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Persian Youth Cohort (PYC) for Study of Mental Health in Iran: Study Protocol and Participant Profile

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Abstract

Introduction: We describe a cohort study of the Iranian youth with the primary aim of providing information on incidence, correlates, and the course of eight common mental disorders.

Methods: The Persian Youth Cohort (PYC) is a population-based longitudinal study. We recruited 11,592 Iranians aged 15-34 years, residing in four districts in the west (Ravansar), south (Fasa), southeast (Rafsanjan), and north (Sari) of the country between 2015 to 2020. In addition to psychiatric assessment for major psychiatric disorders using modified composite international diagnostic interview-version 2.1 (CIDI-v2.1), data on psychosocial conditions, potential risk/protective factors, mental health service use, and medical history are also collected. The study is planned to continue for at least eight years after enrollment in each site.

Results: In this study, we present the design, methodological considerations, and the number of participants interviewed in each phase. The median age of participants was 27.0 years (IQR=9.0) and more than half (58.8%) were married. Notably, 4.5% of participants reported lifetime suicide attempts, while the prevalence of any lifetime mental disorder, as evaluated in this study, was found to be 30.2%.

Conclusion: This study will provide valuable data on the incidence of mental disorders and help identify risk and protective factors for mental health problems. It will also provide insight into trajectories of mental disorders and critical information about the future mental health care needs that the country's healthcare system will be facing.

Keywords: Healthcare service utilization, Iran, Mental disorders, Prevalence, Prospective study

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Introduction

Iran has faced significant social changes in the last few decades, which include considerable improvement in literacy, a high level of urbanization, and immigration in the context of a significant political revolution. In addition, the country has faced numerous adversities including

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an eight-year war with the neighboring country (Iraq) and economic sanctions against the country that have contributed to significant inflation and economic hardship.

With the growth of urbanization, mass immunization, and improved health care standards, the country's main health burden has transitioned from acute communicable diseases to chronic non-communicable diseases.[1] At the time, mental and behavioral disorders are the second group of diseases causing the highest DALY and the first group of diseases causing YLD in Iran,[2] with major depression and drug use disorders making the largest contribution.[3]

Iranian national mental health survey (IranMHS), conducted in 2011, revealed that 23.6% of the population aged 15 to 64 years met diagnostic criteria for at least one psychiatric disorder in the past 12 months. Female gender, living in urban areas, low socioeconomic status, illiteracy, and unemployment increased the odds of mental disorders.[4]

IranMHS shed light on the extent and severity of mental disorders in Iran and highlighted the necessity for large-scale longitudinal studies of mental health. The Persian Youth Cohort (PYC), the first large cohort study on youth in Iran, was mainly designed to provide longitudinal information on incidence, correlates, and course of common mental disorders in the country. In this paper, we briefly describe the objectives, design, and procedures of PYC, the progress made so far, and the challenges faced.

PYC aims to determine:

1. The incidence of common psychiatric disorders;
2. The risk and protective factors for the incidence of common psychiatric disorders;
3. The course and outcomes of common psychiatric disorders; and,
4. The risk and protective factors of course and outcomes of common psychiatric disorders.

Three major groups of psychiatric disorders are assessed: depressive disorders, including major depressive disorder (MDD) and persistent depressive disorder (dysthymia); anxiety disorders, including generalized anxiety (GAD) and obsessive-compulsive disorders (OCD); and substance use disorders including alcohol, cannabis, opioids, and stimulants use disorders. The main outcomes of interest include incidence of psychiatric disorders, initiation of alcohol and drug use, suicide, disability, as well as traffic and non-traffic injuries. In addition, the course and outcome of mental disorders, including chronicity, relapse, remission, hospitalization, and death are assessed.

Materials and Methods

PYC is a longitudinal prospective cohort study with population-based recruitment, baseline assessment, and long-term follow-up. A total of 11,592 individuals, from four areas of Iran, were recruited for the study.

Study Sites

Four districts from different parts of the country were selected for this study: Ravansar district in the Kermanshah province in the west of the country, Fasa district in the Fars province in the south, Rafsanjan district in the Kerman province in the south-east, and Sari district in the Mazandaran province in the north (Figure 1).

The sites were selected based on the following considerations: adequate variations in socio-economic variables, low migration rate to facilitate follow-up, good knowledge of the Persian language, and availability of suitable health research infrastructure. PYC builds on the PERSIAN Adult Cohort Study,[5] a cohort study for non-communicable diseases on individuals 35 to 70 years of age, which was started in 2014 and has been running in 18 districts (including the four sites of PYC) and developed a rich infrastructure at the sites. At each site, a research clinic called the Cohort Center was set up in which all assessments, including physical examinations and biological sample collection, are conducted. We selected four of these districts with the above requirements for PYC. We further integrated the field management and some of the assessments of PYC into the PERSIAN Adult Cohort and shared the facilities. This included setting up private rooms at each site for conducting PYC assessments.

Sampling

In each district, several neighborhoods with different socioeconomic profiles were purposefully selected using population census data or health centers' data. The sample was mixed urban and rural in Ravansar and Fasa, and urban and suburban in Rafsanjan and Sari districts. All eligible members of the households in the selected neighborhood were invited to participate in the study. The required sample size was estimated at approximately 11,400 participants, assuming 90% power, a two-sided alpha of 0.05, an incidence of major depressive disorder of 0.03 in the unexposed group and 0.02 in the exposed group, and allowing for a 10% loss to follow-up. Finally, 11,592 participants were recruited.

Participants

The population in the age range of 15 to 34 years, residing in the selected catchment areas was the target population of the study if they had Iranian citizenship or legal residence and resided in the districts for at least six months in the last

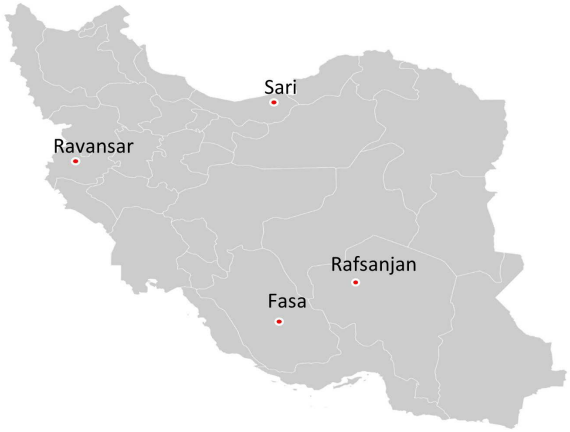

Figure 1. Geographical location of the cohort sites in Iran

12 months. They were excluded if they were temporarily residing in the district for some reason (e.g. for education or job-related purposes); unable to respond to questions due to any acute or severe illness; or could not understand the Persian language. It should be noted that although people with different languages and/or dialects reside in the selected areas, the majority of youth fully understand Persian, which is the official language of Iran. Overall, 84.5% of the eligible individuals accepted the invitation and were successfully accessed. Reasons for non-participation included being busy during cohort center work hours and unwillingness to participate.

Fieldwork Staff

Fieldwork staff consists of 1) the personnel who identify and invite the individuals at the door of their residence; 2) those who register the participants' identification data; 3) medical and lab staff; and 4) clinical psychologists who conduct the diagnostic interviews. All staff has received training on their tasks. Psychologists are female and familiar with the culture and language of the geographical area. The training of the interviewers included 42 hours of interactive training, covering the following topics: the study objectives, general interview techniques, ethical considerations, proper administration of the instruments, and details of the fieldwork. It also included supervised mock interview sessions, and a total of eight hours of psychiatric interviews using the study instruments in a psychiatric hospital with patients who consented to participate. In the end, each interviewer passed an examination to be certified for the assignment. During the pre-pilot phase, psychologists' interviews with 10 participants were audio recorded and these records were evaluated by the research team. In addition, two complete interviews conducted by each psychologist were observed and on-site training was provided. Continuous training, supervision, data cleanup, and feedback are provided for all psychologists. At the initiation of each wave, on-site training on new instruments is also provided.

Recruitment

A similar procedure employed in the PERSIAN Adult Cohort was used to identify, invite and register the participants, and perform physical assessment.[5] In summary, trained personnel contacted the identified families at the door of each residence, explained the study objectives and procedures, filled the table of family members, and assessed the eligibility criteria. The potential participants were invited to the study and an appointment was made for the baseline interview if the individual agreed to participate. Those household members who could not be interviewed at the initial appointment (e.g. traveling or being acutely ill), but were able to participate later on while the baseline enrollment was ongoing (a two-year period) were also included in the study. The participants were asked to carry their identification documents to interviews. If the individual did not show up for an appointment, further contacts were made at the home and up to three new appointments were made.

Enrollment and the Workflow

At the baseline enrollment, upon arrival at the center, the individual received the necessary information and provided written consent. Next, identifying data and socio-demographic characteristics were recorded and a unique barcode was given to each individual to label all samples and documents. Following this step, the participants were referred to the sample collection room for laboratory tests and the medical assessment room for physical examination and assessment of medical history. Subsequently, the psychological interview was carried out by clinical psychologists in a private room. The psychological interview is the main and the largest part of the PYC fieldwork and consists of face-to-face computer-assisted personal interviews (CAPI). The whole interview for the baseline assessment took an average of 97 (±42) minutes in the four sites.

Data Collection

A desktop personal computer is provided to each interviewer in the cohort centers. They can enter the participants' responses and the results of other examinations directly into a highly secure online software package. After recruitment of the first 100 cases in the first two sites, the data were cleaned up and the syntax for diagnosis of psychiatric disorders was executed to identify possible mistakes in data collection, data entering, and the computer program.

Quality Control

Quality control measures are being implemented at three levels, the computer program, the local team, and the central team. The duration of each interview is recorded by the computer program and is regularly monitored. Proper intervention is carried out if the duration of an interview by an interviewer is an outlier. Data validations have been defined for numbers, such as data on the age of onset and recency. In addition, the field manager is responsible to check answers to specific questions on both a daily and weekly basis. At the central level, the data management team is responsible for the completeness and plausibility of data. The team uses a protocol for checking data on a weekly and monthly basis and reports all errors to the field manager of each site. Moreover, the research team visits the sites and observes interviews periodically. Interviews of randomly selected cases are audio recorded and reviewed by one of the research team members.

Follow-up Stages

The study is planned to continue for at least eight years after enrollment in each site. Comprehensive face-to-face follow-up assessments are planned biannually after the initial enrollments (second, third, fourth, and fifth study waves). Some of the instruments were not administered at each wave to reduce the time and interview burden

(Table 1). For participants who were not able to attend a comprehensive face-to-face interview, a brief telephone interview is substituted. Since the start of the COVID-19 outbreak, interviewers were allowed to perform the interview via a video call for participants who are not willing to attend cohort centers in person. To reduce loss to follow-up, a brief telephone interview is conducted in alternate years between biannual comprehensive assessments.

Measurements and Instruments

Table 1 presents a brief description of the PYC measurement package and whether the questionnaire was present at each assessment point. As a general rule, lifetime timeframe of baseline questionnaires was replaced by the past two years

Table 1. Measurements of Persian Youth Cohort (PYC) at Baseline and Each Following Wave

Construct	Instrument	Baseline	W2	W3	W4
General information					
Demographic characteristics	Questionnaire on socio-demographic variables	*	*	*	*
Socio-economic status (SES)	A modified version of SES questionnaire used in the Health Service Utilization Study of Iran	*	*	*	*
Common psychiatric disorders					
Generalized anxiety disorder	Composite International Diagnostic Interview (CIDI) Version 2.1 (section D)	*	*	*	*
Major depressive disorder	CIDI Version 2.1 (section E)	*	*	*	*
Dysthymic disorder	CIDI Version 2.1 (section E)	*	*	*	*
Obsessive compulsive disorder	CIDI Version 2.1 (section K)	*	*	*	*
Alcohol use disorders	CIDI Version 2.1 (section J)	*	*	*	*
Opioid use disorders	CIDI Version 2.1 (part of section L)	*	*	*	*
Stimulant use disorders	CIDI Version 2.1 (part of section L)	*	*	-	-
Cannabis use disorders	CIDI Version 2.1 (part of section L)	-	-	*	*
Other mental health assessments					
Psychotic symptoms	Peters *et al.* Delusions Inventory (PDI-21)	-	*	-	-
Adult ADHD symptoms	Composite International Diagnostic Interview Version 5	-	-	*	-
Suicidal thoughts and attempts	Adapted from questionnaire used in the World Mental Health Survey	*	*	*	*
Aggressive behaviors	Adapted from questionnaire used in the US National Household Survey on Drug Abuse (NHSDA)	*	*	*	*
Substance use	Short form for drug and alcohol use	*	*	*	*
Internet use and problematic use of the Internet	A short form on Internet use and 9-item Problematic Internet Use Questionnaire (PIUQ-9)	-	*	-	-
Problematic use of social networking	A screening questionnaire for assessment of problematic use of SNS	-	-	*	*
Digital gaming and problematic gaming	A short form on gaming patterns and a screening questionnaire for assessment of problematic use of digital gaming	-	-	*	*
Gambling	A short form on gambling in the past 12 months	*	*	*	*
Sleep pattern	Questionnaire used in Adult PERSIAN Cohort	*	*	*	*
Sleep quality	Pittsburg Sleep Quality Index (PSQI)	-	-	*	-
Psychological distress	Kessler psychological distress scale (K10 or K6)	*	*	*	*
Happiness	Happiness index	*	*	*	*
Satisfaction with life and hope for the future	A short questionnaire on satisfaction and hope	-	-	*	*
Functional impairment	Sheehan Disability Scale (SDS)	*	*	*	*
Potential risk/protective factors					
Major life events	Adapted from questionnaire used in the British Psychiatric Morbidity Survey	*	*	*	*
Food security	Adapted from six-item U.S. Household Food Security Survey Module	-	-	*	*
Family history of psychiatric disorders	Questionnaire on lifetime history of major psychiatric illnesses among 1st-degree relatives	*	-	-	-
Resilience	Connor-Davidson resilience scale (CD-RISC-10)	*	-	-	-
Social capital	Adapted from social capital questionnaire used in the Iranian survey of Urban Health Equity Assessment and Response Tool (Urban HEART-1)	*	*	*	*
Interest in migration	A short questionnaire on immigration inside the country or abroad	*	*	*	*
Body image	A short questionnaire on perception of face and body image	*	*	*	*

Table 1. Contined.

Construct	Instrument	Baseline	W2	W3	W4
Factors correlated to substance use	Adapted from the questionnaire used in the repeated surveys of substance use in students of Tehran University of Medical Sciences	*	*	*	*
Physical activities	Derived from short-form of the International Physical Activity Questionnaire (IPAQ)	*	*	*	*
Attitude toward mental health treatment	Derived from the National Comorbidity Survey Replication (NCS-R)	*	-	-	-
Relationship with parents	Parental binding instrument (PBI)	-	-	*	-
Executive functioning	Symbol Digit Modalities Test (SDMT)	-	-	*	-
Service utilization for mental health					
Screening questionnaire for service use	A modified version of service use questionnaire used in IranMHS	*	*	*	*
Outpatient service use	A modified version of service use questionnaire used in IranMHS	*	*	*	*
Hospital admission	A modified version of service use questionnaire used in IranMHS	*	*	*	*
Other services for mental illness	A modified version of service use questionnaire used in IranMHS	*	*	*	*
Medical information					
Chronic medical illnesses	Questionnaire on 10 chronic medical illnesses	*	*	*	*
Physical injury	A modified version of Short-Form Injury Questionnaire-7	*	*	*	*
Medications	A short form on current medications	*	*	*	*
Physical examination and lab tests					
Anthropometric evaluation	Measurement of height, weight, waist, and hip circumference	*	*	*	-
Blood pressure examination	Systolic and diastolic blood pressure measurements	*	*	*	-
Laboratory tests	Complete blood count, blood biochemistry, urinalysis	*	-	-	-

in the follow-ups given the biennial schedule of the follow-ups.

General Information

Demographic questionnaire

We obtained data about sex, age, educational status, marital status, age at first marriage, number of children, brothers, and sisters, occupation, health insurance status, ethnicity, parents' education, history of immigration, and place of residence. We register the address and all phone contacts of participants and at least one of their close relatives or friends to increase the chance of successful follow-ups.

Socio-economic status (SES)

The SES questionnaire had been utilized in prior national surveys.[5-7] We used a modified version with minor modifications. It includes the number of family members, housing situation (e.g. ownership, mortgage, or rent), characteristics of place of residence (area and number of rooms), ownership of agricultural land or cattle, a list of household assets (e.g. car, personal computer), number of books read during last year and number of travels abroad in lifetime. In the third wave, we added a question on difficulty in covering the monthly expenses, with a 4-point Likert response from "very difficult (= 1)" to "not at all (4)".

Common Psychiatric Disorders

Composite International Diagnosis Interview version 2.1 (CIDI 2.1)

We employ a fully structured diagnostic interview based on the Diagnostic and Statistical Manual of Mental Disorders-4th edition (DSM-IV) and the International Classification of Diseases-10th Revision (ICD-10).[8] The Persian version of CIDI 2.1 has been validated in the Iranian general population and previously used in the IranMHS.[7,9]

Modules included in the PYC are GAD, MDD, dysthymic disorder, OCD, and alcohol as well as other substance use disorders. For the baseline assessment, the lifetime version of the CIDI 2.1 is employed.

Other Psychosocial Conditions

Peters et al. Delusions Inventory (PDI): A screening questionnaire has been added to the second wave to assess psychotic symptoms.[10] The Persian version of the PDI-40 has been translated and validated and has shown good internal consistency, and test–retest reliability.[11] In the present study, we used the 21-item version with "yes-no" questions covering 11 categories of delusional themes. For each "yes" response, three additional questions are asked to clarify the levels of three dimensions of distress, preoccupation and conviction associated with the experience (each dimension for each question is graded from 1 to 5).

Adult attention deficit hyperactivity disorder (ADHD) symptoms

A Persian translation of the short screener version of the Adult ADHD Self-Report Scale (ASRS) was used to identify probable adult ADHD. It includes 6 out of 18 questions in the original version, which enquires about the frequency of recent DSM-IV Criterion A symptoms of adult ADHD in general population samples. The short version has been studied in two community samples with good concordance with clinical diagnosis and adequate reliability.[12,13] The

Persian translation of the original version had acceptable validity and reliability indices.[14,15]

Questionnaire for suicidal thoughts and behaviors

This questionnaire has been derived from the questionnaire used in the World Mental Health (WMH) Surveys and validated and used in the IranMHS.[7,16] Lifetime history of suicidal ideations, plans, number of suicide attempts and methods as well as past year suicide attempts are queried and whether the attempt was serious.

Questionnaire for assessment of aggression

This questionnaire assesses violence in the past 12 months and is adapted from the questionnaire used in US National Household Survey on Drug Abuse (NHSDA) and validated and used in the IranMHS.[7,17] Questions include property damage, self-harm, and harm toward family members or others. The severity of the violence is also determined by two questions. These questions examine the legal consequences of committing violent acts and the need for the injured person or victim to seek treatment.

Short form for substance use

A list of common or important substances with potential for abuse is included in this questionnaire and the respondents are being asked about use of these substances in their lifetime and the past 12 months at baseline. These include cigarettes, waterpipe, alcohol, and illicit drugs. Illicit drugs include opium, heroin, methamphetamine, cannabis, ecstasy, inhalants, and other addictive substances. The list also includes prescription opioids and methylphenidate, both without prescription. The last question on this questionnaire is about the history of injection drug use in lifetime and past 12 months. In the next waves, we added questions on the substances that were frequently quoted as "other addictive substances" at the baseline (e.g. morphine and cocaine). In the third wave, we have added questions on age of onset for seven substances and history of opioid overdose.

Use of Internet and Social networking sites (SNS) and their problematic use

Two screening questions are asked on the number of days of internet use and the time the participant spent on internet on a typical day during the past week. In the second wave, we added the 9-item Problematic Internet Use Questionnaire (PIUQ-9) and two extra questions about time spent in the past 24 hours specifically on 1) using internet for the purposes other than education and job-related issues and, 2) using social media. We also added Laconi et al to assess problematic use of Internet.[18] This questionnaire has been already validated in Iranian youth.[19] In the third wave, we replaced PIUQ-9 with a short 3-item questionnaire for assessment of problematic use of SNS, which has been developed in Persian language as a screening tool for use in the primary health care (PHC) system.

Digital Gaming and problematic use

Two screening questions are asked on the number of days of digital gaming and the time the participant spent on these activities on a typical day during the past week. In the second wave, the duration spent on online and offline gaming is queried separately. In the third wave, we added a short 3-item questionnaire for assessment of problematic gaming, developed in the Persian language as a screening tool for use in the PHC system.

Gambling

Two questions are asked regarding betting and gambling in the past 12 months.

Sleep pattern and quality

To assess sleep patterns we used the questions on sleep and circadian rhythm that have been previously used in the Adult PERSIAN Cohort and was validated by Farrahi Moghadam et al.[5,20] These include questions on the usual time of waking up in the morning and falling asleep, daytime sleeping, desired time for morning awakening, and shift working in the past month. For the third wave, we added the Pittsburg Sleep Quality Index (PSQI). The index has 19 questions and produces seven component scores, including sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medications, and daytime dysfunction.[21]

Kessler psychological distress scale (K10 and K6)

Psychological distress is assessed using Kessler psychological distress scale.[22] K10 consists of 10 questions about feelings in the past month on a 5-point Likert scale from "never (=0)" to "always (=4)". A Persian translation of the K10 is available (https://www.hcp.med.harvard.edu/ncs/k6_scales.php) and has been shown to have good psychometric properties.[23] K10 is used at baseline and a shorter version (K6) is used in the next waves.

Happiness index

The respondents are asked to rate their own present happiness state using one item with a 5-point Likert scale response ranging from "never (=1)" to "very much (=5)". It has been already validated and studied in a general population survey of adults aged 18 to 64.[24]

Satisfaction with life and hope for the future

We asked one question regarding general satisfaction with life with responses on a 5-point Likert scale ranging from "very much" to "not at all". Another question asks if the participant believes that "our children" will have a good and favorable future also with responses on a 5-point Likert scale from "certainly yes" to "certainly not".

Sheehan Disability Scale (SDS)

The SDS is a short, self-report scale that asks about disability related to psychiatric problems in main functional domains including home management, work abilities, ability to form and maintain close relationships,

and social life in a 1-month period or longer in the past 12 months when psychiatric problems were most severe.[25] Disability in the four described domains is classified into five categories from zero or "no impairment" to 100% or "extreme disability". The Persian version of the SDS has been validated.[26]

Potential Risk/protective Factors

Major Life Events Checklist

This scale is derived from a questionnaire used in the British Psychiatric Morbidity Survey and assesses the occurrence of major life events during lifetime and past 12 months.[27] The severity or impact of the events are not assessed. It includes a list of life events that commonly happen in people's life such as the death of family members or relatives and some uncommon but serious events such as sexual abuse. The full questionnaire is used only in the first wave. In the second and third waves, an extra question regarding emotional abuse is added.

Food security

We use three questions for assessing food insecurity in the previous 12 months, derived from a six-item short form of USDA's Economic Research Service in third wave of the study.[28] The questions ask about cutting the size of the meals or skipping meals, or being hungry because of not having enough money.

Family history of psychiatric disorders

History of any psychiatric illness in the first-degree relatives, and whether the diagnosis was made by a physician and/or a mental health professional were asked. The specific psychiatric diagnosis was ascertained, including depression, anxiety, OCD, bipolar disorder, psychotic disorders, substance use disorders, and other psychiatric disorders.

Connor-Davidson resilience scale (CD-RISC)

Resilience, the ability to cope with stress and adversity, was assessed by CD-RISC at baseline assessment.[29] The Persian version of the 25-item CD-RISC has been previously validated.[30] The short form of the scale has also been developed with better psychometric properties compared to the original version.[31] We utilized a short form of CD-RISC, which includes 10 statements about the adaptation of a person to stressful situations in life (e.g. "I am able to adapt to change").

Social capital

We utilized a questionnaire specifically developed for the Iranian general population survey to assess social capital.[32] The questionnaire has also been used in the Iranian survey Urban HEART-1".[33] We selected three domains of "voluntary social support and participation", "friendship and social cohesion", and "trust", towards several groups including family members, relatives, friends, neighbors, coworkers, those living in neighborhood, co-religionists, and all citizens. Each item employs a 5-point Likert scale from "Not at all (= 1)" to "Absolutely"(= 5)".

Interest in migration

Interest in migration to a different location in the country or to another country is assessed by the questions adapted from the 2018 National Youth Survey in Bosnia and Herzegovina.[34] Responses could range from (1) or "I am strongly interested" to (5) or "I have no immigration intent at all".

Body image

Body image is assessed by two questions about respondents' perception of ugliness of their face and body: "Is your [face/body] ugly, unattractive, or obnoxious?" Responses are recorded on a 5-point Likert scale ranging from "very ugly" to "no ugliness at all". The questions were adapted from the Cosmetic Procedure Screening Questionnaire (COPS) for body dysmorphic disorder.[35]

Factors correlated with substance use

Risk perception, social acceptance, access to drugs, substance use in family and friends, and opportunity for use are asked using six sets of questions for four substances each, including alcohol, opium, heroin, and methamphetamine. The questionnaire has been utilized in a repeated survey of substance use among students of Tehran University of Medical Sciences.[36] In the second wave, the questions are limited to access to drugs and opportunity for use and in the third wave, access to cannabis and opportunity for use of cannabis are added.

Physical activities

Two questions address the number of days in which the person had moderate to vigorous physical activity in the past week. "Moderate to vigorous physical activity" is defined as activities leading to increased breathing rate. The question is derived from the International Physical Activity Questionnaire (IPAQ).[37]

Attitude toward mental health treatment

This short questionnaire is comprised of four questions regarding participants' attitudes towards seeking mental health services for psychiatric problems. The questionnaire has already been used in the National Comorbidity Survey Replication (NCS-R) in the United States.[38] We just added a fourth question focusing on seeking help for addiction to the original questionnaire at baseline.

Parental binding instrument (PBI)

We used the 16-item version of the PBI for assessing parenting styles of mother and father, separately.[39] This instrument is widely used for quantifying three dimensions of parenting styles—care, protectiveness, and authoritarianism as perceived by the child during the first 16 years of their life. Responses to each item are on a 4-point Likert scale ranging from 0 to 3. PBI has been translated to Persian and has shown acceptable psychometric properties.[40]

Symbol Digit Modalities Test (SDMT)

This is a screening test for neurological dysfunction and assesses information processing speed. We administered the written response format of the SDMT. The test involves matching nine numerical digits and substituting them with abstract symbols in 90 seconds. Participants were given 10 practice items before commencing the test. The final score is the correct number of substitutions and ranges between 0 and 110.[41]

Service Utilization for Mental Health

The instrument was initially developed using two questionnaire packages: 1) World Mental Health Survey (WMH) and 2) Iranian health service utilization study.[42,43] It has been culturally adapted and harmonized with the structure of existing mental health services in the country, and its face and content validity, and inter-rater reliability are reported elsewhere.[7] it included four following questionnaires:

Screening questionnaire for service use

Any health service use for mental health problems in lifetime and in the past 12 months;

Outpatient service use for mental illness questionnaire

Services received in the past 12 months from general physicians, psychiatrists, other medical professions, psychologists, drug treatment centers, and other health providers; and the reasons for accessing each type of provider, whether currently under treatment or care, and the types of services received. From the third wave on, specific questions on methadone maintenance treatment are added.

Hospital admission questionnaire

Detailed information on lifetime admission for psychiatric problems or addiction, and whether it occurred in past 12 months. In the second and third waves of PYC, questions regarding hospital admissions for medical problems and reasons for admissions are added.

Other services for mental illness questionnaire

Other services during the past 12 months such as taking drugs from a pharmacy without prescription or more than the prescribed dose for mental illness or addiction; traditional/complementary medicines, harm reduction services from Drop-in-Centers (DICs), and self-help groups.

Medical Information

Chronic medical illnesses

Lifetime history of 10 chronic medical illnesses including diabetes mellitus, hypertension, ischemic heart disease, stroke, renal failure, liver failure, chronic respiratory diseases, thyroid diseases, rheumatoid diseases, and cancers are queried. If they respond "yes", they are also asked about the duration of illness, age at the first diagnosis, and if they are currently receiving any treatment or care for the conditions.

Injury Questionnaire

This questionnaire is a modified version of the Short-Form Injury Questionnaire-7 (SFI-7) which has been validated in Iran.[44] The questionnaire includes main aspects of all injuries in the past 12 months which has led to medical encounter or caused a significant disturbance in routine daily activities at least for one day. Respondents who answered "yes" to this question are asked additional questions including type of injury (e.g. traffic, fall), situation of injured person in traffic accident (e.g. motorcycle driver), the type of vehicle that caused the traffic accident (e.g. car, bicycle), reason of injury (e.g. intentional self-harm, non-intentional harm due to occupational hazard), and the consequences of injury (recovered, under-care, disabled). These questions are answered separately for each injury in the past 12 months.

Medications

The respondents are asked to bring their current medication containers and the prescription orders when they visit the center. Information on all medications including psychopharmacologic medications is collected. These include the name and dosage of the medication, whether the medications were prescribed, and adherence to the directions for use.

Physical examination and lab tests

Physical examination: Anthropometric variables including height (cm), weight (kg), as well as waist and hip circumference (cm) are measured using the National Institute of Health (NIH) protocols and are consistent with the adult PERSIAN Cohort Study.[5] In addition, systolic and diastolic blood pressures are recorded.

Laboratory tests: Blood tests are provided for the respondents if they consent. A small amount of blood is used to examine complete blood count (CBC) and measure the following biochemistry tests: fasting blood sugar, total cholesterol, HDL cholesterol, triglycerides, alanine transaminase (ALT), aspartate transaminase (AST), alkaline phosphatase (ALP), gamma-glutamyl transpeptidase (GGT), blood urea nitrogen (BUN), and creatinine levels. Urine analyses are also performed. The results of all tests performed are saved in the study database, and also given back to the participants.

Assessment of Mortality

A similar protocol as the PERSIAN adult cohort is being used in the current study to ascertain mortality.[5] In brief, when death is confirmed at the follow-ups, a trained physician contacts the family or primary caregivers and conducts a verbal autopsy interview. Death certificates and other medical documents are collected and two physicians independently determine the cause of death. A third physician reviews all information in case of any disagreement and determines the final cause of death. The causes of death are coded according to the International Classification of Diseases, Tenth Revision (ICD-10).

Telephone Interviews

A short phone interview questionnaire is used one year after each in-person interview. These interviews were primarily designed to maintain connection with the participants and update the contact information and also to collect some important information between the comprehensive assessments. The interview includes questions regarding any hospital admissions and the reasons for admission, outpatient service use, K6 questionnaire, and questions about serious suicidal ideations and suicide attempts since the last in-person interview. The whole telephone interview lasts between 3 to 7 minutes. Participants are generally contacted by the same primary interviewers who conducted the last in-person interview. The interviewers contact participants at different times during the working hours of work days in a 1-month window. The contacts' dates and reasons for unsuccessful attempts are recorded.

Ethical Aspects

The core research protocol was approved by the Ethics Committee of Tehran University of Medical Sciences in Iran (no. IR.TUMS.REC.1395.2291). In addition, the protocol of each site was approved by the Ethics Committees of local Universities of Medical Sciences. The field workers were intensively trained about the ethical issues related to the study and signed a code of commitment to ethical principles. Participation in the study is voluntary and written informed consent is obtained. The participant can refuse to respond to any part of the interview or any specific question. All efforts are made to guarantee privacy and confidentiality during the interviews. Since the interviewers are from the same district as the participants, a rule has been set that the individual is referred to another interviewer, if they know each other in person. Participants are urgently referred to appropriate health services if any serious threat, such as suicide is detected by the interviewers. The participants might also be referred accordingly upon their own request. Participants receive their laboratory test results with a physician's consultation, and/or body composition analysis, or visit for dental health care as incentives. The result of the K10 screening for psychological distress based on the computerized algorithm is also provided to the participant upon request. We employed several measures to ensure data safety. All the computers in the field, the PYC web, data server, and databases are encrypted with passwords and securely stored. Access to individual participant data follows a strict protocol, according to the role of each staff member and for a limited period. Encrypted backups are made monthly from all databases and in excel format.

Results

In this study, participants were recruited from four districts: Ravansar, Fasa, Rafsanjan, and Sari, with respective participant counts of 2991, 3014, 3006, and 2581. Enrollment started in April 2015 in Ravansar, in May 2015 in Fasa, in January 2017 in Rafsanjan, and in May 2018 in Sari. Enrollment for the baseline stage was completed for Fasa and Ravansar in April 2017, for Rafsanjan in January 2019, and for Sari in May 2020. Table 2 shows the number of participants enrolled in each stage of the study up to May 2025.

Overall, from the 11,592 eligible individuals who entered the study 98,6% and 84.2% were successfully contacted and interviewed at the "first short telephone follow-up" and at the "second wave follow-up", respectively.

Baseline Characteristics of Participants

The median age of participants was 27.0 years (IQR = 9.0) and 57.9% were female. More than half (58.8%) of participants were married, while 39.0% were never married and 2.1% were previously married. The median years of full-time education was 12.0 years (IQR = 5.0). Employment statistics indicated that 36.2% of participants were employed (69.5% of males, and 11.9% of females), and 64.7% of females were housewives. Students comprised 18.5% of the population. Urban residency was predominant, with 65.1% of participants residing in urban areas. In Sari, the whole sample was recruited from urban areas. Regarding socioeconomic status, 33.3% were categorized as low, 33.6% as middle, and 33.0% as high socioeconomic status. The

Table 2. Number of Participants Enrolled and Followed Up as of May 2025.

	Ravansar	Fasa	Rafsanjan	Sari	Total
Baseline assessment (first wave)	2991	3014	3006	2581	11,592
First short telephone follow-up	2959	3001	2960	2510	11,430
Second wave follow-up					
Full interview	2566	2724	2387	2087	9764
Alternative brief telephone interview	251	194	444	61	950
Second short telephone follow-up	2901	3002	2887	2472	11,262
Third wave follow-up					
Full interview	1849	2477	1193	1080	6599
Alternative brief telephone interview	778	297	430	752	2257
Third short telephone follow-up	2830	2888	2017	Ongoing	-
Fourth wave follow-up					
Full interview	1617	1631	Ongoing	Ongoing	-
Alternative brief telephone interview	693	151			

Table 3. Characteristics of Participants at Baseline

Variables	Total N	Total N = 11592 (M = 4877			Ravansar N = 2991 (M = 1336)			Fasa N = 3014 (M = 1268)			Rafsanjan N = 3006 (M = 1323)			Sari N = 2581 (M = 950)		
		All %	M %	F %	All %	M %	F %	All %	M %	F %	All %	M %	F %	All %	M %	F %
Age																
15-24	4186	36.1	37.7	34.9	30.9	32.2	29.9	33.8	34.1	33.6	40.2	42.4	38.4	40.1	43.8	37.9
25-34	7406	63.9	62.3	65.1	69.1	67.8	70.1	66.2	65.9	66.4	59.8	57.6	61.6	59.9	56.2	62.1
Marital status																
Never married	4526	39.0	54.1	28.1	41.0	54.5	30.2	32.1	46.8	21.5	44.1	58.5	32.9	38.9	57.3	28.2
Married	6818	58.8	45.1	68.8	55.8	44.2	65.1	66.0	52.5	75.8	54.3	41.0	64.8	59.2	42.3	69.1
Previously married [1]	248	2.1	0.8	3.1	3.2	1.3	4.8	1.9	0.7	2.7	1.6	0.5	2.4	1.9	0.4	2.7
Education																
Up to 5 Years	849	7.3	4.4	9.4	17.1	6.7	25.6	6.0	5.8	6.2	2.0	2.5	1.7	3.6	2.0	4.6
6 to 12 Years	7451	64.3	64.6	64.1	58.0	60.5	56.0	68.7	65.5	71.1	60.2	61.0	59.5	71.1	74.0	69.5
More than 12 Years	3291	28.4	31.0	26.5	24.9	32.9	18.5	25.2	28.7	22.7	37.8	36.5	38.8	25.2	24.0	25.9
Occupation																
Employed	4188	36.2	69.5	11.9	36.7	72.8	7.6	35.8	71.5	9.9	41.4	68.9	19.8	29.8	63.2	10.2
Blue-collar job	869	7.5	16.0	1.3	7.7	16.5	0.6	9.0	20.2	0.9	6.7	12.9	1.8	6.4	13.9	2.0
Housewife	4340	37.5	0.0	64.7	43.2	0.0	78.0	42.4	0.1	73.2	26.7	0.0	47.7	37.6	0.0	59.6
Student	2139	18.5	20.8	16.8	10.8	14.2	8.0	14.3	17.0	12.4	24.1	24.8	23.5	25.7	29.5	23.4
Unemployed	398	3.4	5.0	2.3	5.7	7.9	3.9	4.0	6.1	2.6	1.9	2.5	1.5	1.9	3.1	1.2
Other groups not in labor force [2]	519	4.5	4.6	4.4	3.6	5.2	2.4	3.4	5.3	2.0	5.9	3.8	7.5	5.1	4.2	5.6
Living in urban/rural areas																
Urban	7542	65.1	64.4	65.6	45.3	47.4	43.7	50.0	48.8	50.9	69.8	70.9	68.9	100	100	100
Rural	4050	34.9	35.6	34.4	54.7	52.6	56.3	50.0	51.2	49.1	30.2	29.1	31.1	0	0	0
Socioeconomic status																
Low	3864	33.3	29.1	36.4	38.9	34.5	42.6	48.6	43.1	52.6	8.5	8.6	8.4	38.0	31.5	41.9
Middle	3896	33.6	34.4	33.0	38.9	39.7	38.2	29.8	31.5	28.5	29.3	29.3	29.3	37.1	38.1	36.6
High	3827	33.0	36.5	30.5	22.2	25.8	19.2	21.7	25.4	19.0	62.3	62.1	62.4	24.8	30.4	21.5
Possession of a personal mobile phone	10972	94.7	98.0	92.2	93.0	98.6	88.5	94.3	98.1	91.5	96.6	97.9	95.7	94.7	97.3	93.3
Access to Internet	7348	63.4	70.6	58.1	46.4	61.1	34.6	53.7	62.0	47.7	81.2	84.7	78.4	73.7	76.1	72.3
Having a basic health insurance	10751	92.8	91.2	93.8	97.0	96.9	97.2	92.8	91.4	93.8	93.2	89.9	95.8	87.3	84.9	88.7
Ever daily use [3] of any tobacco products	1616	13.9	31.2	1.4	13.2	28.6	0.7	16.0	36.4	1.2	16.7	34.8	2.4	9.3	22.8	1.3
Kessler Psychological Distress Scale (K10)																
Score < 15	7569	65.4	72.2	60.4	63.5	68.3	59.6	63.4	72.9	56.6	63.5	69.4	58.9	71.9	80.8	66.7
Score = 15-18	1486	12.8	11.5	13.8	13.1	13.3	13.0	13.1	11.1	14.5	13.9	12.5	14.9	11.0	7.9	12.8
Score ≥ 19	2527	21.8	16.3	25.8	23.4	18.4	27.4	23.5	16.0	28.9	22.6	18.1	26.2	17.1	11.3	20.5
Lifetime Suicide Attempt	521	4.5	3.1	5.5	5.2	3.4	6.7	4.5	3.6	5.2	4.8	3.3	5.9	3.3	1.8	4.1
Mental disorders																
Any Lifetime Mental Disorder [4]	3492	30.2	31.1	29.5	31.4	32.0	30.9	33.2	34.5	32.3	32.9	37.4	29.3	22.2	16.7	25.4
Any Lifetime Depressive Disorder	2265	19.6	15.8	22.3	23.3	21.3	24.9	20.9	16.2	24.3	17.8	14.6	20.3	15.7	9.1	19.6
Any Lifetime Alcohol Use Disorder	609	5.3	12.4	0.1	4.6	10.3	0.0	5.7	13.7	0.0	8.5	19.1	0.2	1.7	4.1	0.2
Any Lifetime Opioid or Stimulant Use Disorder	354	3.1	7.0	0.2	1.0	2.1	0.1	4.9	11.4	0.2	4.5	9.9	0.4	1.6	4.2	0.1

[1]Widowed, divorced, or separated.
[2]Unemployed, not seeking a job, and disabled.
[3]Daily use for at least one month in the lifetime.
[4]DSM-IV lifetime diagnosis of any mental or substance use disorder assessed in this study.

vast majority (94.7%) owned personal mobile phones, and 63.4% had internet access. Basic health insurance coverage was reported by 92.8% of participants. The median score on the Kessler Psychological Distress Scale was 11.0 (IQR = 11.0). Lifetime suicide attempts were reported by 4.5% of participants. The prevalence of any lifetime mental disorder, as assessed in this study, was 30.2%. Any lifetime depressive disorder had a prevalence of 19.6%. In males, lifetime alcohol use disorder was observed at a prevalence of 12.4%, and lifetime opioid or stimulant use disorder at 7.0%, while females showed a prevalence of 0.1% for alcohol use disorder and 0.2% for opioid or stimulant use disorder. Table 3 shows socio-demographic and mental health characteristics of participants at the baseline.

Discussion

This is a well-designed longitudinal study with several strengths. First, population-based longitudinal studies investigating mental health and substance use among youth are limited in the world,[45-48] and this is one of the first cohort studies in developing countries and the first from Iran—a middle-income country in the Middle East, with rapid changes in sociodemographic features over the last decade and significant drug and social problems. Although several large cohort studies are currently ongoing in Iran, this is the only one addressing mental health as the main objective. Common mental disorders, as well as substance use and use disorders, are covered in this study. We also assess incidence and risk factors of injuries, which impose a high burden and are associated with high mortality in the young population in Iran. Second, we have recruited participants from four geographical areas of the country with unique characteristics such as ethnicity, susceptibility to natural disasters, socioeconomic status, and different levels of urbanization. The relatively large sample size in the four sites allows us to precisely estimate the effect sizes. Third, we have planned a long follow-up that can shed light on the incidence rate and provides high-level evidence on the causes of mental disorders in this setting. The individuals are recruited from a young age so that documentation of the events and multiple factors during their early life is possible. We apply multiple follow-ups (every year, either face-to-face or by phone) of the total study sample, which minimizes recall bias and loss to follow-up and allows for rapid evaluation of the mental health effects of life events. We have recorded the national ID and identity information of participants, which provides the possibility of linkage of our data with other national databases such as death registry. Fourth, we have assessed a comprehensive list of exposures and have utilized standardized tools for assessment of outcomes. All of the assessments are computer-assisted, reducing data entry errors and data loss. Fifth, we have employed local staff with intensive training and a strict quality control plan. The response rates have been better than expected, so far (Table 2).

Nevertheless, the study has several limitations. Similar to other cohort studies, the voluntary basis of participation might generate a bias. The assessments are almost all based on self-reports and are susceptible to various biases such as recall bias and reporting bias. Recording the identity details of participants might be a barrier to accurate responses to sensitive questions. Due to the inclusion of a long list of conditions and factors and employing a lengthy interview, we had to limit the range of mental health conditions and risk factors assessed. Although we tried to include four sites from the country and in each site, select a variety of neighborhoods to increase representativeness of our sample, results from our cohort may not be generalized to the general population of the Iranian youth. The COVID-19 pandemic, which began in Iran in February 2020, affected multiple phases of the study across different sites. In particular, it overlapped with the second wave follow-up in Sari and Rafsanjan, the third wave follow-up across all study sites, and the fourth wave follow-up in Ravansar and Fasa, potentially influencing participant retention and follow-up.

Conclusion

The establishment of this longitudinal youth cohort in Iran would enable us to assess the incidence of mental disorders and understand the causal relationship between many individual and contextual factors with mental health problems. The study also aims to provide insights into trajectories of mental disorders and provide clinically useful information to predict future outcomes. Similar to other countries in the region, Iran is undergoing fast socio-demographic, economic, and environmental changes. This study provides a unique window into the mental health consequences of these fast-paced changes and useful information for the country's policymakers.

Authors' Contribution

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Competing Interests
The authors have no competing interests to declare.

Ethical Approval
The core research protocol was approved by the Ethics Committee of Tehran University of Medical Sciences in Iran (no. IR.TUMS.REC.1395.2291). In addition, the protocol of each site was approved by the Ethics Committees of local Universities of Medical Sciences.

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