

Comparison of major depression diagnostic classification probability using the SCID, CIDI, and MINI diagnostic interviews among women in pregnancy or postpartum: An individual participant data meta-analysis

Brooke Levis^{1,2} | Dean McMillan³ | Ying Sun¹ | Chen He^{1,2} | Danielle B. Rice^{1,4} | Ankur Krishnan¹ | Yin Wu^{1,5} | Marleine Azar^{1,2} | Tatiana A. Sanchez¹ | Matthew J. Chiovitti¹ | Parash Mani Bhandari^{1,2} | Dipika Neupane^{1,2} | Nazanin Saadat¹ | Kira E. Riehm^{1,6} | Mahrukh Imran¹ | Jill T. Boruff⁷ | Pim Cuijpers⁸ | Simon Gilbody³ | John P.A. Ioannidis⁹ | Lorie A. Kloda¹⁰ | Scott B. Patten^{11,12,13} | Ian Shrier^{1,2,14} | Roy C. Ziegelstein¹⁵ | Liane Comeau¹⁶ | Nicholas D. Mitchell^{17,18} | Marcello Tonelli¹⁹ | Simone N. Vigod²⁰ | Franca Aceti²¹ | Rubén Alvarado²² | Cosme Alvarado-Esquivel²³ | Muideen O. Bakare^{24,25} | Jacqueline Barnes²⁶ | Cheryl Tatano Beck²⁷ | Carola Bindt²⁸ | Philip M. Boyce^{29,30} | Adomas Bunevicius³¹ | Tiago Castro e Couto³² | Linda H. Chaudron³³ | Humberto Correa³⁴ | Felipe Pinheiro de Figueiredo³⁵ | Valsamma Eapen^{36,37,38} | Michelle Fernandes^{39,40} | Barbara Figueiredo⁴¹ | Jane R.W. Fisher⁴² | Lluïsa Garcia-Esteve^{43,44,45} | Lisa Giardinelli⁴⁶ | Nadine Helle²⁸ | Louise M. Howard^{47,48} | Dina Sami Khalifa^{49,50,51} | Jane Kohlhoff^{36,37,52} | Laima Kusminskas⁵³ | Zoltán Kozinszky⁵⁴ | Lorenzo Lelli⁴⁶ | Angeliki A. Leonardou⁵⁵ | Beth A. Lewis⁵⁶ | Michael Maes^{57,58} | Valentina Meuti²¹ | Sandra Nakić Radoš⁵⁹ | Purificación Navarro García^{43,60} | Daisuke Nishi^{61,62} | Daniel Okitundu Luwa E-Andjafono⁶³ | Emma Robertson-Blackmore⁶⁴ | Tamsen J. Rochat^{65,66} | Heather J. Rowe⁴² | Bonnie W.M. Siu⁶⁷ | Alkistis Skalkidou⁶⁸ | Alan Stein^{69,70} | Robert C. Stewart^{71,72} | Kuan-Pin Su^{73,74} | Inger Sundström-Poromaa⁶⁸ | Meri Tadinac⁷⁵ | S. Darius Tandon⁷⁶ | Iva Tendais⁴¹ | Pavaani Thiagayson^{77,78,79} | Annamária Töreki⁸⁰ | Anna Torres-Giménez^{43,44,45} | Thach D. Tran⁴² | Kylee Trevillion⁴⁷ | Katherine Turner⁸¹ | Johann M. Vega-Dienstmaier⁸² | Karen Wynter^{42,83} | Kimberly A. Yonkers^{84,85,86} |

This is an open access article under the terms of the Creative Commons Attribution License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

© 2019 The Authors. International Journal of Methods in Psychiatric Research published by John Wiley & Sons Ltd

Andrea Benedetti^{2,87,88} | Brett D. Thombs^{1,2,4,5,88,89}

¹Lady Davis Institute for Medical Research, Jewish General Hospital, Montréal, Québec, Canada

²Department of Epidemiology, Biostatistics and Occupational Health, McGill University, Montréal, Québec, Canada

³Hull York Medical School and the Department of Health Sciences, University of York, York, UK

⁴Department of Psychology, McGill University, Montréal, Québec, Canada

⁵Department of Psychiatry, McGill University, Montréal, Québec, Canada

⁶Department of Mental Health, Bloomberg School of Public Health, Johns Hopkins University, Baltimore, MD, USA

⁷Schulich Library of Physical Sciences, Life Sciences, and Engineering, McGill University, Montréal, Québec, Canada

⁸Department of Clinical, Neuro and Developmental Psychology, EMGO Institute, Vrije Universiteit Amsterdam, Amsterdam, the Netherlands

⁹Department of Medicine, Department of Health Research and Policy, Department of Biomedical Data Science, Department of Statistics, Stanford University, Stanford, CA, USA

¹⁰Library, Concordia University, Montréal, Québec, Canada

¹¹Department of Community Health Sciences, Department of Psychiatry, University of Calgary, Calgary, Alberta, Canada

¹²Mathison Centre for Mental Health Research & Education, University of Calgary, Calgary, Alberta, Canada

¹³Cuthbertson & Fischer Chair in Pediatric Mental Health, University of Calgary, Calgary, Alberta, Canada

¹⁴Department of Family Medicine, McGill University, Montréal, Québec, Canada

¹⁵Department of Medicine, Johns Hopkins University School of Medicine, Baltimore, MD, USA

¹⁶International Union for Health Promotion and Health Education, École de santé publique de l'Université de Montréal, Montréal, Québec, Canada

¹⁷Department of Psychiatry, University of Alberta, Edmonton, Alberta, Canada

¹⁸Alberta Health Services, Edmonton, Alberta, Canada

¹⁹Department of Medicine, University of Calgary, Calgary, Alberta, Canada

²⁰Women's College Hospital and Research Institute, University of Toronto, Toronto, Ontario, Canada

²¹Department of Neurology and Psychiatry, Sapienza University of Rome, Rome, Italy

²²Escuela de Salud Pública Dr. Salvador Allende, Faculty of Medicine, Universidad de Chile, Santiago, Chile

²³Laboratorio de Investigación Biomédica, Facultad de Medicina y Nutrición, Avenida Universidad, Durango, Mexico

²⁴Child and Adolescent Unit, Federal Neuropsychiatric Hospital, Enugu, Nigeria

²⁵Childhood Neuropsychiatric Disorders Initiatives, Enugu, Nigeria

²⁶Department of Psychological Sciences, Birkbeck, University of London, Bloomsbury London, UK

²⁷School of Nursing, University of Connecticut, Mansfield, CT, USA

²⁸Department of Child and Adolescent Psychiatry, University Medical Center Hamburg-Eppendorf, Hamburg, Germany

²⁹Discipline of Psychiatry, Westmead Clinical School, Sydney Medical School, University of Sydney, Sydney, New South Wales, Australia

³⁰Department of Psychiatry, Westmead Hospital, Sydney, New South Wales, Australia

³¹Neuroscience Institute, Lithuanian University of Health Sciences, Kaunas, Lithuania

³²School of Medicine, Universidade Federal De Minas Gerais (UFMG), Belo Horizonte, MG, Brazil

³³Departments of Psychiatry, Pediatrics, Obstetrics and Gynecology, School of Medicine and Dentistry, University of Rochester, Rochester, NY, USA

³⁴Faculty of Medicine, Universidade Federal de Minas Gerais, Belo Horizonte, Brazil

³⁵Department of Neurosciences and Behavior, Ribeirão Preto Medical School, Ribeirão Preto, Brazil

³⁶School of Psychiatry, University of New South Wales, Kensington, Australia

³⁷Ingham Institute, Liverpool, New South Wales, Australia

³⁸Sydney South West Local Health District, Liverpool, New South Wales, Australia

³⁹Faculty of Medicine, Department of Paediatrics, University of Southampton and Southampton Children's Hospital, Southampton, UK

⁴⁰The Nuffield Department of Women's & Reproductive Health, John Radcliffe Hospital and Oxford Maternal & Perinatal Health Institute, Green Templeton College, University of Oxford, Oxford, UK

⁴¹School of Psychology, University of Minho, Braga, Portugal

⁴²School of Public Health and Preventive Medicine, Monash University, Melbourne, Victoria, Australia

⁴³Perinatal Mental Health Unit CLINIC-BCN, Institut Clínic de Neurociències, Hospital Clínic, Barcelona, Spain

⁴⁴Vulnerability, Psychopathology and Gender Research Group, Generalitat de Catalunya, Catalonia, Spain

⁴⁵August Pi i Sunyer Biomedical Research Institute, Barcelona, Spain

⁴⁶Psychiatry Unit, Department of Health Sciences, University of Florence, Florence, Italy

⁴⁷Institute of Psychiatry, Psychology & Neuroscience, King's College London, London, UK

⁴⁸South London and Maudsley NHS Foundation Trust, London, UK

- ⁴⁹Faculty of Health Sciences, Ahfad University for Women, Omdurman, Sudan
- ⁵⁰Department of Community Medicine, Institute of Health and Society, Faculty of Medicine, University of Oslo, Oslo, Norway
- ⁵¹The Center for Global Child Health, Hospital for Sick Children, Toronto, Ontario, Canada
- ⁵²Karitane, Carramar, New South Wales, Australia
- ⁵³Private Practice, Hamburg, Germany
- ⁵⁴Department of Obstetrics and Gynaecology, Blekinge Hospital, Karlskrona, Sweden
- ⁵⁵First Department of Psychiatry, Women's Mental Health Clinic, Athens University Medical School, Athens, Greece
- ⁵⁶School of Kinesiology, University of Minnesota, Minneapolis, MN, USA
- ⁵⁷Department of Psychiatry, Faculty of Medicine, Chulalongkorn University, Bangkok, Thailand
- ⁵⁸Impact Strategic Research Center, Deakin University, Geelong, Victoria, Australia
- ⁵⁹Department of Psychology, Catholic University of Croatia, Zagreb, Croatia
- ⁶⁰Psychology Service, Regidoria de Polítiques de Gènere, Ajuntament de Terrassa, Terrassa, Spain
- ⁶¹Department of Mental Health, Graduate School of Medicine, The University of Tokyo, Tokyo, Japan
- ⁶²Department of Mental Health Policy, National Institute of Mental Health, National Center of Neurology and Psychiatry, Kodaira, Japan
- ⁶³Unité de Neuropsychologie, Département de Neurologie, Centre Neuro-psycho-pathologique, Faculté de Médecine, Université de Kinshasa, Kinshasa, Democratic Republic of the Congo
- ⁶⁴Halifax Health, Graduate Medical Education, Daytona Beach, FL, USA
- ⁶⁵MRC/Developmental Pathways to Health Research Unit, School of Clinical Medicine, University of Witwatersrand, Johannesburg, South Africa
- ⁶⁶Human and Social Development Programme, Human Sciences Research Council, Johannesburg, South Africa
- ⁶⁷Department of Psychiatry, Castle Peak Hospital, Hong Kong SAR, China
- ⁶⁸Department of Women's and Children's Health, Uppsala University, Uppsala, Sweden
- ⁶⁹Department of Child and Adolescent Psychiatry, University of Oxford, Oxford, UK
- ⁷⁰MRC/Wits Rural Public Health and Health Transitions Research Unit (Agincourt), School of Public Health, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa
- ⁷¹Department of Mental Health, College of Medicine, University of Malawi, Zomba, Malawi
- ⁷²Division of Psychiatry, University of Edinburgh, Edinburgh, UK
- ⁷³College of Medicine, China Medical University, Taichung, Taiwan
- ⁷⁴Mind-Body Interface Laboratory and Department of Psychiatry, China Medical University Hospital, Taichung, Taiwan
- ⁷⁵Department of Psychology, Faculty of Humanities and Social Sciences, University of Zagreb, Zagreb, Croatia
- ⁷⁶Feinberg School of Medicine, Northwestern University, Chicago, IL, USA
- ⁷⁷Institute of Mental Health, Hougang, Singapore
- ⁷⁸KK Women's and Children's Hospital, Kallang, Singapore
- ⁷⁹National Healthcare Group, Singapore
- ⁸⁰Department of Emergency, University of Szeged, Szeged, Hungary
- ⁸¹Epilepsy Center-Child Neuropsychiatry Unit, ASST Santi Paolo Carlo, San Paolo Hospital, Milan, Italy
- ⁸²Facultad de Medicina Alberto Hurtado, Universidad Peruana Cayetano Heredia, Lima, Peru
- ⁸³School of Nursing and Midwifery, Deakin University, Melbourne, Victoria, Australia
- ⁸⁴Department of Psychiatry, Yale School of Medicine, New Haven, CT, USA
- ⁸⁵Department of Obstetrics, Gynecology, and Reproductive Sciences, Yale School of Medicine, New Haven, CT, USA
- ⁸⁶School of Epidemiology and Public Health, Yale University, New Haven, Connecticut, USA
- ⁸⁷Respiratory Epidemiology and Clinical Research Unit, McGill University Health Centre, Montréal, Québec, Canada
- ⁸⁸Department of Medicine, McGill University, Montréal, Québec, Canada
- ⁸⁹Department of Educational and Counselling Psychology, McGill University, Montréal, Québec, Canada

Correspondence

Brett D. Thombs, Jewish General Hospital,
4333 Cote Ste Catherine Road, Montreal,
Quebec H3T 1E4, Canada.
Tel: (514) 340-8222 ext. 25112.
Email: brett.thombs@mcgill.ca

Funding information

Canadian Institutes of Health Research, Grant/
Award Number: KRS-140994; CIHR Frederick

Abstract

Objectives: A previous individual participant data meta-analysis (IPDMA) identified differences in major depression classification rates between different diagnostic interviews, controlling for depressive symptoms on the basis of the Patient Health Questionnaire-9. We aimed to determine whether similar results would be seen in a different population, using studies that administered the Edinburgh Postnatal Depression Scale (EPDS) in pregnancy or postpartum.

Banting and Charles Best Canada Graduate Scholarship Doctoral Awards; Vanier Canada Graduate Scholarship; Utting Postdoctoral Fellowship from the Jewish General Hospital; Fonds de recherche du Québec - Santé (FRQS) Masters Training Award; Research Institute of the McGill University Health Centre; Ministry of Health of Chile; Health Foundation, Grant/Award Number: 1665/608; Patrick and Catherine Weldon Donaghue Medical Research Foundation; University of Connecticut Research Foundation; Werner Otto Foundation; Kroschke Foundation; Feindt Foundation; National Counsel of Technological and Scientific Development, Grant/Award Numbers: 444254/2014-5, 403433/2004-5; Minas Gerais State Research Foundation, Grant/Award Number: APQ-01954-14; National Institute of Mental Health, Grant/Award Numbers: K23MH080290, K23MH64476; Brazilian Ministry of Health; Fundação de Amparo à Pesquisa do Estado de São Paulo; Swiss National Science Foundation, Grant/Award Number: 32003B 125493; Child: Care Health and Development Trust; Department of Psychiatry, University of Oxford; Ashok Ranganathan Bursary from Exeter College, University of Oxford; National Institute for Health Research, Grant/Award Numbers: RP-DG-1108-10012, RP-PG-1210-12002; Operational Program Science and Innovation2010; Community Support Board III and by the European Community Fund FEDER, Grant/Award Number: POCI/SAU-ESP/56397/2004; Invest to Grow Scheme from the Australian Government Department of Families, Housing, Community Services and Indigenous Affairs; Ministerio de Trabajo y Asuntos Sociales, Women's Institute, Grant/Award Number: 7/98; Programme Grants for Applied Research Programme, Grant/Award Numbers: RP-PG-1210-12002, RP-DG-1108-10012; South London Clinical Research Network; Department of Health and Social Care; National Health and Medical Research Council; Ratchadaphiseksomphot Endowment Fund 2013 of Chulalongkorn University, Grant/Award Number: CU-56-457-HR; Croatian Ministry of Science, Education, and Sports; Ministry of Work and Social Affairs, Institute of Women, Grant/Award Number: 13/00; Japan Society for the Promotion of Science; National Center of Neurology and Psychiatry; Brain and Behavior Research Foundation; University of Oxford, Grant/Award Number: HQ5035; Tuixen Foundation, Grant/Award Number: 9940; Wellcome Trust, Grant/Award Numbers: 071571, 082384/Z/07/Z; American Psychological Association; Wellcome Trust Intermediate Fellowship, Grant/Award Number: 211374/Z/18/Z; beyondblue Victorian Centre of Excellence in Depression and Related Disorders; Swedish Research Council, Grant/Award Numbers: 523-2014-2342, 521-2013-2339; Swedish Council for Working Life and Social Research, Grant/Award Number: 2011-0627; Marta

Methods: Data accrued for an EPDS diagnostic accuracy IPDMA were analysed. Binomial generalised linear mixed models were fit to compare depression classification odds for the Mini International Neuropsychiatric Interview (MINI), Composite International Diagnostic Interview (CIDI), and Structured Clinical Interview for DSM (SCID), controlling for EPDS scores and participant characteristics.

Results: Among fully structured interviews, the MINI (15 studies, 2,532 participants, 342 major depression cases) classified depression more often than the CIDI (3 studies, 2,948 participants, 194 major depression cases; adjusted odds ratio [aOR] = 3.72, 95% confidence interval [CI] [1.21, 11.43]). Compared with the semistructured SCID (28 studies, 7,403 participants, 1,027 major depression cases), odds with the CIDI (interaction aOR = 0.88, 95% CI [0.85, 0.92]) and MINI (interaction aOR = 0.95, 95% CI [0.92, 0.99]) increased less as EPDS scores increased.

Conclusion: Different interviews may not classify major depression equivalently.

KEYWORDS

depressive disorders, diagnostic interviews, Edinburgh Postnatal Depression Scale, individual participant data meta-analysis, major depression

Lundqvist Foundation; Swedish Society of Medicine, Grant/Award Number: SLS-331991; Professor Francis Creed's Journal of Psychosomatic Research Editorship, Grant/Award Number: BA00457; Department of Health, Grant/Award Numbers: DOH95F022, DOH94F044; China Medical University and Hospital, Grant/Award Numbers: DMR94-46, DMR-92-92, CMU94-105; Thomas Wilson Sanitarium; Myer Foundation; Australian National Health and Medical Research Council; Tejada Family Foundation, Inc.; Peruvian-American Endowment, Inc.; National Institute of Child Health and Human Development, Grant/Award Number: 5 R01HD045735

1 | INTRODUCTION

Among diagnostic interviews for classifying major depression in research, semistructured interviews, such as the Structured Clinical Interview for DSM (SCID; First, 1995), are designed to be administered by clinically trained professionals, who may insert unscripted queries and use judgement to decide whether symptoms are present. Fully structured interviews, such as the Composite International Diagnostic Interview (CIDI; Robins et al., 1988), are completely scripted and can be administered by lay interviewers. The Mini International Neuropsychiatric Interview (MINI; Lecrubier et al., 1997; Sheehan et al., 1997) is a very brief fully structured interview that was designed for rapid administration and intended to be overinclusive.

The different diagnostic interviews are typically considered equivalent for major depression classification in research (Hewitt, Gilbody, Brealey, et al., 2009; Manea, Gilbody, & McMillan, 2012; Mitchell, Meader, & Symonds, 2010; Moriarty, Gilbody, McMillan, & Manea, 2015). However, a recent individual participant data meta-analysis (IPDMA) of 57 studies (17,158 participants) from diverse settings that controlled for participant characteristics and depressive symptom severity on the basis of the Patient Health Questionnaire-9 (PHQ-9) found that, among fully structured interviews, the MINI classified depression about twice as often as the CIDI. Compared with semistructured interviews, fully structured interviews (MINI excluded) classified fewer participants with high-level depressive symptoms as depressed (Levis et al., 2018). This was the first large study to compare major depression classification across diagnostic interviews. However, it is important to determine if findings can be replicated in more than a single study.

The present study aimed to determine whether similar patterns between diagnostic interview and major depression classification could be seen among an independent set of studies that administered the Edinburgh Postnatal Depression Scale (EPDS) to women who were pregnant or had recently given birth, also using an IPDMA approach (Cox, Holden, & Sagovsky, 1987). As in the previous study, we first compared major depression classification odds within fully structured interviews to determine if different fully structured interviews perform differently (MINI vs. CIDI). Then, we compared the CIDI and MINI with the semistructured SCID, separately. In each case, we controlled for participant characteristics and depressive symptom

severity on the basis of EPDS scores. Finally, we tested whether differences in classification rates between interviews were associated with depressive symptom severity.

2 | METHODS

We used data accrued for an IPDMA on the diagnostic accuracy of the EPDS, which is the most commonly used depression screening tool for women in pregnancy or postpartum (Hewitt et al., 2009). The IPDMA was registered in PROSPERO (CRD42015024785), a protocol was published (Thombs et al., 2015), and results were reported following PRISMA-DTA (McInnes et al., 2018) and PRISMA-IPD (Stewart et al., 2015) reporting guidelines.

2.1 | Identification of eligible studies

For the main IPDMA, data sets from articles in any language were eligible for inclusion if (a) they included diagnostic classification for current major depressive disorder (MDD) or major depressive episode (MDE) using any version of Diagnostic and Statistical Manual of Mental Disorders (DSM; American Psychiatric Association [APA], 1987; APA, 1994; APA, 2000) or International Classification of Diseases (ICD; World Health Organization, 1992) criteria on the basis of a validated semistructured or fully structured interview; (b) they included EPDS scores; (c) the diagnostic interview and EPDS were administered within 2 weeks of each other because DSM and ICD criteria specify that symptoms must have been present in the last 2 weeks; (d) participants were women aged ≥ 18 years who were not recruited from youth or college settings; and (e) participants were not recruited from psychiatric settings or because they were identified as having symptoms of depression because screening is done to identify previously unrecognised cases. For the present study, we only included studies that assessed major depression using the SCID, CIDI, and MINI because there were only three studies that used other interviews.

Data sets where not all participants were eligible were included if primary data allowed selection of eligible participants. For defining major depression, we considered MDD or MDE on the basis of the DSM or ICD. If more than one was reported, we prioritised MDE over MDD, because screening would attempt to detect depressive

episodes and further interview would determine if the episode is related to MDD or bipolar disorder, and DSM over ICD.

2.2 | Search strategy and study selection

A medical librarian searched Medline, Medline In-Process & Other Non-Indexed Citations and PsycINFO via OvidSP, and Web of Science via ISI Web of Knowledge from inception to June 10, 2016, using a peer-reviewed search strategy (Methods S1; PRESS, 2016). We also reviewed reference lists of relevant reviews and queried contributing authors about non-published studies. Search results were uploaded into RefWorks (RefWorks-COS, Bethesda, MD, USA). After deduplication, unique citations were uploaded into DistillerSR (Evidence Partners, Ottawa, Canada) for storing and tracking search results.

Two investigators independently reviewed titles and abstracts for eligibility. If either deemed a study potentially eligible, full-text review was done by two investigators, independently, with disagreements resolved by consensus, consulting a third investigator when necessary. A translator was consulted for determining the eligibility of one Chinese article.

2.3 | Data extraction, contribution, and synthesis

Authors of eligible data sets were invited to contribute de-identified primary data. We emailed corresponding authors of eligible primary studies at least three times, as necessary. If we did not receive a response, we emailed co-authors and attempted to contact corresponding authors by phone.

Diagnostic interview used as the reference standard and country were extracted from published reports by two investigators independently, with disagreements resolved by consensus. Countries were categorised as “very high,” “high,” or “low-medium” development on the basis of the United Nation's Human Development Index, a statistical composite index that includes indicators of life expectancy, education, and income (United Nations, 2019). Participant-level data provided in data sets included age, pregnancy status (pregnant vs. postpartum), EPDS scores, and major depression status.

Individual participant data were converted to a standard format and synthesised into a single data set with study-level data. We compared published participant characteristics and diagnostic accuracy results with results from raw data sets and resolved any discrepancies in consultation with the original investigators. For the present study, we restricted our data to participants with complete data for all variables included in our analyses. Then, for studies that collected data at multiple time points, we restricted our data to the time point with the most participants. If there was a tie, we selected the time point with the largest number of major depression cases.

2.4 | Statistical analyses

To isolate the association between diagnostic assessment method and major depression classification, we estimated binomial generalised

linear mixed models with a logit link function. All analyses controlled for depressive symptom severity (continuous EPDS scores), age (continuous), country Human Development Index (very high, high, or low-medium), and pregnant versus postpartum status. Given that each study only administered one diagnostic interview, these covariates were included in analyses to account for their potential influence on major depression classification. Covariates were chosen a priori on the basis of their potential influence on major depression classification as well as their availability across primary studies. To account for correlation between subjects within the same primary study, a random intercept was fit for each primary study. Fixed slopes were estimated for EPDS score, diagnostic interview, age, Human Development Index, and pregnant versus postpartum status.

We estimated generalised linear mixed models to compare major depression classification odds for MINI versus CIDI, CIDI versus SCID, and MINI versus SCID. We then fit additional models including an interaction between interview and EPDS score. All analyses were run in R using the glmer function within the lme4 package.

3 | RESULTS

Of 3,418 unique titles and abstracts identified from the database search, 3,097 were excluded after title and abstract review and 226 were excluded after full text review, leaving 95 eligible articles with data from 64 unique participant samples, of which 45 (70% of data sets; 70% of participants) contributed data (Figure 1). Reasons for exclusion for the articles excluded at the full-text level are given in Table S1. In addition, authors of included studies contributed data from an additional eligible study that was not identified in the search, for a total of 46 data sets. Characteristics of included studies and eligible studies that did not provide data sets are shown in Table S2. In total, 12,759 participants (1,553 [12%] with major depression) were included; none of whom were included in the previous PHQ-9 analysis (Levis et al., 2018).

Of the 46 total included studies, there were 28 SCID studies (7,279 participants, 14% major depression), 3 CIDI studies (2,948 participants, 7% major depression), and 15 MINI studies (2,532 participants, 14% major depression; Table 1). Seventeen of the 28 SCID studies described the SCID as having been administered by clinically trained professionals.

As shown in Figure 2 and Table S3, for all interviews, the proportion with major depression generally increased as EPDS scores increased.

Model coefficients for each analysis are shown in Table S4. Among fully structured interviews, controlling for EPDS scores, the MINI was more likely to classify major depression than the CIDI (adjusted odds ratio [aOR] = 3.72; 95% confidence interval [CI] [1.21, 11.43]). The CIDI and MINI tended to classify major depression less often than the SCID, but there was high uncertainty in estimates (aOR for CIDI vs. SCID = 0.34, 95% CI [0.09, 1.34]; aOR for MINI vs. SCID = 0.91, 95% CI [0.43, 1.94]).

FIGURE 1 Flow diagram of study selection process**TABLE 1** Participant data by diagnostic interview

Diagnostic interview	N studies	N participants	N (%) major depression
SCID	28	7,279	1,017 (14)
CIDI	3	2,948	194 (7)
MINI	15	2,532	342 (14)
Total	46	12,759	1,553 (12)

Abbreviations: CIDI, Composite International Diagnostic Interview; MINI, Mini International Neuropsychiatric Interview; SCID, Structured Clinical Interview for DSM Disorders.

As EPDS scores increased, the probability of diagnosis increased more for the MINI than for the CIDI (interaction aOR = 1.07, 95% CI [1.03, 1.12]) but increased less for both the CIDI and MINI than for the SCID (interaction aOR for CIDI = 0.88, 95% CI [0.85, 0.92]; interaction aOR for MINI = 0.95, 95% CI [0.92, 0.99]).

4 | DISCUSSION

We compared depression classification across diagnostic interviews in studies that administered the EPDS with women in pregnancy or postpartum, controlling for participant characteristics and depressive symptom severity on the basis of EPDS scores. Among fully

structured interviews, odds of major depression were substantially higher for the MINI than the CIDI. As depressive symptom severity increased, the probability of diagnosis increased more for the MINI than for the CIDI. There were no definitive differences in classification odds between the CIDI and SCID and between the MINI and SCID, but, as EPDS scores increased, likelihood of classification increased less for the CIDI and MINI than for the SCID. Results were similar to those of our previous study that assessed depressive symptom severity in diverse patient groups with the PHQ-9 (Levis et al., 2018). In that study, on the basis of subgroup analyses by PHQ-9 scores, we found that the CIDI classified fewer participants with high-level depressive symptoms as depressed than the SCID. Due to limited numbers of participants and major depression cases for each interview across EPDS scores in the present study, we were unable to conduct subgroup analyses based on EPDS scores. However, our interaction analyses were generally consistent with previous findings.

There are limitations to consider. First, we were unable to obtain primary data for 19 of 64 eligible data sets identified in our search (30% of data sets; 30% of participants). Second, only three included studies used the CIDI, one of which had only one major depression case. Third, across interviews, there were few participants with high EPDS scores and few major depression cases with low EPDS scores. For the CIDI, data were sparse across EPDS scores. Notwithstanding,

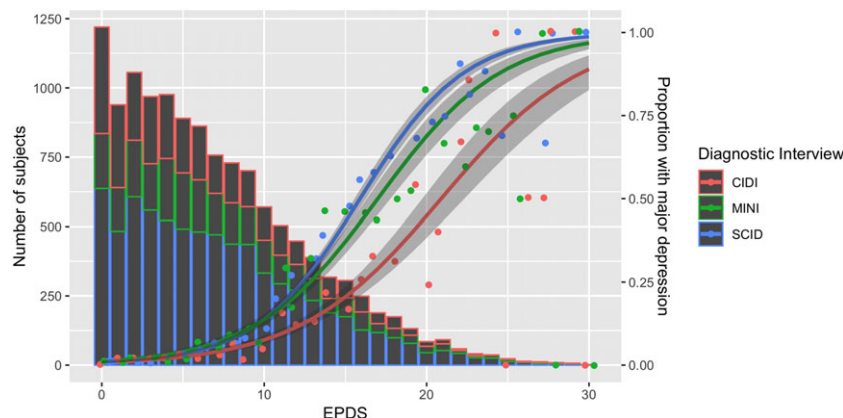


FIGURE 2 Probability of major depression classification by EPDS score for the SCID, CIDI, and MINI. CIDI, Composite International Diagnostic Interview; EPDS, Edinburgh Postnatal Depression Scale; MINI, Mini International Neuropsychiatric Interview; SCID, Structured Clinical Interview for DSM Disorders. The histogram presents the number of subjects at each EPDS score for each diagnostic interview. The lines present the proportion with major depression at each EPDS score for each diagnostic interview. The lines for each diagnostic interview were generated by estimating generalised additive logistic regression models with EPDS score as the main predictor and proportion with major depression as the outcome. The shapes of the associations were estimated directly from the data, using the mgcv package, with the amount of smoothing estimated via generalised cross validation. The analyses did not account for clustering by study

the previous PHQ-9 study and the present study have used samples many times the size of other studies that have attempted to compare diagnostic interviews for major depression (Anthony et al., 1985; Booth, Kirchner, Hamilton, Harrell, & Smith, 1998; Brugha, Jenkins, Taub, Meltzer, & Bebbington, 2001; Hesselbrock, Stabenau, Hesselbrock, Mirkin, & Meyer, 1982; Jordanova, Wickramasinghe, Gerada, & Prince, 2004). Fourth, residual confounding may exist. We were only able to consider variables collected in the original investigations, and the included study-level variables may not apply uniformly to all participants in a study. Finally, not all SCID studies described interviewer qualifications. It is possible that use of untrained interviewers may have reduced performance differences across interviews.

5 | CONCLUSION

The previous PHQ-9 IPDMA found that different diagnostic interviews may not be equivalent for major depression classification. In the present study, we observed similar patterns. The CIDI and MINI were designed as less resource-intensive options that can be administered by research staff without diagnostic skills, but they may misclassify major depression in substantial numbers of patients compared with the SCID. The findings of both the previous and present IPDMAs suggest that different interviews may not classify major depression equivalently and should be combined in meta-analyses with caution.

DATA ACCESSIBILITY

Requests to access data should be made to the corresponding author at brett.thombs@mcgill.ca.

DECLARATION OF INTEREST STATEMENT

All authors have completed the ICMJE uniform disclosure form and declare no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous 3 years with the following exceptions: Dr. Patten reports grants from Hotchkiss Brain Institute/Pfizer Competition, outside the submitted work. Dr. Tonelli declares that he has received a grant from Merck Canada, outside the submitted work. Dr. Vigod declares that she receives royalties from UpToDate, outside the submitted work. Dr. Beck declares that she receives royalties for her Postpartum Depression Screening Scale published by Western Psychological Services. Dr. Boyce declares that he receives grants and personal fees from Servier, grants from Lundbeck, and personal fees from AstraZeneca, all outside the submitted work. Dr. Howard declares that she has received personal fees from NICE Scientific Advice, outside the submitted work. Dr. Nishi declares that he has received personal fees from Sumitomo Dainippon Pharma Co., Ltd., outside the submitted work. Dr. Sundström-Poromaa declares that she has served on advisory boards and acted as invited speaker at scientific meetings for MSD, Novo Nordisk, Bayer Health Care, and Lundbeck A/S. Dr. Yonkers declares that she receives royalties from UpToDate, outside the submitted work.

ACKNOWLEDGEMENTS

This study was funded by the Canadian Institutes of Health Research (CIHR, KRS-140994). Ms. Levis was supported by a CIHR Frederick Banting and Charles Best Canada Graduate Scholarship Doctoral Awards. Ms. Rice was supported by a Vanier Canada Graduate Scholarship. Dr. Wu was supported by an Utting Postdoctoral Fellowship from the Jewish General Hospital, Montreal, Quebec, Canada. Ms. Azar was supported by a Fonds de recherche

du Québec - Santé (FRQS) Masters Training Award. Mr. Bhandari was supported by a studentship from the Research Institute of the McGill University Health Centre. The primary study by Alvarado et al. was supported by the Ministry of Health of Chile. The primary study by Barnes et al. was supported by a grant from the Health Foundation (1665/608). The primary study by Beck et al. was supported by the Patrick and Catherine Weldon Donaghue Medical Research Foundation and the University of Connecticut Research Foundation. The primary study by Helle et al. was supported by the Werner Otto Foundation, the Kroschke Foundation, and the Feindt Foundation. Prof. Robertas Bunevicius, MD, PhD (1958–2016) was principal investigator of the primary study by Bunevicius et al. but passed away and was unable to participate in this project. The primary study by Couto et al. was supported by the National Counsel of Technological and Scientific Development (CNPq; Grant 444254/2014-5) and the Minas Gerais State Research Foundation (FAPEMIG; Grant APQ-01954-14). The primary study by Chaudron et al. was supported by a grant from the National Institute of Mental Health (Grant K23 MH64476). The primary study by Figueira et al. was supported by the Brazilian Ministry of Health and by the National Counsel of Technological and Scientific Development (CNPq; Grant 403433/2004-5). The primary study by de Figueiredo et al. was supported by Fundação de Amparo à Pesquisa do Estado de São Paulo. The primary study by Tissot et al. was supported by the Swiss National Science Foundation (Grant 32003B 125493). The primary study by Fernandes et al. was supported by grants from the Child: Care Health and Development Trust and the Department of Psychiatry, University of Oxford, Oxford, UK, and by the Ashok Ranganathan Bursary from Exeter College, University of Oxford. Dr. Fernandes was supported by a National Institute for Health Research (NIHR) academic clinical fellowship. The primary study by Tendais et al. was supported under the project POCI/SAU-ESP/56397/2004 by the Operational Program Science and Innovation 2010 (POCI 2010) of the Community Support Board III and by the European Community Fund FEDER. The primary study by Fisher et al. was supported by a grant under the Invest to Grow Scheme from the Australian Government Department of Families, Housing, Community Services and Indigenous Affairs. The primary study by Garcia-Esteve et al. was supported by Grant 7/98 from the Ministerio de Trabajo y Asuntos Sociales, Women's Institute, Spain. The primary study by Howard et al. was supported by the NIHR under its Programme Grants for Applied Research Programme (Grants RP-PG-1210-12002 and RP-DG-1108-10012) and by the South London Clinical Research Network. The views expressed are those of the authors and not necessarily those of the NHS, the NIHR, or the Department of Health and Social Care. The primary study by Phillips et al. was supported by a scholarship from the National Health and Medical Research Council (NHMRC). The primary study by Roomruangwong et al. was supported by the Ratchadaphiseksomphot Endowment Fund 2013 of Chulalongkorn University (CU-56-457-HR). The primary study by Nakić Radoš et al. was supported by the Croatian

Ministry of Science, Education, and Sports. The primary study by Navarro et al. was supported by Grant 13/00 from the Ministry of Work and Social Affairs, Institute of Women, Spain. The primary study by Usuda et al. was supported by Grants-in-Aid for Young Scientists (A) from the Japan Society for the Promotion of Science (primary investigator: Daisuke Nishi, MD, PhD) and by an Intramural Research Grant for Neurological and Psychiatric Disorders from the National Center of Neurology and Psychiatry, Japan. Dr. Robertson-Blackmore was supported by a Young Investigator Award from the Brain and Behavior Research Foundation and NIMH Grant K23MH080290. The primary study by Rochat et al. was supported by grants from University of Oxford (HQ5035), the Tuixen Foundation (9940), the Wellcome Trust (082384/Z/07/Z and 071571), and the American Psychological Association. Dr. Rochat receives salary support from a Wellcome Trust Intermediate Fellowship (211374/Z/18/Z). The primary study by Rowe et al. was supported by the diamond Consortium, beyondblue Victorian Centre of Excellence in Depression and Related Disorders. The primary study by Comasco et al. was supported by funds from the Swedish Research Council (VR: 521-2013-2339, VR: 523-2014-2342), the Swedish Council for Working Life and Social Research (FAS: 2011-0627), the Marta Lundqvist Foundation (2013, 2014), and the Swedish Society of Medicine (SLS-331991). The primary study by Prenoveau et al. was supported by the Wellcome Trust (Grant 071571). The primary study by Stewart et al. was supported by Professor Francis Creed's Journal of Psychosomatic Research Editorship fund (BA00457) administered through University of Manchester. The primary study by Su et al. was supported by grants from the Department of Health (DOH94F044 and DOH95F022) and the China Medical University and Hospital (CMU94-105, DMR-92-92, and DMR94-46). The primary study by Tandon et al. was supported by the Thomas Wilson Sanitarium. The primary study by Tran et al. was supported by the Myer Foundation who funded the study under its Beyond Australia scheme. Dr. Tran was supported by an early career fellowship from the Australian National Health and Medical Research Council. The primary study by Vega-Dienstmaier et al. was supported by Tejada Family Foundation, Inc. and Peruvian-American Endowment, Inc. The primary study by Yonkers et al. was supported by a National Institute of Child Health and Human Development grant (5 R01HD045735). Drs. Benedetti and Thombs were supported by FRQS researcher salary awards.

AUTHOR CONTRIBUTIONS

B. L., D. M., J. T. B., P. C., S. G., J. P. A. I., L. A. K., S. B. P., I. S., R. C. Z., L. C., N. D. M., M. T., S. N. V., A. Benedetti, and B. D. T. were responsible for the study conception and design. J. T. B. and L. A. K. designed and conducted database searches to identify eligible studies. F. A., R. A., C. A. E., M. O. B., J. B., C. T. B., C. B., P. M. Boyce, A. Bunevicius, T. C. e. C., L. H. C., H. C., F. P. F., V. E., M. F., B. F., J. R. W. F., L. G. E., L. G., N. H., L. M. H., D. S. K., J. K., L. K., Z. K., L. L., A. A. L., B. A. L., M. M., V. M., S. N. R., P. N. G., D. Nishi, D. O. L. E. A., E. R. B., T. J. R.,

H. J. R., B. W. M. S., A. Skalkidou, A. Stein, R. C. S., K. P. S., I. S. P., M. T., S. D. T., I. T., P. T., A. T., A. T. G., T. D. T., K. Trevillion, K. Turner, J. M. V. D., K. W., and K. A. Y. contributed primary data sets that were included in this study. B. L., Y. S., C. H., D. B. R., A. K., Y. W., M. A., T. A. S., M. J. C., P. M. Bhandari, D. Neupane, N. S., K. E. R., and M. I. contributed to data extraction and coding for the meta-analysis. B. L., A. Benedetti, and B. D. T. contributed to the data analysis and interpretation. B. L., D. M., A. Benedetti, and B. D. T. contributed to drafting the manuscript. All authors provided a critical review and approved the final manuscript. A. Benedetti and B. D. T. are the guarantors; they had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analyses.

ORCID

Pim Cuijpers  <https://orcid.org/0000-0001-5497-2743>

Zoltán Kozinsky  <https://orcid.org/0000-0001-7485-9895>

Brett D. Thombs  <https://orcid.org/0000-0002-5644-8432>

REFERENCES

- American Psychiatric Association (1987). *Diagnostic and statistical manual of mental disorders: DSM-III* (3rd ed., revised). Washington, DC: American Psychiatric Association.
- American Psychiatric Association (1994). *Diagnostic and statistical manual of mental disorders: DSM-IV* (4th ed.). Washington, DC: American Psychiatric Association.
- American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders: DSM-IV* (4th ed., text revised). Washington, DC: American Psychiatric Association.
- Anthony, J. C., Folstein, M., Romanoski, A. J., Von Korff, M. R., Nestadt, G. R., Chahal, R., ... Gruenberg, E. M. (1985). Comparison of the lay Diagnostic Interview Schedule and a standardized psychiatric diagnosis: Experience in eastern Baltimore. *Archives of General Psychiatry*, 42(7), 667–675. <https://doi.org/10.1001/archpsyc.1985.01790300029004>
- Booth, B. M., Kirchner, J. A., Hamilton, G., Harrell, R., & Smith, G. R. (1998). Diagnosing depression in the medically ill: Validity of a lay-administered structured diagnostic interview. *Journal of Psychiatric Research*, 32(6), 353–360. [https://doi.org/10.1016/S0022-3956\(98\)00031-4](https://doi.org/10.1016/S0022-3956(98)00031-4)
- Brugha, T. S., Jenkins, R., Taub, N., Meltzer, H., & Bebbington, P. E. (2001). A general population comparison of the Composite International Diagnostic Interview (CIDI) and the Schedules for Clinical Assessment in Neuropsychiatry (SCAN). *Psychological Medicine*, 31(6), 1001–1013. <https://doi.org/10.1017/S0033291701004184>
- Cox, J. L., Holden, J. M., & Sagovsky, R. (1987). Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. *The British Journal of Psychiatry*, 150, 782–786. <https://doi.org/10.1192/bjp.150.6.782>
- First, M. B. (1995). *Structured clinical interview for the DSM (SCID)*. John Wiley & Sons, Inc.
- Hesselbrock, V., Stabenau, J., Hesselbrock, M., Mirkin, P., & Meyer, R. (1982). A comparison of two interview schedules: the Schedule for Affective Disorders and Schizophrenia-Lifetime and the National Institute for Mental Health Diagnostic Interview Schedule. *Archives of General Psychiatry*, 39(6), 674–677. <https://doi.org/10.1001/archpsyc.1982.04290060036007>
- Hewitt, C., Gilbody, S., Brealey, S., Paulden, M., Palmer, S., Mann, R., ... Richard, D. (2009). Methods to identify postnatal depression in primary care: An integrated evidence synthesis and value of information analysis. *Health Technology Assessment*, 13(36), 1–145. 147–230
- Jordanova, V., Wickramasinghe, C., Gerada, C., & Prince, M. (2004). Validation of two survey diagnostic interviews among primary care attendees: A comparison of CIS-R and CIDI with SCAN ICD-10 diagnostic categories. *Psychological Medicine*, 34(6), 1013–1024. <https://doi.org/10.1017/S0033291703001727>
- Lecrubier, Y., Sheehan, D. V., Weiller, E., Amorim, P., Bonora, I., Harnett Sheehan, K., ... Dunbar, G. C. (1997). The Mini International Neuropsychiatric Interview (MINI). A short diagnostic structured interview: Reliability and validity according to the CIDI. *European Psychiatry*, 12(5), 224–231. [https://doi.org/10.1016/S0924-9338\(97\)83296-8](https://doi.org/10.1016/S0924-9338(97)83296-8)
- Levis, B., Benedetti, A., Riehm, K. E., Saadat, N., Levis, A. W., Azar, M., ... Thombs, B. D. (2018). Probability of major depression diagnostic classification using semi-structured versus fully structured diagnostic interviews. *The British Journal of Psychiatry*, 212(6), 377–385. <https://doi.org/10.1192/bjp.2018.54>
- Manea, L., Gilbody, S., & McMillan, D. (2012). Optimal cut-off score for diagnosing depression with the Patient Health Questionnaire (PHQ-9): A meta-analysis. *CMAJ*, 184(3), E191–E196. <https://doi.org/10.1503/cmaj.110829>
- McInnes, M. D. F., Moher, D., Thombs, B. D., McGrath, T. A., Bossuyt, P. M., Clifford, T., ... PRISMA-DTA Group (2018). Preferred Reporting Items for a Systematic Review and Meta-analysis of Diagnostic Test Accuracy Studies: The PRISMA-DTA statement. *Jama*, 319(4), 388–396. <https://doi.org/10.1001/jama.2017.19163>
- Mitchell, A. J., Meader, N., & Symonds, P. (2010). Diagnostic validity of the Hospital Anxiety and Depression Scale (HADS) in cancer and palliative settings: A meta-analysis. *Journal of Affective Disorders*, 126(3), 335–348. <https://doi.org/10.1016/j.jad.2010.01.067>
- Moriarty, A. S., Gilbody, S., McMillan, D., & Manea, L. (2015). Screening and case finding for major depressive disorder using the Patient Health Questionnaire (PHQ-9): A meta-analysis. *General Hospital Psychiatry*, 37(6), 567–576. <https://doi.org/10.1016/j.genhosppsych.2015.06.012>
- PRESS—Peer Review of Electronic Search Strategies (2016). *2015 guideline explanation and elaboration (PRESS E&E)*. Ottawa: CADTH.
- Robins, L. N., Wing, J., Wittchen, H. U., Helzer, J. E., Babor, T. F., Burke, J., ... Towle, L. H. (1988). The Composite International Diagnostic Interview: An epidemiologic instrument suitable for use in conjunction with different diagnostic systems and in different cultures. *Archives of General Psychiatry*, 45(12), 1069–1077. <https://doi.org/10.1001/archpsyc.1988.01800360017003>
- Sheehan, D. V., Lecrubier, Y., Sheehan, K. H., Janavs, J., Weiller, E., Keskiner, A., ... Gunbar, G. C. (1997). The validity of the Mini International Neuropsychiatric Interview (MINI) according to the SCID-P and its reliability. *European Psychiatry*, 12(5), 232–241. [https://doi.org/10.1016/S0924-9338\(97\)83297-X](https://doi.org/10.1016/S0924-9338(97)83297-X)
- Stewart, L. A., Clarke, M., Rovers, M., Riley, R. D., Simmonds, M., Stewart, G., ... PRISMA-IPD Development Group (2015). Preferred Reporting Items for Systematic Review and Meta-Analyses of individual participant data: The PRISMA-IPD statement. *Jama*, 313(16), 1657–1665. <https://doi.org/10.1001/jama.2015.3656>
- Thombs, B. D., Benedetti, A., Kloda, L. A., Levis, B., Riehm, K. E., Azar, M., ... Vigod, S. (2015). Diagnostic accuracy of the Edinburgh Postnatal Depression Scale (EPDS) for detecting major depression in pregnant and postnatal women: Protocol for a systematic review and individual patient data meta-analyses. *BMJ Open*, 5, e009742. <https://doi.org/10.1136/bmjopen-2015-009742>

United Nations. International human development indicators. <http://hdr.undp.org/en/countries>. Accessed March 16, 2019.

World Health Organization (1992). The ICD-10 classifications of mental and behavioural disorder: Clinical descriptions and diagnostic guidelines Geneva.

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

How to cite this article: Levis B, McMillan D, Sun Y, et al. Comparison of major depression diagnostic classification probability using the SCID, CIDI, and MINI diagnostic interviews among women in pregnancy or postpartum: An individual participant data meta-analysis. *Int J Methods Psychiatr Res*. 2019;28:e1803. <https://doi.org/10.1002/mpr.1803>