SSQ-14 score at baseline, and education.

**SSQ-14:** Shona Symptom Questionnaire (0-14)

**PHQ-9:** Patient Health Questionnaire (0-27)

**GAD-7:** Generalized Anxiety Disorder 7-item scale (0-12)

**WHODAS:** World Health Organization Disability Assessment Schedule, version 2.0 (0-48)

**EQ-5D:** EuroQOL 5D (0-25)

DOI: [10.1001/jama.2016.19102](https://doi.org/10.1001/jama.2016.19102)

Fully automated

Telemedicine

Professional health  
workers without  
technology support

Fully automated

Technology  
supporting remote  
lay health workers

Technology supporting  
face-to-face lay health  
workers +/- telemedicine

Telemedicine

Technology supporting  
face-to-face professional  
health workers

Professional health  
workers without  
technology support



# Health information technology interventions

- HIT could address multiple drivers of morbidity and mortality using psychological techniques
- HIT has had mixed success to-date moving patient-oriented outcomes
- Shifting identity, and interventions based on self-determination theory, cognitive behavioral therapy and problem-solving therapy could help increase HIT intervention effectiveness

# Health information technology interventions

- Consider different interventions across the spectrum of each symptom complex/disease
- Plan interventions within an established healthcare delivery system
- HIT can provide information, deliver feedback, and connect with others (including healthcare workers)
  - Measure effectiveness using a different approach
  - Escalate to providers when necessary
- Add new functions as pilot results inform next best steps

# Thank you

[linkedin.com/in/goelanupam](https://www.linkedin.com/in/goelanupam)

[anupam.goel@uhc.com](mailto:anupam.goel@uhc.com)