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Investigating expressed emotion in individuals at-risk of developing psychosis and their families over 12 months

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Abstract

High levels of expressed emotion (EE) are present in families of individuals with an at-risk mental state (ARMS) of psychosis and can negatively impact on service users' functioning and symptoms, as well as relatives' psychological wellbeing.

Objectives: This is the first longitudinal study to assess EE from the family/carers' perspective, as well as the service users' perceptions of the family/carers' EE. We explored the effects of EE on transition risk and outcomes of depression, worry, and anxiety.

Methods: Questionnaires were completed by 70 ARMS individuals and 70 family/carers at three time points: baseline, 6 and 12 months. All participants completed measures of anxiety, depression, and worry, plus a version of the Family Questionnaire to assess EE.

Results: EE scores reduced over time for both service users and family/carers. High EE perceived by service users at 6 months was associated with higher transition to psychosis at 12 months. High-EE levels at baseline were associated with higher levels of service user depression and family/carer anxiety at 12 months. Higher family/carer total EE scores were associated with less contact with the service user and higher levels of worry.

Conclusions: Novel implications suggest that interventions to reduce high EE in families of people with ARMS would benefit service users by protecting them from higher levels of depression and transition to psychosis. Reducing high-EE attitudes would also benefit the family/carers by reducing levels of anxiety and worry. Family interventions focussing on multiple perceptions of the home environment could help to direct services and prevent negative psychological outcomes for all family members.

KEYWORDS

expressed emotion, families, high risk, psychosis, randomized control trial, transition

KEY ABBREVIATIONS: ARMS, at-risk mental state; EE, expressed emotion; EOI, emotional-over-involvement; FQ, Family Questionnaire for relatives; FQi, Family Questionnaire for service users.

1 | INTRODUCTION

Individuals with an at-risk mental state (ARMS) of psychosis fall into at least one of the following groups based on the nature of their vulnerability to psychosis: family vulnerability, attenuated psychotic symptoms (subclinical psychotic symptoms), or brief limited intermittent psychotic symptoms (full-blown psychotic symptoms that resolve themselves spontaneously within a week). Approximately 20% of individuals transition to developing psychosis in the first year, steadily increasing over subsequent years, and 40% continue to meet ARMS criteria after 6 months (Tor et al., 2017). Despite no formal diagnosis, ARMS individuals often experience comorbid psychological conditions including anxiety and depression (Fusar-Poli et al., 2014). Depression is a principal concern for ARMS individuals and their families, with service users (SUs) presenting a heightened risk for suicide (Andriopoulous et al., 2011). In England, recommended intervention for ARMS includes individual cognitive behavioural therapy (CBT) with or without family intervention (FI, NICE, 2014).

The concept of high-expressed emotion (EE) is one of the most thoroughly investigated psychosocial constructs in mental health literature (Brown et al., 1972). EE is used to quantify the family environment, reflected by a relative's attitude, behaviours, and communication. The construct of EE comprises negative aspects: criticism, hostility, and emotional-over-involvement (EOI) and positive aspects: warmth and positive remarks (Leff & Vaughn, 1985). High-EE carer attitudes, predominantly highly critical and EOI, typically increase when symptoms of psychosis become more apparent (Hooley, 2007) and are strong predictors of relapse in psychosis (Butzlaff & Hooley, 1998; Hooley & Campbell, 2002).

EE has been assessed in various ways from either the perspective of relatives or service user, with the former being the most common approach. The gold standard Camberwell Family Interview (CFI) involves the researcher asking relatives about interactions with the service user and evaluating the family emotional environment based on their answers (Leff & Vaughn, 1985). The CFI is audio-recorded with responses objectively rated using five scales (EOI, warmth, positive remarks, hostility, and criticism). An alternative methodology includes relatives self-reporting on their own EE, for example, the Family Questionnaire (FQ, Wiedemann et al., 2002), which has good concurrent validity with the CFI. Additional methods include measuring EE expressed by the service user and measuring SUs' own perceptions of the relatives' EE. Service user EE has largely been investigated with the two-item self-report Perceived Criticism (PC) Questionnaire (Hooley & Teasdale, 1989), which asks SUs to identify a significant person and rate how "critical" and "disapproving" they think that person is of them. Relatives' and SUs' ratings on the PC are not highly correlated in ARMS populations (Golembo-Smith et al., 2014). This study aims to explore a new version of EE for individuals (FQi) and to examine any differences in predictive validity with the FQ.

Hypothesis 1. Family/carers reported EE and SUs' perceptions of family/carer EE will be moderately but not highly correlated.

Key Practitioner Message

- High expressed emotion rated by service users at 6 months was associated with higher transition to psychosis at 12 months.
- High expressed emotion rated by service users at baseline was associated with higher levels of service user depression at 12 months.
- High expressed emotion rated by family/carers at baseline was associated with higher levels of family/carer anxiety at 12 months.
- The Family Questionnaire for relatives (FQ) and service users (FQi) provides healthcare professionals a quick, accessible method of assessing multiple perceptions of the home environment.
- The assessment of expressed emotion for relatives (FQ) and service users (FQi) could help to guide services in when to provide family intervention for families of ARMS individuals.

This study will investigate EE from both the family/carers' reported EE and the SUs' perception of family/carers' EE. This present study was embedded within a feasibility study (*ethical approval: 16/NW/0278*) investigating combined Individual and Family Cognitive Behavioural Therapy (IFCBT) for people at-risk of developing psychosis (Law et al., 2019). Participants were randomly allocated to either combined IFCBT intervention or enhanced treatment as usual (ETAU). ETAU involved all participants being able to access or continue with their treatment, which often included individual CBT from an Early Intervention Service. The combined IFCBT intervention followed individual CBT from previous studies (French & Morrison, 2004; Morrison et al., 2012), with the FI component involving 4–6 sessions with a key relative, focussing on communication styles, problem solving, and goal setting, following NICE guidelines (, 2014).

FIs in psychosis have been found to reduce high- to low-EE levels and improve SU outcomes and family/carer well-being (Claxton et al., 2017). Constructive communication in response to problems between ARMS individuals and their parent was associated with a decrease in negative symptoms (O'Brien et al., 2008) and enhanced social functioning, whereas conflicting communication was associated with an increase in positive symptoms (O'Brien et al., 2009). Having accessed FI, family/carers of ARMS individuals self-reported increased confidence in their role and learnt new skills and strategies that facilitated more effective communication with the SU (Izon, Berry, et al., 2020). Only one study to date has focussed on EE in families that received intervention for ARMS, the North American Prodrome Longitudinal Study (NAPLS, O'Brien et al., 2014; Miklowitz et al., 2014; O'Brien et al., 2015). This randomized control trial (RCT) compared 18 sessions of family-focused therapy with three sessions of family psychoeducation. O'Brien et al. (2015) investigated changes in EE at multiple time points in a subsample of the NAPLS trial using the PC. At 6 months, there was a significant reduction in both mothers' self-reported criticism and youths' perceived maternal criticism, with change predicting improvements in positive symptoms at 12 months (O'Brien et al., 2015). However, O'Brien and colleague's (2015) study has several limitations: the aforementioned brief two-item PC questionnaire does not account for all EE components, only mothers were represented as the family member and there was over 50% loss to follow-up. Using a more robust design, this study aims to explore longitudinal changes in EE.

Hypothesis 2. Total EE scores (for both SUs and family/carers) will reduce over time across both trial arms. However, there will be a greater average reduction in the IFCBT arm compared with the ETAU arm of the trial.

Preventing or delaying transition to psychosis has been a primary outcome of early intervention. Previous research has suggested that family/carers are better informants than SUs in rating symptoms and would significantly predict conversion to first episode psychosis (FEP, Golembo-Smith et al., 2014). Only two studies to date have analysed the associations between conversion to psychosis and EE status (see Izon et al., 2018). Schlosser et al. (2010) found EE levels were not significantly related to conversion to psychosis; however, the authors suggest the small sample size limits the predictive power. The European Prediction of Psychosis Study (EPOS; Haidl et al., 2018) was a larger study, which investigated the relationship between transition risk and 235 ARMS individuals' perceptions of a relative's EE (measured using the Level of Expressed Emotion [LEE] Questionnaire). This questionnaire consists of four factors (perceived lack of emotional support, perceived irritation, PC, and perceived intrusiveness), which can be combined to give a total score for EE. LEE measurements of “perceived criticism” and “intrusiveness” were non-significant factors in predicting transition at 18 months, but “perceived irritability” and “perceived lack of emotional support” were significant predictors. Although key strengths of this study were the relatively large sample and longitudinal design, it was limited by its sole focus on SUs' perceptions of EE. As previously indicated, EE is typically measured from the relatives' perspectives and as relatives' and as SUs' perceptions are not always highly correlated, it is important to assess both. High-EE carer attitudes have been associated with more visible symptoms of psychosis; therefore, we expect high-EE to increase transition likelihood within the ARMS population. Considering the dearth of research on EE and transition, this study aimed to investigate both individual and family/carer perspectives of EE in the ARMS population.

Hypothesis 3. High-EE groups (ratings from SUs and family/carers) across the baseline data will have a higher transition rate than low-EE groups at follow-up. *Note*. High/low-EE have been defined by a cut-off on the EE measure; further details can be found in the measures section of the methods.

ARMS individuals experience higher levels of family conflict compared with other adolescents with symptoms of psychopathology (Salinger et al., 2018). A recent systematic review of EE in the ARMS population (Izon et al., 2018) found high levels of criticism, hostility, warmth, and EOI among family members, with levels of high-EE like those found in FEP studies. The review concluded that greater levels of criticism and hostility in relatives were associated with more long-term distressing symptoms and poorer functioning in ARMS individuals. High criticism and EOI were strongly associated with levels of anxiety and depression for both relatives and SUs (Domínguez-Martínez et al., 2014; Domínguez-Martínez et al., 2017). Previous studies have predominately been cross-sectional, and therefore, this longitudinal study aims to explore the effect of EE on the levels of depression, anxiety, and worry of the ARMS population and their family.

The mental well-being of families of ARMS is also an important outcome and likely to play a role in EE. Early psychosis caregivers often have heightened risk of psychological distress and more negative caregiving appraisals compared with family members of individuals who experience enduring psychosis (Martens & Addington, 2001). Many family/carers experience challenges themselves, including mental distress, busy lifestyles, whilst caring for other family members (Izon, Au-Yeung, & Jones, 2020). Experiences of ARMS family/carers include worry and distress, which can impact on their own well-being, appraisal of the SUs' symptoms, and communication with the SU (Izon et al., 2019). A longitudinal qualitative study found family/carers of ARMS continued to experience high levels of worry after 12 months (Izon, Berry, et al., 2020).

High levels of criticism and EOI attitudes (high-EE) may represent a maladaptive attempt from family members trying to cope with the stress of caring (Álvarez-Jiménez et al., 2010). Relatives' criticism more consistently relates to burden and appraised stress from the current situation (Hinojosa-Marqués, Domínguez-Martínez, Kwapil, & Barrantes-Vidal, 2019), whereas EOI associates with concern and worry for ARMS individuals (Meneghelli et al., 2011). This is important when considering manifestations of EE attitudes are associated with relatives' perception of loss, which can be mediated by anxiety (Hinojosa-Marqués, Domínguez-Martínez, Sheinbaum, et al., 2019). A recent study found relatives' psychological distress and negative emotional representation of the condition (fear, worry, or anger of early psychosis) predicted criticism and EOI at 6 months better than individuals' symptoms (Hinojosa-Marqués et al., 2020). In addition to relatives' anxiety and negative emotional representation of the disorder, attributions of blame to the individual predicted EE criticism at baseline. In contrast, relatives' anxiety, negative emotional representation of the disorder, and attributions of control predicted high-EE-EOI, both at baseline and follow-up assessments. Understanding the components that comprise and maintain high-EE attitudes would help to guide services in shaping interventions for families and caregivers of ARMS individuals. This study aims to investigate how self-perceived EE effects both SUs' and relatives' mental health over 12 months.

Hypothesis 4. Total EE scores (ratings from SUs and family/carers) will be positively associated with SU and family/carer own baseline anxiety, worry, and depression levels. High-EE groups (ratings from SUs and family/carers) across the baseline data will have higher anxiety, worry, and depression than low-EE groups at follow-up.

ARMS individuals are typically identified in early adolescence and therefore predominately live at home with their families. Meneghelli et al. (2011) found ARMS SUs with high-EE caregivers were on average younger, had higher contact with their caregivers, and were more likely to live together compared to low-EE caregivers. ARMS individuals are at the earlier stages of the condition, with no formal diagnosis and with families often expressing a misunderstanding of the symptoms (Izon et al., 2019) and perceived loss (Hinojosa-Marqués, Domínguez-Martínez, Sheinbaum, et al., 2019). This study aimed to explore associations between caregiver–SU contact time and high-EE.

Hypothesis 5. Total EE scores (ratings from SUs and family/carers) will be positively associated with more contact time between the family/carers and SUs at baseline.

In summary, varying methodologies have been used to assess EE and outcomes for SUs and their families in the ARMS population (Izon et al., 2018). Studies measuring changes in EE over time typically use the PC measure. Much of the literature investigating EE outcomes comes from relatives' perspectives. Measuring multiple perceptions provides a more reliable and valid outcome of the family environment. It provides a greater understanding of how EE interacts with transition to psychosis and associated outcomes for the ARMS population and their families. The fact that the recommended intervention for ARMS individuals is CBT "with or without" FI (NICE, 2014) provides further rationale for understanding more about the individuals' perceptions of family/carers' EE.

2 | METHODS

2.1 | Participants

Participants in the trial included 70 dyads of ARMS SUs and their family/carers. See Table 1 for baseline characteristics. Inclusion criteria for SUs were aged 16–35, help-seeking, meeting criteria on the Comprehensive Assessment of At-Risk Mental States of psychosis (CAARMS; Yung et al., 2005), and living with or in regular contact with family, carers, or loved ones (we use the term "family/carer" throughout this article). Exclusion criteria were receipt of an antipsychotic medication to treat symptoms of psychosis, insufficient fluency in English, significant risk to self or others, organic impairment, and moderate–severe learning disability. Family/carers were nominated as the most significant person by the SU on entry into the trial. They provided verbal consent to take part in the IFCBT intervention if the SU was randomized to the treatment arm. There were no exclusion criteria for family/carers.

TABLE 1 A summary of the descriptive characteristics of service users with at-risk mental state (ARMS) of psychosis and their family/carer at baseline (entry into the trial)

	Service user	**Family/carer**
	***N* (%) or *M* (*SD*)**	***N* (%) or *M* (*SD*)**
Variables of interest	***N* = 70**	***N* = 70**
Group of ARMS (*N*, %)		
Attenuated psychotic symptoms	56 (80%)	-
Family vulnerability to psychosis	3 (4.3%)	-
Mixed[a]	11 (15.7%)	-
Treatment[b] (*N*)		
IFCBT: ETAU	36: 34	36: 34
Age		
Mean	22.2 (4.9)	42.1 (13.5)
Range (years)	16–35	17–67
Gender (*N*, %)		
Males	42 (60%)	16 (22.9%)
Females	28 (40%)	54 (77.1%)
Ethnicity (*N*, %)		
White British	61 (87.14%)	65 (92.85%)
Mixed	4 (5.71%)	2 (2.86%)
Asian	3 (4.29%)	1 (1.43%)
Other	2 (2.86%)	2 (2.86%)
Family/carer (*N*, %)		
Parent	-	43 (61.4%)
Other relative	-	3 (2.9%)
Partner	-	18 (25.7%)
Friend or other (e.g., neighbour)	-	6 (5.7%)
Frequency of contact[c] (hours past month) direct contact		
Mean	-	102.6 (76.97)
Medium	-	96.0 (76.97)
Indirect contact		
Mean	-	25.5 (40.26)
Medium	-	8.00 (40.26)
Overall contact		
Mean	-	128.1 (97.56)
Medium	-	112.54 (40.26)

Abbreviations: ETAU, enhanced treatment as usual; IFCBT, combined individual and family cognitive behavioural therapy (CBT) intervention; *M*, mean; *N*, number; *SD*, standard deviation.

[a] A service user that fell into two of the ARMS groups, for example, brief limited intermittent psychotic symptoms and attenuated psychotic symptoms.

[b] Participants were randomly allocated to either combined individual and family CBT intervention (IFCBT) or enhanced treatment as usual (ETAU).

[c] Information about frequency contact was available only for *n* = 49.

2.2 | Procedures

SUs and family/carers participating in the RCT each completed all measures outlined below at three time points: baseline, 6- (post-intervention), and 12-month follow-up. See Table 2 for the assessment schedule and measures of interest.

2.3 | Measures

2.3.1 | Clinical status

SUs' clinical status was rated with the CAARMS (Yung et al., 2005), which was used to differentiate ARMS groups at baseline and follow-up. In addition, the CAARMS identified individuals who had transitioned to FEP and those who no longer met ARMS criteria at follow-up.

2.3.2 | Expressed emotion

EE was assessed with the FQ (Wiedemann et al., 2002), which is a 20-item self-report measure ($\alpha = .99$, $n = 70$) with two subscale: 10 items assessing criticism ($\alpha = .99$) and 10 items assessing EOI ($\alpha = .99$). The FQ is a self-report measure of relatives' own EE. We adapted the measure for SUs to complete to understand their perceptions of their relatives' EE (FQi). For example, on the FQ, "I tend to neglect myself because of him/her" was replaced with "They tend to neglect themselves because of me" on the FQi. There was high internal consistency for the FQi overall score ($\alpha = .87$, $n = 70$) and subscales criticism ($\alpha = .86$) and EOI ($\alpha = .81$).

The FQ cut-off points for high critical comments and high EOI are 23 and 27, respectively, which correlate highly with the CFI, with a 74% agreement of classifications (Wiedemann et al., 2002). Total scores for the FQi were calculated, as well as high/low-EE, which were categorized according to Wiedemann et al. (2002). The FQ has a better agreement with the CFI on EOI than other EE measures and is labour saving (Wiedemann et al., 2002).

2.3.3 | Contact time

Family/carers reported the amount of direct, indirect, and overall contact (hours) that they had with the SU over the previous month.

The measures underneath were applied in both SUs and family/carers samples.

2.3.4 | Depression

The 21-item Beck Depression Inventory (BDI-II, Beck et al., 1996) was used to measure symptoms of depression. Scores range from 0 (*normal/minimal*) to 63 (*severe depression*). There was high internal consistency for total BDI score ($\alpha = .96$, $n = 138$).

2.3.5 | Anxiety

The 20-item Social Interaction Anxiety Scale (SIAS, Mattick & Clarke, 1998) was used to measure symptoms of anxiety. Scores range from 0 to 80, with higher scores indicating more discomfort or social anxiety. There was high internal consistency for total SIAS score ($\alpha = .93$, $n = 138$).

2.3.6 | Symptoms of worry

The 16-item Penn State Worry Questionnaire (PSWQ, Meyer et al., 1990) was used to capture the generality, excessiveness, and uncontrollability dimensions of pathological worry. Scores range from 16 to 80, with higher scores reflecting greater levels of worry. There was high internal consistency for total PSWQ score ($\alpha = .92$, $n = 46$).

2.4 | Statistical analysis

We conducted analysis using SPSSv25. Total scores on all measures were prorated by averaging the available items for each participant when less than 20% of items were missing. Less than 10% of the overall data set was prorated. Data distributions were inspected for normality. Participants in the two treatment arms were compared in terms of demographic variables and outcome measures using *t* tests.

TABLE 2 Assessment schedule for measures in the current study

	Baseline		6 months		12 months	
Measure	Service user (*N*)	Family/carer (*N*)	Service user (*N*)	Family/carer (*N*)	Service user (*N*)	Family/carer (*N*)
CAARMS	*70*	-	*57*	-	*58*	-
FQ/FQi	*70*	*69*	*57*	*53*	*53*	*52*
SIAS	*69*	*69*	*57*	*53*	*50*	*47*
PSWQ[a]	*23*	*23*	*34*	*30*	*50*	*46*
BDI	*69*	*69*	*57*	*54*	*53*	*51*

Note: Adapted from Law et al. (2019).

Abbreviations: BDI, Beck Depression Inventory; CAARMS, Comprehensive Assessment of At-Risk Mental States; FQ, Family Questionnaire for relatives; FQi, Family Questionnaire for service users; PSWQ, Penn State Worry Questionnaire; SIAS, Social Interaction Anxiety Scale.

[a] PSWQ at baseline was relatively small as the measure was added 19 months into the study.

Pearson's correlations were conducted to assess the correlation between family/carers reported EE and SUs' perceptions of family/carers' EE. Mixed measures ANOVAs were conducted to investigate how total EE scores changed over time across both trial groups for SUs and family/carers. Logistic regression was performed to assess the impact of high-/low-EE on the likelihood that an SU would transition to psychosis, whilst controlling for the treatment arm. Pearson's correlations were conducted to assess the associations between SU and family/carer total EE, anxiety, worry, depression, and contact time at baseline. Mixed-method ANOVAs were conducted to investigate associations between low-/high-EE at baseline with anxiety, worry, and depression at 6- and 12-month follow-ups for SUs and family/carers. Post hoc tests were used to investigate significant differences.

3 | RESULTS

3.1 | Sample characteristics

The majority of SUs were male and had attenuated psychotic symptoms. They typically lived with a parent (62.9%), friends, or other relatives (10%), whereas over a quarter lived alone (27.1%). Most of the family/carers were parents, specifically White, British mothers aged 40 years (see Table 1).

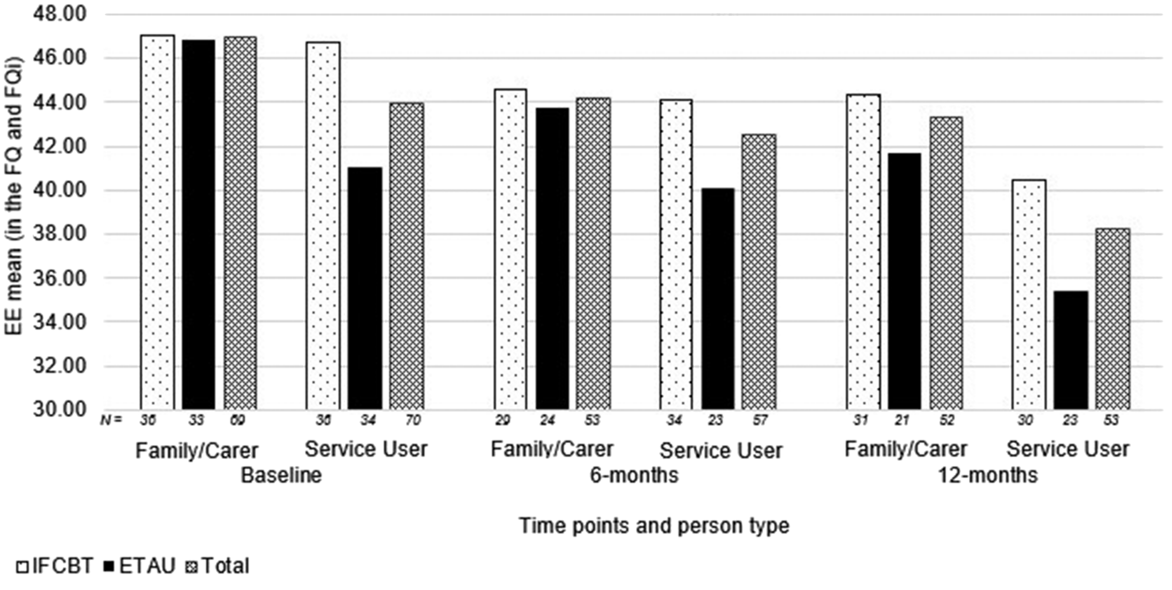
Thirty-four SUs and their family/carers were allocated to ETAU and 36 allocated to the IFCBT treatment arm. Baseline group comparisons showed no significant differences between treatment arms (IFCBT or ETAU) in variables other than EE. Independent sample *t* tests for baseline EE showed a significant mean difference (5.75) for SUs with the IFCBT arm scoring higher than ETAU, *t*(68) = 2.46, *p* = .016.

Of the original 70 dyads, 57 SUs (81%) and 54 family/carers (77%) completed 6-month follow-up measures. At 6 months, 10 SUs transitioned to FEP. There were no differences in sample characteristics for both SUs and family/carers who did and did not complete 6-month follow-up measures.

Fifty-six SUs (80%) and 52 family/carers (74%) completed 12-month follow-up measures. A further four transitioned to FEP. The total number of transitions to FEP within the 12-month trial was 14 (24%). SUs who did not take part at 12-month follow-up (*M* = 49.07, *SD* = 7.95) reported significantly higher average baseline EE scores, *t*(68) = −2.17, *p* = .034, compared with those that did engage at follow-up (*M* = 42.68, *SD* = 10.26).

3.1.1 | Hypothesis 1: Family/carers reported EE and SUs' perceptions of family/carer EE will be moderately but not highly correlated

There was a statistically significant positive correlation between FQ and FQi total scores at baseline (*r* = .46, *p* = .001, *n* = 69), meaning that EE levels were moderately correlated (Evans, 1996).



Abbreviations. IFCBT = Individual Cognitive Behavioural Therapy and Family Intervention; ETAU = enhanced treatment as usual; FQ = Family Questionnaire for relatives; FQi = Family Questionnaire for service users.

This graph displays the mean EE scores from family/carers and service users using the FQ and FQi respectively. There is a further breakdown of treatment allocation for the IFCBT and the ETAU arms of the trial, as well as a total for each person type at the three time points.

FIGURE 1 Service user and family/carer mean expressed emotion (EE) respective of their group allocation at all three time points

3.1.2 | Hypothesis 2: Total EE scores (for both SUs and family/carers) will reduce over time across both trial arms. However, there will be a greater average reduction in the IFCBT arm compared to the ETAU arm of the trial

We explored changes in EE using the FQi and FQ (see Figure 1).

Service users

A mixed-measure ANCOVA was conducted to control for the aforementioned significant mean difference for SUs' baseline total EE scores. There was a significant effect of time but not between treatment groups, nor interaction with time, $F(2,141.16) = 5.53$, $p = .005$. Post hoc tests using the Bonferroni correction revealed significant reductions in FQi scores between baseline and 12 months ($p = .001$) and 6 and 12 months ($p = .002$), however, no significant differences between baseline and 6 months ($p = 1.00$).

Family/carers

There was a significant time effect but not between treatment groups, nor interaction with time, $F(2,172.92) = 5.94$, $p = .004$. Post hoc tests using the Bonferroni correction revealed significant reductions in FQ scores between baseline and 6 months ($p = .041$) and baseline and 12 months ($p = .012$), however no significant differences between 6 and 12 months ($p = 1.00$).

3.1.3 | Hypothesis 3: High-EE groups (ratings from SUs and family/carers) across the baseline data will have a higher transition rate than low-EE groups at follow-up

Service users

High-EE at baseline was not associated with higher transition rate at 6 or 12 months; however, high-EE at 6 months was associated with higher transition rate at 12-month follow-up (see Table 3).

Family/carers

Family/carer high-EE was not associated with higher transition rate at follow-up (see Table 3).

3.1.4 | Hypothesis 4: Total EE scores (ratings from SUs and family/carers) will be positively associated with SU and family/carer own baseline anxiety, worry and depression. High-EE groups at baseline will have higher anxiety, worry, and depression than low-EE groups at follow-up

Service users

Baseline. There was a weak but significant positive correlation between anxiety scores and FQi total scores, which was replicated

TABLE 3 Summary of regression analysis for expressed emotion (EE) variables associated with transition to psychosis at follow-up for service users and family members

Variable	R^2	*B*	*SE B*	*β*	95% CI	*p*
Outcome: transition to psychosis at 6-month follow-up						
Service user (*N* = 57)	.019					
Baseline EE		.013	.039	1.013	.939, 1.093	**.742**
Treatment allocation		−.633	.796	.531	.112, 2.526	**.427**
Family/carer (*N* = 56)	.031					
Baseline EE		−.026	.033	.974	.913, 1.040	**.436**
Treatment allocation		−.468	.757	.626	.142, 2.759	**.536**
Outcome: transition to psychosis at 12-month follow-up						
Service user (*N* = 58)	.005					
Baseline EE		−.014	.033	.986	.924, 1.053	**.683**
Treatment allocation		−.017	.656	.983	.272, 3.559	**.979**
Family/carer (*N* = 57)	.033					
Baseline EE		−.034	.030	.967	.911, 1.026	**.262**
Treatment allocation		−.017	.630	.983	.286, 3.376	**.978**
Outcome: transition to psychosis at 12-month follow-up						
Service user (*N* = 54)	.132					
6-months EE		1.471	.689	4.353	1.127, 16.808	**.033***
Treatment allocation		.030	.688	1.030	.267, 3.972	**.965**
Family/carer (*N* = 48)	.024					
6-months EE		.595	.686	1.813	.473, 6.951	**.385**
Treatment allocation		−.213	.690	.808	.209, 3.126	**.757**

*$p < .05$.

with FQi EOI and criticism subscales. No other correlations between EE and symptoms were statistically significant (See Table 4).

Follow-ups. A mixed measures ANCOVA was conducted to control for the significant mean difference in baseline EE scores. There was no statistically significant difference in depression between high- and low-EE groups at 6 months, $F(1,715.63) = 3.97$, $p = .052$, partial $\eta^2 = .078$, but there was at 12 months, $F(1,1483.58) = 8.37$, $p = .006$, partial $\eta^2 = .15$. The partial eta squared represents a large effect size (Richardson, 2011) meaning SUs with high-EE at baseline had higher levels of depression at 12 months. No significant differences were found between baseline high-/low-EE and measures of worry or anxiety at 6 and 12 months.

Family/carers

Baseline. There was a weak but significant positive correlation between anxiety scores and FQ total scores, which was replicated with the FQ EOI and criticism subscales. There was moderate–strong positive correlation between worry and FQ total scores, which was also replicated with the FQ subscales. No other correlations between EE and symptoms were statistically significant (See Table 4).

Follow-ups. There was no statistical significance difference in anxiety between high- and low-EE groups at 6 months, $F(1,39.59) = .63$, $p = .43$, partial $\eta^2 = .015$, but there was at 12 months, $F(1,242.57) = 4.66$, $p = .037$, partial $\eta^2 = .11$. The partial eta squared represents a medium–large effect size (Richardson, 2011) meaning family/carers with high-EE at baseline had higher levels of anxiety at 12 months. No significant differences were found between baseline EE scores and measures of worry or depression at 6 and 12 months.

3.1.5 | Hypothesis 5: Total EE scores (ratings from SUs and family/carers) will be positively associated with more contact time between the family/carers and SUs at baseline

There was statistically significant but weak negative correlation between the FQ subscales of criticism and indirect contact and overall contact time (the past month). No other correlations between EE measures and contact time were statistically significant. There was however a medium–strong negative correlation between the subscales of family/carer worry and direct, indirect, and contact time (See Table 4).

4 | DISCUSSION

The current study explored longitudinal effects of EE, SU transition to FEP, and symptoms of distress for both SUs and family/carers. The authors will discuss the findings in accordance with each aim and prior research.

This study aimed to explore a new version of EE for individuals (FQi) and to examine any differences in predictive validity with the FQ. As hypothesized, we found a moderate correlation between the baseline total mean scores of the FQ and FQi. In comparison with other EE measures, the FQi provides an individual SU perspective on EE, which can be used alongside a version for relatives. SUs may be more aware of the family/carer critical comments and EOI than the family/carer themselves. The adapted measure took under 5 min to complete and was highly acceptable to SUs as evidenced by high completion rates of those seen at 6- and 12-month follow-up. Assessing EE at multiple time points across both SUs and their family/carers is useful for our understanding of symptoms and outcomes for ARMS SUs and their families. Understanding the perceptions of the

TABLE 4 Pearson correlations among measures for ARMS service users and their family/carers at baseline

	1	2	3	4	5	6	7	8	9
1. Criticism	-	-	-	–.30*	–0.21	–.29*	.53**	0.12	.25*
2. EOI	-	-	-	–0.18	–0.14	–0.18	.65**	–0.00	.27*
3. Overall EE	-	-	-	–0.28	–0.20	–0.27	.66**	0.07	.29*
4. Indirect contact	–0.04	–0.16	–0.11	-	-	-	–.45*	0.16	–0.09
5. Direct contact	0.04	0.06	0.06	-	-	-	–.42*	–0.06	0.02
6. Total contact	0.02	–0.02	0.00	-	-	-	–.58*	0.02	–0.02
7. Worry	0.15	0.41	0.33	0.28	0.13	0.26	-	0.03	.57**
8. Depression	0.02	0.02	0.02	–0.06	0.19	0.12	–0.08	-	0.07
9. Anxiety	.29*	.25*	.32**	0.04	0.04	0.05	.54**	0.09	-

Note. Correlations for service users ($n = 70$) are to the left of and below the diagonal. Correlations for family/carers ($n = 70$) are to the right and above the diagonal. Correlations between subscales and the measure have not been included in this table. The amount of direct, indirect, and overall contact (hours) with the service user over the previous month.

Abbreviations: BDI, Beck Depression Inventory; EE, expressed emotion; EOI, emotional-over-involvement; FM, family member/carer; FQ, Family Questionnaire for relatives; FQi, Family Questionnaire for service users; PSWQ, Penn State Worry Questionnaire; SIAS, Social Interaction Anxiety Scale; SU, service user.

**Correlation is significant at the 0.01 level (two-tailed).

*Correlation is significant at the 0.05 level (two-tailed).

environment from both perspectives enables healthcare providers to create a more enriched formulation and provide more holistic support.

The study investigated longitudinal changes in EE. In line with the study hypothesis, there were significant reductions in EE scores at follow-up, yet no reported differences between treatment arms (IFCBT or ETAU). Similar to previous findings (O'Brien et al., 2015), criticism significantly decreased over time. The overall reduction in criticism across both groups may be due to spontaneous reductions that occur with the passage of time with an adjustment to SUs' symptoms or the family atmosphere. Both family/carers and ARMS individuals expressed unsettled lifestyles and changes, impacting on their own well-being, family setting, and engagement with services (Izon, Au-Yeung, & Jones, 2020). The authors suggest that high-EE ARMS individuals and their family/carer may be more likely to disengage from services. Possible explanations for the non-significance between the therapy and ETAU arms could be due to the varied number of FI sessions across participants or FI not always addressing the high level of family/carer worry. In addition, the study did not report on families in the ETAU arm who received FI, in accordance with the NICE guidelines (, 2014). Future research should investigate a larger sample with a more detailed and structured FI component.

Only two studies have previously investigated associations between conversion to psychosis and EE status. This study aimed to explore the relationship between the concepts from both SU and family/carer perspective. Contrary to the hypothesis, baseline high-EE was not associated with increased transition to psychosis. However, at 6 months, SUs' high-EE perceptions of family/carers were associated with higher transition. Our novel findings may suggest that prolonged high-EE attitudes perceived by SUs may be important in ARMS transition after 12 months. This supports previous research suggesting that family/carer perspective of EE is unrelated to transition (Schlosser et al., 2010) and the importance of the SUs' perceptions of EE in increasing risk of transition to psychosis at 18 months (Haidl et al., 2018). However, our findings contrast to Haidl et al. (2018) EPOS study, which found “perceived irritability” and “perceived lack of emotional support” were significant predictors but not EE. These differences may be linked to the contrasting study designs: The EPOS study was observational, involving a culturally diverse European population, whereas the current study involved an intervention with a population from North West England. Considering the limited number of studies that have analysed the associations between conversion to psychosis and EE status, further research is necessary.

This study explored how self-perceived EE effects both SUs' and relatives' mental health over 12 months. Significant small positive correlation was found between SUs' total EE scores and their anxiety. The findings support previous literature where high criticism and EOI were strongly associated with levels of anxiety and depression for SUs (Domínguez-Martínez et al., 2014; Domínguez-Martínez et al., 2017). In contrast to Domínguez-Martínez et al.'s (2014) findings, EE and depression did not correlate. This finding was also true for family/carers. Although, mild–moderate average scores for family member depression in this study replicated other EE studies in the ARMS population (Hamaie et al., 2016; Welsh & Tiffin, 2015). This may be due to the intervention element of the study and participants' emotion state lifted and feeling relieved with reduced concerns having entered services or offered psychological intervention. We found high-EE reported by SUs at baseline was however associated with higher levels of depression at 12 months. ARMS individuals often experience comorbid undiagnosed depression (Fusar-Poli et al., 2014) and present at a heightened risk for suicide (Andriopoulous et al., 2011). These symptoms combined with family/carers' long-term worry for SUs (Izon, Au-Yeung, & Jones, 2020) and perceived high-EE from SUs may explain higher depression for ARMS individuals at 12 months.

The finding that family/carers' EE correlated with their anxiety and worry replicates previous studies (Domínguez-Martínez et al., 2014; Domínguez-Martínez et al., 2017; Meneghelli et al., 2011). The high-EE group at baseline had higher family/carer anxiety levels compared with the low-EE group at 12 months. This study complimented Hinojosa-Marqués et al.'s (2020) finding that relatives' psychological distress and negative emotional representation of the condition (fear, worry, or anger) predicted criticism and EOI at 6 months. Family/carers may not understand the experiences of ARMS individuals when they first enter services and express higher levels of concern (Izon et al., 2019; Izon, Au-Yeung, & Jones, 2020) and experience perceived loss (Hinojosa-Marqués, Domínguez-Martínez, Sheinbaum, et al., 2019). The exacerbated levels of worry may cause feelings of responsibility and uncertainty to whether they were doing or saying the right things (Coker et al., 2016; Izon et al., 2019; Kumar et al., 2019), which may lead to family/carers being more critical and overprotective. Understanding the longevity of anxiety experienced by family/carers that maintain EE attitudes would aid services in shaping interventions.

This study aimed to explore associations between caregiver–SU contact time and high-EE. Less contact increased family/carer worry, whereas specifically less indirect and overall contact was associated with increased family/carer criticism. These findings reject the hypothesis and contradict the psychosis literature. Increased contact between SUs with psychosis and critical caregivers strongly predicts relapse, rehospitalization, and poorer outcomes of all family members (Butzlaff & Hooley, 1998; Hooley & Campbell, 2002). The surprising findings may be due to over a quarter of SUs living alone and therefore spending less time with their parents (Friedlmeier & Granqvist, 2006). This may be on account of their age, challenging experiences, drop in functioning, and not wanting to worry them. SUs who feel criticized and rejected often defend themselves by distancing from their families (Khaleque & Rohner, 2002). Parents remain confused, uncertain, worried, and waiting for service involvement (Izon et al., 2019). Hinojosa-Marqués et al. (2020) reported that relatives' anxiety and negative emotional representation of the condition and attributions of blame to the individual predicted EE criticism at baseline, which may be enhanced when they have less SU contact.

4.1 | Limitations and future research recommendations

This was a convenience sample of those taking part in a longitudinal, feasibility RCT, the IFCBT trial. Whilst randomization was not stratified on SUs' EE, the significant difference between the arms at baseline is a deficiency in the design. The number of SUs who transitioned to psychosis was small, thus limiting the power for the effect of IFCBT analysis, albeit this was very comparable with recent research (Fusar-Poli et al., 2012; Golembo-Smith et al., 2014). The study warrants further replication into a larger data set to analyse the effect of an FI on the relationship between levels of EE and clinical outcomes. The sample also consisted of mainly White British parents, therefore, the findings may not be generalisable to all culture and relationships. Future research could look at a larger, cross-cultural longitudinal study to predict transition and long-term family/carer and SU outcomes.

The FQi is not validated; however, the authors found high internal validity and significant moderate correlation with the FQ. It is important to note that both the FQ and FQi focus on negative aspects of criticism and EOI. A recent review highlights the importance of warmth, positive remarks, and optimal family involvement in improving functioning and reducing symptoms (Izon et al., 2018). Therefore, future research should investigate how positive aspects of EE change over time in relation to symptoms and transition outcomes.

The study looked at outcomes of depression, anxiety, and worry. We found an association between worry and EE; however, high-EE was not associated with worry over time. The sample of SUs and family/carers who completed the PSWQ at baseline was relatively small as the measure was added 19 months into the study. EOI has been associated with positive and negative effects on outcomes in ARMS (Schlosser et al., 2010). Worry may mediate the relationship between high-EE (EOI) attitudes and families' health outcomes. Understanding how worry, health outcomes, and EE interact over time would be important for services.

Despite the limitations, the study had many strengths: Both SUs and family/carers reported on the family environment, which provided a more comprehensive assessment of EE. The longitudinal design enabled changes in EE, criticism, and EOI components to be investigated over time.

4.2 | Clinical implications

Understanding the family environment and having the ability to assess it from both the SU and family/relative perspective is important for services. Clinicians would have a quick, easy method for assessing high/low-EE from both perspectives. The assessment could also help to guide services in providing FI to families with the greatest need when resources may restrict them from providing FI to all ARMS families. EE environments can be positively associated with high levels of worry and anxiety for family/relatives, with prolonged high-EE associated with higher transition to psychosis, higher family/carer anxiety, and higher ARMS SU depression. Early involvement of family/relatives in the SUs' care can help reduce EE attitudes from both the SU and family/carer perspective. Low levels of contact with SUs were associated with higher levels of EE and worry. When feasible, services should look to involve family/carers to help reduce their worry, by providing an opportunity for all relatives to express their perceptions of the home environment.

5 | CONCLUSION

The study found moderate correlation between the FQ and a version that had internal consistency and adapted for ARMS SUs (FQi). In the context of the research trial, there was a significant time effect for both SUs and their family/carer but non-significant effect of treatment or treatment time interaction. Novel findings were that prolonged high-EE post-6 months was associated with higher transition to FEP at 12 months. High-EE at baseline was associated with higher levels of depression for SUs and higher levels of anxiety for family/carers at 12 months. Higher total EE reported by family/carers was associated with less contact with SUs and higher levels of worry for them. Involvement of family/carers in FI would help reduce worry, critical, and EOI attitudes and increase their contact time with the SU. Involving important family/carers in FI and focussing on high-EE perceptions of all family members may reduce transition risk and improve long-term outcomes.

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CONFLICT OF INTEREST

We have no conflict of interest to disclose.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICAL STANDARDS

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

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