Subclinical psychosis syndromes in the general population: results from a large-scale epidemiological survey among residents of the canton of Zurich, Switzerland

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Epidemiology and Psychiatric Sciences / Volume 24 / Issue 01 / February 2015, pp 69 - 77
DOI: 10.1017/S2045796013000681, Published online: 26 November 2013

Link to this article: http://journals.cambridge.org/abstract_S2045796013000681

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Subclinical psychosis syndromes in the general population: results from a large-scale epidemiological survey among residents of the canton of Zurich, Switzerland

W. Rössler1,2,3*, V. Ajdacic-Gross1,3, H. Haker1,4, S. Rodgers1, M. Müller1 and M. P. Hengartner1

Aims. Prevalence and covariates of subclinical psychosis have gained increased interest in the context of early identification and treatment of persons at risk for psychosis.

Methods. We analysed 9829 adults representative of the general population within the canton of Zurich, Switzerland. Two psychosis syndromes, derived from the SCL-90-R, were applied: ‘schizotypal signs’ and ‘schizophrenia nuclear symptoms’.

Results. Only a few subjects (13.2%) reported no schizotypal signs. While 33.2% of subjects indicated mild signs, only a small proportion (3.7%) reported severe signs. A very common outcome was no ‘schizophrenia nuclear symptoms’ (70.6%). Although 13.5% of the participants reported mild symptoms, severe nuclear symptoms were very rare (0.5%). Because these two syndromes were only moderately correlated (r = 0.43), we were able to establish sufficiently distinct symptom clusters. Schizotypal signs were more closely connected to distress than was schizophrenia nuclear symptoms, even though their distribution types were similar. Both syndromes were associated with several covariates, such as alcohol and tobacco use, being unmarried, low education level, psychopathological distress and low subjective well-being.

Conclusions. Subclinical psychosis symptoms are quite frequent in the general population but, for the most part, are not very pronounced. In particular, our data support the notion of a continuous Wald distribution of psychotic symptoms in the general population. Our findings have enabled us to confirm the usefulness of these syndromes as previously assessed in other independent community samples. Both can appropriately be associated with well-known risk factors of schizophrenia.

Received 22 July 2013; Revised 14 October 2013; Accepted 15 October 2013; First published online 26 November 2013

Key words: Attenuated psychosis syndrome, epidemiology, schizotypy, subclinical psychosis.

Introduction

Although significant variability exists between incidence and prevalence rates of schizophrenia, the average annual incidence is about 0.2 per 1000 persons, with a lifetime prevalence of 0.4–0.7% (Rössler et al. 2005). While schizophrenia can be considered a relatively rare disease, subclinical psychosis symptoms are much more frequent in the general population (Scott et al. 2006; Rössler et al. 2007) and in socio-culturally different countries (Loch et al. 2011). These symptoms are commonly referred to as psychotic-(like) experiences, proneness to psychosis, at-risk mental state, schizotypy or exceptional experiences (Fach et al. 2013). A recent systematic review of 61 reported incidence and prevalence studies of population rates for subclinical psychosis symptoms revealed a median prevalence rate of 7.2% and a median annual incidence rate of 2.5%, with significant variation detected in those rates (Linscott & van Os, 2013).

Subclinical psychosis symptoms, although not always of clinical relevance (Johns & van Os 2001), can have predictive power for the onset of clinical psychotic disorders later in life (van Os et al. 2000). As such, the topic has gained increased interest within the context of early identification and treatment of persons at risk for psychosis. Because of various early intervention
programmes, a new category was proposed for introduction in DSM-5 to address this ‘psychosis risk syndrome’, which describes a condition ‘with recent onset of modest psychotic-like symptoms and clinically relevant distress and disability’ (Tsuang et al. 2013). However, the data showed that only a minority of persons develops a diagnosable psychotic disorder (Fusar-Poli et al. 2012). Another newly discussed category, the ‘attenuated psychosis syndrome’, did not necessarily imply a transition of subclinical psychosis to a full psychotic disorder. It also was discounted because certainty was lacking about its validity and reliability. Moreover, it was unclear how this attenuated psychosis syndrome could be delimited from a schizotypal personality disorder (Tsuang et al. 2013).

One explanation for the fuzziness of this concept is the ‘near Babylonian speech confusion’ within this field. Schultze-Lutter et al. (2011) have argued that this at-risk nomenclature lacks clarity with the emergence of ever-new terms and concepts. Indeed, no comprehensive picture currently describes what actually constitutes subclinical psychosis. Therefore, to reduce its heterogeneity of assessed symptoms, researchers must define more general psychopathological categories.

We have previously employed several independent community samples and populations – in particular, data from the ‘Zurich Study’ (Angst et al. 2005) – to evaluate subclinical psychosis with higher-order syndromes, as derived from the SCL-90-R. In that unique small-community sample, which we followed longitudinally over 30 years, we identified subclinical psychosis syndromes with relevant distress and functional disability (Rössler et al. 2007). Although none of those participating individuals developed a psychotic disorder, persons with persisting subclinical psychosis syndromes were found to be at risk for developing other mental disorders (Rössler et al. 2011a).

To validate some of these results, we have now conducted a cross-sectional study in which we analysed those two previously established psychosis syndromes. Here, a new, much larger sample of adults, 20–41 years old, was followed. They were considered representative of the general population of the canton of Zurich, Switzerland. Our objectives were to (i) determine the distribution of these syndromes, (ii) estimate their prevalence and comorbidity, and (iii) investigate their associations using several covariates.

Methods

Study design and sampling

This study was conducted as part of the ‘Zürcher Impulsprogramm zur nachhaltigen Entwicklung der Psychiatrie’ (ZInEP, i.e. ‘Zürcher Impulsprogramm für Sustainable Development of Mental Health Services’ (ZInEP, i.e. ‘Zürcher Impulsprogramm zur nachhaltigen Entwicklung der Psychiatrie’). This broadly based public mental health research programme is located in the canton of Zurich. The Epidemiology Survey, one of six ZInEP subprojects, comprises four parts: (1) telephone screening; (2) comprehensive, semi-structured face-to-face interviews with a stratified subsample; (3) socio-physiological laboratory examination; and (4) a longitudinal survey. Its design was adapted from the longitudinal Zurich cohort-study (Angst et al. 2005). For the present analysis, we used data from the first step of the survey – the telephone screening – collected between August 2010 and May 2012.

The 9829 Swiss male and female participants were aged 20–41 years at the onset of the survey and were representative of the general population of the Zurich canton. All were screened through a computer-assisted telephone interview (CATI) that utilised the Symptom Checklist-27 (SCL-27) (Hardt et al. 2004) plus items from the psychoticism and paranoid ideation subscales of the SCL-90-R (Derogatis, 1977). Additional items included assessments of socio-demography and substance use.

Participants were randomly selected through the registration offices of all municipalities within the canton, and residents without Swiss nationality were excluded. In accordance with detailed instructions from the research team, a leading marketing and field research institute (GfK ‘Growth for Knowledge’), conducted each CATI. In all, 14 professional telephone interviewers were employed, with seven of them covering 76% of all 9829 interviews. The overall response rate was 53.6%. Reasons for non-response were no telephone connection, only telephone answering machine, incorrect telephone number, communication impossible, unavailability during the study period, or refusal by the targeted person him/herself or a third person. In cases where potential participants were available by telephone, the response rate was 73.9%.

The Cantonal Ethics Committee (KEK) of Zurich approved the ZInEP Epidemiology Survey to fulfil all legal and data privacy protection requirements. The survey was performed in strict accordance with the Declaration of Helsinki of the World Medical Association. All participants gave their written informed consent.

Instruments and measures

The SCL-27 (Hardt et al. 2004) is a German short-form of the well-known SCL-90-R (Derogatis, 1977), which is used to report a wide variety of psychiatric symptoms over the most recent 4-week period. Subjects respond according to a five-point Likert scale that ranges from (1) ‘not at all’ to (5) ‘extremely’. Six
subscales of symptoms are included: depressive, dysthymic, vegetative, agoraphobic, socio-phobic and mistrust. A total distress score similar to the GSI in the SCL-90-R is also available. Cronbach’s α for the subscales are all greater than 0.70 and Cronbach’s α for the GSI is 0.93. The correlation between the GSI of the SCL-27 and the GSI of the SCL-90-R is $r = 0.95$ (Hardt et al. 2004). Here, we added items from the psychoticism and paranoid ideation subscales of the original SCL-90-R to those of the mistrust subscale. This provided two re-arranged subscales of subclinical psychosis that we had previously established in the Zurich Study (Rössler et al. 2007). The first new subscale was used to address social and interpersonal deficiencies, as evidenced by a reduced capacity for close relationships as well as ideas of reference, odd beliefs, and suspicion/paranoid ideation. As such, this factor was reminiscent of symptoms corresponding to a schizotypal personality disorder. Thus, we named this subscale ‘schizotypal signs’. The second new subscale – ‘schizophrenia nuclear symptoms’ – included items of thought insertion, thought-broadcasting, thought control and hearing voices (Table 1). Those symptoms represent attenuated forms of the nuclear symptoms of schizophrenia. A detailed description of the development of these subscales is provided elsewhere (see Rössler et al. 2007). They have also been replicated and applied in other representative samples (Breetvelt et al. 2010; Rössler et al. 2011). Categories of distress for both subscales were defined as follows: ‘no distress’, with a mean value <1.00; ‘low distress’, 1.01–1.49; ‘moderate distress’, 1.50–1.99; ‘high distress’, 2.00–2.99; and ‘extreme distress’, with a mean value ≥2.99.

All other variables included in the analysis were also assessed during the CATI, with most proposing a single question and standardised response options. Topics covered alcohol use, smoking, children, civil state, housing and sex, as well as a self-evaluation of the individual’s satisfaction with their mental health and a comparison with that of other persons. In addition, participants were asked about abusive drinking and level of education. The former was assessed with the question, ‘Some people may have a drink too much at a party or special occasion. Does this happen to you as well from time to time?’ Education level was defined as ‘low’ when high school or simple occupation was the highest level achieved, ‘moderate’ when college or specialised occupation was the uppermost, and ‘high’ when university was the highest degree attained.

**Table 1.** Items for the new subscales of ‘schizophrenia nuclear symptoms’ and ‘schizotypal signs’ that replace those for the ‘paranoid ideation’ (PN) and ‘psychoticism’ (PS) subscales from the original SCL-90-R

<table>
<thead>
<tr>
<th>New SCL-90-R items</th>
<th>Original SCL-90-R subscale*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Schizophrenia nuclear symptoms subscale</strong></td>
<td></td>
</tr>
<tr>
<td>7: Someone else can control your thoughts</td>
<td>PS</td>
</tr>
<tr>
<td>16: Hearing voices other people do not hear</td>
<td>PS</td>
</tr>
<tr>
<td>35: Other being aware of your thoughts</td>
<td>PS</td>
</tr>
<tr>
<td>62: Having thoughts that are not your own</td>
<td>PS</td>
</tr>
<tr>
<td><strong>Schizotypal signs subscale</strong></td>
<td></td>
</tr>
<tr>
<td>8: Others are to blame for your troubles</td>
<td>PN</td>
</tr>
<tr>
<td>18: Feeling most people cannot be trusted</td>
<td>PN</td>
</tr>
<tr>
<td>43: Feeling you are watched by others</td>
<td>PN</td>
</tr>
<tr>
<td>68: Having ideas others do not share</td>
<td>PN</td>
</tr>
<tr>
<td>76: Others not giving you proper credit</td>
<td>PN</td>
</tr>
<tr>
<td>77: Feeling lonely even when with people</td>
<td>PS</td>
</tr>
<tr>
<td>83: Feeling people take advantage of you</td>
<td>PN</td>
</tr>
<tr>
<td>88: Never feeling close to another person</td>
<td>PS</td>
</tr>
</tbody>
</table>

*Items excluded from the original PS subscale are 84: Thoughts about sex that bother you a lot; 85: Idea you should be punished for sins; 87: Idea something is wrong with your body; and 90: Idea something is wrong with your mind.
when related to categorical predictors or with standardised regression coefficients ($\beta$) when related to continuous predictors. All analyses were performed with SPSS version 20 for Macintosh.

Results

The sample comprised 4908 females and 4919 males. Ranging from 20 to 41 years, the mean age was 28.9 (S.D. = 7.1). Most interviewed subjects were unmarried (66.9%), followed by married (30.9%), and separated/divorced/widowed (2.3%). A total of 2795 (28.4%) reported having children. Finally, education levels were low for 43.6% of participants, moderate for 38.0% and high for 18.4%.

The distribution of our two psychosis subscales was inspected in detail (Fig. 1). ‘Schizotypal signs’ ranged from 1 to 5, with a mean of 1.623 (S.D. = 0.572), median of 1.5, skewness of 1.385 (S.E. = 0.025), and a kurtosis of 2.257 (S.E. = 0.049). ‘Schizophrenia nuclear symptoms’ also ranged from 1 to 5, but had a clearly lower mean of 1.159 (S.D. = 0.332), median of 1.0, skewness of 3.319 (S.E. = 0.025), and a large kurtosis of 15.989 (S.E. = 0.050). The common feature between them was their clear representation of an inverse Gaussian distribution (also known as a Wald distribution). The Spearman correlation between both syndromes was $r = 0.434$ ($p < 0.001$).

Categorisation of both subscales yielded the frequencies listed in Table 2. Most subjects reported low (33.2%) or moderate (30.2%) distress in ‘schizotypal signs’. A state of ‘no distress’ was rather uncommon (13.2%) and extreme distress was very rare (3.7%). In contrast, distress in ‘schizophrenia nuclear symptoms’ showed an exponential decline. The vast majority reported no distress (70.6%), followed by low (13.5%) and moderate (11.6%) distress. Only 0.5% reported extreme distress.

The contingency table for distress categories is shown in Table 3. As expected, values were statistically highly significant (Pearson $\chi^2 = 2652.96$, df = 16, $p < 0.001$). Interestingly, none of the subjects with extreme distress in ‘schizophrenia nuclear symptoms’ reported no, low, or moderate ‘schizotypal signs’ distress. By comparison, 877 subjects with no ‘schizophrenia nuclear symptoms’ distress also reported high ‘schizotypal signs’ distress (representing 45.5% of all subjects in that ‘schizotypal signs’ category) while 87 reported even extreme ‘schizotypal signs’ distress (24.3%).

Table 4 presents the various factors related to ‘schizotypal signs’ and ‘schizophrenia nuclear symptoms’. Except for sex, all variables included in this analysis had a statistically significant association with ‘schizotypal signs’. However, inspection of the effect sizes for standardised mean differences revealed that most associations were rather weak. A mean ‘schizotypal signs’ difference of 0.11 represented a small effect; 0.29, medium; and 0.45, large. Accordingly, most differences were small or small-to-medium. The largest effects with respect to ‘schizotypal signs’ were found for the mean differences between no alcohol use and daily use (mean difference = 0.21) as well as between married and separated/divorced/widowed (mean difference = 0.23). In a multivariate analyses where all predictors were entered simultaneously daily alcohol use, daily smoking and low education remained the strongest independent predictors. As for ‘schizophrenia nuclear symptoms’, abusive drinking and having children yielded no statistically significant association. Sex was statistically significant, but the

![Fig. 1. Distribution of ‘schizotypal signs’ (left) and ‘schizophrenia nuclear symptoms’ (right).]
effect size was marginally small and not of practical significance. Small, medium and large effects corresponding to ‘schizophrenia nuclear symptoms’ had mean differences of 0.06, 0.16 and 0.26, respectively. Thus, most statistically significant effects found for ‘schizophrenia nuclear symptoms’ represented marginally small effects (<0.06). The largest effects were found for the mean ‘schizophrenia nuclear symptoms’ difference between drinking daily v. several times per week (mean difference = 0.10) as well as between low and high education levels (mean difference = 0.10). When adjusted for each other, the strongest multivariate predictors were clearly low education and daily alcohol use. Psychopathological syndromes were all statistically significantly related to both subscales. For ‘schizotypal signs’ the effects ranged from medium ($\beta > 0.3$) to large ($\beta > 0.5$) size and they were substantially larger than the moderate effects found in ‘schizophrenia nuclear symptoms’. In each case, the strongest psychopathological association of both subscales was the socio-phobic syndrome ($\beta = 0.70$ and 0.40 for ‘schizotypal signs’ and ‘schizophrenia nuclear symptoms’, respectively).

Table 5 lists the subjective appraisal of participants’ mental health. Distress in both subscales increased exponentially with higher dissatisfaction. Subjects who showed markedly increased distress in ‘schizotypal signs’ and ‘schizophrenia nuclear symptoms’ were very dissatisfied with their mental health and appraised it as being much worse compared with that of other persons. Each category differed significantly from all others. The corresponding effect sizes were large.

**Discussion**

This study was conducted within a population deemed to be at higher risk for mental disorders, i.e. persons between the ages of 20 and 41. Our sample group was obtained from a pool of almost 10,000 persons representative of the general population in the canton of Zurich, Switzerland. Although a considerable part of the general population had indicated some kind of psychosis symptoms, only a small proportion of that was connected with severe symptoms.

The two syndromes were only moderately correlated, i.e. establishing sufficiently distinct symptom clusters. In particular, we noted that ‘schizotypal signs’ was more connected to distress than was attenuated forms of ‘schizophrenia nuclear symptoms’, even though their distribution types were similar. The only difference was that the distribution of ‘schizophrenia nuclear symptoms’ was more heavily peaked (demonstrating a
higher kurtosis), meaning that more subjects were situated at the lower extreme of the distribution when compared with ‘schizotypal signs’. The typically inverse Gaussian, or Wald, distribution was to be expected for a continuously distributed symptom within the general population. We act on the assumption of a Wald distribution, i.e. continuously declining values from no/low symptom load over moderate symptom load to high/extreme symptom load. We don’t find in our distribution a ‘zone of rarity’, characterised by very low values between no/low and high/extreme values, which would clearly constitute two distinct groups.

In epidemiological terms, the distribution type can give us some hints of underlying causes of the presumed continuum. Assumed that psychosis is a multifactorial disorder comparable to other chronic disorders such as diabetes, the observed distribution of the characteristic under investigation depends on the degree to which these causes interact, their prevalence and the degree to which their effect sizes differ (Johns & van Os, 2001). If the effects of the causes were moderate and contributed additively, we could expect a Gaussian distribution. If the causes contributed both independently and in interaction, we expect an inverse Gaussian distribution. We found the latter distribution type in our study.

While we found a rather broad distribution of distress in persons with ‘schizotypal signs’, an exponential decline was noted in ‘schizophrenia nuclear symptoms’. That is, most persons indicating the latter displayed no distress. This possibly meant that their ‘schizophrenia nuclear symptoms’ were rather rare events whereas ‘schizotypal signs’ were much more pervasive and, as such, more distressing.

Table 4. Associations of ‘schizotypal signs’ and ‘schizophrenia nuclear symptoms’, adjusted for sex and age. Values followed by a different superscript within a column vary significantly at corrected p < 0.05

<table>
<thead>
<tr>
<th></th>
<th>Schizotypal signs</th>
<th>Schizophrenia nuclear symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (95% CI)</td>
<td>Sig.*</td>
</tr>
<tr>
<td>Alcohol use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1.65a (1.62; 1.68)</td>
<td>0.000</td>
</tr>
<tr>
<td>&gt;1 per month</td>
<td>1.61b (1.59; 1.63)</td>
<td></td>
</tr>
<tr>
<td>&gt;1 per week</td>
<td>1.61b (1.59; 1.62)</td>
<td></td>
</tr>
<tr>
<td>Daily</td>
<td>1.86c (1.77; 1.95)</td>
<td></td>
</tr>
<tr>
<td>Abusive drinking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1.59a (1.57; 1.60)</td>
<td>0.000</td>
</tr>
<tr>
<td>Yes</td>
<td>1.64b (1.62; 1.65)</td>
<td></td>
</tr>
<tr>
<td>Smoking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1.57a (1.56; 1.58)</td>
<td>0.000</td>
</tr>
<tr>
<td>Occasionally</td>
<td>1.67a (1.63; 1.71)</td>
<td></td>
</tr>
<tr>
<td>Daily</td>
<td>1.76a (1.74; 1.79)</td>
<td></td>
</tr>
<tr>
<td>Having children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1.66a (1.64; 1.67)</td>
<td>0.000</td>
</tr>
<tr>
<td>Yes</td>
<td>1.54a (1.51; 1.56)</td>
<td></td>
</tr>
<tr>
<td>Civil state</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unmarried</td>
<td>1.66a (1.65; 1.68)</td>
<td>0.000</td>
</tr>
<tr>
<td>Married</td>
<td>1.53b (1.51; 1.55)</td>
<td></td>
</tr>
<tr>
<td>Sep/div/widowed</td>
<td>1.76a (1.67; 1.85)</td>
<td></td>
</tr>
<tr>
<td>Housing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alone</td>
<td>1.77a (1.73; 1.80)</td>
<td>0.000</td>
</tr>
<tr>
<td>Community</td>
<td>1.60a (1.59; 1.61)</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>1.67a (1.65; 1.69)</td>
<td>0.000</td>
</tr>
<tr>
<td>Moderate</td>
<td>1.60a (1.58; 1.62)</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>1.55a (1.52; 1.57)</td>
<td></td>
</tr>
<tr>
<td>Sex**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>1.62a (1.60; 1.63)</td>
<td>0.307</td>
</tr>
<tr>
<td>Females</td>
<td>1.61a (1.61; 1.64)</td>
<td></td>
</tr>
<tr>
<td>Age***</td>
<td>1 S.D. increase</td>
<td></td>
</tr>
<tr>
<td>-0.062 (0.010)</td>
<td>0.000</td>
<td>-0.052 (0.010)</td>
</tr>
<tr>
<td>Depressive</td>
<td>1 S.D. increase</td>
<td></td>
</tr>
<tr>
<td>0.619 (0.011)</td>
<td>0.000</td>
<td>0.375 (0.017)</td>
</tr>
<tr>
<td>Dysthymic</td>
<td>1 S.D. increase</td>
<td></td>
</tr>
<tr>
<td>0.534 (0.011)</td>
<td>0.000</td>
<td>0.344 (0.016)</td>
</tr>
<tr>
<td>Vegetative</td>
<td>1 S.D. increase</td>
<td></td>
</tr>
<tr>
<td>0.490 (0.012)</td>
<td>0.000</td>
<td>0.351 (0.019)</td>
</tr>
<tr>
<td>Agoraphobic</td>
<td>1 S.D. increase</td>
<td></td>
</tr>
<tr>
<td>0.489 (0.014)</td>
<td>0.000</td>
<td>0.385 (0.022)</td>
</tr>
<tr>
<td>Socio-phobic</td>
<td>1 S.D. increase</td>
<td></td>
</tr>
<tr>
<td>0.698 (0.010)</td>
<td>0.000</td>
<td>0.404 (0.017)</td>
</tr>
</tbody>
</table>

*Test of model effect.
**Adjusted only for age.
***Adjusted only for sex.
The contingency table showed that subjects scoring high on ‘schizophrenia nuclear symptoms’ scored similarly high on ‘schizotypal signs’, whereas subjects scoring high on the latter scored rather low or moderate on the former. Again, persons who suffered primarily from ‘schizotypal signs’ might have only occasionally displayed ‘schizophrenia nuclear symptoms’, whereas those with distressing ‘schizophrenia nuclear symptoms’ in the foreground were affected pervasively in ‘schizotypal signs’.

The two syndromes were related to various covariates, although mostly rather weak. The associations with alcohol and tobacco use are replications of well-established findings (Degenhardt & Hall, 2001; Compton et al. 2009; Rössler et al. 2012a). One association with the psychopathological feature of social phobia is somewhat tautological because, by definition, ‘schizotypal signs’ are especially linked with distrust in social relationships. Nevertheless, a systematic review also provides some evidence that social and interpersonal dysfunctions may predate the onset of psychotic symptoms (Gayer-Anderson & Morgan, 2013). Interestingly we found no important sex differences even though they have long been reported in full-blown psychosis (McGrath et al. 2008). Thus, those differences in psychosis apparently manifest themselves at the high end of the continuum (full-blown schizophrenia) rather than within the subthreshold range. Here, we confirmed results from a previous analysis of the Zurich cohort study, in which we also could not identify substantial sex differences in subclinical psychosis (Rössler et al. 2012b). This finding is also in line with that from the large meta-analysis of Linscott & van Os (2013).

By focusing on subthreshold syndromes, we have provided evidence for subclinical psychosis syndromes that are quite common in the general population. This has enabled us to avoid restricting the validity of these results only to specific high-risk groups, as currently investigated in early psychosis-detection programmes. Such population-based studies will allow researchers to investigate the occurrence of psychotic symptoms before psychopathology becomes clinically relevant. Nevertheless, we could previously demonstrate that a high symptom load of the two syndromes assessed, is associated with various kinds of functional impairments (Rössler et al. 2007). Furthermore, those symptoms will be meaningful for prevention and intervention programmes, because we have already demonstrated that they may predispose a person to a wide range of mental disorders (Rössler et al. 2011a). Finally, subclinical psychosis detrimentally impacts the course and severity of affective disorders (Wigman et al. 2012), and it constitutes a risk factor for suicidal behaviour (Kelleher et al. 2012). Accordingly, we have determined in our study that the two syndromes are not meaningless for the lives of affected persons. In particular, ‘schizotypal signs’ impair the subjective well-being and satisfaction with mental health when compared with others. This is much less the case with respect to ‘schizophrenia nuclear symptoms’, probably because those symptoms are not as frequent and pervasive.

In summary, our description of these two sufficiently discrete syndromes can reduce the heterogeneity of symptoms associated with subclinical psychosis. In this study we verified the usefulness of those syndromes as previously assessed in other representative samples (Rössler et al. 2007, 2011b; Brevett et al. 2010). Both syndromes

<table>
<thead>
<tr>
<th>Individual satisfaction with mental health</th>
<th>Schizotypal signs</th>
<th>Schizophrenia nuclear symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very low</td>
<td>2.71 (0.09)</td>
<td>1.69 (0.09)</td>
</tr>
<tr>
<td>Low</td>
<td>2.34 (0.04)</td>
<td>1.37 (0.03)</td>
</tr>
<tr>
<td>Moderate</td>
<td>1.99 (0.02)</td>
<td>1.27 (0.01)</td>
</tr>
<tr>
<td>High</td>
<td>1.63 (0.01)</td>
<td>1.16 (0.01)</td>
</tr>
<tr>
<td>Very high</td>
<td>1.40 (0.01)</td>
<td>1.09 (0.00)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Comparison of mental health with others</th>
<th>Schizotypal signs</th>
<th>Schizophrenia nuclear symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Much worse</td>
<td>2.59 (0.09)</td>
<td>1.55 (0.09)</td>
</tr>
<tr>
<td>Worse</td>
<td>2.12 (0.03)</td>
<td>1.29 (0.02)</td>
</tr>
<tr>
<td>Equal</td>
<td>1.67 (0.01)</td>
<td>1.17 (0.01)</td>
</tr>
<tr>
<td>Better</td>
<td>1.55 (0.01)</td>
<td>1.14 (0.00)</td>
</tr>
<tr>
<td>Much better</td>
<td>1.46 (0.01)</td>
<td>1.11 (0.01)</td>
</tr>
</tbody>
</table>

*Test of model effect.
feature similar syndromes that are used to characterise
crass-blown psychosis. Therefore, they are particularly
appropriate for describing the psychosis continuum.

However, the present study did involve some limitations.
The telephone interviews were conducted by laypersons,
and the assessed variables were quite restricted in number
and detail. Nevertheless, we were able to canvass a large
representative sample when compared with most other
investigations that have focused on subclinical psychosis
within a general

In addition to the more specific limitations of our
study, there are some more general concerns about
assessment approaches in psychiatric epidemiology.
Firstly, the content of the described phenomena can
never go beyond the actually assessed symptoms or
signs. That is to say that we cannot definitely decide
if the two syndromes identified are natural entities or
resulting from the structure of our questionnaires. As
such the applied questionnaires determine the content
and the distribution type of the epidemiological
findings. Additionally, the fewer items assessed the more
rough the estimates will be.

Concerning our research question we find two types
of items, the ones representing the same symptoms as
seen in manifest psychosis, i.e. schizophrenia nuclear
symptoms but less pronounced in intensity and quan-
tity and attenuated psychosis symptoms, i.e. weaker as
described in ‘schizotypal signs’ compared with full-
blown symptoms. The former type of symptoms
suggests that this type of symptom only turns into a dis-
order, e.g. depending on the degree of subjective dis-
triss or in a certain cultural context implying various
levels of societal tolerance. The latter type of symptoms
(schizotypal signs) is an attenuated form with varying
degrees of severity along a continuum, i.e. precursors
of a psychotic disorder. The continuity of symptoms
is implied as on inspection the values of our scale are con-
tinuously decreasing from ‘no/low’ to ‘high/Extreme’.

But we cannot hypothesise a continuum from normal
experiences to clinical phenomena, as we did not assess
manifest psychosis in our sample.

Acknowledgements
We thank Professor Jules Angst for his continuing and
encouraging support of our epidemiological studies.

Financial Support
ZInEP was supported by a private Foundation. The
Foundation had no further role in the design of the
study; the collection, analysis and interpretation of
data; the writing of this report; or the decision to sub-
mits this paper for publication.

Conflict of Interest
None.

Ethical standard
The authors assert that all procedures contributing to
this work comply with the ethical standards of the rel-
evant national and institutional committees on human
experimentation and with the Helsinki Declaration of
1975, as revised in 2008.

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