ARTICLE

The structure of paranoia in the general population

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Abstract

Background

Psychotic phenomena appear to form a continuum with normal experience and beliefs, and may build upon common emotional interpersonal concerns.

Aims

We tested predictions that paranoid ideation is exponentially distributed and hierarchically arranged in the general population, and that persecutory ideas build on more common cognitions of mistrust, interpersonal sensitivity and ideas of reference.

Method

Items were chosen from the SCID-II questionnaire and the Psychosis Screening Questionnaire in the second British National Survey of Psychiatric Morbidity (N=8580), to test a putative hierarchy of paranoid development using confirmatory factor analysis, latent class analysis and factor mixture modelling analysis.

Results

Different types of paranoid ideation ranged in frequency from less than 2% to nearly 30%. Total scores on these items followed an almost perfect exponential distribution (r=.99). Our four *a priori* first-order factors were corroborated (Inter-personal Sensitivity; Mistrust; Ideas of Reference; Ideas of Persecution). These mapped onto four classes of individual respondents: a rare, severe, *Persecutory Class* with high endorsement of all item factors, including persecutory ideation; a *Quasi-normal Class* with infrequent endorsement of interpersonal sensitivity, mistrust and ideas of reference and no ideas of persecution; and two intermediate classes, characterised respectively by relatively high endorsement of items relating to mistrust and to ideas of reference.

Conclusions
The paranoia continuum has implications for the aetiology, mechanisms and treatment of psychotic disorders, while confirming the lack of a clear distinction from normal experiences and processes.
Declaration of interest
None

Introduction

Paranoid ideation is characteristic of psychotic illness, but, like other psychotic phenomena, may be widespread in non-clinical populations (1-5). Wariness of the intentions of others may be adaptive in some situations, and becomes a clinical problem only when it is excessive, exaggerated or distressing, or interferes with functioning. Given that such ideation may precede delusion formation (6,7), our understanding of delusions should be enhanced by studying paranoid thinking in non-clinical populations. In our cognitive model of persecutory delusions (8), we hypothesized that even severe paranoia builds upon common emotional concerns, particularly themes of interpersonal worry or social anxiety. The interpersonal sensitivities often seen in emotional disorders (e.g. concerns about rejection or about being vulnerable) inform worries about future threat and the intention of others. In some people, these fears lead to ideas that others are watching or talking about them. Ideas of persecution are hypothesised to emerge from these ideas of reference. This process implies a close structured relationship between worry, anxiety and paranoia. It has credence, as all concern the theme of the anticipation of threat (9), and there is increasing empirical evidence for links between affect and paranoia (10-15).

The current investigation employs data from a general population survey to examine the distribution and underlying structure of components of paranoid ideation. Our analyses were driven by the hypothesis that the overall distribution of such ideation should be similar in form to that of affective symptoms, with many people having few such thoughts and a few people having many (3,16,17). Moreover, as with affective symptoms, increasing symptom counts should be characterised by the recruitment of rarer and odder ideas (18): in other words, a hierarchy of paranoid thoughts underpins an inherent structure within the continuum. In our cognitive model of paranoia (8), we postulated four sub-categories of paranoid experience: *interpersonal sensitivities; mistrust; ideas of reference; and ideas of persecution*. Moreover, we postulate that this structure arises because the subcategories are linked as part of a hierarchical process. Members of the general population would be classifiable in terms of these factors, and the resulting classification would correspondingly reflect hierarchical relationships between the factors.

These ideas can be formally tested in a number of ways. Given our specific hypotheses, three were appropriate: 1) confirmatory factor analysis (CFA), which establishes the structure of linear relationships between items; 2) latent class analysis (LCA), which attributes individuals to a number of separate classes; and 3) the hybrid procedure, factor mixture modelling analysis (FMMA), which allows the factor structure to be related to the class structure.

Method

The second British National Psychiatric Morbidity Survey (NPMS2000) was carried out in 2000 on a representative sample of the British population (19,20).

Sample

Because of its good coverage, the British small users postcode address file (PAF) was used to generate a list of private households (19). Full details of sampling are provided elsewhere (20). 15,804 addresses were obtained. Interviewers visited these to identify private households with at least one person aged 16 to 74 years. One person was selected from each qualifying household using the Kish grid method (21). Just under 70% of those approached agreed to a first phase interview, which the vast majority completed in full, providing 8576 individuals for the current analysis .

Design
The survey comprised two phases (19, 20). The first was carried out by well-trained non-clinical interviewers employed by the Office for National Statistics. It included the use of screening instruments to determine participants for a further interview by trained clinicians to establish diagnoses of psychosis and personality disorder. To test our hypotheses, we abstracted items from two screening instruments, the Psychosis Screening Questionnaire (PSQ; 22), and the questionnaire version of the Structured Clinical Interview for DSM-IV (SCID-II; 23). We used data from the 2000 British National Survey of Psychiatric Morbidity as it is the only one in the British National Survey programme to include both these measures (24).

Measuring Paranoia
For current purposes, we used items 2, 3, 3a and 3b from the PSQ, relating to ideas of persecution, conspiracy and interference. From the SCID-II, we used items 2, 3, 4, 6, 10, 25, 26, 27, 28, 33 and 35. These relate to different personality disorders (avoidant, dependent, paranoid and schizotypal), but were chosen *a priori* in line with our specific interest in cognitive content (progressing from mistrust through reference to persecution). This enabled us to test our ideas of how paranoia builds on certain common worries. Our fifteen selected items approximate to those used by Freeman and his colleagues (3). On theoretical grounds, they were separated into four groups: *mistrust*, *interpersonal sensitivities*, *ideas of reference*, and *ideas of persecution* (see Table 1). We also summed the item endorsements to produce an overall paranoia score for each individual. Finally, for each item, we calculated the mean difference for the total item count between those with and those without the given item (correcting for the contribution due to that item) (18). We term this the *excess item score.*

Table 1 about here

Strategy of analysis
We first analysed the frequency distribution of individual paranoia scores in our total sample. We hypothesised that, as with affective symptoms (16), this distribution would be exponential.

We used Mplus version 6 (25) to conduct the latent variable modelling. CFA is used to test specific hypotheses about the content and the number of dimensions (factors) that underlie a set of variables purporting to measure a given phenomenon (here paranoid ideation). The resulting factors help to explain the nature of the interrelationships between the observed variables (the individual paranoia items). LCA, in contrast, explores whether *individuals* can be classified into groups (classes) based on their particular endorsement of the paranoia items. The basic difference between the two procedures lies in the underlying latent variable - in CFA, paranoia is viewed as a continuous latent variable, whereas in LCA, it is categorical. Hybrid models, as in FMMA, incorporate both continuous and categorical latent variables - these models propose that there may be one (or more) dimension(s) of paranoia, and at different points along the dimension(s), there are groups of people (classes) who are homogeneous within class, and heterogeneous across classes, in relation to their paranoia symptoms. Hybrid models can be estimated in a variety of different ways, and the exact make-up of each model should be based on pre-existing theory, of the type we test here.

Three CFA models were tested: (i) a one-factor model representing '*severity of paranoid ideation*'; (ii) a four-factor model representing our *a priori* factors '*interpersonal sensitivities'*, '*mistrust*', '*ideas of reference*', and '*ideas of persecution*'; and (iii) a higher-order factor model, representing a second-order factor of '*severity of paranoid ideation*' underpinned by the four first-order factors outlined in the previous model. Figure 1 illustrates these models. The *ovals* represent the latent variables or factors and the *square boxes* represent observed binary variables. The *arrows* connecting the factors to the categorical indicators (u1-u15) represent factor loadings. The *curved connections* between the factors represent correlations. The default estimator for this analysis was a robust maximum likelihood (WLSMV) estimator. All factor loadings were estimated, with factor variances fixed at one.

Figure 1 about here

Next, a series of successive latent class models, varying the number of classes from 1 to 8, were estimated. LCA evaluates whether a group of associated observed variables can be related to an underlying categorical variable, comprising two or more classes (levels) (26). LCA, as used here, allowed us to consider not only the number of items endorsed, but also their overall pattern of distribution (27). Decisions regarding the most appropriate model should be guided both by statistical fit indices and by conceptual considerations, that is, the meaningfulness and distinctiveness of the latent class profiles. The default estimator for this analysis was a robust maximum likelihood (MLR) estimator. Further details outlining how these models were estimated and evaluated is described in detail in the electronic statistical supplement.

One limitation of LCA is that it fails to account for individual difference within classes. Factor mixture analysis (FMMA; 28) combines the latent class model and the common factor model, and has a single categorical, and one or more continuous, latent variables. In FMMA, continuous latent variables are used to explain the variation and covariation in a set of observed items, while the categorical latent variable represents heterogeneity at the factor level (27). Thus, the superiority of factor mixture models over other conventional models is that they permit simultaneous classification of people into diagnostic groups, whilst also modelling the severity of disorder (29). Use of FMMA models is increasing in psychiatry. However, it is still relatively uncommon, and procedural conventions are not yet fully established. In the current study we chose to estimate five different model types, varying in terms of restrictiveness, as outlined by Clark et al. (29) (see Table 2).

Table 2 about here

Sampling weights and other variables that account for the complex survey design of NPMS2000 were used in all analyses to enhance the reliability and validity of the parameter estimates, standard errors, and model fit calculations. The default estimator for the FMMA was a MLR estimator.

Results

The prevalence of individual paranoia items

The endorsement of individual paranoia items was considerable, ranging from 1.5% to 28% (Table 1). The total number of paranoia items could range from 0 to 15, although in the event no-one scored 15 (weighted mean 2.3, SD 2.6). The distribution of total scores is displayed in Figure 2. The data could be fitted by a single continuous distribution model (16), following an exponential curve with a correlation between observed and model estimated scores of 0.99.

Figure 2 about here

Non-reflexive relationships between items

As predicted, positive excess item scores were associated with each item, confirming that the relationship between items was not random (Table 1). The mean excess score was 3.5 (SD = 1.0). However, the excess score varied between the items, ranging from 2.0 to 5.5. If the relationship between items is non-reflexive (i.e. their endorsement follows a hierarchical arrangement) the rarer items should be associated with a greater excess score than the more frequent ones. This is what we found. Thus, the excess symptom score associated with each item was significantly and strongly associated with the frequency of endorsement of that item (r =-0.79, p <0.001). For example, worry about people using or hurting the participant (frequency 28%) was associated with an excess symptom score of 2.7, while a belief about plots designed to cause serious harm (frequency 1.5%) was associated with an excess symptom score of 5.5.

Confirmatory Factor Analysis (CFA)
Table 3 outlines the standardised factor loadings, factor correlations, and goodness-of-fit indices for the competing CFA models. Despite moderate to strong factor loadings, the one-factor model did not generally fit the data well. Both the first- and second- order four factor models provided a good fit to the data, with strong factor loadings (first-order ranging from 0.514-0.978; second-order ranging from 0.629-0.953). A Chi-square difference test for nested models (see statistical supplement) revealed that the first-order four factor model was a superior fit to the one-factor model (χ^2 diff = 1245.355, *df* diff = 6, p < 0.001) and the second-order four factor model (χ^2 diff =24.656, *df* diff = 2, p < 0.001). Collectively, these model results provided strong confirmation of our *a priori* grouping of items.

Table 3 about here

Latent Class Analysis (LCA)
The results for the competing latent class models are presented in Table 4. The fit indices did not identify clearly which model provided the best explanation of the data (the log-likelihood value, AIC, BIC, and SSABIC continued to decrease as the number of classes in the models increased). This was notunexpected, given that we had hypothesised *a priori* that underlying the categorisation of classes is a dimension of severity. This is not captured by LCA, but can be modelled using FMMA

Table 4 about here

Factor Mixture Modelling Analysis (FMMA)
FMMA is often useful in reducing the number of classes into more meaningful subgroups, especially if the classes are modelling differences in severity. The FMMA results presented in Table 5 should be interpreted in the light of our theoretical model of paranoia, specifically that the items are related non-reflexively, with the more extreme paranoia items being associated with a greater overall severity, as indicated by the item count. Based on the goodness-of-fit indices, two models stand out (shown in bold typeface in Table 5): both were one-factor models with four latent classes. Following the notation of Clark et al. (29), the best fitting model in terms of the BIC was the four-class variant of FMM3 (FMM-3 4C). This model proposes that: 1) people in the survey can be categorised into four groups (or classes): the people inin each class experience a similar *type* of paranoid ideation, distinct from that experienced by people in the other classes; and 2) underlying each class, there is a single dimension of ‘paranoia’, which is conceptualised identically in each class (as indicated by the invariant factor loadings; range of standardised loadings 0.394-0.850). In other words, the level of paranoia (‘severity’) is the same in each class (as indicated by the invariant factor variance). On both theoretical and empirical grounds, this assumption is, however, implausible – people in the community with different types of paranoid experiences will vary in terms of the severity of those experiences.

We therefore considered model 4C of the FMM-4 type to be the best conceptual model overall. This provided a good explanation of the data, very similar to its FMM-3 equivalent, and was less restrictive, in that the factor variances were allowed to vary across classes. This implies differences in terms of the severity of paranoid ideation, both between classes and within each class, i.e. between the class members (cf.30).

Insert Table 5 about here

The estimated probabilities for the paranoia items derived from model FMM-4 are illustrated in Figure 3. The items are grouped within the factors tested by the CFA. The three largest classes between them include nearly 90% of participants (each class accounting for between a quarter and a third), and were characterised by a uniformly low probability of endorsing ideas of persecution. The largest class comprised 33.3% of the sample, and as a group its members scored highly on interpersonal sensitivity and moderately on mistrust: it is best described as the *Interpersonal Sensitivity class*. The second class was almost as common (28.6%). It can be termed be *Mistrust class*, as its members scored more highly than the *Interpersonal Sensitivity class* on the mistrust items, but lower on interpersonal sensitivity. These two classes both displayed some endorsement of item PD28 in the ideas of reference factor ("do you often detect hidden threats or insults in things people say or do?"), an item that shares attributes of interpersonal sensitivity. The members of class 3 had roughly equal rates of endorsement of ideas of reference, interpersonal sensitivity, and mistrust. Their endorsement of the items in these three factors was relatively infrequent, varying between 10% and 20%. In consequence they scored slightly higher on ideas of reference than the first two classes. Nevertheless, given their relatively low rates of overall endorsement of items, they might reasonably be designated the *Quasi-normal* class. The fourth class was much less common than the first three (11.9%). It was also much more symptomatic, characterized by a high probability of perceiving direct threats to personal safety (all of them felt people were against them, three quarters agreed that people were deliberately trying to harm them, and nearly 15% thought people were plotted against them). It was the only group that scored highly on ideas of persecution, and its endorsement of items from the other three factors was almost invariably higher than that of the other classes. They constitute a clear "*Persecutory*" class. The 'severity' factor variance for the underlying paranoid ideation dimension was lowest in the 'Mistrust' class (0.45), followed by the 'Interpersonal Sensitivity' class (0.48), then the 'Persecutory' class, and finally the 'Quasi-normal' class (0.97).

Figure 3 about here

Discussion

In this paper we used a secondary analysis of items from the SCID-II questionnaire and the PSQ to identify structural relationships in the spectrum of paranoid ideation. These items have face validity for detecting paranoid ideation, in that, because of the form they take, they seem likely to distinguish both between different thought contents, and between people with stronger and weaker paranoid inclinations. They were selected *a priori* to test our hypotheses, and no other items were examined.

Some of the items were endorsed by 20-30% of the general population. These covered a consciousness of a lack of assertiveness, worries over social inferiority, worries over criticism by others, feelings that people were generally against the respondent and might use or hurt them, and a reluctance to reveal too much in case people used it in adverse ways. Ideas of reference involving the detection of hidden threats or insults were almost as common. One sixth of the population spent a lot of time wondering if they could trust their friends or work colleagues. Around 10% of the population sometimes felt that people were watching them, staring at them, deliberately acting to harm them or trying to control their thoughts. Slightly fewer felt that people in public places might be talking about them. Finally, a much smaller proportion, but still nearly 2% of the population, thought that some group was plotting to cause them serious harm or injury.

Our results supported our initial hypothesis that items reflecting paranoid ideation would follow an exponential distribution like that seen with affective symptoms (16). Only one other group seems to have approached attributes relating to paranoia in this way, albeit by using conventional categories of personality disorder (31). They found a slightly different (cubic) curve of distribution for items forming the diagnostic criteria for paranoid personality disorder (the item count with the highest frequency was 2 rather than zero).

CFA provided strong evidence in support of our postulated categorisation of paranoid experience, clearly identifying factors representing mistrust, interpersonal sensitivity, ideas of reference, and ideas of persecution. LCA models offered only an incomplete account of the data. However, LCA does not allow for dimensional aspects of item distribution, and these are very likely to be present. We therefore applied FMMA to our data.
Theoretical considerations are regarded as important in the interpretation of FMMA. The two models of best fit obtained by FMMA both included a provision for variations in overall severity. The model FMM-3/4C, in which variations were permitted within classes, but not between classes, was a slightly better fit, but relied on an implausible assumption incompatible with our initial conceptualisation of paranoia. Thus on theoretical and empirical grounds, we favoured model FMM-4/4C, which did allow for variation in severity between classes.

In our study, the less frequent items had a content suggestive of a greater disturbance in social perception . Our analyses also support our hypothesis of a non-reflexive relationship: that these less frequent, more severe, items were relatively more predictive of other paranoia items. This tallies with the idea that paranoid ideationis continuously distributed, with actual paranoid delusions being placed at the extreme end of the continuum. At a single point in time, the continuum is defined by differences between individuals located at individual positions on the curve. However, people are themselves likely to vary in a way that would place them at different positions on the curve at different times, dependent on changing circumstances. In a sense, they would move along the curve, a speculation now with some support from longitudinal investigation (7, 32).

The continuum model was also supported by the factor mixture modelling analysis: while this identifies subcategories of individuals, the rarest class (the only one strongly associated with ideas of persecution) almost invariably had the highest rates of the other features of paranoia. The quasi-normal class had low rates of items forming the mistrust, interpersonal sensitivity, and ideas of reference factors, and showed no endorsement of persecutory ideas. Positioned between these classes were two intermediate classes, loaded particularly towards mistrust and ideas of reference respectively. It is possible that these represent alternative routes into more florid ideas of persecution. In general, our analyses supported the existence both of the subcategories of paranoia and of an underlying dimension. Movement between the categories and along the dimension indicate the processes whereby the more extreme forms of paranoia develop, eventually resulting in diagnosable psychotic disorders.

This investigation, based on a random sample of the general population of Great Britain corroborates our study of paranoia in a student population (3). The relative frequency of individual items was similar, and there was a continuous exponential distribution of paranoid thoughts, with similar non-reflexive relationships between less and more frequent items.

Limitations
There is inevitably a degree of inaccuracy in the methods feasible in large surveys, but this is traded off against the sample size required in a study of the structure of paranoia. However, self-report items like those used here correlate both with interviewer assessments (e.g.33), and with experimental investigations (e.g. 34).

Questions in the PSQ apply to experiences within the past year, while the SCID-II asks about an implicit general tendency to think in particular ways. Thus the instruments are potentially discrepant in relation to the timing of the experiences they tap. This may not be crucial, as the propensity to paranoid thought may operate as a mixture of trait and state attributes. We were unable to take account of the possibility that the paranoid ideation of individual participants was grounded in reality, although the capacity of the characteristics of experience to elicit paranoia is itself likely to occur on a dimension.

The models were tested on a single sample, and require replication.

Conclusion

If we take the rates of endorsement of paranoid items in our study at face value, they suggest that paranoia is so common as to be almost normal. We are certainly obliged to make decisions to trust or to mistrust on a daily basis. The sheer frequency of paranoid beliefs implies that, to some degree, it can be adaptive in social situations (31). Individuals who are trusting, open, and never suspicious of the intentions of others may end up as naïve objects of exploitation. When surrounded by strangers, it may be better to remain somewhat wary of their intentions until they are definitely seen to be favourable. However, too great a degree of suspiciousness may obstruct the development of the social relationships necessary for the maintenance of well-being (35). Thus, paranoia leads to isolation that may foster the retention of unusual ideas by removing the possibility of normalising exposure (36).

Our results have implications for the aetiological study of psychosis (17). Other continua are almost certainly involved (5). Evidence encourages the separate consideration of paranoia, grandiosity, hallucinations, and thought disorder (e.g. 37). Our findings also imply that in some people movement along these continua results in the emergence of psychosis (32). Thus the role of aetiology is to explain exactly why particular people make this journey at particular times in their lives. In the psychological domain, this implies the concatenation of different psychological attributes, some cognitive, some emotional (38,39). In social terms, adverse early experiences in increasing the propensity to paranoia, may have a tonic effect on people's position on the curve, while more recent events may be responsible for more immediate movement along it. The role of appraisal in this process is likely to be crucial (40,41, 42), and offers an opportunity for focused psychological treatments, as does the normalising implications of the widespread distribution of paranoid thought, which may reduce self-stigmatisation. Our findings would also encourage the consideration of treatment at an early stage.

Finally, the continuum model of psychosis has complex implications for diagnostic systems. We would agree with Linscott & van Os (4) that taxonomic classifications of schizophrenia, while remaining of heuristic value, create pragmatic divisions that do not map onto corresponding latent discontinuities. However, they argue that the empirically demonstrated continua of experience probably do have an underlying structure. Our results are a corroboration of their position.

Figure 1: Alternative factor models conceptualising the dimensionality of paranoia items

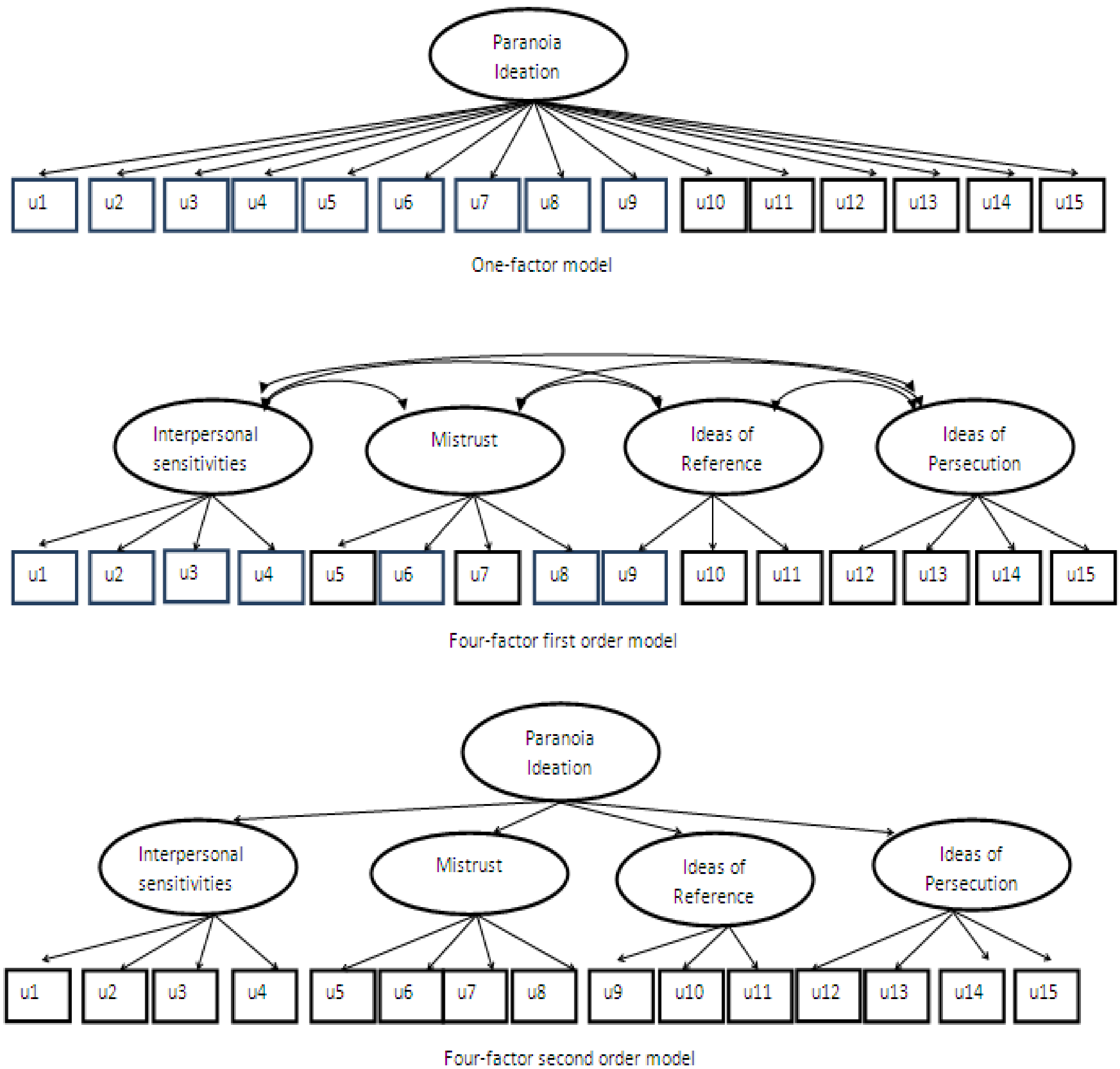

Figure 2. The distribution of total paranoia scores

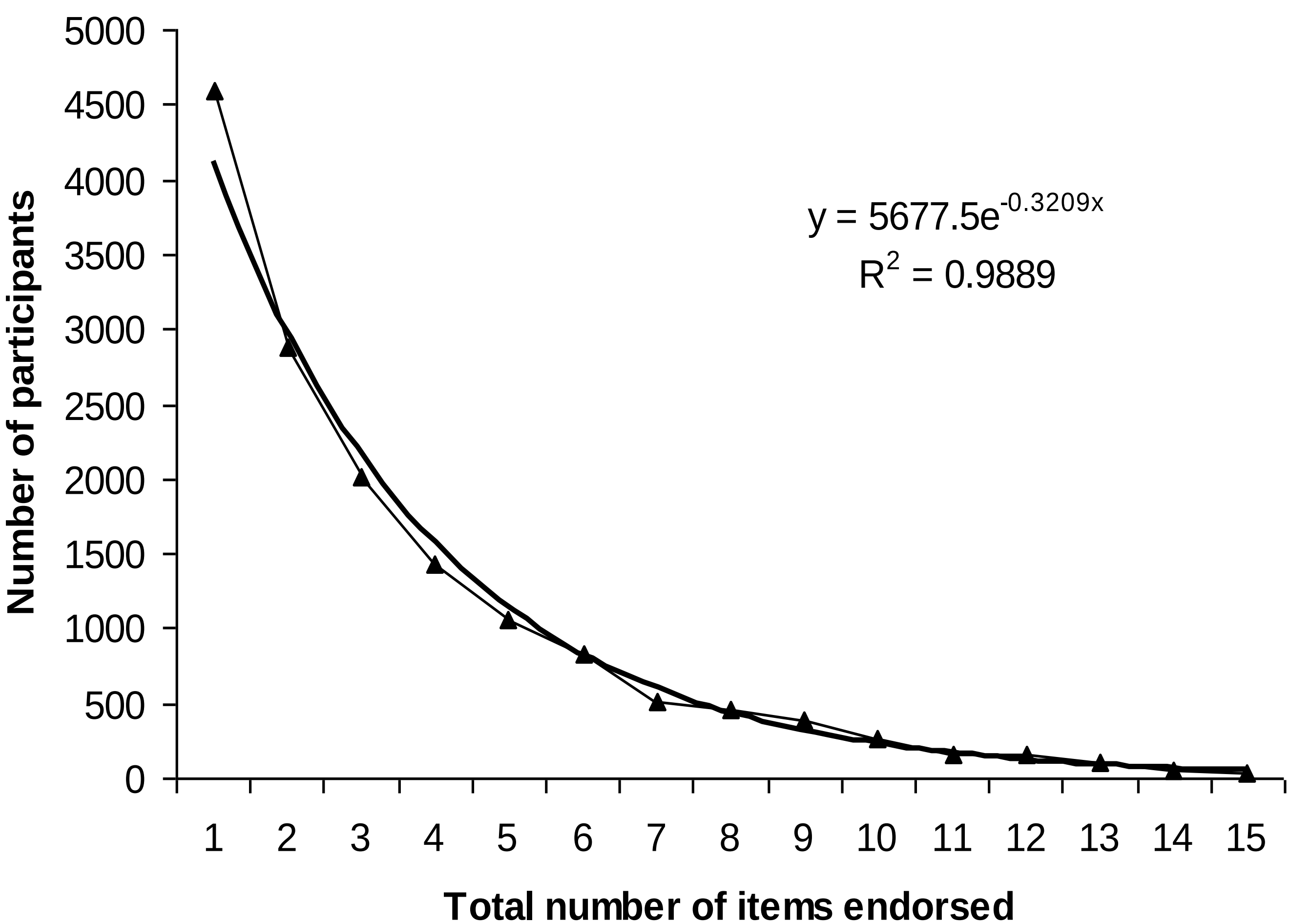

Figure 3 Estimated probabilities for the occurrence of 15 paranoia items in the one-factor four-class mixture model (FMM-4).

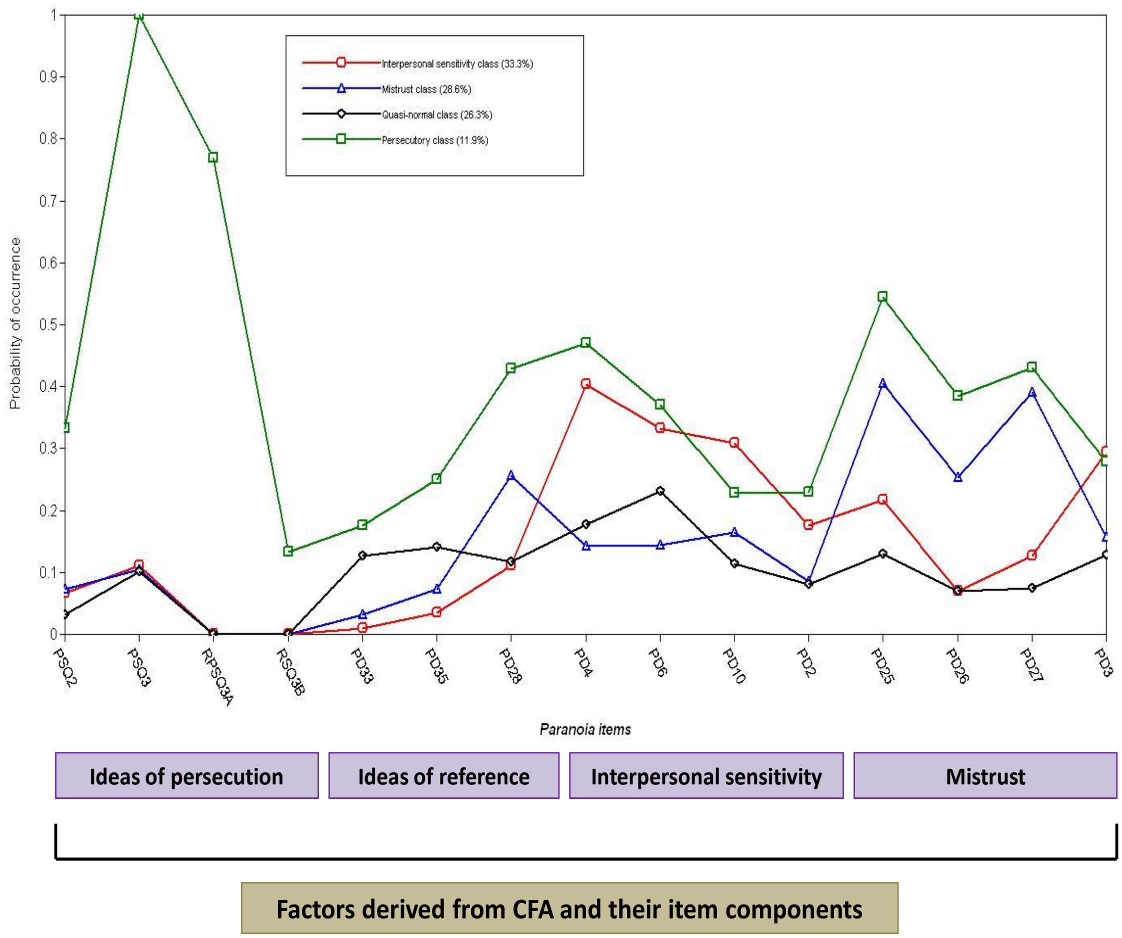

Table 1*: Frequency of individual items related to paranoia and associated excess item scores*

n= 8576		Frequency	Excess item score
	Interpersonal Sensitivities		
PD2	Do you avoid getting involved with people unless you are certain they will like you?	12.6%	3.56
PD4	Do you often worry about being criticised or rejected in social situations?	27.7%	3.07
PD6	Do you believe that you're not as good, as smart, or as attractive as most other people?	25.4%	2.49
PD10	Do you find it hard to disagree with people even when you think they are wrong?	20.3%	1.97
	Mistrust		
PD3	Do you find it hard to be 'open' even with people you are close to?	20.8%	2.44
PD26	Do you spend a lot of time wondering if you can trust your friends or the people you work with?	15.5%	3.96
PD25	Do you often have to keep an eye out to stop people from using you or hurting you?	28.1%	2.70
PD27	Do you find that it is best not to let other people know much about you because they will use it against you?	21.3%	3.13
	Ideas of Reference		
PD28	Do you often detect hidden threats or insults in things people say or do?	19.0%	3.57
PD33	When you are out in public and see people talking, do you often feel that they are talking about you?	6.5%	5.07
PD35	When you are around people, do you often get the feeling that you are being watched or stared at?	9.7%	4.69
	Ideas of persecution		
PSQ3	Over the past year, have there been times when you felt that people were against you?	20.9%	3.00
PSQ2	Have you ever felt that your thoughts were directly interfered with or controlled by some outside force or person?	9.0%	2.03
PSQ3a	Have there been times when you felt that people were deliberately acting to harm you or your interests?	9.0%	3.98
PSQ3b	Have there been times you felt that a group of people was plotting to cause you serious harm or injury?	1.5%	5.52

Table 2 Overview of five different factor mixture models estimated

Restrictiveness	Model	Factor variance	Factor covariance	Factor mean	Factor loadings	Item thresholds (latent classes)
Most ↑	FMM-1	Fixed at zero	Fixed at zero	Varies across classes	Equal across classes	Equal across classes
	FMM-2	Freely estimated	Freely estimated	Set to zero	Equal across classes	Equal across classes
	FMM-3	Freely estimated, but equal across classes	Freely estimated, but equal across classes	Set to zero	Equal across classes	Allowed to vary across classes
	FMM-4	Allowed to change across classes	Allowed to change across classes	Set to zero	Equal across classes	Allowed to vary across classes
↓ Least	FMM-5	Allowed to change across classes	Allowed to change across classes	Set to zero	Allowed to vary across classes	Allowed to vary across classes

Note. Models based on recommendations outlined by Clark et al. (29)

Table 3 Standardised factor loadings, factor correlations, and goodness-of-fit statistics for 3 competing confirmatory factor analytic models of 15 paranoia items from 2000 National Morbidity Survey (n=8576)

Item	Question details	Models					
		1-factor	4-factor first-order model				4-factor second-order model*
		F1	F1	F2	F3	F4	
psq2	Thoughts interfered with/controlled by outside force	0.532				0.644	
psq3	Felt people were against you	0.685				0.978	
psq3a*	Felt people were deliberately acting to harm you/interests	0.700				0.952	
psq3b*	Felt that a group was plotting to cause you serious harm/injury	0.672				0.904	
pd33	Out in public and see people talking, feel they are talking about you	0.835			0.869		
pd35	Feel being watched or stared at	0.839			0.881		
pd28	Detect hidden threats or insults in things people say or do?	0.764			0.817		
pd4	Worry about being criticised/rejected in social situations?	0.735	0.845				
pd6	Not as good/smart/ attractive as most other people?	0.600	0.681				
pd10	Hard to disagree with people even when you think they are wrong?	0.452	0.514				
pd2	Avoid getting involved with people unless certain they will like you?	0.674	0.761				
pd25	Keep an eye out to stop people from using you or hurting you	0.678		0.720			
pd26	Wonder if you can trust your friends/work people	0.801		0.853			
pd27	Don't let people know much about you because they'll use it against you	0.725		0.769			
pd3	Find it hard to be 'open' even with people you are close to	0.544		0.576			
	Second order factor loadings						F1=0.825; F2=0.934 F3=0.953; F4=0.629
Goodness of fit statistics	Chi-square *df* (p)	2850.027 *90* (<0.0001)	938.400 *84* (<0.0001)				951.965 *86* (<0.0001)
	Comparative Fit Index (CFI)	0.908	0.972				0.971
	Tucker Lewis Index (TLI)	0.893	0.964				0.965
	Root Mean Square Error of Approximation (RMSEA)	0.060	0.034				0.034

*Notes:
F1= Interpersonal sensitivities; F2= Mistrust; F3= Ideas of Reference; F4=Ideas of Persecution; Second-order factor 'Severity of paranoia idea'
Factor loadings for 4-factor model are the same for the 4-factor second-order model

Missing values for psq3a and psq3b are recoded as zero (not asked of participant because assumed negative)

Table 4 Results from latent class analysis of 15 paranoia items in the National Psychiatric Morbidity Survey 2000 (n=8576)

Model	Log-likelihood	Replicated Log-likelihood	# free parameters	AIC	BIC	SSABIC	LMR-LRT (*p*)	Entropy
1c	-53653.224	Yes	15	107336.449	107442.300	107394.632	NA	NA
2c	-46637.077	Yes	31	93336.154	93554.912	93456.400	13936.122 ($p < 0.001$)	0.849
3c	-45698.149	Yes	47	91490.298	91821.964	91672.606	1864.986 ($p < 0.001$)	0.751
4c	-44805.585	Yes	63	89737.169	90181.743	89981.540	1772.894 ($p < 0.001$)	0.799
5c	-44467.169	Yes	79	89092.338	89649.819	89398.771	672.192 ($p < 0.001$)	0.790
6c	-44190.940	Yes	95	88571.880	89242.268	88940.375	548.672 ($p < 0.001$)	0.785
7c	-44068.571	Yes	111	88359.142	89142.438	88789.700	243.061 ($p=0.0138$)	0.795
8c	-43970.504	No	127	88195.008	89091.211	88687.628	194.790 ($p=0.0265$)	0.793

Table 5 Results from factor mixture models of 15 paranoia items in the National Psychiatric Morbidity Survey 2000 (n=8576)

Model	Log-likelihood	Replicated log-likelihood	# free parameters	AIC	BIC	SSABIC
FMM-1						
2c	-46637.077	yes	31	93336.154	93554.3912	93456.400
3c	-45746.095	yes	33	91558.189	91791.061	91686.193
4c	-45619.330	yes	35	91308.659	91555.645	91444.421
5c	-45593.659	yes	37	91261.317	91522.416	91404.837
FMM-2						
2c	-45596.157	yes	33	91258.315	91491.187	91386.319
3c	-45562.565	no	36	91197.131	91451.173	91336.771
4c	-45594.967	no	39	91267.934	91543.146	91419.211
5c	-45593.219	no	42	91270.439	91566.821	91433.353
FMM-3						
2c	-44434.219	yes	46	88960.438	89285.047	89138.867
3c	-44054.713	yes	62	88233.426	88670.943	88473.918
4c	**-43919.327**	**yes**	**78**	**87994.653**	**88545.078**	**88297.207**
5c	-43846.883	yes	94	87881.766	88545.098	88246.383
FMM-4						
2c	-44433.857	yes	47	88961.715	89293.381	89144.023
3c	-44052.647	yes	64	88233.294	88684.924	88481.544
4c	**-43917.581**	**yes**	**81**	**87997.163**	**88568.758**	**88311.354**
5c	-43844.729	yes	98	87885.458	88577.016	88265.590
FMM-5						
2c	-44419.630	no	61	88961.261	89391.721	89197.874
3c	-43993.243	no	92	88170.485	88819.704	88527.344
4c	-43846.878	no	123	87939.756	88807.733	88416.861
5c	-43795.600	no	154	87899.200	88985.935	88496.551

Note. Specific details about model estimation are outlined in Table 1. Bold print indicates the best fitting models based on fit indices (see discussion in text).

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