

Izmir Mental Health Survey for Gene-Environment Interaction in Psychoses (TürkSch): Objectives and Methodology



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SUMMARY

Objective: To describe the objectives and design of a multistage study on the prevalence and risk factors of mental health problems, in particular psychotic disorders and psychotic symptoms, by assessing a probabilistic sample of household residents in the Izmir Metropolitan Area, aged 15-64 years.

Method: The study included three different observation frames. In the first stage, of which methodology is in the focus of this paper, the primary screening instrument was the Composite International Diagnostic Interview 2.1, which assesses lifetime and/or last one year occurrence of several DSM-IV disorders. Second, a parallel survey of social capital of administrative wards was conducted in the same neighbourhoods. Third, a nested-case control study was performed to study effects of genetic and environmental risk factors on wide psychosis phenotype.

Results: A total of 4011 males and females were contacted through a multistage clustered area probability sample of administrative neighbourhoods and households, covering 9 districts and 302 neighbourhoods. The response rate for the first stage was 76.5% in 5242 eligible households. Respondents were interviewed at home in 2008 for the screening of included mental health problems. The screened disorders were mood disorders (last 1 year), schizophrenia and other non-affective psychotic disorders (lifetime), and dependence and abuse of psychoactive substances (lifetime).

Conclusion: Although cross-sectional in nature, the TürkSch has a unique study design and yields data of high quality. This enables study of the prevalence, risk and higher-order interactions underlying ill-health in the Turkish population, with a specific focus on psychosis.

Key Words: Psychoses, epidemiology, prevalence, genetics, risk factors, methodology

INTRODUCTION

The risk and protective factors of disorders with psychotic features (affective and non-affective psychosis) are thought to operate, in part, as gene-environment interactions (Howes et al. 2004, van Os et al. 2008). Genetic risk is embedded within the genome and social and environmental factors are scattered through the early life span of individuals (Howes et al. 2004, van Os et al. 2005). Most of these factors operate far before the onset of the symptoms, and possibly converge on a final common pathway of sensitization of underlying

neurobiological systems (Collip et al. 2008). To show how interactive effects between distal environmental risk factors and genetic variation impact on ill-defined clinical syndromes such as schizophrenia represents an enormous challenge. It has been suggested that the pathway from risk to expression of illness involves, first, expression of psychosis proneness in the form of subtle, non-clinical psychotic experiences (the extended psychosis phenotype) that are thought to reflect the transitory expression of genetic risk for psychotic disorder in the general population (van Os et al. 2009; Linscott and van Os, 2010). In some individuals, normally transitory subclini-

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cal psychotic experiences may become persistent, representing the hypothesised “sensitised state”, in the case of additional exposure to environmental risk factors such as cannabis, urbanicity or childhood trauma (Cougnard et al. 2007). Finally, the greater the level of persistence of the extended psychosis phenotype in the form of psychotic experiences, the greater the probability of individuals ultimately developing need for care and becoming users of psychiatric services (Dominguez et al. 2009). A significant proportion of psychotic disorders may thus be conceptualized as the rare, poor outcome of a common, and normally transitory, developmental extended psychosis phenotype, characterized by persistence of psychometrically detectable subclinical psychotic experiences. This has been referred to as the psychosis proneness–persistence–impairment model of psychotic disorder (van Os et al. 2009).

To date, aspects of the hypothesised psychosis proneness–persistence–impairment model of psychotic disorder have been tested in general population samples such as the NEMESIS study in the Netherlands (Bijl et al. 1998), and the EDSP study in Germany (Lieb et al. 2000, Wittchen et al. 1998). These studies have provided new insights into the extended psychotic phenotype in the general population applying cross-sectional and longitudinal analytical strategies. However, these studies were not designed to specifically study psychosis, resulting in limited assessments of psychotic symptoms and, particularly, clinical psychotic outcomes. Also, risk factors included were not chosen for their association with psychotic outcomes and studies were not genetically sensitive, with a few notable exceptions (Hanssen et al. 2006, Linney et al. 2003, Polanczyk et al. 2010).

Although there are several epidemiological studies on mental health disorders in Turkey (Akvardar et al. 2003, Danaci et al. 2002, Deveci et al. 2005, Deveci et al. 2007, Elbi et al. 2002, Kilic and Ulusoy 2003, Kılıç 1998, Ogel et al. 2004, Onder et al. 2006, Sar et al. 2007), studies with a special focus on psychotic disorders are rare (Alptekin et al. 2009, Binbay et al. 2011a). Such studies would be of major interest, given the fact that immigrants from Turkey in Western European countries form a notable exception to the well-replicated observation that immigrants to these countries have much higher rates of psychotic disorder (Cantor-Graae and Selten 2005, Veling et al. 2006, Binbay et al. 2011b). Considering these findings, it is obvious that any study on psychotic disorders in Turkey will be of interest. Base rate data from Turkey as well as possible effects of risk factors is lacking for international comparisons for psychotic symptoms and psychotic disorder. The Izmir Mental Health Survey for Gene-Environment in Psychoses (TürkSch) was therefore conducted to provide new insights and knowledge in psychiatric epidemiology in Turkey, to provide internationally comparable data and to identify effects of environmental risks in interaction with genetic background risk.

The present paper outlines the objectives and the research methodology of the TürkSch project with a priority on the first stage. We aimed to assess, in relation to psychotic symptoms and psychotic disorder, aspects of developmental, environmental and genetic factors, as well as their interactions, in a cross-sectional survey and embedded nested case-control study. Environmental risk factor assessment involved both individual and neighbourhood/neighbourhood level factors. Genetic risk factors included individual and familial analyses. We screened the community level of non-clinical psychotic experiences, psychotic symptoms and lifetime prevalence of psychotic disorders in the different neighbourhoods of an urban area.

The aims of the study thus were:

1. To assess, in the same epidemiological sample, the lifetime prevalence of the extended psychosis phenotype in the form of psychotic experiences or psychotic symptoms below the threshold of criteria for clinical disorder amongst adolescents and adults (15 - 64 years of age) as well as the lifetime prevalence of DSM-IV mental health disorders with psychotic symptoms;
2. To determine the pattern of associations between the extended psychosis phenotype and demographic factors, risk factors and psychiatric co-morbidity, and compare it with the pattern of associations with DSM-IV psychotic disorders in the same epidemiological sample. Risk factors included *individual level* developmental risk factors including urbanicity, cannabis use, ethnicity, migration, childhood trauma, socioeconomic position at birth and residential instability, as well as *contextual, neighbourhood-level* risk factors, including neighbourhood-level social capital and neighbourhood-level social deprivation.
3. To assess the lifetime prevalence of alcohol and substance abuse related disorders, focusing on the broad spectrum of usage patterns in association with psychiatric outcomes.
4. To assess the one year prevalence of affective disorders.
5. To assess the consequences of mental disorders in terms of mental health service use and care needs, treatment patterns and functional impairments.

Research design

The marked difference between prevalence and incidence of psychotic disorders indicates that a cross-sectional approach will inherently present limitations (Hotopf 2003). First, the interval between exposure to risk factors and the emergence of clinically relevant symptoms can be longer than a decade (Howes et al. 2004). Second, the spatial and temporal characteristics of risk factors vary during the life time (Binbay et al. 2007, van Os et al. 2005). Third, although psychotic disorders mainly start in adolescence and early adulthood, an important number of risk factors are mainly present in the earliest stages of life (Collip et al. 2008, Howes et al. 2004,

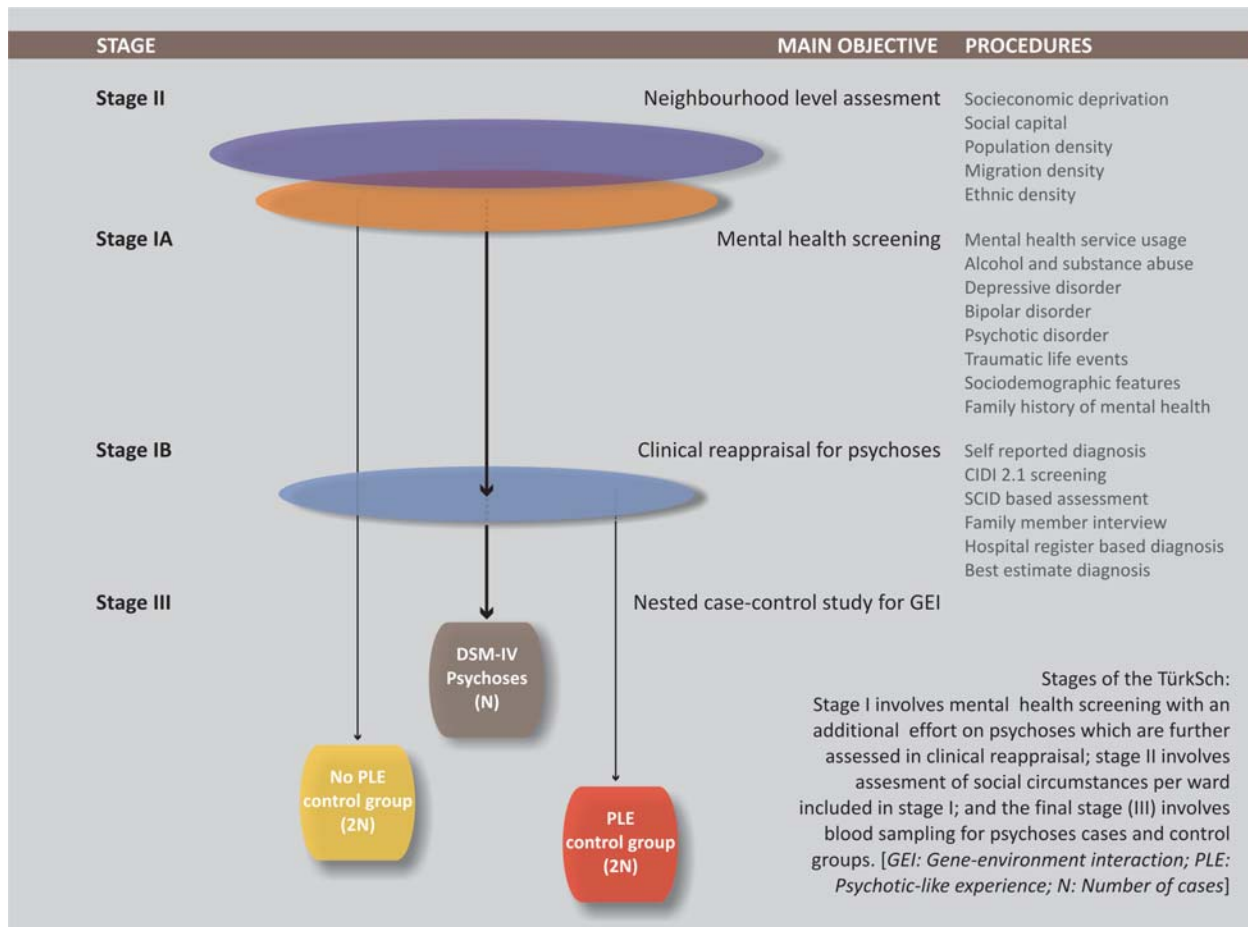


FIGURE 1. The schematic representation of three stages of the TürkSch

Rutten and Mill 2009, van Os et al. 2005). For these three reasons, one may wonder whether it is possible to examine the developmental process of psychotic disorders in a cross-sectional study, where the exposures and outcomes are measured at the same time.

Longitudinal cohort studies may provide an accurate assessment of the temporal patterns and real effect sizes of risk factors for the illness (Weich and Prince 2003). However, such studies, in the case of schizophrenia, will be prohibitively expensive and also require extremely accurate systems of outcome registration for long extended periods (Weich and Prince 2003).

Therefore, the TürkSch consisted of a three-stage data collection to assess individual, family and neighbourhood level variables. The first two data sets were collected in order to assess the prevalence of mental health problems with a special focus on psychotic outcomes (Stage I), and to assess social capital in Izmir neighbourhoods (Stage II). The last stage (Stage III) was a nested case-control study that recruited individuals with psychotic outcomes and healthy controls from stage I in order to overcome the drawbacks of a cross-sectional study with limited financial means and time. The schematic representation of the three stages of the TürkSch is presented in figure 1.

General description of the population of Izmir

The province of Izmir is the third most industrialized area of Turkey, concentrating 8% of the Gross Domestic Product. Almost three out of four inhabitants of the province reside within the Izmir metropolitan area, which is the third most urban area of Turkey (TURKSTAT 2008). The Izmir metropolitan area is located on the West coast of the country, scattered around the bay area. Total population of The Izmir metropolitan area was 371.000 in 1960, 554.000 in 1970, 1.489.817 in 1985, 1.758.780 in 1990, 2.232.265 in 2000, and has reached 2.606.294 (1.297.119 men and 1.309.175 women) in 2007 (TURKSTAT 2008). A large number of migrants from poorer rural areas in the Western (1960s and 1980s) and Eastern (1990s) regions of Turkey have moved to Izmir (Ünverdi 2005).

Before 2008, the Izmir metropolitan area was divided into 9 administrative districts including mainly urban neighbourhoods with different characteristics in terms of population density and socioeconomic deprivation. Urban neighbourhoods include residential high and middle-class areas, deprived inner-city areas, and areas of 'gecekondu' (slum or squatter areas) (Ünverdi 2005). The number of neighbourhoods per district as well as their population density is presented in Table 1.

TABLE 1. Number of urban and rural neighbourhoods in each district of the Izmir metropolitan area with population density of each district in 2007 and number of neighbourhoods in the TürkSch sample

District	Total urban population	Urban neighbourhoods	Urban neighbourhoods in sample	Total rural population	Rural Neighbourhoods	Rural neighbourhoods in sample	Households in sample	Urban area (km ²)	Population density (person/km ²)
Balçova	74.837	8	7	-	-	-	191	29	2.580
Bornova	470.211	37	37	5.942	12	-	990	224	2.100
Buca	393.934	39	39	6.996	8	2	899	134	2.940
Çiğli	141.769	22	19	2.482	2	2	310	97	1.461
Gaziemir	86.111	12	12	23.180	4	4	220	63	1.367
Güzelbahçe	15.651	7	6	3.604	5	-	60	110	142
Karşıyaka	514.917	43	41	267	2	-	1160	66	12.293
Konak	847.409	168	123	817	2	-	2040	69	12.281
Narlidere	61.455	11	10	-	-	-	130	63	975
Total	2.606.294	348	294	42.288	35	8	6000	855	3.048

History of the neighbourhoods in Izmir

The Izmir neighbourhoods have changed with the social and spatial transformation process that is strongly related to the socioeconomic changes in the country as a whole, and also to patterns of migration and development of the urban built environment (Kocaman 2008).

From the 1960s to 1970s, the city expanded along a number of developmental axes (Sönmez 2007). New housing estates were built for inner-city residents. However, those who could afford moved out, leaving their houses to the new migrant population. This led to concentration of poverty in the inner areas of Izmir due to an insufficient number of jobs and housing in the city (Sönmez 2007). *Gecekondu* areas were also populated by migrants (Sönmez 2007).

Spatial formations are likely to contribute to the quality of social relations, and that inner city neighbourhoods have been observed to possess different social features (Ünverdi 2005). One study reported that residents of the inner areas of Izmir displayed less acts indicative of social cohesion and solidarity compared to residents in slum areas (Sönmez 2007). The reason for this was thought to lie in higher rates of temporal tenancy and associated higher rates of housing mobility in the former area (Sönmez 2007). Immigrants from the same provinces or regions tend to settle in the same area (Ünverdi 2005), resulting in social, economical and cultural solidarity among immigrants, referred to as *hemşehri*, implying a type of social network.

Urban neighbourhoods have been classified by the Municipality of Izmir. This Urban Information System is based on the governmental, social and physical facilities within the administrative area. Classification depends on the level of disorganized features of streets and buildings (graffiti/outer paintings of buildings, regularity of sidewalks, status of road and drainage system etc.) and includes three categories (highly, moderately and weakly developed urban areas) (Metropolitan

Municipality of Izmir 2007). The characteristics of neighbourhoods are annually reported to the Turkish Institute of Statistics (TURKSTAT) by the municipality of Izmir.

The TürkSch study: Sampling

The study was approved by the Ege University ethic's committee and subjects provided written informed consent. Power calculations based on published rates for psychotic disorder and psychotic experiences, and on published effect sizes of common risk factors, indicated that a sample size of at least 4884 respondents was required for the descriptive, epidemiological part of the study (Stage I). In order to account for attrition and refusal, we aimed to include 6000 subjects in the sample.

The 6000 subjects were randomly selected from the Izmir population using a multistage sampling procedure, stratified by urbanicity in four categories including rural areas in the wider Izmir metropolitan area (Metropolitan Municipality of Izmir 2007). First, TURKSTAT selected 6000 households and provided the addresses to the investigators. The distribution of the households over the Izmir neighbourhoods (excluding those neighbourhoods with no settlement) was similar to the distribution of the total population in each district. In the second step, a sample of private households (addresses) was selected in each district in proportion to the population of administrative neighbourhoods. The Ege University team sent letters to each selected address to announce a visit and interviewers visited each address. All these addresses were visited between November 2007 and October 2008.

The third step was completed during the visit. After providing informed consent, one household member aged between 15 and 64 years and available to complete the interview was randomly selected using the Kish within-household sampling method (Kish 1949). This method was preferred to achieve probability sampling in the household. The interviewer lists

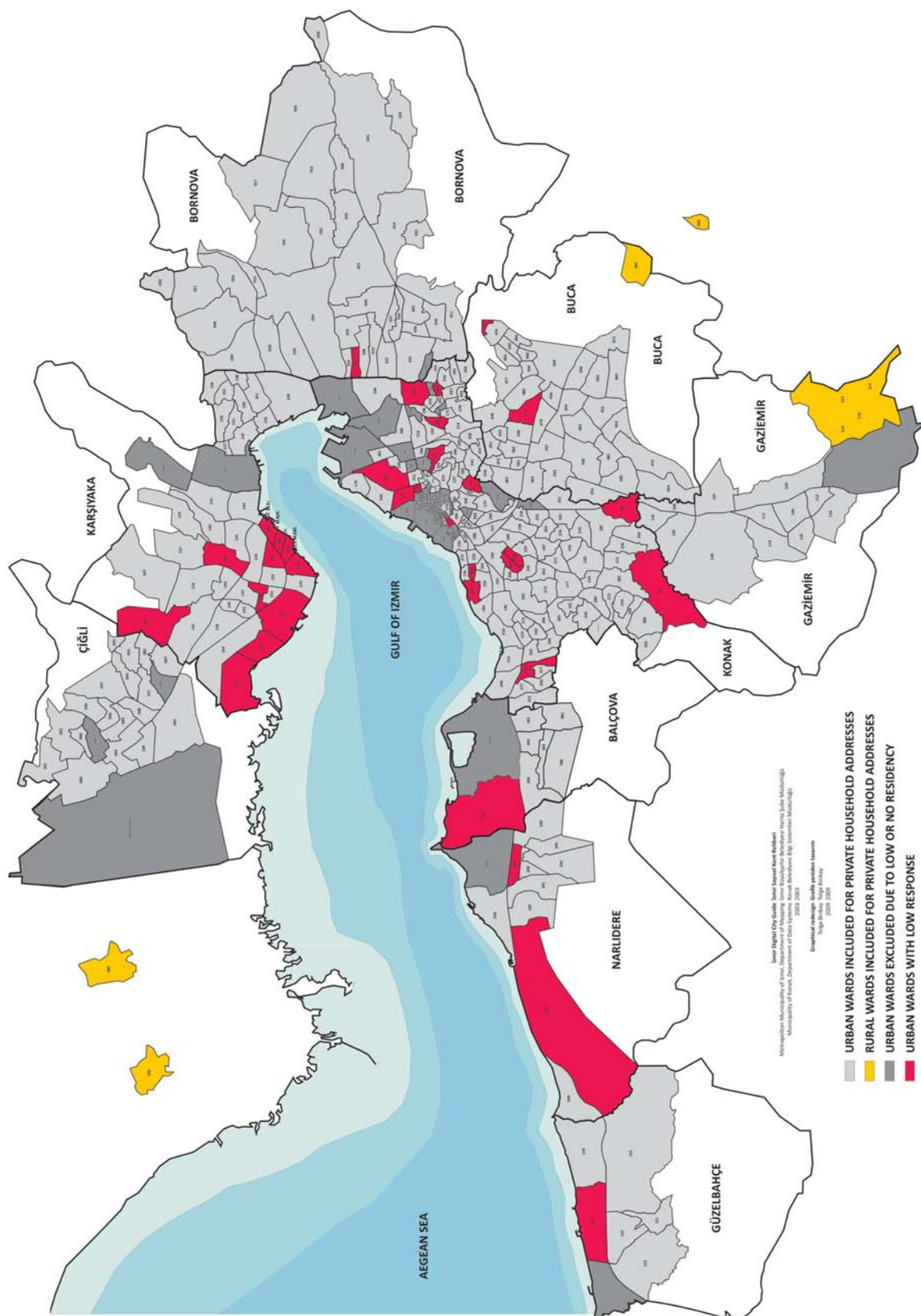


FIGURE 2. The map representing the neighbourhoods within the Izmir metropolitan area and the neighbourhoods included in the TürkSch sample

the name, gender and age of each eligible person in the visited household. Subsequently, each person on the list is numbered within an order of ascending age at first in males and then in females. Finally the interviewer designates the person who will be interviewed from the Kish table. If one of the residents of the household had been diagnosed with a psychotic disorder, he or she was recruited for the study without application of the Kish method. Persons who were not immediately available (due to hospitalization, military service, travel, imprisonment or acute exacerbation of a mental disorder) were contacted later in the year.

The sample covered 294 of the 348 administrative neighbourhoods in Izmir with an additional 8 rural neighbourhoods out of 35 rural neighbourhoods located at least 30 kilometres from the city centre. The map representing the neighbourhoods within the Izmir metropolitan area and the neighbourhoods included in the study is presented in figure 2.

In stage II, for each stage I address, two addresses were drawn from the same neighbourhood within the same address cluster, in order to obtain an assessment of the neighbourhood (socioeconomic deprivation, ethnic density, migration density, voting density and social capital) of the stage I address independent of the stage I respondent. Of the two addresses, one was contacted; the second address was only contacted in case of non-response from the first address.

For the nested case-control stage of the TürkSch (stage III) on interaction between genetic and environmental risk factors within the extended psychosis phenotype, the cases were all individuals with expression of psychotic experiences at a certain level of severity, including all individuals with presence of psychotic disorder based on DSM-IV diagnosis of psychotic disorders and affective psychoses recruited from stage I. There were two control groups also recruited from stage I: Individuals without any psychotic experience and individuals with any psychotic-like experience at any level of severity. The total case-control sample was estimated to include 500 individuals (100 cases, 400 controls) with a blood sample, based on a power calculation assuming gene-environment interaction between moderately prevalent (20-30%) genetic and environmental risks and moderately strong departure from more than additive effects.

Screening and the diagnostic instrument

In order to assess psychotic experiences and to diagnose disorders with psychotic features, assessments were based on relevant sections of the Composite International Diagnostic Interview (CIDI) 2.1 (Andrews and Peters 1998). The CIDI is a fully structured interview developed by the World Health Organization (WHO) (Robins et al. 1988) and has been used in various surveys around the world, including ones in Turkey (Alptekin et al. 2009, Cilli and Kaya 2003, Deveci

et al. 2007, Kılıç 1998). Primarily designed for use in epidemiological studies of mental disorders, the CIDI can be used by both clinicians and trained interviewers. CIDI-based screening of symptoms provides diagnoses of various mental disorders in accordance with the definitions and criteria of the International Classification of Diseases, Tenth Revision (World Health Organization 1992), and Diagnostic and Statistical Manual of Mental Disorders (Fourth Edition) (American Psychiatric Association 1994), along with information about frequency, duration, help-seeking, severity of symptoms, and psychosocial impairment.

The CIDI consists of sections on various mental states including affective disorders, anxiety disorders, mood disorders, psychotic disorders and substance abuse. The TürkSch assessment included screening sections on tobacco, alcohol and substance-related disorders, depressive and dysthymic disorders, manic and bipolar affective disorders, schizophrenia and other psychotic disorders, post-traumatic stress disorder, and three final sections containing concluding questions, interviewer observations, and interviewer ratings. The mean time per interview was 35.2 minutes.

Psychotic symptoms were rated using 14 CIDI items for delusions (G1, G2, G3, G4, G5, G7, G8, G9, G10, G11, G12, G13, G13b and G14) and 5 for hallucinations (G17, G18, G20, G20C, G21). All items were rated dichotomously indicating presence or absence. Rating the psychotic symptoms can be difficult, because sometimes individuals can be describing a plausible event that the CIDI may rate as a psychotic symptom. Therefore, the following procedures were followed. First, during the interview, each time a participant endorsed a CIDI psychotic symptom, the participant was asked to give an example, which was written down verbatim by the interviewer for later review with the clinician. Second, the interviewer wrote down, for each item that was endorsed, how plausible this particular experience was – in other words, how likely it was that the experience was not psychotic but concerned an event that had really taken place. All CIDI interviews were reviewed by the clinician (psychiatrist or clinical psychologist) and all participants who had endorsed a psychotic symptom but who in fact might have been describing a plausibly non-psychotic experience were re-contacted by the clinician over the telephone. A total of 6% of the entire sample was contacted over the telephone for this purpose. Telephone interviews followed the same procedure as the face-to-face interviews. Inter-rater reliability of the G section was low-medium with K : 0.45 before the onset of field work.

In order to identify individuals with a diagnosis of psychotic disorder, several steps of case identification were applied. In the first step, the person and the family were asked if the person had ever been treated for a mental health problem and/or had received a diagnosis of psychiatric disorder. If this was the case, the person was asked for permission to contact the

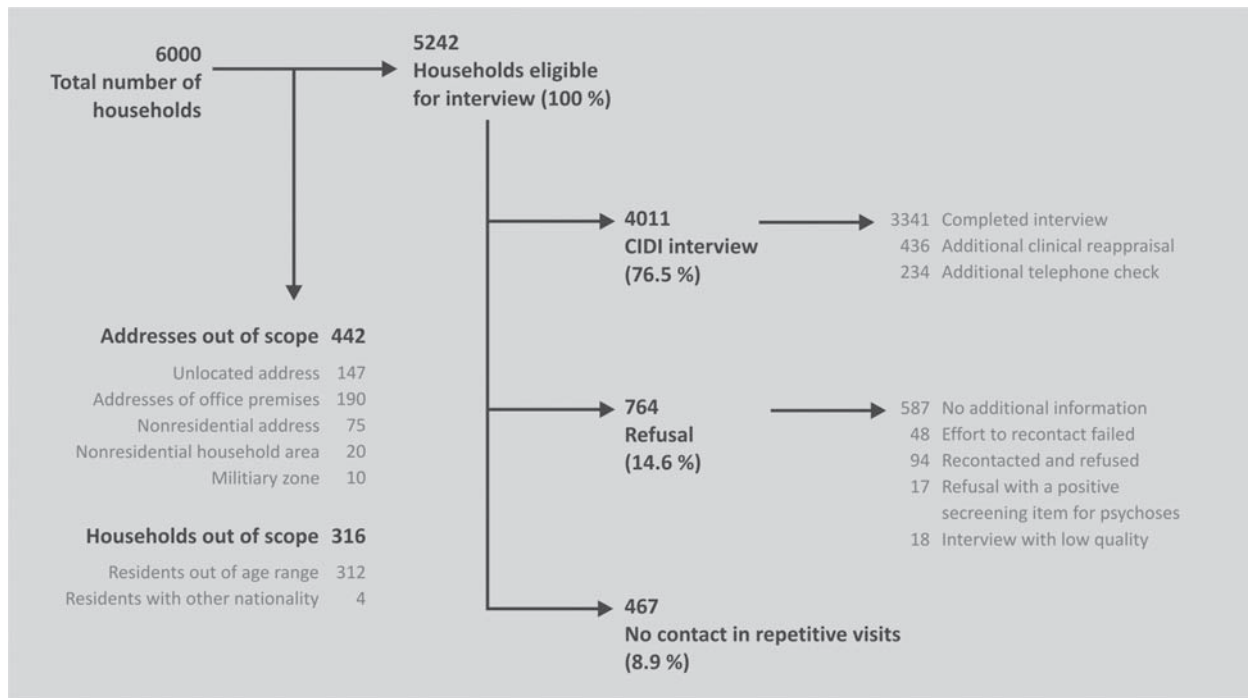


FIGURE 3. The details, steps and final result of each visit at stage I of the TürkSch

GP, psychiatrist or any other health professional involved in the diagnosis or the treatment of the participant in order to verify the diagnosis and review case material. For individuals never diagnosed with a psychotic illness, a second step diagnostic assessment was carried out if the participant endorsed one or more CIDI psychosis items in combination with endorsement of an item indicating a high level of frequency, duration, help-seeking, severity and psychosocial impairment associated with these psychotic experiences. All these individuals were re-contacted by the study team and invited for a clinical evaluation with the Structured Clinical Interview (SCID) for DSM-IV (Spitzer et al. 1992). Final diagnoses were made after a SCID interview by a psychiatrist or clinical psychologist at home or at the hospital.

Interviewers, interviewer training and quality control

Lay interviewers had at least high school education, had a health-related profession, and/or were experienced in doing field surveys. Training of the interviewers included basic information on mental health problems, symptom dimensions in psychosis, field work and ethical as well as medico-legal aspects. In addition, training for the CIDI interview was carried out using official CIDI training material. Bimonthly briefing meetings were arranged to exchange and share experiences and prevent interviewer “drift”. In order to monitor and conduct quality checks of the visits and interviews over the entire data collection period, each interview was assessed using a standard procedure for formal consistency, appropriate recording and coding. In addition, 1431 respondents filled in

a confidential form about the interview and the way the interviewer had conducted the interview. Weekly sessions were organised to provide detailed feedback to each interviewer and to clarify remaining questions.

Missing values on any section of the questionnaire were filled in by making a phone call to the respondent. When the quality of the interview was deemed low, or if too much data was missing, a second visit was planned by a different interviewer. Thus, a total of 392 revisits were carried out in order to ensure data quality and completeness. A total of 19 interviewers were employed in the project, however the majority of the interviews (64.8%) were carried out by 4 interviewers that were employed for the entire study period.

Methods to increase response

Special efforts were made aiming to increase the response rate. Addresses of subjects who were contacted several times without success were given to another interviewer and interviewers with high response rates were assigned to addresses and individuals who were difficult to reach.

If case response rates in an area were low or anticipated to be low, key persons (e.g. community leaders) were informed before visiting the area in order to gain recognition and acceptance in the neighbourhood. Additionally in neighbourhoods where security or response is probably a concern, clinicians from the study team joined interviewer team for visits to households. A telephone hotline was available throughout the study period for respondents and/or interviewers wanting

TABLE 2. Distribution of sociodemographic variables in stage I of the TürkSch, where extended psychosis phenotype was screened

	TürkSch sample		Izmir metropolitan area [2007]	
	n	%	n	%
Total	4011	(100.0)	1.916.367	(100.0)*
Gender				
Male	1683	(42.0)	935187	(48.8)
Female	2328	(58.0)	981180	(50.2)
Age				
15-24	792	(19.8)	440077	(23.0)
25-34	1088	(27.1)	493831	(25.8)
35-44	849	(21.1)	408915	(21.3)
45-54	720	(17.9)	349442	(18.2)
55-64	562	(14.1)	224102	(11.7)
Completed years of education				
0	272	(6.8)		
1-5	1382	(34.5)		
6-8	515	(12.8)		
9-11	869	(21.7)		
≥12	973	(24.2)		
Employment status				
Employed	1375	(34.3)		
Unemployed	208	(5.2)		
Retired	503	(12.5)		
Student	404	(10.1)		
Housewife	1447	(36.1)		
Not employed, other	74	(1.8)		
Urban development level of household area				
Rural	85	(2.1)	-	(1.5)**
Weakly developed urban	834	(20.8)	-	(19.1)
Moderately developed urban	1996	(49.8)	-	(53.5)
Highly developed urban	1096	(27.3)	-	(25.9)
Household composition				
Lives with parents	1117	(27.9)		
Lives alone	194	(4.8)		
Single-parent family	218	(5.4)		
Lives with partner (with or without child)	1611	(40.2)		
Lives with other(s)	870	(21.7)		
Monthly household income***				
<500	596	(14.9)		
501-1000	1679	(41.9)		
1001-1500	808	(20.4)		
1501-2500	578	(14.4)		
>2500	317	(7.9)		

*Population aged 15-64 years; **Rates are based on the sample size provided by TURKSTAT; ***33 respondents refused to supply information and income was calculated as TL.

to consult with a clinician. A press-release was published in national and regional newspapers and media websites in order to sensitise the population to the initiative.

Response

Out of 6000 addresses, 5242 households were eligible for interview. The main reasons for ineligibility were change of address, incorrect address and addresses with residents not meeting the inclusion criteria (not aged between 15 and 65 years). The interviewers made a minimum of ten visits or calls at an address at different times of the day and days of the

week, if necessary, to make contact. The mean number of visits to an address was 1.7 (1-12) and the total number of visits was 10711.

In the 5242 eligible households, a total of 4011 individuals were successfully interviewed, resulting in a 76.5% response rate. The main reasons for non-response were refusal to participate (18.2%), failure to contact anyone in the identified household (3.1%) and failure to contact the sampled individual in an identified household (3.0%). Non-response was higher in urbanized high income areas. In addition, non-response was higher in men than in women. In order to ex-

amine the possibility of differential non-response associated with refusal, a special effort was made to obtain information on the mental health status of non-participating individuals, including re-visit by a clinician if consent could be obtained. The details, steps and final result of each visit, at stage I, are presented in figure 3.

Table 2 presents sociodemographic features of the respondents and of the metropolitan Izmir population in 2007. Almost 15 percent of the respondents were illiterate or did not have a formal education and the number of years of education was lower in the older age groups, as expected (cohort effect). At the time of the interview, 24.5% of the study population was in paid employment.

Other Instruments

A *sociodemographic data questionnaire* was used in order to determine educational level, employment status, social class, socioeconomic status, household income, household amenity, detailed status of current and past residence including urbanicity of birth place and of places of residence between 0-15 years, educational and occupational status of parents, birth year of parents, migration pattern and probable reasons for migration, ethnic group, and any history of early childhood trauma. An additional section was devoted to *mental health service use*. The SF-36 short form was used to measure health-related quality of life (Ware et al. 1994).

Neighbourhood-level measures were derived from stage II data and included social capital (measures of social trust and cohesion, social disorganization, informal social control, and social cognition), voting rate, ethnic density, migrant density, residential instability, average income, urban development level (Urban Information System), average neighbourhood income. Social capital measures used were mainly derived from the Sampson scale, adapted for use in the Turkish population (Sampson et al. 1997).

Statistical Aspects

All analyses were performed using Stata (version 10, StataCorp., 2001). The main analytical outcome of the study was lifetime sample prevalence of subclinical psychotic experiences, psychotic symptoms with clinical relevance (based on a continuous *impairment score* combining CIDI items on frequency, duration, help-seeking, severity and impairment associated with psychotic experiences; range 1-7) and psychiatric disorders with psychotic features. Guided by the previous literature (Cougnard et al. 2007, Dominguez et al. 2009, Scott et al. 2006, van Os et al. 2001, van Os et al. 2009), a *psychotic experience* was defined as any positive CIDI rating on the screening questions of the psychosis section and an impairment score of zero, and not fulfilling criteria for *psychotic disorder* as defined below. A *weak psychotic symptom* was de-

fined as any positive CIDI rating on the screening questions of the psychosis section in combination with an impairment score in the range of 1-3 and not fulfilling criteria for *psychotic disorder* as defined below. A *strong psychotic symptom* was defined as any positive CIDI rating on the screening questions of the psychosis section in combination with an impairment score in the range of 4-7 and not fulfilling criteria for *psychotic disorder* as defined below. *Psychotic disorder* applied to all individuals with (i) a past or current diagnosis of any DSM-IV diagnosis of disorder with a psychotic feature, based either on a hospital, general practitioner or other clinical register diagnosis, or (ii) diagnosis by the clinician interviewing the participant during clinical re-interview.

Cross-sectional assessment provided lifetime prevalence of substance abuse and traumatic life events, last one year prevalence of depressive and bipolar disorders, as well as lifetime and last one year prevalence estimates of mental health service usage.

Associations between exposures and outcomes were expressed as odds ratios and 95% confidence intervals, derived from logistic regression, before and after adjustment for confounding factors and before and after an adjustment assessing independence of risk factors.

In the analysis of area characteristics such as social capital, data were grouped according to neighbourhood, thus becoming, in statistical terms, part of a multilevel structure with level-one units (individuals) clustered into level-two units (neighbourhoods). These hierarchically structured data were subjected to multilevel linear and logistic regression analysis (Snijders & Bosker, 1999) in order to investigate neighbourhood effects while controlling for individual effects. Multilevel or hierarchical linear modelling techniques are a variant of the more often used unilevel linear analyses and are ideally suited for the analysis of clustered data, in this case, consisting of multiple persons clustered within a single neighbourhood. The β s and odds ratios are the fixed regression coefficients of the predictors in the multilevel model and can be interpreted identically to the estimate in the unilevel linear regression analyses.

Limitations

The TürkSch is the second largest study in Turkey providing key features on mental health problems, public health-related consequences of mental disorders, mental health service usage patterns and possible gaps in mental health services.

There are some limitations in the TürkSch. As a consequence of the sampling method, both homeless and institutionalised subjects were excluded, while rates of psychotic disorder may be higher in these groups than in the general population. However, because both groups are rather small, effects on prevalence will be negligible.

Households including an individual diagnosed with psychotic disorder may have refused more often to participate despite the efforts of the study team. In addition, males and younger subjects are underrepresented, while prevalence of schizophrenia is higher in males and young people (van Os and Kapur 2009). Therefore, the psychosis prevalence estimate of the TürkSch is at the lower end of the true rate.

Despite these limitations, the response rate was satisfactory, and significant efforts were made in order to ensure optimal quality of the data. Thus, assessment not only involved lay interviewers, but also clinician visits to households, telephone follow-up, re-assessments, broad clinical evaluations, register based confirmation of diagnoses and continuous monitoring of the field work with efforts to increase response. Given these strengths, the aims, objectives and design of the TürkSch can be pursued in framework of a unique design yielding high-quality data allowing a broad comparison with the published literature.

CONCLUSION

In sum, although cross-sectional in nature, the TürkSch has a unique study design and yields data of high quality. This enables study of the prevalence, risk and higher-order interactions underlying ill-health in the Turkish population, with a specific focus on psychosis.

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