Difference in Incidence Rate of Psychotic Disorders between Military Personnel and Civilians

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Abstract

Psychotic disorders are characterized by a period where someone experiences a disconnection from reality. The incidence of psychotic disorders varies greatly between studies. Previous meta-analyses have looked at the overall incidence of psychotic disorders in various population cohorts. However, this current meta-analysis focuses on the difference in incidence of psychosis between army personnel and the general population. Previous studies have shown that traumatic events might lead to a higher risk of developing psychotic disorders. Since army personnel are more prone to encounter these events, one might think that the incidence of psychotic disorders will also be higher in this group. For the meta-analysis we used an existing database to compare incidences of psychotic disorders between army personnel and the general population. The current meta-analysis included three studies in the army personnel group and 97 studies in the general population group. For both groups pooled incidence rates were calculated to compare the groups. The analysis showed a pooled incidence rate of 21,98 per 100.000 person-years for the army personnel group and a pooled incidence rate of 30,91 per 100.000 person-years for the general population group. The difference between both groups was statistically significant (IRR = 0,7113, P < 0,0001, 95% CI [0,6929; 0,7301]). The results indicate that the incidence of psychotic disorders within the military cohort group is lower. Reasons for this might be because of the protective factors and screening tactics in the military. Further research is needed to study whether or not the incidence of psychotic disorders is indeed lower and if so, why that is.

Keywords: psychotic disorders, army/military study, meta-analysis, incidence rates

Introduction

Psychotic disorders are characterized by a period where someone has a disconnection from reality. Different diagnoses include: non-affective psychosis, schizophrenia, affective psychosis, bipolar disorder, psychotic depression and substance induced psychosis (American Psychiatric Association, 2013). These disorders are associated with significant health, social and economic concerns (National Institute of Mental Health, n.d.). Therefore, it is important to understand how often these disorders occur and what variables influence these incidences.

There is a lot of data on incidences of psychotic disorders, however many of these vary in their results. For instance, Schofield et al. (2017) report an incidence rate of 157 cases of non-affective psychoses per 100.000 person-years at risk, while Sipos et al. (2004) report an incidence rate of 21 cases of non-affective psychoses per 100.000 person-years at risk. Because of these widely ranging results, it is unclear what the actual incidence of psychosis in the population is. To get a more accurate view of the incidence of psychotic disorders, a meta-analysis will be useful. A meta-analysis combines all appropriate studies and their results to get a more global insight of the incidence rate. Jongsma et al. (2019) previously provided such a meta-analysis and calculated an overall pooled incidence of all psychotic disorders of 26.6 per 100 000 person-years (22.0 - 31.7). Meaning that, on average, 26.6 new cases of psychotic disorders occur per 100.000 people each year.

One reason for the wide range in results of incidence rates could be due to some studies being focussed on specific groups of people, such as immigrants, urban people or military cohorts. These groups might share certain factors which influence the risk of psychotic disorders, such as lower quality of life and life functioning (Strobl et al., 2012). Our current study is investigating the difference in incidence of psychotic disorders between army personnel/veterans and the general population. A veteran is someone who has served in the military during missions or wars, often facing the risk of various injuries during their service.

Psychiatric diagnoses were second only to musculoskeletal injuries as a cause for disease and nonbattle injury in army personnel during the Iraq war (Goodman et al., 2010). Therefore it is important to get a better understanding of the incidences of those diagnoses. Previous studies have focused on which mental health diagnoses had a higher incidence rate within a group of veterans, with PTSD being the most common diagnosis (Ramsey et al., 2024). This was as expected, since a majority of the cohort was deployed in a combat theatre which might lead them to be more likely to be exposed to traumatic events. Most studies involving army personnel and veteran groups therefore mostly focus on the incidence and prevalence of PTSD.

However, there is a close connection between anxiety disorders such as PTSD and psychotic disorders, and these often co-occur. A comorbid anxiety disorder and schizophrenia generally negatively impacts the individual's recovery and functioning (Achim et al., 2009). Van den Berg et al. (2015) argue that trauma has a big role in the development of psychotic disorders. This may indicate that military personnel might have a greater risk at developing psychotic disorders because of their exposure to traumatic events. So, the traumatic events may not only lead to PTSD, but also increase the chances of developing a psychotic disorder. Therefore, traumatic events might not only result in a worse prognosis for people with psychotic disorders, they might also be the cause of the disorder itself.

There has not been a lot of research on the incidence rate of psychotic disorders in army personnel and veterans in particular. This could be because the incidence of schizophrenia is lower than PTSD in the army (Ramsey et al., 2017) and therefore less relevant for practitioners. Even though the incidence rate might be lower than PTSD, it is still important to know what the incidence rate is of psychosis among (former) army personnel to create awareness and subsequently improve treatment for these people.

In this meta-analysis, we therefore examine the difference in the incidence rates of

psychotic disorders between veterans/army personnel and the general population. We hypothesize that veterans have a significantly higher incidence rate of psychosis than people in the general population.

Method

Study design

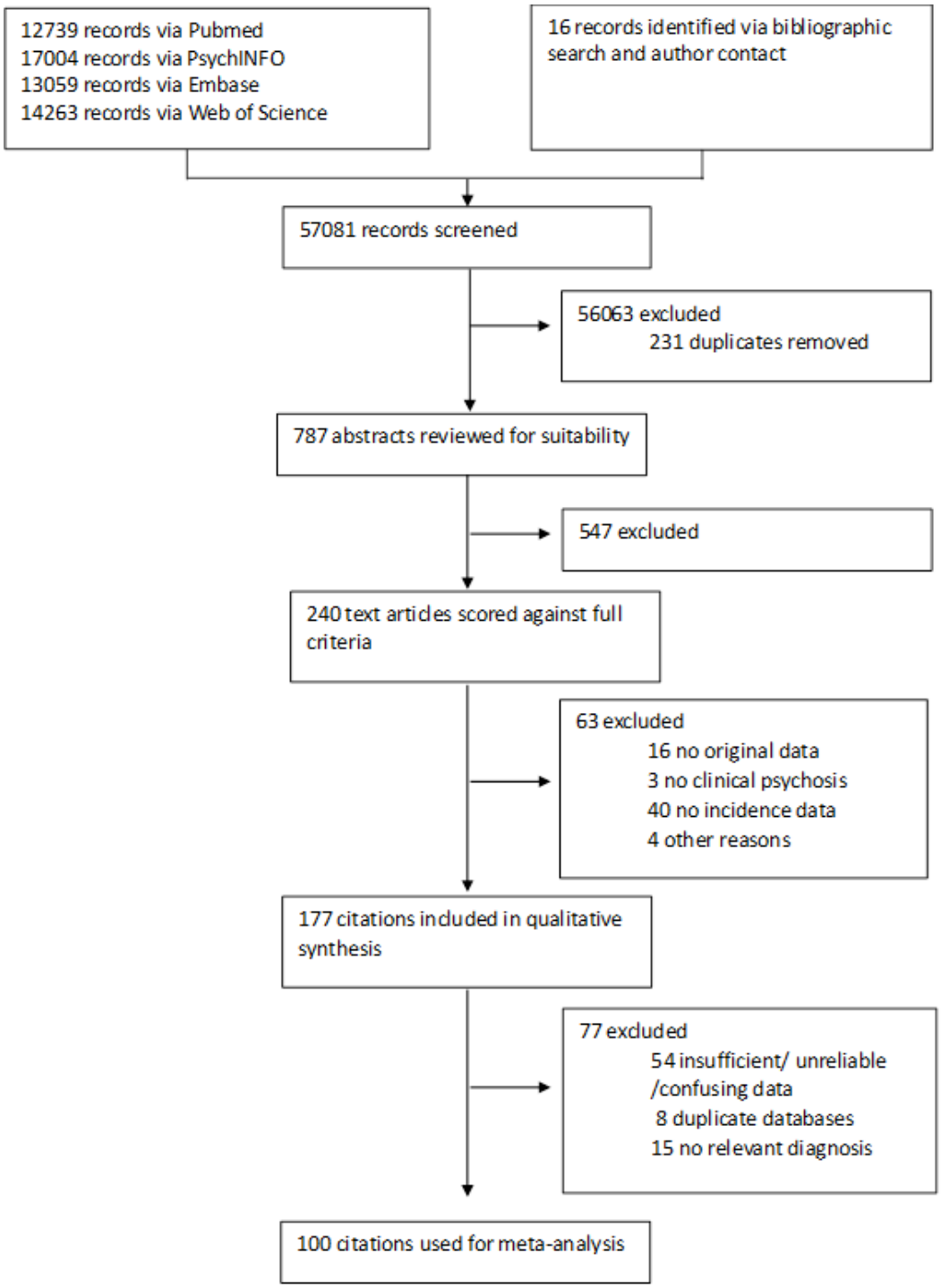
In this study we will conduct a meta-analysis. Hence, there will be no actual people participating in this study, but data extracted from previously published scientific studies. The current study uses the database from Jongsma et al. (2019) which followed the PRISMA guidelines and was preregistered with PROSPERO. The study consisted of title screening, abstract screening, full text screening, data extraction and data analysis. The current study is part of bigger project which aims to update the meta-analysis of Jongsma et al (2019). My contribution to this project was to screen the abstracts of the included articles that had been screened on their titles. Since the data extraction of this current project is not yet finished, the data from Jongsma et al (2019), which provided a completed data extraction, was used for this meta-analysis.

Search strategy

Studies were acquired on Pubmed, Psychinfo, Web of Science and Embase. The search terms used for both Pubmed and Web of Science are noted in the appendix. The search provided 57.081 studies of which 177 met the inclusion criteria. Figure 1 shows the process of article selection. All studies were published between January 1st 2002 and December 31st 2017. Only scientific articles written in the English language were included. Only population-based case findings were used.

Figure 1

PRISMA flowchart



Selection criteria

The inclusion criteria for the studies were: the citations contains incidence data or data from which incidence could be derived (i.e. both the incidence of psychotic disorders and the

person-years of the study); ages of participants between 18 and 64; participants were diagnosed with a first episode of any psychotic disorder (i.e. non-affective psychosis, schizophrenia, affective psychosis, bipolar disorder, psychotic depression and substance induced psychosis).

Data Extraction

From the selected studies the following descriptive data will be extracted: cases of psychosis, person-years, country of the study, period of the study, type of study, diagnostic outcomes, whether or not the study is about army personnel, sex, age and ethnicity. These will be used to get a more concrete view of what both groups look like and could be variables which influence our findings. If the crude incidence of all psychotic disorders is reported in the included articles, these will be used. If not, the incidence will be calculated by dividing the number of cases by the total person-years, multiplied by 100.000. The person-years will be calculated by multiplying the population of the study with the duration of the study. In Example 1 a more extensive overview of the calculations of these crude rates are shown.

Example 1: *crude rate calculation*

> A study of a period of 5 years has been conducted and might yield 30 cases of psychotic disorders. The total population within the cohort is 1.803.460 individuals. With these numbers the person-years as well as the crude rates can be calculated. To get the person-years, the total population will be multiplied by the duration of the study in years. So in this example: 180.3460 individual x 5 years = 9.017.300 person-years. The crude rate can now be calculated by dividing the number of cases by the person-years and multiplying that result with 100.000 to get a crude rate per 100.000 person-years. In this example, the crude rate would therefore be (30 cases / 9.017.300 person-years) x 100.000 = 33,27.

Analyses

An incidence rate ratio (IRR) will be calculated to test the hypothesis that veterans have an higher incidence rate than civilians. To compare both groups, total cases with a psychotic disorder diagnoses will be summed up, as well as the total person-years of both groups. The total amount of cases of both groups will be divided by the total person-years of

both groups. By multiplying both with 100.000, two pooled incidence rates can be derived. Those two will be compared with each other. These calculations will be done with the incidence rate ratio calculator of Med Calc (2024).

The pooled incidence sums the incidence rate of all studies into one incidence rate, making it more reliable and easier to compare. Comparing both pooled incidence rates will yield an IRR, which describes the difference between both groups. An alpha of 0.01 will be used to test whether there is a significant difference between both pooled incidence rates of the army cohort studies and the general population studies. In line with the hypothesis we expect an IRR of > 1, meaning that the first group (army personnel/veterans) have a higher risk of developing psychotic disorders than the second group (general population).

Results

Of the 177 articles provided by Jongsma et al (2019), n=100 were used for this meta-analysis, since the other 77 were either incomplete, duplicate, unreliable or did not meet the inclusion criteria (see Figure 1). Of those 100 articles, three articles included data on army personnel and were thus assigned to the army group. The other 97 articles were assigned to the general population group. Due to the high number of included studies, we have opted to include an overview of these studies as a separate appendix, rather than include a table in the main text (see Appendix Table 1).

The included studies came from all over the world. The populations in the studies ranged from 2.580 to over 4 million. There was also a wide range in the duration of the studies, which greatly influenced the person-years of each study (from 44.982 person-years to 1.212.304.080 person-years). The duration of the studies, the country of the studies, the diagnostic outcomes and the amount of cases are included in Table 1 in the Appendix.

The crude incidence rates in the studies including army personnel ranged from 14,30 to 30,46. In the general population, the crude incidence rate ranged from 1,38 to 192,58. All

cases, incidence rates and person-years of the individual studies are reported in Table 2 in the Appendix.

The analysis showed a pooled incidence rate of 21,98 per 100.000 person-years for the army personnel group and a pooled incidence rate of 30,91 per 100.000 person-years for the general population group. The difference between both groups was statistically significant (IRR = 0,7113, P < 0,0001, 95% CI [0,6929; 0,7301]).

Post Hoc Analysis

Four of the 97 studies from the general population group had an extremely high incidence rate of 124,07 per 100.000 person-years up to 192,58 per 100.000 person-years (Schofield et al., 2017; Markkula et al., 2017; Sailas et al., 2005; Amminger et al., 2006). An additional analysis was done without these outliers, to see whether these studies influence our findings. The analysis showed a pooled incidence of 30,24 per 100.000 person-years for the general population. The difference between both groups was again statistically significant (IRR = 0.7269, P < 0,0001, 95% CI [0,7080; 0,7461]).

Discussion

The goal of this meta-analysis was to research whether people who have been enlisted in the army have a higher incidence of psychotic disorders in comparison to the general population. Our results showed that people who are enlisted in the army in fact have a lower incidence of psychotic disorders than the general population. This is contrary to our hypothesis, that army personnel would have a higher incidence of psychotic disorders.

Interpretation of the Results

The hypothesis that psychotic disorders would more frequently occur in army personnel was set mostly because of a bigger predisposition of traumatic events in the army, which might have an effect on developing psychotic disorders. However, no evidence was

found to support this hypothesis. The results showed evidence for the opposite, that people in the army personnel cohort have a lower incidence of psychotic disorders.

The articles used for the army group consisted of the article of Ramsey et al. (2017) which provided data from veterans who served in Iraq, whereas the other two studies (Cowan et al., 2011; Manrique-Garcia et al., 2012) focus on conscripts and active army personnel. This means that the group was very heterogeneous and included people who served in very traumatic battlefield situations as well as enlisted conscripts who have never been on a mission. One of the studies containing the conscripts (Cowan et al., 2011) reported an incidence rate of 14,30, while the other two studies showed an incidence rate of 32,33 (Manrique-Garcia et al., 2012) and 30,46 (Ramsey et al., 2017). This means that when that conscript cohort study would be excluded from the meta-analysis, the pooled incidence rate would be much more similar to the pooled incidence rate of the general population group. It could be assumed that conscripts who have not been on missions, and thus are less likely to encounter traumatic events, would have a lower incidence rate than the veterans. When they actually do go on missions and experience traumatic events the incidence rises more towards the incidence rate of the veterans. Only the article of Ramsey et al. (2017) mentions that their participants have fought on an active battlefield. The other two studies do not mention this and it is therefore uncertain if active participation on the battlefield has influence on the incidence of psychosis.

Four included studies in the general population group reported incidence rates greater than hundred per 100.00 person-years (Schofield et al., 2017; Markkula et al., 2017; Sailas et al., 2005; Amminger et al., 2006), with the highest incidence rate in the study of Schofield et al. (2017) of 192,58 per 100.000 person-years. All four studies were focused on specific cohorts with a bigger risk of developing psychosis, such as immigrants, young men and prison populations. A post hoc analysis was performed to see whether these studies would have an

effect on the outcome. The post hoc analysis showed that the difference between both groups was still significant and had little effect on the incidence rate ratio. However, more articles with high incidence rates in the general population group were focused on specific groups which might have made the general population more heterogeneous than the army group. This might have led to the general population group having a higher pooled incidence rate.

Strengths and Limitations

This is the first meta-analysis that researches the incidence of psychotic disorders in army personnel, and compares it to incidence rates in the general population. Currently, there is a lack of knowledge on the incidence of psychotic disorders in this particular cohort.

The first limitation is that the two groups differed a lot. The general population group consisted of a lot more studies than the army personnel group. The army cohort consisted of three studies of which one was Swedish and the other two from the United States of America. The general population group included a more varied list of countries, predominantly consisting of western countries, but also countries like Taiwan and South Korea. The army group included only the diagnostic outcomes of schizophrenia and brief psychosis, whereas the general population group was made out of multiple studies which included a wide variety of multiple psychotic disorders. The army group also consisted of mostly men, for instance 87.6% were men in the study of Ramsey et al. (2017). Whereas this varied a lot between the studies in the general population group.

The second limitation is that most studies were set in the Western world. With the exception of a few studies, almost all studies are set in Europe, USA or Canada. Therefore, the results of this meta-analysis are less applicable to Asian or African countries.

Recommendations and Clinical Implications

Currently there is little information on the incidence of psychotic disorders in the army. This meta-analysis showed that the incidence of psychotic disorders is lower in army

personnel cohorts than in the general population. However, the used articles for the army group in this meta-analysis varied in incidence and both groups also differed a lot. This might have influenced the results. To battle that, future studies should focus on comparing the army cohort with a more suitable comparison group or to make multiple comparison groups. These comparison groups should have a comparable diagnostic outcome, population size and country settings.

It is important to understand what variables increase the risk of developing a psychotic disorder. According to the current study, serving in the army is not a variable that attributes to the development of a psychotic disorder. This result might also imply that the mental health services provided by the army are doing well at keeping the rates of psychotic disorders low. The screening tactics used to detect and prevent psychotic disorders in the army, might have implications to also lower the incidence in the general population. Veteran support groups should consider the incidence and prevalence of psychotic disorders to support the veterans with their struggles. It is also important for individuals who are eager to join the army to consider what impact army service might have on their lives.

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Schofield, P., Thygesen, M., Das-Munshi, J., Becares, L., Cantor-Graae, E., Pedersen, C., & Agerbo, E. (2017). Ethnic density, urbanicity and psychosis risk for migrant groups - A population cohort study. *Schizophrenia research*, *190*, 82–87. https://doi.org/10.1016/j.schres.2017.03.032

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Appendix

Search Terms used for PubMed

((((((((inciden*[Title/Abstract]) OR epidemiolog*[Title/Abstract])) OR ((((((episod*[Title/Abstract]) OR contact*[Title/Abstract]) OR admission*[Title/Abstract]) OR admit*[Title/Abstract])) AND (((first*[Title/Abstract]) OR 1st[Title/Abstract]) OR hospital*[Title/Abstract]))) OR ((case[Title/Abstract]) AND register*[Title/Abstract])) OR case control*[Title/Abstract]) OR ((((prospectiv*[Title/Abstract]) OR population*[Title/Abstract]) OR communit*[Title/Abstract]) OR survey*[Title/Abstract]))) AND (((((((((schizo*[Title/Abstract]) OR (((psychotic[Title/Abstract]) OR psychosis[Title/Abstract]) OR psychoses[Title/Abstract])) OR bipolar disorder*[Title/Abstract]) OR delusion* disorder[Title/Abstract]) OR (((((illness*[Title/Abstract]) OR disorder*[Title/Abstract])) AND mental[Title/Abstract]) AND (((severe[Title/Abstract]) OR serious[Title/Abstract]) OR chronic[Title/Abstract]))) OR SMI[Title/Abstract]) OR mani* depressi*[Title/Abstract]) OR chronic psychosis) OR schizoaffective disorder) AND ("2002/01/01"[PDat] : "2017/12/31"[PDat])

Search Strategy as used in Web of Science

#19 #18 AND #1 DocType=All document types; Language=All languages;
#18 #17 AND #11 DocType=All document types; Language=All languages;
#17 #16 OR #15 OR #14 OR #13 OR #12 DocType=All document types; Language=All languages;
#16 TI=(prospectiv* or population* or communit* or survey*) DocType=All document types; Language=All languages;
#15 TI=(case control*) DocType=All document types; Language=All languages;

#14 TI=(case AND register)

DocType=All document types; Language=All languages;

#13 TI=(inciden* OR epidemiolog*)

DocType=All document types; Language=All languages;

#12 TI=((first* OR 1st OR hospital*) AND (episod* OR contact* OR admission* OR admit*))

DocType=All document types; Language=All languages;

#11 #10 OR #9 OR #8 OR #7 OR #6 OR #5 OR #4 OR #3 OR #2

DocType=All document types; Language=All languages;

#10 TI=(schizoaf* disorder)

DocType=All document types; Language=All languages;

#9 TI=(mani* depressi*)

DocType=All document types; Language=All languages;

#8 TS=psychosis

DocType=All document types; Language=All languages;

#7 TI=(SMI)

DocType=All document types; Language=All languages;

#6 TI=((sever OR serious OR chronic) AND mental AND (illness* OR disorder*))

DocType=All document types; Language=All languages;

#5 TI=(delusion* disorder)

DocType=All document types; Language=All languages;

#4 TI=(bipolar disorder*)

DocType=All document types; Language=All languages;

#3 TI=(psychotic OR psychosis OR psychoses)

DocType=All document types; Language=All languages;

#2 TI=(schizo*)

DocType=All document types; Language=All languages;

#1 PY=(2002-2017)

DocType=All document types; Language=All languages;

Table 1

Descriptive statistics of included articles

	Country	Period	Type	Diagnostic outcomes	Number of cases
Amminger et al 2006	Australia	1997-2000	First treatment	All psychosis	1019
Andersen et al 2007	Norway	1877-2005	First admission	Schizophrenia, affective psychoses	89
Anderson et al 2012	Canada	2000-2006	First contact	Schizophrenia spectrum disorders	456
Anderson et al 2015	Canada	1999-2008	Population register	F20+25	21363
Baldwin et al 2002	Ireland	1995-2000	First contact	All psychosis	69
Baldwin et al 2003	Ireland	1995-2002	First contact	All psychosis, Schizophrenia spectrum psychosis	146
Baldwin et al 2005	Ireland	1995- 2003	First contact	All psychoses	194
Barghadouch et al 2018	Denmark	1993-2000	Cohort	Non-affective disorders	51
Bogren et al 2009	Sweden	1947-1997	First contact	Schizophrenia, schizoaffective, non-affective, affective	89
Bogren et al 2010	Sweden	1947-1997	First presentation	Schizophrenia & schizoaffective, non-affective, affective	108
Boonstra et al 2008	The Netherlands	2002	First contact	Non-affective psychoses	75
Burns et al 2008	South Africa	2005	First presentation	All psychosis	160
Cantor-Graae et al 2003	Denmark	1970-1998	Population register	Schizophrenia	10278
Cantor-Graae et al 2005	Sweden	1999-2001	first contact	Psychotic disorders	150
Cantor-Graae et al 2007	Denmark	1970-2001	Population register	Schizophrenia, non-affective disorders, affective disorders	10779

Cantor-Graae et al 2013	Denmark	1995-2010	Population register	Schizophrenia spectrum disorders	10546
Castagnini et al 2013	Denmark	1995-2008	First diagnosis	Acute and transient psychosis	7926
Cheng et al 2010	England	2002-7	First contact	Non-affective psychosis	285
Cheng et al 2011	England	2002-2007	First contact	All clinicically relevant psychotic disorder	285
Chien et al 2004	Taiwan	1997-2001	First contact/ claim	Schizophrenia	419
Cocchi et al 2014	Italy	2007 - 2009	First contact	Schizophrenia and related syndromes	43
Coid et al 2008	England	1996- 2000	First contact	All psychosis	484
Cowan et al 2011	USA	2000-2009	First hospitalization	Schizophrenic disorders	1976
Filatova et al 2016	Finland	1966/ 1986	Cohort	Psychoses	295
Gigantesco et al 2012	Italy	2008	First contact	All psychotic disorders	143
Gould et al 2006	England	2002	First presentation	All psychotic illnessess	111
Hanoeman et al 2002	Suriname	1992-93	First admission	Schizophrenia or Schizophreniform disorder	73
Hardoon et al 2013	England	2000 - 2010	First record or diagnosis	1. Schizophrenia 3. Other non-organic psychosis	7364
Harlap et al 2009	Israel	1964-76	Cohort	Schizophrenia	637
Harris et al 2005	Australia	MISSING	First presentation	All psyhcosis	224
Hoeffding et al 2017	Denmark	1995-2013	Population register	Schizophrenia and related disorders	31647
Hogerzeil et al 2014	The Netherlands	2000-2005	First contact & case register	Schizophrenia	1097
Hollander et al 2016	Sweden	1998-2011	Population register	Non-affective disorders	3704
Jongsma et al 2018	England, France, Italy, The	2010-2013	First contact	All psychotic disorders	2774

	Netherlands, Spain, Brazil				
Jorgensen et al 2011	Sweden	2005	Case register	Non-affective psychosis and schizophrenia	416
Juvonen et al 2007	Finland	1950-1959	Population register	Schizophrenia, schizoaffective, schizophreniform	597
Kim et al 2017	South Korea	2002-2013	Cohort	Schizophrenia	9387
Kirkbride et al 2006	England	1997-1999	First contact	All psychotic disorders	568
Kirkbride et al 2007	England	1997-1999	First contact	Bread psychosis	295
Kirkbride et al 2007	England	1997-1999	First contact	Any psychotic disorder	148
Kirkbride et al 2008	England	1996 - 1998/ 1998 - 2000	First contact	All psychotic disorders	484
Kirkbride et al 2013	England	2009 - 2011	First presentation	All psychotic disorders	357
Kirkbride et al 2016	England	2009-2013	First contact	All psychoses	687
Kirkbride et al 2017	England	2009-2013	First Contact	All psychotic disorders	687
Kirkbride et al 2017	England	2009-2013	First Contact	All psychotic disorders	687
Lasalvia et al 2014	Italy	2005-2007	First contact	All psychoses	558
Laursen et al 2007	Denmark	1955-1987	Population register	Schizophrenia, schizoaffective	13297
Li et al 2007	Sweden	1987-2004	Population register	All psychosis	40228
Markkula et al 2017	Finland	2011-2014	Population register	Non-affective psyhoses	2105
Menezes et al 2007	Brazil	2002 - 2004	First contact	All psychotic disorders	367
Mulè et al 2016	Italy	2008-11	First contact	FEP	204
Nielsen et al 2016	Denmark	1977-2002	Population register	Schizophrenia	6729
Nielsen et al 2017	Denmark	1955-1999	Population register	schizophrenia	21305
Norredam et al 2009	Denmark	1994-2003	Cohort	Psychotic disorders	1127
Norredam et al 2010	Denmark	1994-2003	Cohort	Psychotic disorders	791

Nosarti et al 2012	Sweden	1973-1985	First admission	Non-affective psychosis, dperessive, eating, drug/ alcohol	464
Nyberg et al 2018	Sweden	1968-2005	Cohort	Schizophrenia , Other psychotic disorders	4641
O'Donoghue et al 2016	Ireland	2006-11	First presentation	Psychosis	292
Paksarian et al 2015	Denmark	1971-1991	Population register	Schizophrenia, non-affective, bipolar	12970
Payne et al 2006	Canada	1993-1995	First admissions	Non affective FEP	146
Pelayo-Terán et al 2008	Spain	2001-2005	First contact	Schizophrenia Spectrum disorder	174
Proctor et al 2004	England	1998-2001	Case register	All psychosis	227
Qin et al 2005	Denmark	1950-1987	Population register	Schizophrenia and schizophrenia-like psyhcosis	10831
Ramsey et al 2017	USA	2001-2014	Cohort	schizophrenia	3273
Richardson et al 2018	England	2009-2013	First Contact	All non-organic psychosis	631
Sailas et al 2005	Finland	1984-1994	Cohort	Psychosis	71
Salokangas et al 2011	Finland		Case register	Schizophrenia	9442
Schofield et al 2011	England	1996-2006	First GP record	All psychotic disorders	508
Schofield et al 2011	England	1996-2006	First GP record	All psychotic disorders	508
Schofield et al 2017	Denmark	1965-2013	Population register	Non-affective disorders	1825
Schofield et al 2017	Denmark	1965-1997	Population register	Non-affective disorders	26881
Selten et al 2002	Netherlan ds	1970-1992	Case register	Schizophrenia	11423
Simon et al 2017	USA	2007-2013	First contact	All non-substance induced psychotic disorders	36513
Singh et al 2004	England	1992-1994	First contact	All psychotic disorders	168

Sipos et al 2004	Sweden	1989-2001	First admission	Schizophrenia and non-affective psychosis	195
Smith et al 2006	Canada	1902-1913	First admission	Schizophrenia, schizoaffective disorder, schizophreniform disorder, psychosis nos	807
Soderlund et al 2015	Sweden	1955-1967	Population register	Schizophrenia, non-affective, bipolar	2003
Sorensen et al 2014	Denmark	1955-1993	Population register	Schizophrenia	17389
Sorensen et al 2015	Denmark	1955-1997	Population register	Schizophrenia	22636
Sørensen et al 2016	Denmark	1930-1976	Cohort	Schizophrenia	4636
Stain et al 2008	Australia	2001-2005	First presentation	HoNOS scores	308
Sundquist et al 2005	Sweden	1997-1999	Population register	Psychosis and depression	6163
Sutterland et al 2013	Netherlands	1996-2006	First GP record	1. Schizophrenia Spectrum Disorder 2. Schizophrenia	293
Szöke et al 2014	France	2010 - 2012/ 2010 - 2012	First contact	All psychosis	133
Szoke et al 2016	France	2010-2014	First contact	Non-affective and affective psychoses	212
Tarricone et al 2012	Italy	2002-2009	First contact	All psychotic disorders	163
Tarricone et al 2016	Italy	2002-10	First contact	All psychoses	187
Tortelli et al 2014	France	2005-2009	First admission	All psychoses	256
Turola et al 2012	Italy	1979-2008	First diagnoses	Schizophrenia	1722
Vassos et al 2016	Denmark	1955-2006	Population register	All psychiatric disorders	24638
Veen et al 2004	The Netherlands	1997-1999	First contact	All psychotic disorders	168
Veling et al 2006	Netherlands	1997-1999/2000-2005	First contact	Schizophrenic disorders	229

Veling et al 2008	The Netherlands	1997-1999/2000-2005	First contact	Psychotic disorders	466
Veling et al 2011	The Netherlands	1997-1999/2000-2005	First contact	All psychotic disorders	618
Vikstrom et al 2017	Sweden	1988-2012	Cohort	Non-affective disorders	30
Wang et al 2017	Taiwan	1997-2007	Cohort	Schizophrenia	238
Weiser et al 2008	Israel	MISSING	Population register	Schizophrenia	1686
Werbeloff et al 2012	Israel	1978-1992	Case register	Schizophrenia	2335
Zammit et al 2010	Sweden	1972 - 1977	First admission	Non-affective psychosis	881
Zandi 2010	The Netherlands	2002 - 2004	First contact	All psychotic disorders	77

Table 2
Crude rates

Cases	Person-years	Crude Rates
Studies army personnel		
Cowan et al 2011	1976	13817104	14,3
Manrique-Garcia et al 2012	471	1456735	32,33
Ramsey et al 2017	3273	10746084	30,46
Studies general population		
Amminger et al 2006	1019	821308	124,07
Andersen et al 2007	39	256040	15,23
Anderson et al 2012	456	784500	58,13
Anderson et al 2015	21363	38409212	55,62
Baldwin et al 2002	69	368190	18,74
Baldwin et al 2003	146	721378	20,24
Baldwin et al 2005	194	613360	31,63
Barghadouch et al 2018	51	99216	51,4
Bogren et al 2009	89	253750	35,07
Bogren et al 2010	80	112906	70,86
Boonstra et al 2008	75	348222	21,54
Burns et al 2008	160	508275	31,48
Cantor-Graae et al 2003	10278	30798560	33,37
Cantor-Graae et al 2005	150	401266	37,38
Cantor-Graae et al 2007	10779	34100000	31,61
Cantor-Graae et al 2013	10546	19984628	52,77
Castagnini et al 2013	4576	49921662	9,17
Cheng et al 2010	285	567921	50,18
Cheng et al 2011	285	569921	50,01
Chien et al 2004	419	664118	63,09
Cocchi et al 2014	43	650000	6,62
Coid et al 2008	484	828546	58,42
Cowan et al 2011	885	3487789	25,37
Filatova et al 2016	244	314250	77,65
Gigantesco et al 2012	143	1941853	7,36
Gould et al 2006	367	2315203	15,85
Hanoeman et al 2002	73	453384	16,1
Hardoon et al 2013	7.364	23429844	31,43
Harlap et al 2009	637	2931357	21,73
Harris et al 2005	224	1900000	11,79
Hoeffding et al 2017	31647	57100000	55,42
Hogerzeil et al 2014	1097	1221486	89,81
Hollander et al 2016	3705	8929803	41,49

Jongsma et al 2018	2183	12933670	16,88
Jorgensen et al 2011	416	5777778	7,2
Juvonen et al 2007	597	10988692	5,43
Kim et al 2017	9387	1,212E+09	76,29
Kirkbride et al 2006	111	373817	29,69
Kirkbride et al 2007	295	565000	52,21
Kirkbride et al 2007	268	565576	47,39
Kirkbride et al 2008	94	828548	11,35
Kirkbride et al 2013	357	838574	42,57
Kirkbride et al 2016	687	2021663	33,98
Kirkbride et al 2017	573	2021663	28,34
Lasalvia et al 2014	558	3077555	18,13
Laursen et al 2007	13297	35732161	37,21
Li et al 2007	40228	110590326	36,38
Markkula et al 2017	2105	1412117	149,07
Menezes et al 2007	218	565576	38,54
Mulè et al 2016	204	1283739	15,89
Nielsen et al 2016	6729	17561876	38,32
Nielsen et al 2017	21305	105178673	20,26
Norredam et al 2009	1127	1456950	77,35
Norredam et al 2010	791	1596100	49,56
Nosarti et al 2012	669	9520833	7,03
Nyberg et al 2018	10205	27528903	37,07
O'Donoghue et al 2016	292	1331060	21,94
Paksarian et al 2015	12970	15700000	82,61
Payne et al 2006	146	1170000	12,48
Pelayo-Terán et al 2008	174	12588864	1,38
Proctor et al 2004	227	747609	30,36
Qin et al 2005	17943	37822970	47,44
Richardson et al 2018	548	2021794	27,1
Sailas et al 2005	71	44982	157,84
Salokangas et al 2011	9442	276626614	3,41
Schofield et al 2011	508	1039253	48,88
Schofield et al 2017	1825	947656	192,58
Schofield et al 2017	26881	37335812	72
Selten et al 2002	11423	59925236	19,06
Simon et al 2017	36513	46652042	78,27
Singh et al 2004	568	1631442	34,82
Sipos et al 2004	1311	8544168	15,34
Smith et al 2006	807	23604691	3,42
Soderlund et al 2015	2003	2595864	77,16
Sorensen et al 2014	17389	50281105	34,58
Sorensen et al 2015	22636	49898592	45,36
Sørensen et al 2016	4936	13986475	35,29

Stain et al 2008	308	1744720	17,65
Sundquist et al 2005	6163	13312410	46,3
Sutterland et al 2013	293	1343761	21,8
Szöke et al 2014	133	493546	26,95
Szoke et al 2016	212	536168	39,54
Tarricone et al 2012	168	646153	26
Tortelli et al 2014	258	814215	31,69
Turola et al 2012	1722	9277950	18,56
Vassos et al 2016	24638	52103520	47,29
Veen et al 2004	168	794096	21,16
Veling et al 2006	229	1034896	22,13
Veling et al 2008	466	1469758	31,71
Veling et al 2011	163	928104	17,56
Veling et al 2014	618	1870408	33,04
Vikstrom et al 2017	30	725900	4,13
Wang et al 2017	238	825759	28,82
Weiser et al 2008	1686	5095798	33,09
Werbeloff et al 2012	2335	7413785	31,5
Zammit et al 2010	881	6318699	13,94
Zandi 2010	104	260672	39,9

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