Employment and relationship outcomes in first-episode psychosis: A systematic review and meta-analysis of longitudinal studies

Running title: Meta-analysis of social outcomes in first onset psychosis

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Abstract

As employment and relationship status are important long-term outcomes in individuals with a diagnosis of first episode psychosis (FEP) disorders, there is a need to elucidate more accurately the extent of these social deficits in people with FEP. This in turn can aid treatment planning and policy development ultimately ensuring more complete and sustainable recoveries. We carried out a systematic review and meta-analysis of longitudinal studies in FEP reporting on employment and relationship status during the illness course. Random effects meta-analyses and meta-regression analyses were employed. Seventy-four studies were included with a sample totalling 15272 (range=20-1724) FEP cases with an average follow-up duration of 8.3 years (SD=7.2). 32.5% (95%CI=28.5-36.9) of people with a diagnosis of FEP disorders were employed and 21.3% (95%CI=16.5-27.1) were in a relationship at the end of follow-up. Studies from high-income countries and Europe had a higher proportion of people in employment at the end of follow-up compared to middle-income nations and non-European countries. The inverse was found for relationship status. The proportion of people with a diagnosis of FEP in employment decreased significantly with longer follow-up. Living with family, being in a relationship at first contact and Black and White ethnicities were identified as significant moderators of these outcomes. These findings highlight marked functional recovery deficits for people with FEP, although cultural factors need to be considered. They support the need for interventions to improve employment opportunities, and social functioning, both in early psychosis and during the longitudinal illness course.

Key words: First-episode psychosis; schizophrenia; occupation; relationships; follow-up; recovery

1. Introduction

The proportion of people who gain a clinical and functional recovery after the diagnosis of first episode psychosis (FEP) has not improved over time, with only one third of patients meeting criteria for recovery in cohort studies published since 1997 (Lally et al. 2017). This low recovery rate and poor functional outcomes are inextricably linked (van Os et al. 2009; Killackey et al. 2006). The clinical course for those with FEP is such that ordinary ambitions to gain employment and to have romantic relationships are not attainable for many (Rinaldi et al. 2010; Killackey et al. 2006).

There is variability in reported employment rates for people with FEP, with rates varying from 23% to 65% (Marwaha and Johnson 2004; Reininghaus et al. 2008; Falk et al. 2016), and with reported decreases in employment rates to 10-20% during the first 5 years of illness (Ajnakina et al. 2017; Johnson et al. 2014; Norman, Manchanda, and Windell 2014). In psychotic disorders sustained unemployment leads to increased stress, anxiety (Topor et al. 2014), decreased social networks (Marwaha and Johnson 2004, 2005), and increased economic burden through reduced and lost earnings (Hakulinen et al. 2019), increased welfare benefits and carer costs (Killackey et al. 2006). Further, people with psychotic disorders find it challenging to either develop or maintain romantic relationships, with only 5-16% shown to be in relationships within 5 years after illness onset (Gignac et al. 2015; Jordan et al. 2014; Tohen et al. 2012; Whitty et al. 2008), contributing to loneliness and social isolation (Sundermann et al. 2014). The heterogeneity in studies on these social outcomes may result from relying on small sample sizes and restricted recruitment settings (Marwaha and Johnson 2004). Individual studies also tend to be restricted to high-income countries (Johnson et al. 2014), which in turn reduces generalisability and representativeness of the knowledge of these functional outcomes.

As both unemployment and the lack of relationships play an important role in influencing longer-term psychosis outcomes, such as poor quality of life (Caron J et al. 2005), increased

psychiatric hospitalisations (Ajnakina et al. 2019; Ajnakina et al. 2017; Agerbo et al. 2004) and reduced recovery rates (Mattsson et al. 2008), there is a need to elucidate more accurately the extent of social deficits in people with psychotic disorders. By establishing unbiased and generalisable estimates of how many people with FEP are employed and in relationships after their first contact with services for psychosis can potentially aid treatment planning and policy development (Friis et al. 2016) ultimately ensuring that people with FEP make more complete and sustainable recoveries and are given every opportunity to participate fully in life. It is equally important to identify moderating factors for these outcomes which may help to identify those psychosis patients who may be at higher risk for significant social deficits in the following years after the first contact with services (Lay et al. 2000; Friis et al. 2016).

Therefore, we conducted a systematic review and meta-analysis of all longitudinal studies that investigated the proportion of people affected with FEP who were employed and in relationships at the end of follow-up. We, further, identified the moderators for these outcomes. We focused on people with FEP because they share a common starting point in their illness course (Petersen et al. 2008) which permits comparison of outcomes in cases who are at the same stage of illness (Drake et al. 2007; Petersen et al. 2008).

2. Methods

This meta-analysis was conducted and reported according to the Meta-Analysis of Observational Studies in Epidemiology guidelines (Stroup et al. 2000) and the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) and Meta-analyses standard (Moher et al. 2009).

2.1. Search Strategy

Two independent authors (O.A. and J.L.) searched PubMed, Medline, and Scopus from database inception until 15 February 2021. Key words used were: ("first episode psychosis"

OR "first episode psychotic" OR "first episode schizophr*" OR "first onset psychosis" OR "first onset psychotic" OR "first onset schizophr*" OR "early onset psychosis" OR "early onset psychotic" OR "early onset schizophr*" OR "recent onset psychosis" OR "recent onset psychotic" OR "recent onset schizophr*" OR "early psychosis" OR "early psychotic" OR "early schizophr*" OR “FEP” OR “schizophrenia” OR “schiz*” OR “affective”) AND (“social” OR “employment” OR “relationship” OR “employ*” OR “relation*” AND “outcome” OR “follow-up”). We further carried out a manual search of the reference lists of the obtained articles. Initially, we screened all retrieved articles based on title and abstract followed by the inspection of the full texts for those studies that were identified as potentially eligible. When data were incomplete, we contacted the corresponding authors inviting them to provide us with the necessary data. In the cases when the studies reported on overlapping cohorts, the ones with the longest follow-up or with the largest study sample for each respective outcome were included. For multi-site studies, data for the combined sample were retrieved.

2.2. Inclusion and exclusion criteria

Longitudinal studies with retrospective and prospective designs that fulfilled the following criteria were included in the analyses:

i) Studies included individuals with FEP who were making their first contact with mental health services for psychosis; in this meta-analysis, FEP were categorised into three broad categories: 1) first episode psychosis (FEP); 2) first episode schizophrenia (FES); and 3) first episode affective psychosis (FEAP);

ii) Studies used a specified standardised diagnostic system such as International Classification of Diseases (ICD versions 8, 9 and 10), Diagnostic and Statistical Manual of Mental Disorders (DSM versions III and IV), and the Research Diagnostic Criteria (RDC);

iii) Articles reported a proportion of patients who were in any form of employment (or any study programs) and relationships at the end of follow-up (these outcomes are defined below);

iv) Studies with a follow-up period of 12 months or longer published in English language in peer-reviewed journals.

We excluded studies if they: i) were Randomised Control Trials; this is because the differences in care entailed by the structured intervention beyond the routine care may impact results; ii) evaluated the practicability and effectiveness of various treatment strategies for FEP; iii) included samples with psychosis that resulted from medical conditions, such as encephalitis or epilepsy and iv) did not report quantitative data on the employment and relationship status of patients with FEP at the end of follow-up.

2.3. Data Extraction

Three authors (J.L., O.A., E.F.) retrieved all data employing a predetermined data extraction form; any discrepancies were settled by consensus. A detailed description of all the variables and their definitions are detailed in Supplementary Materials.

2.4. Definitions of outcomes

The co-primary outcomes were:

a) Being employed was defined as having either a full- / part-time job, being a student at school or university, or being involved in a study / training program. Although some studies that met our inclusion criteria used a broader definition of employment to include self-employed (Albert et al. 2011; Gignac et al. 2015), housework (Fisher et al. 2015; Jarbin, Ott, and Von Knorring 2003; Thorup et al. 2014), being on sick leave or maternity leave (Thorup et al. 2014) and activities in day centres (Jarbin, Ott, and Von Knorring, 2003), while others specified that individuals were expected to be only in full-time employment (Gignac et al. 2015; Harrow et al. 2005), or to be in work or education for at least 50% previous year (Boden et al. 2009; Morgan et al. 2014) to be considered as employed, the majorities of the studies defined being employed at the end of follow-up in simple terms as being in employment or studying (Aadamsoo et al. 2011; Abdel-Baki et al. 2017; Ahmad et al. 2016;

Amminger et al. 2011; Birchwood et al. 1992; Chang et al. 2011; Harrison et al. 1999; Hollis 2000; Jaracz et al. 2015; Kua et al. 2003; Marneros et al. 2003; Petersen et al. 2008).

b) Being in a relationship was defined as being in a romantic relationship, having a partner, cohabiting and/or being married. Similar to the employment outcome, the relationship status at the end of follow-up was self-described by the patients in most studies and was defined as a categorical variable (i.e., married/has a partner/in a relationship/cohabiting vs being single).

Moderator variables

Because employment and relationship status are complex, to elucidate what factors moderate these outcomes we extracted information on a range of different circumstances and included them as moderators in our analyses. The included moderators encompassing demographic factors, such as age at illness onset (years), and a proportion of patients who were men (%). We elucidated a proportion of patients who were reported to be of White ethnicity (%) comparative to all non-white ethnic groups; similarly, a proportion of patients reported to be of Black (%) and Asian (%) ethnicity comparative to non-Black and non-Asian ethnic groups respectively. Variables related to clinical presentation and treatment included duration of untreated psychosis (days), mean baseline psychotic symptom scale scores, proportion of patients who were reported to be treated with taking antipsychotic medications (%) at baseline and at the end of a follow-up period, and proportion of responders who were reported to be complaint with their antipsychotic medications (%) at the end of follow-up. We further included factors related to social circumstance at the time of recruitment; these included the proportion of patients who were employed (%), single (%), in a relationship (%) and living at home (%). To capture the effects of study designs on the outcomes, we additionally included the proportion of patients who were reported to be lost during the follow-up period (%), length of follow up and study year publication as potential modifiers.

2.5. Statistical analysis

All analyses were carried out in Comprehensive Meta-Analysis software (CMA, Version 3). The pooled prevalence of each outcome was estimated employing a random-effects model (Borenstein et al. 2010) which was chosen to account for the impact of the differences in interventions received across the studies on employment and relationship status at the end of follow-up. To compare these outcomes based on specific factors, we further stratified these analyses according to: 1) baseline diagnosis 2) assessment types; 3) length of follow-up; 4) study region; 5) study settings, and 6) economic status of the country where the study took place. To detect and illustrate publication bias a forest plot and a funnel plot were utilised (Phan et al. 2014; Duval and Tweedie, 2000).

We employed an unrestricted maximum likelihood meta-regression to identity the moderating factors which included moderating age, male gender, ethnicity, baseline psychotic symptoms, relationship and employment status at baseline, duration of untreated psychosis (DUP), length of follow-up, attrition rate, and study year, treatment with antipsychotic medications at baseline and during the follow-up period, and adherence with antipsychotic medications during follow-up. The meta-regression was performed with each moderator variable being entered individually.

Publication bias was measured with the Egger regression test (Opjordsmoen et al. 2010). The Duval and Tweedie “trim-and-fill” method was used to adjust the presence of any publication bias (Tohen, Tsuang, and Goodwin, 1992). Heterogeneity was assessed with the Q statistic yielding a chi-square and *p*-value, and the I^2 statistic with scores above 50% and 75% indicating moderate and high heterogeneity (Higgins et al. 2003). Statistical significance was at the $p \leq 0.05$ level.

3. Results

3.1. Search results and included participants

A flowchart depicting the process of the study selection process is presented in **Figure 1**; descriptions of all article included in the analyses are provided in **Table 1** and Supplementary Table 1. The search produced 1951 unique publications, which were considered at the title and abstract level; of these, full text review for 533. The latter resulted in a total of 74 studies that met our inclusion criteria. The combined sample across the included studies comprised 15272 FEP cases (range=20-1724) with a mean age at illness onset of 26.4 years (SD=7.5, median=25.6, range=14.3-70); 58.6% of these were male and 56.8% had a baseline diagnosis of FES.

3.2. Meta-analysis of employment at the end of follow-up

The pooled proportion of people with FEP who were employed at the end of follow-up are provided in **Table 1** and Supplementary Figure 1. We identified 70 studies that reported the number of people affected with FEP who were employed at the end of follow-up (Aadamsoo et al. 2011; Abdel-Baki et al. 2011; Abdel-Baki et al. 2017; Agius et al. 2008; Ahmad et al. 2016; Ajnakina et al. 2017; Albert et al. 2011; Amminger et al. 2011; Berg et al. 1983; Birchwood et al. 1992; Bland and Orn 1978; Boden et al. 2009; Bühler et al. 2002; Chang et al. 2011; Coryell et al. 1996; Chua et al. 2019; Eggers et al. 2001; Falk et al. 2016; Fisher et al. 2015; Gignac et al. 2015; Gupta et al. 1997; Harrison et al. 1999; Harrow et al. 2005; Helgason 1990; Henry et al. 2010; Hill et al. 2012; Ho et al. 1998; Jabs et al. 2004; Jaracz et al. 2015; Jarbin et al. 2003; Johnson et al. 2014; Kaleda 2009; Kua et al. 2003; Langeveld et al. 2014; Lay et al. 2000; Lehtinen et al. 2000; Ran et al. 2018; Marneros et al. 2003; Mason et al. 1995; McCreadie et al. 1989; Morgan et al. 2014; Norman et al. 2014; Petersen et al. 2008; Rangaswamy 2012; Ropcke and Eggers 2005; Schimmelmann et al. 2008; Schmidt et al. 1995; Scottish Schizophrenia Research Group 1992; Singh et al. 2004; Soskis, Harrow, and Detre 1969; Stirling et al. 2003; Stralin et al. 2018; Tang et al. 2014; Thara 2004; Thorup et al. 2014; Tohen et al. 1990;Torgalsboen et al. 2015; Turner et al. 2009; Turner et al. 2015; Ucok et al. 2011; Van Winkel et al. 2007; Vazquez-Barquero et al. 1999; Velthorst et al. 2017; Verdoux et al. 2002; White et al. 2009; Whitty et al. 2008; Wiersma et al. 2000;

Wieselgren and Lindstrom 1996; Zandi et al. 2011; Zhang-Wong et al. 1995) with a total sample of 14828 (range=22-1724). The average length of follow-up among these studies was 8.3 years (SD=7.2, median=5 years, interquartile range (IQR)=3-13). The pooled proportion of employed patients with a diagnosis of FEP at the end of follow-up was 32.5% (95% Confidence Intervals (CI)=28.5-36.9, I^2=94.6, Q=1283.2); the trim-and-fill method showed that the proportion of FEP cases in employment was 27.6% (95%CI=32.6-42.7) after adjusting for missing studies. The Begg-Mazumdar (Kendall's tau *b*=-0.010, *p*=0.910) and Egger test (*t*=0.75, df=65, *p*=0.436) indicated no publication bias.

3.3. Stratified analyses of employment

Results from the stratified analyses of employed at the end of follow-up individuals with are presented in **Table 2**. The pooled proportion of individuals employed at the end of follow-up was higher in studies which were carried out in countries with high income economies (33.4%, 95%CI=29.7-37.9, I^2=93.4, Q=921.1 (trim-and-fill adjusted: 34.1%) than countries with middle income economies (28.1%, 95%CI=15.4-45.6, I^2=95.6, Q=147.6). Compared to studies from Asia (30.7%, 95%CI=20.8-42.8, I^2=94.9, Q=156.0 (trim-and-fill adjusted: 45.4%)), the proportion of FEP cases in employment at the end of follow-up was significantly higher in studies from North America (36.9%, 95%CI=25.9-49.4, I^2=93.0, Q=172.6), Australia and New Zealand (35.5%, 95%CI=25.7-46.7, I^2=93.9, Q=49.1) and Europe (32.6%, 95%CI=27.3-38.0, I^2=93.7, Q=639.1 (trim-and-fill adjusted: 33.9%)). The pooled prevalence of employment among FEP cases at the end of follow-up was highest in studies with a length of follow-up between 1-2 years (43.0%, 95%CI=36.5-44.3, I^2=91.6, Q=166.1) and lowest in studies with a follow-up of ≥6 years (26.8%, 95%CI=22.5-31.5, I^2=93.1, Q=421.5 (trim-and-fill adjusted: 27.7%)). Compared to first episode affective disorders, individuals diagnosed with FES (29.9%, 95%CI=24.6-35.8, I^2=93.7, Q=631.1 (trim-and-fill adjusted: 35.3%)) or FEP (25.9%, 95%CI=29.4-42.3, I^2=94.1, Q=392.2) on the first contact with mental health services were less likely to be in employment at the end of follow-up (p<0.001).

3.4. Moderator variables influencing employment

Results from the unrestricted maximum likelihood meta-regression for employment at the end of follow-up are provided in **Table 3**. A lower proportion of employed FEP patients at follow-up was associated with living at home at baseline (β=-0.01, 95%CI=-0.02- -0.02, p=0.040, R^2=0.50). There was a significant association between higher loss to attrition and reduced employment at the end of follow-up (β=-0.03, 95%CI=-0.04- -0.02, p<0.001, R^2=0.18).

3.5. Meta-analysis of relationship status at the end of follow-up

The pooled proportion of people with FEP who were in relationships at the end of follow-up are reported in **Table 4** and Supplementary Figure 2. Overall, 33 studies were identified that reported on the number of FEP patients who were in relationships at the end of follow-up (Aadamsoo et al. 2011; Agius et al. 2008; Ajnakina et al. 2017; Berg et al. 1983; Birchwood et al. 1992; Bühler et al. 2002; Coryell et al. 1996; Eggerset al. 2001; Fisher et al. 2015; Gignac et al. 2015; Helgason 1990; Henry et al. 2010; Hollis 2000; Jabs et al. 2004; Jaracz et al. 2015; Jarbin et al. 2003; Jordan et al. 2014; Kaleda 2009; Lay et al. 2000; Ran et al. 2018; Marneros et al. 2003; Morgan et al. 2014; Parnas et al. 1988; Rangaswamy 2012; Ropcke and Eggers 2005; Scottish Schizophrenia Research Group 1992; Tang et al. 2014; Thara 2004; Tohen et al. 2012; Torgalsboen et al. 2015; Van Winkel et al. 2007; Vazquez-Barquero et al. 1999; Whitty et al. 2008; Wiersma et al. 2000) with a total sample of 4322 (range=20-532). The mean duration of follow-up across these studies was 10.1 years (SD=8.8, IQR=3-13). The pooled proportion of FEP cases in relationships at the end of the follow-up period was 21.3% (95%CI=16.5-27.1, I^2=95.2, Q=650.9). The Begg-Mazumdar (Kendall's tau b=-0.10, p=0.427) indicated no publication bias. Although the Egger test (t=2.79, df=30, p=0.009) suggested potential publication bias, the publication bias adjusted trim analysis found no change.

3.6. Stratified analyses of relationship status

Stratified pooled proportions of FEP cases in relationships at the end of follow-up are reported in **Table 4**. The proportion of patients who were in a relationship at the end of follow-up was significantly higher in studies from Asia (35.9%, 95%CI=25.4-47.9, I^2=88.1, Q=33.6) compared to studies from Europe (20.8%, 95%CI=17.3-24.7, I^2=77.0, Q=87.1 (trim-and-fill adjusted: 17.6%)), Australia and New Zealand (12.0%, 95%CI=9.9-14.6, $studies_n$=1), and North America (13.3%, 95%CI=2.3-50.1, I^2=98.3, Q=180.9). The studies conducted in countries with middle income economies reported a higher proportion of FEP cases who were in relationship at the end of follow-up (38.4%, 95%CI=27.8-50.2, I^2=73.1, Q=7.4) compared with studies conducted in countries with high income economies (20.0%, 95%CI=14.9-26.3, I^2=95.4, Q=592.8).

3.7. Moderator variables influencing relationship status

Results from the unrestricted maximum likelihood meta-regression for relationship status at the end of follow-up are provided in **Table 5**. A lower pooled proportion of patients who were in relationships at the end of follow-up was associated with White (β=-0.15, 95%CI=-0.02- -0.01, p<0.001, R^2=0.55) and Black (β=-0.02, 95%CI=-0.03- -0.01, p<0.001, R^2=0.67) ethnicities, and being single at baseline (β=-0.02, 95%CI=-0.04- -0.01, p=0.001, R^2=0.48). A higher proportion of FEP cases in relationships at the end of follow-up was associated with Asian ethnicity (β=0.01, 95%CI=0.01-0.02, p<0.001, R^2=0.67) and being in a relationship at the time of first contact with mental health services for psychosis (β=0.04, 95%CI=0.02-0.05, p<0.001, R^2=0.63).

4. Discussion

As far as we are aware, the present study is the first systematic review and meta-analysis to have investigated the pooled proportion of FEP cases that were in employment (including being in education or vocational training) and relationships at the end of follow-up. Uniquely to this study, we also identified moderating factors for these outcomes, which may help to identify people with a diagnosis of FEP disorders who may be at higher risk of poor long-

term outcomes. We found that one-third of all individuals with FEP were employed at the end of a 9-year follow-up and one-fifth were in relationships at the end of a 10-year follow-up period. While the proportion of individuals who were in relationships remained relatively stable, the number of employed individuals following FEP significantly decreased over time. Although evidence is accumulating that in relation to clinical outcomes (Lally et al. 2017) and service use (Ajnakina et al. 2019) the illness trajectory of FEP may not be as progressively deteriorating (Zipursky and Agid 2015) as previously thought (Schmidt et al. 1995; Ropcke and Eggers 2005), this study highlights that longitudinal social outcomes in people with FEP remain poor. Mirroring these findings, it was previously shown that recovery rates in FEP remain at 38%, without improvement seen in the past 20 years when using recovery criteria based on clinical and functional domains (Lally et al. 2017).

4.1. Social outcomes in first episode psychosis

The benefits of employment for people with FEP are clear. Employment promotes financial independence, provides social contact and personal meaning in life, and increases self-worth and self-efficacy in management of illness (Rinaldi et al. 2010). However, our results showed that only 34% of people with FEP were in employment at the end of follow-up. Stigmatisation, economic disincentives and low self-esteem are reported to be among the main barriers to employment for people with mental illnesses (Marwaha and Johnson 2005, 2004). For many, psychosis develops during a period critical to the consolidation of life skills (Killackey et al. 2006), which may result in an individual being unable to obtain qualifications or work experience to gain employment after illness onset (Marwaha and Johnson 2004). It is, therefore, important to increase accessibility to supported employment or education programs in FEP, in order to (re)-engage them in the workforce (Morgan 2013). Indeed, a meta-analysis of randomised clinical trials (RCTs) comparing individual placement and support (IPS), which is a form of structured employment support involving integration of clinical and vocational services, with the standard vocational rehabilitation in those with psychotic disorders, found that people who received IPS were twice as likely to be in

competitive employment (Modini et al. 2016). Another example of the benefits of supported employment or education programs for people with psychosis come from the Recovery After an Initial Schizophrenia Episode-Early Treatment Program (RAISE-ETP) study, which demonstrated a short-term effectiveness of coordinated specialist care that included the provision of supported education and employment in improving time spent in work or education and improving quality of life in FEP when compared to community care (Kane et al. 2016). Nonetheless, the impact of such an approach on longer-term social outcomes is yet to be investigated. Our findings further demonstrated that a reduction in the proportion of individuals with FEP who were in employment at the end of follow-up was associated with a longer duration of follow-up. This in turn may indicate that barriers to employment may increase over time, which might represent the emergence of cognitive difficulties or simply the diminishing appeal to the labour market of people as they get older particularly if they are unskilled. Nevertheless, this only reinforces the need to provide robust vocational and educational interventions, not only at the time of first contact with mental health services for psychosis, but throughout the illness course (Morgan 2013).

Despite the incorporation of vocational rehabilitation as part of clinical care for psychotic disorders (Twamley et al. 2003), the proportion of employed individuals with FEP after the first contact with mental health services has remained consistently low since 1968. One explanation for this may be that vocational rehabilitation is not always included in the care for people with psychotic disorders (Bertram and Howard 2006). Moreover, the wide variations found in employment rates between countries with different economic status may suggest that low employment rates in people following FEP are not fully explained by deficits inherent to psychotic disorders. Rather, they may be influenced by wider social, political and economic factors (Marwaha and Johnson 2004) as well as accessibility to the appropriate intervention services (Burti 2001; Saxena et al. 2006).

Although for some being in a relationship may be a source of stress (Williams 2003), for many close relationships are an important part of what makes their life meaningful (Redmond et al. 2010). It signifies having support and a strong social network, which has been shown to improve prognosis in psychotic disorders (Redmond et al. 2010; Erickson et al. 1989). However, our results showed that the longitudinal protective effect of this factor is limited to only 20% of all individuals with FEP. Previous studies have identified that people with schizophrenia are less likely to marry or be in relationships, particularly men (Murray et al. 2002). The low rates of relationships remove one potential stable caregiver from a person's life. The proportion of individuals with FEP who were in relationships at the end of follow-up was significantly higher in middle-income nations and Asia compared to high-income nations and European countries which may be explained by cultural differences and expectations (Saxena et al. 2006). Having close support in a relationship may aid recovery as a partner may help with daily activities, medication adherence, accessing clinical care and recognising signs of relapse.

4.2. Impact of moderator variables on the social outcomes in FEP patients

Social outcomes such as employment and relationship status are complex and likely to be affected by a range of different circumstances. Our results showed that White and Black ethnicity were associated with a decreased proportion of individuals who were in relationships at the end of follow-up. This highlights that people of White ethnicity affected by FEP may be as socially isolated during their illness course as individuals of Black ethnicity have been shown to be (Morgan et al. 2006). However, across the included studies, ethnicity was categorised crudely as black, white or Asian ethnicity. Although there is substantial evidence linking DUP to an increased frequency of relapse (Perkins et al. 2005; Loebel et al. 1992), and poorer social and work functioning (Perkins et al. 2005; Haas et al. 1998), our results did not support the importance of DUP in relation to employment and relationship status during first 9 years of illness. However, the significant variability in the definitions of DUP across the studies on first episode psychosis is noteworthy (Howes et al. 2021); thus,

we urge caution when generalising our observations to all patients with FEP. Furthermore, living at home at the time of the first contact with mental health services for psychosis was linked to a lower proportion of employment at the end of follow-up. It may be that living at home with the family may reflect increased premorbid dependence in individuals with psychosis, or a more severe illness presentation, which in turn is related with a decreased probability of future employment. Similarly, being single at baseline was associated with a lower proportion of individuals with FEP being in a relationship at the end of follow-up. This may imply that those who were not in a relationship at the time of their first episode may have had premorbid or early onset social impairments precluding them from developing a relationship during their illness course. Finally, our results highlighted that higher dropout rates were significantly associated with the proportion of employed individuals at the end of follow-up, potentially indicating that those patients with FEP who were not in contact with secondary health services may be overly missed during follow-up.

4.3. Methodological Considerations

In this study by examined longitudinal social outcomes distinctly for FEP, FES and affective psychosis, we arguably captured the most representative trajectory of employment and relationship status for these diagnostic categories. Having utilised sample with FEP cases safeguarded the findings against biased imposed by illness chronicity (Perry et al. 2016) or variability in duration of medication use (Lally and Gaughran 2018) and permitted comparison of these longitudinal outcomes in cases measured from the same stage of illness (Drake et al. 2007; Emsley et al. 2003). The study utilised data from a wide range of studies including in- and outpatient settings, and case notes and face-to-face interviews, increasing the generalisability of the findings (Jorgensen et al. 2014).

Notwithstanding the strengths, there are several limitations that warrant consideration. There was a significant variability in the number of articles from different region of the world, with most studies carried out in European countries. We cannot exclude a possibility that the

different health care services available to people affected with FEP in different countries might have had impacted our results (Burti 2001; Saxena et al. 2006; Tulloch et al. 2012). It is well known that local economic circumstances can have a great impact on employment among those with mental illness (Warner 2004) but these were not considered making comparisons across regions and time problematic. We did not have information on other potentially important covariates including types of treatments received, substance use and symptom profile over the course of follow-up. Further, country level social welfare benefits programs may operate in such a way as to be a disincentive to low skilled workers from returning to employment. A return to work may impact on a person's access to medical care and their ability to afford medications that may have been provided when receiving social welfare benefits, or if earning below governmental defined income thresholds. Information on the nature of relationships in the included studies in this meta-analysis varied considerably making it difficult to capture how stable these relationships were. Family support remains an important factor in aiding recovery in FEP (Ajnakina et al. 2017), due to its positive effect on service utilisation retention, medication compliance and engagement with social networks (Ajnakina et al. 2017; Sundermann et al. 2014) and being unable to measure the presence of stable family relationships constitutes an important limitation of this work.

Many studies reported employment and relationship statuses as arbitrary categories with little if any description as to how cases were remunerated for work (Killackey et al. 2006), and how many required sustained attendances at work or ongoing relationships for people to be categorised as employed (Marwaha and Johnson 2004) or in relationships. It was also challenging to disentangle when being in a full-time educational program was or was not considered being in employment; thus, these results may need to be treated with some caution. Having information on the exact duration of time individuals with FEP were in employment or in relationships during the course of their illness would have provided a far more nuanced understanding of these outcomes. However, such data was not provided in the studies included in this meta-analysis. Given that the relationship between employment

and relationship status may vary by gender, it is important to examine interaction effects between these variables on the likelihood of being employed and in relationship at the end of follow-up. However, due to the limited number of studies we were unable to do so.

4.4. Conclusion

In the last 50 years little has changed in the proportion of people with FEP in employment in the years after illness onset. Although people with psychotic disorders identify obtaining employment and relationships as important recovery aims, we found that people with FEP become increasingly socially excluded with limited employment as they get older. Given that FEP typically occurs at an age when career and relationship choices are been established, our results reinforce the importance of providing social and vocational rehabilitation not only at the beginning of psychiatric care but in the years after the first episode and for this to continue throughout the illness course. Based on our findings, clinicians and policy makers need to begin to address the barriers to enable the use of social and vocational support interventions regardless of the stage of illness. Recovery focused interventions, including employment and social functioning should be a fundamental part of clinical care and be delivered over the long term.

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Table 1. Characteristics of studies that examined the proportion of patients with FEP who were employed and in relationship at the end of follow-up after their first contact with mental health services for psychosis. A fuller version of this table is provided in Supplementary Table 1.

Studies included in the meta-analysis	Study characteristics					Patients characteristics		Outcomes at follow-up	
	Year	Country	FU length (years)	Baseline sample (N)	Sample at follow-up (N)	Male (%)	Age at onset (mean)	Employed (N)	In relationship (N)
Aadamso et al	2011	Estonia	2	153	107	39.9	28.4	71	32
Abdel-Baki et al	2011	Canada	13	142	78	71.1	24.4	35	
Abdel-Baki et al	2017	Canada	2	212	176	80.2	23	91	
Agius et al	2008	UK	3	62	62	79	28.5	44	21
Ahmad et al.	2016	Sri Lanka	1	60	25	36.7	26	20	
Ajnakina et al	2017	UK	5	290	254	66	28.3	47	59
Albert et al	2011	Denmark	5	468	255	56.1	26	97	
Amminger et al	2011	Australia	7	542	366	70.5	21.9	145	
Berg et al	1983	Sweden	23	22	20	100	26	12	7
Birchwood et al	1992	UK	1	137	101	58.4		29	29
Bland & Orn	1978	Canada	14	45	43	51.2	32.6	13	
Boden et al	2009	Sweden	5	124	76	68.4	28.5	38	
Bühler et a	2002	Germany	5	58	46		20.6	16	13
Chang et al	2011	Hong Kong	3	138	93	45.2	31.2	47	
Chua, et al	2019	Singapore	2	1724	1177	46.7	27.7	829	
Coryell et al	1996	USA	10	787	532	38.2	28.1	305	443
Eggers et al	2001	Germany	41.9	57	44	43.2	14.3	29	11
Falk et al	2016	Sweden	4.5	756		55.7		406	
Fisher et al	2015	UK	1.5	149	149	71.1	24	64	34
Gignac et al	2015	Canada	4	81	39	47.5	22.3	38	2
Gupta et al	1997	USA	1	41	35	66	24	20	
Harrison et al	1999	UK	3	168	143	59	30.6	72	
Harrow et al	2005	USA	15	157	121	57.3	22.3	31	

Helgason	1990	Iceland	21	107	84		50.5	33.5		14	39
Henry et al	2010	Australia	7.4	723	484		69.4	21.5		226	87
Hill et al	2012	Ireland	12	171	123		57.9	29		55	
Ho et al	1998	USA	2	50	50		64	21.4		20	
Hollis	2000	UK	11.5	110	93		52.7	14.9			12
Jabs et al	2004	Germany	13		77		40.3	22.7		35	25
Jaracz et al	2015	Poland	8.1	86	64		60.5	24.7		29	14
Jarbin et al	2003	Sweden	10.5	81	78		50.6	16		57	21
Johnson et al	2014	India	5	131	95		55	29.5		9	
Jordan et al	2014	Canada	2	278	159		69.2	22			21
Kaleda	2009	Russia	16.8		278		100	17.1		175	70
Kua et al	2003	Singapore	15	402	216		60.7	23.3		101	
Langeveld et al	2014	Norway	10	301	178					62	
Lay et al	2000	Germany	12	96	69		58.5	16		16	6
Lehtinen et al	2000	Finland	2	135	106		56.6	29.4		83	
Marneros et al	2003	Germany	3	42	38		52.6	35.4		12	18
Mason et al	1995	UK	13	67	59		72.6	29		22	
McCreadie et al	1989	UK	2	49	38		47			16	
Morgan et al	2014	UK	10.7	532	387		57.9	30.8		85	124
Norman et al	2014	Canada	5	188	132		77.3	23.8		24	
Parnas et al	1988	Denmark	6		67			32.7			31
Petersen et al	2008	Denmark	2	547	369		58.3	26.8		146	
Ran et al	2018	China	14	209	146		44.5	28.7		111	98
Rangaswamy et al	2012	India	25	90	47		50	24.5		16	30
Ropcke & Eggers	2005	Germany	15.4	55	39		51.3	16.9		8	12
Schimmelmann et al	2008	Australia	1.5	635	489		67	21.3		215	
Schmidt et al	1995	Germany	7.3	118	97		54	16.6		17	
Singh et al	2004	UK	3	166	143		59			47	
Soskis et al	1968	USA	5	39	32		41	25.4		29	
SSRG	1992	UK	5	49	42		47.6			8	9

Stirling et al	2003	UK	10.7	112	49		56.3	26.3		7	
Strålin et al	2018	Sweden	13	175	157		55	28.7		67	
Tang et al	2014	Hong Kong	13	153	96		46	31.7		69	31
Thara	2004	India	20	90	61		50	24.5		26	45
Thorup et al	2014	Denmark	5	578	520					212	
Tohen et al	1990	USA	4	24	24		54	26		21	
Tohen et al	2012	USA	2	56	49		50	36.3			8
Torgalsboen et al	2015	Sweden	2	28	25		60.7	21		13	10
Turner et al	2015	Ireland	12	38	38		63	70		19	
Turner et al	2009	New Zealand	2	236	194			22.4		124	
Üçok et al	2011	Turkey	4.9	93	44		52.1	21.1		17	
Van Winkel et al	2007	Belgian	10.7	100	70		70	23.2		17	9
Vazquez-barquero et al	1999	Spain	3	86	76		48.7			37	20
Velthorst et al	2016	USA	20	485	262		65.8	29		86	
Verdoux et al	2002	France	2	65	34		57.1	32.1		23	
White et al	2009	UK	10	109	69		59	27.4		13	
Whitty et al	2008	Ireland	4	171	129		65	25.5		46	8
Wiersma et al	2000	Multicentre	15	496	349		49	42		71	78
Wieselgren & Lindstrom	1996	Sweden	5	120	101		72	27.1		26	
Zandi et al	2011	Netherlands	2.5	52	51		59.6	32.5		35	
Zhang-Wong et al	1995	Canada	5	175	123		71.1	23.3		50	

FU, follow up period; n, number; BL, baseline; FU, follow-up; UK, United Kingdom; USA, United States of America

Table 2. *Meta-analysis of employment at the end of follow-up in patients with first episode psychosis*

Analysis		Meta-analysis				Heterogeneity			Publication bias
	N studies	Pooled prevalence (%)	95% CI		Between group *P*-value	I^2	*Q*-value	*p*-value	Trim and fill 95% CI [N studies trimmed]
Employment at the end of follow-up	70	32.5	28.5	36.9		94.6	1283.2	<0.001	37.6, 32.8-42.7 [11]
Study year group					0.740				
1968-1998	16	34.8	25.4	45.5		93.6	248.4	<0.001	No change
1999-2007	17	29.2	21.3	38.5		93.6	248.4	<0.001	No change
2008-2011	16	35.1	26.8	44.3		94.9	292.6	<0.001	No change
2012-2021	20	31.1	24.2	38.9		95.6	460.3	<0.001	36.4, 27.7-46.0 [3]
Study region					**<0.001**				
Asia	9	30.7	20.8	42.8		94.9	156.0	<0.001	45.4 29.5-62.3 [4]
Australia & New Zealand	4	35.5	25.7	46.7		93.9	49.1	<0.001	No change
Europe	43	32.6	27.3	38.0		93.7	639.1	<0.001	33.9, 29.0-39.1 [4]
Multicentre	1	14.3	11.5	17.7		0.0	0.0	1.000	N/A
North America	13	36.9	25.9	49.4		93.0	172.6	<0.001	33.4, 21.6-47.7 [1]
Assessment type					0.898				
Case notes	12	32.5	24.0	42.5		95.4	240.8	<0.001	44.6, 31.4-57.8 [4]
Interview	49	34.0	29.1	38.9		92.8	664.1	<0.001	32.1, 19.6-48.0 [1]
Combination	7	29.2	17.9	43.8		94.0	10.2	<0.001	No change
Settings					0.755				
Adult psychiatric hospitals	34	29.2	23.9	35.2		91.8	401.9	<0.001	33.5, 26.7-37.1 [2]
Community & early intervention services	3	31.2	24.7	38.6		67.1	6.1	0.048	No change
In-/out-patient psychiatric services	27	33.8	28.1	40.0		96.2	687.5	<0.001	39.5, 32.6-46.9 [5]
FU categories					**<0.001**				
1-2 years	15	43.0	36.5	44.3		91.6	166.1	<0.001	No change
3-5 years	22	32.6	24.6	41.8		94.5	382.1	<0.001	38.6, 29.2-48.9 [4]
> 6 years	30	26.8	22.5	31.5		93.1	421.5	<0.001	27.7, 23.3-32.5 [1]
Societal status					**<0.001**				
High income	62	33.4	29.7	37.9		93.4	921.1	<0.001	34.1, 29.5-38.8 [1]
Middle income	7	28.1	15.4	45.6		95.6	147.6	<0.001	49.2, 27-9-70.8 [4]
Diagnosis					**<0.001**				

	Affective	3	58.4	26.6	84.5			88.0	16.6	<0.001		38.7, 13.6-71.7 [2]
	FEP	24	25.9	29.4	42.3			94.1	392.2	<0.001		No change
	FES	41	29.9	24.6	35.8			93.7	631.1	<0.001		35.3, 29.0-42.2 [7]

N, number; FEP, first episode psychosis; FU, follow up period; FEAP, first episode affective psychosis; CI, confidence intervals; N/A, not appropriate

Table 3. *Meta regression of moderators of the proportion of patients with first episode who were employed at the end of follow-up*

Main analysis of longitudinal studies on employment in FEP	**Number of comparison**	**β**	**95 CI**		***p*-value**	**R^2**
Moderator						
Demographic factors	19	0.00	-0.02	0.03	0.678	0.00
Age at illness onset ($mean_{years}$)	18	0.00	-0.02	0.03	0.670	0.00
Male	62	0.00	-0.02	0.01	0.640	0.00
White	17	0.01	0.00	0.02	0.193	0.00
Black	15	0.01	-0.01	0.02	0.530	0.00
Asian	14	0.00	-0.01	0.01	0.390	0.00
Clinical presentation and treatment						
Baseline psychotic symptoms(mean)	19	0.01	-0.01	0.02	0.570	0.00
Duration of untreated psychosis (days-mean)	22	0.00	0.00	0.00	0.241	0.00
Duration of untreated psychosis (days-median)	15	0.00	0.00	0.00	0.172	0.00
Taking antipsychotic medications at baseline	20	0.00	-0.01	0.00	0.219	0.08
Taking antipsychotic medications at follow up	32	-0.00	-0.01	0.01	0.475	0.00
Compliance with antipsychotic medications during follow-up	11	0.00	-0.01	0.02	0.766	0.00
Social factors						
Employed at baseline	31	0.01	-0.01	0.02	0.270	0.00
Single at baseline	23	0.00	-0.01	0.01	0.746	0.06
Living at home at baseline	5	-0.01	-0.02	0.00	**0.040**	0.50
In a relationship at baseline	24	0.01	-0.02	0.03	0.571	0.00
Other factors						
Drop-out	64	-0.03	-0.04	-0.02	**0.000**	0.18
Length of follow up	66	-0.02	-0.04	0.00	0.074	0.06
Study year publication	52	0.00	-0.01	0.02	0.573	0.04

DUP, duration of untreated psychosis; β, beta coefficient; CI, confidence intervals

Table 4. *Meta-analysis of proportion of patients with first episode psychosis who were in a relationship at the end of follow-up*

Analysis		Meta-analysis				Heterogeneity			Publication bias
	N studies	Pooled prevalence (%)	95% CI		Between group *P*-value	I^2	*Q*-value	*p*-value	Trim and fill 95% CI [N studies trimmed]
Relationship status at the end of follow-up	33	21.3%	16.5%	27.1%		95.2	650.9	<0.001	No change
Study year group					0.295				
1968-1998	7	30.8	19.2	45.6		94.3	105.2	0.000	No change
1999-2007	10	20.1	13.2	29.4		89.5	85.3	0.000	No change
2008-2011	4	15.2	7.9	27.1		91.9	37.2	0.000	No change
2012-2021	12	22.3	14.6	32.5		96.5	312.4	0.000	No change
Study region					**<0.001**				
Asia	5	35.9	25.4	47.9		88.1	33.6	0.000	No change
Australia & New Zealand	1	12.0	9.9	14.6		0.0	0.0	1.000	N/A
Europe	21	20.8	17.3	24.7		77.0	87.1	0.000	17.6, 11.5-26.0 [5]
Multicentre	1	15.7	12.8	19.2		0.0	0.0	1.000	N/A
North America	4	13.3	2.3	50.1		98.3	180.9	0.000	No change
Assessment type					0.606				
Case notes	9	25.2	15.6	38.1		95.6	183.8	<0.001	No change
Interview	19	21.8	14.7	31.0		96.6	526.0	<0.001	No change
Combination	5	17.8	10.5	28.8		91.3	45.9	<0.001	No change
Settings					**<0.001**				
In- and out-patient psychiatric services	13	25.7	16.8	37.		97.5	482.6	0.000	No change
Inpatient	18	20.0	16.0	24.7		79.0	81.0	0.000	No change
Outpatient/Community services	1	4.7	2.4	9.1		0.0	0.0	1.000	No change
FU categories					0.557				
1-2 years	6	18.6	12.4	26.9		82.8	29.1	0.000	No change
3-5 years	8	18.5	11.6	28.0		86.0	50.2	0.000	No change
>6 years	18	23.7	16.7	32.6		96.7	508.3	0.000	No change
Societal status					**<0.001**				
High income	28	20.0	14.9	26.3		95.4	592.8	0.000	No change
Middle income	3	38.4	27.8	50.2		73.1	7.4	0.024	No change

Diagnosis					0.093						
	Affective	3	16.2	2.3	61.0			96.5	56.5	0.000	No change
	FEP	10	16.7	12.3	22.1			89.4	84.5	0.000	No change
	FES	20	26.1	19.5	34.0			94.0	319.0	0.000	No change

N, number; FEP, first episode psychosis; FU, follow up period; FEAP, first episode affective psychosis; CI, confidence intervals; N/A, not appropriate

Table 5. *Meta regression of moderators of the proportion of patients with first episode who were in a relationship at the end of follow-up*

Main analysis of longitudinal studies on relationship status in FEP	**Number of comparison**	**β**	**95 CI**		***p*-value**	**R^2**
Moderator						
Demographic factors						
Age at illness onset ($mean_{years}$)	28	0.03	-0.02	0.09	0.215	0.00
Males	29	-0.02	-0.04	0.01	0.165	0.41
White	12	-0.15	-0.02	-0.01	**0.000**	0.55
Black	9	-0.02	-0.03	-0.01	**0.000**	0.67
Asian	9	0.01	0.01	0.02	**<0.001**	0.67
Clinical presentation and treatment						
Baseline psychotic symptoms(mean)	9	0.01	-0.00	0.02	0.152	0.14
Duration of untreated psychosis ($mean_{days}$)	9	0.00	0.00	0.00	0.868	0.00
Duration of untreated psychosis ($median_{days}$)	6	0.00	-0.00	0.00	0.227	0.00
Taking antipsychotic medications at baseline	8	0.00	-0.03	0.02	0.858	0.00
Taking antipsychotic medications at follow up	12	0.01	-0.02	0.03	0.656	0.00
Compliance with antipsychotic medications during follow-up	6	-0.03	-0.03	0.03	0.842	0.00
Social factors						
Employed at baseline	13	-0.01	-0.03	0.00	0.153	0.06
Single at baseline	12	-0.02	-0.04	-0.01	**0.001**	0.48
Living at home at baseline	3	0.01	-0.01	0.02	0.581	0.00
In a relationship at baseline	17	0.04	0.02	0.05	**<.001**	0.63
Other factors						
Drop-out	29	-0.02	-0.05	0.01	0.135	0.00
Length of follow up	30	0.02	-0.02	0.06	0.251	0.02
Study year publication	25	-0.01	-0.03	0.01	0.302	0.00

DUP, duration of untreated psychosis; β, beta coefficient; CI, confidence intervals

Figure Legends

Figure 1. The flowchart of the article selection process in the meta-analysis of the proportion of people with first episode psychosis (FEP) who were employed and in a relationship at end of follow-up,