

# The ZInEP Epidemiology Survey: background, design and methods

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## Abstract

This article introduces the design, sampling, field procedures and instruments used in the ZInEP Epidemiology Survey. This survey is one of six ZInEP projects (Zürcher Impulsprogramm zur nachhaltigen Entwicklung der Psychiatrie, i.e. the “Zurich Program for Sustainable Development of Mental Health Services”). It parallels the longitudinal Zurich Study with a sample comparable in age and gender, and with similar methodology, including identical instruments. Thus, it is aimed at assessing the change of prevalence rates of common mental disorders and the use of professional help and psychiatric services. Moreover, the current survey widens the spectrum of topics by including sociopsychiatric questionnaires on stigma, stress related biological measures such as load and cortisol levels, electroencephalographic (EEG) and near-infrared spectroscopy (NIRS) examinations with various paradigms, and sociophysiological tests. The structure of the ZInEP Epidemiology Survey entails four subprojects: a short telephone screening using the SCL-27 ( $n$  of nearly 10,000), a comprehensive face-to-face interview based on the SPIKE (Structured Psychopathological Interview and Rating of the Social Consequences for Epidemiology: the main instrument of the Zurich Study) with a stratified sample ( $n = 1500$ ), tests in the Center for Neurophysiology and Sociophysiology ( $n = 227$ ), and a prospective study with up to three follow-up interviews and further measures ( $n = 157$ ). In sum, the four subprojects of the ZInEP Epidemiology Survey deliver a large interdisciplinary database. Copyright © 2014 John Wiley & Sons, Ltd.

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## Background

### Introduction

Over recent decades, psychiatric epidemiology has brought the real world into psychiatry – and vice versa. Today,

mental disorders are known to be much more frequent than many clinicians, politicians and the lay public had previously assumed. Moreover, subthreshold disorders have come into focus and have been recognized as a major source of burden. Another step further on, dimensional concepts are

supplementing both the crude categorical concepts of mental disorders as well as their more sophisticated derivatives. Meanwhile, the use of health services has been shown to lie far below the actual need for professional help, due to lack of knowledge, inappropriate attitudes and other reasons.

A great deal of new information has come from large population studies: the Epidemiologic Catchment Area Survey (Regier and Kaelber, 1995), the National Comorbidity Survey (NCS) in the United States (Kessler *et al.*, 1994), the British National Psychiatric Morbidity Survey (Jenkins *et al.*, 1998), the German National Health Interview and Examination Survey – Mental Health Supplement (Jacobi *et al.*, 2002), and the PsyCoLaus Study (Preisig *et al.*, 2009). Finally, recent cross-sectional studies have used very large samples, i.e. the World Mental Health Survey (Kessler *et al.*, 2007).

Longitudinal surveys have revealed new perspectives on the complex interplay of risk factors, genetics, behavioral processes and brain systems involved in the etiopathogenesis of comorbid mental disorders, syndromes and symptoms, for example the Swedish Conscripts Study (Andreasson *et al.*, 1987), the Northern Finland 1966 Birth Cohort (Rantakallio, 1988), the Zurich Study (Angst *et al.*, 1984), the Munich Early Developmental Stages of Psychopathology Study (Wittchen *et al.*, 1998), the Netherlands Mental Health Survey and Incidence Study (NEMESIS) (Bijl *et al.*, 1998), the NCS-R (Kessler *et al.*, 2005) or the recently started NEMESIS II (de Graaf *et al.*, 2010).

Further major advances in psychopathology will require a sufficient grasp of the complexity of the matter. Few disciplines and methodological approaches are able to meet this challenge, and one among them is epidemiology. This was the background for initiating the ZInEP Epidemiology Survey in Zurich, which is one of six ZInEP projects (Zürcher Impulsprogramm zur nachhaltigen Entwicklung der Psychiatrie, i.e. the “Zurich Program for Sustainable Development of Mental Health Services”).

The ZInEP Epidemiology Survey is basically geared to parallel the longitudinal Zurich Study in many instances (Angst *et al.*, 1984; Angst *et al.*, 2005). It seizes the opportunity to combine information from a new cross-sectional survey with the information from an existing longitudinal survey. However, the current survey widens the spectrum of topics by including sociopsychiatric questionnaires on stigma, stress related biological measures such as allostatic load and cortisol levels, electroencephalographic (EEG) and near-infrared spectroscopy (NIRS) examinations with various paradigms, and sociophysiological tests. It delivers a large interdisciplinary database which enables us to combine and exchange questions and answers from epidemiology and other disciplines. This paper introduces the

aims and the design of the ZInEP Epidemiology Survey. Furthermore it describes the sampling, the field procedures and the instruments used in this survey.

## Aims

The preliminary aims of the survey were in parallel to the surveys mentioned earlier: to generate further comprehensive information about mental health and mental disorders in the general population. This target also included subthreshold syndromes and symptoms, comorbidity patterns, risk factors and triggers, burdens and attributions. However, we were interested in outcomes such as the use of health services and all related factors: subjective motives and hurdles, i.e. stigmatization and self-stigmatization, perceived availability of services and experiences the subjects had had with services in the past.

Moreover, by constructing parallels to the Zurich Study we aimed to obtain a direct basis for comparative analyses. In particular, we aimed to assess whether prevalence rates of common mental disorders (CMD) and use of health services have changed. If so, we wanted to disentangle whether this change had occurred in time or due to age effects or by cohort succession. Thus we adapted a specific sample design for this purpose (see later).

Four major and several minor aims extend the spectrum of the Zurich Study. The major extensions were the following:

- a broader coverage of psychosis-near symptoms and signs in order to display new perspectives on psychosis
- addressing the role of stress in the interactions between depression and psychosis symptoms; this extension also included a series of biological parameters and was embedded in an add-on study supported by the Swiss National Science Foundation (grant # 3247B0-122071)
- assessment of personality disorders
- assessment of attitudes, stigmatization and related behavioral parameters.

The minor extensions included further (psycho)pathological topics (attention deficit hyperactivity disorder (ADHD), post-traumatic stress disorder (PTSD), dyslexia and stuttering, mental pain), risk factors (obstetric complications, traumatic experiences in childhood), protective factors (resilience) and related variables such as coping abilities.

## Design

### General design

The general design of the ZInEP Epidemiology Survey comprised four consecutive subprojects (Figure 1; see also

**Table 1.** Measures of allostatic load

<i>Physical examination</i> <sup>1</sup>	
Systolic and diastolic blood pressure	Indexes of cardiovascular activity/two measurements Indexes for more chronic levels of metabolism and adipose tissue deposition, thought to be influenced by increasing glucocorticoid activity
Waist/hip ratio and body mass index	
<i>Blood measurements</i> <sup>2</sup>	
Serum HDL, LDL and total cholesterol levels	Indexes of long-term atherosclerotic risk Integrated measure of glucose metabolism during a period of several days
Fastening pro-insulin and fastening glucose	
High sensitivity C-reactive protein (CRP)	Inflammatory marker, risk factor for cardiovascular disease
D-dimer, fibrinogen	Indexes or haemostatic functioning
DHEA-S	Functional HPA axis antagonist
Norepinephrine, epinephrine	Indexes of sympathetic nervous system activity
<i>Saliva</i> <sup>3</sup>	
Cortisol excretion	Measure of HPA axis activity
<i>Urinary excretion</i> <sup>4</sup>	
Urinary albumin/creatinine	Albumin creatinine ratio as measure of subclinical nephropathy

<sup>1</sup>Blood pressure will be determined from three readings in the sitting position after a five-minute rest period on the dominant arm.

<sup>2</sup>Blood will be collected into appropriate tubes and be either immediately shipped to the laboratory for same day analysis or centrifuged and stored at  $-80^{\circ}\text{C}$ . High sensitivity C-reactive protein and pro-insulin will be determined using a commercially available high-sensitivity assay.

<sup>3</sup>Saliva: see earlier.

<sup>4</sup>Spot urine.

<http://www.zinep.ch/epidemiologie/informationforresearchers> for more detailed information about the sex-age-subsamples in each subproject):

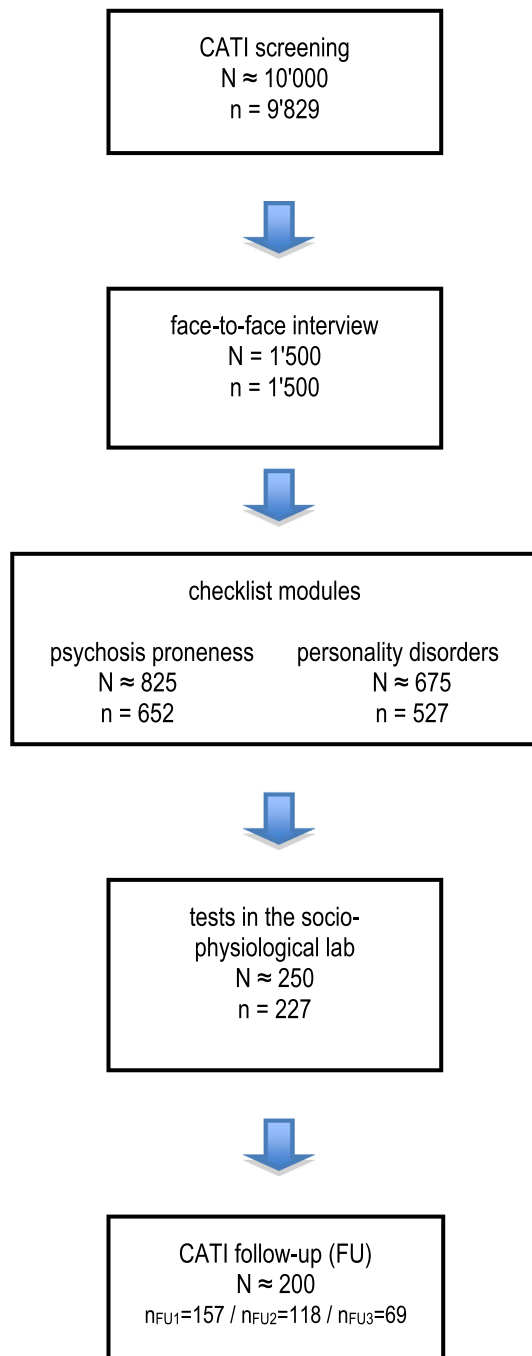
- (1) A short telephone screening using the SCL-27 (Hardt *et al.*, 2004), a short form of the SCL-90-R (Derogatis, 1977), in order to construct a stratified sample for subproject 2 and preselect samples for subprojects 3 and 4 (see sampling details later).
- (2) A comprehensive interview, which included a semi-structured diagnostic face-to-face interview using a short form of the Structured Psychopathological Interview and Rating of the Social Consequences for Epidemiology (SPIKE) used in the Zurich Study (Angst *et al.*, 1984; Angst *et al.*, 2005), as well as several additional self-reporting tools, i.e. checklists filled in by the participants. Apart from a fixed set of questionnaires, further modules addressing psychosis and personality disorders were supplemented in a proportion of 55:45%. The modular design of the checklists was aimed at saving time and containing attrition of the participants.
- (3) Tests in the Center for Neurophysiology and Sociophysiology to assess several neurophysiological

and biological markers related to psychosis proneness, stress vulnerability, and allostatic (cumulative stress) load (Table 1).

- (4) Up to three prospective bimonthly follow-up interviews and saliva probes focusing on life events, stress perception, biological stress levels, major changes in symptom load, in particular regarding psychotic symptoms.

#### Parallels and extensions of the study design with regard to the Zurich Study

Following basic methodological features were adopted from the Zurich Study. Firstly, the basic screening and stratification procedure was used in order to obtain a sample enriched by cases with a high symptom load for the main interview. Stratification procedures such as the present two-stage procedure are a common strategy employed to save time and resources (Dunn *et al.*, 1999). In the ZInEP Epidemiology Survey, participants scoring above the 75th percentile on the global severity index (GSI) of the SCL-27 (high-scorers) and participants scoring below this cutoff (low-scorers) were sampled at a ratio of 60:40%.



**Figure 1.** Study design of the ZInEP Epidemiology Survey: subprojects with preliminary sample projections (uppercase *N*) and definitive samples (lowercase *n*) (more detailed information is displayed at <http://www.zinep.ch/epidemiologie/informationforresearchers/>).

The second basic parallel with the Zurich Study is related to the age structure of the sample. As mentioned earlier, the Zurich Study is a panel study based on two birth cohorts

(1958 and 1959), which were interviewed seven times. Thus the age of these cohorts at each interview was defined by the year of interview. We adapted the related age years in selecting our samples (see Figure 2). The parallelized samples of the Zurich Study and the ZInEP Epidemiology Survey should help in interpreting any changes that might have occurred in time or due to age effects or by cohort succession.

Last but not least, the parallels between the Zurich Study and the present survey relate to use of similar instruments. For the purposes of the ZInEP Epidemiology Survey we used the Mini-SPIKE, a shortened form of the SPIKE (Structured Psychopathological Interview and Rating of the Social Consequences of Psychological Disturbances for Epidemiology – Version 10), which was developed in the Zurich Study.

Furthermore, the ZInEP Epidemiology Survey extends the spectrum of the Zurich Study (see also sections entitled “Aims”, and “Survey instruments and procedures”). On the design level this is in particular due to the subprojects 3 and 4. The tests in the Center for Neurophysiology and Sociophysiology (subproject 3) and the embedded prospective study (subproject 4) particularly add neurophysiological and biological markers to epidemiological information derived from the survey.

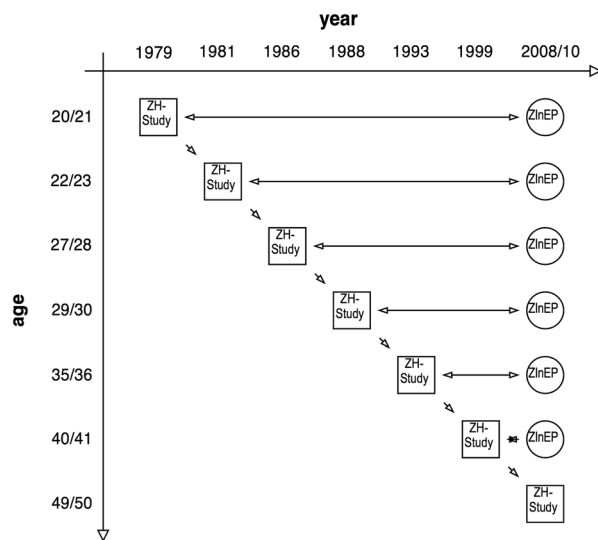
### Projections on sample sizes

The expectations and estimates related to the sample sizes were based on the needs and parameters of the face-to-face interviews (subproject 2). A sample of 1500 subjects, stratified by sex, age and SCL-27 status was assumed to require up to 10,000 screening interviews and a preliminary base of about 20,000 addresses. By offsetting the stratification, the sample would represent 3600 persons. The tests in the Center for Neurophysiology and Sociophysiology and the follow-up interviews were planned with a subgroup of the face-to-face sample, i.e. 200–250 subjects, depending mainly on the ease of acquiring and reaching the subjects for the time-consuming tests and interviews.

## Methods

### Place and time

The catchment area, the canton of Zurich, is a mixed urban–rural area with a population of 1.35 million, which comprises about one sixth of the total Swiss population. Zurich is the capital of the canton. With approximately 400,000 residents, it is the largest city and at the same time the economic center of Switzerland. About 20% of the residents are foreigners.



**Figure 2.** The Zurich Study panel and the age structure of the ZInEP Epidemiology Survey.

The ZInEP Epidemiology Survey, i.e. the screening and the face-to-face interviews, started in August 2010. The tests in the Center for Neurophysiology and Sociophysiology started in February 2011 and the follow-up interviews two months later. The screening finished in May 2012 and all other subprojects in September 2012.

The interviews and tests were scheduled to follow at least two months after the preceding interview or test. Most of the examinations took place within 2–4 months since the last one. A participant who underwent all interviews including the testing in the Center for Neurophysiology and Sociophysiology and all follow-up interviews was accompanied at least one year by the ZInEP team. If more than a half year had gone by between the screening and the tests in the Center for Neurophysiology and Sociophysiology, the SCL-27 interview was repeated.

#### Sample design and steps in sample construction

The ZInEP Epidemiology Survey aimed to recruit a representative sample of 20 to 41 years old adults comparable in gender and age to the assessment periods of the Zurich Study. In analogy to the Zurich Study, the population was restricted to Swiss residents.

The steps in sample construction and deriving subsamples were the following (for more information see <http://www.zinep.ch/epidemiologie/informationforresearchers>):

A. Obtain addresses from the municipalities for each sample: The resident registration offices of all municipalities of the canton of Zurich were contacted and

asked to send us the addresses of Swiss residents with the indicated years of birth. Since the focus was on specific years of birth (or age groups), this was the only efficient approach to reaching the target group. We provided general information about the study for the offices, the approval of the Ethics Committee, the sampling scheme, the screening questionnaire and, on request, further material such as the regulations of the data protection office of the canton of Zurich. We also offered any technical help on request.

- B. Allocate phone numbers to a market and field research institute: The addresses were sent to the marketing and field research institute GfK (Growth for Knowledge) in Hergiswil, Switzerland, to identify the corresponding telephone numbers. This agency had also been selected to carry out the screening interviews. The proportion of residents with a published landline number decreased from 60% encountered in rural areas (i.e. at the beginning of the study) to 40% met in urban areas (i.e. at the end of the study). Additionally, we established mail contact in subgroups with low proportions in order to reach potential participants without landline numbers.
- C. Draw random subsamples for the screening: The random selection of participants from the pool with known phone numbers was carried out by the research group. The quotes were adapted continuously depending on the response rates.
- D. After the screening, stratify the subsamples into high- and low-scorers according to the screening results, i.e. the GSI-scores of the SCL-27 and draw random subsamples for the face-to-face interviews: The stratified sample for the face-to-face interview was constructed as following. As mentioned earlier, participants scoring above the 75th percentile of the SCL-27 general severity score (high-scorers) and participants scoring below this cutoff (low-scorers) in each of the 12 sex-birth-year subgroups (see also Figure 2) were sampled in a relation of 3:2. Thus, among the 1500 participants in the face-to-face interview, there were 900 high-scorers and 600 low-scorers. In each of the 12 sex-birth-year subgroups there were 75 high-scorers and 50 low-scorers. Almost all high-scorers were included in the face-to-face interview. In this study, we received a re-weighting factor of 4.5 for the low-scorers in order to re-establish the population proportions. This results in a virtual sample of 3600 persons after re-weighting.
- E. After the face-to-face interviews, build subsamples for tests in the Center for Neurophysiology and Sociophysiology and the follow-up interviews: The subsamples for the

tests in the Center for Neurophysiology and Sociophysiology and the follow-up interviews were constructed according to the outcomes of two psychoticism scales (Rössler *et al.*, 2007) – the schizophrenia nuclear symptoms scale (SNS) and the schizotypal signs scale (STS) – which were included in the screening interview. We introduced four subsamples according to the following criteria:

- highest quintile on both scales
- highest quintile on the SNS, any quintile on the STS
- highest quintile on the STS, any quintile on the SNS
- controls with low overall GSI-scores, no use of professional help

This design equals a modified between-group comparison. The controls were not asked to participate in the follow-up interviews.

### Fieldwork

At the beginning, i.e. before the screening interview, participants received an introductory letter with a brochure and general information about the study. Further material was made available on a website. In case of questions, the participants could contact the research team via a hotline or by email.

Before each face-to-face or follow-up interview, participants were informed by another letter communicating that they had been selected for the next survey part and introducing the interview or the tests. The participants were asked to give their written informed consent for each survey part in which they participated.

The screening interviews (survey part one) were accomplished by the market and field research institute GfK using computer assisted telephone interviews (CATIs). In sum, 14 professional telephone interviewers were put on this interview, and seven of them covered 76% of all 9829 interviews. The interviewers were trained before the beginning of the study and twice during the study in accordance with the instructions from the research team. Supervision was provided by the GfK senior staff as well as by the research team who also had the opportunity to listen in on the interviews periodically. The research team intervened if analyses revealed that an interviewer induced any deviating response patterns.

The average duration of the screening interview was 14.0 (standard deviation [SD] 3.6, range 7.1–55.9) minutes. At the end of the screening interview the participants were asked whether they would agree to participate in the second part of the survey if their name were drawn by random selection. All participants who

gave a positive answer or were undecided were included as available for the next survey part.

The face-to-face interviews (part two of the survey) and the following survey parts were organized by the research team and accomplished by 21 extensively trained clinical psychologists. Six of them accomplished 61% of all 1500 interviews. The research team provided continuous supervision of the interviewers based on various outcome parameters (interview duration, response patterns, return of checklists, positive answers regarding continuing participation, symptom load, and symptom patterns). The interviewer team met periodically for training, but also for the exchange of experiences in order to improve the instruments and interview procedures.

The participants could choose to be interviewed either at home (presupposing the absence of other persons in the room) or at the research offices of the Psychiatric University Hospital in Zurich. Overall, 67% of the participants chose the second alternative.

The interviews were designed as semi-structured computer assisted personal interviews (CAPIs). The interview templates were developed with SPSS Data Entry Builder (version 4). The average duration of the face-to-face interviews was 144 minutes (SD 55, range 50–765).

An integral part of the interview were self-reporting instruments (checklists) which could be filled in immediately after the face-to-face interview or later at home. To favor the former case, we paid interviewers a bonus for subjects who agreed. In the latter case, we asked participants to return the questionnaires within the following two weeks. In cases of noncompliance we firstly reminded them to return the checklists by letter and subsequently by telephone.

We expected most participants to complete the checklists within one to two hours. The voluminous set of checklists was a compromise between the aim of covering as many topics as possible, the length of the face-to-face interview, and a reasonable versus ambitious load of homework. As a further measure to enrich the information base we divided the first part of the checklists, i.e. a fourth of the set, into a psychoticism module and a personality disorder module (see also Figure 1).

All participants in part two of the survey were offered a shopping voucher of 20 Swiss francs as an incentive. At the end of the face-to-face interview they were asked whether they would agree to participate in parts three and four of the survey if random selection were to draw their ID number. Again, all participants who gave a positive answer or were undecided were included as available for the next survey part.

The tests in the Center for Neurophysiology and Sociophysiology (part three of the survey) took a whole day. They were carried out by a biologist and three assistants (psychology students) who underwent several training cycles. In addition, physicians from the Psychiatric University Hospital of Zurich were involved in the procedure of blood sampling.

The participants were asked to bring four saliva probes assembled the day before as well as three probes collected on the day of the examination and to come to the Center for Neurophysiology and Sociophysiology with an empty stomach and without having smoked beforehand. During the day at the Center for Neurophysiology and Sociophysiology the participants were interviewed, provided saliva, blood and urine probes, completed computer-based tests, and underwent several tests involving EEG and NIRS measurements. All participants in part three (and four) of the survey received an incentive of 100 Swiss francs.

Up to three follow-up interviews (part four of the survey) were carried out bimonthly after the day at the Center for Neurophysiology and Sociophysiology in CATI format. We selected an interviewer from part two for this task. The interviews focused on stress vulnerability, life events and change of symptom load. If a change since the previous interview occurred, the interview was supplemented by further questionnaires and the participant was again asked to provide saliva probes for measuring cortisol levels.

### Feedback

At the end of the face-to-face interview and the day at the Center for Neurophysiology and Sociophysiology the participants were asked whether they would like to be informed of their personal results at the end of the study. For this purpose we created a webpage and selected several questionnaires and tests for display. For data security reasons, the logins were first sent to the participants and, second, the passwords were supplied by recorded delivery.

### Ethical and data security issues

The ZInEP Epidemiology Survey was approved by the Ethics Committee of the canton of Zurich (KEK). The data assessment and storage procedures were evaluated by the data protection office of the canton of Zurich.

### Survey instruments and procedures

The list of instruments is displayed in Table 2. The main instruments of the screening (SCL) and the face-to-face

interview (SPIKE) were adopted from the Zurich Study in order to ascertain comparability of the results.

### Screening instrument

The main instrument of the screening interview was the SCL-27 (Hardt *et al.*, 2004), i.e. an abbreviated version of the SCL-90-R (Derogatis, 1977). It consists of six instead of the original nine subscales covering symptoms of:

- depression
- dysthymia
- vegetative symptoms
- agoraphobia
- social phobia
- mistrust

Just as the SCL-90-R, the SCL-27 also yields an overall score: the GSI. The Cronbach's  $\alpha$  of the SCL-27-GSI as well as the correlation with the SCL-90-R-GSI were shown to be over 0.9 (Hardt *et al.*, 2004).

We supplemented the screening interview with questions from the original SCL hostility subscale, the SCL psychoticism subscale and the SCL paranoid ideation subscale. While the hostility questions were supposed to help us assign the most experienced interviewers to hostile interviewees, the latter questions were included because of the particular emphasis on subclinical psychosis symptoms in this survey.

### Diagnostic instrument

The Mini-SPIKE applied in the face-to-face interview is basically a short form of the SPIKE, the diagnostic instrument of the Zurich Study. It covers symptoms and further diagnostic parameters (length, recurrence, burden) of common mental disorders over the past 12 months.

The SPIKE was first developed in the 1970s (Binder *et al.*, 1982). Initially, it was based on preliminary versions of the *Diagnostic and Statistical Manual of Mental Disorders*, Third Edition (DSM-III). Later, it adopted the DSM-III-R and DSM-IV criteria as they were published. As an exception, the neurasthenia module is based on the International Classification of Diseases, 10th revision (ICD-10) criteria. The SPIKE covers most common mental disorders. Each diagnostic module of the SPIKE is introduced by a screening question including examples, thus rendering the SPIKE a semi-structured interview. Positive screening questions elicit detailed questions on symptoms, on subjective distress, on attribution of causes for the symptoms, and on seeking help. Each module is completed by anamnestic questions on symptoms experienced in the past and help seeking.

**Table 2.** Topics, questionnaires, scales and tests in the ZInEP Epidemiology Survey

Survey part	Topic	Issue/instrument/questions	source / comments
Screening interview	Demographics	Questions based on Swiss Household Panel SCL-27	www.swisspanel.ch (Hardt <i>et al.</i> , 2004)
	Mental health	SCL-90-subcales SNS, STS, hostility	(Derogatis, 1977; Rössler <i>et al.</i> , 2007)
	Substance use (smoking, alcohol use)	Questions based on Swiss Health Survey 2007	www.bfs.admin.ch
Face-to-face interview	Attitudes towards mental disorders and treatment	Questions based on survey from Swiss National Research Foundation project no 32-52571.97	(Lauber <i>et al.</i> , 2000)
	Demographics	Mini-SPIKE	(Angst and Dobler-Mikola, 1985)
	Mental health: <i>sleep, neurasthenia, panic, generalized anxiety disorder, specific phobia, social phobia, agoraphobia, depression, suicidality, hypomania, obsessive-compulsive disorder, psychosis symptoms, eating disorders</i>	Mini-SPIKE	(Angst and Dobler-Mikola, 1985)
	Substance use: <i>smoking, alcohol use, illicit drug use</i>	Mini-SPIKE, self-constructed life chart, CAGE	(Angst and Dobler-Mikola, 1985; Ewing, 1984)
	Use of professional and/or lay help	Adapted from SPIKE and modified	(Angst and Dobler-Mikola, 1985)
	Mental disorders among relatives	Self-constructed questions	
	Treatment, help seeking	Self-constructed questions	(Weissman and Paykel, 1974)
	Social network, partnership	Adapted from SPIKE (modified version of the	Social Adjustment Scale, Weissman/Paykel )
	Expressed emotions	Perceived Criticism Scale (modified)	(Hooley and Teasdale, 1989)
	Acute somatic diseases	self-constructed questions	
	Chronic somatic diseases	Self-constructed questions	
	Accidents	Self-constructed questions	
	Attitudes towards mental disorders and treatment	Emotional Reactions to Mental Illness Scale (ERMIS)	(Angermeyer and Matschinger, 2003)
	Obstetric complications	questions based on the Obstetric Complications Scale	(Littman and Parmelee, 1978)
	Sexual hormones	Self-constructed questions	<i>Only women</i>
		Stuttering questions adapted from Craig <i>et al.</i>	(Craig <i>et al.</i> , 2002)



Stuttering, handedness, mother language	handedness questions adapted from Vuoksimaa <i>et al.</i>	(Vuoksimaa <i>et al.</i> , 2009)
Personality	Big Five Inventory short form (BFI-S) Bem Sex Role Inventory (BSRI) The Brief Core Schema Scale (BCSS)	(Schupp and Gerlitz, 2008) (Schneider-Düker and Kohler, 1988) (Fowler <i>et al.</i> , 2006) (Krohne <i>et al.</i> , 1996; Watson <i>et al.</i> , 1988) (Bunney <i>et al.</i> , 1999) (Merckelbach <i>et al.</i> , 2001) (Freeman <i>et al.</i> , 2005; Lincoln <i>et al.</i> , 2009)
Mental health/psychosis symptoms	Positive and Negative Affects Schedule (PANAS) SIAPA: Anomale Sinneswahrnehmungen CEQ: Creative Experiences Questionnaire	(Raine and Benishay, 1995) (Beauducel <i>et al.</i> , 2003; Zuckerman, 1994) (Doering <i>et al.</i> , 2007; Schotte <i>et al.</i> , 1998) (Rosler <i>et al.</i> , 2004) (Retz-Junginger <i>et al.</i> , 2003) (Breslau <i>et al.</i> , 1999)
Mental health/personality disorders	Paranoia Checklist Interpersonal Intolerance of Ambiguity Scale (SIA) Schizotypal Personality Questionnaire – Brief (SPQ-B)	(Marmar <i>et al.</i> , 1994) (Orbach <i>et al.</i> , 2004) (Rutz, 1999; Rutz <i>et al.</i> , 1995; Walinder and Rutz, 2001)
Mental health/ADHD	Sensation Seeking Scales, Form V (SSS-V) SSS-V Assessment of DSM-IV Personality Disorders (ADP-IV)	(Schulz and Schlotz, 1999) (Cohen <i>et al.</i> , 1983; Grassel <i>et al.</i> , 2007) (Maslach <i>et al.</i> , 1996)
Mental health/PTSD	ADHD Self-Rating Behaviour Questionnaire Wender Utah Rating Scale Short Form (WURS-K) PTSD Screening-Scale Peritraumatic Dissociation Experiences Questionnaire Mental Pain (surfeit of the pain subscale)	(Bernstein <i>et al.</i> , 1994) (Green, 1996)
Mental health/depression, suicidality	The Gotland Male Depression Scale Trier Inventory for the Assessment of Chronic Stress (TICS) (short form SSCS)	
Mental health/stress	Perceived Stress Scale Maslach Burnout Inventory – General Survey Adverse experiences in childhood – adapted from SPIKE Childhood Trauma Questionnaire Trauma History Questionnaire	
Mental health/risk factors		

(Continues)

Table 2. (Continued)

Survey part	Topic	Issue/instrument/questions	source / comments
		Life Events: modified version of the Life Events Inventory developed by Tennant/Andrews	(Tennant and Andrews, 1976)
	Mental health/protective factors	Brief COPE	(Carver, 1997)
		Connor Davidson Resilience Scale (CD-RISC)	(Connor and Davidson, 2003)
	Dyslexia	Dyslexia-Checklist by Smythe and Everatt	(ADysTrain, 2009)
	Attitudes towards mental disorders and treatment	Attitudes Toward Seeking Professional Psychological Help Scale-Short Form (ATSPPH-SF)	(Fischer and Farina, 1995)
		Perceived Devaluation-Discrimination Questionnaire	(Link <i>et al.</i> , 1989)
		Stigma Stress Questionnaire	(Rüsch <i>et al.</i> , 2009a;
		Stigma Coping Orientation Scales (SCOS)	Rüsch <i>et al.</i> , 2009c)
		Depression Literacy Questionnaire	(Link <i>et al.</i> , 2002)
		Self-Stigma in Mental Illness Scale	(Griffiths <i>et al.</i> , 2004)
		Barriers to Care Evaluation Scale	(Corrigan <i>et al.</i> , 2006)
		Sexual hormones (estradiol, progesterone, testosterone)	(Clement <i>et al.</i> , 2012)
Tests at the Center for		Stress parameters/allostatic load (height, weight, hip/waist ratio, serum HDL, LDL and total	Blood samples
Neurophysiology and		body cholesterol levels; fasting pro-insulin and fasting	Blood, saliva and urine samples
Sociophysiology		glucose; high sensitivity C-reactive Protein (CRP); D-dimer, fibrinogen; DHEA-S; norepinephrine and epinephrine levels; urinary albumin and creatinine)	(Seeman <i>et al.</i> , 2001)
	Stress parameters/cortisol	Cortisol	Saliva samples from day before and same day
	Mental health/psychosis	PANSS	(Kay <i>et al.</i> , 1987)
		Jumping to Conclusions	(Colbert and Peters, 2002;
		Reading the Mind in the Eyes Test	McKay <i>et al.</i> , 2006)
	Sociophysiology	Digit-Symbol Coding Test	(Baron-Cohen <i>et al.</i> , 2001)
			(Wechsler, 1997)

Electroencephalography (EEG)	<p>High-frequency somatosensory evoked potentials (HF-SEP)</p> <p>Loudness dependence of auditory evoked potentials (LDAEP)</p> <p>Mismatch negativity (MMN)</p> <p>NoGo-anteriorization</p>	<p>(Kawohl <i>et al.</i>, 2007; Norra <i>et al.</i>, 2004)</p> <p>(Gudlowski <i>et al.</i>, 2009; Juckel <i>et al.</i>, 2003)</p> <p>(Heekeren <i>et al.</i>, 2008; Umbricht and Krljes, 2005)</p> <p>(Fallgatter, 2001; Fallgatter and Strik, 1999)</p> <p>(Ehls <i>et al.</i>, 2007; Herrmann <i>et al.</i>, 2003)</p> <p>(Williams <i>et al.</i>, 1996)</p> <p>(Oldfield, 1971)</p>
Near-infrared spectroscopy (NIRS)	Verbal Fluency test	Self-constructed questions (Hardt <i>et al.</i> , 2004)
Handedness	Edinburgh Handedness Inventory	(Fowler <i>et al.</i> , 2006)
Mental health	Perceived events and distress (semi-structured interview)	Self-constructed questions (Hardt <i>et al.</i> , 2004)
Follow-up interviews	SCL-27	Self-constructed questions (Hardt <i>et al.</i> , 2004)
	BCSS	Self-constructed questions (Hardt <i>et al.</i> , 2004)
	CD-RISC2 (abbreviated Connor-Davidson Resilience Scale)	Self-constructed questions (Hardt <i>et al.</i> , 2004)
	Optional: SPQ-B	Self-constructed questions (Hardt <i>et al.</i> , 2004)
	Optional: cortisol	Self-constructed questions (Hardt <i>et al.</i> , 2004)
Stress parameters/cortisol	Client Sociodemographic and Service Receipt Inventory	Self-constructed questions (Hardt <i>et al.</i> , 2004)
Attitudes towards mental disorders and treatment	Service Use Questionnaire	Self-constructed questions (Hardt <i>et al.</i> , 2004)
Mental health service use	Service Use Questionnaire	Self-constructed questions (Hardt <i>et al.</i> , 2004)

Validity and reliability testing with the SPIKE was carried out regarding depression and anxiety at the beginning of the Zurich Study when the subjects were in their twenties (Angst *et al.*, 2005). The SPIKE rating of the diagnostic level of depression was found to have high sensitivity and modest specificity (0.95 and 0.59, respectively, for major depression; 0.83 and 0.63, respectively, for minor depression). Likewise, the SPIKE had good sensitivity for detecting subthreshold depression, anxiety and mania (i.e. respective kappas of 0.90, 0.83, 0.67). A limitation with respect of later interviews and also the ZInEP Epidemiology Survey is the narrow age range to which the psychometric assessment primarily applies.

While 17 modules of the Mini-SPIKE correspond to the SPIKE, the Mini-SPIKE differs in some instances from its predecessor:

- somatoform complaints (except sleep), making up the initial somatic modules of the SPIKE, were excluded in order to enter in *medias res* and to downsize the face-to-face interview length
- for the same reason, the questions on use of help were centralized into a separate module
- topics such as PTSD or ADHD were not included in the face-to-face interview but were covered by checklists
- subjective distress was displayed both on an analogue visual scale and on the Pictorial Representation of Illness and Self Measure (PRISM) (Buchi and Sensky, 1999)
- the modules covering substance use were extended by life-charts in order to improve the lifetime information on substance use

#### Additional questionnaires in the face-to-face interview and in the checklists

The face-to-face interview was rounded off by several further modules including both conventional SPIKE extensions (social network and support) and new instruments. The latter focused on prevalence of somatic diseases and accidents, on risk factors such as mental disorders among relatives and obstetric complications, and on further single issues which were considered to be preferably covered in the face-to-face framework (expressed emotions, social distance, stuttering). Like the Zurich Study, the ZInEP Epidemiology Survey also used a checklist section. In contrast to the Mini-SPIKE the checklist section was clearly enlarged (see Table 2). More detailed information is displayed at <http://www.zinep.ch/epidemiologie/informationforresearchers/>.

#### Modules in the Center for Neurophysiology and Sociophysiology

The day at the Center for Neurophysiology and Sociophysiology combined five different kinds of examinations (see also Table 2 and the webpage mentioned earlier):

- questionnaires, partly worked through in face-to-face interviews (e.g. the Positive and Negative Syndrome Scale [PANSS]) and partly filled in as checklists
- tests, either computer assisted or in paper-and-pencil style
- biological measurements including blood, saliva and urine probes
- EEG measurements
- NIRS measurements

#### Modules in the prospective follow-up study

The bimonthly follow-up interviews focused on the effects of the incidence of stressful life events or changing psychopathology scores on psychotic symptoms. The former were assessed by a semi-structured interview entailing both questions on changes and life events during the past weeks as well as their subjective burden score on a 10-point scale. Psychopathology scores were again assessed by the SCL-27 (Hardt *et al.*, 2004) supplemented by questions covering psychosis symptoms. Moreover, we also routinely applied the Brief Core Schema Scale (BCSS; Fowler *et al.*, 2006) and a short form of the Connor-Davidson resilience scale (CD-RISC-2) (Vaishnavi *et al.*, 2007).

In the case of relevant stressors (defined by a cutoff of five points on a 10-point subjective burden scale) or in the case of relevant change of the SCL-27 GSI (defined by one standard deviation change with respect to the previous interview – only in follow-up interviews 2 and 3) the interview was extended by the Schizotypal Personality Questionnaire – Brief (SPQ-B; Raine and Benishay, 1995). In addition, the participants were asked again to provide a day set of four saliva probes following the same scheme as earlier.

At the third and last follow-up we used a previously validated Service Use Questionnaire (Rüsch *et al.*, 2009b) to assess mental health service use over the past six months.

#### Response

The baseline population comprised about 108,000 men and women. In the first step, foreign residents (25% in young adults and slightly over 40% in middle aged adults) were excluded from the baseline. Nearly 40% of the over

57,000 addresses we received from the municipalities were implemented in constructing the screening sample (see Table 3). In 20.2% of the implemented addresses no contact at all could be established, in 6.1% contact was not possible for technical reasons or unavailability, and in 16.0% a person other than the target person refused further contact. If the target person be reached, the response rate was 73.9% (males: 70.6%, females: 77.6%).

In the next step, among the 9829 screened persons, 6515 (66.3%) initially agreed or were not definitively against carrying out a face-to-face interview (males: 70.6%, females: 77.6%). When actually asked for an appointment, 64.9% thereof (males: 69.4%, females: 60.0%) showed up.

The checklists after the face-to-face interview were not returned by 21.4% of study participants ( $n = 321$ ) (males: 28.4% [ $n = 213$ ], females: 14.4% [ $n = 108$ ]) despite two personal reminders. This was double the magnitude of missing returns in the Zurich Study. In more detail, not only did females respond more readily than males, but also middle-aged age groups more readily than younger ones and SCL-27-low-scorers more readily than high-scorers. The range of missing checklists varied between 44% in the groups of young male high-scorers and 2% in middle-aged female low-scorers.

The participation rate in tests at the Center for Neurophysiology and Sociophysiology was 53.8%. After removal of incorrectly classified participants and aborted tests, 227 subjects remained in this subsample. Of these, 157 subjects engaged in the first follow-up CATI. Their further participation was precluded by a limited time frame for the follow-up interviews.

As expected, the response patterns were skewed by two main factors: urbanicity and education level. Regarding urbanicity, 38.7% of the population (restricted to the birth years used in this study) lived in one of the two major cities (Zurich, Winterthur), whereas the proportion of face-to-face interviewees from Zurich and Winterthur was 56.8%. The skewing factors regarding education level are displayed in Table 4. Persons with a low education status or administrative and technical professions had higher refusal rates in each survey part than persons with a university background and high educational level.

Consequently, urbanicity and education level – together with the sample stratification scheme along SCL-27 GSI scores – are key variables in determining weighting scores to represent the population of young and middle-aged adults in analyses of the data. We adopted a three-step weighting procedure following partly the procedure of the Swiss Household Panel (Voorpostel

*et al.*, 2010). In the first step, weights were introduced to adjust for the non-response and under-representation regarding to urbanicity and education level while roughly accounting for the sex-birth year structure of the face-to-face sample. In the second step, calibration was applied to adjust the weights such that the totals of the stratification variable (high-/low-scorer status on SCL-27) were re-established in each sex-birth year subgroup. In the third step, the weights were finally adjusted for the proportion of each sex-birth year subgroup within the population of the 20–40 year old Swiss citizens in the canton of Zurich, again retaining the totals of the stratification variable. The mean of the step 1 weights was 1.01 (SD = 0.58, range 0.43–5.01), the mean of the adjusted step 2 weights was 1.00 (SD = 0.57, range 0.39–5.24) and similarly of step 3: 1.00 (SD = 0.59, range 0.36–5.99). The final weights resulted from combining the latter with the design weights according to the stratification of the sample (one for the high-scorer status and 4.5 for the low-scorer status on SCL-27) and had a mean of 2.4 (SD = 2.35, range 0.41–21.94).

## Discussion

This report introduces the Epidemiology Survey of ZInEP, a new study in psychiatric epidemiology carried out in Zurich, Switzerland. While the survey parallels the Zurich Study in many instances, it provides a new large database which will be relevant for mental health services research, stigma research and interdisciplinary research including neurobiology, sociophysiology and genetics. Among other things, the survey put particular emphasis on psychosis syndromes and their link to stress vulnerability. In this context, the survey pursued new approaches by integrating a subproject with tests in the Center for Neurophysiology and Sociophysiology and by embedding a prospective study assessing stressful events and their consequences for psychosis syndromes. The survey provides a model of how epidemiological and experimental research can be combined.

The survey was subject to several limitations. A major obstacle was the ongoing disappearance of landline telephone numbers, which are being replaced by mobile phones or kept private in order to avoid commercial calls. The survey took place in the midst of this process. The proportion of mobiles may be particularly high in the following four subgroups: (1) highly mobile subjects no longer living in their parents' home but not having their own family either, (2) participants starting a new working

**Table 3.** Inclusion and participation in the subprojects of the ZInEP Epidemiology Survey

Information	Included	Not included/ refused/drop-out	Differentiation
Addresses:			
received	57,400		
implemented preliminarily			24,623
implemented by GfK in fieldwork			23,041
Preliminary contact established:			
yes	18386		
no (no response, telephone responder)		4655	
Contact established to target person:			
yes	13,295		
no		5091	
contact not appropriate <sup>1</sup>		1409	
negative reply by third person			3,682
Screening CATI:			
yes	9829		
refused to participate		3466	
Face-to-face interviews:			
completed	1500		
refused to participate		810	
Checklists:			
completed	1179		
module psychosis			652
module personality disorders			527
not completed		321	
complementary checklists completed in the Center for Neurophysiology and Sociophysiology			
module psychosis			90
module personality disorders			134
Tests in the Center for Neurophysiology and Sociophysiology:			
completed	227		
controls			37
high SNS/STS scores			68
high SNS scores			48
high STS scores			76
completed, but excluded		8	
excluded because of altered scores			6
aborted examination			2
refused to participate		202	
contact not possible			34
primary drop-out			143
secondary drop-out (after initial ok)			25
Follow-up CATI			
follow-up 1 completed	154		
refused to participate at follow-up 1		2	
follow-up 2 completed	118		
refused to participate at follow-up 2		4	
follow-up 3 completed	67		
refused to participate at follow-up 3		8	

<sup>1</sup>Incorrect phone number person (416); communication not possible (518); not available during study period (280); other reasons

**Table 4.** Education level of participants and drop-outs of the screening and face-to-face interview samples

Highest education level	Screening participants	Screening dropouts	Face-to-face participants	Face-to-face dropouts	Population <sup>1</sup>
Primary level	4.7	11.8	5.0	5.9	8.0
Crafts/administrative/technical professions (basic level)	38.9	51.5	34.3	47.4	41.6
Secondary school level, college	18.0	10.4	19.6	18.8	13.7
High level professional formation, technical college, university	38.4	26.3	41.1	27.8	36.7
Total	100	100	100	100	100

<sup>1</sup>The population refers to Swiss residents with same birth years such as in the study sample.

career or having a job requiring high mobility, (3) subjects with low financial resources, and (4) subjects who are marginalized and/or have severe mental or substance abuse problems. This profile, in particular the subgroups two and four, may be quite similar to the profile of drop-outs in population surveys, for example, also in the Zurich Study (Eich *et al.*, 2003). However, surveys that rely on specific samples drawn from the population such as birth year groups, appear to be less and less feasible.

In sum, the four subprojects of the ZInEP Epidemiology Survey deliver a large database providing not only comprehensive information on issues in psychiatric epidemiology but also a great deal of material for interdisciplinary approaches with a spectrum ranging from health services to experimental pathological research.

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## Declaration of interest statement

The authors have no competing interests.

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