Supplementary appendix to:

Woodrow, A., Sparks, S., Bobrovskaia, V., Paterson, C., Murphy, P., Hutton, P. (submitted). Decision-making ability in psychosis: A systematic review and meta-analysis of the magnitude, specificity and correlates of impaired performance on the Iowa and Cambridge Gambling Tasks.

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3. **Protocol**

Decision-making in psychosis: a meta-analytic review of performance correlates on gambling-type tasks. Amanda Woodrow, Sarah Sparks, Valeria Bobrovskaia,Paul Hutton

*Review question(s):*

How does the performance of people with psychosis on decision-making tasks compare to a) non-psychiatric controls and b) individuals with non-psychotic symptoms? What is the magnitude and reliability of any differences?

What factors are correlated with the performance of people with psychosis on decision-making tasks? What is the magnitude and reliability of these correlations?

*Searches:*

Electronic databases (PsycINFO, EMBASE, MEDLINE and Web of Science) and grey literature will be searched. Reference lists of key papers (e.g. relevant reviews) will be hand searched for further eligible articles.

The databases will be searched using the keywords (psychosis OR schizo\*) AND (decision making) AND (gambling task OR effort cost OR risk\* task OR gains task OR information sampling). The search strategy will be amended appropriately for each database.

Title and abstract searches will be completed by two reviewers. Full text articles will be reviewed against predetermined inclusion criteria. A third reviewer will check for consistency and arbitrate any discrepancies.

*Types of Study:*

All studies which have assessed decision-making capacity in individuals with a diagnosis of psychosis will be included if they have used a gambling/effort-cost/risk-reward task such as the Iowa Gambling Task.

Cross-sectional, correlational studies, cohort studies, case-control studies, audits and prospective studies and trials will be included where other inclusion criteria are met.

*Condition under investigation:*

Decision making ability in non-affective psychosis.

*Participants/population:*

Studies will be included if they have a minimum of 50% participants who have a diagnosis of non-affective psychosis.

*Intervention/Exposure:*

N/A

*Comparator(s)/ Control:*

The first primary research question will be addressed by analysing data from studies where participants are compared with a healthy control group and / or an alternative clinical group (i.e. affective psychosis/BPD, non-psychotic mental health diagnosis, e.g. depression, anxiety).

The second primary research question will be addressed using data from within-group comparisons. Studies which assess the selected variables within the psychosis group will be included.

*Context:*

Included studies will assess factors influencing decision making capacity on gambling-type decision-making tasks. This will generally be confined to hypothetical decision making.

*Outcome(s):*

Our primary outcomes are (i) correlates of decision-making performance (in people with psychosis), and (ii) group differences in performance on decision-making tasks (people with psychosis vs controls).

We will consider the role of four broad sets of psychological factors: motivation/impulsive behaviour; cognitive factors (executive functions); emotions and symptoms (positive/negative). We will not consider brain imaging or other neurobiological data, and we will not consider the role of broad demographic or social variables (although we will record these to characterise the samples).

*Data Extraction:*

A table will be used to record methodological data such as the type of study, quality-related parameters, the type of task used, sample size and relevant demographic information. The factors under investigation will be listed, along with statistical information pertaining to each factor (mean scores, SDs) as will any data which quantifies the strength of the associations between these factors (e.g., correlations).

Two reviewers will extract data independently. Any discrepancies will be reviewed in conjunction with a third reviewer.

*Risk of Bias (quality) assessment:*

Scores will be assigned using an adapted version of the Agency for Healthcare Research and Quality (AHRQ) tool. Two researchers will grade each study independently and scores will be recorded and compared. Interrater reliability will be monitored and any significant discrepancies will be arbitrated by the third researcher.

The overall quality of the final outcome will be assessed using an adapted version of the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach.

*Strategy for data synthesis:*

Meta-analysis will be conducted for any variables for which at least three studies can provide adequate data. Correlations will be computed between each variable and decision-making. These will be transformed into Fisher’s Z scores and a random effects model will be used to compute an overall pooled effect size along with 95% confidence intervals. Estimates will then be back-transformed into Pearson’s r scores and interpreted using Cohen’s (1988) conventions (0.1 – small; 0.3 = moderate; 0.5 = large).

*Analysis of subgroups*:

Comparison between high versus low quality studies.

*Dissemination plans:*

The completed review will be submitted for publications to a peer-reviewed journal.

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*Anticipated or actual start date:*

06 May 2016

*Anticipated completion date:*

18 August 2016

*Conflicts of interest:*

None known

*Language:*

English

*Country:*

Scotland

*Subject index terms:*

Psychosis; Schizophrenia, Decision Making; Gambling Task

*Stage of review:*

Ongoing

*Date of registration in PROSPERO:*

20 June 2016

|  |  |  |
| --- | --- | --- |
| **Stage of review at time of original submission** | **Started** | **Completed** |
| Preliminary searches | Yes | No |
| Piloting of the study selection process | Yes | No |
| Formal screening of search results against eligibility criteria | No | No |
| Data extraction | No | No |
| Risk of bias (quality) assessment | No | No |
| Data analysis | No | No |

Available from <http://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42016041241>

1. **Changes from protocol**

The review protocol was registered in 2016 with PROSPERO (International Prospective Register of Systematic Reviews). Subsequent changes include:

Review question

No change

Searches

No change, although the search was updated in early 2018.

Types of study

For homogeneity and interpretation, we decided to limit the studies to those reporting either Iowa Gambling Task or Cambridge Gambling Task data. Otherwise no change.

Condition

No change

Participants/population

No change

Comparator/control

No change

Outcome

Most measured outcomes fell under the broad headings of motivation/impulsivity, cognitive factors, emotions and symptoms. However we also assessed the relationship between decision-making performance and (i) antipsychotic dose and type, and (ii) years of education.

Risk of bias assessment

No change

Data synthesis

No change, however we also used meta-regression to examine relationships where few within-study correlations were reported.

Analysis of subgroups

Rather than simply assess differences between high or low quality studies, we used meta-regression to examine the effect of poor matching in detail.

Review team

Additional members (PM and CP) were included during the update in 2018, to help with searching, quality assessment and analysis.

1. **Search strategy**

We searched PsychInfo, MEDLINE, EMBASE and Web of Science for papers published between 1992 and 1st May 2016, using the following terms:

(psychosis, psycho\*, schizo\*) AND (decision making) AND (gambling task OR risk\*task OR gains task)

Hand searches of reference lists in relevant eligible articles were also undertaken. All searches and screening were undertaken by two independent reviewers. In the event of missing data, corresponding authors were contacted. They were asked for any further information and if they knew of any unpublished studies.

A second search was conducted in March 2018 to update the original search. Papers published from 2016-2018 were identified and screened by two independent reviewers.

1. **Excluded studies**

The following table details studies or reports excluded after inspection of the full-text report, or via correspondence with authors. Studies or reports excluded on basis of title or abstract alone are not detailed as these are too numerous and the vast majority were of different conditions or were otherwise unrelated to the review question.

| Study | Reason for exclusion |
| --- | --- |
| Ahn et al (2011) | IGT not present or task too conceptually dissimilar |
| Averbeck et al (2011) | IGT not present or task too conceptually dissimilar |
| Baek et al (2013) | IGT not present or task too conceptually dissimilar |
| Bark (2005) | No usable data reported or not made available upon request |
| Bellani, Tomerlleria & Brambilla (2009) | Review |
| Beszterczey et al (2013) | Sample not suitable |
| Brown et al (2013) | IGT not present or task too conceptually dissimilar |
| Cheng et al (2012) | IGT not present or task too conceptually dissimilar |
| Culbreth, Westbrook & Barch (2016) | IGT not present or task too conceptually dissimilar |
| Docx et al (2015) | IGT not present or task too conceptually dissimilar |
| Doll et al (2014) | IGT not present or task too conceptually dissimilar |
| Doll et al (2014) | Duplicate |
| Farreny et al (2016) | IGT not present or task too conceptually dissimilar |
| Fervaha et al (2015) | IGT not present or task too conceptually dissimilar |
| Fischer et al (2015) | IGT not present or task too conceptually dissimilar |
| Gold et al (2013) | IGT not present or task too conceptually dissimilar |
| Gold et al (2015) | IGT not present or task too conceptually dissimilar |
| González-Blanch et al (2008) | IGT not present or task too conceptually dissimilar |
| Heerey et al (2007) | IGT not present or task too conceptually dissimilar |
| Horan et al (2015) | IGT not present or task too conceptually dissimilar |
| Jolley et al (2014) | IGT not present or task too conceptually dissimilar |
| Joyce et al (2013) | IGT not present or task too conceptually dissimilar |
| Joyce et al (2013) | Duplicate |
| Kaiser (2015) | IGT not present or task too conceptually dissimilar |
| Karlsgodt et al (2014) | IGT not present or task too conceptually dissimilar |
| Kim et al (2007) | IGT not present or task too conceptually dissimilar |
| Koch (2010) | IGT not present or task too conceptually dissimilar |
| Larquet, 2010 | IGT not present or task too conceptually dissimilar |
| Li et al (2014) | IGT not present or task too conceptually dissimilar |
| Li et al (2016) | Sample not suitable |
| Lincoln et al (2010) | IGT not present or task too conceptually dissimilar |
| Ludewig, Paulus & Vollenweider (2003) | IGT not present or task too conceptually dissimilar |
| Mata (2007) | No usable data reported or not made available upon request |
| Martino (2007) | Sample overlaps Martino (2014) |
| McCarthy et al (2016) | IGT not present or task too conceptually dissimilar |
| Moustafa (2015) | IGT not present or task too conceptually dissimilar |
| Mukherjee et al (2016) | Sample not suitable |
| Owashi et al (2009) | IGT not present or task too conceptually dissimilar |
| Rausch et al (2014) | IGT not present or task too conceptually dissimilar |
| Reddy et al (2014) | IGT not present or task too conceptually dissimilar |
| Reddy et al (2014) | Duplicate |
| Reddy et al (2015) | IGT not present or task too conceptually dissimilar |
| Rosenfeld (1992) | IGT not present or task too conceptually dissimilar |
| Strauss et al (2011) | IGT not present or task too conceptually dissimilar |
| Struass et al (2015) | IGT not present or task too conceptually dissimilar |
| Toyomaki et al (2017) | IGT not present or task too conceptually dissimilar |
| Treadway et al (2015) | IGT not present or task too conceptually dissimilar |
| Trémeau et al (2008) | IGT not present or task too conceptually dissimilar |
| Vogel, Strauss & Allen (2013) | IGT not present or task too conceptually dissimilar |
| Waltz (2011) | IGT not present or task too conceptually dissimilar |
| Whitney & Hinson (2012) | Sample not suitable |
| Wischnieski & Brüne (2010) | IGT not present or task too conceptually dissimilar |
|  |  |

Note: Iowa Gambling Task (IGT)

1. Characteristics of included studies and baseline demographics

|  |  |  |  |  |  | |  | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table E1. Summary of study characteristics and baseline demographics** | | | | | | | | | | |
| **Study Ref** | **Groups included in review** | **N participants** | **Task type** | **Country** | **Age, mean (SD)** | **Proportion male** | | **Years of Education (SD)** | | **Ethnicity** |
| Adan 2017 | Psychosis group | 50 | IGT | Spain | 36.1 (7.8) | 100% | | 9.8 (2.1) | | Not reported |
| Altamura 2015 | Psychosis group | 35 | IGT | Italy | 42.5 (10.4) | 20% | | Not reported | | Not reported |
| Benninger 2003 | Psychosis group | 36 | IGT | Canada | 43.9 (8.2) | 67% | | 12.8 (2.7) | | Not reported |
| Healthy controls | 18 | 45.2 (11.9) | 67% | | 13.9 (2.1) | |
| Brambilla 2013 | Psychosis group | 70 | IGT | Italy & UK | 44.2 (10.9) | 59% | | Not reported | | Not reported |
| Bipolar group | 70 | 44.6 (11.3) | 53% | |
| Healthy controls | 140 | 43.9 (11.2) | 51% | |
| Brown 2015 | Psychosis group | 59 | IGT | USA | 42.2 (11.8) | 71% | | 12.6 (2.7) | | Not reported |
| Healthy controls | 43 | 41.1 (11.8) | 60% | | 14.8 (2.2) | |
| Caletti 2013 | Psychosis group | 30 | IGT | Italy | 42.5 (10.2) | 80% | | Not reported | | Not reported |
| Bipolar group | 18 | 42.2 (11.7) | 22% | |
| Healthy controls | 18 | 36.1 (14.5) | 33% | |
| Cavallaro 2003 | Psychosis group  OCD group  Healthy controls | 110  67  56 | IGT | Italy | 33.0 (9.5)  30.5 (8.9)  31.2 (6.0) | 60%  49%  39% | | 12.7 (2.4)  12.4 (2.9)  13.5 (2.8) | | Not reported |
| Cella 2012 | Psychosis group | 25 | IGT | UK | 39.2 (10.5) | 60% | | 13.4 (2.1) | | Caucasian 100% |
| Healthy controls | 24 | 35 (10.5) | 46% | | 15.4 (1.8) | | Caucasian 96%; Other 4% |
| Chan 2013 | Psychosis group | 19 | IGT | Hong Kong | 38.1 (7.6) | 58% | | 12.2 (1.9) | | Not reported |
| Control group | 23 | 37.9 (10.8) | 61% | | 16.8 (3.2) | |
| Choi 2011 | Psychosis group | 25 | IGT | USA | 44.7 (9.7) | 100% | | 13.2 (1.8) | | Not reported |
| Healthy controls | 23 |  |  | 42.2 (19.1) | 100% | | 14.8 (2.0) | |  |
| Da Silva 2017 | Psychosis group | 39 | IGT | Canada | 33.6 (9.8) | 46% | | 15.0 (3.6) | | Not reported |
| Healthy controls | 39 | 30.3 (10.9) | 54% | | 17.2 (2.7) | |
| Goddard 2017 | Psychosis group | 16 | IGT | Canada | 28.4 (1.4) | 50% | | 12.6 (1.5) | | Caucasian 94%  Bi-racial 6% |
| Healthy controls | 20 | 24.1 (5.7) | 55% | | 17.4 (2.8) | | Not reported |
| Gu 2013 | Psychosis group | 351 | IGT | China | 28.1 (8.0) | 66% | | 9.9 (2.9) | | Han Chinese 100% |
| Healthy controls | 344 | 22.4 (6.6) | 34% | | 10.6 (2.7) | | Han Chinese 100% |
| Heerey 2008 | Psychosis group | 40 | CGT | USA | 45.8 (10.2) | 78% | | 12.3 (2.0) | | African American 28%  Caucasian 68%  Other 5% |
| Healthy controls | 26 | 48.3 (9.9) | 69% | | 14.3 (2.0) | | African American 35%  Caucasian 65%  Other 0% |
| Highet 2014 | Psychosis group | 28 | IGT | Australia | 34.6 (7.7) | 68% | | 11.8 (2.01) | | Not reported |
| Healthy controls | 28 | 34.4 (6.8) | 68% | | 11.9 (1.5) | |
| Hori 2014 | Psychosis group | 86 | IGT | Japan | 35.1 (12.1) | 50% | | 12.7 (2.7) | | Not reported |
| Healthy controls | 51 | 36.7 (9.9) | 49% | | 13.4 (2.2) | |
| Hutton 2002 | Psychosis group | 50 | CGT | UK | 31.1 (10.76) | Not reported | | Not reported | | Not reported |
| Healthy control | 56 | 32.7 (10.47) |
| Kester 2006 | Psychosis group | 15 | IGT | USA | 15.9 (2.7) | 60% | | Not reported | | Caucasian 40%; Non-Caucasian 60% |
| Healthy controls | 25 | 17.1 (1.8) | 56% | | Caucasian 16%; Non Caucasian44% |
| Kim 2009 | Psychosis group | 52 | IGT | South Korea | 30.6 (5.9) | 58% | | 12.7 (2.1) | | Not reported |
| Healthy group | 55 | 28.8 (7.5) | 53% | | 14.8 (1.9) | |
| Kim 2012 | Psychosis group | 30 | IGT | Korea | 29.2 (5.7) | 63% | | 14.0 (1.9) | | Not reported |
| Healthy group | 33 | 27.8 (3.0) | 49% | | 14.8 (1.4) | |
| Kim 2016 | Psychosis group | 39 | IGT | Korea | 38.9 (9.5) | 46% | | 13.0 (2.1) | | Not reported |
| Healthy group | 31 | 38.3 (9.1) | 45% | | 14.0(2.4) | |
| Lee 2007 | Psychosis group  Healthy group | 23  28 | IGT | South Korea | 27.6 (5.5)  26.9 (3.6) | 70%  54% | | 14.1 (2.0)  14.3 (1.5) | | Not reported |
| Martin 2015 | Psychosis group | 50 | CGT | Australia | 45.5 (10.4) | 68% | | Not reported | | Not reported |
| Healthy controls | 50 | 46.5 (9.6) | 68% | |
| Martino 2014 | Psychosis group | 25 | IGT | Argentina | 35.2 (12.0) | Not reported | | 10.3 (2.2) | | Not reported |
| Bipolar group | 45 | 37.0 (10.4) | 14.0 (2.4) | |
| Healthy controls | 40 | 40.3 (12.0) | 13.9 (2.8) | |
| Matsuzawa 2015 | Psychosis group | 61 | IGT | Japan | 34.3 (8.3) | 54% | | 13.8 (2.2) | | Not reported |
| Healthy controls | 50 | 31.9 (7.8) | 66% | | 15.4 (3.1) | |
| Moss 2009 | Psychosis group | 47 | IGT | Canada | 37.3 (9.8) | 77% | | 12.8 (2.1) | | Caucasian 60%  African American 11%  Asian 13%  Hispanic 0%  Other 17% |
| Healthy controls | 38 | 35.3 (8.5) | 45% | | 16.1 (2.3) | | Caucasian 74%  African American 8%  Asian 5%  Hispanic 3%  Other 13% |
| Nakamura 2008 | Psychosis group | 24 | IGT | USA | 39.1 (10.3) | 100% | | 12.8 (1.8) | | Not reported |
| Healthy controls | 25 | 41.1 (9.1) | 76% | | 15.0 (2.0) | |
| Nestor 2014 | Psychosis group | 65 | IGT | USA | 42.2 (10.0) | Not reported | | 13.3 (1.9) | | Not reported |
| Healthy controls | 65 | 41.6 (8.5) | 14.9 (2.0) | |
| Newman 2007 | Psychosis group | 70 | IGT | USA | 36.6 (11.7) | 71% | | 11.9 (12.3) | | African-American 44%; Hispanic 21%; Caucasian 16%; Asian 10%; Other 9% |
| Nishinaka 2016 | Psychosis group | 71 | IGT | Japan | 42.8 (11.9) | 85% | | 12.3 (2.6) | | Not reported |
| Healthy controls | 54 | 42.1 (11.4) | 89% | | 12.8 (2.7) | |
| Pedersen 2017 | Psychosis group | 38 | IGT | Germany | 40.1 (14.0) | 58% | | 11.0 (1.7) | | Not reported |
| Healthy controls | 38 | 40.0 (13.8) | 58% | | 11.6 (1.6) | |
| Premkumar 20081 | Psychosis group | 75 | IGT | UK | 37.9 (9.5) | 73% | | Not reported | | Not reported |
| Healthy group | 25 | 35.4 (11.9) | 64% | |
| Raffard 2011 | Psychosis group | 64 | IGT | France | 34.3 (11.3) | 73% | | 10.6 (2.3) | | Not reported |
| Healthy controls | 64 | 33.6 (11.0) | 42% | | 12.2 (2.8) | |
| Rim 2007 | Psychosis group | 39 | IGT | South Korea | 32.4 (7.2) | 49% | | 12.7 (1.9) | | Not reported |
| Healthy controls | 33 | 29.0 (8.9) | 42% | | 14.7 (1.8) | |
| Ritter 2004 | Psychosis group | 20 | IGT | USA | 48.5 (6.0) | 100% | | 13.8 (1.7) | | Caucasian 95%; African-American 5% |
| Healthy controls | 15 | 47.1 (10.2) | 100% | | 13.3 (1.5) | | Caucasian 87%; African-American 13% |
| Roca 2014 | Psychosis group | 15 | IGT | Argentina | 36.7 (8.6) | Not reported | | Not reported | | Not reported |
| Healthy controls | 14 | 42.6 (14.7) |
| Rodriguez-Sanchez 2005 | Psychosis group | 80 | IGT | Spain | 25.7 (6.7) | 69% | | 11.3 (2.7) | | Not reported |
| Healthy controls | 22 | 26.1 (6.5) | 55% | | 12.1 (2.2) | |
| Sedgwick 2016 | Psychotic group | 15 | IGT | UK | 34.5 (8.1) | 100% | | Not reported | | 50% white |
| DPD group | 17 | 36.8 (9.4) | 90% white |
| Psychosis & DPD comorbid group | 26 | 31.3 (7.3) | 25% white |
| Healthy controls | 30 | 37.8 (10.9) | 94% white |
| Sevy 2007 | Psychosis group | 27 | IGT | USA | 30.0 (9.0) | 63% | | 12.0 (2.0) | | Not reported |
| Healthy controls | 20 | 33.0 (10.0) | 60% | | 15.0 (2.0) | |
| Shirayama 2010 | Psychosis group | 19 | IGT | Japan | 30.5 (5.6) | 63% | | 13.7 (1.8) | | Not reported |
| Healthy controls | 18 | 31.4 (8.4) | 78% | | 15.4 (3.2) | |
| Shurman 2005 | Psychosis group | 39 | IGT | USA | 33.5 (10.1) | 72% | | 13.4 (1.2) | | Caucasian 60%, Hispanic 20%, African-American 20% |
| Healthy controls | 10 | 32.1 (4.5) | 50% | | 15.5 (2.4) | | Caucasian 51%, Hispanic 18%, African-American 11%, Other 20% |
| Stratta 2015 | Psychosis group  Healthy controls | 30  32 | IGT | Italy | 37.5 (10.2)  39.6 (10.4) | 60%  50% | | 13.3 (3.9)  12.8 (3.0) | | Not reported |
| Struglia 2011 | Psychosis group | 40 | IGT | Italy | 41.4 (10.3) | Not reported | | 10.4 (3.1) | | Not reported |
| Healthy controls | 20 | 42.4 (11.8) | 12.3 (3.4) | |
| Turnbull 2006 | Psychosis group | 21 | IGT | UK&USA | 38.3 (10.4) | 62% | | 12.6 (1.0) | | Not reported |
| Healthy controls | 21 | 36.1 (8.9) | 62% | | 12.1 (1.0) | |
| Wasserman 2012 | Psychosis group | 125 | IGT | Canada | 40.41 (12.5) | 81% | | 12.15 (3.0) | | Not reported |
| Healthy controls | 26 | 48.2 (14.3) | 58% | | 15.1 (2.0) | |
| Whitney 2004 | Psychosis group | 54 | IGT | USA | 44.5 (8.8) | 96% | | 12.68 (1.9) | | Caucasian 75%; African American 25% |
| OCD group | 11 | 49.8 (17.3) | 91% | | 13.73 (1.9) | | Caucasian 91%; African-American 9% |
| Wilder 1998 | Psychosis group | 12 | IGT | USA | 34.3 (5.9) | 91% | | 13.1 (2.5) | | Not reported |
| Healthy controls | 30 | 30.2 (9.7) | 41 | | 15.2 (2.4) | |
| Wing 2013 | Psychosis group | 68 | IGT | Canada | 37.9 (10.9) | 71% | | 13.0 (2.7) | | Caucasian 57%; African-American 12%; Asian 12%; Hispanic 3%; Other 12% |
| Healthy controls | 62 | 39.0 (11.3) | 37% | | 16.0 (4.8) | | Caucasian 65%; African-American 10%; Asian 10%; Hispanic 3%; Other 10% |
| Yip 2009 | Psychosis group | 42 | IGT | USA | 40.6 (7.1) | 69% | | 12.2 (2.2) | | Not reported |
| Healthy controls | 19 | 37.3 (11.6) | 81% | | 14.9 (2.9) | |
| Zhang 2015 | Psychosis group | 46 | IGT | China | 19.9 (3.8) | 80% | | 10.5 (1.8) | | Not reported |
| Healthy controls | 80 | 19.2 (3.0) | 84% | | 10.6 (1.4) | |
| Note: Cambridge Gambling Task (CGT); Dissocial Personality Disorder (DPD); Obsessive Compulsive Disorder (OCD); Iowa Gambling Task (IGT); Standard deviation (SD)  1Premkumar 2015 and Premkumar 2011 are secondary reports of Premakumar 2008. Data from all analyses used. | | | | | | | | | | |

| **Table E2. Diagnosis of participants with psychosis per study, and diagnostic criteria used** | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Study** | **Schizophrenia** | **Schizoaffective disorder** | **Schizophreniform disorder** | **Psychosis NOS** | **Brief psychotic disorder** | **Bipolar Disorder** | **Drug-induced psychosis** | **Mood disorder (NOS)** | **Delusional disorder** | **Diagnostic criteria** |
| Adan 2017 | 84.2% | 15.8% |  |  |  |  |  |  |  | DSM-IV |
| Altamura 2015 | 100% |  |  |  |  |  |  |  |  | DSM-IV |
| Benninger 2003 | 100% |  |  |  |  |  |  |  |  | DSM-IV |
| Brambilla 2013 | 100% |  |  |  |  |  |  |  |  | DSM-IV |
| Brown 2015 | 83.1% | 16.9% |  |  |  |  |  |  |  | DSM-IV |
| Caletti 2013 | 100% |  |  |  |  |  |  |  |  | DSM-IV |
| Cavallero 2003 | 100% |  |  |  |  |  |  |  |  | DSM-IV |
| Cella 2012 | 100% |  |  |  |  |  |  |  |  | DSM-IV |
| Chan 2013 | 100% |  |  |  |  |  |  |  |  | DSM-IV |
| Choi 2011 | 100% |  |  |  |  |  |  |  |  | DSM-IV |
| Da Silva 2017 | 82.1% | 17.9% |  |  |  |  |  |  |  | DSM-IV |
| Goddard 2017 | 62.5% | 12.5% |  | 12.5% |  | 12.5% |  |  |  | Chart (unclear if ICD or DSM) |
| Gu 2013 | 100% |  |  |  |  |  |  |  |  | ICD-10 |
| Heerey 2008 | 100% |  |  |  |  |  |  |  |  | DSM-IV |
| Highet 2014 | 100% |  |  |  |  |  |  |  |  | DSM-IV |
| Hori 2014 | 100% |  |  |  |  |  |  |  |  | DSM-IV |
| Hutton 200 FEP/Chronic vs HC | 100% |  |  |  |  |  |  |  |  | DSM-IV |
| Kester 2006 | 100% |  |  |  |  |  |  |  |  | Unclear |
| Kim 2009 | 100% |  |  |  |  |  |  |  |  | DSM-IV |
| Kim 2012 | 100% |  |  |  |  |  |  |  |  | DSM-IV |
| Kim 2016 | 100% |  |  |  |  |  |  |  |  | DSM-IV |
| Lee 2007 | 100% |  |  |  |  |  |  |  |  | DSM-IV |
| Martin 2015 | 100% |  |  |  |  |  |  |  |  | DSM-IV |
| Martino 2014 | 100% |  |  |  |  |  |  |  |  | DSM-IV |
| Matsuzawa 2015 | 100% |  |  |  |  |  |  |  |  | DSM-IV |
| Moss 2009 | <100% | >1% |  |  |  |  |  |  |  | DSM-IV |
| Nakamura 2008 | 100% |  |  |  |  |  |  |  |  | DSM-IV |
| Nestor 2014 | 100% |  |  |  |  |  |  |  |  | DSM-IV |
| Newman 2007 | 62.9% | 37.1% |  |  |  |  |  |  |  | Chart (likely DSM-IV) |
| Nishinaka 2016 | 85.9% (F2) |  |  |  |  |  | 12.7% (F1) | 1.4% (F3) |  | ICD-10 |
| Pedersen 2017 | 100% |  |  |  |  |  |  |  |  | DSM-IV |
| Premkumar 2008 | 89.3%1 | 10.7% |  |  |  |  |  |  |  | DSM-IV |
| Raffard 2011 | 100% |  |  |  |  |  |  |  |  | DSM-IV |
| Rim 2007 | 100% |  |  |  |  |  |  |  |  | DSM-IV |
| Ritter 2004 | 75% | 25% |  |  |  |  |  |  |  | DSM-IV |
| Roca 2014 | 100% |  |  |  |  |  |  |  |  | DSM-IV |
| Rodriguez-Sanchez 2005 (Crespo-Facorro 2009) | 61.1% |  | 27% | 5.6% | 6.3% |  |  |  |  | DSM-IV |
| Sedgwick 2016 | 70.7% | 26.8% |  |  |  |  |  |  | 2.5% | ICD-10 |
| Sevy 2007 | <100% | >1% |  |  |  |  |  |  |  | DSM-IV |
| Shirayama 2010 | 100% |  |  |  |  |  |  |  |  | DSM-IV |
| Shurman 2005 | 100% |  |  |  |  |  |  |  |  | DSM-IV |
| Stratta 2015 | 100% |  |  |  |  |  |  |  |  | DSM-IV |
| Struglia 2011 | 100% |  |  |  |  |  |  |  |  | DSM-IV |
| Turnbull 2006 | 100% |  |  |  |  |  |  |  |  | DSM-IV |
| Wasserman 2012 | <100% | >1% |  |  |  |  |  |  |  | DSM-IV |
| Whitney 2004 | 74% | 26% |  |  |  |  |  |  |  | DSM-IV |
| Wilder 1998 | 91.7% | 8.3% |  |  |  |  |  |  |  | DSM-IV |
| Wing 2013 | <100% | >1% |  |  |  |  |  |  |  | DSM-IV |
| Yip 2009 | 66.7% | 33.3% |  |  |  |  |  |  |  | DSM-IV |
| Zhang 2015 | 100% |  |  |  |  |  |  |  |  | DSM-IV |
| Note: Not otherwise specified (NOS)   1. Including diagnoses of paranoid (80%), catatonic (1.3%) and residual (5.3%) schizophrenia and undifferentiated schizophrenia (2.7%). | | | | | | | | | | |

1. **Study quality assessment tool**

We adapted a tool for assessing the methodological quality of observational studies that has been successfully employed in prior research undertaken by the Agency for Healthcare Research and Quality (AHRQ). The main methodological quality criteria were retained but the underlying factors related to each study quality criterion were adapted in some instances for this specific context. Each study is assessed on a number of methodological quality criteria (for example, unbiased selection of groups, sample-size calculations, and so on) that are rated as being met, not met, partially met, or being unclear.

Following the guidance of experts in the field of meta-analysis, we will avoid scale-based or aggregated study quality rating. Quality assessments were presented descriptively to guide the interpretation of findings, rather than used as a means to weight or adjust aggregated effect sizes. However, as noted, we planned to test whether specific aspects of methodology were moderators of effect sizes. These included blinding and the matching of participants on demographics.

The tool we used is reproduced below.

1

General instructions: Grade each criterion as ‘Yes’, ‘No’, ‘Partially’, or ‘Unclear’. Factors to consider when making an assessment are listed under each criterion. Where appropriate (particularly when assigning a ‘No’, ‘Partially’, or ‘Unclear’ score), please provide a brief rationale for your decision (in parentheses) in the evidence table.

1. Unbiased selection of the cohort?

Factors that help reduce selection bias:

○ Inclusion/exclusion criteria:

○ Recruitment strategy

▪ Clearly described

▪ Criteria for inclusion in psychosis and comparison groups clearly outlined.

▪ Relatively free from bias (selection bias might be introduced, for example, by recruitment via advertisement).

2. Selection minimizes baseline differences in prognostic factors?

Factors to consider:

○ Was selection of the comparison group appropriate?

○ Is the comparison group matched with the clinical group on key demographics (age, gender, education (if a measure of IQ was not reported), ethnicity)?

*No = significantly different on at least 2; Partial = significantly different on 1; Yes = no significant differences on 4 or 3 excluding ethnicity*

3. Sample size calculated?

Factors to consider:

○ Did the authors report conducting a power analysis or describe some other basis for determining the adequacy of study group sizes for the primary outcome(s) of interest to us?

○ Where a power calculation is presented, do the final numbers obtained match up to this (for example, within 10% of required numbers)?

4. Adequate description of the cohort?

Consider whether the cohort is well-characterized in terms of baseline:

○ Age

○ Sex

○ Education

○ Ethnicity

○ Diagnosis/clinical status

*No = reported 1 of the above or less; Partial = reported 2 to 4; Yes = reported all 5 or 4 excluding ethnicity*

5. Validated method for ascertaining psychotic disorder or delusions?

Factors to consider:

○ Was the method used to ascertain exposure clearly described (details should be sufficient to permit replication in new studies)?

○ Was a valid and reliable measure used to ascertain exposure (subjective measures based on self-report tend to have lower reliability and validity than objective measures such as clinical interview)? Likewise, relying on medical notes is likely to introduce bias due to variation in how assessment is undertaken.

6. Validated method for measuring decision-making?

Factors to consider:

○ The Iowa Gambling Task or a conceptually equivalent variant should be used

○ Were these measures implemented consistently across all study participants?

○ Were several trials and/or a practice run included in the procedure?

7. Outcome assessment blind to exposure?

Factors to consider:

○ Were the study investigators who assessed outcomes blind to whether participants had a psychotic disorder (this criterion will not apply in the case of internet-based or automated designs where a researcher is not present)?

8. Adequate handling of missing data?

Factors to consider:

○ Are the details of missing data clearly reported, including how missing data was handled in the analyses? If not, is there any reason to believe missing data was present (for example, lower N in analysis than initially reported in the participants section).

○ Did missing data from any group exceed 20%?

○ If missing data was present and substantial, were steps taken to minimize bias (for example, sensitivity analysis or imputation).

9. Appropriate analysis/ Analysis controls for confounding?

Factors to consider:

○ Was the kind of analysis done appropriate for the kind of outcome data (categorical, continuous, and so on)?

○ Was the number of variables used in the analysis appropriate for the sample size (the statistical techniques used must be appropriate to the data and take into account issues such as controlling for small sample size, clustering, rare outcomes, multiple comparison, and number of covariates for a given sample size)?

For controlled studies:

○ If groups were not matched as baseline, did the analysis control for any baseline differences between groups?

○ Does the study identify and control for important confounding variables and effect modifiers (for example, IQ)?

1. **Outcome specific study quality tables**

**G.1. Overall – All studies included in review**

| **Study ref** | **Unbiased selection of cohort?** | **Selection minimises baseline differences in prognostic factors?1** | **Sample size calculation or adequate power?** | **Adequate description of the cohort?** | **Validated method for ascertaining psychosis** | **Validated methods for ascertaining decision-making** | **Outcome assessments blind to clinical status?** | **Few instances of missing data or missing data adequately handled?** | **Appropriate analysis/Analysis controls for confounders?** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Adan 2017 | Yes | N/A | Unclear | Yes | Yes | Yes | No | Yes | Yes |
| Altamura 2015 | Yes | N/A | No | Partial | Yes | Yes | No | No | N/A |
| Benninger 2003 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Yes |
| Brambilla 2013 | Yes | Yes | Yes | Yes | Yes | Yes | No | Yes | Yes |
| Brown 2015 – net | Yes | Partial | No | Yes | Yes | Yes | No | Yes | No |
| Caletti 2013 | Unclear | Partial | No | Partial | Yes | Yes | No | Yes | Yes |
| Cavallaro 2003 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Yes |
| Cella 2012 | Yes | Partial | No | Yes | Yes | Yes | No | Unclear | No |
| Chan 2013 | Unclear | Partial | No | Yes | Yes | Yes | No | Yes | Yes |
| Choi 2011 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Yes |
| Da Silva 2017 | Unclear | Partial | No | Yes | Yes | Yes | No | Unclear | Partial |
| Goddard 2017 | Partial | Partial | No | Yes | Unclear | Yes | No | Unclear | Unclear |
| Gu 2013 | Yes | No | Yes | Yes | Yes | Yes | No | No | Yes |
| Heerey 2008 | Unclear | Partial | No | Yes | Yes | Yes | No | Yes | No |
| Highet 2014 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Hori 2014 | Unclear | Yes | No | Yes | Yes | Yes | No | Unclear | Yes |
| Hutton 2002 | Yes | Partial | No | Partial | Yes | Yes | No | Yes | Yes |
| Kester 2006 | Yes | Yes | No | Yes | Yes | Yes | No | Unclear | Yes |
| Kim 2009 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | No |
| Kim 2012 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Kim 2016 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Lee 2007 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Martin 2015 | Yes | Yes | No | Partial | Yes | Yes | No | Unclear | Yes |
| Martino 2014 | Unclear | No | No | Partial | Yes | Yes | No | Unclear | Yes |
| Matsuzawa 2015 | Unclear | Partial | No | Yes | Yes | Yes | No | Unclear | No |
| Moss 2009 | Yes | No | No | Yes | Yes | Yes | No | Yes | Partial |
| Nakamura 2008 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Partial |
| Nestor 2014 | Yes | Yes | No | Partial | Yes | Yes | No | Yes | Yes |
| Newman 2007 | Yes | N/A | No | Yes | Yes | Yes | No | Yes | N/A |
| Nishinaka 2016 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Pedersen 2017 | Yes | Yes | Yes | Yes | Yes | Yes | No | Yes | Yes |
| Premkumar 2008 (2011) | Unclear (yes) | Partial (N/A) | No (No) | Yes (yes) | Yes (yes) | Yes (yes) | No (no) | Yes (partial) | Partial (N/A) |
| Raffard 2011 (Fond 2013) | Unclear | Partial | No | Yes | Yes | Yes | No | Yes | Yes |
| Rim 2007 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Yes |
| Ritter 2004 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Roca 2014 | Unclear | Unclear | No | No | Yes | Yes | No | Yes | Yes |
| Rodriguez-Sanchez 2005 (Crespo-Facorro 2009) | Yes | Yes | No | Yes | Yes | Yes | Yes | Yes | Yes |
| Sedgwick 2016 | Yes | Unclear | No | Unclear | Yes | Yes | No | Yes | Yes |
| Sevy 2007 | Yes | Partial | Yes | Yes | Yes | Yes | No | Yes | Yes |
| Shirayama 2010 | Unclear | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Shurman 2005 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Partial |
| Stratta 2015 | Yes | Yes | Yes | Yes | Yes | Yes | No | Yes | Yes |
| Struglia 2011 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Yes |
| Turnbull 2006 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Wasserman 2012 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Partial |
| Whitney 2004 | Yes | Unclear | No | Yes | Yes | Yes | Yes | Yes | Yes |
| Wilder 1998 | Unclear | Unclear | No | Yes | Yes | Yes | No | Unclear | Unclear |
| Wing 2013 | Unclear | No | No | Yes | Yes | Yes | No | Yes | Yes |
| Yip 2009 | Unclear | No | No | Yes | Yes | Yes | No | Yes | Yes |
| Zhang 2015 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
|  |  |  |  |  |  |  |  |  |  |

**G.2. Psychosis versus healthy controls**

| **Study ref** | **Unbiased selection of cohort?** | **Selection minimises baseline differences in prognostic factors?1** | **Sample size calculation or adequate power?** | **Adequate description of the cohort?** | **Validated method for ascertaining psychosis** | **Validated methods for ascertaining decision-making** | **Outcome assessments blind to clinical status?** | **Few instances of missing data or missing data adequately handled?** | **Analysis controls for confounders?** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Benninger 2003 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Yes |
| Brambilla 2013 | Yes | Yes | Yes | Yes | Yes | Yes | No | Yes | Yes |
| Brown 2015 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | No |
| Caletti 2013 | Unclear | Partial | No | Partial | Yes | Yes | No | Yes | Yes |
| Cavallaro 2003 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Yes |
| Cella 2012 | Yes | Partial | No | Yes | Yes | Yes | No | Unclear | No |
| Chan 2013 | Unclear | Partial | No | Yes | Yes | Yes | No | Yes | Yes |
| Choi 2011 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Yes |
| Da Silva 2017 | Unclear | Partial | No | Yes | Yes | Yes | No | Unclear | Partial |
| Goddard 2017 | Partial | Partial | No | Yes | Unclear | Yes | No | Unclear | Yes |
| Gu 2013 | Yes | No | Yes | Yes | Yes | Yes | No | No | Yes |
| Heerey 2008 | Unclear | Partial | No | Yes | Yes | Yes | No | Yes | Yes |
| Highet 2014 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Hori 2014 | Unclear | Yes | No | Yes | Yes | Yes | No | Unclear | Yes |
| Hutton 2002 Chronic vs HC | Yes | Partial | No | Partial | Yes | Yes | No | Yes | Yes |
| Hutton 2002 FEP vs HC | Yes | Partial | No | Partial | Yes | Yes | No | Yes | Yes |
| Kester 2006 | Yes | Yes | No | Yes | Yes | Yes | No | Unclear | Yes |
| Kim 2009 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | No |
| Kim 2012 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Kim 2016 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Lee 2007 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Martin 2015 | Yes | Yes | No | Partial | Yes | Yes | No | Unclear | Yes |
| Martino 2014 | Unclear | No | No | Partial | Yes | Yes | No | Unclear | Yes |
| Matsuzawa 2015 | Unclear | Partial | No | Yes | Yes | Yes | No | Unclear | No |
| Moss 2009 | Yes | No | No | Yes | Yes | Yes | No | Yes | Partial |
| Nakamura 2008 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Partial |
| Nestor 2014 | Yes | Yes | No | Partial | Yes | Yes | No | Yes | Yes |
| Nishinaka 2016 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Pedersen 2017 | Yes | Yes | Yes | Yes | Yes | Yes | No | Yes | Yes |
| Premkumar 2008 | Unclear | Partial | No | Yes | Yes | Yes | No | Yes | Partial |
| Raffard 2011 (details from Fond 2013) | Unclear | Partial | No | Yes | Yes | Yes | No | Yes | Yes |
| Rim 2007 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Yes |
| Ritter 2004 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Roca 2014 | Unclear | Unclear | No | No | Yes | Yes | No | Yes | Yes |
| Rodriguez-Sanchez 2005 (Crespo-Facorro 2009) | Yes | Yes | No | Yes | Yes | Yes | Yes | Yes | Yes |
| Sedgwick 2016 | Yes | Unclear | No | Unclear | Yes | Yes | No | Yes | Yes |
| Sevy 2007 | Yes | Partial | Yes | Yes | Yes | Yes | No | Yes | Yes |
| Shirayama 2010 | Unclear | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Shurman 2005 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Partial |
| Stratta 2015 | Yes | Yes | Yes | Yes | Yes | Yes | No | Yes | Yes |
| Struglia 2011 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Yes |
| Turnbull 2006 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Wasserman 2012 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Partial |
| Wilder 1998 | Unclear | Unclear | No | Yes | Yes | Yes | No | Unclear | Unclear |
| Wing 2013 | Unclear | No | No | Yes | Yes | Yes | No | Yes | Yes |
| Yip 2009 | Unclear | No | No | Yes | Yes | Yes | No | Yes | Yes |
| Zhang 2015 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
|  |  |  |  |  |  |  |  |  |  |

Note: First-episode psychosis (FEP);

**G.3. Decision-making performance: Psychosis versus Bipolar Disorder**

| **Study ref** | **Unbiased selection of cohort?** | **Selection minimises baseline differences in prognostic factors?1** | **Sample size calculation or adequate power?** | **Adequate description of the cohort?** | **Validated method for ascertaining psychosis** | **Validated methods for ascertaining decision-making** | **Outcome assessments blind to clinical status?** | **Few instances of missing data or missing data adequately handled?** | **Analysis controls for confounders?** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Brambilla 2013 | Yes | Yes | Yes | Yes | Yes | Yes | No | Yes | Yes |
| Caletti 2013 | Unclear | Partial | No | Partial | Yes | Yes | No | Yes | Yes |
| Martino 2014 | Unclear | No | No | Partial | Yes | Yes | No | Unclear | Yes |
|  |  |  |  |  |  |  |  |  |  |

**G.4. Attention to gain bias: psychosis vs healthy controls**

| **Study ref** | **Unbiased selection of cohort?** | **Selection minimises baseline differences in prognostic factors?1** | **Sample size calculation or adequate power?** | **Adequate description of the cohort?** | **Validated method for ascertaining psychosis** | **Validated methods for ascertaining decision-making** | **Outcome assessments blind to clinical status?** | **Few instances of missing data or missing data adequately handled?** | **Appropriate analysis/Analysis controls for confounders?** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Brambilla 2013 | Yes | Yes | Yes | Yes | Yes | Yes | No | Yes | Yes |
| Cella 2012 | Yes | Partial | No | Yes | Yes | Yes | No | Unclear | No |
| Kester 2006 | Yes | Yes | No | Yes | Yes | Yes | No | Unclear | Yes |
| Kim 2016 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Premkumar 2008 | Unclear | Partial | No | Yes | Yes | Yes | No | Yes | Partial |
| Sevy 2007 | Yes | Partial | Yes | Yes | Yes | Yes | No | Yes | Yes |

**G.5. Memory bias for recent outcomes: psychosis vs healthy controls**

| **Study ref** | **Unbiased selection of cohort?** | **Selection minimises baseline differences in prognostic factors?1** | **Sample size calculation or adequate power?** | **Adequate description of the cohort?** | **Validated method for ascertaining psychosis** | **Validated methods for ascertaining decision-making** | **Outcome assessments blind to clinical status?** | **Few instances of missing data or missing data adequately handled?** | **Appropriate analysis/Analysis controls for confounders?** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Brambilla 2013 | Yes | Yes | Yes | Yes | Yes | Yes | No | Yes | Yes |
| Cella 2012 | Yes | Partial | No | Yes | Yes | Yes | No | Unclear | No |
| Kester 2006 | Yes | Yes | No | Yes | Yes | Yes | No | Unclear | Yes |
| Kim 2016 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Premkumar 2008 | Unclear | Partial | No | Yes | Yes | Yes | No | Yes | Partial |
| Sevy 2007 | Yes | Partial | Yes | Yes | Yes | Yes | No | Yes | Yes |

**G.6. Choice consistency: Psychosis vs healthy controls**

| **Study ref** | **Unbiased selection of cohort?** | **Selection minimises baseline differences in prognostic factors?1** | **Sample size calculation or adequate power?** | **Adequate description of the cohort?** | **Validated method for ascertaining psychosis** | **Validated methods for ascertaining decision-making** | **Outcome assessments blind to clinical status?** | **Few instances of missing data or missing data adequately handled?** | **Appropriate analysis/Analysis controls for confounders?** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Brambilla 2013 | Yes | Yes | Yes | Yes | Yes | Yes | No | Yes | Yes |
| Cella 2012 | Yes | Partial | No | Yes | Yes | Yes | No | Unclear | No |
| Kester 2006 | Yes | Yes | No | Yes | Yes | Yes | No | Unclear | Yes |
| Kim 2016 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Premkumar 2008 | Unclear | Partial | No | Yes | Yes | Yes | No | Yes | Partial |
| Sevy 2007 | Yes | Partial | Yes | Yes | Yes | Yes | No | Yes | Yes |

**G.7. Correlation 1 Decision making performance and negative symptoms**

| **Study ref** | **Unbiased selection of cohort?** | **Selection minimises baseline differences in prognostic factors?1** | **Sample size calculation or adequate power?** | **Adequate description of the cohort?** | **Validated method for measuring symptoms?** | **Validated methods for ascertaining decision-making** | **Outcome assessments blind to clinical status?** | **Few instances of missing data or missing data adequately handled?** | **Analysis controls for confounders?** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Altamura 2015 | Yes | N/A | No | Partial | Yes | Yes | No | No | N/A |
| Brown 2015 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | No |
| Hori 2014 | Unclear | Yes | No | Yes | Yes | Yes | No | Unclear | Yes |
| Kester 2006 | Yes | Yes | No | Yes | Yes | Yes | No | Unclear | Yes |
| Kim 2012 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Lee 2007 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Matsuzawa 2015 | Unclear | Partial | No | Yes | Yes | Yes | No | Unclear | No |
| Nestor 2014 | Yes | Yes | No | Partial | Yes | Yes | No | Yes | Yes |
| Premkumar 2008 | Unclear | Partial | No | Yes | Yes | Yes | No | Yes | Partial |
| Rim 2007 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Yes |
| Rodriguez-Sanchez 2005 | Yes | Yes | No | Yes | Yes | Yes | Yes | Yes | Yes |
| Shurman 2005 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Partial |
| Turnbull 2006 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
|  |  |  |  |  |  |  |  |  |  |

**G.8. Correlation 2 Decision making performance and positive symptoms**

| **Study ref** | **Unbiased selection of cohort?** | **Selection minimises baseline differences in prognostic factors?1** | **Sample size calculation or adequate power?** | **Adequate description of the cohort?** | **Validated method for ascertaining symptoms?** | **Validated methods for ascertaining decision-making?** | **Outcome assessments blind to clinical status?** | **Few instances of missing data or missing data adequately handled?** | **Analysis controls for confounders?** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Brown 2015 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | No |
| Hori 2014 | Unclear | Yes | No | Yes | Yes | Yes | No | Unclear | Yes |
| Kester 2006 | Yes | Yes | No | Yes | Yes | Yes | No | Unclear | Yes |
| Kim 2012 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Lee 2007 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Premkumar 2008 | Unclear | Partial | No | Yes | Yes | Yes | No | Yes | Partial |
| Rim 2007 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Yes |
| Rodriguez-Sanchez 2005 | Yes | Yes | No | Yes | Yes | Yes | Yes | Yes | Yes |
| Struglia 2011 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Yes |
| Turnbull 2006 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
|  |  |  |  |  |  |  |  |  |  |

**G.9. Correlation 3 Decision making performance and general symptoms**

| **Study ref** | **Unbiased selection of cohort?** | **Selection minimises baseline differences in prognostic factors?1** | **Sample size calculation or adequate power?** | **Adequate description of the cohort?** | **Validated method for measuring symptoms?** | **Validated methods for ascertaining decision-making?** | **Outcome assessments blind to clinical status?** | **Few instances of missing data or missing data adequately handled?** | **Analysis controls for confounders?** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Hori 2014 | Unclear | Yes | No | Yes | Yes | Yes | No | Unclear | Yes |
| Kim 2012 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Lee 2007 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Premkumar 2008 | Unclear | Partial | No | Yes | Yes | Yes | No | Yes | Partial |
| Rim 2007 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Yes |
|  |  |  |  |  |  |  |  |  |  |

**G.10. Correlation 4 Decision making performance and overall symptoms**

| **Study ref** | **Unbiased selection of cohort?** | **Selection minimises baseline differences in prognostic factors?1** | **Sample size calculation or adequate power?** | **Adequate description of the cohort?** | **Validated method for measuring symptoms?** | **Validated methods for ascertaining decision-making?** | **Outcome assessments blind to clinical status?** | **Few instances of missing data or missing data adequately handled?** | **Analysis controls for confounders?** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Hori 2014 | Unclear | Yes | No | Yes | Yes | Yes | No | Unclear | Yes |
| Kim 2012 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Lee 2007 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Premkumar 2008 | Unclear | Partial | No | Yes | Yes | Yes | No | Yes | Partial |
| Rim 2007 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Yes |
| Yip 2009 | Unclear | No | No | Yes | Yes | Yes | No | Yes | Yes |
|  |  |  |  |  |  |  |  |  |  |

**G.11. Correlation 5 Decision making performance and intelligence**

| **Study ref** | **Unbiased selection of cohort?** | **Selection minimises baseline differences in prognostic factors?1** | **Sample size calculation or adequate power?** | **Adequate description of the cohort?** | **Validated method for ascertaining IQ** | **Validated methods for ascertaining decision-making** | **Outcome assessments blind to clinical status?** | **Few instances of missing data or missing data adequately handled?** | **Analysis controls for confounders?** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Brown 2015 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | No |
| Goddard 2017 | Partial | Partial | No | Yes | Yes | Yes | No | Unclear | Yes |
| Hori 2014 | Unclear | Yes | No | Yes | Yes | Yes | No | Unclear | Yes |
| Kester 2006 | Yes | Yes | No | Yes | Yes | Yes | No | Unclear | Yes |
| Nestor 2014 | Yes | Yes | No | Partial | Yes | Yes | No | Yes | Yes |
| Raffard 2012 | Unclear | Partial | No | Yes | Yes | Yes | No | Yes | Yes |
| Rim 2007 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Yes |
| Roca 2014 | Unclear | Unclear | No | No | Yes | Yes | No | Yes | Yes |
| Rodriguez-Sanchez 2005 | Yes | Yes | No | Yes | Yes | Yes | Yes | Yes | Yes |
| Wilder 1998 | Unclear | Unclear | No | Yes | Yes | Yes | No | Unclear | Unclear |
| Yip 2009 | Unclear | No | No | Yes | Yes | Yes | No | Yes | Yes |
|  |  |  |  |  |  |  |  |  |  |

**G.12. Correlation 6 Decision making performance and years of education**

| **Study ref** | **Unbiased selection of cohort?** | **Selection minimises baseline differences in prognostic factors?1** | **Sample size calculation or adequate power?** | **Adequate description of the cohort?** | **Validated method for ascertaining psychosis** | **Validated methods for ascertaining decision-making** | **Outcome assessments blind to clinical status?** | **Few instances of missing data or missing data adequately handled?** | **Analysis controls for confounders?** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Goddard 2017 | Partial | Partial | No | Yes | Unclear | Yes | No | Unclear | Yes |
| Rodriguez-Sanchez 2005 | Yes | Yes | No | Yes | Yes | Yes | Yes | Yes | Yes |
| Yip 2009 | Unclear | No | No | Yes | Yes | Yes | No | Yes | Yes |
|  |  |  |  |  |  |  |  |  |  |

**G.13. Correlation 7 Decision making performance and executive functioning – perseveration**

| **Study ref** | **Unbiased selection of cohort?** | **Selection minimises baseline differences in prognostic factors?1** | **Sample size calculation or adequate power?** | **Adequate description of the cohort?** | **Validated method for measuring executive function?** | **Validated methods for ascertaining decision-making** | **Outcome assessments blind to clinical status?** | **Few instances of missing data or missing data adequately handled?** | **Analysis controls for confounders?** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Brambilla 2012 | Yes | Yes | Yes | Yes | Yes | Yes | No | Yes | Yes |
| Cavallaro 2003 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Yes |
| Goddard 2017 | Partial | Partial | No | Yes | Yes | Yes | No | Unclear | Yes |
| Kester 2006 | Yes | Yes | No | Yes | Yes | Yes | No | Unclear | Yes |
| Kim 2012 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Lee 2007 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Rim 2007 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Yes |
| Rodriguez-Sanchez 2005 | Yes | Yes | No | Yes | Yes | Yes | Yes | Yes | Yes |
| Shurman 2005 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Partial |
| Wing 2013 | Unclear | No | No | Yes | Yes | Yes | No | Yes | Yes |
| Yip 2009 | Unclear | No | No | Yes | Yes | Yes | No | Yes | Yes |
|  |  |  |  |  |  |  |  |  |  |

**G.14. Correlation 8 Decision making performance and executive functioning - performance**

| **Study ref** | **Unbiased selection of cohort?** | **Selection minimises baseline differences in prognostic factors?1** | **Sample size calculation or adequate power?** | **Adequate description of the cohort?** | **Validated method for measuring executive function?** | **Validated methods for ascertaining decision-making** | **Outcome assessments blind to clinical status?** | **Few instances of missing data or missing data adequately handled?** | **Analysis controls for confounders?** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Brambilla 2012 - categories | Yes | Yes | Yes | Yes | Yes | Yes | No | Yes | Yes |
| Kester 2006 - categories | Yes | Yes | No | Yes | Yes | Yes | No | Unclear | Yes |
| Kim 2012 - categories | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Lee 2007 – categories | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Nestor 2014 - total correct | Yes | Yes | No | Partial | Yes | Yes | No | Yes | Yes |
| Rim 2007 - categories | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Yes |
|  |  |  |  |  |  |  |  |  |  |

**G.15. Correlation 9 Decision making performance and working memory**

| **Study ref** | **Unbiased selection of cohort?** | **Selection minimises baseline differences in prognostic factors?1** | **Sample size calculation or adequate power?** | **Adequate description of the cohort?** | **Validated method for ascertaining psychosis** | **Validated methods for ascertaining decision-making** | **Outcome assessments blind to clinical status?** | **Few instances of missing data or missing data adequately handled?** | **Analysis controls for confounders?** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Brown 2015 - LNS | Yes | Partial | No | Yes | Yes | Yes | No | Yes | No |
| Goddard 2017 - DS | Partial | Partial | No | Yes | Unclear | Yes | No | Unclear | Yes |
| Martin 2015 - DSB | Yes | Yes | No | Partial | Yes | Yes | No | Unclear | Yes |
| Nestor 2014 WMS-III IM | Yes | Yes | No | Partial | Yes | Yes | No | Yes | Yes |
| Rodriguez-Sanchez 2005 – DSB | Yes | Yes | No | Yes | Yes | Yes | Yes | Yes | Yes |
|  |  |  |  |  |  |  |  |  |  |

Note: Letter Number Sequencing Test (LNS); Digit Span (DS); Digit Span Backwards (DSB); Wechsler Memory Scale – 3rd Edition (WMS-III); Immediate memory (IM)

**G.16. Correlation 10 Decision making performance and social functioning**

| **Study ref** | **Unbiased selection of cohort?** | **Selection minimises baseline differences in prognostic factors?1** | **Sample size calculation or adequate power?** | **Adequate description of the cohort?** | **Validated method for ascertaining psychosis** | **Validated methods for ascertaining decision-making** | **Outcome assessments blind to clinical status?** | **Few instances of missing data or missing data adequately handled?** | **Analysis controls for confounders?** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Caletti 2013 | Unclear | Partial | No | Partial | Yes | Yes | No | Yes | Yes |
| Kester 2006 | Yes | Yes | No | Yes | Yes | Yes | No | Unclear | Yes |
| Premkumar 2008 | Unclear | Partial | No | Yes | Yes | Yes | No | Yes | Partial |
| Stratta 2015 | Yes | Yes | Yes | Yes | Yes | Yes | No | Yes | Yes |
|  |  |  |  |  |  |  |  |  |  |

**G.17. Correlation 11 Decision making performance and antipsychotic dose (CPZ equivalents)**

| **Study ref** | **Unbiased selection of cohort?** | **Selection minimises baseline differences in prognostic factors?1** | **Sample size calculation or adequate power?** | **Adequate description of the cohort?** | **Validated method for ascertaining psychosis** | **Validated methods for ascertaining decision-making** | **Outcome assessments blind to clinical status?** | **Few instances of missing data or missing data adequately handled?** | **Analysis controls for confounders?** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Brambilla 2013 | Yes | Yes | Yes | Yes | Yes | Yes | No | Yes | Yes |
| Hori 2014 | Unclear | Yes | No | Yes | Yes | Yes | No | Unclear | Yes |
| Lee 2007 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
|  |  |  |  |  |  |  |  |  |  |

**G.18. Decision making performance: First-generation vs second-generation antipsychotics**

| **Study ref** | **Unbiased selection of cohort?** | **Selection minimises baseline differences in prognostic factors?1** | **Sample size calculation or adequate power?** | **Adequate description of the cohort?** | **Validated method for ascertaining psychosis** | **Validated methods for ascertaining decision-making** | **Outcome assessments blind to clinical status?** | **Few instances of missing data or missing data adequately handled?** | **Analysis controls for confounders?** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Benninger 2003 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Yes |
| Cavallero 2003 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Yes |
| Rodriguez-Sanchez 2005 (C-F 2009) | Yes | Yes | No | Yes | Yes | Yes | Yes | Yes | Yes |
| Shurman 2005 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Partial |
| Wasserman 2012 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Partial |
| Yip 2009 | Unclear | No | No | Yes | Yes | Yes | No | Yes | Yes |
|  |  |  |  |  |  |  |  |  |  |

**G.19. Decision making performance: First-generation antipsychotics vs healthy individuals**

| **Study ref** | **Unbiased selection of cohort?** | **Selection minimises baseline differences in prognostic factors?1** | **Sample size calculation or adequate power?** | **Adequate description of the cohort?** | **Validated method for ascertaining psychosis** | **Validated methods for ascertaining decision-making** | **Outcome assessments blind to clinical status?** | **Few instances of missing data or missing data adequately handled?** | **Analysis controls for confounders?** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Benninger 2003 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Yes |
| Cavallaro 2003 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Yes |
| Rodriguez-Sanchez 2005 (C-F 2009) | Yes | Yes | No | Yes | Yes | Yes | Yes | Yes | Yes |
| Shurman 2005 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Partial |
| Wasserman 2012 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Partial |
| Yip 2009 | Unclear | No | No | Yes | Yes | Yes | No | Yes | Yes |
|  |  |  |  |  |  |  |  |  |  |

**G.20. Decision making performance: Second-generation antipsychotics vs healthy individuals**

| **Study ref** | **Unbiased selection of cohort?** | **Selection minimises baseline differences in prognostic factors?1** | **Sample size calculation or adequate power?** | **Adequate description of the cohort?** | **Validated method for ascertaining psychosis** | **Validated methods for ascertaining decision-making** | **Outcome assessments blind to clinical status?** | **Few instances of missing data or missing data adequately handled?** | **Analysis controls for confounders?** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Benninger 2003 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Yes |
| Cavallaro 2003 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Yes |
| Cella 2012 | Yes | Partial | No | Yes | Yes | Yes | No | Unclear | No |
| Goddard 2017 | Partial | Partial | No | Yes | Unclear | Yes | No | Unclear | Yes |
| Gu 2013 | Yes | No | Yes | Yes | Yes | Yes | No | No | Yes |
| Hori 2014 | Unclear | Yes | No | Yes | Yes | Yes | No | Unclear | Yes |
| Kim 2012 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Matsuzawa 2015 | Unclear | Partial | No | Yes | Yes | Yes | No | Unclear | No |
| Pedersen 2017 | Yes | Yes | Yes | Yes | Yes | Yes | No | Yes | Yes |
| Rodriguez-Sanchez 2005 (C-F 2009) | Yes | Yes | No | Yes | Yes | Yes | Yes | Yes | Yes |
| Shurman 2005 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Partial |
| Turnbull 2006 | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes |
| Wasserman 2012 | Yes | Partial | No | Yes | Yes | Yes | No | Yes | Partial |
| Yip 2009 | Unclear | No | No | Yes | Yes | Yes | No | Yes | Yes |

1. **GRADE Assessment of all outcomes**

*Method*

All assessments were conducted independently by two reviewers and any disagreements were resolved through discussion, and an overall rating agreed upon. For assessment of outcome quality, we downgraded by 1 point if two of the parameters in our quality assessment had ≥50% studies with at least one ‘no’ or ‘unclear’ rating, and 2 points if three parameters had ≥50% studies with ratings of ‘no’ or ‘unclear’.

We downgraded by 1 point for inconsistency if the I2 statistic was ≥40% in the context of an unclear direction of effect or ≥75% in the context of a clear direction of effect. We downgraded by 2 points if the I2 statistic was ≥75% in the context of an unclear direction of effect. We downgraded an outcome for imprecision if *“a recommendation or clinical course of action would differ if the upper versus the lower boundary of the CI represented the truth”* (Guyatt et al., 2011) and / or the number of events and sample size meant the optimal information size was not reached. For binary outcomes we based our judgements on absolute rather than relative estimates of effect.

We downgraded for publication bias when, for outcomes with at least 10 studies ([82](#_ENREF_82)), funnel-plots suggested asymmetry and this was not better explained by selective reporting bias or some other factor.

**I. Forest plots: Group differences**

**I.1 Decision-making performance: Psychosis vs healthy individuals**



**I.2 Differences in IQ: Psychosis vs healthy individuals (g)**



**I.3 Differences in years of education: Psychosis vs healthy individuals (g)**



**I.4 Differences in gender: Psychosis vs healthy individuals (difference in absolute risk of being male)**

**I.5 Decision-making performance: Psychosis vs bipolar (g)**

****

**I.6 Decision-making performance: First-generation antipsychotics (T) vs second-generation antipsychotics (A) (g)**

****

**I.7 Decision-making performance: Second-generation antipsychotics (A) vs healthy individuals**

****

**I.8 Decision-making performance: First-generation antipsychotics (T) vs healthy individuals**



**I.9. Decision-making performance: Attention to gain bias (insensitivity to loss) psychosis vs healthy controls**



**I.10. Decision-making performance: Memory bias for recent outcomes (learning-rate) psychosis vs healthy controls**

****

**I.11. Decision-making performance: Choice consistency psychosis vs healthy controls**

****

1. **Forest plots: Meta-analyses of within-psychosis group correlations (all Pearson’s r)**

**J.1 Decision-making performance and overall psychotic symptom severity (PANSS total)**

****

**J.2 Decision-making performance and negative psychotic symptoms**

****

**J.3 Decision-making performance and positive psychotic symptoms**

****

**J.4 Decision-making performance and general psychotic symptoms**

****

**J.5 Decision-making performance and intelligence (IQ)**

****

**J.6 Decision-making performance and years of education**

****

**J.7 Decision-making performance and working memory**

****

**J.8 Decision-making performance and executive functioning – perseveration**

****

**J.9 Decision-making performance and executive functioning – categories**

****

**J.10 Decision-making performance and antipsychotic dose (Chlorpromazine equivalents)**

****

**J.11 Decision-making performance and social functioning**



1. **Funnel Plots for meta-analyses with >10 studies**

**K.1 Decision-making performance: Psychosis vs healthy individuals**



**K.2 IQ differences: Psychosis vs healthy individuals**



**K.3 Education differences: Psychosis vs healthy individuals**



**K.4 Gender differences: Psychosis vs healthy individuals**



**K.5 Decision-making performance: Second-generation antipsychotics vs healthy individuals**



**K.6 Decision-making performance and negative symptoms**



**K.7 Decision-making performance and positive symptoms**



**K8 Decision-making performance and intelligence**



**K.9 Decision-making performance and executive functioning – perseveration**



1. **Meta-regression bubble plots**

**L.1 Decision-making performance and task type (Iowa Gambling Task or Cambridge Gambling Task)**

**L.2 Decision-making performance and data extraction hierarchy**

**L.3 Decision-making performance and data extraction hierarchy – all net**

**L.4 Decision-making performance and year of publication**

**L.5 Decision-making performance and proportion diagnosed with schizophrenia**

**L.6 Decision-making performance and stage of illness in psychosis group**

**L.7 Decision-making performance and overall symptoms (continuous)**

****

**L.8 Decision-making performance and symptom severity classification**

****

**L.9 Decision-making performance and reporting of overall psychotic symptoms**

****

**L.10 Decision-making performance and difference in depression severity (standardised mean difference): Psychosis vs healthy individuals**

****

**L.11 Decision-making performance and group differences in IQ (standardised mean difference)**

****

**L.12 Decision-making performance and IQ matching (M=Matched; NM=Not Matched)**

****

**L.13 Decision-making performance and differences in years of education (standardised mean difference)**

**L.14 Decision-making performance and education matching (M=Matched, NM=Not Matched)**



**L.15 Decision-making performance and gender differences (difference in absolute risk of being male)**



**L.16 Decision-making performance and gender matching (M=Matched; NM=Not Matched)**

****

**L.17 Decision-making performance and antipsychotic dose (continuous; chlorpromazine equivalents)**

**L.18 Decision-making performance and category of antipsychotic dose**

**L.19 Decision-making performance and antipsychotic dose reporting**

**L.20 Decision-making performance and proportion taking antipsychotics**



**L.21 Decision-making performance and proportion taking first-generation antipsychotics (‘typical’)**

**L.22 Decision-making performance and proportion taking second-generation antipsychotics (‘atypical’)**



1. **PRISMA checklist**

| **Section/topic** | **#** | **Checklist item** | **Reported on page #** |
| --- | --- | --- | --- |
| **TITLE** | | |  |
| Title | 1 | Identify the report as a systematic review, meta-analysis, or both. | i |
| **ABSTRACT** | | |  |
| Structured summary | 2 | Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number. | 1 |
| **INTRODUCTION** | | |  |
| Rationale | 3 | Describe the rationale for the review in the context of what is already known. | 6-7 |
| Objectives | 4 | Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS). | 6-7 |
| **METHODS** | | |  |
| Protocol and registration | 5 | Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number. | 8 |
| Eligibility criteria | 6 | Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale. | 8 |
| Information sources | 7 | Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched. | 8 |
| Search | 8 | Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated. | 8 |
| Study selection | 9 | State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis). | 8 |
| Data collection process | 10 | Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators. | 8-10 |
| Data items | 11 | List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made. | 8-10 |
| Risk of bias in individual studies | 12 | Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis. | 10 |
| Summary measures | 13 | State the principal summary measures (e.g., risk ratio, difference in means). | 11 |
| Synthesis of results | 14 | Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I2) for each meta-analysis. | 11 |

| **Section/topic** | **#** | **Checklist item** | **Reported on page #** |
| --- | --- | --- | --- |
| Risk of bias across studies | 15 | Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies). | 16 |
| Additional analyses | 16 | Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified. | 15 |
| **RESULTS** | | |  |
| Study selection | 17 | Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram. | 12 |
| Study characteristics | 18 | For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations. | Supplement 10-15 |
| Risk of bias within studies | 19 | Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12). | 16 |
| Results of individual studies | 20 | For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot. | Supplement 21-30 |
| Synthesis of results | 21 | Present results of each meta-analysis done, including confidence intervals and measures of consistency. | 19 |
| Risk of bias across studies | 22 | Present results of any assessment of risk of bias across studies (see Item 15). | 16 |
| Additional analysis | 23 | Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]). | 15 |
| **DISCUSSION** | | |  |
| Summary of evidence | 24 | Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers). | 23 |
| Limitations | 25 | Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias). | 27 |
| Conclusions | 26 | Provide a general interpretation of the results in the context of other evidence, and implications for future research. | 27 |
| **FUNDING** | | |  |
| Funding | 27 | Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review. | 11 |

**References for studies included in systematic review**

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Gu H, Liu C, Liu C, Chen M, Zhang Q, Zhai J, Wang K, Ji F, Xu Z, Shen Q, Bao X, Chen X, Li J, Dong Q and Chen C (2013) The combined effects of the 5- HTTLPR and HTR1A rs6295 polymorphisms modulate decision making in schizophrenia patients. *Genes, Brain & Behavior* **12,** 133-139.

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