Reliability and validity of the
Index of Dental Anxiety and Fear (IDAF-4C+)
in an Australian adult sample

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Why studying dental fear is important

- **Dental fear:**
  - Has a high prevalence (12%-16%)
  - Is associated with reduced treatment
    - Acts as a barrier to obtaining treatment
    - Related to cancelled appointments
    - Behavioural difficulties in the clinic
  - Is associated with poorer oral health
    - Self-rated
    - Clinical indices (D, M, DMFT)

Armfield JM, Slade GD, Spencer AJ. Dental fear and adult oral health in Australia. *Community Dent Oral Epi* 2009;37:220-30.
Armfield JM. The extent and nature of dental anxiety and phobia in Australia. *Australian Dental Journal* (In Press).

Measuring adult dental anxiety and fear

- **Main adult's scales**
  - Corah's Dental Anxiety Scale (DAS) – 1969
  - Kleinknecht's Dental Fear Survey (DFS) – 1973
  - Stouthard's Dental Anxiety Inventory short-form (DAI-S) – 1993
  - Modified Dental Anxiety Scale (MDAS) – 1995
  - Hierarchical Anxiety Questionnaire (HAQ) – 1999

Some problems with existing scales

- Too long and therefore not practical
- Measure feared stimuli rather than the fear itself
- Only measure the emotion of fear, excluding the physiological, behavioural and cognitive components
- Items have poor construct validity and are unrelated to dental fear
- Poor response scales

Schuurs AHB, Hoogstraten J. Appraisal of dental anxiety and fear questionnaires: a review. *Community Dent Oral Epi* 1993;21:329-39.
Armfield JM. How do we measure dental anxiety and fear and what are we measuring anyway? *Oral Health and Preventive Dentistry* 2010;8:107-15.

The Index of Dental Anxiety and Fear (IDAF-4C$^+$)
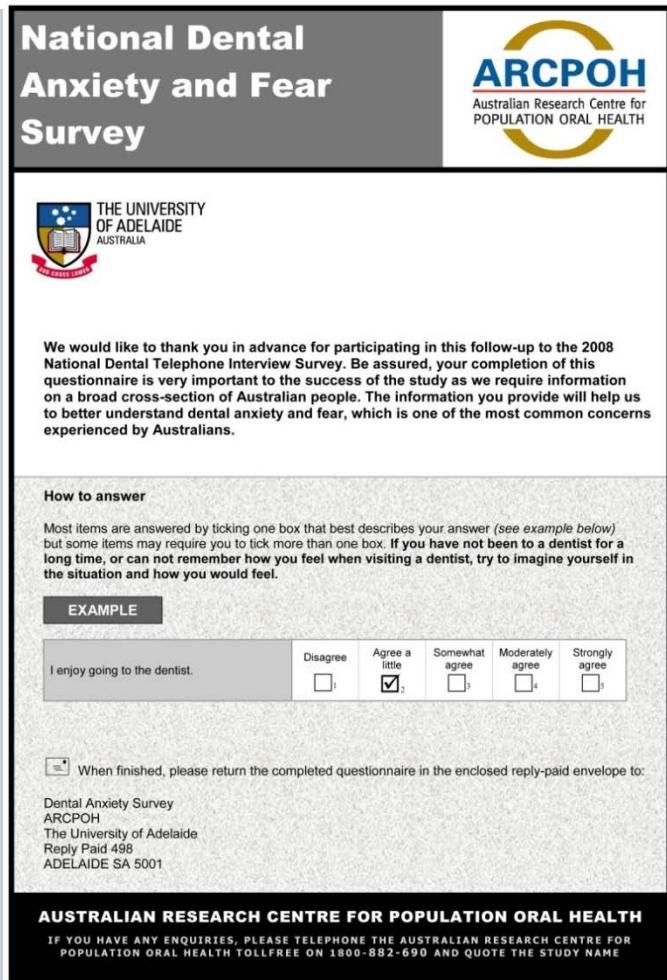
- The IDAF-4C$^+$ has three modules which measure:

1. The four components of dental fear (IDAF-4C)
    1. Emotional component
    2. Behavioural component
    3. Physiological component
    4. Cognitive component

2. Dental phobia, using DSM-IV based diagnostic criteria including the differential diagnosis of other conditions (IDAF-P)

3. Potential anxiety-inducing stimuli (IDAF-S)

Methods - study design

- **Study nested within the National Dental Telephone Interview Survey (NDTIS)**
  - Stratified sampling from all of Australia
  - Sample size approx. 6,000
- **The 'National Dental Anxiety and Fear Survey' sent to a random 25% of available adults**
  - Estimated sample size approx. 1,500
- **Test-retest questionnaire approx. 4 months later**
  - Random selection of 600 respondents (not foreshadowed)

Questionnaire and measures

- **4 pages long**
- **Sections:**
  - Cognitive vulnerability perceptions (12 items)
  - Corah's DAS (4 items)
  - IDAF-4C+
    - Base module (8 items)
    - Phobia module (5 items)
    - Stimulus module (10 items)
  - Avoidance and negative experiences (20 items)
  - Dental Coping Strategy Questionnaire (16 items)

Dental anxiety and fear module (IDAF-4C)

How much do you agree with the following statements?	Disagree	Agree a little	Somewhat agree	Moderately agree	Strongly agree
(a) I feel anxious shortly before going to the dentist.	1	2	3	4	5
(b) I generally avoid going to the dentist because I find the experience unpleasant or distressing.	1	2	3	4	5
(c) I get nervous or edgy about upcoming dental visits.	1	2	3	4	5
(d) I think that something really bad would happen to me if I were to visit a dentist.	1	2	3	4	5
(e) I feel afraid or fearful when visiting the dentist.	1	2	3	4	5
(f) My heart beats faster when I go to the dentist.	1	2	3	4	5
(g) I delay making appointments to go to the dentist.	1	2	3	4	5
(h) I often think about all the things that might go wrong prior to going to the dentist.	1	2	3	4	5

Dental phobia module (IDAF-P)

- Based on DSM-IV-TR diagnostic criteria

A. Marked and persistent fear that is excessive or unreasonable, cued by the presence or anticipation of a specific object or situation

B. Exposure to the phobic stimulus almost invariably provokes an immediate anxiety response

C. The person recognizes that the fear is excessive or unreasonable

D. The phobic situation(s) is avoided or else is endured with intense anxiety or distress

E. The avoidance, anxious anticipation, or distress in the feared situation(s) interferes significantly with the person's normal routine, occupational (or academic) functioning, or social activities or relationships, or there is marked distress about having the phobia.

F. In individuals under age 18 years, the duration is at least 6 months

G. The anxiety…or phobic avoidance associated with the specific object or situation are not better accounted for by another mental disorder

C17. Do the following statements apply to you?	Yes	No
(a) My avoidance or fear of going to the dentist significantly interferes with my life in some way (normal routine, occupational or academic functioning, social activities, or relationships).	☐1	☐2
(b) I am greatly distressed about my level of dental fear.	☐1	☐2
(c) I consider my level of dental fear to be excessive or unreasonable	☐1	☐2
(d) I am afraid of going to the dentist because I am concerned I may have a panic attack (abrupt fear with sweating, pounding heart, fear of dying or losing control, chest pain etc.).	☐1	☐2
(e) I am afraid of going to the dentist because I am generally highly self-conscious or concerned about being watched or judged in social situations.	☐1	☐2

Stimulus module – IDAF-S

To what extent are you anxious about the following things when you go to the dentist?	Not at all	A little	Somewhat	Moderately	Very much
(a) Painful or uncomfortable procedures	1	2	3	4	5
(b) Feeling embarrassed or ashamed	1	2	3	4	5
(c) Not being in control of what is happening	1	2	3	4	5
(d) Feeling sick, queasy or disgusted	1	2	3	4	5
(e) Numbness caused by the anesthetic	1	2	3	4	5
(f) Not knowing what the dentist is going to do	1	2	3	4	5
(g) The cost of dental treatment	1	2	3	4	5
(h) Needles or injections	1	2	3	4	5
(i) Gagging or choking	1	2	3	4	5
(j) Having an unsympathetic or unkind dentist	1	2	3	4	5

Results - sampling and response rates
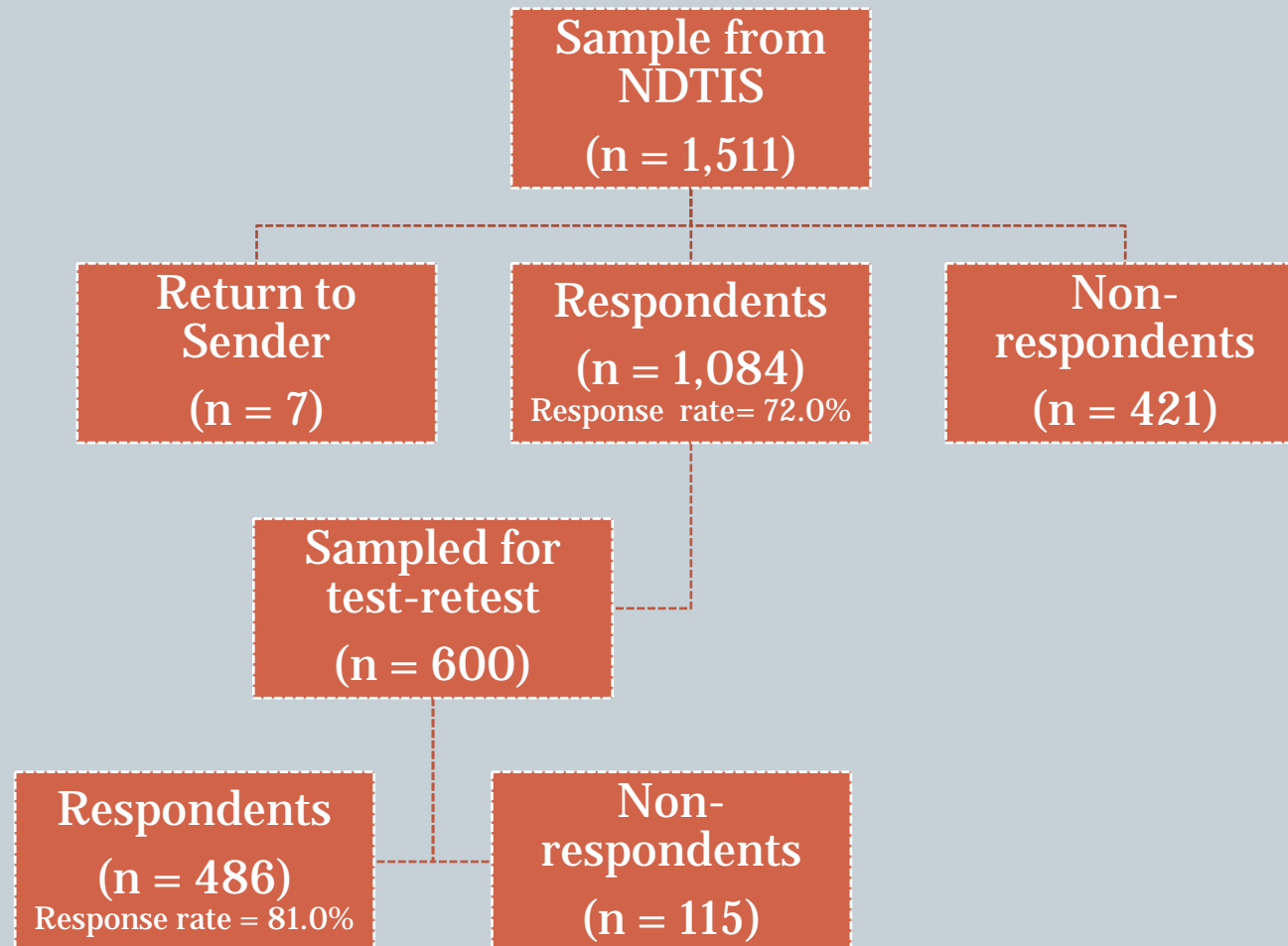
IDAF-4C subscale associations

	Cognitive	Physiological	Behavioural	Emotional
Cognitive	–	0.73	0.64	0.70
Physiological		–	0.79	0.90
Behavioural			–	0.78
Emotional				–

Pearson r correlation coefficients, $p < 0.001$

Reliability of the anxiety and fear module (IDAF-4C)

- Cronbach's alpha (internal consistency) = 0.94
- Corrected item-total correlations range from 0.65 to 0.90
- Intra-class correlation (single measures) = 0.67 (95%CI = 0.65-0.69)
- Test-retest reliability at approx. 4 months (Pearson r correlation):
  - All participants ($n = 492$): 0.81
  - Only participants without an intervening examination ($n = 300$): 0.82

Test-retest reliability of IDAF-S items

IDAF-S item	Item test-retest correlation
Painful or uncomfortable procedures	0.73
Feeling embarrassed or ashamed	0.72
Not being in control of what is happening	0.63
Feeling sick, queasy or disgusted	0.55
Numbness caused by the anesthetic	0.56
Not knowing what the dentist is going to do	0.60
The cost of dental treatment	o.70
Needles or injections	0.71
Gagging or choking	0.72
Having an unsympathetic or unkind dentist	0.66

Note: All Pearson r correlation coeficients significant at $p < 0.001$

Correlations with other fear measures

	IDAF-C	IDAF-P	IDAF-B	IDAF-E	DAS
IDAF-4C	0.82	0.95	0.90	0.94	0.84
IDAF-C	–	0.73	0.63	0.70	0.64
IDAF-P		–	0.78	0.90	0.81
IDA-B			–	0.77	0.72
IDAF-E				–	0.85

IDAF-4C = Index of Dental Anxiety and Fear; IDAF-C = Index of Dental Anxiety and Fear – Cognitive Subscale; IDAF-P = Index of Dental Anxiety and Fear – Physiological Subscale; IDAF-B = Index of Dental Anxiety and Fear – Behavioural Subscale; IDAF-E = Index of Dental Anxiety and Fear – Emotional Subscale; DAS = Dental Anxiety Scale

Comparing the IDAF-4C and Corah's DAS
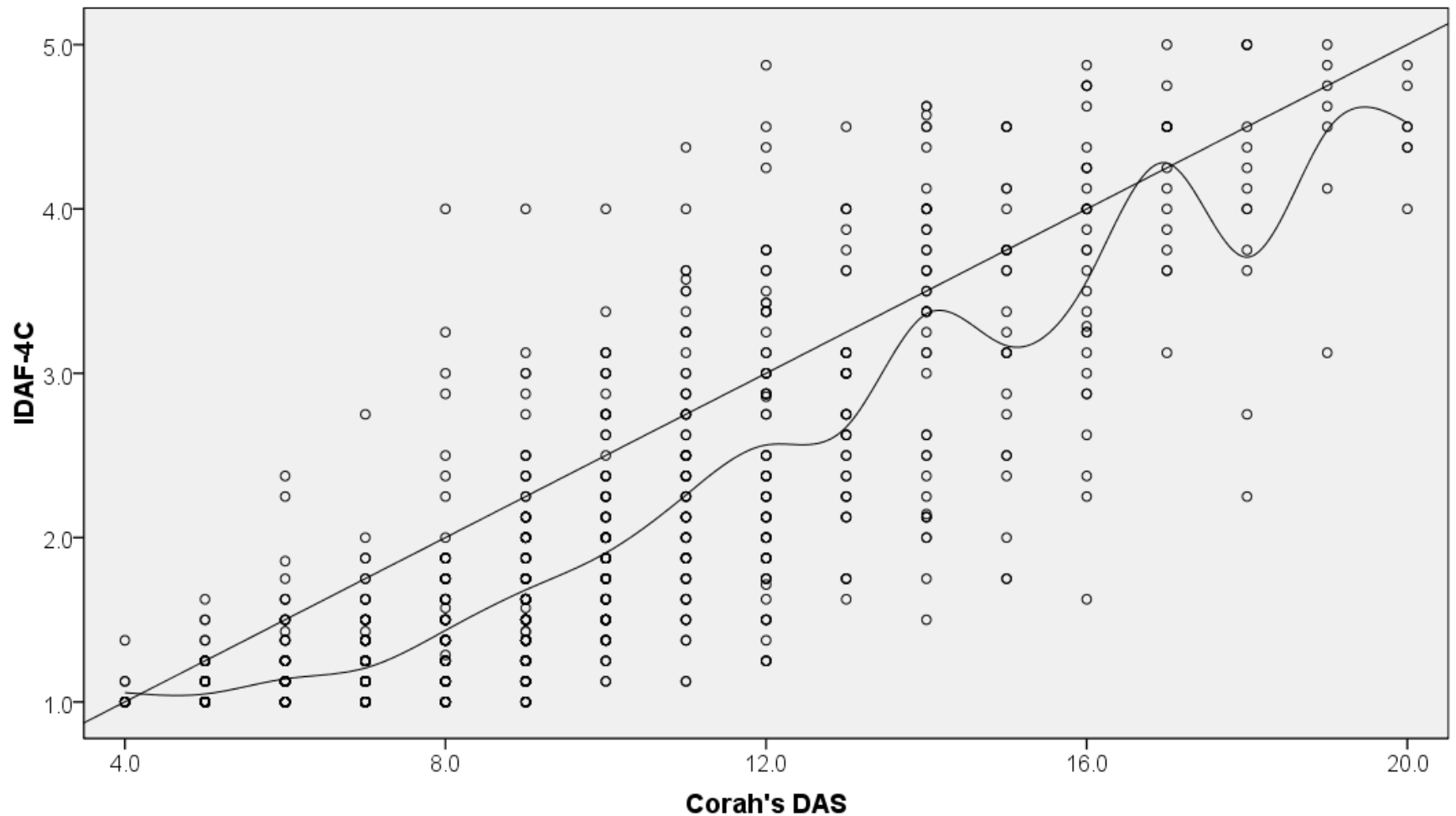
Correlation of IDAF-S items with dental fear

IDAF-S item	Correlation with IDAF-4C	Correlation with DAS
Painful or uncomfortable procedures	0.71	0.71
Feeling embarrassed or ashamed	0.43	0.35
Not being in control of what is happening	0.67	0.57
Feeling sick, queasy or disgusted	0.66	0.60
Numbness caused by the anesthetic	0.46	0.40
Not knowing what the dentist is going to do	0.58	0.49
The cost of dental treatment	0.29	0.25
Needles or injections	0.58	0.58
Gagging or choking	0.53	0.49
Having an unsympathetic or unkind dentist	0.51	0.47

Note: All Pearson r correlation coeficients significant at $p < 0.001$
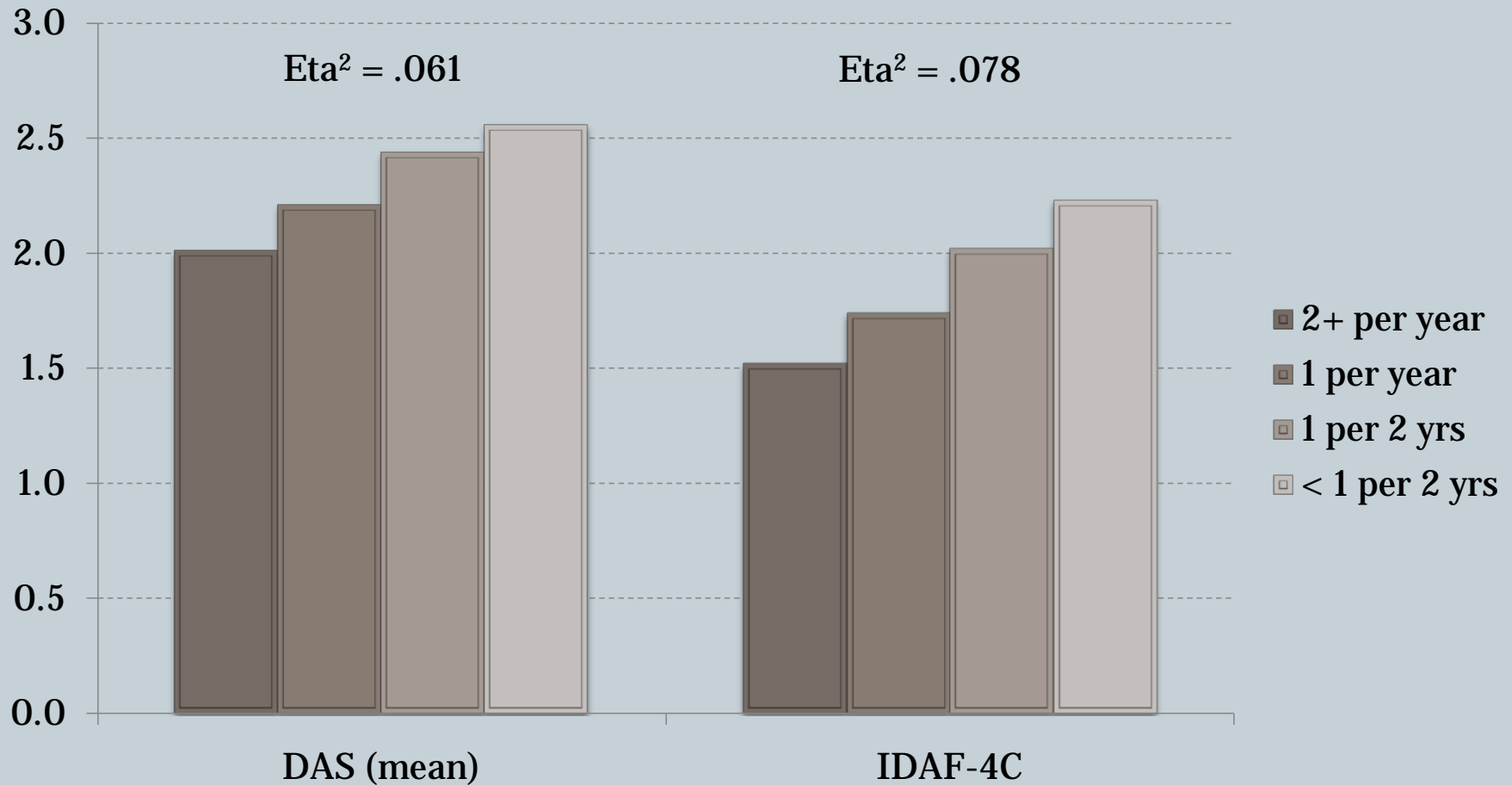
Phobia module - prevalence

- ## Phobia or disorder with a dental component – 6.0%
  (IDAF-4C ≥ 3.0 and significant interference with life or distress about having the fear)

- ## Dental phobia – 2.9%
  (IDAF-4C ≥ 3.0 and significant interference with life or distress about having the fear and not better classified as Panic Disorder or Social Phobia)

- ## DSM-IV criteria dental phobia – 1.1%
  (IDAF-4C ≥ 3.0 and significant interference with life or distress about having the fear and the belief that the fear is excessive or unreasonably and not better classified as Panic Disorder or Social Phobia)
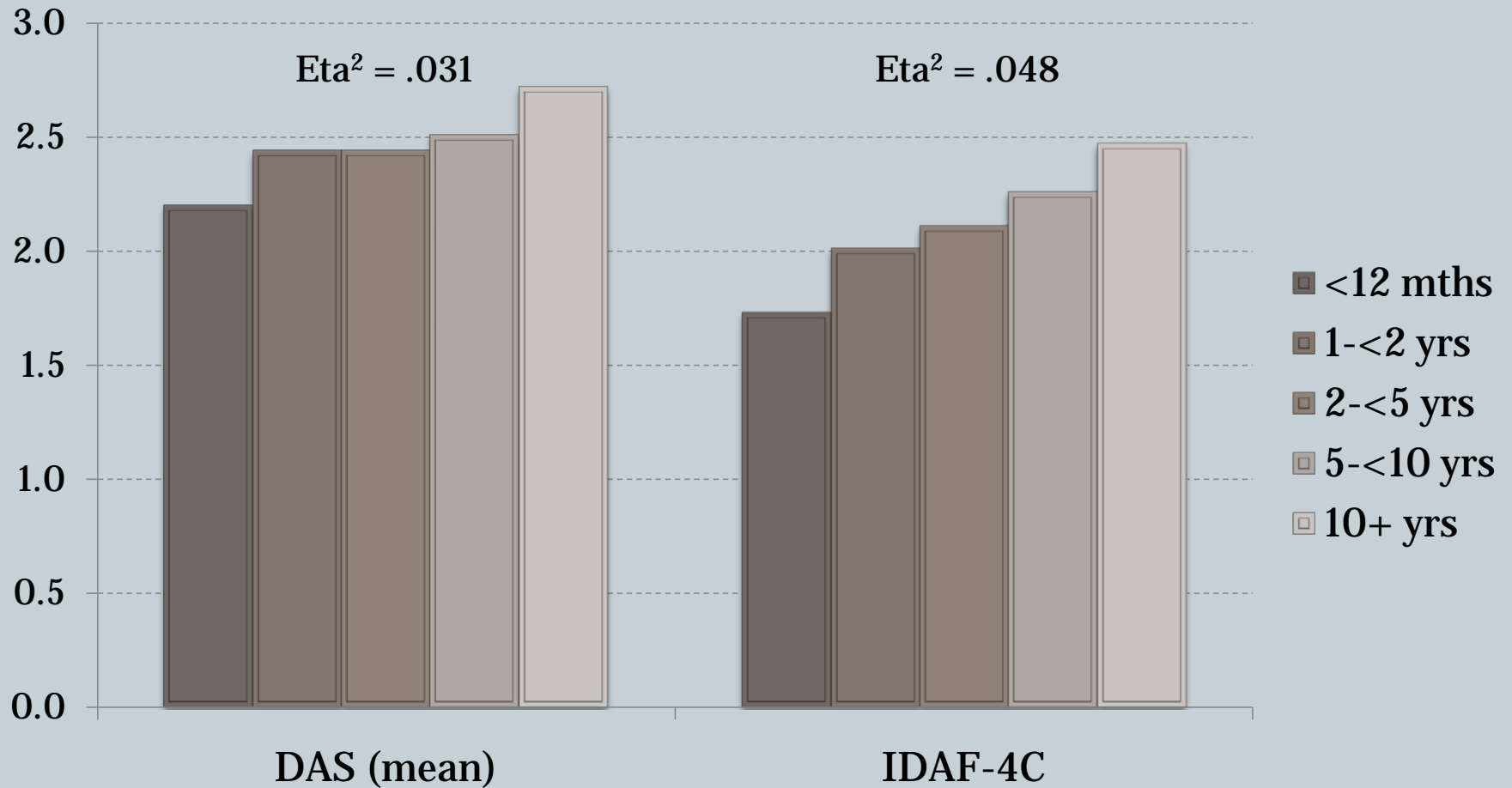
Frequency of dental visits by dental fear

Time since last visit by dental fear

Usual reason for visit by dental fear

Mean score

$Eta^2 = .050$

$Eta^2 = .076$

- Check-up
- Problem

DAS (mean)
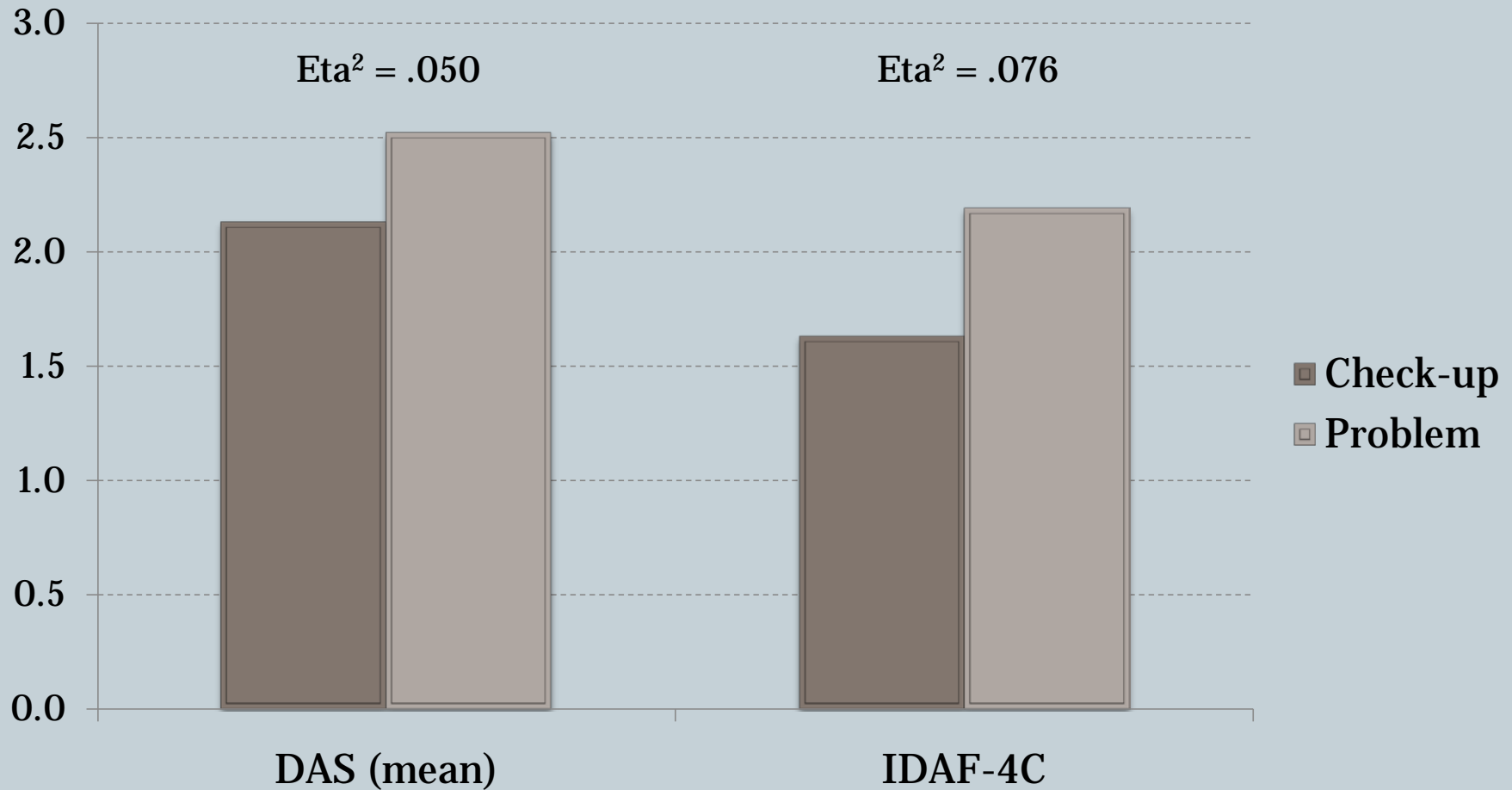
IDAF-4C

Predicting dental avoidance

	No avoidance for any reason (mean)	Avoids dentist for any reason (mean)	F	p	Eta^2
Corah's DAS	7.95	10.02	99.14	<0.001	.085
IDAF-4C	1.43	2.18	142.44	<0.001	.130

	No avoidance due to fear (mean)	Avoids dentist due to fear (mean)	F	p	Eta^2
Corah's DAS	8.49	13.74	380.93	<0.001	.262
IDAF-4C	1.66	3.34	512.01	<0.001	.323

Predictive validity – visiting and experience

A. "Have you visited a dentist or dental professional since filling out the initial National Dental Anxiety and Fear Survey?"

Baseline fear	Visited dentist 4months later		Did not visit dentist 4 months later		
	Mean	95% CI	Mean	95% CI	Nagelkerke R Square
IDAF-4C	1.65	1.52-1.79	1.94	1.87-2.01	.022
DAS	8.45	7.98-8.91	9.40	9.17-9.63	.022

B. "How would you describe your recent dental visit?"

Baseline fear	Positive experience at future visit		Negative experience at future visit		
	Mean	95% CI	Mean	95% CI	Nagelkerke R Square
IDAF-4C	1.59	1.46-1.71	2.20	1.85-2.54	.075
DAS	8.27	7.82-8.72	9.96	8.73-11.19	.053

Predicting phobia diagnosis by IDAF-4C and DAS scores

	IDAF-4C			Corah's DAS		
	Mean	Sig.	Partial Eta^2	Mean	Sig.	Partial Eta^2
Dentally-related phobia/disorder						
No ($n = 1015$)	1.74	<0.001	0.297	8.84	<0.001	0.154
Yes ($n = 65$)	4.05			14.59		
Dental phobia						
No ($n = 1049$)	1.82	<0.001	0.136	9.04	<0.001	0.060
Yes ($n = 31$)	4.04			14.16		
Dental phobia (DSM-IV criteria)						
No ($n = 1068$)	1.86	<0.001	0.046	9.14	<0.001	0.020
Yes ($n = 12$)	3.93			13.83		

Sensitivity /Specificity for dental phobia

	IDAF-4C					DAS			
	>2.5	>3.0	>3.5	>4.0	>4.5	13+	15+	17+	19+
Sensitivity	100.0	93.8	81.5	47.7	20.0	75.4	47.7	23.1	7.7
Specificity	84.2	90.1	94.1	97.4	99.3	87.1	93.4	97.3	99.1
Total Se+Sp	184.2	183.9	175.6	145.1	119.3	162.5	141.1	120.4	106.8
PPV	28.9	37.9	46.9	54.4	65.0	27.2	31.6	35.7	35.7
NPV	100.0	99.6	98.8	96.7	95.1	98.2	96.5	95.2	94.4
LR+	6.33	9.47	13.81	18.35	28.57	5.84	7.23	8.56	8.56
LR-	0.00	0.07	0.20	0.54	0.81	0.28	0.56	0.79	0.93

Se = Sensitivity; Sp = Specificity; PPV = Positive Predictive Value; NPV = Negative Predictive Value; LR$^+$ = Positive Likelihood Ratio; LR$^-$ = Negative Likelihood Ratio

Summary of assessment of IDAF-4C⁺ modules

- ## The IDAF-4C is reliable as shown by:
    - High internal consistency (Cronbach's alpha = 0.94)
    - Test-retest reliability at 4 months = 0.84
- ## The IDAF-4C is valid as shown by:
    - Association with other dental fear measure
    - Predicting future service use and negativity of experience
    - Associations with dental phobia diagnoses
    - Associations with reduced visiting frequency, dental avoidance due to fear, fear of specific items
- ## The IDAF-P and IDAF-S both demonstrate validity and reliability

Discussion

- The IDA-4C+ can be used for:
  - The assessment of dental anxiety and fear at a population or individual level;
  - Making a provisional diagnosis of dental phobia;
  - Determining important fear relevant stimuli for fearful (or non-fearful) individuals.

Discussion (continued)

- It is preferred over existing measures because:
  - It has a solid theoretical base for measuring dental anxiety and fear;
  - It is psychometrically sound, showing good reliability and validity;
  - It's modular approach allows flexibility for specific purpose usage;
  - It is comparatively better at predicting dental avoidance and service use, specific fears, and dental phobia than the most widely used measure of dental anxiety and fear.

Future directions

- A comparison of the IDAF-4C$^+$ with other dental fear measures ie MDAS and DAI.

- A version of the IDAF-4C$^+$ for use with children

- Validation of the phobia module against clinical diagnosis

- Translation and cross-cultural comparisons

Acknowledgements