How does longitudinally measured maternal expressed emotion affect internalizing and externalizing symptoms of adolescents from the general community?

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Background: In previous studies, maternal expressed emotion (EE) has been found to be a good predictor of the course of adolescent internalizing and externalizing symptoms. However, these studies have been cross-section as opposed to longitudinal. The goal of this study is to examine longitudinal data of perceived maternal EE and adolescent internalizing and externalizing symptoms to determine if maternal EE affected the course of adolescent symptoms (a parent effect model), or if the course of adolescent symptoms affected maternal EE (a child effect model), or if maternal EE and adolescent symptoms affected one another bidirectionally. **Methods:** Dutch adolescents ($N = 497$; 57% boys; $M = 13$ years) from the general community and their mothers were prospectively studied annually for three years. At all waves the mothers completed the Level of Expressed Emotion (LEE) questionnaire and the adolescents completed self-rated measures of internalizing and externalizing symptoms. Structural equation modeling (SEM) was used to analyze the longitudinal data. **Results:** The results of the SEM analyses clearly demonstrate that a child effect model best describes the relationship between maternal EE and the course of adolescent internalizing and externalizing symptoms. **Conclusions:** This longitudinal study of the mothers' EE perceptions suggests that it is the course of the internalizing and externalizing symptoms of adolescents from the general community that affects maternal EE, and not the mothers' perceived EE influencing the course of the adolescents' symptoms. Since this study was based on adolescents from the general community, it is suggested that these findings should also be replicated in clinical samples of adolescents. **Keywords:** Adolescents, expressed emotion, mother, longitudinal, perception. **Abbreviation:** EE: expressed emotion.

In the study of the effects parents have on adolescent psychopathology, one prominent line of research has been the study of maternal expressed emotion. Expressed emotion (EE) is a measure of the emotions expressed by a mother to her adolescent child. While EE was originally designed to study the relationship between adult psychiatric patients' relapse with their family members, recent EE research such as Wedig and Nock (2007) have reasoned that, since the psychopathological disorder symptoms displayed by children and adolescents first occur when they are living with their parents, parents' high EE might be an important factor in the (further) development of psychopathological symptoms. Two child and adolescent mental disorder categories that have received increased attention in recent EE studies are internalizing and externalizing problem behavior symptoms.

With respect to internalizing problem behavior symptoms, it has been found that high parental EE is predictive of the course of a child's internalizing

symptoms (Asarnow, Tompson, Hamilton, Goldstein, & Guthrie, 1994; Hirshfeld, Biederman, Brody, Faraone, & Rosenbaum, 1997). In a study by Asarnow, Tompson, Woo, and Cantwell (2001), the authors suggested that the relationship between children's internalizing symptoms and parental EE criticism may be bidirectional in nature; each party reinforces the negative behavior in the other.

High EE has also been related to externalizing problem behavior symptoms. In recent EE studies of children, it has been found that high parental EE predicted externalizing symptoms of girls (Peris & Hinshaw, 2003) and boys (Psychogiou, Daley, Thompson, & Sonuga-Barke, 2007); findings similar to previous EE studies of children and adolescents (e.g., Stubbe, Zahner, Goldstein, & Leckman, 1993; Vostanis, Nicholls, & Harrington, 1994). Hence, much like the case with the relationship between high parental EE and child internalizing symptoms, researchers such as Peris and Hinshaw (2003) have suggested that this association between parental EE and child externalizing symptoms might be a bidirectional relationship, with parents' EE and

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children's externalizing problem behaviors influencing one another.

While the above-mentioned studies of parental EE primarily used cross-sectional designs (i.e., conducting only one measure of EE at Time 1 to predict a future measurement of child internalizing and externalizing behavior symptoms at Time 2), two notable exceptions are longitudinal EE studies by Peris and Baker (2000) and Hastings, Daley, Burns, and Beck (2006). Both used the Five Minute Speech Sample (FMSS) to measure maternal EE and both studies measured maternal EE twice. Peris and Baker (2000) found that maternal EE, measured when the children were preschoolers, was predictive of attention deficit/hyperactivity disorder (ADHD) symptoms when these children were in third grade. However, in a more recent longitudinal study by Hastings et al. (2006) the researchers did not find a longitudinal relationship between maternal EE and child and adolescent externalizing symptoms.

All of the aforementioned studies of EE and childhood internalizing and externalizing behavior symptoms have been conducted with either the semi-structured Camberwell Family Interview (CFI; Leff & Vaughn, 1985) or the shortened alternative EE interview, the Five Minute Speech Sample (FMSS; Magaña et al., 1986). In a review of the measurement of EE, Hooley and Parker (2006) noted that while the CFI is the golden standard measurement for EE assessment, it is also a lengthy instrument that takes 1–2 hours to conduct the interview and 2–3 hours to code the results from the interview. There is also extensive training required for CFI coding. The FMSS, in contrast, requires the interviewed person to speak about the patient for five minutes, uninterrupted, and Hooley and Parker (2006) noted that this alternative interview has gained much prominence in the field of child psychopathology research. While the FMSS is clearly less time-consuming to administer, it does require more time to code (approximately 20 minutes) than a questionnaire and, like the CFI, requires formal training.

Since both the CFI and, to a lesser degree, the FMSS are time-consuming and require formal training, researchers have explored alternative and concise measures of EE. In a review of the literature, Van Humbeeck, Van Audenhove, Pieters, De Hert, and Storms (2002) identified nine such measures. In a later review of the literature, Hooley and Parker (2006) found that only three of the measures have been validated against the CFI: the Level of Expressed Emotion questionnaire (LEE; Cole & Kazarian, 1988), the Family Attitude Scale (FAS; Kavanagh et al., 1997) and the Perceived Criticism Scale (PC; Hooley & Teasdale, 1989). All three measures are relatively short questionnaires (LEE: 60 items; FAS: 30 items; PC: 1 item), and have demonstrated predictive validity in a range of psychiatric disorders (Hooley & Parker, 2006; Van Humbeeck et al., 2002).

In contrast to interviews, questionnaire measures of EE can be more readily employed in the repeated measurement of EE. Of the three aforementioned alternative measures of EE, only the 38-item revised version of the LEE[1] (comprising 4 scales) (Gerlsma & Hale, 1997; Gerlsma, van der Lubbe, & van Nieuwenhuizen, 1992) has been studied in terms of adolescents' perceived EE of their parents. In a study by Hale, Raaijmakers, Gerlsma, and Meeus (2007), confirmatory factor analyses demonstrated that the four-factor structure of this questionnaire applied to adolescents in the same way that it had previously been shown to apply to adults (Gerlsma & Hale, 1997; Gerlsma et al., 1992). Furthermore, this same study found the LEE scales to be significantly correlated with adolescent internalizing symptoms.

In a more recent study by Hale, Raaijmakers, van Hoof, and Meeus (in press), the 38-item version of the LEE was extended with a new 8-item scale entitled perceived Constructive Criticism (8 items). While the CFI measures the positive comments the family member expresses about the patient, little is known about the CFI positive comments scale's prediction of adolescent psychopathological symptoms and in previous EE studies this measure has been largely ignored (Wearden, Tarrier, Barrowclough, Zastowny, & Armstrong-Rahill, 2000). According to the researchers, the Constructive Criticism scale was constructed to reflect the CFI positive comments scale and the items of this scale were formulated to fit with the items of the revised 38-item version of the LEE. In their four-year longitudinal study of adolescent perceived EE the researchers demonstrated that each of the four scales of the 38-item LEE and this new scale, Constructive Criticism, predicted adolescent internalizing and externalizing behavior symptoms. Furthermore, this new scale also predicted the growth of adolescent internalizing symptoms in a linear growth curve model.

However, these studies by Hale et al. (2007, in press) studied only the adolescent's perception of parental EE, and did not study the parents' view of their own EE. Since EE was originally designed as an interview (i.e., the CFI) to determine the parents' EE, it stands to reason that the parents' view of their EE, much like the interview, should also be examined in the same questionnaire format. Therefore, the goal of this three-year longitudinal study is to examine whether parental reports of their EE predict the course of adolescent internalizing and externalizing symptoms in the same way that adolescent-perceived parental EE has in previous studies.

Hence, in the current three-year longitudinal study, we will analyze the development of internalizing and externalizing symptoms of adolescents from the general community by studying the

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[1] It should be noted that this 38-item revised version of the LEE, while based on the original 60-item of the LEE, has not yet been tested against the CFI.

direction of effects over time between self-reported parental EE (as measured by the 38-item LEE and the additional Constructive Criticism scale) and adolescent internalizing and externalizing symptoms, and examining whether these effects are unidirectional or bidirectional in nature. Previous studies (e.g., Branje, Hale, & Meeus, 2008; Keijsers, Branje, Van der Valk, & Meeus, 2010; Lollis & Kuczynski, 1997; Lytton, 1990) have explored the effects of mothers' behaviors on the course of their children's internalizing and externalizing behavior symptoms. These studies noted that three 'direction of effects' models can occur: a parent effect model (in which parental behaviors influence the course of their child's internalizing and externalizing behavior symptoms over time), a child effect model (in which the child's internalizing and externalizing behavior symptoms influence his or her parents' behaviors over time) and finally a bidirectional effect model (in which both influences take place simultaneously). Since no studies on the longitudinal effects of parent-reported EE have been previously conducted, and therefore no specific hypotheses can be formulated, all three effect models will be tested and compared to one another. Nevertheless, on the basis of previous (predominately cross-sectional) EE studies, one could assume that a parent effect model would best predict the course of adolescent internalizing and externalizing symptoms. Before these three effect models can be tested, a confirmatory factor analysis will be conducted to examine whether this parent version of the LEE had a similar five-scale factor structure as the adolescent five-scale version of the LEE (Hale et al., in press).

Methods

Subjects

Data for the current study came from an ongoing longitudinal study in the Netherlands, entitled RADAR (Research on Adolescent Development And Relationships). For the current study, we used three waves of annual questionnaire data that were collected from 497 Dutch adolescents and their mothers. The sample was composed of 283 boys and 214 girls. At the first measurement wave, adolescents were in first grade of junior high and were 13 years old, on average (SD = .5). Mothers were 44.5 years, on average (SD = 4.5). The ethnic backgrounds of the adolescents and their mothers in this study were rather homogeneous, because only families in which both parents had a good understanding of the Dutch language were selected for participation. Of the adolescents, 95.2% identified themselves as Dutch, 1.4% identified themselves as Surinamese, and 3.4% identified themselves as another ethnicity, such as French, Australian, English, or Indonesian. Families classified as low socioeconomic status (SES) comprised 10.8% of the sample (i.e., both mother and father were either unemployed or employed as unskilled laborers: Netherlands Central Bureau of Statistics, 1993).

Procedure

Before the start of the study, adolescents and their mothers received written information about the research and they provided written informed consent. Each year, the adolescents and their mothers filled in questionnaires during home visits. Trained research assistants provided verbal instructions, given just prior to completion of the questionnaires, to complement the written instructions printed above each questionnaire. Other research assistants conducted data entry to ensure that the data remained anonymous.

This study and its assent and consent documents were approved by the Ethical-Medical committee of University Medical Centre Utrecht (The Netherlands).

Measures

Mothers' expressed emotion. This study employed the 38-item version of the parent version of the Level of Expressed Emotion (LEE) questionnaire, which takes approximately five minutes to complete (Hale et al., 2007). The LEE assesses four EE dimensions: Lack of Emotional Support (19 items), Intrusiveness (7 items), Irritation (7 items), and Criticism (5 items) (Hale et al., 2007). The questionnaire, filled in by the mother, is scored on a four-point scale ranging from 1 = 'untrue' to 4 = 'true'. The LEE has demonstrated good psychometric properties in previous studies of adults (Gerlsma & Hale, 1997) and adolescents (Hale et al., 2007, in press).

In addition to these four scales, a new fifth scale was developed and included in this study, entitled perceived Constructive Criticism (8 items). This scale, written by the first author, was constructed to reflect the Camberwell Family Interview positive comments scale. The eight items of the Constructive Criticism scale are: 'I teach my child new things with my critical remarks'; 'I give my child helpful suggestions'; 'I give my child criticism without attacking him or her'; 'I tell my child what I think of him or her in a respectful manner'; 'My criticism of my child is constructive'; 'I let my child know I am interested in him or her with my remarks'; 'I give my child criticism that he or she finds valuable'; 'I build my child's self-confidence with my remarks'. These items were scored by mothers on the same four-point scale ranging from 1 = 'untrue' to 4 = 'true'.

Sum scores of all scales were computed. In this study, the Cronbach internal consistency coefficients of the LEE subscales for each of the three waves were: Lack of Emotional Support: α = .78, .78, and .81; Intrusiveness: α = .82, .83, and .86; Irritation: α = .77, .77, and .80; Criticism: α = .58, .57, and .58; Constructive Criticism: α = .79, .80, and .80.

Adolescent internalizing symptoms. Adolescent internalizing symptoms were measured with the 23-item Reynolds Adolescent Depression Scale (RADS; Reynolds, 2000). The questionnaire is composed of items referring to various depressive symptom categories such as mood, vegetative, cognitive, and psychomotor disturbances. The questionnaire, filled in by adolescents, is scored on a four-point scale ranging from 1 = 'almost never' to 4 = 'most of the time'. Sum

scores were used for the analyses. The RADS questionnaire had high internal consistency for each of the three annual waves (α = .93, .94, and .94).

Adolescent externalizing symptoms. Adolescent externalizing behavior symptoms were measured by the 30-item externalizing scale (which consists of the 19-item aggression behavior symptom subscale and 11-item delinquency behavior symptom subscale) of the Child Behavior Checklist Youth Self-Report (YSR; Verhulst, van der Ende, & Koot, 1997). The questionnaire, filled in by the adolescent, is scored on a three-point scale ranging from 0 = '*never*', 1 = '*sometimes*' to 2 = '*often*'. Sum scores were used for the analyses. The YSR questionnaire had high internal consistency for each of the three annual waves (α = .87, .91, and .89).

Data considerations and strategy of analysis

We aimed to explore if parental reports of their EE can predict the course of adolescent internalizing and externalizing symptoms and/or vice versa. Therefore, we first conducted confirmatory factor analyses to validate the internal five-factor structure. Second, we employed cross-lagged path analyses to test the longitudinal effects between EE and internalizing and externalizing symptoms. All these structural equation models (SEM) were conducted in M*plus* 4.0 (Muthén & Muthén, 2006).

Because adolescents' internalizing and externalizing symptoms scores were somewhat positively skewed, these variables were root-transformed prior to the analyses. After these transformations, externalizing symptoms were no longer skewed and the skewness of the internalizing symptoms was positive but well within acceptable ranges (maximum skewness after transformation 1.10, *SE* = .11; Tabachnick & Fidell, 2001). In addition, models were estimated with a robust maximum likelihood estimation method (MLR: Satorra & Bentler, 1994), which is a better way to estimate standard errors when normality assumptions are violated.

Respondents with missing data were included in the model estimations. Per variable, a maximum of 9.5% of the cases was missing. However, because these missing data were completely at random (Little's (1988; see also Little & Rubin, 2002) MCAR test: χ^2 (271, N = 497) = 51.06, p = 1.00), respondents with missing data could be included in model estimations using full information maximum likelihood (Enders & Bandalos, 2001).

The fit of the models was evaluated by means of four indices: the Relative Discrepancy Index (χ^2/df), the Comparative Fit Index (CFIndex), the Tucker–Lewis Index (TLI), and the Root Mean Square Error of Approximation (RMSEA). Model fit is satisfactory if CFIndex > .90; TLI > .90, and the RMSEA < .08 (Hu & Bentler, 1999; Kline, 2005).

Results
Confirmatory factor analyses

First, we conducted confirmatory factor analyses on our three annual wave data sets to validate the five-factor structure of our LEE questionnaire. To ensure that we would have enough observations per esti-

mated parameter (Kline, 2005; Little, Cunningham, Shahar, & Widaman, 2002), and to obtain the number of indicators per factor to the optimal number of three (Little et al., 2002), we parceled items on face validity so that three parcels would load on each factor. In addition to reducing the number of parameters that have to be estimated, and reducing the number of latent factor indicators to the optimal number of three, using parcels has several additional advantages over using items. These advantages include higher reliability and lower communality of factor indicators (Kishton & Widaman, 1994) and a reduced likelihood of distributional violations (Hau & Marsh, 2004).

Before parceling, it is of the utmost importance to know whether constructs are one-dimensional or not (Little et al., 2002). Exploratory factor analyses revealed that this was indeed the case for all scales.[2] A description of the items that are parceled can be found in Table 1. As can clearly be seen in Table 2, the model fit indices of the LEE five-factor model were satisfactory at each of the three waves. We also tested the factorial invariance over time, by constraining the factor loadings to be equal over the three measurement waves. This constrained model had a similar fit to the unconstrained model ($\Delta\chi^2$ (20, N = 497) = 25.68, p = .18). Hence, it can be concluded that the factor structure was satisfactory within each wave and moreover equivalent over the three waves, much like has been found for the recent adolescent five-factor solution of the LEE (Hale et al., in press).

Descriptive statistics

Table 3 provides the means and standard deviations of the mother's LEE five scales at the first measurement wave, and correlations between these scales and the adolescents' internalizing and externalizing symptoms at the first measurement wave.[3] In respect of the correlations, in general it was found that the mother's Criticism, Intrusiveness, Irritation, and Lack of Emotional Support LEE scale scores correlated significantly with one another, in the same manner that has been previously found for the adolescent version of the LEE (Hale et al., 2007). Additionally, the Constructive Criticism LEE scale scores correlated negatively with the other LEE scale scores, as expected, because the Constructive Criticism scale is meant to reflect the positive comments scale of the Camberwell Family Interview.

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[2] The exploratory factor analyses can be obtained from the first author upon request.

[3] The means and the standard deviations of the mother's LEE five scales at the second and third measurement waves, and correlations between these scales and the adolescents' internalizing and externalizing symptoms at the second and third measurement waves, are available from the first author upon request.

Table 1 Parceling of the Level of Expressed Emotion (LEE) question items

Factor	Parcel	Question item
CC	1	I teach my child new things with my critical remarks.
CC	1	I give my child criticism without attacking him/her.
CC	1	My criticism of my child is constructive.
CC	2	I give my child helpful suggestions.
CC	2	I tell my child what I think of him/her in a respectful manner.
CC	2	I give my child criticism that he/she find valuable.
CC	3	I let my child know that I am interested in him/her with my remarks.
CC	3	I build my child's self-confidence with my remarks.
CR	1	I am critical of my child.
CR	1	I get annoyed when I want something from him/her.
CR	2	I try to change my child.
CR	2	I show my child that I love him/her. *(Inverse scoring)*
CR	3	I usually agree with my child. *(Inverse scoring)*
IN	1	I am always nosing into my child's business.
IN	1	I don't pry into my child's life. *(Inverse scoring)*
IN	2	I often check up on my child to see what he/she is doing.
IN	2	I have to know everything about my child.
IN	2	I insist on knowing where my child is going.
IN	3	I am always interfering.
IN	3	I butt into my child's private matters.
IR	1	I can't think straight when things go wrong.
IR	1	I make matters worse for my child when things aren't going well.
IR	2	I am able to be in control in stressful situations. *(Inverse scoring)*
IR	2	I can cope well with stress. *(Inverse scoring)*
IR	3	I fly off the handle when my child doesn't do something well.
IR	3	I get upset when my child doesn't check in with me.
IR	3	I get irritated when things don't go right.
LES	1	I calm my child down when he/she is upset. *(Inverse scoring)*
LES	1	I am sympathetic towards my child when he/she is ill or upset. *(Inverse scoring)*
LES	1	I will not help my child when I'm upset.
LES	1	I don't know how to handle my feelings when my child unwell.
LES	1	I understand my child's limitations. *(Inverse scoring)*
LES	1	I accuse my child of exaggerating when he/she says he/she is unwell.
LES	1	I am willing to gain more information to understand my child's condition, when my child is not feeling well. *(Inverse scoring)*
LES	2	I try to make my child feel better when he/she is ill. *(Inverse scoring)*
LES	2	I take it easy with my child, even if things aren't going right. *(Inverse scoring)*
LES	2	I am a considerate person when my child is ill. *(Inverse scoring)*
LES	2	I often accuse my child of making things up when my child is not feeling well.
LES	2	I try to reassure my child when he/she is not feeling well. *(Inverse scoring)*
LES	2	I expect the same level of effort from my child, even if he/she is not feeling well.
LES	3	I am tolerant with my child, even when he/she is not meeting my expectations. *(Inverse scoring)*
LES	3	I can see my child's point of view. *(Inverse scoring)*
LES	3	I make my child feel valuable as a person. *(Inverse scoring)*
LES	3	I hear my child out. *(Inverse scoring)*
LES	3	I make my child feel relaxed when he/she is around. *(Inverse scoring)*
LES	3	I am understanding if my child makes a mistake. *(Inverse scoring)*

Note: LEE = Level of Expressed Emotion questionnaire, CC = Constructive Criticism, CR = Criticism, IN = Intrusiveness, IR = Irritation, LES = Lack of Emotional Support.

Cross-lagged panel models

Second, to assess the longitudinal associations between mothers' expressed emotion and adolescent adjustment, we analyzed two different three-wave cross-lagged models, linking EE to the adolescents' internalizing and externalizing symptoms, respectively. These models included correlations at the first, second and third wave of the study, one- and two-year stability paths, and cross-lagged over-time effects of EE on adolescent psychopathological symptoms and vice versa. These cross-lagged paths

will be examined to determine the direction of effects between parental EE and adolescent internalizing and externalizing symptoms, and examine whether these effects are unidirectional, either a parent effect model or a child effect model, or if the effects are bidirectional.

To model the longitudinal linkages between EE and the adolescents' internalizing and externalizing symptoms as parsimoniously as possible, we tested whether cross-lagged effects were time invariant. Constraining the five cross-lagged paths from the mothers' self-rated EE to the adolescents' self-rated

Table 2 Results of confirmatory factor analyses on each wave

Factor	Parcel	Factor loadings		
		T1	T2	T3
CC	1	.64	.68	.65
	2	.87	.88	.89
	3	.78	.80	.81
CR	1	.76	.75	.77
	2	.65	.66	.66
	3	.25	.24	.27
IN	1	.76	.79	.84
	2	.76	.69	.72
	3	.80	.86	.88
IR	1	.70	.72	.71
	2	.47	.48	.55
	3	.74	.73	.73
LES	1	.68	.77	.76
	2	.69	.69	.67
	3	.73	.37	.83
Model fit	CFIndex	.95	.95	.96
	TLI	.94	.94	.94
	RMSEA	.05	.06	.06
	χ^2/df	2.32	2.40	2.37

Note: CC = Constructive Criticism, CR = Criticism, IN = Intrusiveness, IR = Irritation, LES = Lack of Emotional Support, CFIndex = Comparative Fit Index, TLI = Tucker–Lewis Index, RMSEA = Root Mean Square Error of Approximation, χ^2/df = Relative Discrepancy Index.

internalizing and externalizing symptoms in the first interval (T1–T2) to be equal to the corresponding five cross-lagged paths in the second interval (T2–T3) did not result in a lower Chi-square model fit (the model for adolescent externalizing symptoms: $\Delta\chi^2$ = 6.90; Δdf = 5; p = .23, and the model for adolescent internalizing symptoms: $\Delta\chi^2$ = 8.65 Δdf = 5; p = .12). In a similar vein, constraining the cross-lagged paths from the adolescents' internalizing and externalizing symptoms to mothers' EE to be time-invariant yielded no significant change in model fit (model for adolescent externalizing symptoms: $\Delta\chi^2$ = 4.62; Δdf = 5; p = .46, and model for adolescent internalizing symptoms: $\Delta\chi^2$ = 3.69 Δdf = 5; p = .59). Hence,

all cross-lagged paths were found to be equal for the two time intervals, and could therefore be constrained to be invariant over time.

After including the cross-lagged paths, the model had satisfactory model fit (the model for adolescent externalizing symptoms: χ^2/df = 2.338; CFIndex = .97; TLI = .95; RMSEA = .05 and the model for adolescent internalizing symptoms: χ^2/df = 2.437; CFIndex = .97; TLI = .94; RMSEA = .05). Results of the final models are displayed in Figure 1 (the model for adolescent externalizing symptoms) and in Figure 2 (the model for adolescent internalizing symptoms).

With respect to the adolescents' externalizing symptoms and the mothers' EE (Figure 1), we found that the adolescents' externalizing symptoms were predictive of all the aspects of mothers' EE in each subsequent year. That is, externalizing symptoms preceded lower levels of Constructive Criticism and higher levels of Criticism, Intrusiveness, Irritation, and Lack of Emotional Support. Only for mothers' Irritability did bidirectional effects occur with adolescents' externalizing symptoms. These results indicated that, predominantly, the child effect model best described the relationship between adolescent externalizing behavior symptoms and maternal EE; the adolescent's externalizing symptoms predicted the mother's negative responses.

For the adolescents' internalizing symptoms and the mother's EE (Figure 2), a highly similar relationship occurred, the only exception being a lack of a relationship between the adolescents' internalizing symptoms and the mothers' Intrusiveness. Again, bidirectional effects occurred for the mother's EE Irritation and the adolescent's internalizing symptoms. The mother's Irritation positively predicted the adolescent's internalizing symptoms, but also vice versa. For all other cross-lagged paths in this model, a child effect model was evident. The adolescent's internalizing symptoms systematically predicted more Criticism, Irritation, and Lack of Emotional

Table 3 Descriptive statistics and correlations between mother-reported expressed emotion and adolescent self-rated externalizing and internalizing symptoms at the first wave

Variable	Descriptives		Bivariate correlations						
	Mean	SD	CC	CR	IN	IR	LES	EXT	INT
CC	26.89	3.03							
CR	7.91	2.00	−.36**						
IN	17.64	3.95	.01	.25**					
IR	11.94	3.23	−.34**	.55**	.27**				
LES	26.28	4.92	−.47**	.59**	.12*	.54**			
EXT	10.61	7.15	−.06	.25**	.11*	.18**	.18**		
INT	37.11	11.56	−.05	.23**	.01	.13**	.18**	.47**	

Note: The sum scores for the adolescent externalizing symptoms and the internalizing symptoms are presented here. For subsequent analyses, the scores for internalizing and externalizing symptoms were root-transformed. CC = Constructive Criticism, CR = Criticism, IN = Intrusiveness, IR = Irritation, LES = Lack of Emotional Support, EXT = Adolescent externalizing symptoms, INT = Adolescent internalizing symptoms. The descriptive statistics and correlations between mother-reported expressed emotion and adolescent externalizing and internalizing symptoms at the second and third waves are available by request from the first author. *p < .05; **p < .01.
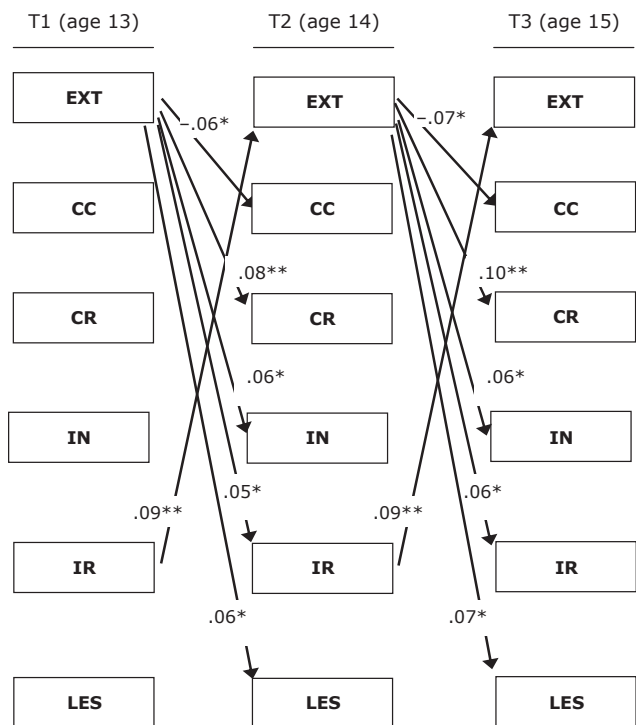
Figure 1 Significant cross-lagged effects in longitudinal three-wave cross-lagged panel model of mother-reported EE and adolescent self-rated externalizing symptoms. *Note.* T1–T3 = Waves 1–3, EXT = Adolescent externalizing symptoms, CC = Constructive Criticism, CR = Criticism, IN = Intrusiveness, IR = Irritation, LES = Lack of Emotional Support. *$p < .05$. **$p < .01$
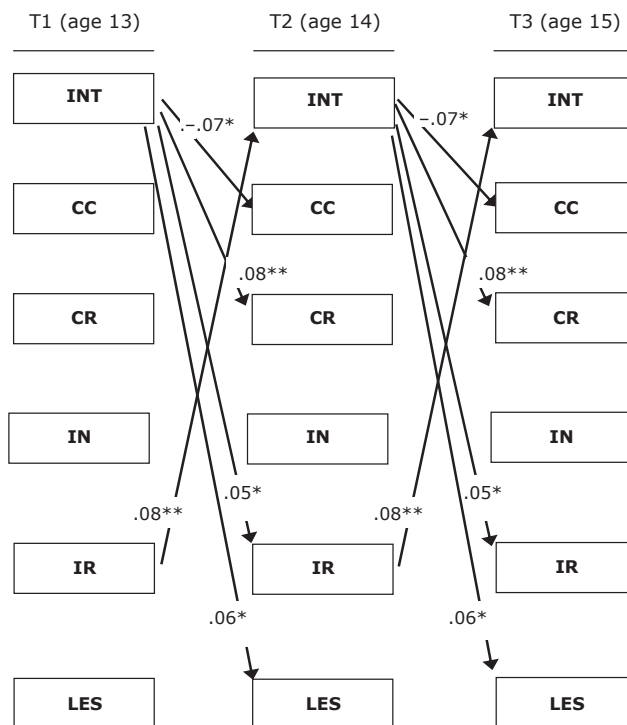
Figure 2 Significant cross-lagged effects in longitudinal three-wave cross-lagged panel model of mother-reported EE and adolescent self-rated internalizing symptoms. *Note.* T1–T3 = Waves 1–3, INT = Adolescent internalizing symptoms, CC = Constructive Criticism, CR = Criticism, IN = Intrusiveness, IR = Irritation, LES = Lack of Emotional Support. *$p < .05$. **$p < .01$

Support in the subsequent wave of the mother's EE. However, adolescent's internalizing symptoms predicted lower levels of the mother's Constructive Criticism.

When the findings of Figures 1 and 2 are taken together, it would appear that, in general, adolescent internalizing and externalizing symptoms elicit maternal EE. Hence, a child effect model seems to best describe the relationship between maternal reports of EE in the prediction of the course of adolescent internalizing and externalizing symptoms. However, the relationship between the mother's Irritation and the adolescent's internalizing and externalizing behavior symptoms is a bidirectional relationship, with the mother's EE and the adolescent's symptoms predicting one another.

Possible sex differences and clinical vs. non-clinical score differences

Since previous studies have shown differences between adolescent boys and girls with respect to internalizing and externalizing symptoms (e.g., Hale, Valk, Engels, & Meeus, 2005), we additionally tested for possible sex differences by constraining the cross-lagged path effects to be equal for boys and girls in a two-group model. No significant change in model fit occurred when the cross-lagged path effects from the mothers' EE to the adolescents' internaliz-

ing and externalizing symptoms were constrained for boys and girls (model for adolescent externalizing symptoms: $\Delta\chi^2 = 6.54$; $\Delta df = 5$; $p > .05$, and model for adolescent internalizing symptoms: $\Delta\chi^2 = 5.53$ $\Delta df = 5$; $p > .05$), nor when the cross-paths from these symptoms to the mothers' EE were constrained (model for adolescent externalizing symptoms: $\Delta\chi^2 = 3.65$; $\Delta df = 5$; $p > .05$ and model for adolescent internalizing symptoms: $\Delta\chi^2 = 4.42$; $\Delta df = 5$; $p > .05$). Hence, no support for sex differences in the longitudinal associations between the mothers' EE and the adolescents' internalizing and externalizing symptoms were found.

Additionally, we also explored whether any of the adolescents from our community sample scored within clinical ranges for internalizing and externalizing symptoms, respectively. With respect to the adolescent internalizing symptoms (as measured by the RADS), we employed a clinical cut-off score of 77 or above (King et al., 1997; Reynolds, 2000). Using this clinical cut-off score we found that only (a maximum of) four adolescents scored 77 or higher during any of the three waves, too small a group size to be employed in SEM.

With respect to the adolescent externalizing symptoms (as measured by the YSR), 50 of the adolescents in our sample had YSR scores at or above the clinical externalizing broadband cut-off T-score of 63 or greater ($T \geq 63$; Achenbach, 1991). To test

for the potential impact of adolescents with YSR scores at or higher than $T \geq 63$ on the associations between EE and YSR externalizing symptoms, we conducted a multigroup analyses with groups of adolescents who scored at or higher than $T \geq 63$ on the YSR ($n = 50$) and the adolescents who scored lower (at or higher than $T < 63$) on the YSR ($n = 441$). These group differences were tested by comparing whether the chi-square fit of an unconstrained model would be significantly lower (i.e., better fitting) than the chi-square fit of a model in which the T1 associations or cross-lagged effects were constrained to be equal across groups. We found no such differences between the groups for either the T1 associations ($\Delta\chi^2 = 5.77$, $df = 5$, $p = .33$) or for the cross-lagged paths ($\Delta\chi^2 = 14.09$, $df = 10$, $p = .18$). Hence we concluded that the longitudinal model for these two groups did not differ from one another.

When these results are taken together, we found that the relationship between maternal EE and adolescent internalizing and externalizing symptoms was best explained by the adolescent group as a whole, as opposed to deviating results for adolescent sex groups or adolescents scoring within clinical ranges for internalizing and externalizing symptoms.

Discussion

This study first demonstrated that the parental version of the five-scale LEE had good psychometric properties, much like the adolescent version of the five-scale LEE (Hale et al., in press). Additionally, this study also found that the internalizing and externalizing symptoms of adolescents from the general community best predicted the mothers' EE scores, as opposed to the mothers' EE predicting the adolescents' symptoms. The only exception to this was the bidirectional effect found between the mother's EE irritation and the adolescent's internalizing and externalizing symptoms.

As noted in the results (Figures 1 and 2), it would appear that adolescent internalizing and externalizing symptoms predominantly elicit maternal EE, which concurs with a child effect model. This is as opposed to a parent effect model, in which the parental EE elicits the adolescent's internalizing and externalizing symptoms, as has been found in most previous EE interview studies. However, most previous studies focused on adolescents from clinical populations as opposed to adolescents from the general community, a point that we will return to later in this discussion.

These findings have important implications not only for future research into the EE construct, but also for family treatments of adolescent internalizing and externalizing behavior symptoms that incorporate the EE construct. To begin with the former, EE research often assumes a parent effect model; a model in which the parental behaviors influence the course of their child's internalizing and externalizing symptoms. Hence, an EE interview is conducted at Time 1 to predict the child's symptoms at Time 2. (Although, as previously noted, two notable exceptions are longitudinal FMSS studies by Peris and Baker (2000) and Hastings et al. (2006) that provided mixed results as to prediction of children's externalizing symptoms from maternal EE.) However, as found in this study, both internalizing and externalizing symptoms of the adolescents predicted maternal EE, and not the other way round. It is conceivable that the interviewer's rating has a different predictive power than that of self-rated EE longitudinal data, in this case from the parent's perspective. While this discrepancy might be explained by the methodology used in measuring EE (i.e., interview vs. questionnaire and cross-sectional vs. longitudinal), this study clearly suggests that the parent's perspective should also be included in EE research and potentially also in family treatments of adolescent internalizing and externalizing symptoms.

This point leads back to the latter issue, family treatments of adolescent internalizing and externalizing behavior symptoms. Most family treatments (that employ the EE concept) focus on a parent effect model (the EE provider [i.e., the parent] affecting the EE receiver [i.e., the child]) (Hooley, Miklowitz, & Beach, 2006). A child effect model, in which the child's psychopathological symptoms elicit EE from the parent, has received much less attention in therapies designed to reduce EE. It is quite conceivable that both a child effect model (as has been found in this study) as well as a parent effect model (as has been found in previous studies such as Hale et al., 2007, in press) help to explain the relationship between parental EE and the course of adolescent internalizing and externalizing symptoms. Specifically, in cognitive therapy, a major focus of the therapy is on the beliefs a person holds as to his or her interactions with others. This 'belief' is literally the person's perception of the interactions he or she has with others. Hence it is possible that psychotherapies that use the EE concept could be refined to incorporate these divergent perceptions on the part of the parent as well as the part of the adolescent.

With respect to the limitations of this study, it should be noted that the LEE was measured without a comparison to the Camberwell Family Interview. This limitation of questionnaire-based measures of EE has been raised in several recent articles on the subject, while also raising the need for clinically useful and accessible Camberwell Family Interview alternatives (Hooley & Parker, 2006). Therefore, it is not possible to judge if the LEE findings of this study would be similar to those obtained by measuring EE using the Camberwell Family Interview, nor which sort of EE measure would best predict the course of adolescent internalizing and externalizing symptoms. Therefore, future studies are recommended to address this issue.

Additionally, this study focused only on self-reports of internalizing and externalizing symptoms from adolescents from the general community. This should not be confused with a clinical diagnosis of a psychiatric disorder. A structured clinical interview could have been used to help to determine the strength of the relationship between the adolescents' self-reports of internalizing and externalizing symptoms and an actual diagnosis of these related disorders. Moreover, these adolescents came from the general community, whereas many previous studies of EE and adolescent internalizing and externalizing symptoms came from clinical populations. However, it has also been suggested that prospective longitudinal community studies of internalizing symptoms may help to circumvent the problem of referral bias that frequently occurs in the clinical setting and may better characterize the course of internalizing symptoms (e.g., Hale, Raaijmakers, Muris, Van Hoof, & Meeus, 2009). The same may also hold true for community studies of externalizing symptoms. Nevertheless, future studies in the clinical setting should be conducted to replicate these findings.

In conclusion, the results of this longitudinal study of the mothers' EE perceptions suggest that it is the course of the adolescents' internalizing and externalizing psychopathological symptoms that affects maternal EE, and not the mothers' perceived EE influencing the course of the adolescents' psychopathological symptoms. The findings of this study alone should give both researchers and therapists a reason to reconsider the parent effect model assumption of previous EE studies.

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Key points

- In previous studies, maternal expressed emotion (EE) has been found to be a good predictor of the course of adolescent internalizing and externalizing symptoms.
- However, these studies have been cross-sectional as opposed to longitudinal.
- This longitudinal study of the mothers' EE perceptions demonstrates that it is the course of the adolescents' internalizing and externalizing psychopathological symptoms that affects their mothers' perception of EE, and not the mothers' perceived EE influencing the course of the adolescents' psychopathological symptoms.
- The findings of this study should give both researchers and therapists a reason to reconsider the parent effect model assumption of previous EE studies.

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