Cognitive Models of the Development of Psychosis

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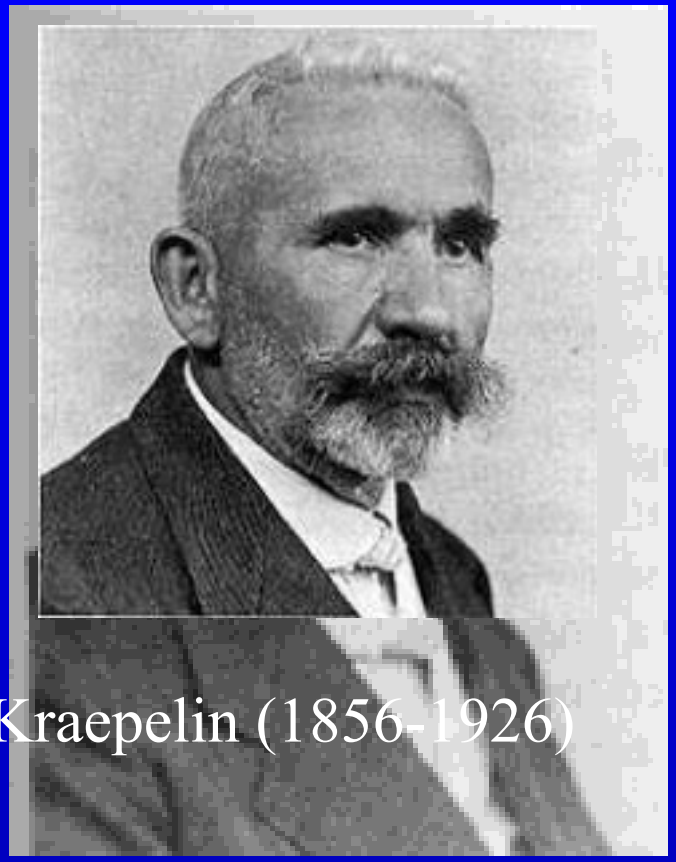
Background

Following DSM-III, neoKraepelinian diagnoses have become the dominant method of description in psychiatry. They are used in research papers, textbooks (even those written by psychologists) and clinical reports.



Emil Kraepelin (1856-1926)

Background

NeoKraepelinian diagnoses are not fit for any of the purposes for which they have been designed:

- **They do not identify true syndromes**
- **They are poor predictors of course and treatment response**
- **They do not map on to particular aetiological processes**

(Bentall, jackson & Pilgrim, 1988; Bentall, 2003)

They are not much better than star signs (another persistent and widely accepted diagnostic system).

Transdiagnostic aetiological processes

In the light of the limited success of research based on the neoKraepelinian pradigm, some researchers have begun to look for alternatives.

One approach is to look for transdiagnostic processes that give rise to particular *complaints* or *symptoms*.

Once we have figured out how to explain hallucinations, delusions, thought disorder, negative symptoms, mania etc. maybe there will be no schizophrenia or bipolar disorder left to explain.

I

The case of paranoia

Persecutory (paranoid) delusions

The most common type:

- **42% of Danish inpatients (Jorgensen & Jensen, 1994); 35% of British deluded patients (Garety, Everitt & Hemsley, 1988).**
- **Ndetei & Vadjher (1984) compared the delusions of psychiatric in-patients from Europe, the Caribbean, India, Africa, the Middle East and the Far East, and found persecutory to be the most common except in Far East (where sexual delusions are most common).**
- **However, exact delusional themes may vary with culture:**

Sendiony (1976) found that middle and upper class Egyptian patients typically report persecutory delusions that have scientific or secular themes, whereas the delusions of poorer patients often involve religious institutions.

Kim, Li, Jiang, & Cui (1993): paranoid delusions in Korean patients tend to reflect fears of rape, whereas fears of vampires and poisoning are more common in Chinese patients

Persecutory (paranoid) delusions

In the SoCRATES first episode sample (Moutoussis et al. 2007)

PANSS* > 2	N/255	%
Delusions (P1)	250	98
Suspicion (P6)	235	91.8
Delusions & Suspicion	230	90.2
Hallucinations (P3)	177	69.1
Thought disorder (P2)	144	56.5
Grandiosity (P5)	98	38.6
Agitation (P4)	179	70.2
Hostility (P7)	97	37.9

Positive and Negative Syndromes Scale (Kay et al., 1987), a widely used measure of psychotic symptoms,

A paranoid continuum?

Many psychologists have argued that psychotic experiences exist on a contiuum with normal functioning (e.g. Claridge, 1990) and have developed psychometric instruments to assess this continuum (e.g. Bentall, Claridge & Slade, 1988),

- Epidemiological studies show that large numbers of people report delusional beliefs (12.0%, van Os et al., 2000, Holland) or paranoia (12.6% paranoia, Poulton et al., 2000, New Zealand)

- Freeman et al. (2005) administered a paranoia questionnaire to over 1000 people in a UK internet survey. They found evidence for a continuum, although extreme beliefs about threats of harm were only endorsed by a minority.

Two types of paranoia?

- Trower and Chadwick (1995) argue that there are two types of paranoia:

  'Poor me' paranoia (persecution underserved, self-esteem preserved)

  'Bad me' paranoia (persecution deserved, self-esteem low)

- However, until recently there was almost no research to examine the distinction.

The PADS (Melo et al., in press)

Developed a Persecution and Deservedness scale (10, 12 and 20 item versions) designed for both patient and clinical participants. Administered to 312 undergraduates and 45 acutely psychotic patients.

1. There are times when I worry that others might be plotting against me.

(ANS: 0 = certainly false; 4 = certainly true)

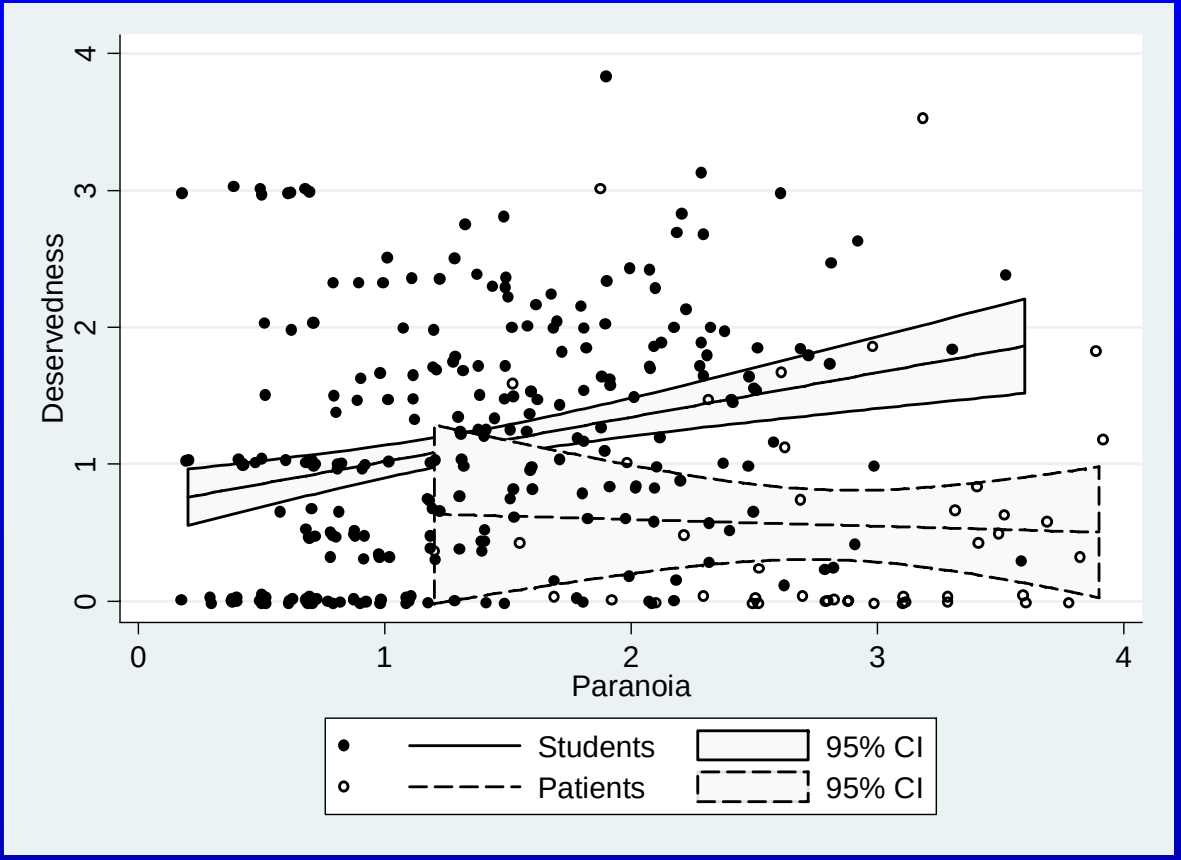
If you've answered 2 or above to the last question, please answer to the following question:

1.1 Do you feel like you deserve others to plot against you?

(ANS: 0 = not at all; 4 = very much)

The PADS (Melo et al., in press)

Adequate reliability was found for both dimensions. In non-patients, a clear relationship was observed between paranoia and deservedness, but this relationship was absent in patients. In the patient sample, deservedness scores appeared to be suppressed.



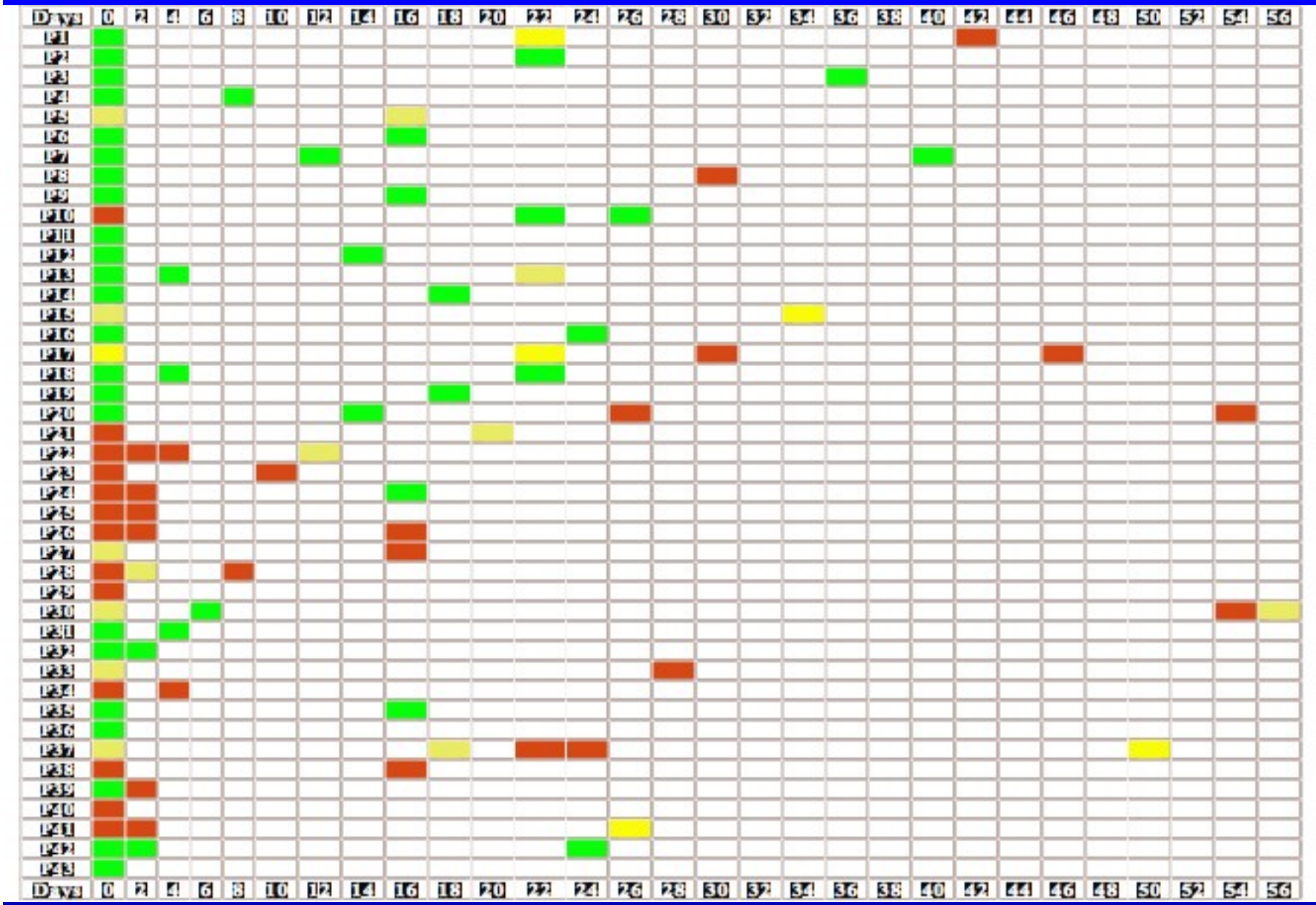
Fluctuations in deservedness (Melo et al., 2006)

43 paranoid patients compared with 22 healthy controls.

Initial intention was to repeat assessments of paranoid patients after 1 month – proved difficult.

All patients completed a deservedness analogue scale on each assessment “0 = I don’t deserve to be persecuted”; “12 = I deserve to be persecuted”.

Fluctuations in deservedness (Melo et al. 2006)



Deservedness

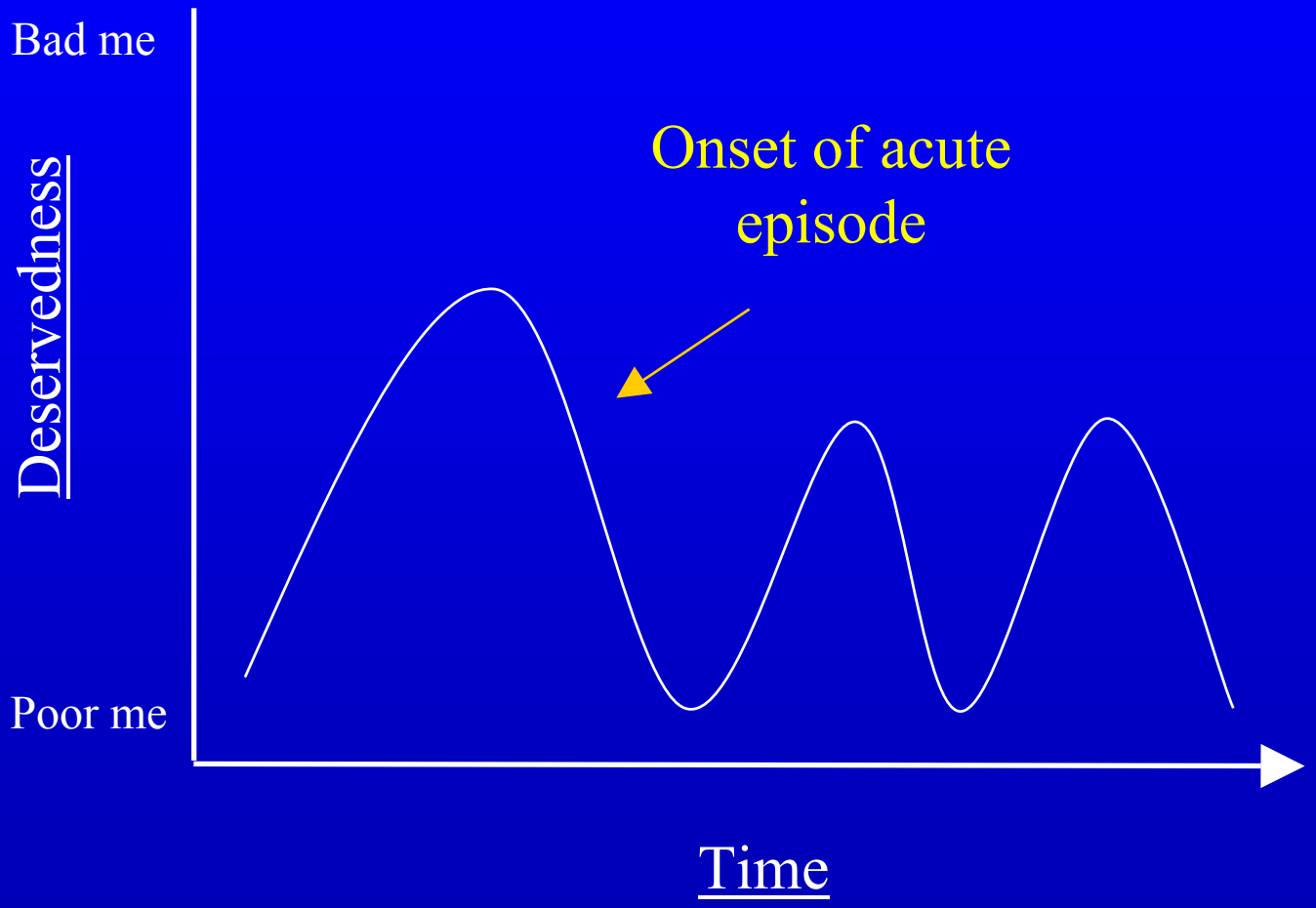
> 6

4.1 - 6

1.1 - 4

0 - 1

Time course of deservedness?



Collip, Oorschot, Thewissen, Van Os, Bentall & Myin-Germeys (in subm.)

Used a diary method (Experience Sampling) to examine variation of momentary paranoia and perceived social threat ("In this company I feel threatened", "In this company I feel accepted" (reversed)) with social context:

- ***whether alone, in unfamiliar company, in familiar company***
- ***subjective stress since last bleep***

At low and moderate levels of trait paranoia (Fenigstein scale), paranoid thinking and perceived social threat were predicted by both context and subjective stress.

At high levels of trait paranoia, paranoid thinking and perceived social threat were NOT predicted by either context and subjective stress.

Take home message from Part I

- **Mild to moderate paranoia is usually bad-me and context-dependent.**

- **Severe paranoia is usually poor-me and context- independent**

- **But, in acutely ill patients, dynamic transitions are observed between poor-me and bad-me beliefs**

II

Psychological mechanisms in paranoia

Psychological processes that have been implicated in paranoia

Jumping to conclusions (e.g. Garety et al. 2001):

Patients with delusions tend to 'jump to conclusions' (make a decision about uncertain events) on the basis of little information

- **Typically measured by 'the beads task'**
- **Well replicated finding**
- **Seems to be associated with delusions rather than specifically paranoia**

Theory of mind (e.g. Corcoran & Frith, 1996):

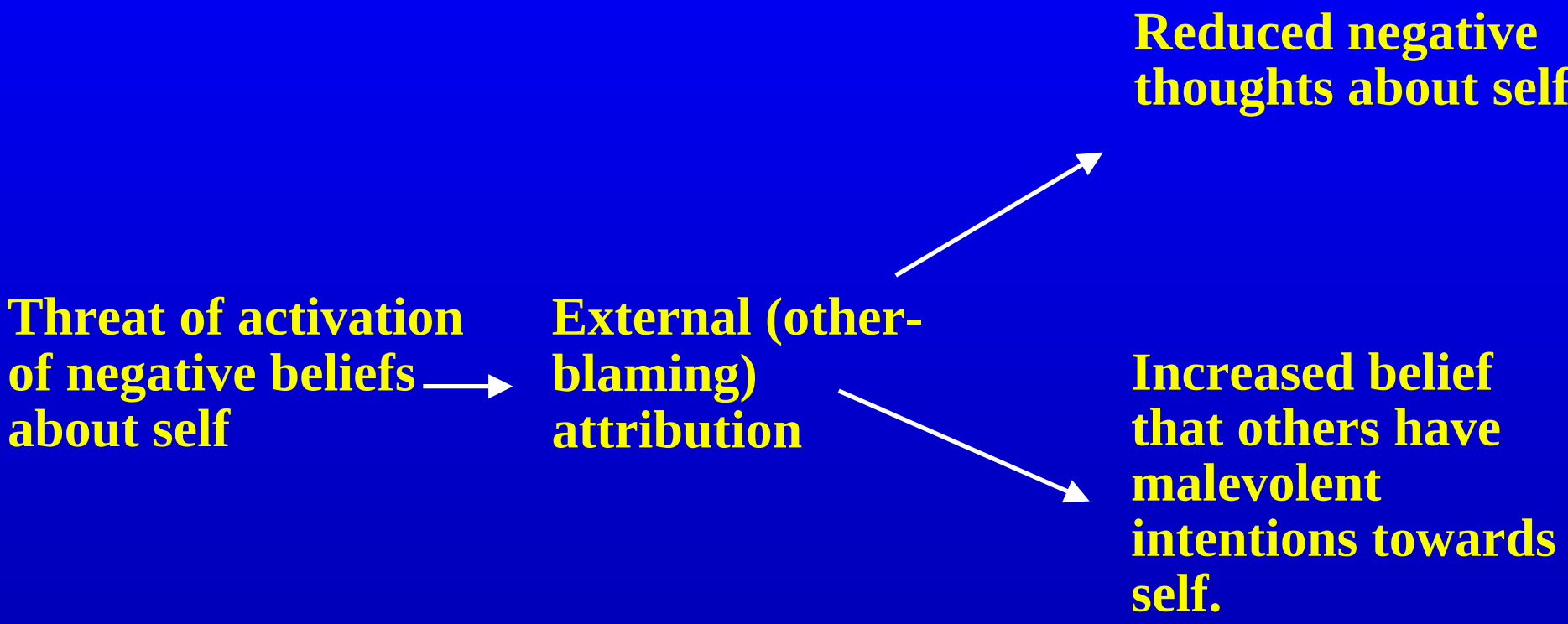
It has been argued that paranoid patients have difficulty in understanding other people's thoughts and feelings (they have a poor 'theory of mind')

- **Assessed by false belief stories, hinting tasks or even appreciation of jokes**
- **Psychotic patients perform poorly on ToM tasks, but specificity to paranoia is ot proven**

Attributions (e.g. Kaney & Bentall, 1989):

The original attributional model

Bentall, Kinderman & Kaney (1994) proposed that an externalizing attributional style minimizes accessibility of negative self-schemas at the expense of generating paranoid beliefs.

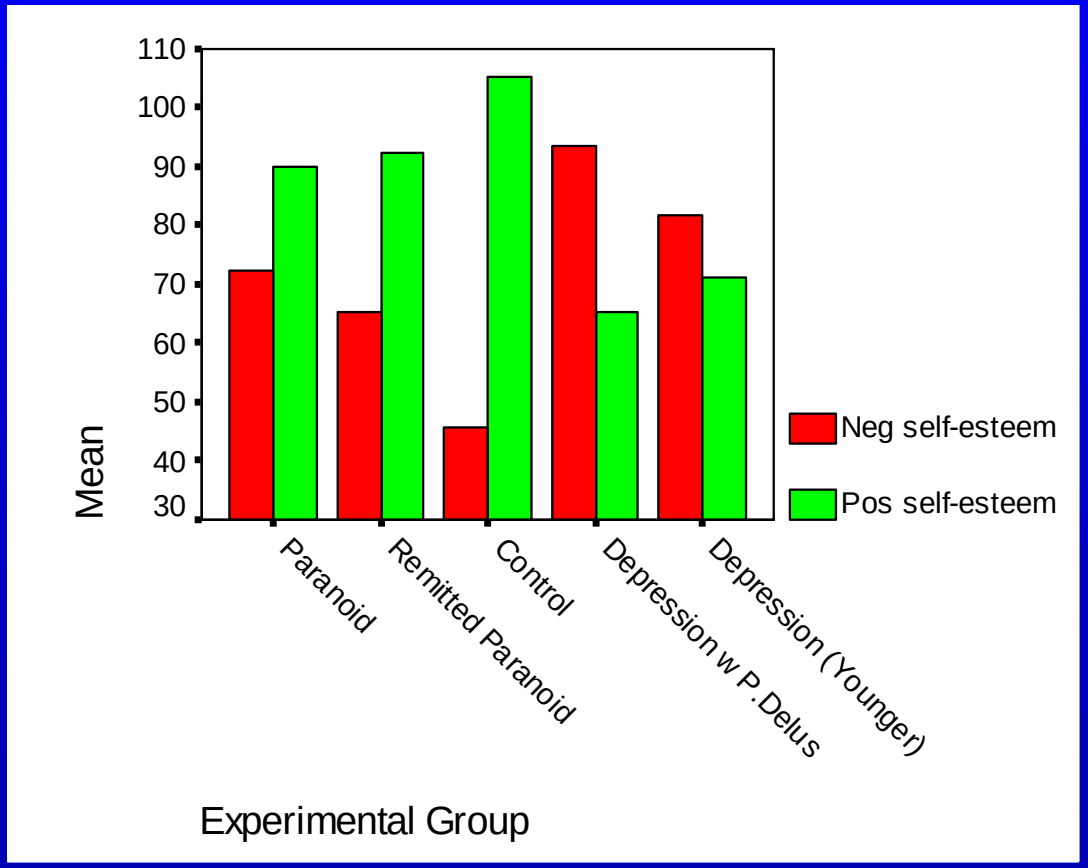


Problem #1: The relationship between self-esteem and paranoia (Bentall et al., 2008)

Wellcome Paranoia Study: Schizophrenic paranoid (N=38), remitted schizophrenic paranoid (N=27), depressed paranoid (N=18), depressed non-psychotic (N=27) and control participants (N=33) (Bentall et al., in press.)

Correlations between negative self-esteem & paranoia (Fenigstein Scale)

	Spearman r
SZ-P	.32
SZ-R	.41*
DEP-P	.42
DEP-NP	.53*
Control	.39*



Thewissen, Bentall, Lecomte, van Os & Myin-Germeys (2008)

- **Patients with positive psychotic symptoms (n=79), individuals with an at-risk mental state for paranoid psychosis (n=38), and control subjects (n=38) assessed using experience sampling method (ESM).**

- **6 day diary, 10 bleeps/day:**
  - **4 items measuring momentary self-esteem**
  - **Other items measuring context, significant experiences and attributions**
- **Momentary paranoia assessed by:**
  - I feel suspicious
  - I feel safe (reverse scored)
  - I feel that others dislike me
  - I feel that others might hurt me

Thewissen, Bentall, Lecomte, van Os & Myin-Germeys (2008)

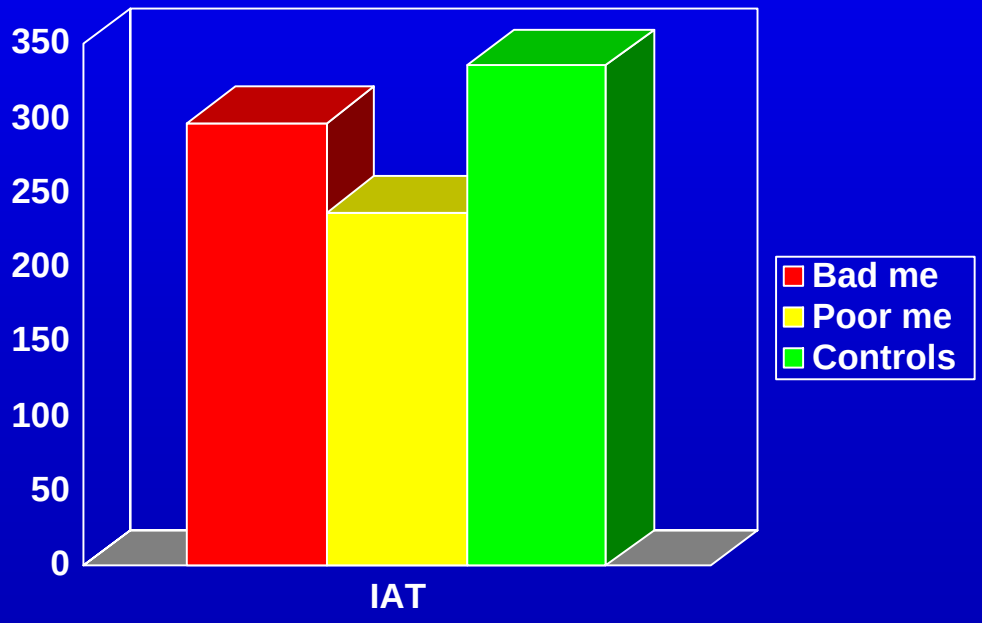
Paranoia was associated with average low self-esteem, an effect that survived correction for depression but not SE instability. Paranoia also independently related to SE stability.

SE instability	Confounders	n	β (SE)	p	p (T2 vs T1) [3]	p (T3 vs T1) [3]
Momentary level [1]	- sex, depression sex, depression, SE level	155 155 155	.11 (.03) .10 (.03) .09 (.03)	p<.001 p<.01 p<.01		*** ** **
Day level [1]	- sex, depression sex, depression, SE level	155 155 155	.21 (.06) .20 (.07) .17 (.07)	p<.01 p<.01 p=.01	* *	** ** **
Subject level [2]	- sex, depression sex, depression, SE level	155 155 155	.13 (.03) .13 (.04) .11 (.03)	p<.001 p<.001 p<.01		*** *** ***

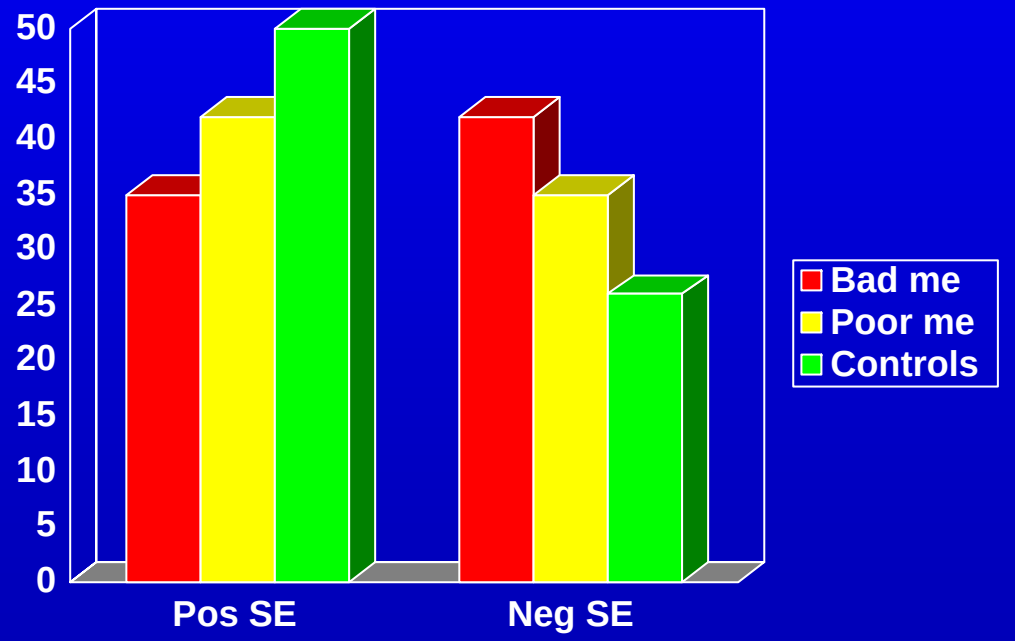
1 Multilevel linear random regression model, β can be interpreted identically to the regression outcome in a unilevel linear regression model. Since 16 patients had missing data at day level, only 139 participants were included in the analyses.
2 Unilevel linear regression model
3 Paranoia Scale tertile scores, T1=low paranoia; T2=medium paranoia; T3=high paranoia;
* p<0.05; ** p<.01; *** p<.001

Grey, Valiente & Bentall (in prep)

Two studies have reported that paranoid patients sometimes show low implicit self-esteem but relatively preserved explicit self-esteem (Moritz & Woodward, 2005; McKay et al. 2005). We measured implicit (Implicit Attitudes Test) vs explicit SE (Nugent & Thomas's scale) in poor-me patients, bad-me patients and controls.



PM = BM < C



All groups sig different

Problem #2: Is the association between attributions and paranoia replicable?

Replications:

- *Candido & Romney (1990) (Canada)*
- *Fear et al. (1996) (Wales)*
- *Lassar & Debbelt (1998) (Germany)*
- *Lee & Wong (1998) (South Korea)*

Partial replications:

- *Kristev et al. (1999) (Australia; partial replication)*
- *Martin & Penn (2002)*
- *McKay et al. (2005)*

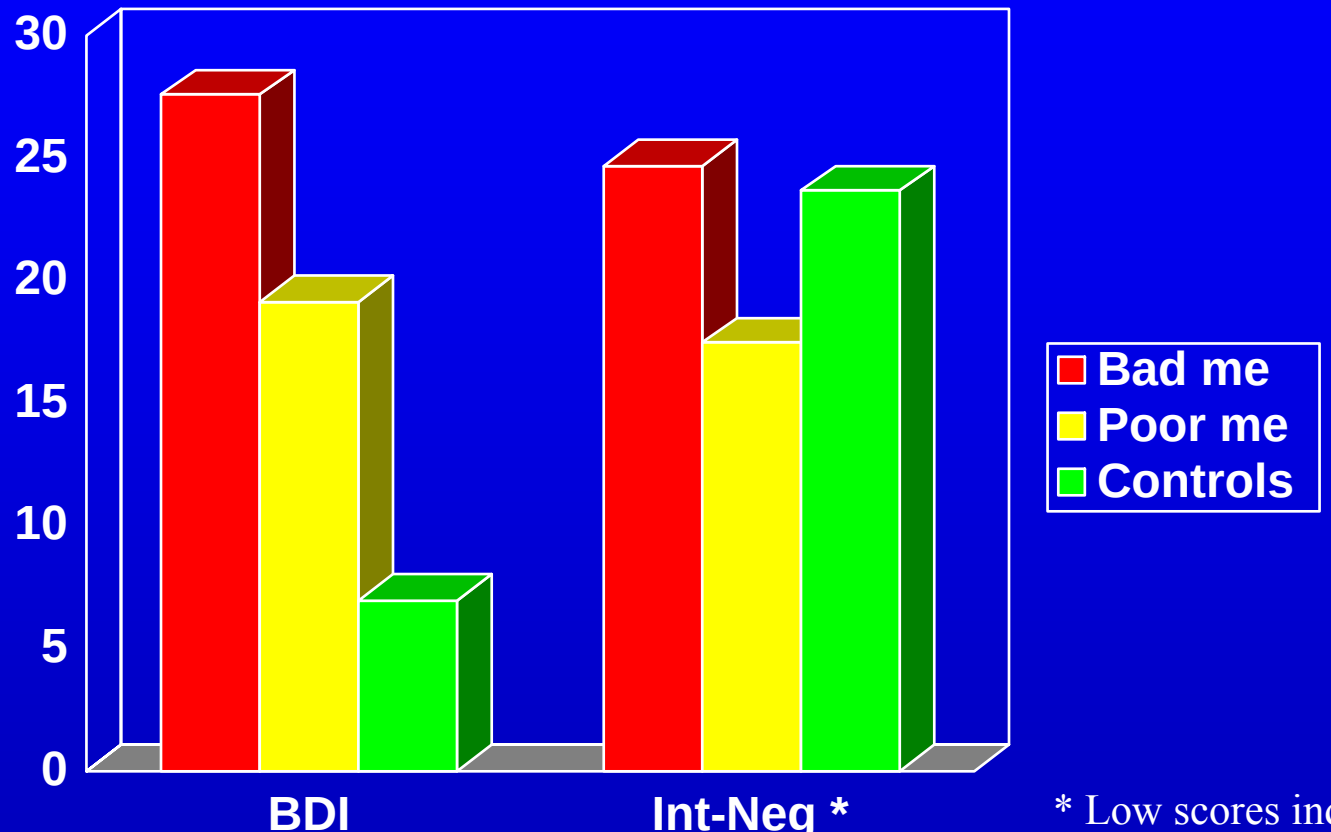
Complete failures to replicate:

- *Humphries and Barrowclough (2006)*
- *Diez-Alagria et al. (2006)*

Attributional abnormalities present in acute paranoid but not 'normal' paranoids

- *Jannsen et al (2006)*
- *McKay et al. (2005)*
- *Martin & Penn (2001 – non-patients) vs Martin & Penn (2002 – patients)*

Attributions and deservedness (Melo et al., 2006)



p < .001

p < .01

* Low scores indicate external attributions for negative events

Must everyone get prizes?

In our recent Wellcome Trust funded study we combined data from the following groups (Bentall et al. 2009):

- **Schizophrenia patients with paranoid delusions**
- **Schizophrenia patients with paranoid delusions in remission**
- **Depressed patients with paranoid delusions**
- **Depressed patients without paranoid delusions**
- **Patient with late onset (aged => 65) schizophrenia-like psychosis with paranoid delusions**
- **Elderly (aged => 65) depressed patients without paranoid delusions**
- **Healthy controls**

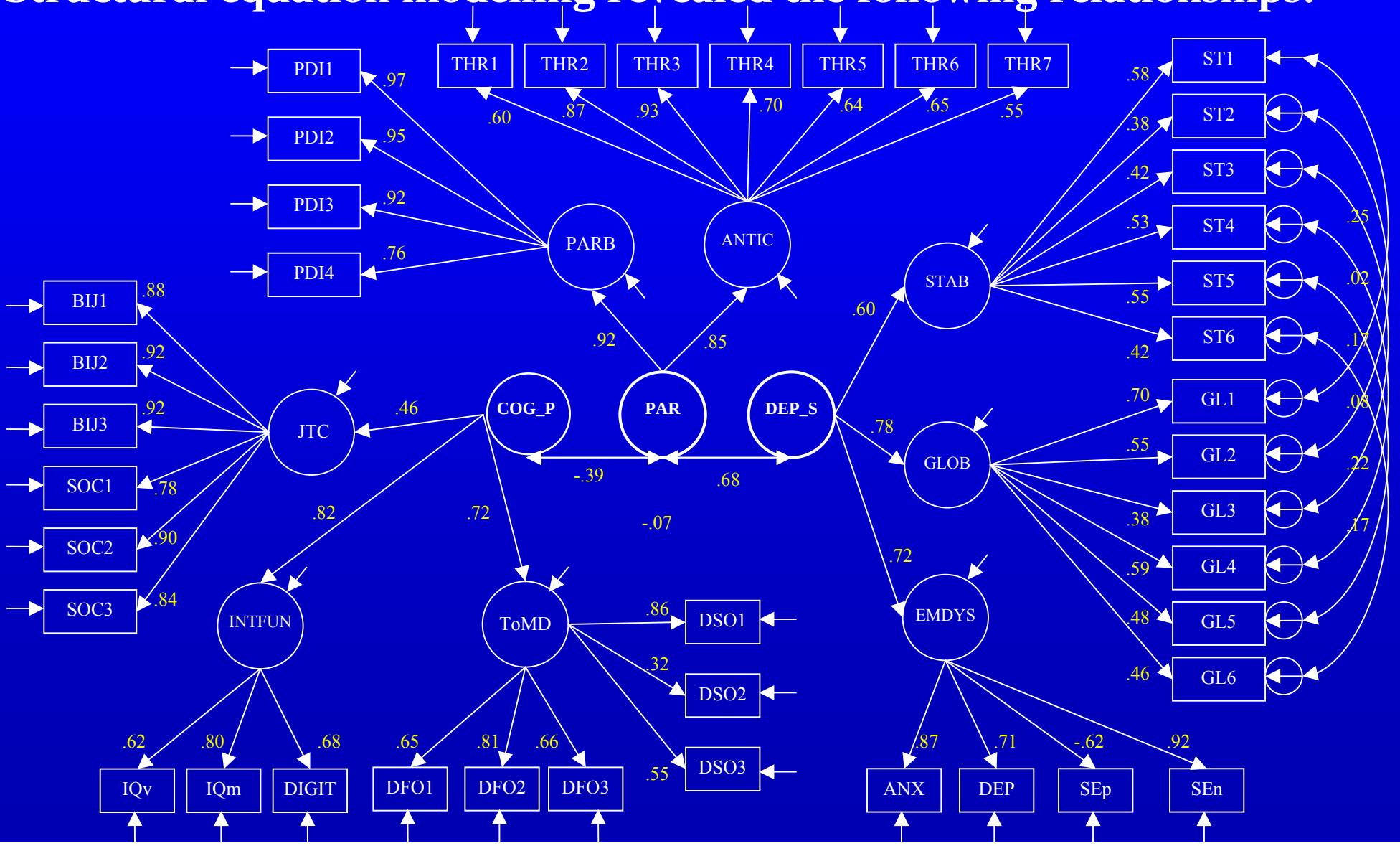
Must everyone get prizes?

And modelled the relationships between measures of:

- **Paranoid beliefs**
- **Threat anticipation**
- **Attributional style (excluding internality)**
- **Self-esteem (positive and negative)**
- **Depression and anxiety**
- **Theory of mind (2 measures)**
- **Jumping to conclusions (2 measures)**
- **Cognitive (executive) function (short WAIS and digit span backwards)**

Could all of these theories be true?

Structural equation modelling revealed the following relationships:



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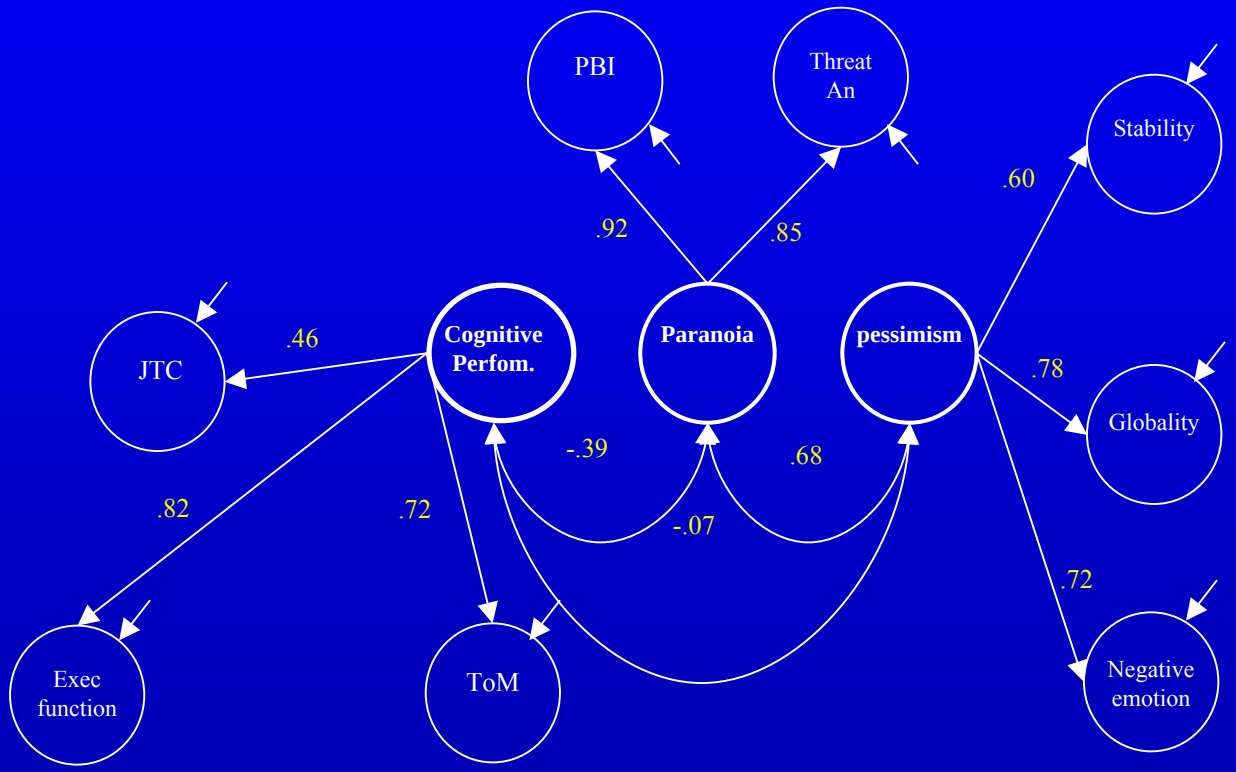


Take home message from Part II

- There is evidence to support the role of multiple psychological processes in paranoia
- These can be broadly grouped into two classes: emotional (self-esteem and attributions) and cognitive (executive function?)
- Emotional factors seem to be more important
- BUT defensive processes seem to be important in poor-me paranoia (we were unable to test this in the Wellcome study)

III

Developmental origins of paranoia

Relationships influence cognitive development

Studies have shown that:

Attachment status (Fonagy et al, 1991) and parental 'mind-mindedness' (Meins et al., 1998) affect the development of ToM skills in children.

Studies of the childhood origins of depression (Alloy et al, 2001) and of normal development (Durkin, 1995) show that attributional style is learned from parents.

Attachment and paranoia

Dozier at al. (1991, 1995) found that schizophrenia patients, especially with paranoia, most likely to have dismissing-avoidant attachment style.

Community surveys of 8000 adults (Mickleson et al., 1997) and 1500 adolescents (Cooper at al., 1998) also show psychosis, especially paranoia, associated with insecure attachment.

Early separation from parents (Morgan et al. 2006) and being unwanted at birth (Myhrman et al. 1996) increase the risk of psychosis in later life.

Pickering, Simpson & Bentall (2008)

503 students completed online questionnaires:

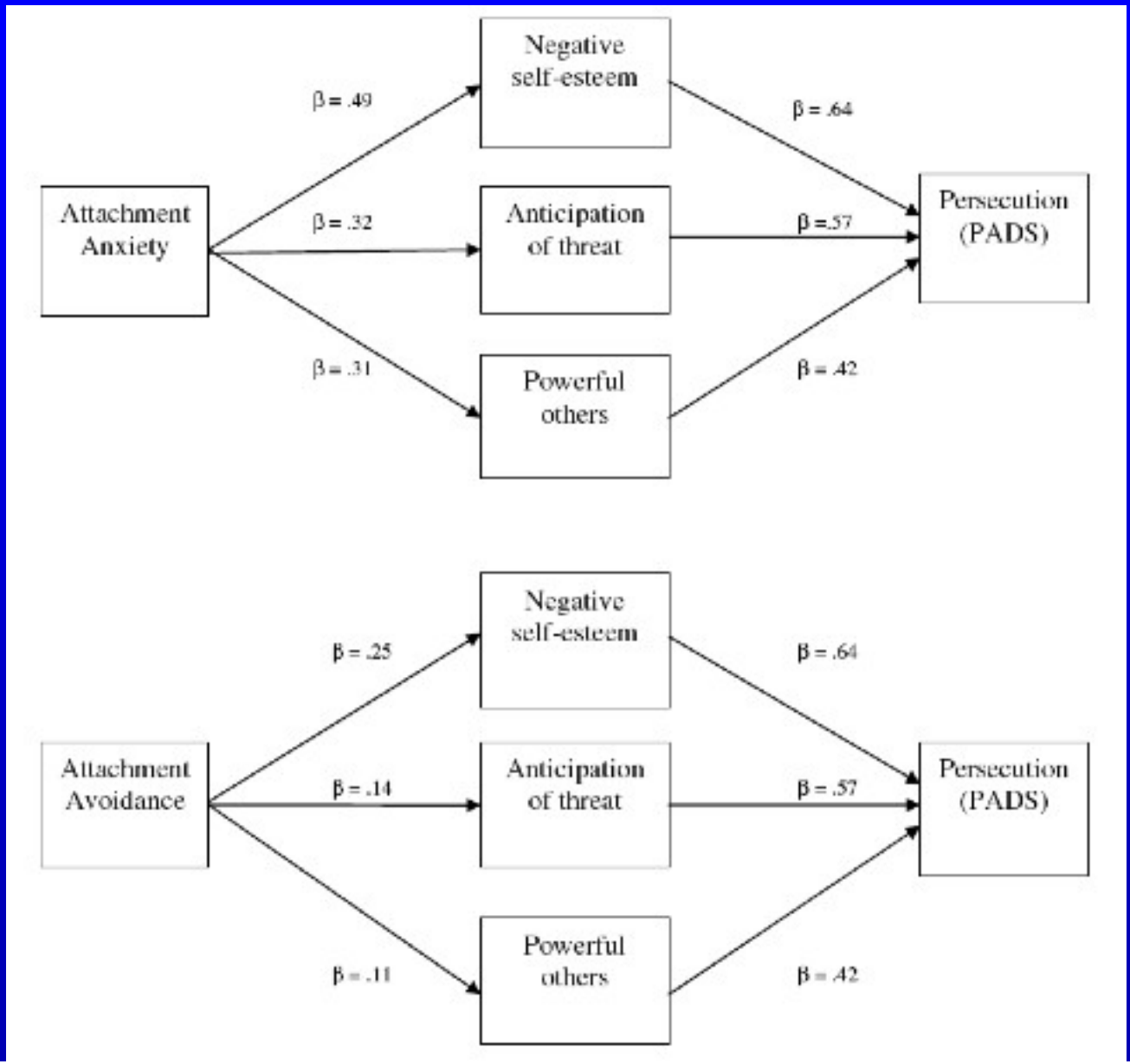
- The PADS (Melo et al. in press)
- The Launay–Slade (1981) Hallucination Scale
- Bartholomew and Horowitz's (1991) Relationship Questionnaire
- Levenson's multidimensional locus of control scale
  (Externality, Chance, Powerful Others)
- Positive and negative self-esteem (Nugent & Thomas, 1993)
- Anticipation of threatening events (Bentall et al. in press)

Insecure attachment predicted paranoia when hallucinations were controlled for:

R^2 = .53, for model including attachment anxiety, negative self-esteem, anticipation of future threat, the recall of threat and powerful others

Insecure attachment did not predict hallucinations when paranoia was controlled for.

Pickering, Simpson & Bentall (2008)



Victimization and paranoia

Mirowski and Ross (1981) reported data on paranoid beliefs from a community survey of residents of El Paso and Juarez. Paranoia was associated with an external locus of control and experiences of victimization and powerlessness.

Janssen et al. (2003), in an epidemiological study of 7000+ Dutch citizens, found that experiences of discrimination predicted the later development of paranoid symptoms.

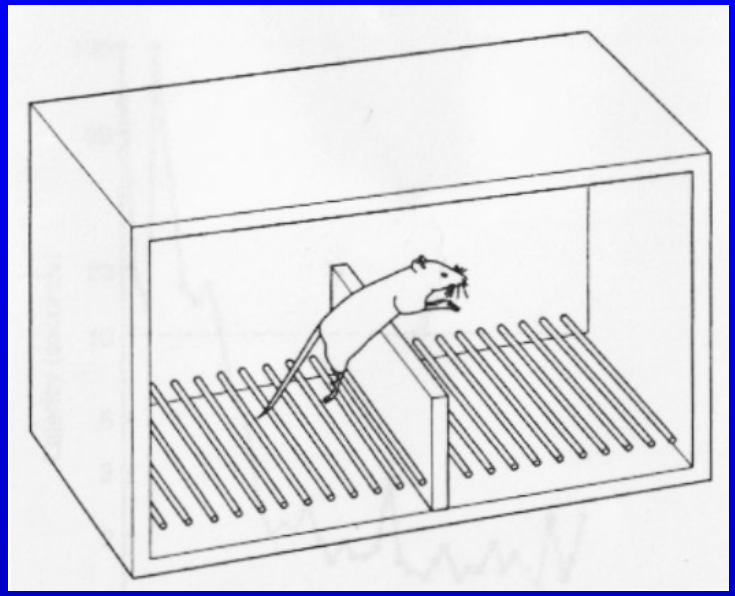
The high risk of psychosis in immigrant groups (Harrison et al., 1988), especially those living in relative isolation from other immigrants (Boydell et al. 2001) might be explained in this way.

IV

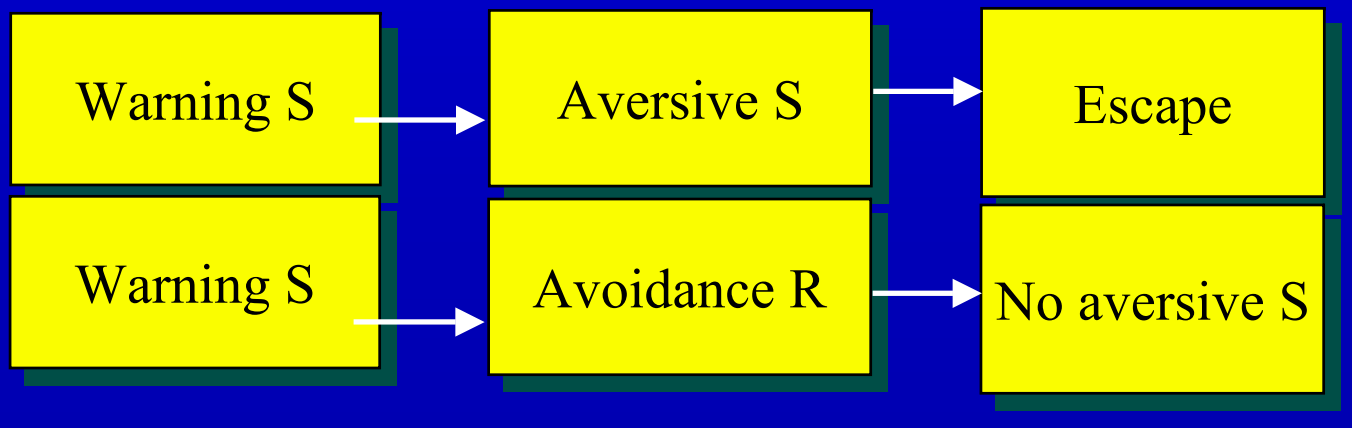
The role of dopamine

The conditioned avoidance paradigm

The animal is placed in a shuttle box, in which it can receive a warning signal and an electric shock. We have argued that this is a reasonable animal model of threat anticipation (Moutoussis, Dayan, Williams & Bentall, 2007).

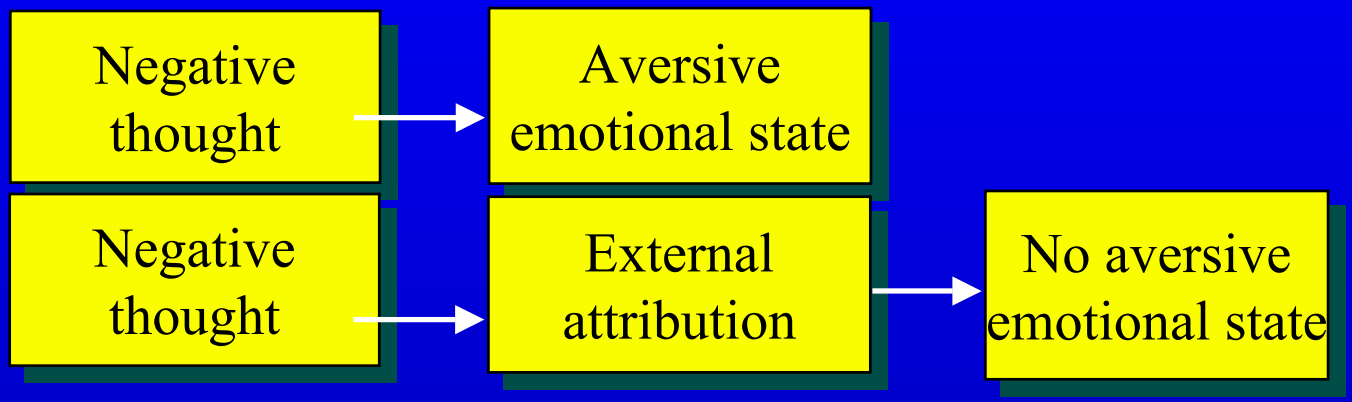


Note that learning continues (decreased response latencies) long after 100% avoidance is achieved.



How does CAR relate to paranoia?

Could attributional responses seen in poor-me paranoia be construed as covert avoidance responses?



The CAR and dopamine

Drugs which block d-2 receptors in the striatum have a powerful therapeutic effect on patients who experience persecutory delusions.

Dopamine-blocking drugs abolish the conditioned avoidance response (CAR) in animals (Beninger et al., 1980; Smith et al. 2005), but not escape responding – suggests a role for dopamine in threat perception. We have proposed a computational model of this effect (Moutoussis et al. 2009).

Animal studies show that repeated exposure to social defeat in animals leads to sensitization of the dopamine system (Selten, 2005).

VI

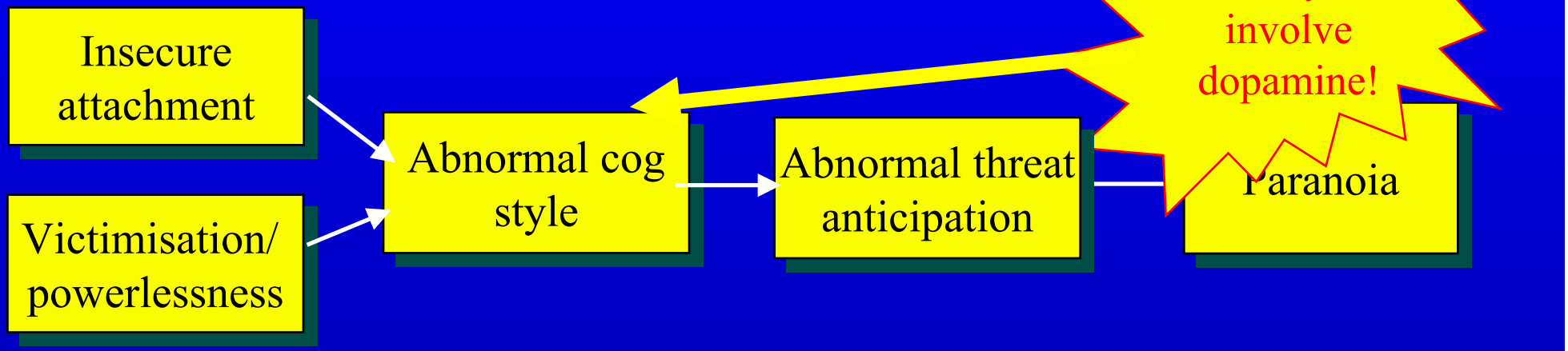
Conclusions

Conclusions: Transdiagnostic models

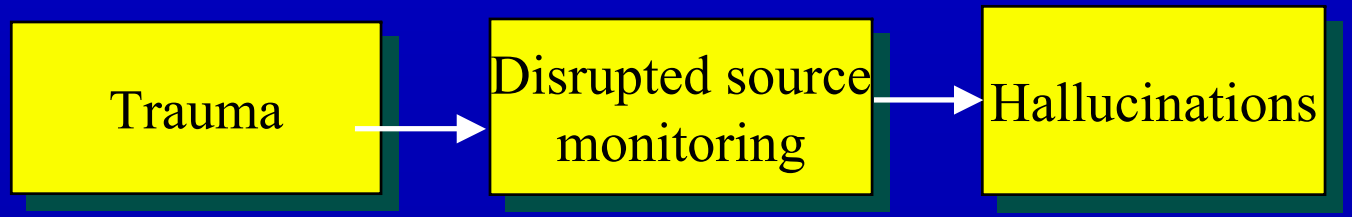
It is possible to construct convincing scientific accounts of symptoms which make no reference to diagnoses. Adding diagnoses to the models does not improve them!

Biological variables can be incorporated into the models!

Paranoia:



Hallucinations:



Conclusions: Types of paranoia

- **There seems to be a discontinuity between moderate and severe paranoia**

	Moderate Paranoid	Severe Paranoia
Type of delusion	Bad-me	Poor-me, but switching to bad-me
Context dependency	Dependent	Independent
Self-esteem		
Implicit	Low	Low
Explicit	Low	Higher
Stability	Less unstable	Highly unstable
Attributions	Normal	External for negative events
Biological mediator	?	Hyper-dopaminergia?
Antipsychotic responsive	No	Yes

Conclusions: developmental origins

It seems likely that the abnormal cognitive functioning seen in paranoid patients is a consequence of a developmental pathway which is influenced by:

- **Insecure attachment**
- **Exposure to victimization/social defeat**

But there may well be many other moderating factors. For example:

- **The A1 allele of the DRD2-TAQ-IA polymorphism is known to reduce D2 receptor density by up to 30%, resulting in a reduced ability to learn to avoid negative consequences (Klien et al., 2007). *This allele should protect against paranoia!***

Implications and further directions

- This account needs to be tested in future studies:

  - Longitudinal investigations of deservedness beliefs and avoidance behaviours in high risk samples

  - Experimental and neuroimaging studies of avoidance responding in clinical samples

  - Tests of new psychological interventions designed to prevent abnormal avoidance behaviour.

That’s all folks!