

Emptying the file drawer: Attentional bias in daily and non-daily smokers

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Take home message

- Trait differences in attentional bias between lighter and heavier smokers are at best much smaller than previously reported
- The dot probe task has inadequate reliability and should not be avoided in individual differences research

What is attentional bias?

- The tendency to fixate attention on environmental cues associated with smoking (Field & Cox, 2008)
- Positive but small relationship with the experience of craving (Field et al., 2009)
- Tentative evidence it can predict abstinence after one week of cessation (Powell et al., 2010)

What's the difference between daily and non-daily smokers?

- Daily smokers
 - Smoke 5 to 30 cigarettes per day (Shiffman et al., 2012a)
 - Report motives of tolerance, craving, and habit
- Non-daily smokers
 - Smoke on 4 to 27 days per month (Shiffman et al., 2012b)
 - Report motives of social situations, exposure to specific cues, and sensory properties
- But... both types of smoker find it difficult to quit smoking long-term (e.g., Tindle & Shiffman, 2011).

The problem

- If its important to the maintenance of drug use, is it higher in some types of smokers?
- Conflict in previous research:
 - Higher in lighter smokers (e.g., Mogg et al., 2005)
 - Higher in heavier smokers (e.g., Vollstädt-Klein et al., 2011)
- Hypotheses:
 1. Non-daily smokers were expected to show greater attentional bias
 2. No clear *a priori* hypothesis for different presentation conditions

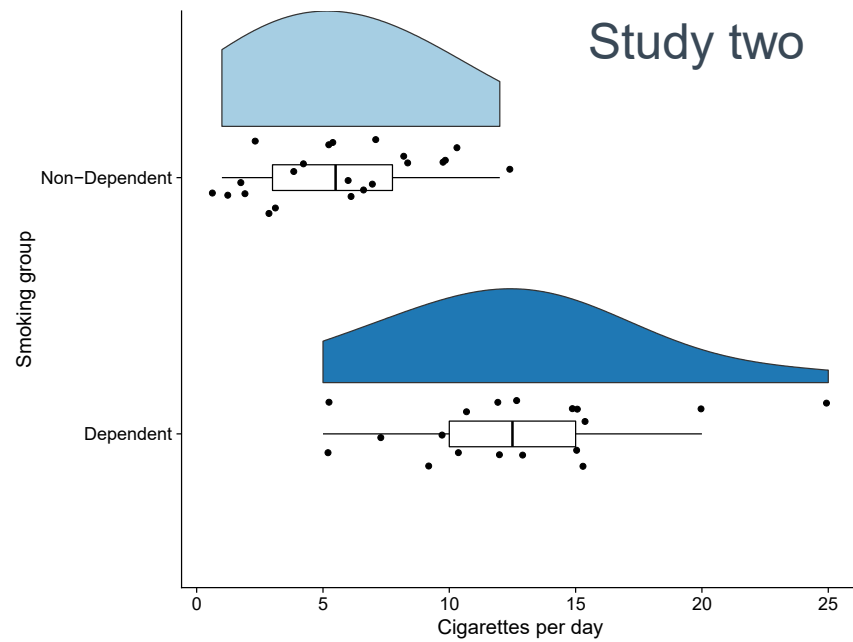
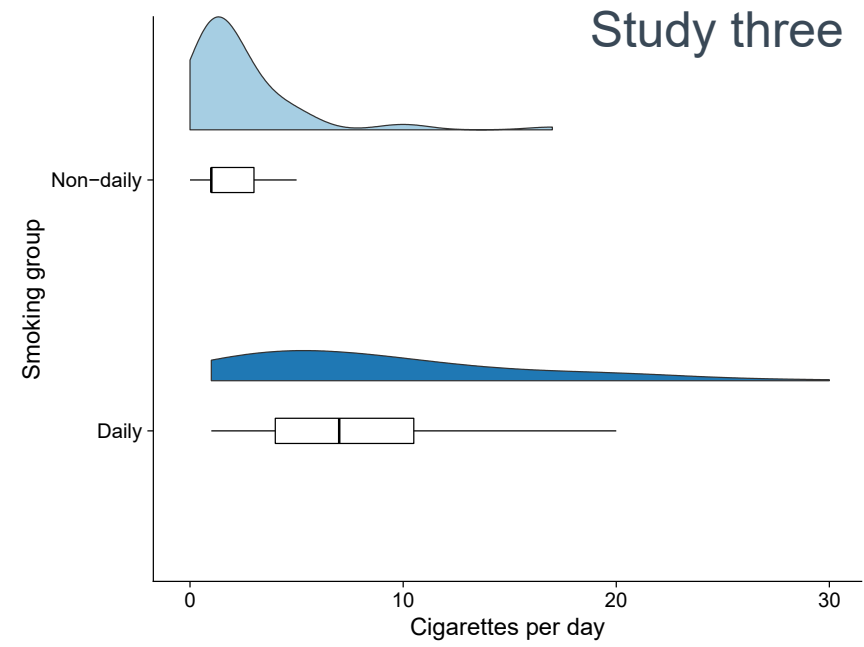
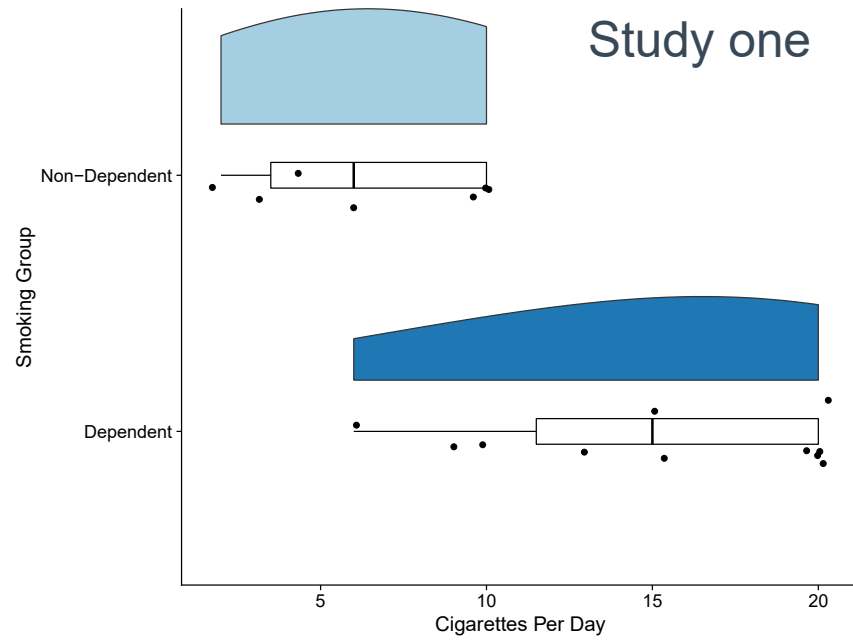
Methods

- Study one (2015)
 - 7 Non-dependent smokers
 - 11 Dependent smokers

- Study two (2016)
 - 22 Non-dependent smokers
 - 18 Dependent smokers

- Study three (2019)
 - 60 Non-daily smokers
 - 106 Daily smokers

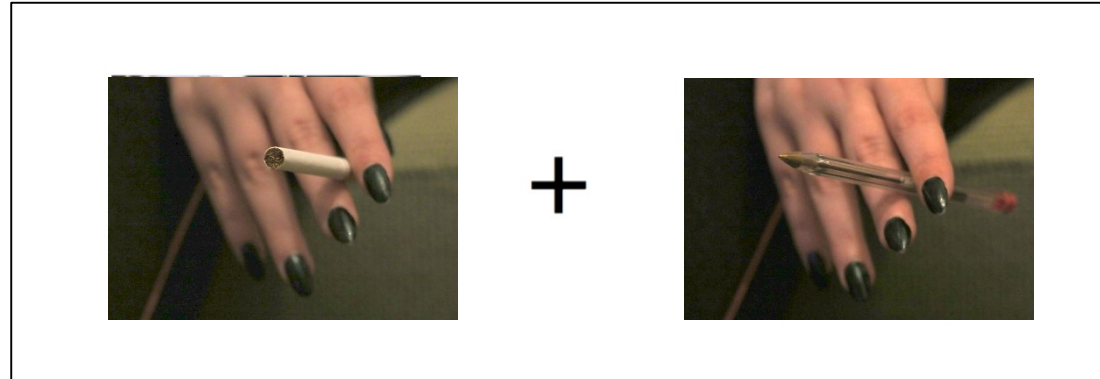




Methods

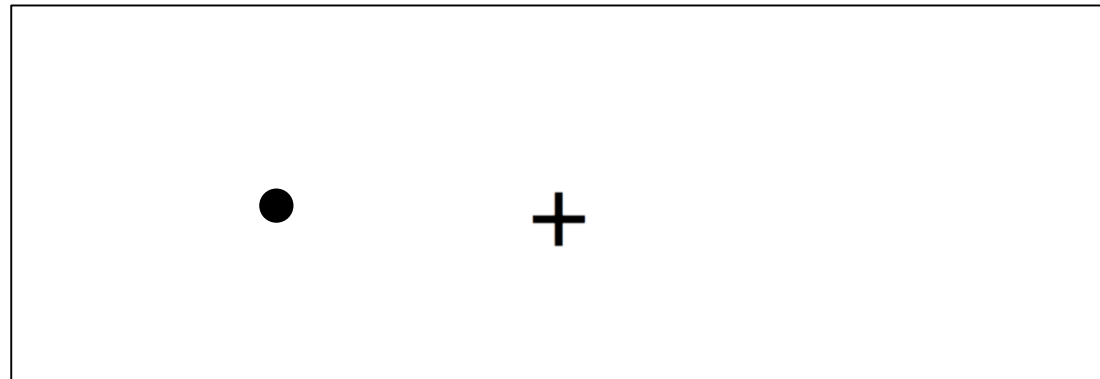
Visual probe task

1.

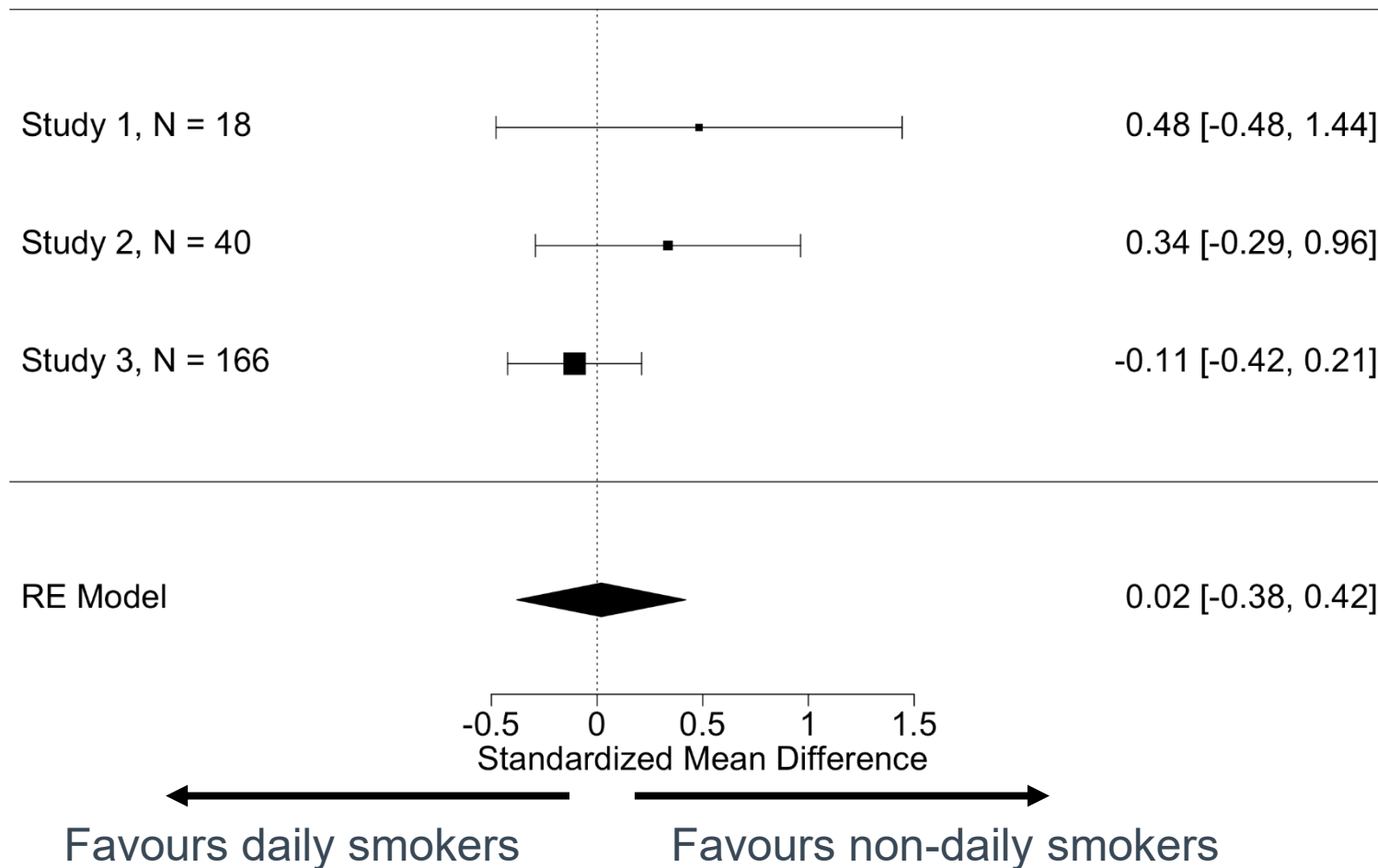


Presented for
200ms or
500ms

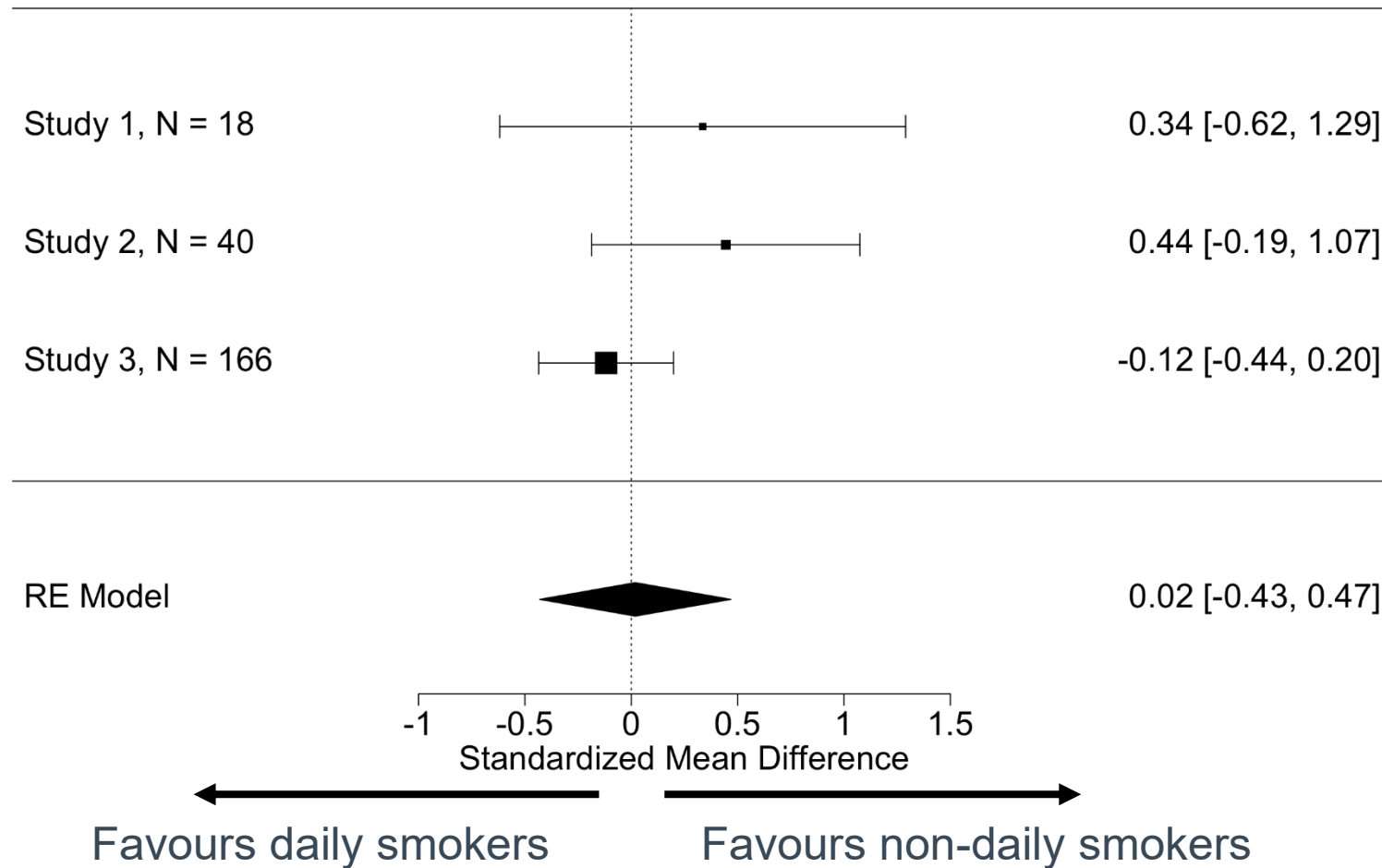
2.



Mini meta-analysis 200ms SOA



Mini meta-analysis 500ms SOA

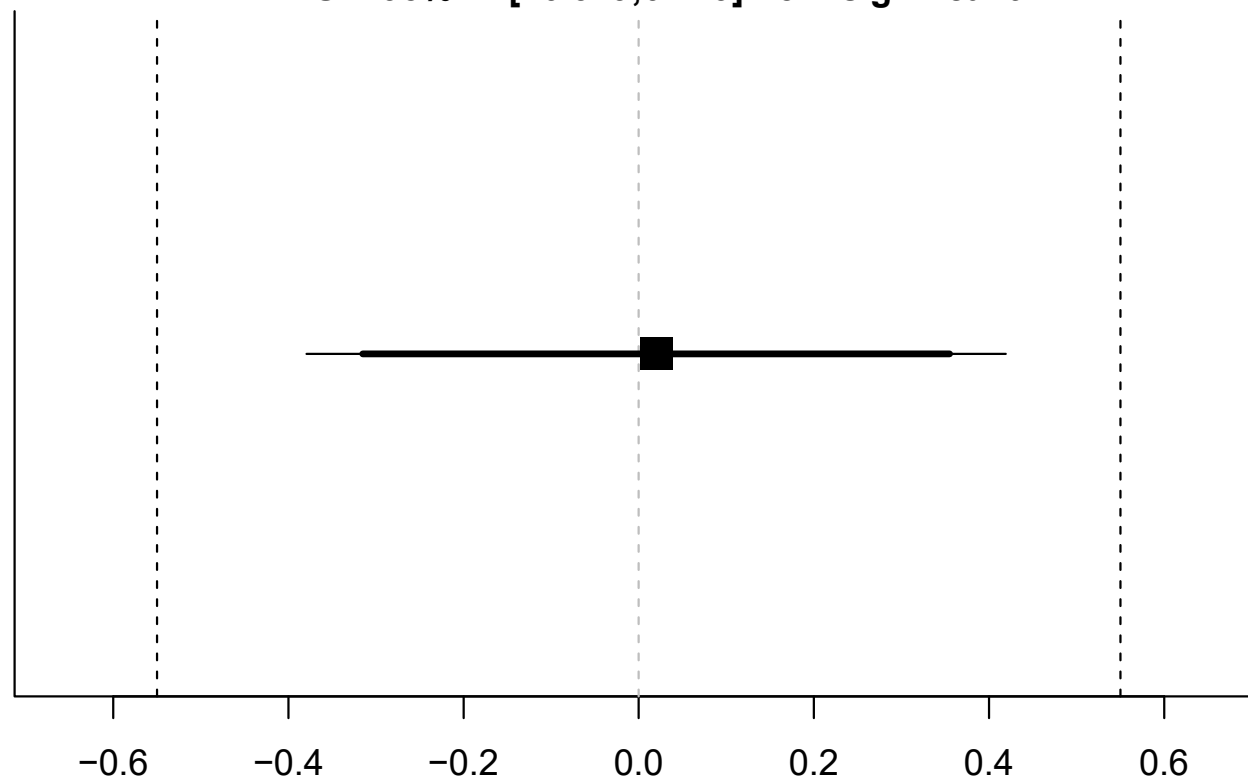


Goh, Hall, & Rosenthal (2016)

Equivalence test 200ms SOA

Equivalence bounds -0.55 and 0.55
Effect size = 0.02
TOST: 90% CI $[-0.315;0.355]$ significant
NHST: 95% CI $[-0.379;0.419]$ non-significant

Boundaries:
Cohen's $d = \pm 0.55$



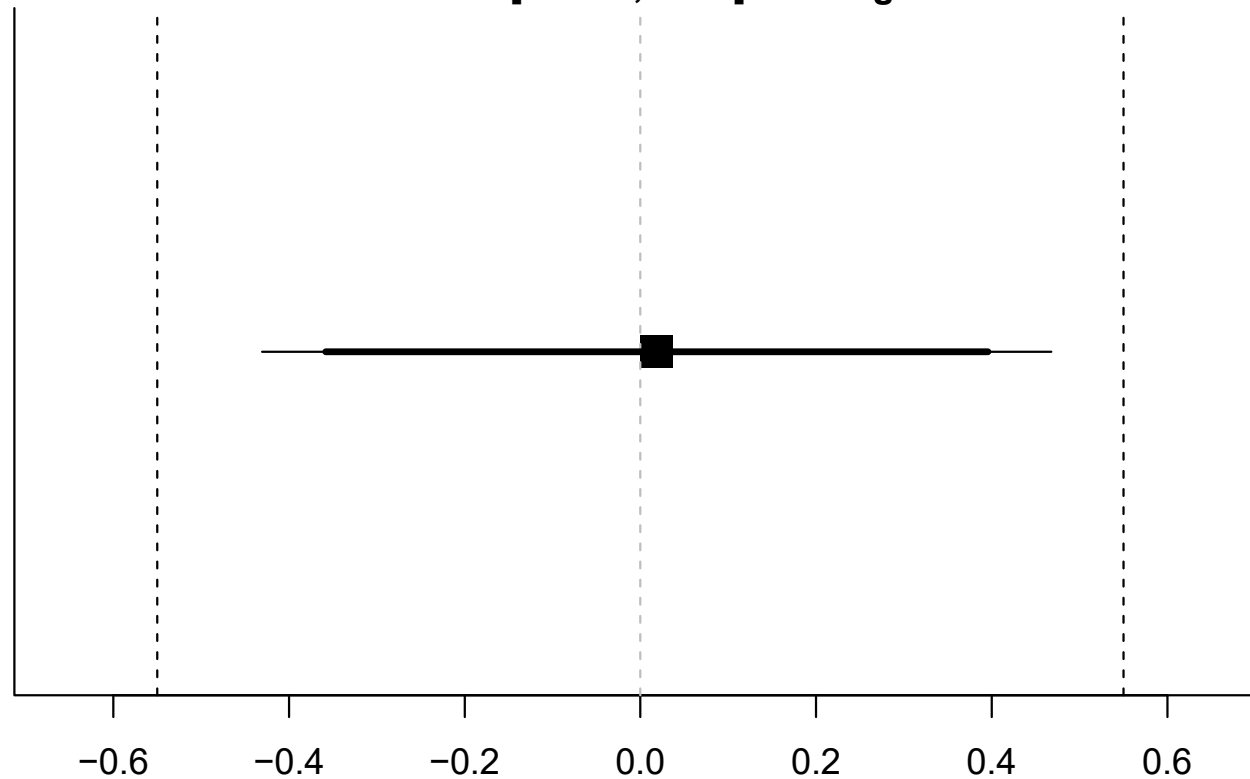
Error bars =
90% + 95%
confidence
intervals

(Lakens, Scheel, & Isager, 2018)

Equivalence test 500ms SOA

Equivalence bounds -0.55 and 0.55
Effect size = 0.019
TOST: 90% CI $[-0.358;0.396]$ significant
NHST: 95% CI $[-0.431;0.468]$ non-significant

Boundaries:
Cohen's $d = \pm 0.55$



Error bars =
90% + 95%
confidence
intervals

(Lakens, Scheel, & Isager, 2018)^{Effect size}

Dot probe split-half reliability

- Study one
 - N/A
- Study two
 - 200ms: $r = .19$, 95% CI = $[-.21, 0.52]$
 - 500ms: $r = .52$, 95% CI = $[0.26, 0.73]$
- Study three
 - 200ms: $r = .48$, 95% CI = $[\.35, \.60]$
 - 500ms: $r = .36$, 95% CI = $[\.21, \.50]$

(Parsons, Kruijt, & Fox, 2019)

What does this mean?

Theory

- Attentional bias may not be a stable, trait like construct (Field et al., 2016)
- Previous studies were underpowered for realistic effects and may have reported inflated effect sizes (Etz & Vanderkerkhove, 2016)
- These factors could combine to produce studies which reported snapshots of fluctuating attentional bias

Methods

- The dot probe task has inadequate levels of reliability to be used for individual differences research (Hedge et al., 2018)

Limitations

- Study three: Participants' smoking levels could not be verified objectively using carbon monoxide.
- All: Different smoking criteria used across studies. No information on smoking days in studies one and two.
- Meta-analysis: Small number of studies provides an imprecise estimate of the heterogeneity (Borenstein et al., 2011)

Conclusions

- Differences between smoking groups are at best much smaller than previously reported
- Attentional bias may be more useful when studied as a state level construct
- The dot probe task should not be avoided in individual differences research

Thank you for listening!

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Known differences

- Images used:
 - Study one = Vollstädt-Klein et al. (2011)
 - Studies two and three = lab images
- Sample:
 - Studies one and two = predominantly undergraduate F2F
 - Study three = online (Prolific) older sample
- Time since last cigarette
 - Study one = minimum one hour
 - Studies two and three = no restrictions
- Group allocation
 - Studies one and two = nicotine dependence (FTCD)
 - Study three = daily / non-daily smoking

Bonus features: study 1

	Light smokers (n = 7)	Heavy smokers (n = 11)
Age	22.14 (5.90)	28.64 (8.65)
CO	5.14 (1.46)	24.73 (19.75)
FTCD	1.00 (0.82)	4.82 (1.33)
CPD	6.43 (3.55)	15.27 (5.20)
WISDM total	44.51 (14.14)	60.74 (14.30)
Last cigarette (minutes)	432.86 (423.86)	108.18 (23.59)
Years as a smoker	6.14 (4.91)	11.36 (7.39)
Age started smoking	16.00 (1.53)	17.18 (5.02)

Bonus features: study 2

	Light smokers (n = 22)	Heavy smokers (n = 18)
Age	21.14 (3.55)	24.11 (8.12)
CO	3.59 (3.11)	10.61 (7.41)
Gender (Female: Male)	17:5	10:8
FTCD	1.00 (0.82)	3.89 (0.96)
CPD	5.59 (3.22)	12.61 (4.94)
WISDM total	47.74 (10.93)	47.96 (11.16)
Last cigarette (minutes)	397.23 (944.23)	40.56 (36.38)
Years as a smoker	4.77 (4.64)	8.11 (9.03)
Age started smoking	16.36 (2.97)	16.00 (2.25)

Bonus features: study 3

	Non-daily (n = 60)	Daily (n = 106)
Age	28.68 (7.71)	31.84 (9.70)
% female	36.67%	20.75%
% white	93%	92%
FTCD	0.52 (1.31)	2.58 (2.17)
CPD	2.38 (2.74)	8.59 (6.41)
Age started to smoke	18.51 (3.65)	17.93 (3.47)
Time since last cigarette (minutes)*	2880 (4590)	60 (633.75)