



Prevalence of delusional ideation in a district in southwestern Uganda

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Abstract

Background: Population-based prevalence studies suggest that psychosis is a continuum distributed in the general population. **Aim:** To assess the prevalence of delusional ideation in young healthy individuals in a low-income country setting (Uganda) and to investigate possible relevant background factors. **Method:** Interviews were conducted in a district capital and in three rural villages, using the Peters et al. Delusions Inventory (PDI-21). **Results:** Levels of delusional ideation and associated levels of distress, preoccupation, and conviction were higher than in studies conducted in Europe. Higher PDI-21 scores were associated with younger age and with urban residence. The urban effect was stronger in persons with a higher level of education. **Conclusions:** Although the factors that contribute to population differences in levels of delusional ideation are currently unknown, the results suggest that urban residence may be an important influence.

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1. Introduction

Population-based prevalence studies of psychosis-like experiences suggest that the schizophrenic phenotype is a continuum, rather than a dichotomous entity qualitatively different from normality (Johns and van Os, 2001; van Os et al., 2000; Verdoux and van Os, 2002). To date, no such studies have been performed in low-income countries.

Certain aspects of religious ideation (e.g. communication with gods or spirits, external control of thoughts and behaviour, importance of rituals) may be similar to delusions having religious content found in schizophrenic individuals (Peters et al., 1999a). The question may be raised as to whether societies where such paranormal beliefs are more common would have greater numbers of individuals distributed towards the schizophrenic end of the spectrum. Moreover, in low-income countries beliefs in the paranormal may be more common among persons with little education and living in rural areas. Thus, previous reports of greater

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prevalence of positive psychotic experiences in urban versus rural areas (van Os et al., 2001) might not apply to low-income countries.

The aim of the present study was to assess the prevalence of delusional ideation in a low-income country setting (Uganda) and to investigate the possible influence of background factors such as education and place of residence. Assessments were performed using the Peters et al. Delusions Inventory (Peters et al., 1999b).

2. Methods

2.1. Setting

Uganda belongs to the least developed countries as defined by the UN, having a GDP per capita of \$234 per year, an illiteracy rate of 31%, and a life expectancy at birth of 46 years (UNCTAD, 2003). The present study was conducted in Mbarara district in southwestern Uganda, situated approximately 270 km from the capital Kampala. Interviews were conducted in Mbarara town and in three neighbouring villages, Kinoni, Bwizibwera and Nyakayojo, 10 to 30 km from Mbarara. These villages were chosen because they were deemed representative (e.g. standard of living, infrastructure) for rural villages in this region. Mbarara town (population 69 208) is the district capital and trading centre, having a university and a hospital, while the economy in the villages depends mainly on agriculture.

The study was approved by the Ethical Committee of the Faculty of Medicine at Mbarara University of Science and Technology (MUST).

2.2. Instrument

The Peters et al. Delusions Inventory (PDI-21) was chosen in order to assess the prevalence of delusional ideation and magic thinking in the selected population. The PDI-21 is brief enough to be used in a fieldwork setting and has previously shown good reliability and validity (Peters et al., 1999b). The inventory consists of 21 questions derived from the Present State Examination (Wing et al., 1974) and includes the following components: (1) religiosity, (2) persecution, (3) grandiosity, (4) paranormal beliefs, (5) thought disturbances, (6) suspiciousness, (7) catastrophic ideation and

thought broadcast, (8) negative self, (9) paranoid ideation, (10) ideation of reference and influence, and (11) depersonalisation (Peters et al., 1999b). Questions are answered on a yes-or-no basis. For each “yes” response, three additional questions are asked concerning the levels of distress, preoccupation and conviction associated with the experience, with answers graded from one to five. Ten additional questions were asked concerning treatment-seeking behaviour and ideas about the cause of mental illness (results not shown). The PDI-21 was translated into Runyankore, the principal language in the region, and back-translated into English as a check for semantic validity.

2.3. Subjects

The study intentionally targeted persons between the ages of 18 and 30 because younger age has been shown to be associated with a greater proneness for psychosis-like experiences (Verdoux et al., 1998a). A house-to-house random search method was not deemed optimal for locating potentially eligible subjects within this age range. Instead, a random search method was implemented in public locations, e.g. the open-air market, in and outside shops, in restaurants, places of work, and at the university campus.

Healthy-looking individuals of presumably appropriate age were approached for potential participation. Those meeting the age criteria were included. Persons with florid mental or physical illness, or clearly under the influence of alcohol or other drugs, were not included. If a person refused because of not being available, an appointment was made for a more convenient time. The frequency of definite refusals was approximately 10%.

2.4. Procedure

The study team consisted of P.L. and three community health workers from Mbarara University of Science and Technology who were trained in community-based health research, and who acted as interpreters. Group discussions helped familiarize them with both the English and Runyankore versions of the questionnaire, as well as the underlying concept of psychosis-like experiences.

The purpose of the survey was presented as an inquiry about people's beliefs and mental experiences.

Although persons were approached in public settings, the interview was performed in a more secluded place, for example a shop or the person's home.

Although the PDI-21 is originally intended as a self-report questionnaire, because of the high illiteracy rate, the questions were presented verbally, with the answers registered by the interviewer. Since P.L. did not speak Runyankore, interviews were preferentially conducted in English. A brief verbal English test was conducted in order to assess English language fluency and comprehension. Interviews were conducted in Runyankore or English, depending on the subjects' language proficiency.

Information on background data was collected prior to the administration of the PDI-21. Educational level was dichotomised into middle/high versus low, with middle/high representing secondary school and higher education (>7 years, per the Ugandan educational system). Social class was dichotomised into middle/high versus low, based on the occupations represented in the sample and according to occupational norms for southwest Uganda, with middle/high social class (groups 1 and 2) representing teachers, shopkeepers, students, hairdressers, bartenders, etc., and low social class (group 3) representing unemployed, farmers and artisans.

2.5. Outcome measures

Five outcome measures were calculated: the *PDI-yes* score, i.e. total number of positive answers (maximum 21), the total scores for *Distress*, *Preoccupation* and *Conviction*, respectively (21 questions, graded from 1 to 5, yielding a maximum of 105 each), and the *PDI-total* score, summarizing the four previous scores (maximum 336).

2.6. Statistical analysis

Statistical analyses were performed using SPSS, version 10.0 (SPSS, 1997). Sub-group comparisons were performed using Student's *t* test for independent samples for continuous variables and Chi-square tests for category variables. The relationship between age and *PDI-yes* scores was assessed by Pearson's correlation analysis. Urban–rural sub-group differences were further analysed using logistic regression. For the purpose of logistic regression, PDI scores (*PDI-*

yes, *PDI-total*) were dichotomised using the medians of the respective distributions as cut-off points in order to yield “high” and “low” sub-groups. Significance level was accepted at $p < 0.05$, two-tailed.

3. Results

3.1. Characteristics of the participants

All participants (approximately 90% of those approached) completed the questionnaire. Demographic details for the entire sample are given in Table 1.

3.2. Outcome measures and their relationship to background characteristics

Table 2 shows the scores for *PDI-yes*, *PDI-total*, *Distress*, *Preoccupation*, and *Conviction* for the total sample, and for the total sample stratified according to gender, place of residence, educational level, and social class. A significant negative correlation was found in the total sample between age and *PDI-yes*

Table 1
Background characteristics of the participants

	Total N=80
Age	23.8 years, mean (S.D. = 3.25) n (%)
Gender	
Male	37 (46%)
Female	43 (54%)
Socio-economic class	
High/Middle	54 (68%)
Low	26 (32%)
Educational level	
Primary school (≤ 7 years)	36 (45%)
Secondary school or higher (>7 years)	44 (55%)
Tribal affiliation	
Banyankore	65 (81%)
Other	15 (19%)
Religion	
Catholic	27 (34%)
Protestant	50 (62%)
Muslim	3 (4%)
Civil status	
Married or not married with partner	49 (61%)
Single	31 (39%)

Table 2
PDI-21 scores in the total sample and in selected sub-groups

Measure	PDI yes	Distress	Preoccupation	Conviction	PDI total
	mean (S.D.)	mean (S.D.)	mean (S.D.)	mean (S.D.)	mean (S.D.)
Total sample, $n=80$	9.8 (3.3)	27.3 (12.0)	32.5 (10.8)	39.1 (13.1)	108.6 (36.9)
Males, $n=37$	9.1 (3.1)	24.7 (10.1)	30.3 (9.3)	35.9 (11.4)	99.9 (31.9)
Females, $n=43$	10.4 (3.4)	29.5 (13.1)	34.4 (11.7)	41.8 (13.9)	116.1 (39.6)
Rural, $n=45$	8.8 (3.0)	24.7 (10.8)	30.4 (10.3)	37.7 (12.5)	101.6 (34.7)
Urban, $n=35$	11.1 ^a (3.3)	30.5 ^b (12.7)	35.3 ^c (10.9)	40.8 (13.8)	117.7 (38.1)
School years ≤ 7 , $n=36$	9.1 (3.2)	26.7 (11.3)	31.4 (10.7)	38.6 (13.5)	105.8 (36.7)
School years >7 , $n=44$	10.4 (3.3)	27.7 (12.6)	33.5 (10.9)	39.4 (12.9)	110.9 (37.3)
Social class 3, $n=26$	9.2 (2.6)	25.5 (10.2)	30.7 (8.6)	37.7 (12.4)	103.1 (31.6)
Social class 1+2, $n=54$	10.1 (3.6)	28.1 (12.7)	33.4 (11.6)	39.7 (13.5)	111.3 (39.2)

^a Urban vs. rural ($p<0.01$).

^b Urban vs. rural ($p=0.03$).

^c Urban vs. rural ($p=0.04$).

score ($r = -0.23$, $p=0.04$). A similar tendency for negative correlation was found between age and *PDI-total* score ($r = -0.20$, $p=0.08$).

Significantly higher scores were obtained in the urban sub-group (vs. rural) on the *PDI-yes* score ($t=3.22$, $p<0.01$), the *Distress* score ($t=2.20$, $p=0.03$), and the *Preoccupation* score ($t=2.06$, $p=0.04$), and borderline significantly higher scores on the *PDI-total* score ($t=1.98$, $p=0.05$). None of the other sub-group comparisons (males vs. females, high vs. low level of education, high vs. low social class) for any PDI-21 measures reached statistical significance.

The findings of increased PDI-21 scores in the urban sub-group were unexpected, in so far as our hypothesis predicted that higher levels of delusional ideation would be found in rural areas where beliefs in paranormal phenomena are presumably more common. Thus, additional post-hoc analyses were performed in order to explore these urban–rural differences.

3.3. Profile of response frequencies for urban and rural sub-groups

Significant differences were found in the urban versus rural sub-groups' response profiles. The rural sub-group had a significantly higher "yes"-frequency solely on item 4, (feelings of) being persecuted ($\chi^2=11.79$, $p<0.01$). The urban sub-group had significantly higher "yes"-frequencies on item 6, (feelings of) being destined to be important ($\chi^2=18.89$,

$p<0.01$), item 7, (feelings of) being a special or unusual person ($\chi^2=8.69$, $p<0.01$), item 8, (feelings of) being especially close to God ($\chi^2=7.17$, $p<0.01$), item 19, having vivid thoughts that can be heard by others ($\chi^2=8.76$, $p<0.01$) and item 21, feeling like a zombie or robot ($\chi^2=8.99$, $p<0.01$).

3.4. Urban–rural differences: possible influence of confounders

Urban–rural differences in PDI scores might have been due to a differential distribution of demographic background factors within these sub-groups, since independent *t*-tests showed that high PDI scores tended to be related both to higher levels of education (*PDI-yes*: $p=0.09$) and to female gender (*PDI-yes*: $p=0.07$; *PDI-total*: $p=0.05$; *Distress*: $p=0.07$; *Preoccupation*: $p=0.09$; *Conviction*: $p=0.05$).

Thus, a logistic regression model was constructed in order to adjust for the potential confounders of age, gender, educational level, and social class on urban–rural PDI differences, with these four variables entered into the model using a stepwise procedure. The urban–rural differences on *PDI-yes* scores remained significant after simultaneous adjustment for all factors (see Table 3). A similar stepwise model using *PDI-total* scores as outcome measure showed a similar urban–rural effect, albeit the effect was marginally reduced (OR = 2.86; 95% CI 0.92–8.92, $p=0.07$) compared to that obtained using *PDI-yes* scores.

Table 3

Influence of place of residence on PDI-yes score^a, adjusted for potential confounders using stepwise logistic regression analysis

Variable	Crude	Model 1	Model 2	Model 3	Model 4
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Place of residence	3.47 (1.37–8.78)	3.01 (1.16–7.80)	3.28 (1.24–8.70)	3.27 (1.04–10.24)	3.28 (1.04–10.34)
Age	–	0.89 (0.77–1.03)	0.91 (0.78–1.06)	0.91 (0.78–1.06)	0.90 (0.77–1.05)
Gender	–	–	1.85 (0.70–4.89)	1.85 (0.70–4.89)	1.76 (0.65–4.76)
Education	–	–	–	1.01 (0.33–3.10)	0.85 (0.23–3.23)
Social class	–	–	–	–	1.34 (0.38–4.68)

^a PDI-yes scores were dichotomised into “low” (0–9) vs. “high” (10–21) scores.

3.5. Educational level and place of residence: influence on PDI scores

To explore the possibility that greater PDI scores in the urban sub-group were due to delusional ideation preferentially developing among low educated persons (i.e. persons having traditional values confronted with an urban environment), we investigated the association between place of residence and education in relationship to the outcome measures (PDI-yes “high” vs. “low”, PDI-total “high” vs. “low”). Analyses were performed using logistic regression, with odds ratios adjusted for age and gender and the category “rural residence/low education” used as reference category. The results obtained were contrary to what we expected: The risk for “high” PDI-yes scores was greatest among highly educated urban dwellers (OR = 3.18, 95% CI 1.04–9.72, $p = 0.04$), whereas the results obtained in the other two categories were nonsignificant (urban residence/low education, OR = 0.87, 95% CI 0.10–7.31; rural residence/high education, OR = 0.55, 95% CI 0.13–2.27). Similar analyses performed with PDI-total scores as outcome measure yielded nonsignificant results in all three categories.

4. Discussion

4.1. Summary of findings

Current rates of delusional ideation and associated levels of distress, preoccupation and conviction were generally two to three times higher than findings from population studies conducted in Europe (Peters et al., 1999a,b; Verdoux et al., 1998b; Verdoux and van Os, 2002). Delusional ideation was greater in younger

persons, as found previously (Verdoux et al., 1998a). Higher rates of delusional ideation and higher levels of distress and preoccupation were strongly associated with urban residence. Moreover, the urban effect was not explained by differences between urban and rural residents in age, gender, education or social class and was greatest in subjects with higher levels of education.

4.2. Methodological limitations

The sample was limited to 80 subjects, and although every effort was made to avoid selection bias, the extent to which the sample is representative of persons residing in Mbarara district might be questioned. First, a purposeful sampling method was employed in order to obtain a sample allowing for urban–rural comparisons. Second, subjects were mainly recruited in public locations, which could have biased the selection towards healthy and active individuals. Possibly, a random house-to-house search method would have resulted in greater numbers of persons from the lowest social class (unemployed, artisans, farmers) as well as more persons with reduced social functioning, e.g. persons with prominent schizotypy. However, it should be noted that social class group 1 (the highest group, represented by 11% of the sample) consisted of teachers, stenographers, and health workers and thus does not correspond to the material standards characteristic of the highest social class in high-income countries. Moreover, when the urban influence on PDI-yes score was adjusted for social class, the confidence interval of the odds ratio was only marginally changed (see Table 3).

Furthermore, in so far as in Mbarara town a greater proportion of persons were included while working or engaged in social interaction than in the villages, the

urban–rural differences are unlikely due to any bias towards preferential selection of persons with schizotypy (e.g. reduced social functioning) in the urban setting. Nevertheless, information concerning subjects' psychiatric history or family history of psychosis was not available for any of the persons in the sample.

Although the back-translation indicated that both PDI-21 language versions were equivalent (P.L.), response rates may have differed according to the language used. Comparisons between subjects interviewed in English ($n=29$) versus those interviewed in Runyankore ($n=51$) revealed no significant differences on the *PDI total* scores ($t=0.77$, $p=0.44$). However, English speakers tended to have higher *PDI-yes* scores ($t=1.76$, $p=0.08$). This is probably explained by the fact that English speakers were significantly better educated ($t=-6.25$, $p<0.01$) than Runyankore speakers, as in the total sample individuals with higher education tended to have higher *PDI-yes* score ($p=0.09$). In total, these results suggest that interview language was not a major determinant of PDI-21 scores.

4.3. Cross-cultural validity of the PDI-21

This is the first application of the PDI instrument in a low-income country setting, and the PDI-21 scores in the present study are markedly higher than in earlier studies. Thus, we found a mean value of 9.8 for *PDI-yes* scores, while Verdoux et al. (1998b) reported a 4.2 mean value in France. Mean values for *Distress*, *Preoccupation* and *Conviction* were 27.3, 32.5 and 39.1, respectively, in contrast to Verdoux et al. (1998b)'s means for the same measures (9.4, 9.8, 13.8). Moreover, in a sub-group of psychotic patients, Verdoux et al. (1998b) found a *PDI-yes* mean of 7.6, with means of 19.3, 15.4, and 25.0 for *Distress*, *Preoccupation*, and *Conviction*, respectively. Although values obtained for *Distress*, *Preoccupation*, and *Conviction* depend upon the number of PDI-items endorsed within any given sample and cannot be directly compared across samples, the high levels of delusional ideation currently found in Uganda might raise questions about the cross-cultural validity of the PDI.

However, several aspects of the results speak against the notion that the PDI lacks cross-cultural

validity in this particular setting. Firstly, the negative correlation found between age and delusional ideation in this population is similar to that found previously in France (Verdoux et al., 1998a,b), suggesting that the same basic phenomenon is indeed being measured, and, similarly, that early adulthood may be a critical phase for the expression of psychosis-like symptoms (Verdoux et al., 1998a). Moreover, considering the relatively narrow age range in the current sample, the effect of age may be stronger than previous studies have indicated.

Secondly, although we did expect traditional and paranormal beliefs to contribute to the PDI-21 scores obtained, the specific items most frequently endorsed have seemingly little to do with traditional and spiritual beliefs, e.g. item #1, "people drop hints". In addition, while traditional beliefs would be expected to be more prevalent among persons with lower education, the highest PDI-21 scores were obtained in highly educated urban dwellers. Furthermore, responses to the additional probe questions indicated that traditional beliefs were more common among rural dwellers, i.e. among the subjects who scored lowest on the PDI-21. For instance, 60% of the rural sub-group indicated that, if the experiences described in the PDI-21 became too distressful, they would seek treatment from a traditional healer versus 17% of the urban sub-group. When asked about the possible causes of mental illness, 56% of the rural sub-group answered "witchcraft or spirits" versus 17% of the urban sub-group. In total, these findings speak against the notion that the PDI-21 solely assessed traditional beliefs.

Thirdly, given that the *Preoccupation* and *Distress* scores have been shown to differentiate between healthy and psychotic individuals (Peters et al., 1999a,b), the high scores currently obtained on these measures indicate that subjects were not merely reporting traditional or religious beliefs but were actually disturbed by their experiences. Peters et al.'s (1999a) study of individuals affiliated with New Religious Movements found that while they endorsed as many PDI items as did psychotic individuals, they were significantly less distressed and preoccupied by their experiences. While the greater cultural acceptance towards hallucinations and paranormal phenomena in many low-income countries should presumably lessen any resulting subjective

distress (Al-Issa, 1995), this did not seem to be the case for these Ugandan subjects. However, it is important to keep in mind that the subjects appeared to be otherwise well functioning, in so far as 50 were employed or self-employed, 10 were university students, and the remainder mostly farmers.

While the high scores generally obtained could partly be due to the younger age of the sample in contrast to Verdoux et al.'s (1998b) and Peters et al.'s (1999a,b) study populations, it cannot be excluded that the high PDI scores obtained in our sample reflect an elevated incidence rate of schizophrenia and/or psychosis in the background population. Although the worldwide incidence of schizophrenia is assumed to be uniform (e.g. Sartorius et al., 1986), little is known about the actual incidence in Uganda.

4.4. Is the urban risk factor universal?

This is the first study to use the PDI in order to investigate prevalence of delusional ideation in relation to urban-rural residence. More generally, the results may be regarded as a replication of van Os et al.'s (2001) findings concerning urban-rural differences in psychosis-like symptoms in The Netherlands, thus providing support for accumulating evidence suggesting that urban birth/upbringing constitutes a risk factor for schizophrenia (e.g. Marcelis et al., 1998; Mortensen et al., 1999; Pedersen and Mortensen, 2001). It is tempting to speculate that the higher PDI scores found in the subjects residing in Mbarara reflect exposure to the same unknown urban risk factor(s) putatively implicated in European cities. Thus, higher rates of delusional ideation in urban areas in a low-income country have implications for the nature of the urban exposure, as its effect may apparently be universal. However, it should be noted that Mbarara is considerably less "urbanised" (e.g. population density, level of industrialization) than most European cities.

4.5. Urbanicity: what is the mechanism?

Previous studies indicating increased risk for psychosis in relationship to urbanicity have thus far not identified the nature of the underlying mechanism, although a wide variety of candidates have been suggested (Mortensen, 2000). Given the low level of urbanization in Mbarara, it may be difficult to con-

ceive of an explanation in the present setting that would involve physical aspects of the environment such as exposure to lead, viruses or air pollution (e.g. Pedersen et al., 2004). Furthermore, the urban effect was stronger in subjects with high education, which might also point towards a non-physical influence. Thus, in this low-income setting a more plausible explanation may be that aspects of the social environment are implicated. It may be more important how the individual perceives his relationship to the environment, than the actual nature of that environment.

In the current context, the items endorsed by urban dwellers indicate some tendency towards self-importance or grandiosity. Paranoid thinking has been proposed to arise in people with low self-esteem in an attempt to decrease the discrepancy between the actual self and the ideal self (Bentall et al., 1994). By analogy, grandiosity may hypothetically fulfil a similar function. In Ugandan communities, the amount of contact with the outside world (e.g. high-income countries) depends upon the level of urbanicity. The discrepancy between one's aspirations and ambitions and the reality of living in a poor country in an economically underprivileged part of the world might therefore be most apparent for those Ugandans who are well educated and who live in urban environments. Although preliminary, the results could suggest that grandiosity and/or other types of delusional ideation might preferentially develop among urban residents as an adaptive strategy. This notion is speculative, given the size of the sample and the fact that these conclusions are based on post-hoc analyses. A larger study with a more representative sample would be needed to confirm these findings.

A parallel may be drawn with African-Caribbeans residing in the UK, where a preponderance of grandiose and paranoid thinking has been reported, and where high rates of schizophrenia found in this group have been suggested to "result from a discrepancy between the actual reality of one's social position and one's expectations and/or perceptions of it" (Sharpley and Peters, 1999). Thus, individuals belonging to ethnic minorities in Europe (e.g. African-Caribbeans) and urban Ugandans may share in common the experience of a discrepancy between their position and their aspirations. Indeed, studies in Europe show a greater risk of schizophrenia among immigrants from low-income countries, with greatest risks among those

with African or African-Caribbean background (Cantor-Graae et al., 2003; Harrison et al., 1997; Selten et al., 2001; Zolkowska et al., 2001).

It has recently been suggested that increased schizophrenia risk in urban and minority populations may be caused by the social environment (van Os and Mc Guffin, 2003). Future studies may want to address the question of whether the urban and minority-group risk factors might be mediated by a common pathway, e.g. the individual's perception of himself in relation to an unfamiliar, hostile or discriminatory social environment.

Research in low-income countries may further our general understanding of the mechanisms that contribute to the development of psychotic experiences and their relationship to the risk for schizophrenia.

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