Caregiving processes and expressed emotion in psychosis, a cross-cultural, meta-analytic review

Ciarán O'Driscoll [a],*, Sukran B. Sener [b], Anthonette Angmark [c], Madiha Shaikh [a,d]

[a] *Research Department of Clinical, Educational and Health Psychology, University College London, UK*
[b] *Division of Psychiatry, University College London, UK*
[c] *Newham Talking Therapies, East London NHS Foundation Trust, UK*
[d] *Research & Development Department, North East London NHS Foundation Trust, UK*

A B S T R A C T

The construct of Expressed Emotion (EE) is a reliable predictor of relapse in psychotic disorders globally. However, cultural differences in the level and manifestation of EE have been reported. This review was conducted in line with PRISMA guidelines to demonstrate the distribution of EE and its domains cross-culturally as well as its relationship with relapse in psychosis. Ninety-six studies reported global EE scores and/or separate EE domains amongst caregivers of a family member with psychosis and used the Camberwell Family Interview (CFI) to measure EE. In the meta-analysis (k = 34, n = 1982), exposure to high EE was indicative of a 95% increased likelihood of relapse compared to low EE. However, no significant effect of geographical region on global EE scores (high/low) or EE domains was found. Several adjustments to the scoring of the CFI were highlighted based on cultural norms, particularly relevant to the domains of emotional over-involvement, warmth and criticism. Although this made meaningful quantitative comparisons across studies difficult, it nonetheless highlighted cultural considerations that need to be taken into account when interpreting EE and understanding its relationship to clinical outcomes.

There is not a universal normative EE experience, with cultural variation in the scoring and interpretation of EE existing as evidenced by adjusted cut off scores and conceptualisation of EE constructs. Thus, it is important for clinical practitioners to have an awareness of different cultural norms in relation to caregiving and care receiving behaviours, which can inform adaptations to clinical interventions in multicultural settings.

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1. Introduction

Expressed Emotion (EE) represents the grouping of emotional characteristics expressed by relatives towards ill family members. The Camberwell Family Interview (CFI) (Vaughn et al., 1976), considered the gold standard measurement of EE has been the most frequently used tool for assessing EE in research with adjusted scoring based on cultural norms (Hooley and Parker, 2006). The CFI has shown considerable concurrent and predictive validity and provides data on five domains of EE (Hooley and Parker, 2006; Van Humbeeck et al., 2002): Critical Comments (CC), Emotional Over-involvement (EOI), Hostility, Warmth, and Positive Remarks (Barrowclough and Hooley, 2003).

The CFI was developed in a region with considerable ethnic variation, which gives the method credence in examining EE across cultures. However, later studies have emphasized the need for caution regarding cultural variations in these assessments (Hooley and Parker, 2006)

given the difficulty rating a 'typical' response when assessing prosodic variables such as speed, pitch and loudness.

Whilst the concept of EE is not pathological in itself, the domains; CC, hostility and EOI are strong predictors of relapse in patients with psychotic disorders cross-culturally (Butzlaff and Hooley, 1998), including immigrant populations (Hashemi and Cochrane, 1999; Kopelowicz et al., 2002).

Cultural variations have been observed, in both the degree and manifestation of EE domains (Bhugra, 2003). The domains that contribute to the attribution of high or low EE are relevant in demonstrating such differences. The demonstration of intrafamilial interactions vary across cultures, and may influence relatives' emotional responses towards an ill family member (Akhtar et al., 2013). Within the CFI, criticism and warmth are rated on prosody, whereas hostility, positive comments and EOI are rated on described behaviour. As such, the individual domains are subject to cultural variations in expected levels of intimacy and concern. A growing body of evidence supports the claim that in relatively collectivist cultures, an absence of positive remarks could be more detrimental than the presence of criticism, given the strong emphasis of family bonds (Singh et al., 2013). In Western countries

* Corresponding author at: Research Department of Clinical, Educational and Health Psychology, University College London, 1-19 Torrington Place, London WC1E 7HB, UK.
E-mail address: ucjtcio@ucl.ac.uk (C. O'Driscoll).

where personal independence is culturally emphasized, criticism may be particularly toxic, whereas in African-American caregiver-adult relationships it might instead connote engagement, caring and support (Rosenfarb et al., 2006; Weisman et al., 2006). It has been suggested that in some cultures, an absence of EOI by a carer, in contrast to many Western cultures, may be interpreted as lack of care (Akhtar et al., 2013; Singh et al., 2013). What constitutes criticism, hostility and EOI is a unique cultural definition, (Akhtar et al., 2013) highlighting the importance of understanding EE and normative caregiving behaviour across different cultures and their impact on clinical outcomes. EE has been associated with outcome where higher levels of warmth correlate with lower levels of relapse in schizophrenia (Lee et al., 2014; Lopez et al., 2009).

EE research has contributed to the development of family-based psychosocial interventions for psychosis that, along with medical treatment, have been shown to improve treatment outcomes (Amaresha and Venkatasubramanian, 2012). Family interventions have tended to be based on knowledge acquired through studies conducted with Caucasian families, whose belief systems and cultural values may differ from those of other ethnic and cultural groups (Chakrabarti, 2011). Culturally tailored interventions are poorly evidenced or unavailable due to a lack of research within ethnic minorities.

While previous EE reviews (Barrowclough and Hooley, 2003; Van Humbeeck et al., 2002) and meta-analyses (Butzlaff and Hooley, 1998) have been conducted, most of the studies included have been from Western countries. There is also a tendency amongst cross-ethnic and cross-national cultural studies to consider the entire sample of caregivers only in terms of high or low EE caregivers, neglecting to examine the individual EE domains that contribute to the high or low classification (Lopez et al., 2009). A more comprehensive assessment of cross-cultural differences would be one that examines high EE profiles as well as specific EE ratings in each domain and their impact on clinical outcomes.

In order to reduce variability due to measurement and allow for comprehensive comparison, only studies that have used CFI were included in this review.

Aims:

1) To explore regional variation in the relationship between EE and relapse.

2) To explore overall regional variation in EE domain ratings.

2. Methodology

The search and review were conducted in accordance with PRISMA guidelines (Moher et al., 2009) (Fig. 1). Databases were systematically searched (OVID Medline, PsycINFO, EMBASE and Web of knowledge) for publications (search keywords in supplementary material). Further references were obtained from reviewing articles and relevant reviews.
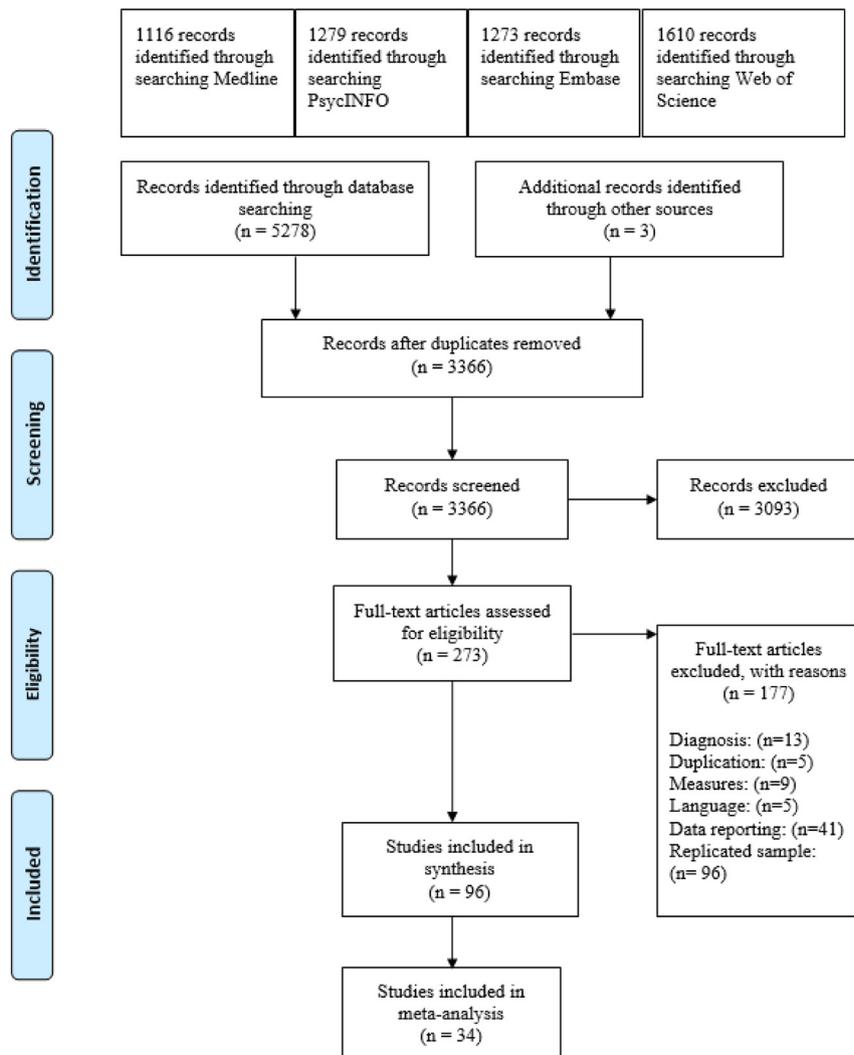

Fig. 1. PRISMA flow diagram.

2.1. Eligibility criteria and search strategy

The following inclusion criteria were applied: (1) CFI used to rate EE, (2) diagnosis of psychosis, schizophrenia, schizoaffective, psychosis unspecified, or bipolar disorder with psychotic features, and (3) published in English. There was no restriction in terms of severity of psychosis symptoms, other than that they were measured using the Diagnostic and Statistical Manual of Mental Disorders or the International Classification of Diseases, or clinical diagnosis made by a treating psychiatrist. Studies were excluded if the researchers assessed EE prior to recruitment and only recruited participants based on EE scores, in order to achieve consistency in comparing EE distributions amongst regions and in measuring relapse. Titles and abstracts were initially screened for eligibility and the full texts assessed against the inclusion and exclusion criteria, by all authors.

2.2. Data extraction

The following data was extracted (1) study characteristics e.g. country, cultural/ethnic groups included (2) clinical characteristics of sample, including diagnosis and duration of illness (3) EE scores (high and low EE, and EE domain data) and relapse outcomes (number of relapses) (4) any scale adjustments of CFI (5) study design and length of follow up (Table 1, supplementary material).

Geographical region was chosen over country to explore subgroup cultural differences, given the large amount of countries (n = 24), this reflects the main variable of interest. Region was defined as Asia (China, India, Iran, Japan and Pakistan), Europe (Czechoslovakia, Denmark, Germany, Greece, Netherlands, Norway, Poland, Scotland, Serbia, Spain, Sweden, Switzerland and United Kingdom), North America (Canada and the United States) Oceania (Australia), Africa (Nigeria) and South America (Brazil).

2.3. Meta–analysis

Meta-analyses were conducted in R using the metafor package (Viechtbauer, 2010) and visualized using metaviz (Kossmeier et al., 2019). Subgroup (region) meta-analyses were carried out using the random-effects model using the method of residual maximum likelihood (REML). Relative risk ratios (RR) were calculated for each study, using CFI total score and relapse data for high and low EE groups. The RR is the likely occurrence of relapse in one group relative to that in the other. Statistical heterogeneity was assessed using the I^2, where an I^2 of 25%, 50%, and 75% is considered small, moderate and large, respectively (Higgins et al., 2003). Subgroup analysis and random effects meta-regressions (REML) were conducted to relate the RRs to characteristics of the studies (relapse indicator and follow up in months).

Metaregession and subgroup analysis can help to explain heterogeneity between studies providing estimates of the difference in effect between studies. In the regional analysis, we aimed to reduce variability, selecting data pertaining to an approximate follow up of 1 year where multiple time points were available. However, all time points were included in the metaregression on follow up. We also investigated the classification of relapse, given the different relapse measures and criteria described by the authors. Data was taken from longitudinal and intervention studies. Where data was not available in the paper, the authors were contacted. Three authors did not respond and their studies were removed.

ANOVA and t-test analysis were used to compare difference in EE across regions.

3. Results

The screening and exclusion process (Fig. 1) yielded 96 studies to be included in the narrative review and 34 for meta-analysis. Studies varied in the extent to which they reported High and Low EE scores as well as relapse information. Descriptions of specific cultural and ethnic groups within studies are reported (S2, supplementary material).

3.1. Assessment of methodological quality

Study quality, design, conduct and analysis was assessed by two independent reviewers using The Joanna Briggs Institute (JBI) Critical Appraisal Tool for Cohort (Bilotta et al., 2014), Fig. 2 summarises the quality rating for all 96 studies included in the review (Item ratings in Table 2, supplementary materials). For every item in the tool, two independent reviewers indicated 'yes', 'no', 'unclear' or 'not applicable' for each study. 43 studies (44.8%) did not identify confounders that could potentially be associated with EE and study outcome, such as ethnicity and sex, or control for potential confounders in analysis. Overall 91 (94.8%) studies were considered to report appropriate analysis and unbiased selection. As cross-sectional (k = 45), longitudinal (k = 33) and intervention (k = 18) studies were included, follow-up time was not applicable for 40 (41.6%) studies. For the remaining studies, 39 explored loss to follow-up.

3.2. Descriptive analysis

A narrative summary of the results was conducted (Roberts et al., 2006), as heterogeneity in terms of study design, and variations in data reporting concerning EE amongst studies precluded a comprehensive quantitative analysis. Some studies adjusted the EE domain score or altered some of the EE constructs to suit the cultural context/norms, specified below. Two studies also used the abbreviated version of CFI (Mueser et al., 1993), which precluded comparisons.

Studies adopted different measures to assess relapse. These measures were grouped into 4 categories based on frequency and similarity; (S3, supplementary materials). Groupings reflected assessment based on different types of relapse and a list of indicators.

3.3. CFI adjustments

The scoring criteria for CFI varied across studies. The standard scoring procedure states that a high EE rating is given if a family member makes six or more critical comments, scores three or above on EOI, or demonstrates any hostile behaviour towards the family member (Leff et al., 1982). Relatives are classified as low EE if they do not meet these thresholds. Seventy-two studies used the 6–3–1 criterion to measure EE.

Vaughn et al. (1984) later noted that an EOI cut-off of 4 produced the best separation of the sample in terms of patients who relapse, a 6–4–1 criterion was used by a further sixteen studies. Two of these studies used the 6–3–1 criteria to measure high and low EE, however modified the score of high criticism to >4 critical comments during analysis; as a better predictor of relapse (Montero et al., 1992; Stirling et al., 1991).

For the remaining eight studies, adjustments related to translation or reflected the cultural norms of the region, where 'culturally relevant' examples are used to conceptualise domains in the language/culture. For instance, in a Chinese study (Phillips and Xiong, 1995), adjustments to CFI were made in the process of translation to account for events that do not commonly occur in China. Children have less autonomy and marriage laws hold parents accountable for caring for a child who cannot care for him or herself regardless of age which could be construed as EOI. Divorce is rarely granted to spouses of seriously mentally ill patients in China, caregivers/spouses who have attempted to divorce and were unsuccessful were considered hostile by the reviewers of the study, even if the caregivers appeared emotionally detached and noncritical manner rather than hostile.

Brown et al. (1972) suggested using a cut-off point of 7 for critical remarks, and lowering the cut-off point to 2 for high criticism and emotional over-involvement when the patient is present during the interview, which, led to caregivers being less emotionally expressive.
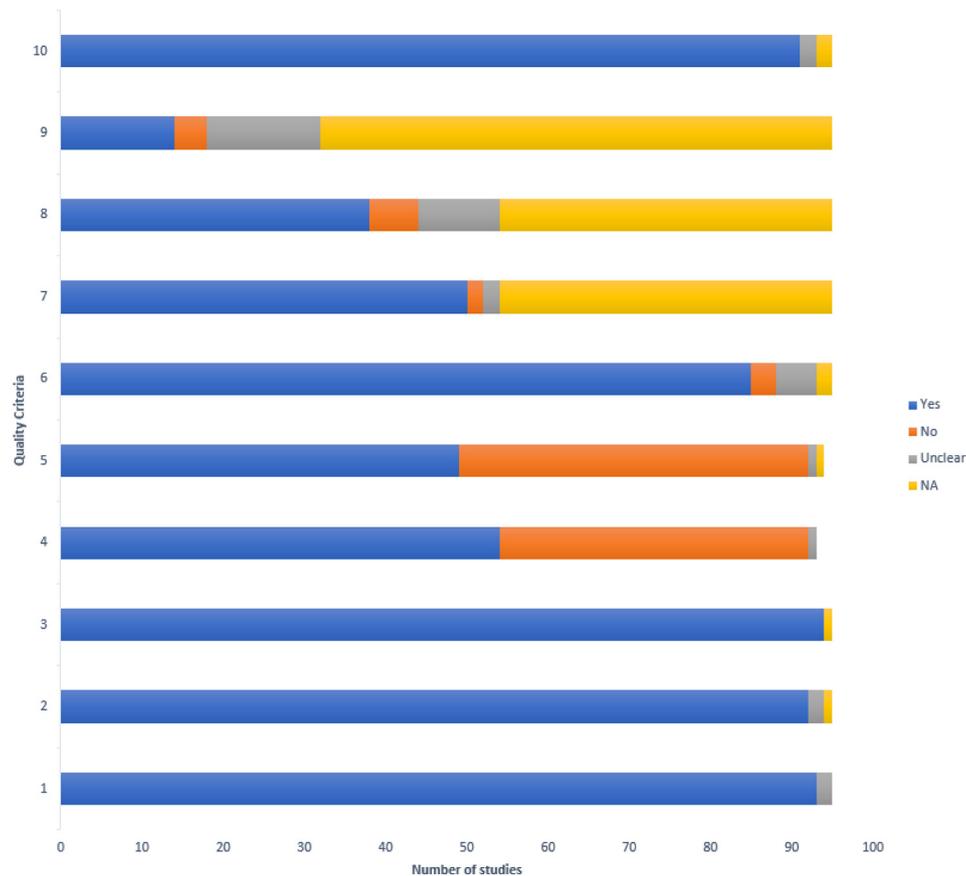
Fig. 2. Quality Review Summary Chart. (1) Unbiased selection of cohort? (2) Was EE measured by CFI (exposures measured similarly)? (3) Validated method for assessing EE? (4) Confounders identified? (5) Confounders controlled for? (6) Valid and reliable measure of outcome? (7) Follow up time reported and sufficient? (8) Follow-up complete, or loss to follow up explored? (9) Strategies to address incomplete follow-up utilized? (10) Appropriate analyses?

Similarly, King et al. (1999) reported a CC cut-off point of 7 to best discriminate relapse at both 9 and 18 month follow-up.

Two Italian (Bertrando et al., 1992; Carra et al., 2007) and 2 Greek studies (Mavreas et al., 1992; Tomaras et al., 2000), opted for the higher threshold for high EOI classification (cut-off point = 4) where EOI is a more frequently observed attitude and characteristic of family relationships.

3.4. Meta-analyses

34 studies provided 39 data points for meta-analyses (n = 1982) where the arms from intervention studies were estimated separately. Fig. 3. shows the subgroup meta-analysis by region. Overall, there was a RR of 1.95 (95% CI: 1.65 to 2.3), being exposed to high EE was indicative of 95% increased likelihood of relapse compared to low EE. However, it should be noted that confidence intervals for 12 data points cross the line, RR = 1. While RRs ranged from 0.33 to 10.16, heterogeneity was not a substantial issue (I^2 = 20%, p < 0.1). There was small to moderate heterogeneity in the European studies, this was explained by two intervention studies (Tarrier et al., 1988; Wiedemann et al., 2001) displaying an inverse result. There was also small to moderate heterogeneity in the North American studies.

3.5. Covariate analysis

Subgroup analysis and a metaregression model suggest that heterogeneity in RR is explained by relapse indicator (R^2 = 99.98%), goodness of fit tests ($Q_{model}(3)$ =11.347. p = 0.01; $Q_{residual}(35)$ =37.722, p = 0.346) where relapse indicated by case record or assessed by clinician

appeared to underestimate relapse compared to the other methods (S3, supplementary materials).

For the meta-regression on follow up, 34 studies were included (48 data points) where data from studies with multiple time points were included. A statistically significant relationship between RR and months of follow up was found (−0.017, SE = 0.004, CI -0.026 to −0.008, p < 0.001). However, this model included two studies at 60 (Huguelet et al., 1995) and at 96 months (Schulze Mönking et al., 1997), once removed (range = 9 to 24 months), the relationship was no longer significant.

Analyzing region and year of publication revealed no significant associations with RR (p = 0.93 and p = 0.15, respectively).

3.6. Sensitivity analysis

Heterogeneity across studies was low, however confidence intervals were wide for a number of studies. A leave one out analysis was conducted to determine if any one study could reduce heterogeneity. As noted above, this was due to the follow up length. Leaving out Schulze Mönking et al. (1997) reduced heterogeneity (I^2 = 7%) however had a negligible influence on the summary effect RR = 1.99 (95% CI: 1.69, 2.35).

Higher quality studies may be expected to provide a more definitive association between EE and RR. Studies which measured and controlled for confounding (k = 20) were entered into a separate meta-analysis (S4, supplementary), displaying no difference, RR = 1.96 (95% CI: 1.54, 2.50), I^2 = 0.

To ensure that intervention studies were not overly influencing the summary effect, a subgroup analysis of intervention arms (k = 4), RR = 1.82 (95% CI: 1.37 to 2.4), I^2 = 0, demonstrated a slight lower RR.

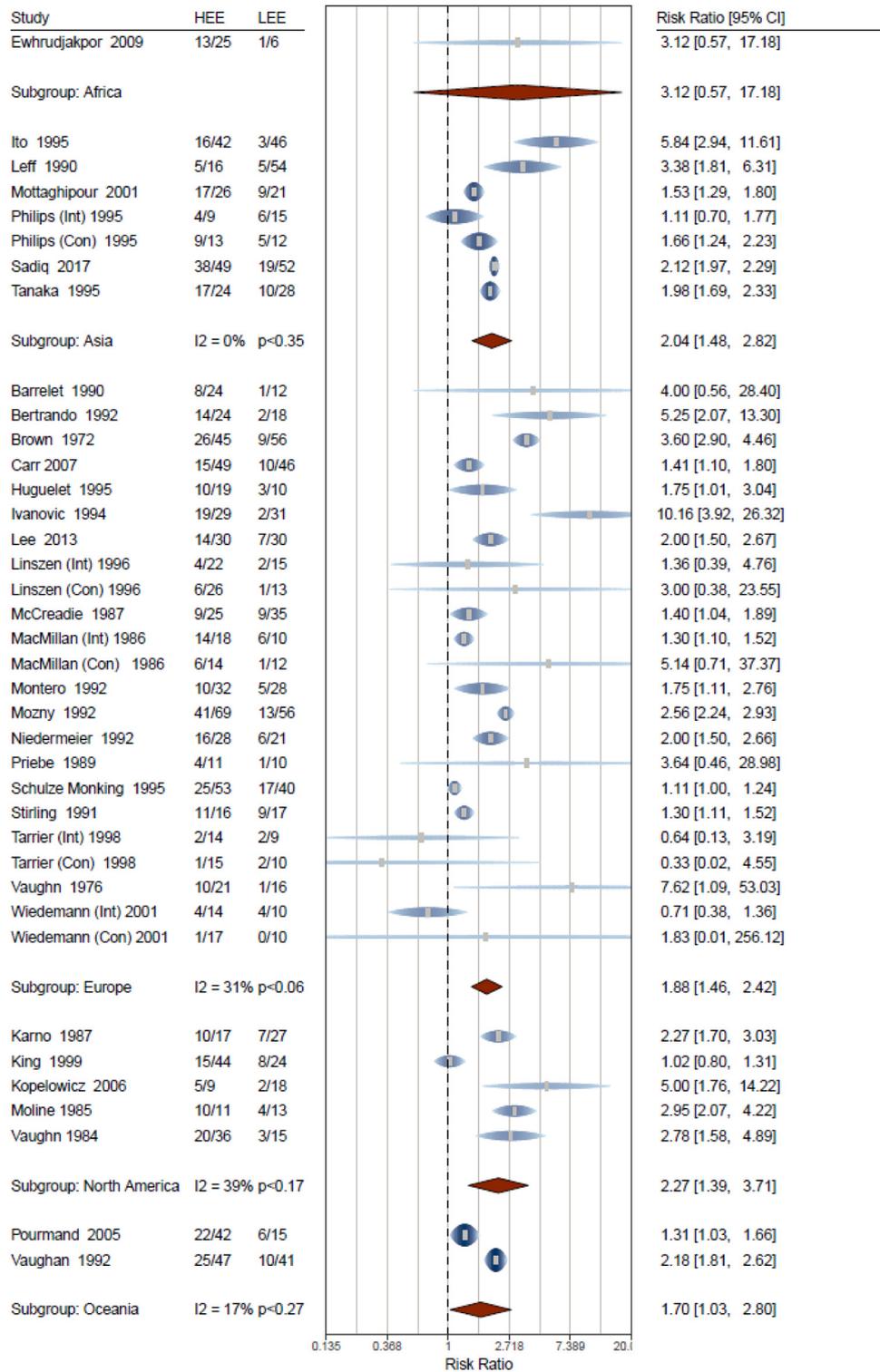**Fig. 3.** Subgroup meta-analysis by region, comparing risk of relapse between high and low EE groups. Int = Intervention, Con = Control.

3.7. Descriptive analysis

3.7.1. EE across regions

Mean ratios (HEE: LEE) of EE across regions are illustrated in Fig. 4. No significant effect of region (Asia, Europe, North America and Oceania) on EE was found ($F(3,81)1.171$, $p < 0.33$). However, the Africa study (Nigeria) was distinctly higher (HEE: LEE, 4.2:1).

No significant differences were observed across regions in mean scores for CC $F(3,24) = 1.314$, $p = 0.29$, EOI $F(2,20) = 0.613$, p =

0.55, Warmth $F(3,14) = 2.74$, $p = 0.08$ or Positive remarks $F(3,13) = 0.256$, $p = 0.86$. The hostility domain did not have sufficient data for statistical analysis (5 studies reporting on relatives with high hostility alone). There were no significant differences in the diagnosis of patients, the diagnostic measure used, education levels of the sample, mean duration of illness and mean age of onset across regions. Percentage of female patients varied significantly across regions ($F(3, 80) = 3.997$, p=. 010). North America had significantly lower female patients than both Asia and Europe (p=. 025 and p=. 027 respectively). This might be
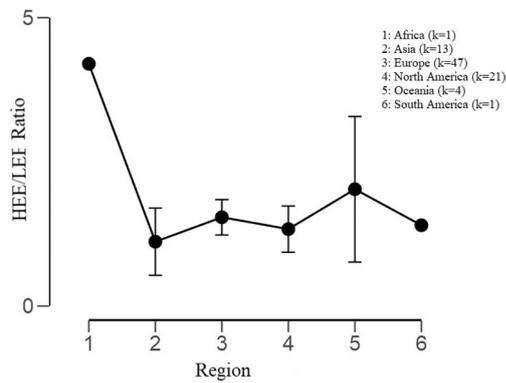
Fig. 4. EE distributions (HEE to LEE ratio) of relatives by region with 95% confidence intervals.

due to the difference in the number of studies included in each region: Asia (n = 7), Europe (n = 18) and North America (n = 15).

3.7.2. Domain level difference

While there was a lack of substantive domain level information, the different domains of EE show variation across regions. For example, relative to British and Danish samples, Chinese (Ran et al., 2003) and Indian (Wig et al., 1987) samples commonly demonstrate high scores on both criticism and warmth. This concept might seem conflicting in Western societies, however in Chinese culture, the criticism can be viewed as a sign of concern (Ran et al., 2003). In a study of first-admission schizophrenia patients in Switzerland, CC alone (cutoff point between 11 and 13) best discriminated between those at a greater risk of relapse (Barrelet et al., 1990).

Yang et al. (2004) included high EOI scores in the low EE group for Chinese caregivers, as caregivers who score high on the EOI scale were found to have similar attributional styles to low EE caregivers (obstructing examination of the relationship of high EOI with relapse). High EOI best predicted relapse in a Japanese sample (Tanaka et al., 1995) with the authors highlighting the role of sociocultural values: with families less likely to express hostility. In a Mexican-American sample (Aguilera et al., 2010), emotional closeness more frequently characterised familial relationships and EOI contributed most to relapse and stress. EOI, as defined in Western cultures, is also common in Iran, (Mottaghipour et al., 2001) with hostility also contributing to high EE in Iranian caregivers.

4. Discussion

The meta-analysis across regions suggests that individuals exposed to high familial EE displayed an increased likelihood of relapse compared to those who experience low EE. This relationship appears to be universal. While heterogeneity between studies exists, this could be explained by the methods used to establish relapse and definition of relapse as return or exacerbation of psychotic symptoms. Indeed, categorising emotion into high/low EE reflects only amount of emotion displayed and does not consider the complexity in defining EE domains within cultural context and normative family values, attitudes and behaviours. Additionally, a tentative relationship may exist where relative risk decreased over time, however, this does not appear within the general follow up period for most studies (within 2 years).

This review did not reveal significant regional differences in high and low EE distribution. This was unexpected as regional and cultural variations in EE have been demonstrated in various studies (Ikram et al., 2011; Singh et al., 2011). Perhaps using a composite score of high/low EE washes out domain level differences that are likely to contribute differently based on cultural context. A variety of adjustments to the CFI were made across studies, both conceptually and to cut off scores. Thus, the distribution between high and low EE caregivers in

studies where adjustments were made make it difficult to meaningfully compare regional variations. The adjustments and differential contribution of EE domains may also reflect different conceptualisation of the EE domains. It is important to note that this finding also highlights that EE remains a robust predictor of relapse across cultures and regions, possibly due to the modifications; which indicates that the CFI can be successfully modified for cross-cultural research.

Nonetheless, the cross-cultural variation observed in the EE domains, as well as the various adjustments made cross-culturally, emphasize the importance of operationalising the original EE constructs so that they are sensitive to cultural differences. Although the rating of the CFI was never meant to be fully standardized, variations in domain ratings across cultures can be helpful. For example, the conceptual differences between EOI and warmth are somewhat unclear, and some studies report the protective aspects of warmth when paired with high EOI, highlighting perhaps some conceptual overlap within these domains (Singh et al., 2011). In addition, these two constructs do not differentiate between intrusive and non-intrusive involvement, and it is likely that intrusive aspects are more likely to predict relapse. The domain EOI aims to capture intrusive concern, however the distinction between concern and intrusive concern cannot always be captured and we are unable to disentangle this effect without this distinction. For example, mothers tend to score higher on EOI, which is expected given prevailing cultural norms in many societies; however, caretaking and affection is not clearly separable from over-involvement behaviours (Singh et al., 2011). The conceptualisation of EOI makes it more likely to occur in close-knit societies, especially in which children socialize from an early age which may make them more prone to engage in sacrificing behaviours towards family members, such as in Pakistan (Ikram et al., 2011). That being said, these are still culturally guided judgements subject to variation.

4.1. Review considerations

The systematic search generated a comprehensive number of articles, however, our ability to generate meaningful cultural comparisons was partly limited due to an underrepresentation of studies cross-culturally especially from Africa and South America, the grouping of countries with little cultural overlap and limited reporting on EE domains. The paucity of reported data on EE domains negated a more nuance investigation of its relationship with relapse across regions/culture. Only studies reported in the English language were included in this analysis. Five non-English studies were identified but excluded. While confounding variables were not accounted for in half the studies the quality of studies was deemed moderate to high. Confounders such as ethnicity, gender, socioeconomic status, and proxy measures of cultures and language dominations that may influence EE ratings, and their association with clinical outcomes should be considered.

Cultural and familial values affecting EE measurement may also be missed. The term 'cultural' used in this review is broad. Many different cultural contexts exist in the same geographical location, and in different ethnic or minority populations within a country thus it is limiting to group together different countries and cultures into regions. For example, Iran and China were grouped into Asia, while the size of families and laws regarding marriage to an ill spouse differ greatly in these countries. Although adjustments to scoring and translations/use of adapted questions to CFI were explored to understand the specific tailoring of CFI for the sample studied and gain insight into the cultural variations, the absence of a clear rationale for adjustments within studies omits comparisons across samples. Score adjustments should be explicitly reported to ensure improved understanding and study comparisons.

Furthermore, theoretical underpinnings of EE are based on normal emotional expression and behaviours within relationships that are defined as problematic based on amount of emotion expressed which will vary hugely based on cultural norms and the complexity of which cannot be captured in this review. An individual patient data meta-

analysis may improve the quality of data and provide scope for further co-variate analysis.

The relationship between EE and acculturation needs to be explored. Jenkins and Karno (1992) showed that first, second, and third generation immigrants may completely differ in their levels of EE. In immigrant families, cultural values may be fluid and dynamic over generations rather than linked to the "home culture" the first generation has left behind (Lopez et al., 2009).

4.2. Research implications

The meta-analysis showed that being exposed to high EE was linked to an increased relative risk of relapse. Given that heterogeneity between studies could mostly be explained by the relapse indicator suggests that the use of a consistent relapse indicator in future studies should allow for meaningful comparisons across studies.

Differences in EE domains that contribute to high or low EE in relapse and non-relapse groups may reveal patterns and identify culturally specific, contributory and protective factors. EE domains such as warmth have been linked as a protective factor in the literature (Tsai et al., 2015), while studies from China have also highlighted that criticism and warmth together might not be a cause for concern where criticism is viewed as a sign of concern (Ran et al., 2003; Wig et al., 1987). EOI was highlighted as a common part of intrafamilial interactions in many cultures. This review highlights the importance of exploring each domain of EE in future studies and its influence and variation on overall EE ratings and their relationship to clinical outcomes. Understanding the cultural differences and adjustments in respective domains of EE would allow more accurate assessment of relatives and guide the routine tailoring of interventions.

4.3. Clinical implications

EE research has influenced the development of family interventions in psychosis, yet limited consideration is given to the cultural context which can inform adaptations to current interventions and refinement of EE measures. In clinical practice, the CFI is not routinely used to assess EE, requiring specific training in administration and scoring. Self-report measures, the Family Attitude Scale (Kavanagh et al., 1997) and the Levels of Expressed Emotion (Cole and Kazarian, 1988) are more likely to be utilized, and it is unclear how reasonable adjustments for cultural variations can be made to self-report measures. Clinicians should be cautious when applying such measures to individuals from diverse cultural and ethnic backgrounds and refer to research that has adjusted EE scores based on culturally normative data. Our results highlight that EOI levels tend to be higher in Asian regions, and that criticism can be perceived as concern and therefore may not have a detrimental effect on Chinese samples. Moreover, EE domains show different trends, such that criticism and warmth are more likely to occur together in a caregiver in close-knit, family oriented cultures (Ikram et al., 2011).

4.4. Conclusion

This review adds useful information regarding the importance of cultural adjustments when understanding EE domains. However, higher EE is related to a greater relative risk of relapse. It is important for clinical practitioners to have an awareness of different cultural norms in relation to caregiving and care receiving behaviours. Further understanding of the protective and detrimental EE domains in relationship to relapse within different cultures, as well as the relationship of EE in patient stress and subjective experience, may facilitate the development of culturally appropriate tools that could aid our cultural understandings and efforts to improve the effectiveness of family interventions in multicultural settings.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.schres.2019.03.020.

References

Aguilera, A., Lopez, S.R., Breitborde, N.J.K., Kopelowicz, A., Zarate, R., 2010. Expressed emotion and sociocultural moderation in the course of schizophrenia. J. Abnorm. Psychol. 119, 875–885.

Akhtar, N., Suhail, K., Rana, S.A., Singh, S.P., 2013. Development of Culturally-specific Family Criticism Scale and Emotional Over-involvement Scale 28, 199–216.

Amaresha, A.C., Venkatasubramanian, G., 2012. Expressed emotion in schizophrenia: an overview. Indian J. Psychol. Med. 34, 12–20.

Barrelet, L., Ferrero, F., Szigethy, L., Giddey, C., Pellizzer, G., 1990. Expressed emotion and first-admission schizophrenia. Nine-month follow-up in a French cultural environment. Br. J. Psychiatry 156, 357–362.

Barrowclough, C., Hooley, J.M., 2003. Attributions and expressed emotion: a review. Clin. Psychol. Rev. 23, 849–880.

Bertrando, P., Beltz, J., Bressi, C., Clerici, M., Farma, T., Invernizzi, G., Cazzullo, C.L., 1992. Expressed emotion and schizophrenia in Italy. A study of an urban population. Br. J. Psychiatry 161, 223–229.

Bhugra, D., 2003. Expressed emotion across cultures. Adv. Psychiatr. Treat. 9, 342–348. https://doi.org/10.1192/apt.9.5.342.

Bilotta, G.S., Milner, A.M., Boyd, I.L., 2014. Quality assessment tools for evidence from environmental science. Environ. Evid. 3, 14.

Brown, G.W., Birley, J.L.T., Wing, J.K., 1972. Influence of family life on the course of schizophrenic disorders: a replication. Br. J. Psychiatry 121, 241–258. https://doi.org/10.1192/bjp.121.3.241.

Butzlaff, R.L., Hooley, J.M., 1998. Expressed emotion and psychiatric relapse: a meta-analysis. Arch. Gen. Psychiatry 55, 547–552.

Carra, G., Montomoli, C., Clerici, M., Cazzullo, C.L., 2007. Family interventions for schizophrenia in Italy: randomized controlled trial. Eur. Arch. Psychiatry Clin. Neurosci. 257, 23–30.

Chakrabarti, S., 2011. Family interventions in schizophrenia: issues of relevance for Asian countries. World J. Psychiatry 1, 4–7.

Cole, J.D., Kazarian, S.S., 1988. The level of expressed emotion scale: a new measure of expressed emotion. J. Clin. Psychol. 44, 392–397.

Hashemi, a H., Cochrane, R., 1999. Expressed emotion and schizophrenia: a review of studies across cultures. Int. Rev. Psychiatry 11, 219–224. https://doi.org/10.1080/09540269974401.

Higgins, J.P.T., Thompson, S.G., Deeks, J.J., Altman, D.G., 2003. Measuring inconsistency in meta-analyses. BMJ 327, 557–560. https://doi.org/10.1136/bmj.327.7414.557.

Hooley, J.M., Parker, H. a, 2006. Measuring expressed emotion: an evaluation of the short-cuts. J. Fam. Psychol. 20, 386–396. https://doi.org/10.1037/0893-3200.20.3.386.

Huguelet, P., Favre, S., Binyet, S., Gonzalez, C., Zabala, I., 1995. The use of the Expressed Emotion Index as a predictor of outcome in first admitted schizophrenic patients in a French speaking area of Switzerland. Acta Psychiatr. Scand. 92, 447–452. https://doi.org/10.1111/j.1600-0447.1995.tb09611.x.

Ikram, A., Suhail, K., Jafery, S.Z., Singh, S., 2011. Rates of expressed emotions in Pakistani relatives of patients with schizophrenia. Isr. J. Psychiatry Relat. Sci. 48, 74–81.

Jenkins, J.H., Karno, M., 1992. The meaning of expressed emotion: theoretical issues raised by cross-cultural research. Am. J. Psychiatry 149, 9–21.

Kavanagh, D.J., O'Halloran, P., Manicavasagar, V., Clark, D., Piatkowska, O., Tennant, C., Rosen, A., 1997. The Family Attitude Scale: reliability and validity of a new scale for measuring the emotional climate of families. Psychiatry Res. 70, 185–195.

King, S., Dixon, M.J., S., K., 1999. Expressed emotion and relapse in young schizophrenia outpatients. Schizophr. Bull. 25, 377–386.

Kopelowicz, A., Zarate, R., Gonzalez, V., Lopez, S.R., Ortega, P., Obregon, N., Mintz, J., 2002. Evaluation of expressed emotion in schizophrenia: a comparison of Caucasians and Mexican-Americans. Schizophr. Res. 55, 179–186.

Kossmeier, M., Tran, U.S., Voracek, M., 2019. Visualizing Meta-analytic Data with R Package Metaviz. https://cran.r-project.org/web/packages/metaviz/metaviz.pdf.

Lee, G., Barrowclough, C., Lobban, F., 2014. Positive affect in the family environment protects against relapse in first-episode psychosis. Soc. Psychiatry Psychiatr. Epidemiol. 49, 367–376. https://doi.org/10.1007/s00127-013-0768-x.

Leff, J., Kuipers, L., Berkowitz, R., Eberlein-Vries, R., Sturgeon, D., J., L., L.Z., K, 1982. A controlled trial of social intervention in the families of schizophrenic patients. Br. J. Psychiatry 141, 121–134. https://doi.org/10.1192/bjp.141.2.121.

Lopez, S.R., Garcia, R., A, J.I, Ullman, J.B., Kopelowicz, A., Jenkins, J., Breitborde, N.J.K., Placencia, P., 2009. Cultural variability in the manifestation of expressed emotion. Fam. Process 48, 179–194. https://doi.org/10.1111/j.1545-5300.2009.01276.x.

Mavreas, V.G., Tomaras, V., Karydi, V., Economou, M., Stefanis, C.N., 1992. Expressed emotion in families of chronic schizophrenics and its association with clinical measures. Soc. Psychiatry Psychiatr. Epidemiol. 27, 4–9.

Moher, D., Liberati, A., Tetzlaff, J., Altman, D.G., PRISMA Group, 2009. Preferred reporting items for systematic reviews and meta-analyses: the {PRISMA} statement. PLoS Med. 6, e1000097.

Montero, I., Gomez-Beneyto, M., Ruiz, I., Puche, E., Adam, A., 1992. The influence of family expressed emotion on the course of schizophrenia in a sample of Spanish patients. A two-year follow-up study. Br. J. Psychiatry 161, 217–222.

Mottaghipour, Y., Pourmand, D., Maleki, H., Davidian, L, 2001. Expressed emotion and the course of schizophrenia in Iran. Soc. Psychiatry Psychiatr. Epidemiol. 36, 195–199.

Mueser, K.T., Bellack, A.S., Wade, J.H., Sayers, S.L., Tierney, A., Haas, G., 1993. Expressed emotion, social skill, and response to negative affect in schizophrenia. J. Abnorm. Psychol. 102, 339–351.

Phillips, M.R., Xiong, W., 1995. Expressed Emotions in Mainland. Chinese families with schizophrenic patients. Int. J. Ment. Health, China https://doi.org/10.1080/00207411.1995.11449319.

Ran, M.-S., Leff, J., Hou, Z.-J., Xiang, M.-Z., Chan, C.L.-W., 2003. The characteristics of expressed emotion among relatives of patients with schizophrenia in Chengdu, China. Cult. Med. Psychiatry 27, 95–106.

Roberts, H., Sowden, A., Petticrew, M., Arai, L, Rodgers, M., Britten, N., 2006. Guidance on the conduct of narrative synthesis in systematic reviews. A product from the {ESRC} methods Programme. Version 1.

Rosenfarb, I.S., Bellack, A.S., Aziz, N., 2006. Family interactions and the course of schizophrenia in African American and White patients. J. Abnorm. Psychol. 115, 112–120.

Schulze Mönking, H., Hornung, W., Stricker, K., Buchkremer, G., 1997. Expressed emotion in an 8 year follow-up. Eur. Psychiatry 12, 105–110.

Singh, S.P., Harley, K., Suhail, K., 2011. Cultural specificity of emotional overinvolvement: a systematic review. Schizophr. Bull. 39, 449–463.

Singh, S.P., Harley, K., Suhail, K., 2013. Cultural specificity of emotional overinvolvement: a systematic review. Schizophr. Bull. 39, 449–463.

Stirling, J., Tantam, D., Thomas, P., Newby, D., Montague, L., Ring, N., Rowe, S., 1991. Expressed emotion and early onset schizophrenia: a one year follow-up. Psychol. Med. 21, 675. https://doi.org/10.1017/S0033291700022315.

Tanaka, S., Mino, Y., Inoue, S., 1995. Expressed emotion and the course of schizophrenia in Japan. Br. J. Psychiatry 167, 794–798. https://doi.org/10.1192/bjp.167.6.794.

Tarrier, N., Barrowclough, C., Vaughn, C., Bamrah, J.S., Porceddu, K., Watts, S., Freeman, H., 1988. The community management of schizophrenia. A controlled trial of a behavioural intervention with families to reduce relapse. Br. J. Psychiatry 153, 532–542.

Tomaras, V., Mavreas, V., Economou, M., Ioannovich, E., Karydi, V., Stefanis, C., 2000. The effect of family intervention on chronic schizophrenics under individual psychosocial treatment: a 3-year study. Soc. Psychiatry Psychiatr. Epidemiol. 35, 487–493. https://doi.org/10.1007/s001270050269.

Tsai, K., Lopez, S., Marvin, S., Zinberg, J., Cannon, T., O'Brien, M., Bearden, C.E., 2015. Perceptions of family criticism and warmth and their link to symptom expression in racially/ethnically diverse adolescents and young adults at clinical high risk for psychosis. Early Interv. Psychiatry 9, 476–486. https://doi.org/10.1111/eip.12131.

Van Humbeeck, G., Van Audenhove, C., De Hert, M., Pieters, G., Storms, G., 2002. Expressed emotion: a review of assessment instruments. Clin. Psychol. Rev. 22, 321–341. https://doi.org/10.1016/S0272-7358(01)00098-8.

Vaughn, C., Leff, J., C., V., Vaughn, C., Leff, J., 1976. The measurement of expressed emotion in the families of psychiatric patients. Br. J. Soc. Clin. Psychol. 15, 157–165.

Vaughn, C.E., Snyder, K.S., Jones, S., Freeman, W.B., Falloon, I.R., 1984. Family factors in schizophrenic relapse. Replication in California of British research on expressed emotion. Arch. Gen. Psychiatry 41, 1169–1177.

Viechtbauer, W., 2010. Conducting Meta-analyses in R with the metafor package. J. Stat. Softw. 36, 1–48. https://doi.org/10.1103/PhysRevB.91.121108.

Weisman, Amy & Rosales, G. & Kymalainen, J.A. (2006)., 2006. Ethnicity, expressed emotion, and schizophrenia patients' perceptions of their family members' criticism. J. Nerv. Ment. Dis. 194, 644–649.

Wiedemann, G., Hahlweg, K., Muller, U., Feinstein, E., Hank, G., Dose, M., 2001. Effectiveness of targeted intervention and maintenance pharmacotherapy in conjunction with family intervention in schizophrenia. Eur. Arch. Psychiatry Clin. Neurosci. 251, 72–84.

Wig, N.N., Menon, D.K., Bedi, H., Leff, J., Kuipers, L., Ghosh, A., Day, R., Korten, A., Ernberg, G., Sartorius, 1987. Distribution of Expressed Emotion Components Among Relatives of Schizophrenic Patients in Aarhus and Chandigarh: II. Br. J. Psychiatry, [Erratum appears in Br J Psychiatry 1987 Dec;151:870]. 151, pp. 160–165. https://doi.org/10.1192/bjp.151.2.160.

Yang, L.H., Phillips, M.R., Licht, D.M., Hooley, J.M., 2004. Causal attributions about schizophrenia in families in China: expressed emotion and patient relapse. J. Abnorm. Psychol. 113, 592–602. https://doi.org/10.1037/0021-843X.113.4.592.