



The validity and reliability of self-reported and machine determined puffing behaviour

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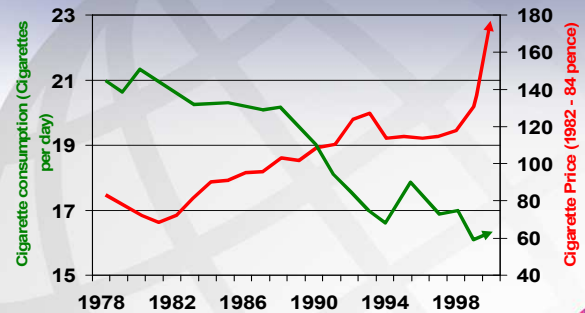


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Rationale

US Cigarette consumption & Real cigarette prices

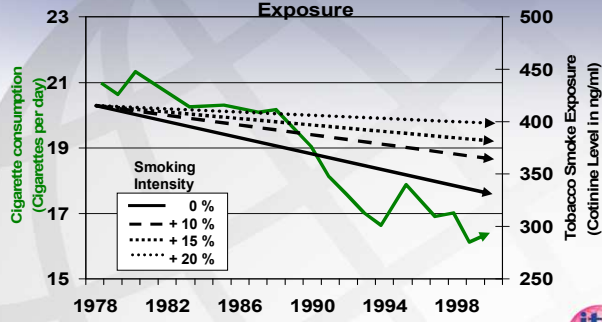


Source: MMWR/CDC, 2006; Warner, 2002



Rationale

US Cigarette consumption & Tobacco Smoke Exposure



Source: MMWR/CDC, 2006; Warner, 2002



Rationale

- Biomarkers provide best estimate of smoking exposure & intensity
- Some evidence that hand-held smoking topography devices provide reliable & valid exposure estimates (Lee et al., 2003)
- But both measures are:
 - Costly
 - Time intensive
 - Not always practical (population studies)
- Self-report would be inexpensive, convenient alternative



Aims

- 1) Stability of self-reported and machine-determined puffing behaviour over time
- 2) Relationship of self-reported to machine-determined puffing behaviour
- 3) Association between puffing behaviour and smoking exposure & intensity (CO Boost)



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Methodology

Methodology[#]

[#]Study sites=USA (Buffalo, Minnesota), UK (London), Canada (Waterloo), Australia (Melbourne)

Visit 1

30 min
smoke
free

Questionnaire

CO reading 1

Cigarette through
CReSS device

2 min

CO reading 2

Visit 2

30 min
smoke
free

Questionnaire

CO reading 1

Cigarette through
CReSS device

2 min

CO reading 2

24 h Interval



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Methodology

- Number of Cigarette Puffs
- Depth of Inhalation
- Interpuff interval
- Smoking Intensity
- Demographics and smoking characteristics
 - Age, Sex, Length of time of smoking, Cigarettes per day, Nicotine dependence (Heaviness of Smoking Index, Heatherton et al., 1989), Cigarette nicotine yield, Quit attempts, Readiness to quit



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Methodology

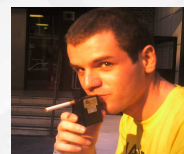
- Carbon-monoxide reading > measure of exposure to cigarette smoke
- CO boost
 - CO reading 2 (post cigarette) - CO reading 1 (pre cigarette) = CO boost
 - CO boost correlates with nicotine boost (Wood et al., 2004)
 - Used as proxy for smoking intensity (smoke exposure per cigarette)



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Methodology

- CReSS device measures
 - Puffs per cigarette
 - Interpuff interval
 - Puff volume
 - Peak Puff Flow
 - Puff Flow
 - Puff Duration



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International Tobacco Control
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Results

1.) Puffing behaviour stability

Measures	Intraclass Correlation Coefficients (95 % CI)	
Self-reported puffing		
Puffs per Cigarette	.628 (.505-.726)	Excellent test-retest reliability
Inter-puff Interval	.760 (.672-.827)	
Inhalation Depth	.773 (.689-.837)	
Smoking Intensity	.808 (.735-.863)	
CReSS-determined puffing		
Puffs per Cigarette	.466 (.314-.596)	Fair-to-good test-retest reliability
Inter-puff Interval	.498 (.350-.622)	
Puff Volume	.701 (.597-.783)	
Peak Puff Flow	.819 (.749-.870)	
Average Puff Flow	.810 (.738-.864)	
Puff Duration	.649 (.532-.743)	



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2.) Comparison: Self-report & CReSS puffing

N=118		Self-report Measures			
		Puffs per Cigarette [§]	Inter-puff Interval [#]	Inhalation Depth [§]	Smoking Intensity [#]
CReSS Device Measures	Puffs per Cigarette	.240**	-.325**	.120	.120
	Inter-puff Interval	.009	-.395**	.027	-.045
	Puff Volume	-.086	-.065	.001	.022
	Peak Puff Flow	-.107	.004	.017	-.028
	Average Puff Flow	-.097	.010	.045	.025
	Puff Duration	.011	-.096	.008	.123
	Total Cigarette Puffing Duration (Puffs per Cigarette x Puff Duration)	.201*	-.283**	.058	-.198*
	Total Cigarette Smoke Volume (Puffs per Cigarette x Puff Volume)	.150	-.290**	.085	.141

* p<.05 level, **p<.01 level; [§] Spearman's rho; [#] Pearson's r



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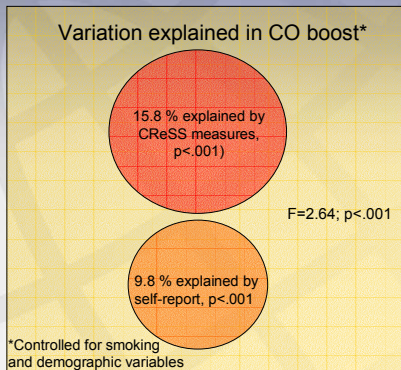
3.) Relationship to CO Boost

- Machine-determined puffing behaviour:
 - Total cigarette puffing duration ($r=.237, p<.05$)
- Self-reported puffing behaviour:
 - Puffs per cigarette ($p=.339, p<.001$)
 - Smoking intensity ($r=.220, p<.05$)
- Linear regression model found that the only significant predictors of greater CO boost were:
 - self-reported puffs per cigarette** \uparrow ($p=.009$)
 - sex=female** ($p=.011$)
 - cigarette nicotine yield** \uparrow ($p=.016$)
 - machine-determined total smoke volume** \uparrow ($p=.03$)



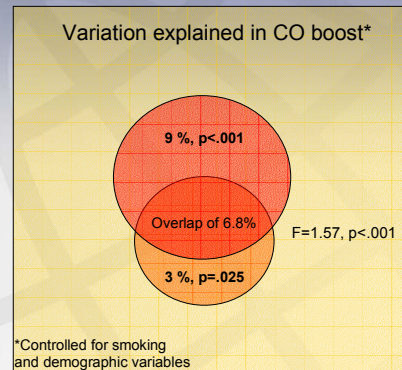
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3.) Relationship to CO Boost - Ctd



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3.) Relationship to CO Boost - Ctd




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Tentative Conclusions


Conclusions

- Self-report and machine-determined puffing behaviour stable over time
- Weak but significant concordance between self-report and machine assessment of puffing
- Self-report and machine topography predict exposure to smoke independently
 - Machine topography better
 - But self-report provides single most predictive measure of CO boost and self-report altogether explains ~ 10 % of variance
- Suggestive of a possible value of self-reported puffing behaviour in large scale studies



Limitations & *Further work*

- CReSS only explained ~16 % of variance
 - reactivity to CReSS machine?
 - measured at only two time point
- Short interval (1 day)
- Sample self-selected
- Only most popular cigarette brands
- *Relate puffing behaviour to cotinine*
- *New study*
 - *Continuous smoking topography over 24 h*
 - *6 months follow-up*



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* ITC Surveys currently in development



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<http://www.itcproject.org>
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