

# Tobacco Dependence and Addiction

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Disclosures

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Consult to NJOY (e-cigarettes)



# Outline

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- What is dependence / addiction?
- Is dependence uni-dimensional?
- Can we assess dependence in non-daily smokers?
- Are we missing key aspects of dependence?

# Wording

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**Dependence**

**=**

**Addiction**

**'Physical dependence'**

**≠**

**Addiction**

# Elements of Dependence

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- 'Physical' dependence
  - Tolerance
  - Withdrawal
- Attachment
  - Over-valuing
  - Salience
  - Preoccupation
- Impaired control
  - Subjective compulsion
  - Automaticity
  - Strong cue response
- Compulsive use
  - Drug-seeking
  - Difficulty quitting
- 'Family resemblance'

(Wittgenstein)

# One Dimension or Several?

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- One major dimension, multiple lesser (but relevant) dimensions
  - WISDM Primary Dependence Motives
    - Craving
    - Automaticity
    - Loss of control
    - Tolerance
  - NDSS-T
    - Drive
    - Tolerance
    - Continuity
    - Priority

# Multiple Validated Measures

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- FTND – Fagerstrom Test for Nicotine Dependence
- WISDM – Wisconsin Inventory of Smoking Dependence Motives
- NDSS – Nicotine Dependence Syndrome Scale
- DSM – Diagnostic & Statistical Manual (diagnosis)

# Moderate Correlations Among Validated Dependence Scales

	FTND	WISDM	NDSS	TDS	CPD
FTND	1				
WISDM	0.44	1			
NDSS	0.50	0.61	1		
TDS	0.26	0.39	0.37	1	
CPD	--	0.29	0.35	0.12	1

FTND – Fagerstrom Test for Nicotine Dependence

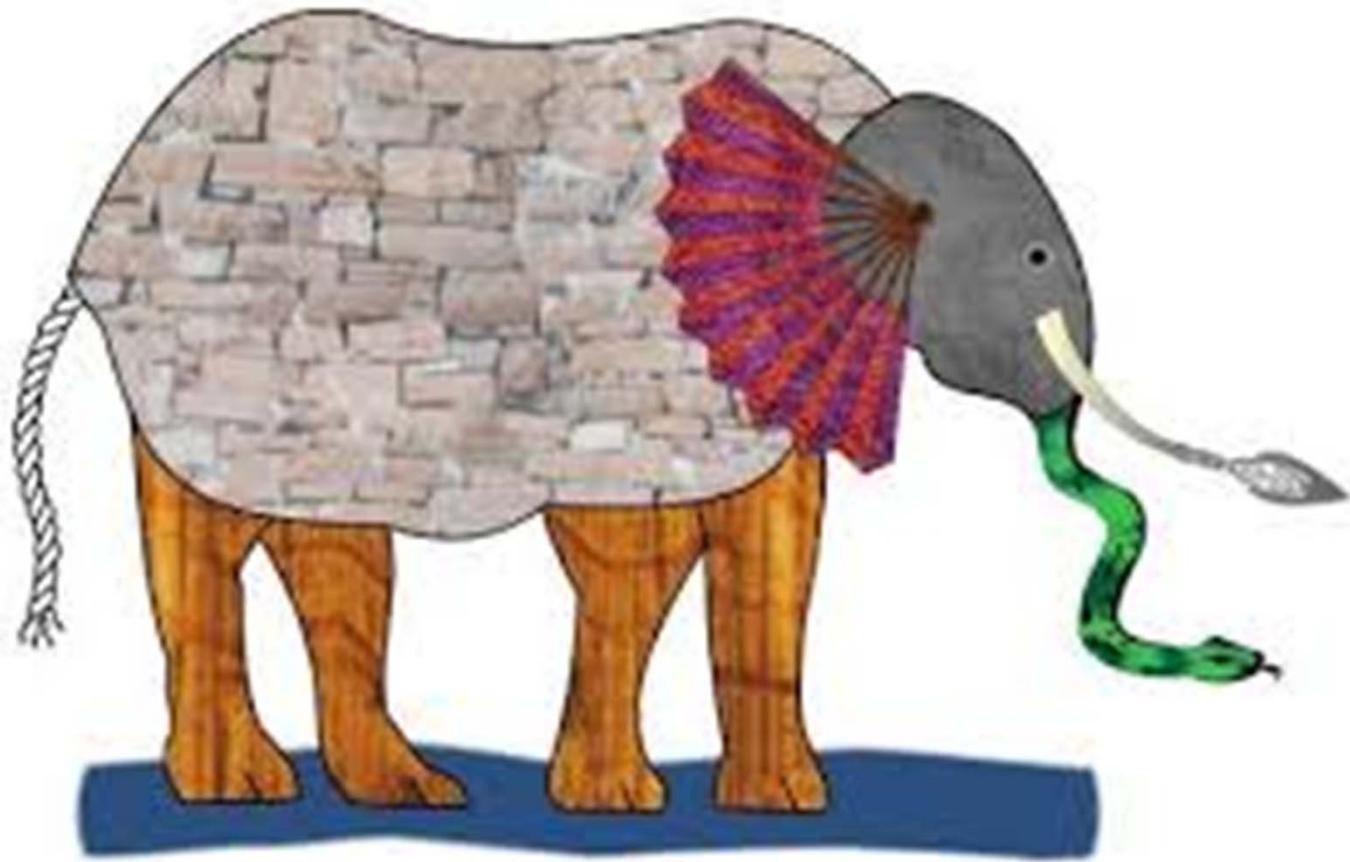
WISDM – Wisconsin Inventory of Smoking Dependence Motives

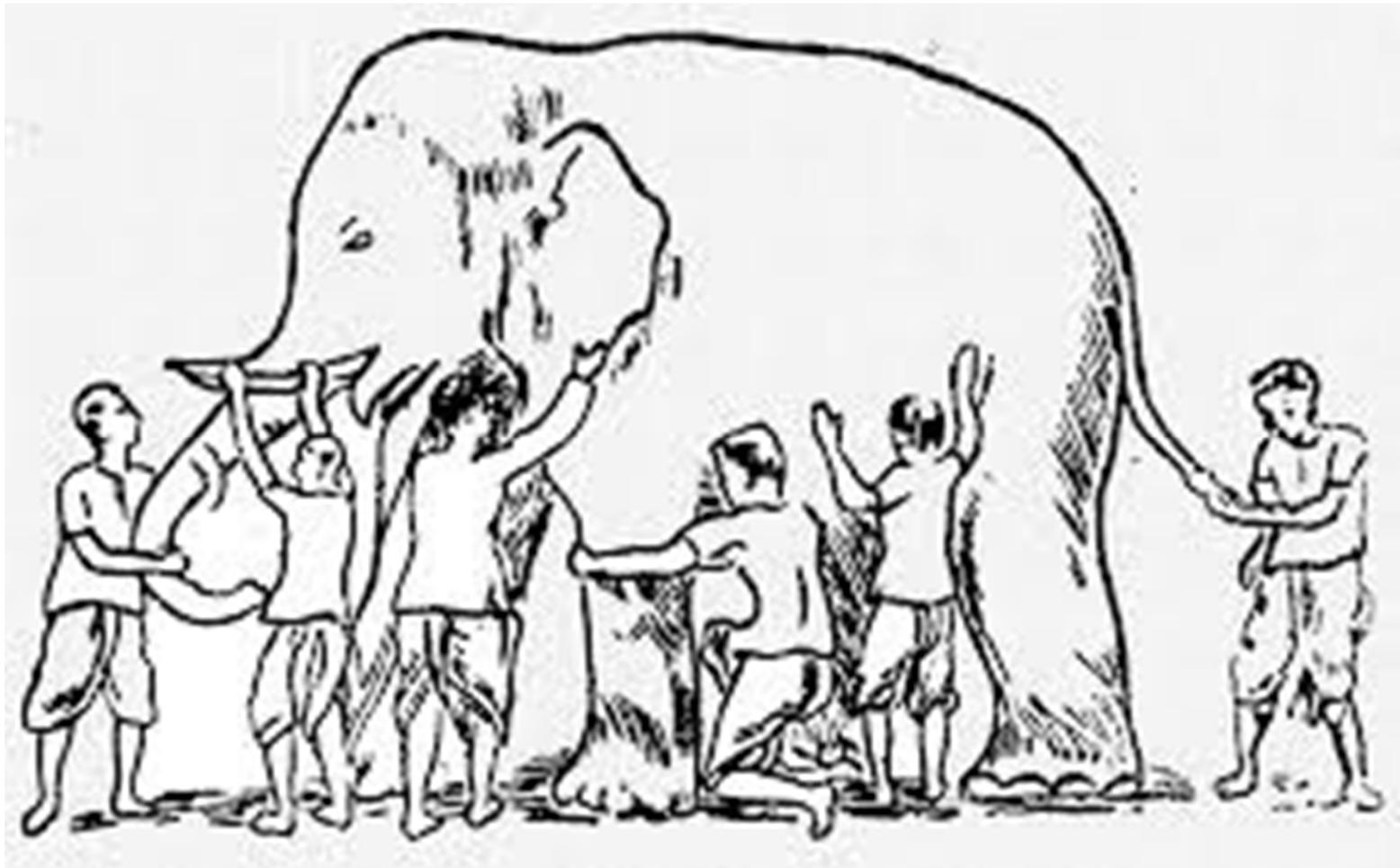
NDSS – Nicotine Dependence Syndrome Scale

TDS – Tobacco Dependence scale (DSM-IV)

CPD – Cigarettes per Day

(Piper et al, 2008,  
**treatment sample**)



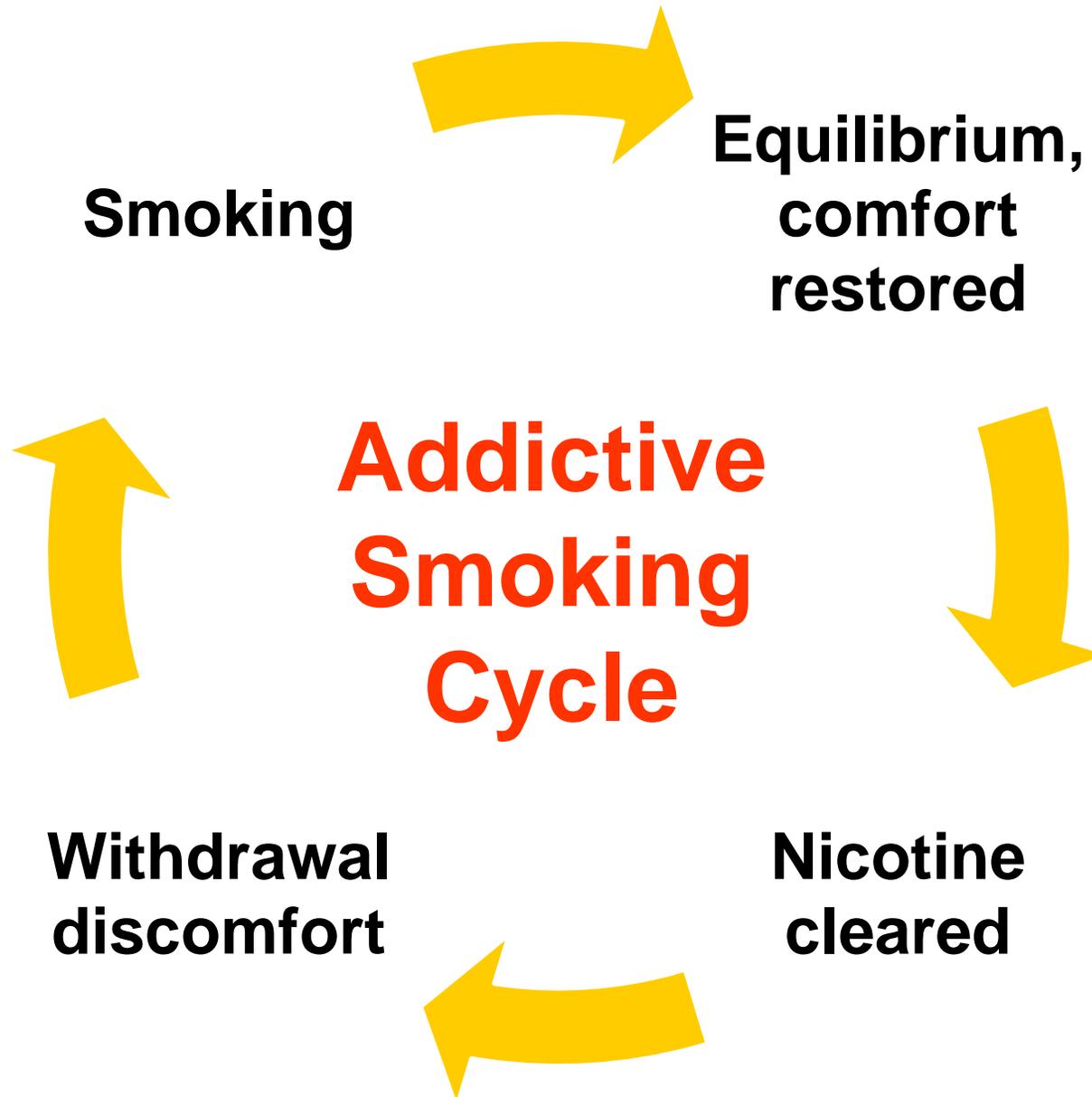


# Elements of Dependence

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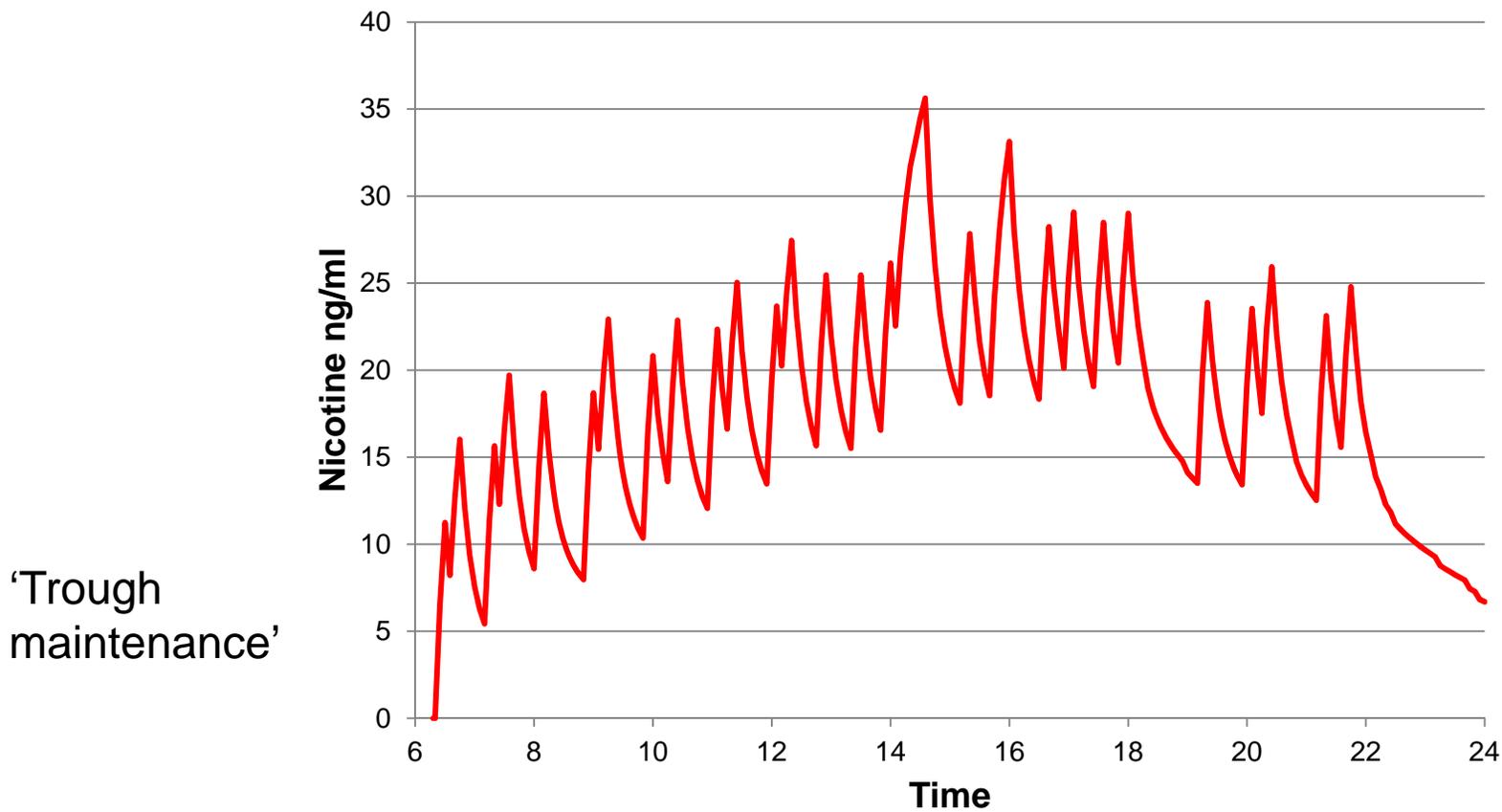
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The nicotine regulation model, emphasizing physical dependence



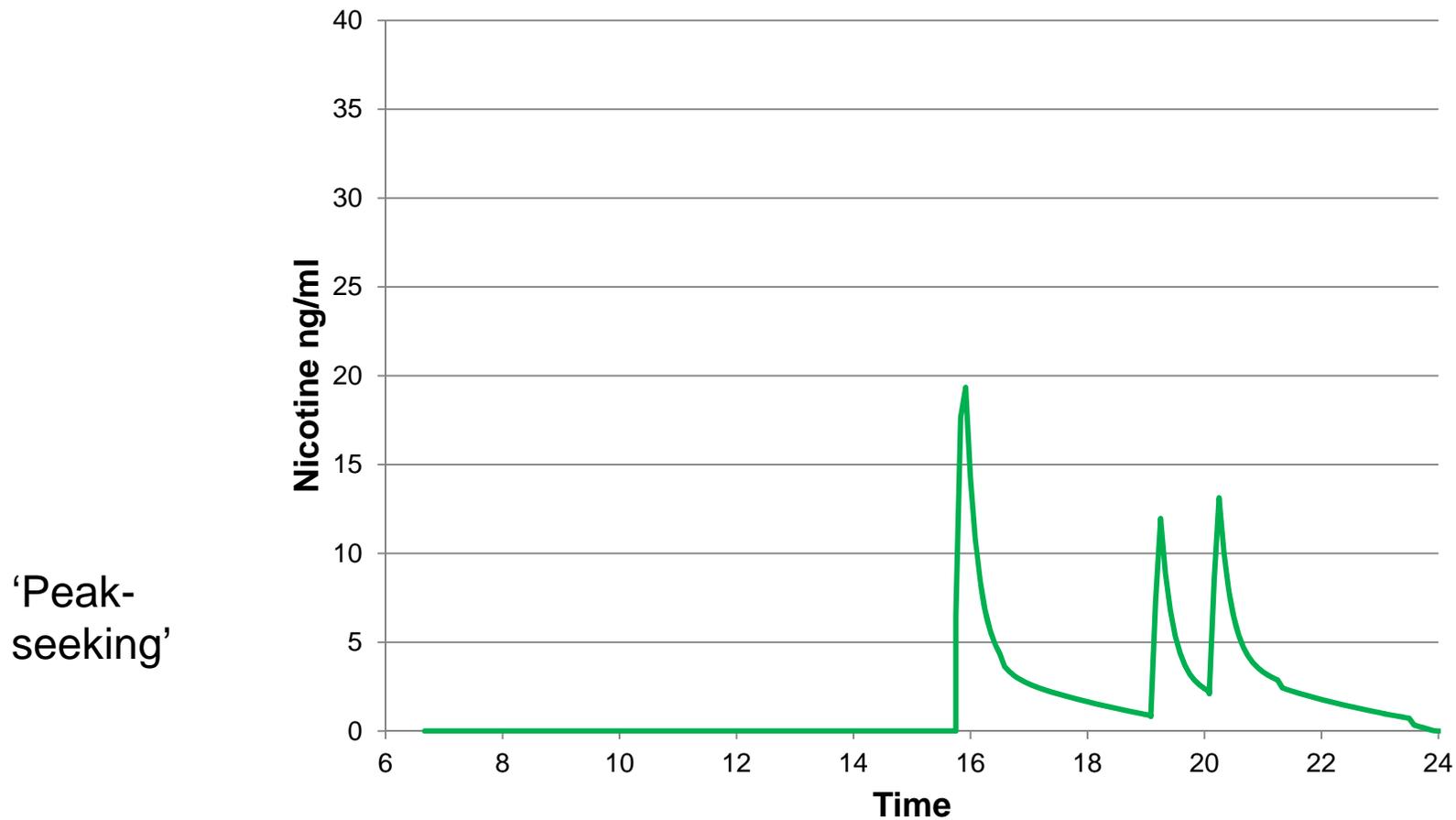
# Smokers

## Maintain Nicotine Levels



Modeled pK data from observed smoking patterns

# Some Smokers Do Not Maintain Nicotine Levels



Modeled pK data from observed smoking patterns



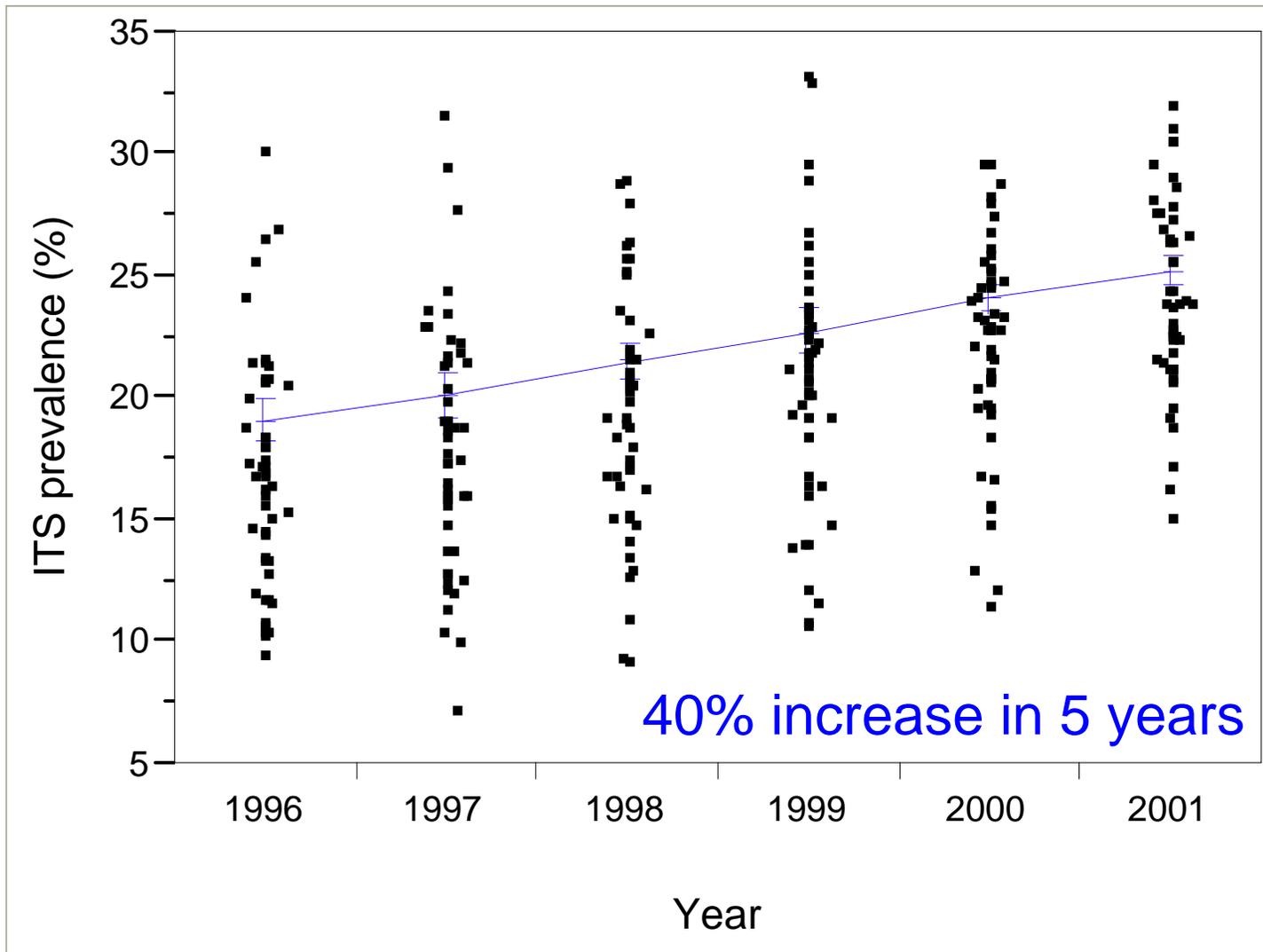
## **ITS** Intermittent Smokers

**38%**  
of US adult  
smokers

**34% at age >25**

(NSDUH, 2012  
in SGR 2014)

# Intermittent Smoking Has Increased Steeply



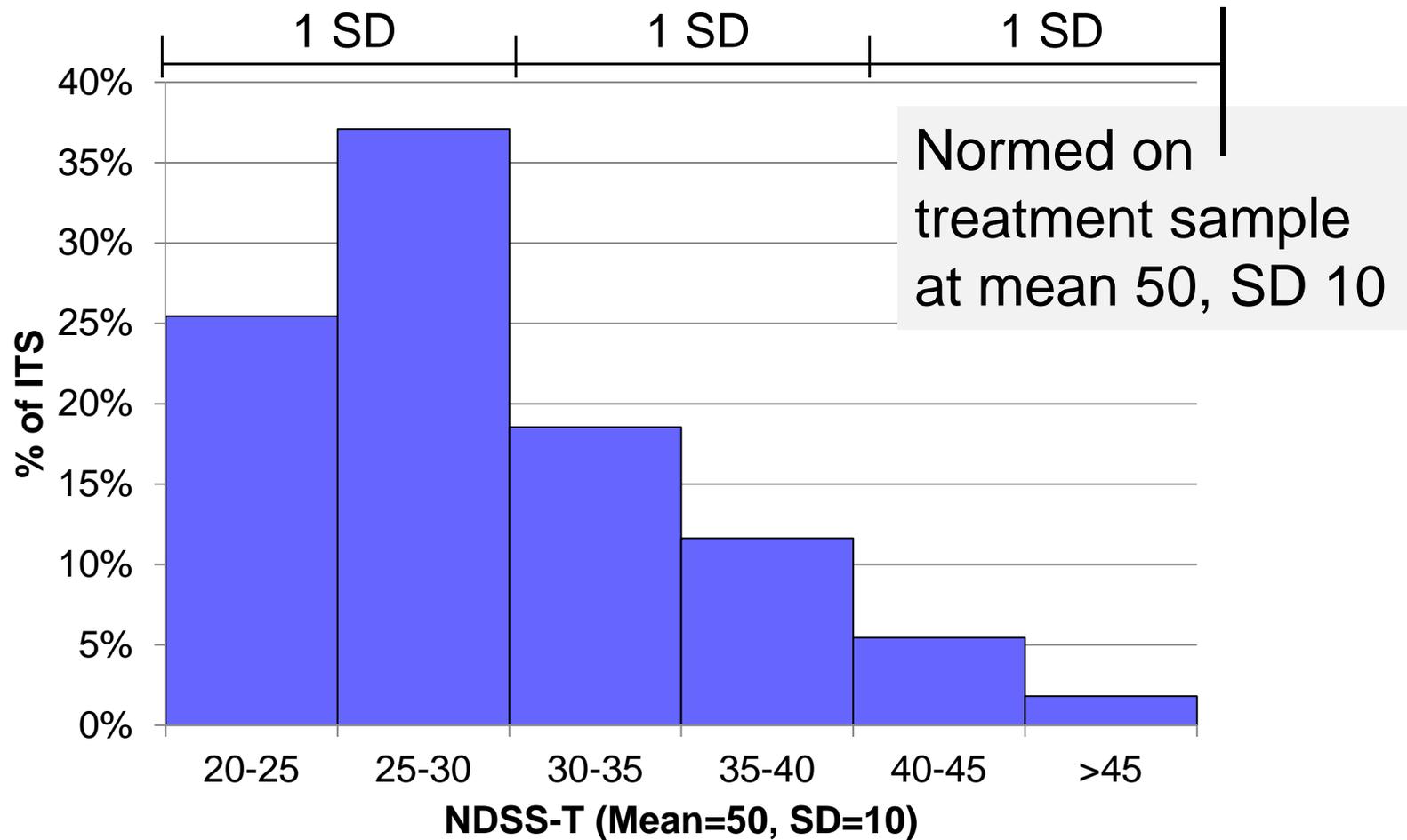
BRFSS,  
MMWR,  
CDC, 2003

# About ITS

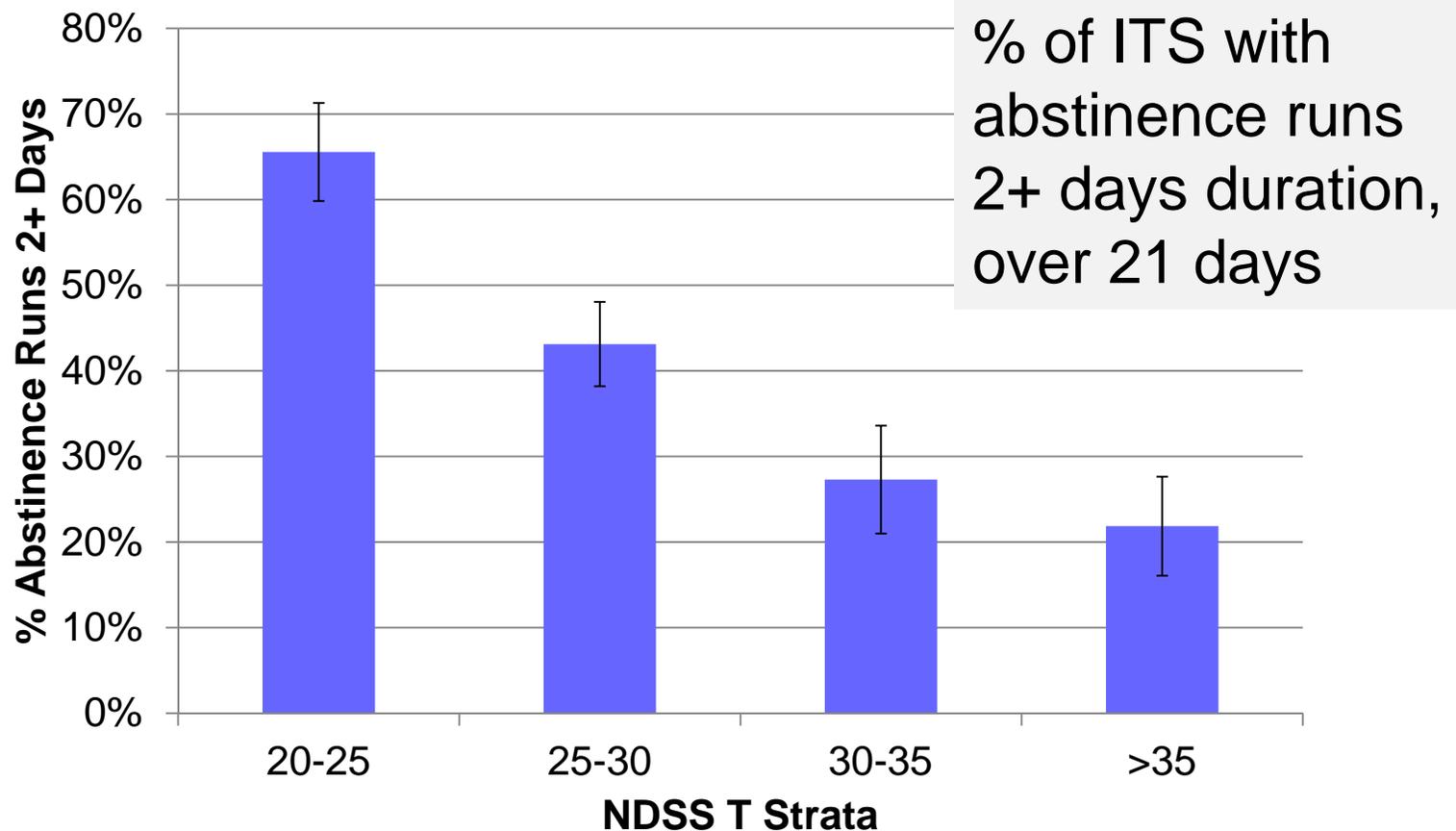
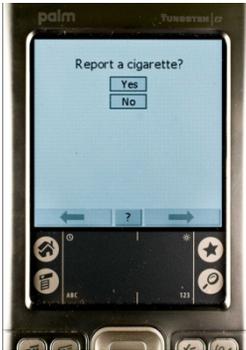
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- Smoke 2/3 days (4-5 days/week)
- Average 4.5 cigarettes on smoking days
- Smoking ~20 yrs, ~40,000 cigarettes
- About half are former daily smokers\*
- Take in 'normal' amounts of nicotine
- Do experience acute craving (when about to smoke)
- Do not experience withdrawal or increased craving on days they don't smoke

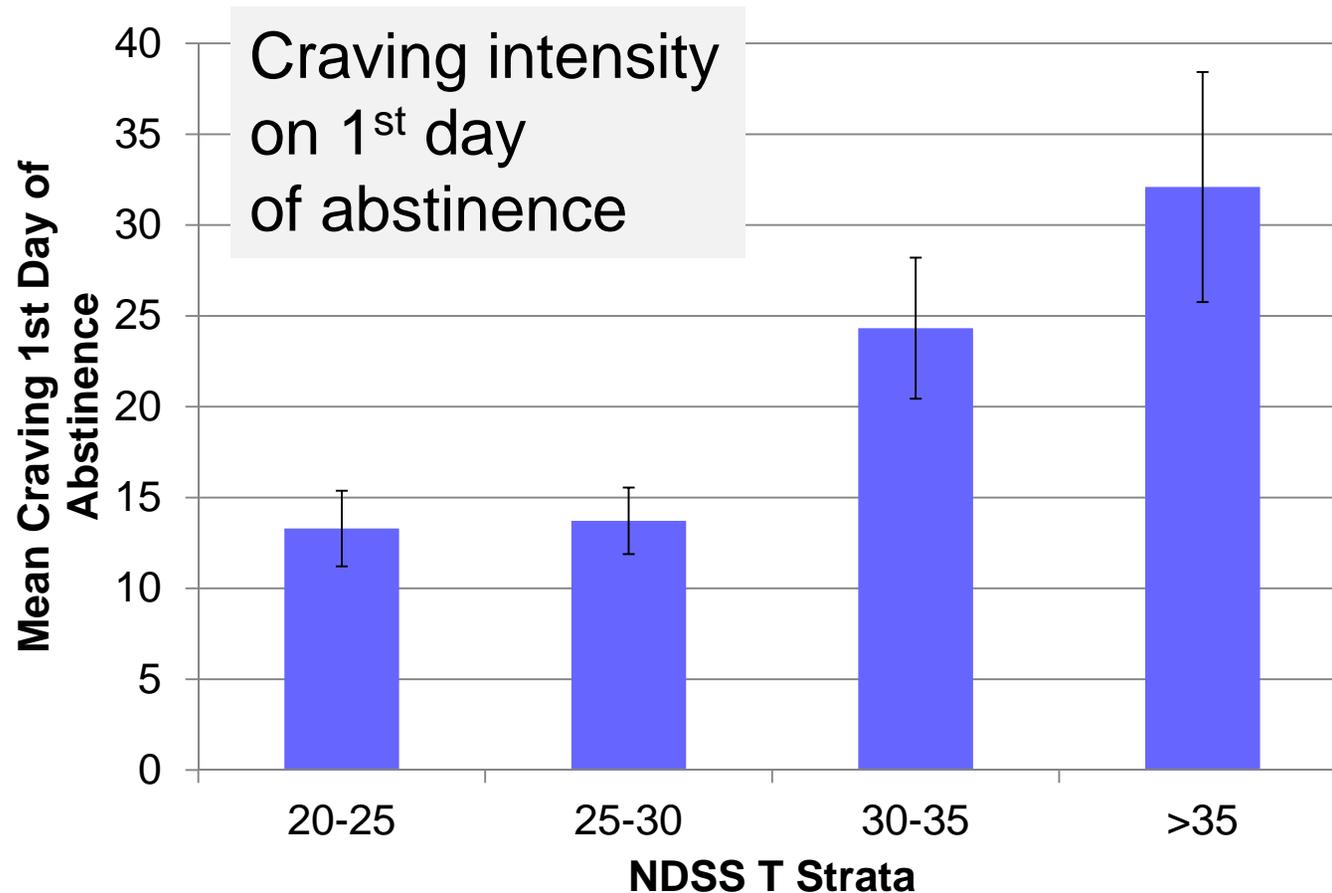
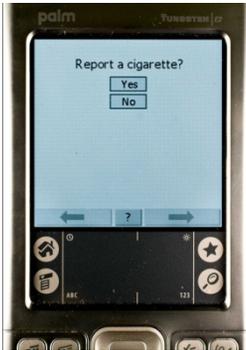
# ITS Show Variations in Levels of Dependence (All in Low Range)



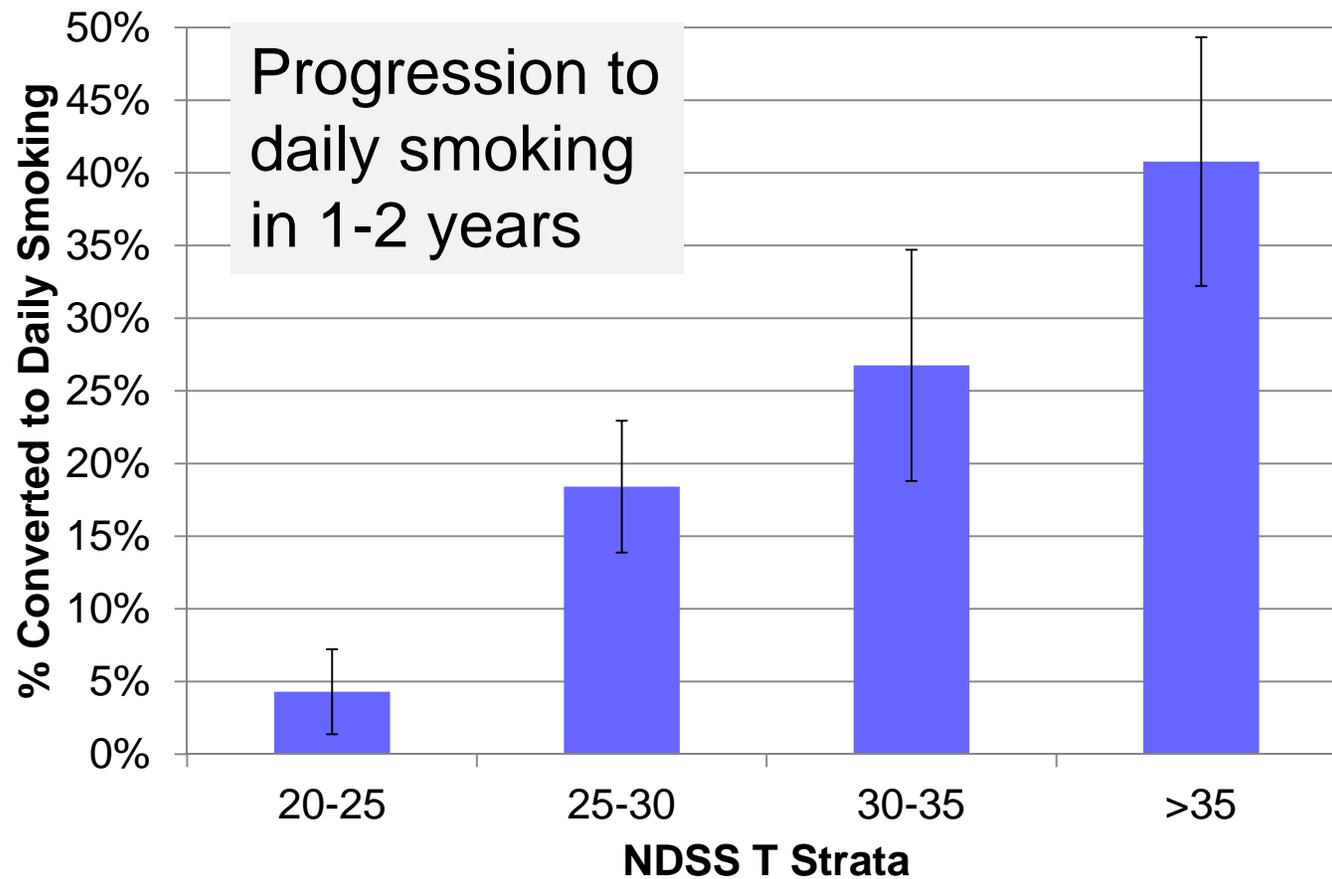
# More Dependent ITS Have Longer Runs of Abstinence



# More Dependent ITS Have More Craving When Abstaining



# More Dependent ITS Are More Likely to Progress to Daily Smoking



# Elements of Dependence

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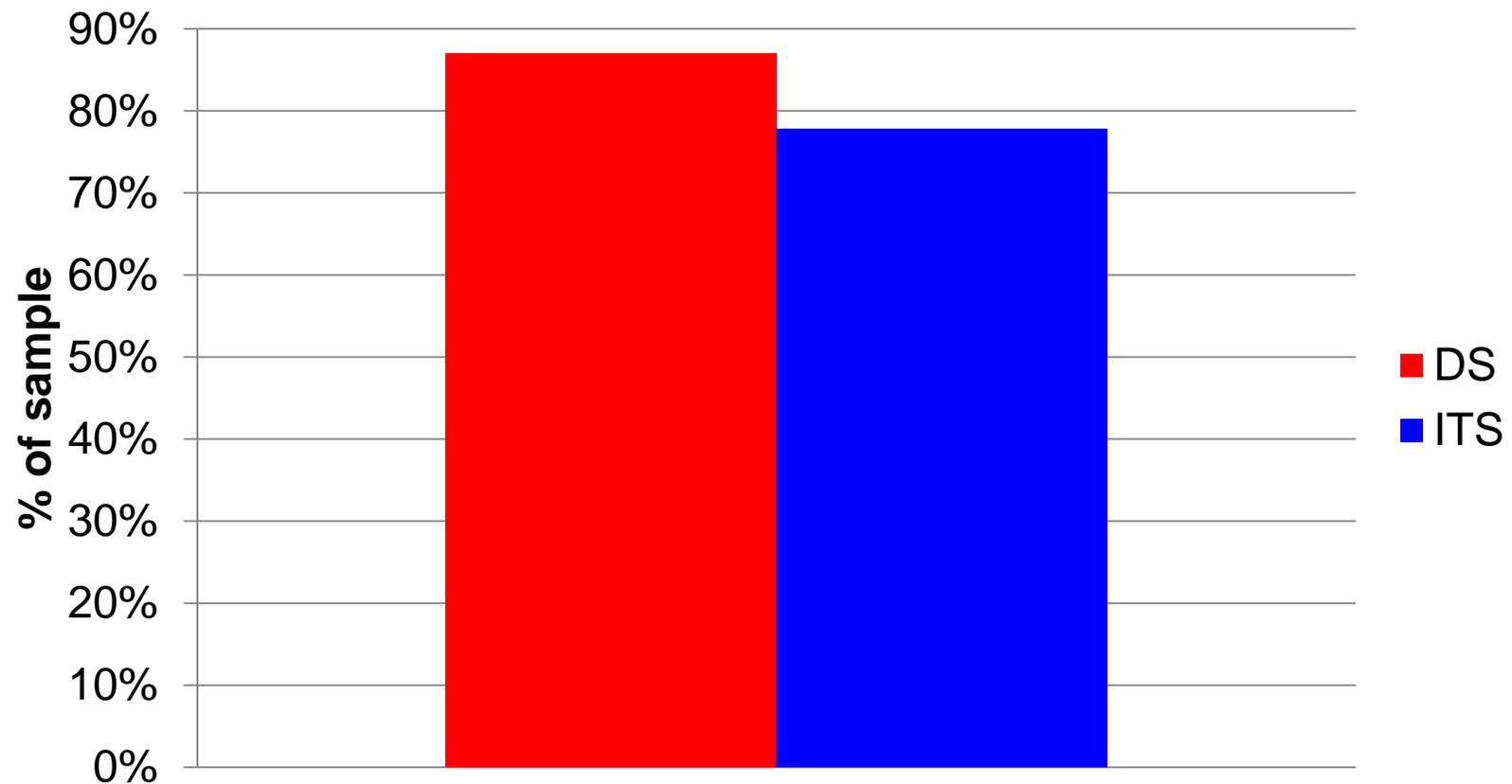
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  - Drug-seeking
  - **Difficulty quitting**

# Can ITS Easily Quit Smoking?

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- Quitting should be easy and success common
- Current Population Survey, 2003
  - 25,344 past-year daily smokers
  - 3,848 past-year ITS
  - Past-year quit attempts
  - Quit success: 90-day abstinence at time of survey

# ITS Almost as Likely as Daily Smokers to Fail at Quitting

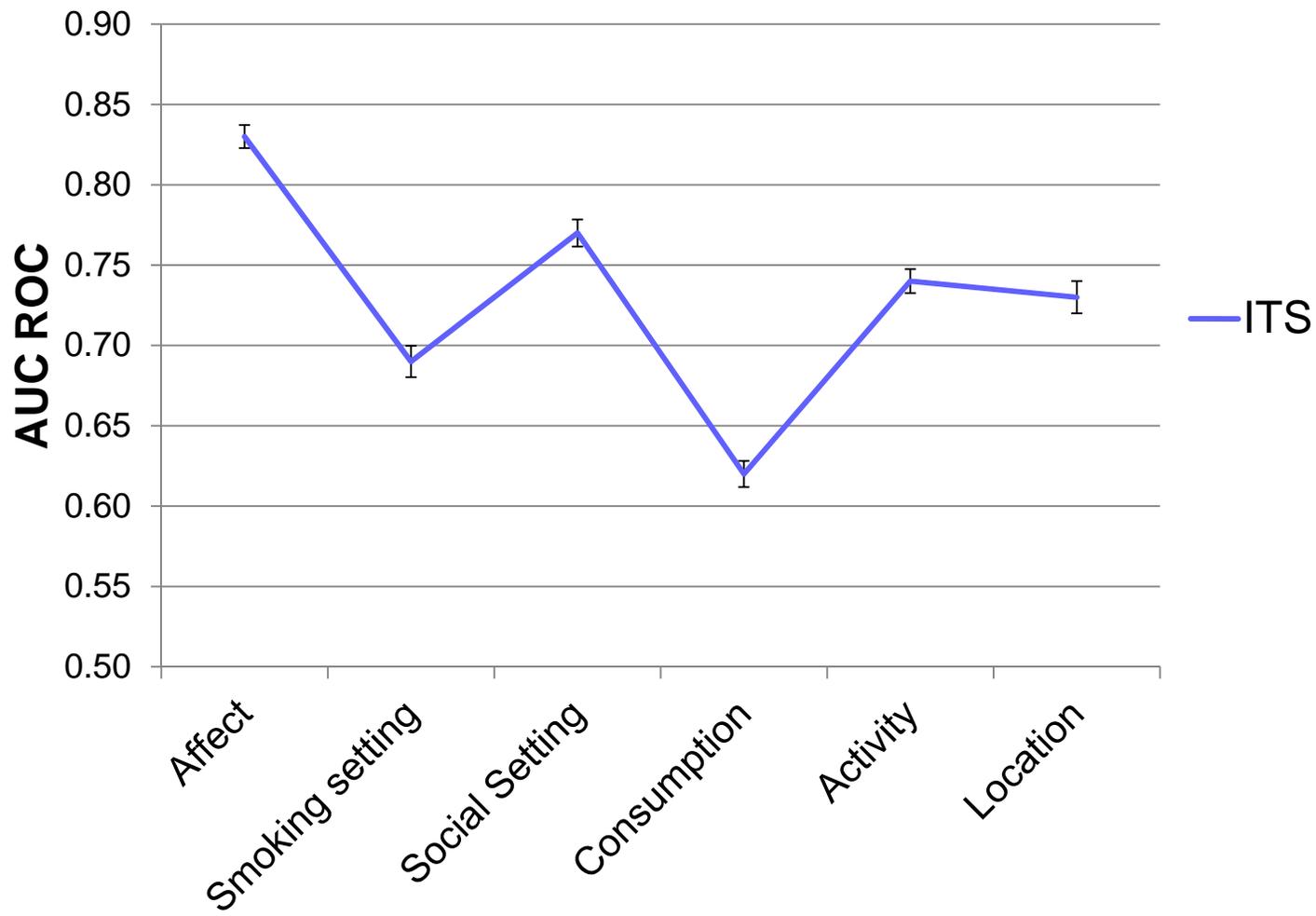


# Elements of Dependence

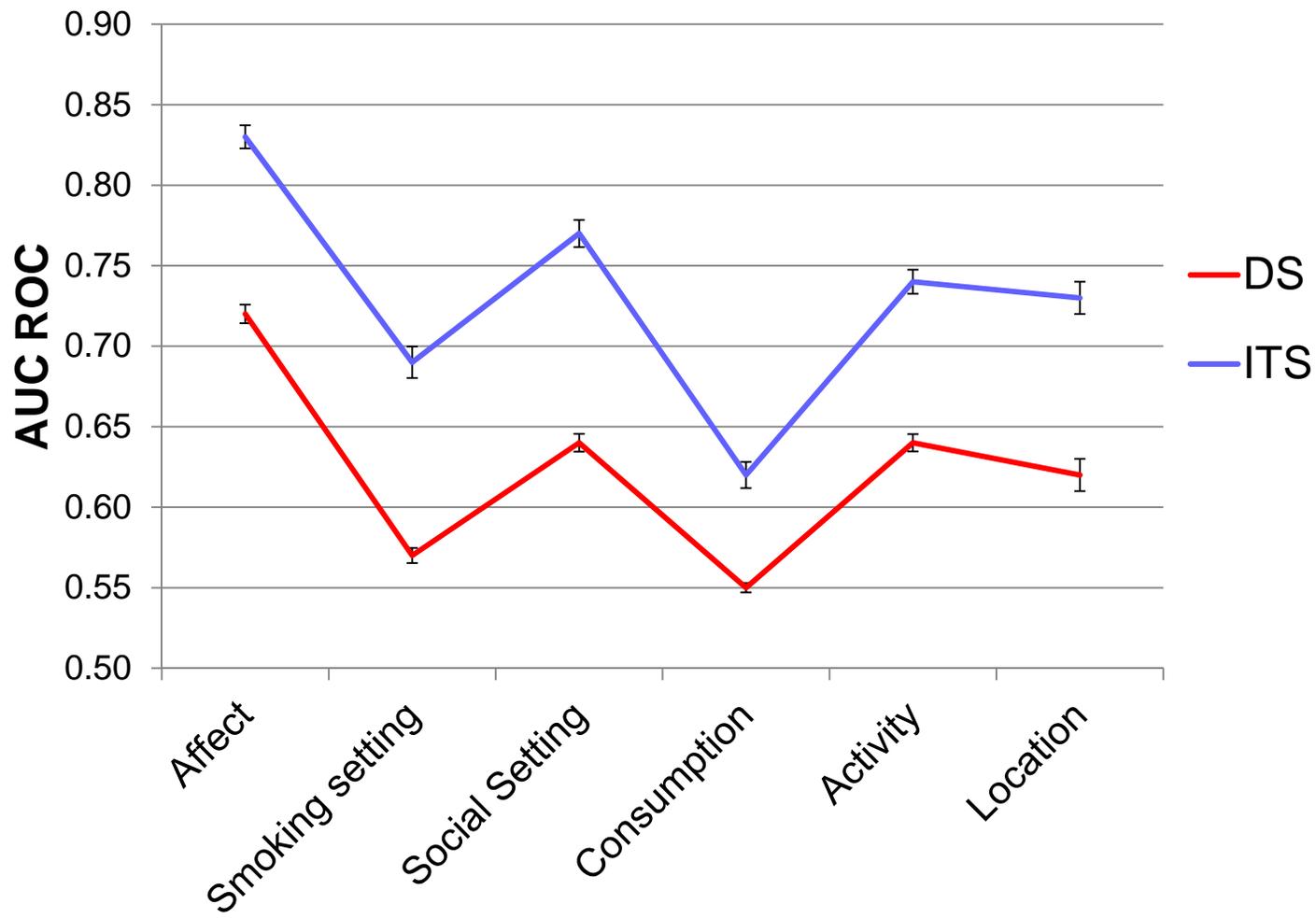
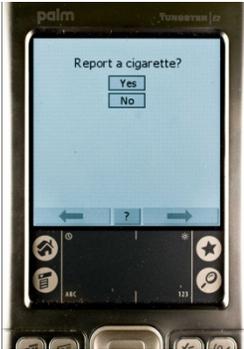
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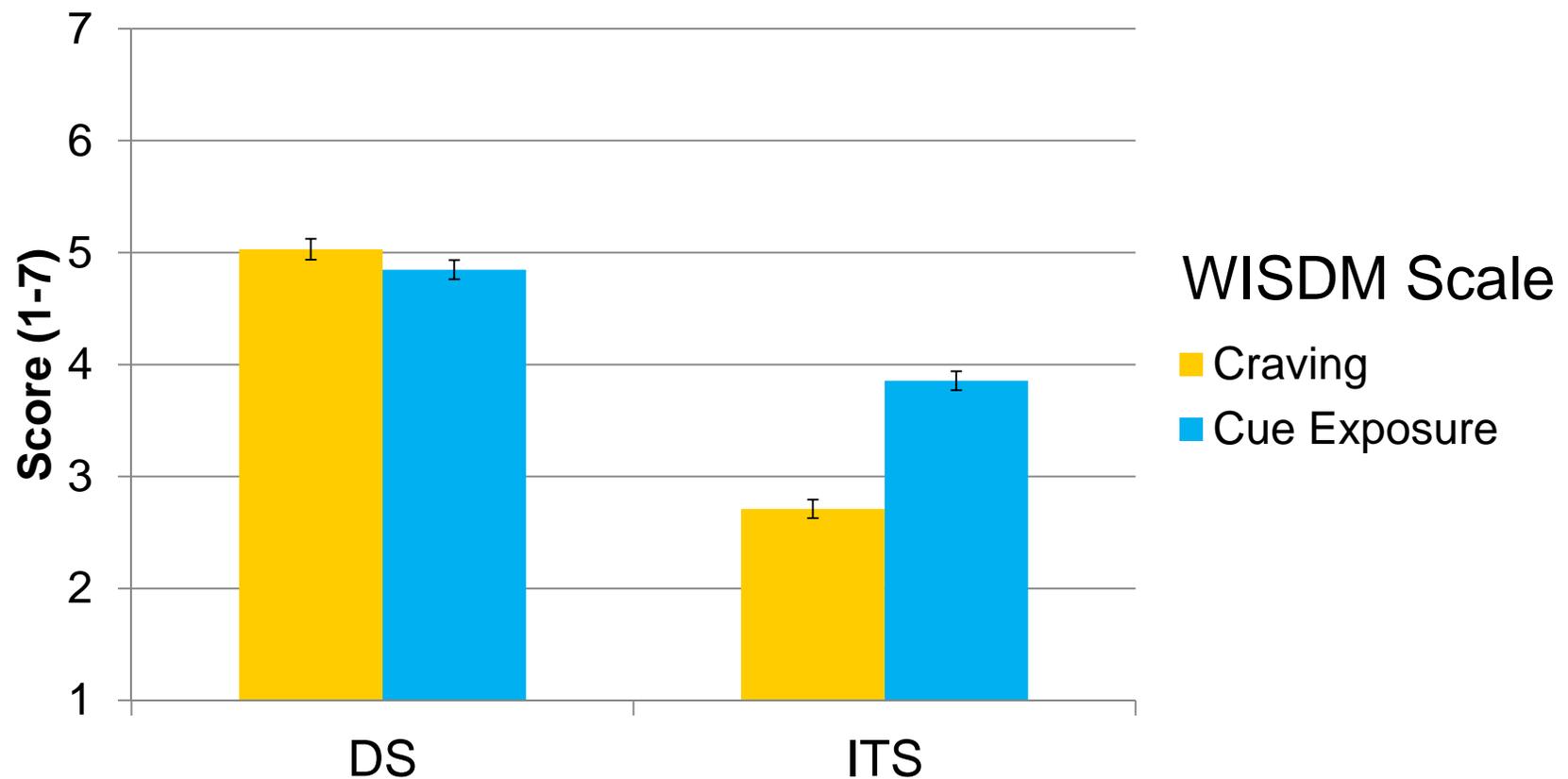
# Stimulus Control of Smoking by Situational Domain



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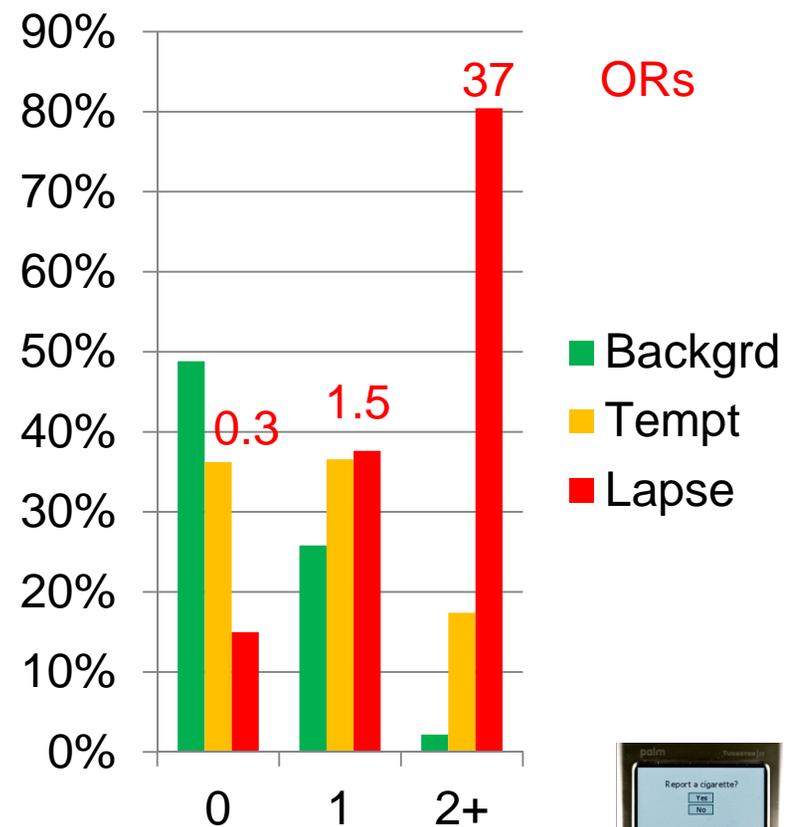


# Both ITS & DS Report Strong Cue Effects, Differ in Relative Importance



# Relapse in Dependent Smokers Occurs During Exposure to Cues

- Relapse often occurs after primary withdrawal has ended
- Relapse occurs in the presence of cues:
  - Alcohol
  - Others smoking
  - Negative affect
  - Perceived availability



# Summary

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- Dependence is multi-dimensional, with common core
- Different measures of dependence capture different aspects
- Nondaily smokers can show low levels of dependence that can be assessed with existing measures
- Some aspects of dependence can occur without tolerance/withdrawal and without constant use
- Effect of cues and stimulus control on use and relapse may be under-estimated by current assessments of dependence, which emphasize craving & withdrawal