



What enhances the development of emotion understanding in young children? A longitudinal study of interpersonal predictors

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We studied potential determinants of the development of children's emotion understanding (EU) from age 4 to 6 in a Norwegian community sample ($N = 974$) using the Test of Emotion Comprehension. Interpersonal predictors included the accuracy of parental mentalization, parental emotional availability, and teacher-reported child social skills. Intrapersonal child factors were child gender and verbal skills. Overall, children's EU increased significantly over time. After adjusting for child gender, age-4 EU, and parental socio-economic status, greater child verbal and social skills and greater parental mentalization each uniquely predicted growth in EU. Results are discussed in terms of theory and research on children's EU and parents' emotion socialization.

Emotion understanding (EU), which refers to one's ability to know the feelings of others and oneself, is essential for competent social functioning and psychological well-being (de Rosnay, Harris, & Pons, 2008). Models describing the development of EU (Halberstadt, Denham, & Dunsmore, 2001; Pons, Harris, & de Rosnay, 2004; Saarni, 1999) highlight several components of EU, from labelling and identifying emotion-eliciting situations to understanding more complex sentiments such as ambivalence and moral emotions. Past research documents links between EU and a variety of positive developmental outcomes, including secure attachment (Fonagy & Target, 1997; Raikes & Thompson, 2008; de Rosnay & Harris, 2002), social competence (Denham, 2006; Dunn & Cutting, 1999), and language skills (Pons, Lawson, Harris, & de Rosnay, 2003). Preschool children who are better at identifying emotions in others also have fewer behaviour problems (Hughes, Dunn, & White, 1998). Delayed development of and limitations in EU are associated, in contrast, with mental disorders (for review, see Southam-Gerow & Kendall, 2002).

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Although children's EU, on average, advances considerably from age 2 years to middle childhood (Hughes & Dunn, 1998; Nelson *et al.*, 2012; Ontai & Thompson, 2002), substantial individual differences in EU exist among children (Harris, 2000; Pons & Harris, 2005). Why do some children excel in EU at an early age whereas others exhibit more limited development? This is the primary question addressed in this report.

Intervention research makes clear that direct training of preschoolers (Domitrovich, Cortes, & Greenberg, 2007; Gavazzi & Ornaghi, 2011) and school-age children (Ornaghi, Brockmeier, & Grazzani, 2014; Tenenbaum, Alfieri, Brooks, & Dunne, 2008) enhances children's EU. Such specific and targeted EU training is not the primary means by which EU development is facilitated in most children. As noted by Denham (1998), interpersonal and intrapersonal factors are the primary drivers of EU development in the lives of most children, so it is these that are the foci of this enquiry.

Interpersonal predictors

Regarding interpersonal factors, emotion socialization starts in the family in the early preschool years and is later supplemented by preschool teachers and peers. Children's interactions and relationships with other people, including their peers, are thought to be the primary means through which children learn about and practise their EU skills. Therefore, in the present enquiry, we focus on interpersonal factors, specifically parents' mentalizing ability (in 'reading' their child's mind), their non-hostile, sensitive parenting, and children's social skills. We regard the latter as an interpersonal factor because the social skills' measure use herein – the Social Skills Rating System (SSRS; Gresham & Elliot, 1990) – mostly taps children's behaviour directed towards peers. We acknowledge that the targeted interpersonal predictors are not extensive and, most notably, exclude important aspects of emotion socialization, perhaps most especially parents' explicit discussion of emotion with their children (Aznar & Tenenbaum, 2013; Dunn, Brown, & Beardsall, 1991; Farrant, Maybery, & Fletcher, 2013).

Parental emotional availability

Parents' emotional resources are likely to influence their children's EU and its development. The emotion socialization literature highlights the influence of parents' ability to accept and help children experience both negative and positive emotions on children's emotional development. Having parents who name and value all types of emotions and who create an emotional climate in which a child's emotions are addressed in a sensitive and non-hostile way is hypothesized to help the child learn about his or her own and other people's emotions (e.g., Eisenberg, Cumberland, & Spinrad, 1998). Empirically, the importance of the emotional quality of the parent-child interaction for the development of EU has received some support in cross-sectional research (Denham & Grout, 1993; Denham, Mitchell-Copeland, Strandberg, Auerbach, & Blair, 1997) and longitudinal studies (Denham, Zoller, & Couchoud, 1994). For example, Denham and Kochanoff (2002) reported that children's EU at ages 3 and 4 was predicted by mothers' positive observed emotions, attentiveness to their children's emotions, and willingness to help their children address their emotions. Unfortunately, it is not clear from such work whether the association reflects parent or child effects (or some other source of influence). Thus, we extend previous enquiry using repeated-measurements of EU to test the proposition that greater parental emotional availability measured at age 4 predicts *increased* EU from age 4 to 6.

Accuracy of parental mentalization

Parents' ability to value and understand their children's emotions and thoughts influences the children's socio-emotional development (Sharp & Fonagy, 2008). Concepts such as *mind-mindedness* (Meins et al., 2003), *reflective function* (Fonagy & Target, 1997), *meta-emotion philosophy* (Gottman, Katz, & Hooven, 1996), *insightfulness* (Oppenheim & Koren-Karie, 2013), and the *accuracy of parental mentalization* (Sharp, Fonagy, & Goodyer, 2006) all refer to an individual's ability to value and understand another person's emotions and thoughts. Fonagy and Target (1997) argue that children's mentalization abilities develop within emotionally charged relationships, while contending that the effect of parental mentalization is mediated via parental behaviour (e.g., parental emotion talk, social interactions during play).

Cross-sectional evidence indicates that mothers who describe their 4- to 6-year-old children in more mentalistic terms have children with more advanced EU (de Rosnay, Pons, Harris, & Morrell, 2004). Due to problems inherent in interpreting such cross-sectional associations, here we rely on a longitudinal design that affords testing the prediction that the greater a parent's ability to take his or her child's perspective, the more the child's EU will increase over time. Evidence consistent with this hypothesis would extend findings from a small sample study ($n = 33$) by Meins, Fernyhough, Russell, and Clark-Carter (1998) showing that greater use of mentalizing language by mothers of 3-year-olds predicted greater child EU 2 years later. Instead of relying on a mentalizing measure based on mothers' verbal description and analysis of videotaped interactions with their children, we developed a measure of the accuracy of parental mentalization, following Sharp et al. (2006), that involves a direct comparison of the child's actual performance on a test of EU with the parent's estimate of child performance on a test of EU.

Child social skills

Banerjee, Watling, and Caputi (2011) observed that a specific component of EU, namely false belief understanding, emerges between 3 and 5 years of age, the development of which coincides with a dramatic increase in peer interaction. Indeed, having more friends and being well liked by peers and teachers, capabilities that are influenced by and influence social skills are positively related to EU (Denham, 1986; Denham, McKinley, Couchoud, & Holt, 1990; Denham et al., 2003). Indeed, some contend that advanced EU predicts advanced social skills (Denham et al., 2003; Garner & Estep, 2001). Of course, the reverse process of influence also seems possible, such that more and higher quality peer interactions enable children to practise and further develop their emotional and social skills (Banerjee et al., 2011). Consistent with this claim, Maguire and Dunn (1997) found that children ($N = 41$) displaying high complexity of social play at 69 months evinced greater understanding of mixed emotions at 7 months later. Similarly, Dunsmore and Karn (2004) measured peer relationships and EU on two occasions across a 6-month period, from age 5.5 to 6 years ($N = 45$), observing that popular children and children with more stable friendships manifested greater growth in EU than other children. Once again, the modest sample sizes raise questions about the replicability and generalizability of the findings, as does the study's failure to evaluate other interpersonal factors known to be related to EU simultaneously. Nevertheless, consistent with the findings summarized above, we hypothesize that child social skills at 4 years of age will predict increased child EU from 4 to 6 years, even after controlling for other intra- and interpersonal variables.

Intrapersonal and demographic factors

Intrapersonal factors included in this report, along with family demographic factors, will serve as covariates in the multivariate analyses to be reported – so that the unique effects of the interpersonal factors already mentioned can be estimated. The covariates have been selected based on prior work showing them to be related to either EU or the interpersonal predictors of EU considered in this enquiry. They include children's gender (Root & Denham, 2010) and verbal skills (Cutting & Dunn, 1999; Pons *et al.*, 2003; de Rosnay & Harris, 2002; de Rosnay *et al.*, 2004), as well as parental socio-economic status (SES; Cutting & Dunn, 1999; Dunn & Brown, 1994).

The present study

1. The present study is the largest population study to investigate EU development over time. In this study, we included interpersonal predictors while controlling for intrapersonal covariates, and we used the same instrument at both time points. Based on prior research, our initial hypotheses were as follows:
2. Parental emotional availability and the accuracy of parents' mentalization measured when their child was 4 years predict an increase in children's EU measured at age 6. In addition, more mature social skills in children measured at age 4 also predict an increase in children's EU measured at age 6.

Method

Participants and procedure

A letter of invitation was sent to all parents of two birth cohorts of children in a city in mid-Norway (approximately 200,000 inhabitants). To increase the variability in EU (and other measured constructs) in an age-restricted sample, we oversampled for children with social, emotional, and behavioural problems, using the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997) as a screening instrument in sample selection and recruitment. The SDQ is an efficient screening for mental-health problems in preschoolers (Sveen, Berg-Nielsen, Lydersen, & Wichstrøm, 2013), which are known to correlate with EU (Southam-Gerow & Kendall, 2002). Details about the procedure and recruitment have been presented elsewhere (Wichstrøm *et al.*, 2012); thus, only a brief outline is provided here.

The parents brought the completed SDQ to the community health check-up appointment that is routinely scheduled for all Norwegian 4-year-olds. Of the parents who were eligible for the study, 97.2% showed up for their appointments at one of the city's well-child clinics. Parents who were not sufficiently proficient in Norwegian to complete the SDQ screen were excluded from the study. A nurse at the clinic informed the parents about the study using procedures and measures approved by the Regional Committee for Medical and Health Research Ethics and then obtained written consent from the parents to participate in the study. A small percentage of the families (5.2%) were not asked to participate because of an error on the part of the clinic staff.

The SDQ is a 31-item measure that has been demonstrated to have an excellent screening ability for psychiatric symptoms among preschoolers (Sveen *et al.*, 2013). SDQ scores on the symptom scale (20 items) were divided into four strata: 0–4, 5–8, 9–11, and 12–40. With a random number generator, defined proportions of parents in each stratum (.37, .48, .70, and .89, respectively) were drawn for participation in further studies. The

sample was adjusted for stratification in all analyses. The dropout rate after consenting at the well-child clinic did not differ across the four SDQ strata ($\chi^2 = 5.70$, $df = 3$, NS) or gender ($\chi^2 = 0.23$, $df = 1$, NS).

Because of child fatigue and missing data from the parents, the analysis sample for this study consisted of 926 parent–child dyads in the first assessment (T1), with 464 boys and 462 girls who completed the TEC. The mean age of the children at T1 was 4.4 years (range 3.85–5.36, $SD = 0.18$). Nearly every caretaker attending the clinic with their child ($M = 35.1$ years, $SD = 5.0$) was the child's biological parent (99.5%), was married or had lived with their partner for more than 6 months (87.6%), and was a woman (84.4%). Both mothers (95.8%) and fathers (94.2%) were of primarily Norwegian ancestry. After the sample was adjusted for stratification, the sample was compared to register information from Statistics Norway on the parents of all 4-year-olds in the mid-Norway city in 2007 and 2008. The sample contained a higher proportion of divorced parents (7.6%) compared with the population as a whole (2.1%), whereas the level of parental education was virtually identical across the sample and population. Consequently, the sample is considered a representative community sample.

In total, 756 children reassessed after 2.4 years (T2), when each child had started first grade ($M = 6.7$ years, range = 6.0–7.7, $SD = 0.16$), had usable TEC scores. Among these children, 48 did not provide usable TEC scores when they were 4 years old. Thus, 974 children had usable TEC measures at either 4 or 6 years and formed the analysis sample. None of the study variables proved significant in predicting attrition.

Children were tested at the clinic without their parents present, and parents granted consent to mail a questionnaire to the childcare provider who knew the child best in the day care centre they were attending. While the child watched a movie in the same room as their parent while wearing headphones, the parent was asked to estimate their children's EU. Parent–child interaction was then videotaped for 30 min across five tasks (Eyberg, McDiarmid, Duke, & Boggs, 2005): Free play (10 min), child-guided play (5), parent-guided play (5), clean-up (max: 5), and child-waiting (i.e., not interacting with the parent) while the parent answered a questionnaire (5).

Measures

Emotion understanding

Emotion understanding was assessed using a Norwegian translation (by the first author, with proofreading by bilingual scholars) of the TEC (Pons & Harris, 2000) at T1 and T2. The TEC is designed for children aged 3–11 years and is composed of nine components. The nine components are described in Table 1, divided into three developmental periods suggested by Pons *et al.* (2004). The TEC has been widely used in research around the world and has been translated to 18 languages (Albanese *et al.*, 2006; Pons & Harris, 2005; Tenenbaum, Visscher, Pons, & Harris, 2004).

A short story accompanied by cartoon scenarios was read aloud to the child while the 'faces' of the cartoon characters were presented without any feature or expression (i.e., a blank circle). At the story's end, the child was asked to indicate the emotional response of the story's protagonist by pointing to one of the four cartoon faces expressing different emotions presented for this purpose, two displaying negative emotions (sad, scared; sad, angry; or scared, angry) and two non-negative emotions (happy, just alright). Practice questions are administered before test questions to confirm children's comprehension of the procedure. The TEC has separate versions for girls and boys, and administration lasted for approximately 15–20 min.

Table 1. Nine components of emotion understanding by age and skills

Period	Component	Skill
External period	Recognition (3–4 years old)	Recognize and name the basic emotions
	External cause (3–4 years old)	Understand how external causes affect emotions in others
	Desire (3–5 years old)	Understand the effect of desires in the emotional reactions of others
Mentalistic period	Reminder (3–6 years old)	Understand the effect of past information on emotions
	Belief (4–6 years old)	Understand the effect of beliefs (true or false) on the emotional reactions of others
	Hiding (4–6 years old)	Understand the differences between the outwardly expressed emotion and the actual, inwardly experienced emotion
Reflective period	Regulation (8 years old)	Understand the effectiveness of using cognitive strategies to maintain control of emotions
	Morality (± 8 years old)	Understand that emotions are linked to morally reprehensible actions and to praiseworthy actions
	Mixed emotion (± 8 years old)	Understand that a person may experience multiple emotions in response to a single situation

The components increase in difficulty and yield a sum score (range: 0–9), with a score of 0 or 1 at each component level. Recognition (component 1) and External cause (component 2) are assessed with five test items, and at least four of the five items must be answered to obtain score of 1. Desire (component 3) is assessed with four test items (4/4 must be answered correctly to obtain score of 1), whereas Belief (component 4), Reminder (component 5), Regulation (component 6), Hiding (component 7), and Mixed (component 8) consist of one test item each. Morality (component 9) is assessed with two items, and both must be answered to obtain score of 1. For a more detailed description of the TEC, see Pons *et al.* (2004).

The theta test was used to assess the reliability; it accounts for the categorical ordering of the data (Zumbo, Gadermann, & Zeisser, 2007) and overcomes some limits of Cronbach's alpha (Gadermann, Guhn, & Zumbo, 2008). The theta for the TEC was .82 at T1 and .91 at T2.

Interpersonal predictors

Parental emotional availability

This predictor was assessed with the EA Scales, 3rd ed. (Biringen, Robinson, & Emde, 1998). Parent and child interactions were videotaped at T1. The EA scales are used to rate four parental dimensions (sensitivity, structuring, non-intrusiveness, and non-hostility) and two child dimensions (responsiveness to and involvement with the parent). All dimensions are assessed in the context of the dyadic interaction, instead of being specific to the behaviour of an individual child or parent; however, we used the sum total of the four parent ratings, as the four parent ratings yielded an internally consistent score in our sample ($\alpha = .74$). All raters were trained and certified as reliable by Z. Biringen, who developed the EA. The inter-rater reliability between multiple blinded coders on a random 10% sample of the videotapes for the total parent scale was ICC = .71.

The accuracy of parental mentalization

This parental accuracy measure regarding children's EU was assessed at T1 using a method described by Sharp *et al.* (2006). Therefore, we first tested the child alone, and the parent was then instructed to provide responses to the TEC *as if they were their child*. The accuracy of parental mentalization reflects the item-by-item correspondence between the parent's estimate and the child's actual response to each question on the TEC (range: 0–21). Because the accuracy of parental mentalization measure captures the agreement between parents and children *without considering the actual correctness of the child's response*, we chose to use all the items instead of the total score (0–9) because the total scores include scoring rules that depend on the correctness of the answer. This approach avoided the possibility of a parent generating an estimation score that exactly matched that of the child (e.g., 3/9) but incorrectly estimating all of the child's individual responses. Because parental accuracy is a *difference* score on the item level whereas the child's TEC score represents the *level* across items, the two measures are conceptually independent.

Child social skills

This predictor was assessed by the total score of the 30-item Social Skills Rating System-teacher report (SSRS-T) (Gresham & Elliot, 1990) at T1 ($\alpha = .93$). The SSRS-T was completed at T1 by the preschool teacher who was best acquainted with the child.

Intrapersonal and demographic factors*Verbal skills*

The Norwegian version of the Peabody Picture Vocabulary Test (PPVT-III) (L. M. Dunn & Dunn, 1997) was used to measure the children's receptive language ability at T1. The examiner presented a word that described one of four pictures on a page and asked the child to point to or say the number of the picture corresponding to the word. The test consisted of four practice items and 204 test items arranged in order of difficulty ($\alpha = .98$).

Parental SES

In addition to the child's gender, parental SES was included as a covariate. Parental occupational status was used as a proxy for SES. The parent who completed the parent version of the TEC was interviewed about her/his occupation. Parental occupational data were coded according to the International Classifications of Occupations (International Labour Office, 1990), yielding the following categories: Unskilled workers, farmers/fishermen, skilled workers, lower professionals, higher professionals, and leaders. Because parental mentalization and parent–child interactions might covary with each individual's SES, we used the informant parent's SES rather than both parents' SES.

Results

Descriptive analyses are presented first, followed by the primary prediction analysis of development of EU from 4 to 6 years. Because we oversampled for mental-health problems, analyses were performed with weights inversely proportional to the drawing probability (i.e., the results for children with high scores on the SDQ were weighted down, and the results for children with low scores on the SDQ were weighted up).

Moreover, a robust maximum-likelihood estimator was used, which yields robust standard errors. Participants were included if they had usable scores on EU at T1 or T2 ($n = 974$). Missing data were handled according to a full information maximum-likelihood procedure using Mplus 7.2 (Muthén & Muthén, 1998–2013). These corrections were performed for all analyses, thereby enabling us to generalize the findings to the larger population from which the study sample was drawn.

Descriptive analyses

Two sets of analyses involving the mean EU and correlations are presented. Table 2 lists the descriptive statistics for all the study variables. At 4 years, the mean EU score was $M_{EU 4 \text{ years}} = 3.36$, $SD = 1.54$. This score almost doubled by T2, $M_{EU 6 \text{ years}} = 5.92$, $SD = 1.43$. To examine the development of EU over time, a growth modelling approach was used. To accommodate growth with only two measurement points, the error terms of EU were set to zero. Growth was parameterized as yearly change. M_{growth} was 1.28, $p < .001$. Because such a change could partly result from altered importance of TEC items as the child grows, measurement invariance was evaluated. The factor loadings of the individual TEC components were examined by the model test procedure in Mplus. None of the factor loadings differed at age 4 and 6 years (i.e., all p -values $> .10$). Figure 1 depicts the percentage of children who correctly completed the EU components at T1 and T2. As the figure shows, the distribution was not truncated at either end of the continuum; therefore, the measurement did not suffer from any major floor and ceiling effects. The overall TEC score improved for most children (84.9%) from T1 to T2, whereas the score did not change for 8.8% of children and declined for 6.3% of children.

Table 3 presents the correlations among all the study variables, showing that EU scores at T1 and T2 were modestly positively correlated. Additionally, greater verbal skills and parental mentalization (measured at T1) were related to better EU, with associations larger

Table 2. Descriptive statistics of the study variables from T1

Predictors and covariates	M (SD)
Interpersonal predictors	
Accuracy of parental mentalization	12.11 (2.4)
Emotional availability	105.41 (15.14)
Social skills	57.35 (10.37)
Intrapersonal and demographic factors	
Verbal skills	92.54 (23.27)
	%
Parent's socio-economic status	
Unskilled workers	3.1
Farmers/fishermen	0.6
Skilled workers	25.2
Lower professionals	39.9
Higher professionals	25.6
Leaders	5.6

Note. EU = emotion understanding.

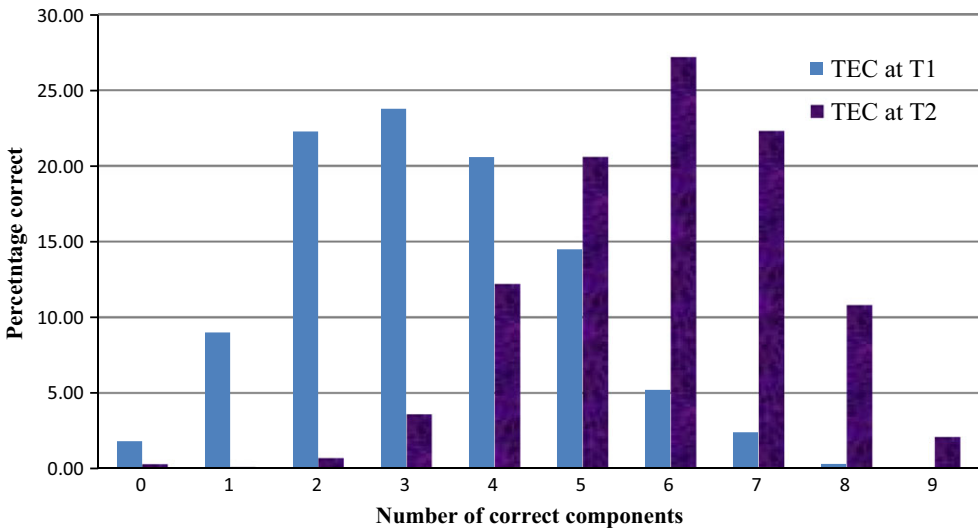


Figure 1. Histogram showing number of correct components comparing the child sum scores from TEC at T1 and TEC at T2.

Table 3. Correlations between variables

Parental accuracy of mentalization (1)	Emotional availability (2)	Social skills (3)	Verbal skills (4)	SES (5)	Gender (% girls) (6)	EU (T1) (7)	EU (T2) (8)
1.	.14*	.08*	.52***	.09*	.07	.81***	.20***
2.		.15***	.15***	.19***	.03	.14**	.06
3.			.15***	.11**	.20***	.04	.20***
4.				.15***	.00	.40***	.18***
5.					-.04	.07	.10*
6.						.01	.04
7.							.16***
8.							

Note. EU = emotion understanding; SES = socio-economic status.

* $p < .05$, ** $p < .01$, *** $p < .001$.

at T1 than at T2; greater parental emotional availability was associated with higher EU at T1; and better social skills (measured at T1) were related to better EU at T2.

Prediction of growth in EU from T1 to T2

To test predictors of growth in EU, the growth parameters of growth and intercept (EU at T1) were regressed on parental mentalization and emotional availability, child social and verbal skills as well as gender and parental SES. These predictors were allowed to correlate. To adjust for potential regression towards the mean effects (e.g., some children could obtain high scores simply by chance by pointing to the correct answers), the slope

was regressed on the intercept. Parental mentalization, parental emotional availability, and child social skills were measured as latent variables. Because parental mentalization items were dichotomous (right or wrong), they were treated as categorical variables. However, this approach resulted in a frequency table for the latent class indicator model that was too large for Mplus to handle, so the chi-square could not be computed. Thus, common model fit indices (e.g., χ^2 , RMSEA, CFI, and TLI) could not be computed. Analysing the model without parental mentalization could provide an indication of model fit of the full model, and this proved satisfactory: $\chi^2(38) = 111.04$, $p < .001$, RMSEA = .044, CFI = .972, TLI = .954, SRMR = .024.

Results are presented in Table 4. Greater parental accuracy of mentalization (T1) was associated with larger EU intercept at T1. More importantly, greater parental accuracy predicted a larger increase in EU over time (i.e., slope), as did better verbal and social skills. As expected when regression towards the mean is at play and as often found in research applying growth curves, the intercept strongly predicted reduced growth. Efforts to determine whether effects of parental mentalization were moderated by levels of verbal skills, social skills, and parental emotional availability revealed no significant interaction effects.

Discussion

To extend prior research on children's EU, we investigated interpersonal predictors and intrapersonal covariates of development in EU from 4 to 6 years in a large community sample of Norwegian children. Results showed that more verbally and socially skilled 4-year-olds whose parents demonstrated better mentalization displayed the greatest EU growth. Taken together, our findings and those of other studies indicate that there are substantial individual differences not only in the *level* of EU but also in the *pace* at which EU develops during the latter part of the preschool years. Hence, children who lag in EU in

Table 4. Predictors and covariates regressed on the intercept and slope of EU from age 4 to 6

	Intercept (4 years)					Slope (change from 4 to 6 years)				
	B	SE B	β	95% CI	p-value	B	SE B	β	95% CI	p-value
Intercept						-.52	.04	-.82	-0.93 to 0.71	<.001
Intrapersonal and demographic factors										
Verbal skills	.00	.00	.05	-0.01 to 0.12	.12	.00	.00	.07	0.02 to 0.13	.01
Gender (% girls)	-.10	.09	-.03	-0.09 to 0.03	.27	.02	.06	.01	-0.05 to 0.07	.75
SES	-.01	.05	-.01	-0.07 to 0.05	.83	.05	.03	.05	-0.01 to 0.11	.07
Interpersonal predictors										
Parental accuracy of mentalization	.98	.29	.76	0.68 to 0.85	<.001	.13	.07	.16	0.03 to 0.30	.02
Emotional availability	.02	.02	.03	-0.05 to 0.11	.42	.00	.01	.00	-0.07 to 0.07	.97
Social skills	-.03	.02	-.05	-0.12 to 0.01	.12	.03	.01	.10	0.04 to 0.17	<.05
R ²			.58		<.001			.51		<.001

Note. EU = emotion understanding; SES = socio-economic status; B = unstandardized regression coefficient; β = standardized regression coefficient.

the mid-preschool period might show rapid increases during the next few years, whereas others display only modest improvements.

Our findings support Banerjee *et al.*'s (2011) claim that a lack of social skills may impair children's ability to develop EU. Most research on the predictors of social-cognitive development has focused on the first 5 years of life, a period during which parents may be more important socialization agents than peers. In the present study, we followed children across the transition from preschool to school, a time when friends become important socialization agents and children develop the ability to mentalize not only their own emotions but also other's emotional reactions. Our results show that children's social skills are a predictor of growth in EU.

Among the parent-related predictors examined in this study, only parental mentalization (not the more behavioural aspect of parental emotional availability) uniquely predicted an increase in EU from age 4 to 6. Hence, the present data suggest that in fostering children's understanding of emotions, parents' ability to mentalize is more important than parental structuring and sensitivity, at least as measured using the Emotional Availability Scales. If the parent knows the child's level of EU, it may be easier to match emotion language and emotion regulation strategies to the child's developmental needs. The parent can behave in a way that fits the child's zone of proximal development to help the child foster better EU.

Or it may be a measurement effect. Parent-child interaction was rated after seeing 30-min videotaped interaction. Many parents may show socially desirable parental behaviour within that time span, but behave otherwise while not being observed. Whereas the way mentalization was measured, socially desirable responding (a parent indicating that their child understands more than it actually does) does not result in a good score, but reveals the discrepancy between parental belief or wish and child actual performance. Future work should seek to test these interpretations of our findings.

Our results are consistent with prior cross-sectional findings that document positive associations between parental mentalization and children's EU (Kårstad, Kvello, Wichstrøm, & Berg-Nielsen, 2014; Meins *et al.*, 1998; de Rosnay *et al.*, 2004) and longitudinal results pertaining to the child's theory of mind by Meins *et al.* (2002). Our mentalization measure directly compares the parental estimate to the child's actual level of EU, and it is less time-consuming to score and interpret the results than other mentalization measures. Future work should examine the covariation of these different mentalization measures.

At the level of individual differences, the stability of EU was modest, with EU at age 4 predicting 2 years later to roughly the same extent as the other age-4 predictors. Starting at age 4 (i.e., when EU is beginning to emerge), one might suspect that modest continuity of EU might result from a floor effect at age 4 when the TEC tasks are too difficult for most 4-year-olds. However, Figure 1 indicates that most children were successful on some EU components, with children's scores at this time varying considerably. Therefore, in combination with high reliability of the TEC, the present findings indicate that there is only modest stability in EU during this developmental period, at least in the population studied. Whether this is also true in other populations is a question for future research.

Although the present research has several strengths, such as prospective multivariate analyses of data from a large and representative community study and the inclusion of a parental mentalization measure, the results should be interpreted in the light of several limitations. First, although our operationalization of parental mentalization follows a well-established tradition (Ha, Sharp, & Goodyer, 2011; Sharp *et al.*, 2006), this specific measure has not been validated beyond the findings of this study. Furthermore, parental

emotional availability was assessed in a laboratory setting, which might have compromised the ecological validity of the study. Additionally, our reliance mainly on mothers calls attention to the need to study fathers and, thereby, comparatively evaluate both maternal and paternal effects – as well as their interacting influence.

While the effects detected were modest in magnitude, they are nevertheless informative with potential translational implications. Most importantly, it should be clear that EU is still developing by the time children start school. As well, it appears that parents' understanding of their child's EU capabilities contributes to its continued growth. This suggests that efforts to facilitate such understanding may contribute to its development, a goal which could be addressed in many ways, no doubt. For example, preschool teachers could be encouraged to inform parents about their children's EU in addition to the intervention programmes already proven useful in research (Domitrovich *et al.*, 2007; Gavazzi & Ornaghi, 2011). If there is a large discrepancy between parent's knowledge of their child's EU, mentalization-based interventions could be introduced with a special focus on parents' ability to read their children's EU.

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References

- Albanese, O., Gavazzi, I. G., Molina, P., Antoniotti, C., Arati, L., Farina, E., & Pons, F. (2006). Children's emotion understanding: Preliminary data from the Italian validation project of Test of Emotion Comprehension (TEC). In F. Pons, M. F. Daniel, L. Lafortune, P. A. Doudin & O. Albanese (Eds.), *Toward emotional competences* (pp. 39–53). Aalborg, Denmark: Aalborg University Press.
- Aznar, A., & Tenenbaum, H. R. (2013). Spanish parents' emotion talk and their children's understanding of emotion. *Frontiers in Psychology*, *4*, 1–11. doi:10.3389/fpsyg.2013.00670
- Banerjee, R., Watling, D., & Caputi, M. (2011). Peer relations and the understanding of faux pas: Longitudinal evidence for bidirectional associations. *Child Development*, *82*, 1887–1905. doi:10.1111/j.1467-8624.2011.01669.x
- Biringen, Z., Robinson, J. L., & Emde, R. N. (1998). *The emotional availability scale* (3rd ed.). Fort Collins, CO: Department of Human Development and Family Studies, Colorado State University.
- Cutting, A. L., & Dunn, J. (1999). Theory of mind, emotion understanding, language, and family background: Individual differences and interrelations. *Child Development*, *70*, 853–865. doi:10.1111/1467-8624.00061
- de Rosnay, M., & Harris, P. L. (2002). Individual differences in children's understanding of emotion: The roles of attachment and language. *Attachment & Human Development*, *4*(1), 39–54. doi:10.1080/14616730210123139
- de Rosnay, M., Harris, P. L., & Pons, F. (2008). Emotional understanding and developmental psychopathology in young children. In C. Sharp, P. Fonagy & I. Goodyer (Eds.), *Social cognition and developmental psychopathology* (pp. 343–385). Oxford, UK: Oxford University Press.

- de Rosnay, M., Pons, F., Harris, P. L., & Morrell, J. M. B. (2004). A lag between understanding false belief and emotion attribution in young children: Relationships with linguistic ability and mothers' mental-state language. *British Journal of Developmental Psychology*, *22*, 197–218. doi:10.1348/026151004323044573
- Denham, S. A. (1986). Social cognition, pro-social behavior, and emotion in preschoolers: Contextual validation. *Child Development*, *57*(1), 194–201. doi:10.2307/1130651
- Denham, S. A. (1998). *Emotional development in young children*. New York, NY: The Guilford Press.
- Denham, S. A. (2006). Social-emotional competence as support for school readiness: What is it and how do we assess it? *Early Education and Development*, *17*(1), 57–89. doi:10.1207/s15566935eed1701_4
- Denham, S. A., Blair, K. A., DeMulder, E., Levitas, J., Sawyer, K., Auerbach-Major, S., & Queenan, P. (2003). Preschool emotional competence: Pathway to social competence? *Child Development*, *74*(1), 238–256. doi:10.1111/1467-8624.00533
- Denham, S. A., & Grout, L. (1993). Socialization of emotion: Pathway to preschoolers' emotional and social competence. *Journal of Nonverbal Behavior*, *17*, 205–227. doi:10.1007/BF00986120
- Denham, S. A., & Kochanoff, A. (2002). Parental contributions to preschoolers' understanding of emotion. *Marriage & Family Review*, *34*, 311–343. doi:10.1300/J002v34n03_06
- Denham, S. A., McKinley, M., Couchoud, E. A., & Holt, R. (1990). Emotional and behavioral predictors of preschool peer ratings. *Child Development*, *61*, 1145–1152. doi:10.1111/j.1467-8624.1990.tb02848.x
- Denham, S. A., Mitchell-Copeland, J., Strandberg, K., Auerbach, S., & Blair, K. (1997). Parental contributions to preschoolers' emotional competence: Direct and indirect effects. *Motivation and Emotion*, *21*(1), 65–86. doi:10.1023/A:1024426431247
- Denham, S. A., Zoller, D., & Couchoud, E. A. (1994). Socialization of preschoolers' emotion understanding. *Developmental Psychology*, *30*, 928–936. doi:10.1037/0012-1649.30.6.928
- Domitrovich, C. E., Cortes, R. C., & Greenberg, M. T. (2007). Improving young children's social and emotional competence: A randomized trial of the preschool "PATHS" curriculum. *The Journal of Primary Prevention*, *28*, 67–91. doi:10.1007/s10935-007-0081-0
- Dunn, J., & Brown, J. (1994). Affect expression in the family, children's understanding of emotions, and their interactions with others. *Merrill-Palmer Quarterly*, *40*(1), 120–137.
- Dunn, J., Brown, J., & Beardsall, L. (1991). Family talk about feeling states and children's later understanding of others' emotions. *Developmental Psychology*, *27*, 448–455. doi:10.1037/0012-1649.27.3.448
- Dunn, J., & Cutting, A. L. (1999). Understanding others, and individual differences in friendship interactions in young children. *Social Development*, *8*, 201–219. doi:10.1111/1467-9507.00091
- Dunn, L. M., & Dunn, L. M. (1997). *Peabody picture vocabulary test* (3rd ed.). Circle Pines, MN: American Guidance Service.
- Dunsmore, J. C., & Karn, M. A. (2004). The influence of peer relationships and maternal socialization on kindergartners' developing emotion knowledge. *Early Education and Development*, *15*(1), 39–56. doi:10.1207/s15566935eed1501_3
- Eisenberg, N., Cumberland, A., & Spinrad, T. L. (1998). Parental socialization of emotion. *Psychological Inquiry*, *9*, 241–273. doi:10.1207/s15327965pli0904_1
- Eyberg, S. M., McDiarmid, N. M., Duke, M., & Boggs, S. R. (2005). *Manual for the dyadic parent-child interaction coding system* (3rd ed.). University of Florida.
- Farrant, B. M., Maybery, M. T., & Fletcher, J. (2013). Maternal attachment status, mother-child emotion talk, emotion understanding, and child conduct problems. *Child Development Research*, *2013*, 1–9. doi:10.1155/2013/680428
- Fonagy, P., & Target, M. (1997). Attachment and reflective function: Their role in self-organization. *Development and Psychopathology*, *9*, 679–700.
- Gadermann, A., Guhn, M., & Zumbo, B. D. (2008). An empirical comparison of Cronbach's alpha with ordinal reliability coefficients alpha and theta. *International Journal of Psychology*, *43*, 55.

- Garner, P. W., & Estep, K. M. (2001). Emotional competence, emotion socialization, and young children's peer-related social competence. *Early Education and Development, 12*(1), 29–48. doi:10.1207/s15566935eed1201_3
- Gavazzi, I. G., & Ornaghi, V. (2011). Emotional state talk and emotion understanding: A training study with preschool children. *Journal of Child Language, 38*, 1124–1139. doi:10.1017/s0305000910000772
- Goodman, R. (1997). The Strengths and Difficulties Questionnaire: A research note. *Journal of Child Psychology and Psychiatry, 38*, 581–586. doi:10.1111/j.1469-7610.1997.tb01545.x
- Gottman, J. M., Katz, L. F., & Hooven, C. (1996). Parental meta-emotion philosophy and the emotional life of families: Theoretical models and preliminary data. *Journal of Family Psychology, 10*, 243–268. doi:10.1037/0893-3200.10.3.243
- Gresham, F. M., & Elliot, S. N. (1990). *Social skills rating system manual*. Circle Pines, MN: American Guidance Service.
- Ha, C., Sharp, C., & Goodyer, I. (2011). The role of child and parental mentalizing for the development of conduct problems over time. *European Child & Adolescent Psychiatry, 20*, 291–300. doi:10.1007/s00787-011-0174-4
- Halberstadt, A. G., Denham, S. A., & Dunsmore, J. C. (2001). Affective social competence. *Social Development, 10*(1), 79–119. doi:10.1111/1467-9507.00150
- Harris, P. (2000). Understanding emotions. In M. Lewis & J. Haviland-Jones (Eds.), *Handbook of emotions* (2nd ed., pp. 281–292). New York, NY: The Guilford Press.
- Hughes, C., & Dunn, J. (1998). Understanding mind and emotion: Longitudinal associations with mental-state talk between young friends. *Developmental Psychology, 34*, 1026–1037. doi:10.1037/0012-1649.34.5.1026
- Hughes, C., Dunn, J., & White, A. (1998). Trick or treat?: Uneven understanding of mind and emotion and executive dysfunction in “hard-to-manage” preschoolers. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 39*, 981–994.
- International Labour Office (1990). *International standard classification of occupations: ISCO-88*. Geneva, Switzerland: Author.
- Kårstad, S. B., Kvello, Ø., Wichstrøm, L., & Berg-Nielsen, T. S. (2014). What do parents know about their children's comprehension of emotions? Accuracy of parental estimates in a community sample of preschoolers. *Child: Care, Health and Development, 40*, 346–353. doi:10.1111/cch.12071
- Maguire, M. C., & Dunn, J. (1997). Friendships in early childhood, and social understanding. *International Journal of Behavioral Development, 21*, 669–686. doi:10.1080/016502597384613
- Meins, E., Fernyhough, C., Russell, J., & Clark-Carter, D. (1998). Security of attachment as a predictor of symbolic and mentalising abilities: A longitudinal study. *Social Development, 7*(1), 1–24. doi:10.1111/1467-9507.00047
- Meins, E., Fernyhough, C., Wainwright, R., Clark-Carter, D., Das Gupta, M., Fradley, E., & Tuckey, M. (2003). Pathways to understanding mind: Construct validity and predictive validity of maternal mind-mindedness. *Child Development, 74*, 1194–1211. doi:10.1111/1467-8624.00601
- Meins, E., Fernyhough, C., Wainwright, R., Das Gupta, M., Fradley, E., & Tuckey, M. (2002). Maternal mind-mindedness and attachment security as predictors of theory of mind understanding. *Child Development, 73*, 1715–1726. doi:10.1111/1467-8624.00501
- Muthén, L. K., & Muthén, B. O. (1998–2013). *Mplus user's guide* (7th ed.). Los Angeles, CA: Author.
- Nelson, J. A., O'Brien, M., Calkins, S. D., Leerkes, E. M., Marcovitch, S., & Blankson, A. N. (2012). Maternal expressive style and children's emotional development. *Infant and Child Development, 21*, 267–286. doi:10.1002/icd.748
- Ontai, L. L., & Thompson, R. A. (2002). Patterns of attachment and maternal discourse effects on children's emotion understanding from 3 to 5 years of age. *Social Development, 11*, 433–450. doi:10.1111/1467-9507.00209

- Oppenheim, D., & Koren-Karie, N. (2013). The insightfulness assessment: Measuring the internal processes underlying maternal sensitivity. *Attachment & Human Development, 15*, 545–561. doi:10.1080/14616734.2013.820901
- Ornaghi, V., Brockmeier, J., & Grazzani, I. (2014). Enhancing social cognition by training children in emotion understanding: A primary school study. *Journal of Experimental Child Psychology, 119*, 26–39. doi:10.1016/j.jecp.2013.10.005
- Pons, F., & Harris, P. (2000). *Test of emotion comprehension: TEC*. Oxford, UK: Oxford University Press.
- Pons, F., & Harris, P. L. (2005). Longitudinal change and longitudinal stability of individual differences in children's emotion understanding. *Cognition & Emotion, 19*, 1158–1174. doi:10.1080/02699930500282108
- Pons, F., Harris, P. L., & de Rosnay, M. (2004). Emotion comprehension between 3 and 11 years: Developmental periods and hierarchical organization. *European Journal of Developmental Psychology, 1*, 127–152. doi:10.1080/17405620344000022
- Pons, F., Lawson, J., Harris, P. L., & de Rosnay, M. (2003). Individual differences in children's emotion understanding: Effects of age and language. *Scandinavian Journal of Psychology, 44*, 347–353. doi:10.1111/1467-9450.00354
- Raikes, H. A., & Thompson, R. (2008). Conversations about emotion in high-risk dyads. *Attachment & Human Development, 10*, 359–377. doi:10.1080/14616730802461367
- Root, A. K., & Denham, S. A. (2010). The role of gender in the socialization of emotion: Key concepts and critical issues. In A. K. Root & S. A. Denham (Eds.), *Focus on gender: Parent and child contributions to the socialization of emotional competence* (Vol. 128, pp. 1–9). San Francisco, CA: Jossey-Bass.
- Saarni, C. (Ed.) (1999). *The development of emotional competence*. New York, NY: The Guildford Press.
- Sharp, C., & Fonagy, P. (2008). The parent's capacity to treat the child as a psychological agent: Constructs, measures and implications for developmental psychopathology. *Social Development, 17*, 737–754. doi:10.1111/j.1467-9507.2007.00457.x
- Sharp, C., Fonagy, P., & Goodyer, I. M. (2006). Imagining your child's mind: Psychosocial adjustment and mothers' ability to predict their children's attributional response styles. *British Journal of Developmental Psychology, 24*, 197–214. doi:10.1348/026151005X82569
- Southam-Gerow, M. A., & Kendall, P. C. (2002). Emotion regulation and understanding – implications for child psychopathology and therapy. *Clinical Psychology Review, 22*, 189–222. doi:10.1016/S0272-7358(01)00087-3
- Sveen, T. H., Berg-Nielsen, T. S., Lydersen, S., & Wichstrøm, L. (2013). Detecting psychiatric disorders in preschoolers: Screening with the Strengths and Difficulties Questionnaire. *Journal of the American Academy of Child & Adolescent Psychiatry, 52*, 728–736. doi:10.1016/j.jaac.2013.04.010
- Tenenbaum, H. R., Alfieri, L., Brooks, P. J., & Dunne, G. (2008). The effects of explanatory conversations on children's emotion understanding. *British Journal of Developmental Psychology, 26*, 249–263. doi:10.1348/026151007X231057
- Tenenbaum, H. R., Visscher, P., Pons, F., & Harris, P. L. (2004). Emotional understanding in Quechua children from an agro-pastoralist village. *International Journal of Behavioral Development, 28*, 471–478. doi:10.1080/01650250444000225
- Wichstrøm, L., Berg-Nielsen, T. S., Angold, A., Egger, H. L., Solheim, E., & Sveen, T. H. (2012). Prevalence of psychiatric disorders in preschoolers. *Journal of Child Psychology and Psychiatry, 53*, 695–705. doi:10.1111/j.1469-7610.2011.02514.x
- Zumbo, B. D., Gadermann, A. M., & Zeisser, C. (2007). Ordinal versions of coefficients alpha and theta for Likert rating scales. *Journal of Modern Applied Statistical Methods, 6*(1), 21–29.