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Children's temperament moderates the long-term effects of pedagogical practices in ECEC on children's externalising problems

Tiril Wilhelmsen[a,b], Ratib Lekhal[c,d], Nina Alexandersen[a,b], Ragnhild E. Brandlistuen[a] and Mari V. Wang[a]

[a]Department of Child Health and Development, Norwegian Institute of Public Health, Oslo, Norway; [b]Department of Psychology, University of Oslo, Oslo, Norway; [c]Department of Communication and Culture, Norwegian Business School, Oslo, Norway; [d]Department of Education, University of Oslo, Oslo, Norway

ABSTRACT

In this study, we explored how free play and scaffolding practices in Early Childhood Education and Care (ECEC) related to children's externalising problems both in ECEC and later in school. Furthermore, we aimed to reduce the knowledge gap of whether these relations depended on children's differences in emotional temperament. We used structural equation modelling to analyse data from 7421 children from the Norwegian Mother, Father and Child Cohort Study. Results indicated that more free play associated with less externalising problems in ECEC for children in general. For children with higher emotionality, more free play related to increased externalising problems in school. Scaffolding in ECEC was not associated with externalising problems, but moderated the longitudinal association of free play for children with higher emotionality. All children benefited from free play in ECEC for their concurrent mental health. However, for children with higher emotionality, more free play in ECEC might be a risk factor for reduced mental health in school, where there is less free play than in ECEC. More scaffolding in combination with free play in ECEC can reduce this risk. Further research should address the content of play and scaffolding practices in more detail.

KEYWORDS

Early childhood education; free play; scaffolding; mental health; child temperament; MoBa

Introduction

Externalising problems, such as aggressive behaviour, inattention and hyperactivity, are some of the most prevalent mental health difficulties among children in the preschool and early school years (Vasileva et al. 2020). Such difficulties can have consequences for children's development and transition from preschool to school, and are therefore important to include in research on the effects of quality of Early Childhood Education and Care (ECEC). ECEC is a prominent part of children's developmental environment in Norway where 97% of children attend ECEC before school age

CONTACT Tiril Wilhelmsen tiwi@fhi.no Department of Child Health and Development, Norwegian Institute of Public Health, Post box 222 Skøyen, Oslo 0213, Norway

(Statistics Norway 2020). The Norwegian context is therefore ideal for investigating the developmental effects of attending ECEC. Over the past decades emerging results indicate that quality aspects that are more proximal to the children's daily experiences are most important for their mental health development (Melhuish et al. 2015). In particular, a relationship between the teacher and child characterised as warm, supportive and low in conflict, is associated with development of less externalising problems during early childhood (e.g. NICHD ECCRN 2002; Sabol et al. 2013; Skalická et al. 2015). However, little attention has been devoted to the effects of other proximal quality aspects, e.g. pedagogical practices and activities, on mental health outcomes (Burchinal 2018). These practices have mainly been researched in relationship with academic school readiness (Goble and Pianta 2017; Ulferts, Wolf, and Anders 2019). The term 'school readiness' should, however, also include social and behavioural outcomes and mental health (Goble et al. 2016; Goble and Pianta 2017). Therefore, the current study examines the associations between practices in ECEC and children's development of externalising problems in preschool at age 5, and in school at age 8 years. Additionally, considering that we do not expect all children to react to such practices in the same way (Phillips, Fox, and Gunnar 2011), we examine whether the associations between practices and externalising problems are stronger for some children than others.

The Norwegian ECEC model

All children in Norway have the right to attend ECEC in their municipality of residence, from the age of one year until they start school at 6 years of age (The Kindergarten Act 2006 §12a). The Norwegian ECEC is publicly subsidized and is increasingly seen as a formalised part of education in Norway (Gulbrandsen 2018). All centres, both public and private, are obliged to follow the nationally regulated quality standards (The Kindergarten Act 2006) concerning, for example, staff's education, teacher–child ratio and content of curriculum. As a result, children in Norway, regardless of their family background, have universal access to relatively high quality ECEC with regulated homogenous structures. This is seen as a mean to increase equity in children's further development (UNICEF Office of Research 2018).

The national curriculum is described in the Framework Plan for Kindergartens (The Norwegian Directorate for Education and Training 2017), which is a set of guidelines and aims for contents and practices in ECEC. Concerning practice, the Framework Plan states that one of the core values is that teachers should preserve the children's right to play. Free play is seen as a spontaneous play, with the purpose of being fun. As such, children can choose their own activities and playmates, and not be interrupted by teacher-led activities or targeted learning outcomes.

Equally important, The Framework Plan states that teachers should *engage* in play, and facilitate activities and play situations that foster learning, self-efficacy and healthy development. This requires the teachers to actively guide children in a way adjusted to their individual levels of development. These aims correspond to the theoretical term of scaffolding, introduced by Bruner (1978), and related to Vygotsky's theory of the zone of proximal development (Vygotsky 1987). Hence, teachers can challenge the children by accommodating for play just above their developmental level, extending their level of mastery from what they would manage alone. Importantly, scaffolding practice

can occur in many different contexts, and is thus not equivalent to direct instruction or formal teacher-led activities.

Although the implementation of the Framework Plan is universal for all Norwegian centres, there is variation in how each centre interprets and implements this plan in their daily work, and which practices the teachers value higher (Gulbrandsen and Eliassen 2013; Lekhal et al. 2013). Thus, children may experience different pedagogical practices in their preschool years.

Pedagogical practice in ECEC

Pedagogical practices encompass a wide range of dimensions regarding how teachers work with the children, such as methods of work, daily routines, and whole-group or individual activities. These are described both in the ECEC-literature (e.g. Chien et al. 2010; Fuligni et al. 2012) and in the Norwegian Framework Plan. As free play and scaffolding are both core values in the Framework Plan, this study is delimitating the investigation to these practices, acknowledging that these are not exclusive to the term of pedagogical practices. Internationally, it is debated to what extent ECEC centres should favour learning and preparation for school, and letting the children play freely without the focus on performance (e.g. Miller and Almon 2009; Bubikova-Moan, Hjetland, and Wollscheid 2019). Engaging in more free play in early education has been seen as a way to preserve children's right to play, in adherence to the United Nation's Convention on Rights of the Child (hereafter UNCRC; Miller and Almon 2009; The Norwegian Directorate for Education and Training 2017).

The values of learning activities and play are not necessarily mutually exclusive, and teachers across many nations differ in their views of how compatible play and learning are (Bubikova-Moan, Hjetland, and Wollscheid 2019). Thus, how much time is devoted to each practice may vary. In the USA, Fuligni et al. (2012) divided a broad array of childcare centres into two programme profiles. First, a 'high free-choice'-profile where the children had the majority of the time allocated to choose activities and playmates on their own, more time in outdoor activities and more child engagement in fantasy and gross motor play. Secondly, a 'structured-balanced' profile with about equal time devoted to free-choice and teacher-directed activities, more scaffolding practice and more child engagement in learning activities. Similarly, in Norway, Gulbrandsen and Eliassen (2013) found an increase from 2008 to 2012 in the teachers' systematic work with learning and linguistic competence in ECEC, but also an increase in work with play and social competence. In both reports, the authors conclude that most centres devote some time to all the different practices, but there is indeed variation across centres in how much time they devote to each.

This variation has led researchers to investigate whether some pedagogical practices are more beneficial for children than other practices. The majority of research conducted on practice and curriculum quality have by and large focused on their effects on children's learning outcomes. In particular, Fuligni et al. (2012) found that a structured-balanced profile was related to better vocabulary abilities at the end of the preschool year, compared to a free-choice profile. Another study in the USA, found that children who attended programmes with high free play had lower gains in language and maths scores, compared to children in programmes with more scaffolding or more individual

instruction (Chien et al. 2010). More recent results support these findings, suggesting that more time in free play and less time in teacher-led activities associated with less gains in language abilities (Goble et al. 2016; Goble and Pianta 2017). Together, such results may advocate for a more teacher-directed and instructional practice in ECEC, thereby facilitating learning outcomes and school readiness.

However, to capture children's full 'school readiness', the term should also include other essential aspects of child development, such as their mental health. Mental health and learning are interrelated (Demaray and Jenkins 2011), and detecting potential associates of early educational experiences with mental health difficulties can have preventive effects for further development in both domains. Among the few studies that have investigated mental health outcomes in relation to ECEC practices, Fuligni et al. (2012) found that programme profiles were unrelated to children's happiness, anxiety or self-regulation during learning tasks, and Goble et al. (2016) found negative associations between more free play and children's levels of social skills. Both of these studies were conducted among a small sample of low-income families in the USA, thereby calling for more extensive research to enhance our understanding of the associations between ECEC practices and mental health development for all children.

Importantly, these types of practices may interact with each other so that combinations of practices might benefit children above that of one practice. Indeed, Goble et al. (2016) found that teachers' conversations with children during free play settings were associated with *better* social development scores. Similarly, teachers' instructional support (closely related to scaffolding practice) during free play was associated with *more* gains in language abilities (Goble and Pianta 2017). These results from the interactions were in contrast to the detrimental main effects of time spent in free play found on these outcomes, emphasizing that teachers' engagement during free play does matter.

Equally, these practices may interact with children's individual differences. Most research in the ECEC field has focused on what types of quality confer risk or protective factors. Yet, these can be different depending on child characteristics and temperament, suggesting that not everyone will benefit equally from the same stimuli (Phillips, Fox, and Gunnar 2011). Therefore, it is important to study whether some children are more sensitive to pedagogical practices than others.

Children's individual differences

Children develop when their personal characteristics interact with the environment (Pianta, Hamre, and Stuhlman 2003). For example, the development of externalising problems in response to poor family income differs depending on children's emotional reactivity (Bøe, Hysing, and Zachrisson 2016). We might therefore expect that children also react differently to stimuli in ECEC depending on their personal characteristics. Small and inconsistent results for the associations between ECEC quality and externalising problems led researchers to believe early on that the associations were only true for some children (Crockenberg 2003). In line with this expectation, Pluess and Belsky (2009) found that children with higher negative emotional temperament were more sensitive to the quality of the teacher–child relationship in ECEC than children who had lower negative emotionality, when measuring behavioural problems and social skills. Similarly,

children with 'difficult' temperament benefited more from the teachers' instructional support for their teacher–child closeness, compared to children with 'easy' temperament (Curby et al. 2011). With such results in mind, Phillips, Fox, and Gunnar (2011) argue that it is essential to investigate the role of individual differences, such as child temperament, to enhance our understanding of how experiences in ECEC can be beneficial for social and behavioural development for some children, but might increase the risk of developmental difficulties for other children. They emphasize the outcome of social and behavioural development in particular, as there are more inconsistencies in results concerning this domain of development in relation to ECEC quality. Although research on children's temperament in interaction with ECEC quality, such as teacher–child relationship, is emerging, little attention is given to pedagogical practices.

The current study

Based on the notion that practice-quality is a more neglected domain in investigations of behavioural and social outcomes within ECEC research (Burchinal 2018), and that individual differences in temperament seem especially important for pathways to behavioural and social outcomes (Phillips, Fox, and Gunnar 2011), the current study has two aims. First, we explore whether there are associations between how commonly the teachers facilitate for free play and scaffolding, and the potential combination of these, and the children's levels of externalising problems reported by both the ECEC-teacher at 5 years, and the school-teacher at 8 years.

Second, we investigate whether children's levels of emotionally reactive temperament across early childhood moderate the associations between free play, scaffolding and externalising problems. Based on previous results we hypothesize that children with higher emotional reactivity are more sensitive to variations in practice, and therefore have stronger effects compared to children with lower emotional reactivity.

Method

Participants

The study is based on a sub-cohort of participants in the Norwegian Mother, Father and Child Cohort Study (MoBa). MoBa is a prospective population-based pregnancy cohort study conducted by the Norwegian Institute of Public Health (Magnus et al. 2016). Participants were recruited from all over Norway from 1999 to 2008, and the women consented to participation in 41% of the pregnancies. The cohort now includes 114,500 children, 95,200 mothers and 75,200 fathers. Follow-up questionnaires were administered at regular intervals during pregnancy and when the children were 6 months, 18 months, 3 years, 5 years and 8 years. The establishment of MoBa and initial data collection was based on a license from the Norwegian Data Protection agency and approval from The Regional Committee for Medical Research Ethics. The MoBa cohort is regulated by the Norwegian Health Registry Act. The current study was approved by The Regional Committees for Medical and Health Research Ethics (2018/1918/REK sør-øst).

We used the tenth version of the quality-assured dataset, which was released for research in 2017 (Norwegian Institute of Public Health 2019). When the children had

turned 5 years, ECEC-teachers of the children born between 2006 and 2009 were invited to evaluate the child development and behaviour, and ECEC quality in an ECEC-questionnaire (Q-Cc). At 8 years, school-teachers of the same children were invited to report on school quality and child development and functioning.

This study includes data from 7421 children (50.2% boys; mean age 5.5 years) whose ECEC-teachers returned the Q-Cc (response rate 40%). For the longitudinal outcomes, we used data from the school-teachers' questionnaire at 8 years old (available 43%; mean age 8.5 years). Additionally, we used available data from three waves of the mothers' questionnaires for child characteristics such as temperament and gender [at 18 months (99% available), 3 years (87% available) and 5 years (94% available) old]. Due to attrition in the school-questionnaire at 8 years we compared the children with complete and incomplete data for the longitudinal variables. There were no differences in emotionality scores or gender balance at 5 years. Children in the attrition sample were slightly higher on externalising problems at 5 years than the complete sample, but non-significantly. Finally, mothers of children in the complete sample were slightly more educated than mothers in the incomplete sample ($\beta = 0.03$, $p = .011$).

Measures

Externalising problems

At 5 years, the ECEC-teachers rated the children's externalising problems using three items (e.g. '*gets in many fights*') from the Child Behaviour Checklist aggression subscale (Achenbach and Ruffle 2000), and seven items (e.g. '*inattentive, easily distracted*' and '*fidgets with hands or feet, squirms in seat*') of inattention and hyperactivity from the Conners' Parent Rating Scale – Revised (Conners et al. 1998). Teachers responded on a 3-point and 4-point Likert scale respectively, and therefore ordinal alpha levels were calculated (Gadermann, Guhn, and Zumbo 2012) indicating good reliability ($\alpha = .78$ for CBCL, and $\alpha = .93$ for CPRS-R).

At 8 years, the school-teachers rated the children's externalising problems using a 4-point scale on a total of 26 items from the Rating Scale for Disruptive Behavioural Disorders (Silva et al. 2005). The items compiled the subscales of oppositional/defiant disorder (eight items, e.g. *deliberately annoys people*; $\alpha = .92$), hyperactivity (nine items, e.g. *fidgets with hands or feet, squirms in seat*; $\alpha = .96$), and inattention (nine items, e.g. *is easily distracted*; $\alpha = .96$).

At both 5 and 8 years old, the individual subscales were combined into an 'externalising problems'-score for each year of measurement, as the subscales were highly correlated ($r = .75$ at 5 years, and $r = .63$–$.80$ at 8 years). We estimated second order latent variables for each year where the subscales had equal factor loadings on the externalising problems score. Both measures showed good model fit (5 years: RMSEA = 0.05, CFI/TLI = 0.99/0.99; 8 years: RMSEA = 0.05, CFI/TLI = 0.97/0.97).

ECEC-practice

The ECEC-teachers evaluated eight items concerning their usual practice in the child's unit the past three months, on a 6-point scale from 1-'very uncommon practice' to 6-'very common practice' (for full item list and descriptions, see appendix). These items were developed based on the Framework Plan for Kindergartens for the purpose of

this study, in collaboration with an advisory board with members representing ECEC-teachers, educational authorities, policymakers and researchers. An exploratory factor analysis indicated that two factors were appropriate. The free play factor (three items) measured whether the teachers usually let the children choose their own activities and play mates, and whether they could play undisturbed. We use the term 'free play', although the items also correspond to what other studies might call free-choice settings, or child-managed settings (Fuligni et al. 2012; Goble and Pianta 2017). Sensitivity analyses indicated that undisturbed play drove many of the effects of free play. We still chose to use all three items for better power. A latent measure of free play was constructed with the three items, indicating a model which was just identified and thus had a perfect model fit.

The scaffolding factor (five items) measured whether the teachers actively looked for situations to guide children, accommodated for activities and adjusted conversations at the appropriate level for the children to develop. A latent measure of scaffolding was constructed with the five items, indicating excellent model fit (RMSEA = 0.04, CFI/TLI = 0.996/0.989).

Temperament

The mothers rated their child on negative emotionality using three items from the Emotionality, Activity and Shyness Temperament Questionnaire (EAS; Buss and Plomin 1984) on a scale from 1-'not typical at all' to 5-'very typical'. The items were '*your child cries easily*', '*your child gets upset or sad easily*' and '*your child reacts intensively when upset*'. Sum scores from the three items were produced for the children at 18 months (mean = 8.08, SD = 2.33), 3 years (mean = 8.30, SD = 2.36) and 5 years (mean = 7.33, SD = 2.54), and an early childhood emotionality score was produced by an average score of these three sums (mean = 7.87, SD = 1.96, Cronbach's $\alpha = .70$). This score was standardized to *z*-scores when used in the analyses.

Covariates

Due to gender differences in levels of externalising problems (Table 1), all analyses were controlled for gender, collected from mother reports and the Medical Birth Registry (MBRN). The MBRN is a national health registry containing information about all births in Norway (Irgens 2000). We also controlled for temperament in the main effect analyses.

Sensitivity analyses indicated that controlling for children's age at the time of filling in the ECEC-questionnaire, birth-month of the year, or earlier externalising problems at the

Table 1. Bivariate correlations between included variables.

		1	2	3	4	5
1	Externalising problems 5 years					
2	Externalising problems 8 years	**.65**				
3	Free play	**−.14**	−.02			
4	Scaffolding	**−.09**	−.01	**.55**		
5	Emotionality	**.06**	**.10**	.02	.02	
6	Gender (1 = boys, 2 = girls)	**−.36**	**−.47**	**.06**	.02	.01

Note: **Bold** = $p < .001$.

age of 18 months (mother reported) did not change any result, and we present results without these covariates.

Statistical analyses

All data were analysed using Mplus version 8.2 (Muthén and Muthén 2017). For externalising problems at 5 and 8 years, free play and scaffolding in ECEC we constructed latent measures with categorical items, using the WLSMV estimator and Theta parameterization. First, we estimated a main effect model where free play and scaffolding predicted externalising problems at 5 and 8 years. Externalising problems at 5 years also predicted externalising problems at 8 years, and children's gender and temperament were included as covariates.

Next, we created three interaction terms between free play, scaffolding and emotionality. These were included in the model in two steps, predicting externalising problems at 5 and 8 years, respectively, using the MLR estimator, and specified type = random and algorithm = integration for latent interaction analyses (Muthén and Muthén 2017).

Finally, to illuminate the significant interactions, we calculated simple slopes for the associations between free play and externalising problems at two values of temperament (±1SD), in line with the analyses used by Pluess and Belsky (2009), and two values of scaffolding (±1SD).

Results

The bivariate correlations (Table 1) indicate that free play and scaffolding in ECEC were positively correlated with each other, and negatively correlated with externalising problems at 5 years, but not at 8 years. Children's temperament was not associated with type of practices, but children with higher emotionality had more externalising problems at both 5 and 8 years. Girls had less externalising problems than boys, and slightly more free play, but there were no gender differences in scaffolding practices, nor in temperament.

ECEC practices and externalising problems

The specified model accounting for the associations between ECEC practices and externalising problems for all children ($N = 7421$) fitted the data well (RMSEA = 0.02, CFI/TLI = 0.98/0.97). It indicated that when teachers typically practiced free play children had less externalising problems at 5 years of age (Table 2). Conversely, free play practice associated with more externalising problems at 8 years, although not significantly at $p < .05$ level. The typical practice of scaffolding was not significantly related to externalising problems at neither 5 nor 8 years, when controlling for free play.

Interactions between practices and temperament

Next, we included the latent interaction terms between practices and temperament in predicting externalising problems at 5 and 8 years respectively. The free play by emotionality interaction was significant at 8 years old, and non-significant at 5 years old (Table 2)

Table 2. The main effects of practice on externalising problems at ages 5 and 8 years from the specified model, and the interaction effects between practices and emotionality as added in a second model.

	Externalising problems 5 years β [95% CI]	Externalising problems 8 years β [95% CI]
All children (N = 7421)		
*Main effects**		
Free play	**−.12 [−.17:−.07]**	.06 [−.01:.13]
Scaffolding	−.02 [−.07:.03]	.01 [−.06:.08]
*Interactions***		
Free play × emotionality	.04 [−.02:.10]	**.08 [.01:.16]**
Scaffolding × emotionality	−.02 [−.07:.04]	−.04 [−.12:.04]
Free play × scaffolding	.01 [−.02:.04]	−.02 [−.06:.02]
Children with high emotionality (N = 1203)**		
Free play × scaffolding	−.02 [−.12:.07]	**−.11 [−.20:−.02]**

*Controlled for child gender and temperament.
**Controlled for child gender.
Note: **Bold** = $p < .050$.

indicating that with higher emotionality the stronger the longitudinal association between more free play in ECEC and increased externalising problems at 8 years old. The simple slopes (Figure 1) revealed that children with higher emotionality were more at risk of externalising problems at 8 years with more free play in ECEC, while children with lower emotionality were not. The interaction between scaffolding and temperament did not predict externalising problems at either ages.

Interactions between free play and scaffolding

Finally, we tested the interaction between free play and scaffolding. This interaction was not predicting externalising problems at neither 5 nor 8 years (Table 2). However, as the

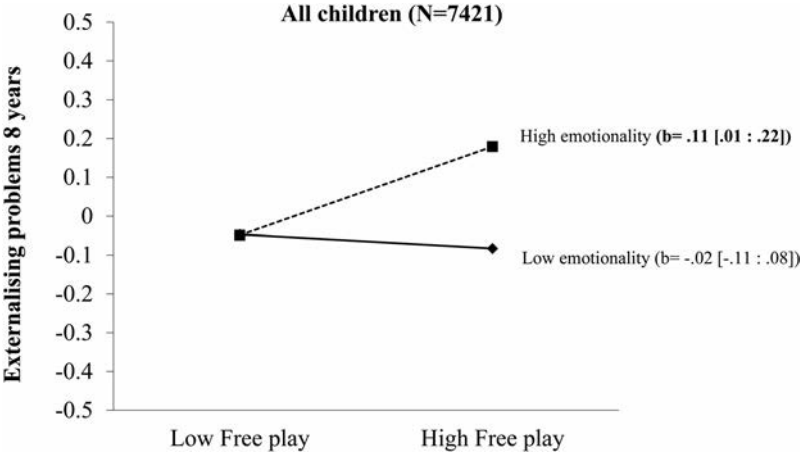

Figure 1. Interactions between free play in ECEC and emotionality predicting externalising problems at 8 years (standardised). High and low emotionality represent 1 SD above and below the mean, respectively.

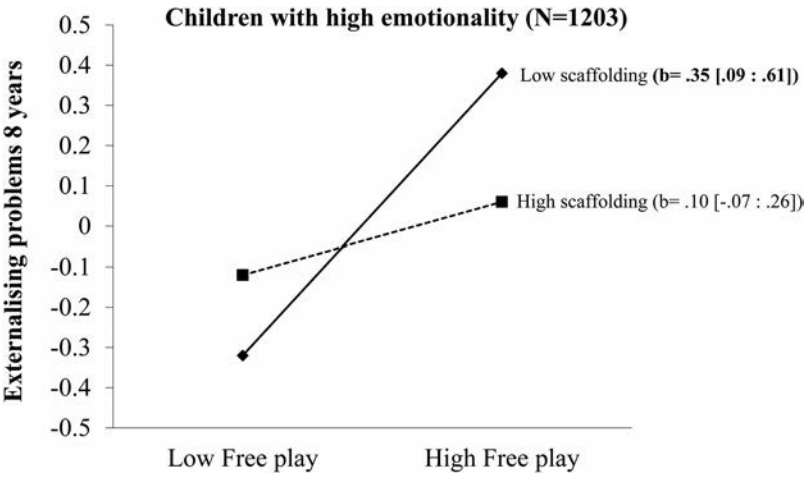

Figure 2. Interaction between free play and scaffolding in ECEC predicting externalising problems at 8 years (standardised) for children with high emotionality (+1SD; $N = 1203$). High and low scaffolding represent 1 SD above and below the mean, respectively.

effects of practices were mainly found for children with high emotionality, we also tested this interaction term for children with high levels of emotionality ($N = 1203$). This was significant at 8 years old, indicating that when teachers practiced more scaffolding, the risk of increased externalising problems at 8 years with more free play in ECEC was reduced for children with higher emotionality (depicted in Figure 2).

Discussion

This study aimed to uncover concurrent and longitudinal associations between pedagogical practices in ECEC and children's development of externalising problems, and potential differences in these depending on children's temperament. We found that when teachers typically practiced free play, children were rated with less externalising problems in ECEC. Scaffolding practice in ECEC was not significantly related to externalising problems, neither was the interaction between the two practices. For children with more emotionally reactive temperaments, however, free play in ECEC was significantly associated with more externalising problems at 8 years old. A typical practice of scaffolding as well as free play in ECEC reduced this long-term effect for children with more emotionally reactive temperament, indicated by the negative interaction between the practices for this group of children.

Practices and mental health

This study responds to the request for research linking play time in ECEC with mental health outcomes reported in the Alliance of Childhood report from the USA (Miller and Almon 2009), and is to the best of our knowledge, the first to explore associations between free play in ECEC and children's externalising problems. That free play was associated with less externalising problems in ECEC strengthen the belief that ECEC

centres should preserve the children's rights to play and to be heard, as core values in the Norwegian Framework Plan, based on the UNCRC (The Norwegian Directorate for Education and Training 2017).

The results extend those of Fuligni et al. (2012) who did not find associations between the 'high free-choice'-profile and measures of children's happiness, anxiety and self-regulation during academic tasks. Furthermore, the results can be seen in contrast to those of Goble et al. (2016) that more time in free play associated with lower social skills. Although social skills and externalising problems are different constructs, they can both be included in the social-emotional domain of development. Perhaps children adjust their behaviour better if they are allowed free play to engage within their own interest, without excessive direct instructions or pressure to perform to teacher's demands. Thus, one could expect free play to be associated similarly to both constructs, i.e. positively to social skills, and negatively to externalising problems. It is likely that differential effects occur because it matters what happens during free play. Goble et al. (2016) found that conversations with the teacher during free play associated with better social development. Moreover, it is evident from early research of play behaviour that self-regulation was more linked to both social and pretend play than to solitary play (Elias and Berk 2002). Hence, the mechanisms through which free play might promote mental health can include the quality of children's interactions with peers and teachers during this free play time, and these mechanisms may account for different results. Further research should take these interactions with teachers and peers into account to understand how free play practice might benefit children's mental health within the ECEC years.

From the current results it seems that allowing children to choose their own activities and play mates and play undisturbed from other planned activities benefit children by a decrease of 12 per cent of a standard deviation in externalising problems at 5 years of age. Despite this being a small effect size, it may constitute a meaningful reduction for children's development and learning, as these are interrelated (Demaray and Jenkins 2011). Children's externalising problems associate with more teacher–child conflict (Skalická et al. 2015) and higher risk of peer-victimization (Øksendal et al. 2019) in early childhood. Hence any reduction in children's concurrent externalising problems may improve their mental health and daily experiences within the ECEC years.

Scaffolding practice did not significantly associate with externalising problems at 5 or 8 years old. Defined by challenging the children to develop further and accommodating for activities and conversations slightly above their normal level, scaffolding by more experienced teachers can, according to Vygotsky's theory about the zone of proximal development, help children thrive in multiple domains, both socially and academically (Bodrova 2008). In order to prevent mental health problems through scaffolding, however, teachers might need certain competences, or exceptional adjustment to each individual child.

Similarly, its effect on mental health might depend on what behaviours or skills the teachers scaffold. Scaffolding in this paper refers to the teachers' view and value of being proactively engaged and interact with the children to foster development. We could not determine from our data what types of knowledge the teachers believe essential, nor the content of the scaffolding practice. Nevertheless, it is likely that the topics of the conversations and of the curriculum are relevant to the developmental outcomes for children. The outcomes may be domain-specific, for instance that scaffolding in social situations may

increase social development. On the other hand, it could also be that the teachers' attention and engagement given through scaffolding, regardless of content, might impact mental health development positively. The child benefits may therefore not be domain-specific to the content (e.g. Uslu 2020). Thus, teacher characteristics, the quality of the teacher–child relationship and the scaffolding topic need investigation in order to detect how the scaffolding practices can associate with mental health in ECEC.

Which practices the ECEC-teachers typically practiced did not significantly associate with long-term development of externalising problems for children in general. This could mean that preschool effects might fade with time and the transition to school. Nevertheless, small long-term effects can also occur due to differential effects based on children's individual characteristics (Phillips, Fox, and Gunnar 2011).

Moderations by children's temperament

The longitudinal association between free play in ECEC and more externalising problems at 8 years of age was apparent only among children with higher emotional temperament. Such differential effects on mental health outcomes are in line with previous results indicating higher susceptibility to ECEC quality among children with higher emotional temperament (Pluess and Belsky 2009, 2010), yet the current results are the first to show this for pedagogical practice.

In contrast to the beneficial effect of free play found for externalising problems in ECEC for all children, children with higher emotional temperament experienced higher risk of externalising problems in school with more free play in ECEC. The transition to school, with its discontinuity in pedagogical practices, is perhaps harder for these children, resulting in increased externalising problems. Concerns about reduced play time and more academic preparation in preschools have been raised (Miller and Almon 2009) debating the pedagogical practice in ECEC. Likewise, one might also debate the pedagogical practices in school, questioning whether school-teachers should opt for more diverse pedagogies. Perhaps teachers can include more playful learning in the early school years, thereby accommodating in particular, for children with higher emotional temperament. Research of different pedagogical practices in school, and their associations with mental health issues, is therefore warranted to enhance our understanding of children's successful transition to school.

Among children with higher emotional temperament, we also found an interaction effect between free play and scaffolding predicting externalising problems at 8 years old. This indicated that if teachers typically practiced more scaffolding, the increased risk of externalising problems in school from more free play in ECEC was reduced, almost eliminated. A potential explanation of these effects could be that children with higher emotional temperament might need more scaffolding and guidance from teachers in order to benefit from free play. As discussed above, the quality of children's interaction with peers and teachers during free play might play a role in these effects. Research of such potential mechanisms should therefore include children's characteristics such as temperament.

Alternatively, the negative interaction can be interpreted the other way around, suggesting that when free play practice is not common, more scaffolding seems associated with *more* externalising problems. Conversely, when free play practice is common, more

scaffolding seems associated with *less* externalising problems. With this line of argument, scaffolding practice in ECEC, which is associated with improved learning outcomes (Chien et al. 2010) and thought to help children thrive socially (Bodrova 2008), will not compromise children's mental health as long as it happens in combination with free play, particularly for children with higher emotional temperament.

In sum, the interaction indicates, in agreement with Goble and colleagues' (2016, 2017) studies, that it matter what the teachers do during free play, and the combination of practicing both free play *and* scaffolding is of particular benefit for children's mental health. This is in line with the practice termed *guided play* (Hirsh-Pasek and Golinkoff 2011), characterised by teachers engaging in and facilitating child-initiated play in order to promote school readiness. The results imply that through the combination of these practices, teachers can preserve the children's right to play, in adherence to the Norwegian Framework Plan and the UNCRC, facilitating mental health development within the ECEC years. At the same time they can also enrich and accommodate for play which fosters a healthy social development longitudinally. This seems of particular benefit for children with higher emotional temperament.

The current results contribute to the research necessary for establishing knowledge-based policies for ECEC practices. Regarding such policies, Hirsh-Pasek and Golinkoff (2011) argue that academic learning should not outweigh social development. Yet, Bubikova-Moan, Hjetland, and Wollscheid (2019) report in their synthesis, that teachers find the delivery pressure for academic school readiness posing challenges for practicing *play-based learning*. Hence, research bridging pedagogical practices with social and behavioural development is essential to guide policy-makers. The results from the current study represent the beginning steps, and encourage further investigations on free play, scaffolding and other dimensions of pedagogical practices, and how they can improve children's development.

Limitations

Despite the strengths of this nationwide cohort study of MoBa, the sample was limited by selection, non-response bias and attrition. Previous studies on longitudinal surveys in Norway, including the MoBa, indicated that estimates of associations were robust, whereas estimates of means and prevalence were biased by attrition and self-selection, (Nilsen et al. 2009; Gustavson et al. 2012; Gustavson, Røysamb, and Borren 2019). Nevertheless, in recent analyses using MoBa data, the authors concluded that estimates of associations may also be biased (Biele et al. 2019). Previous estimations indicate that mothers in MoBa have on average better health and socioeconomic status compared to the Norwegian population in general (Nilsen et al. 2009). In our analyses on differences between children with complete and incomplete longitudinal data, children did not differ on the study variables at 5 years old, but children with complete data had mothers with higher average of years of education. Consequently, the parameters in the present study might be underestimated due to overrepresentation of children from high-functioning families both in the complete sample, and in the follow-up sample at 8 years. This means that in the population in general, with more variation in children's mental health and family background, we might expect stronger, rather than weaker effects.

We cannot conclude, based on our analyses, why the association between free play and externalising problems occurs, especially for the concurrent effects at 5 years old. As opposed to our interpretation that free play reduces children's externalising problems, the direction of the association could be reversed if children with more externalising problems are allowed more free play. We argue this is less likely, as adjusting for mothers' report of children's early externalising problems did not change the results. Further research will need to replicate and extend these results to determine such directions of effects.

The fact that the ECEC-teachers reported on both practices and child behaviour in ECEC could potentially result in reporter bias of these estimates. Yet, the inclusion of the longitudinal data reported by the school-teachers and that temperament was reported by the mothers are major strengths of this study.

Finally, teachers self-reported free play and scaffolding. More objective, observational measures of practice might have yielded more precise estimates, but were unfeasible in this study given the large sample. We argue that these measures represent the teachers' values of these practices, and that we minimize measurement error by using latent variables. Although the measures of free play and scaffolding were developed to correspond to the actual practices of ECEC-teachers described in the Framework Plan for Kindergartens, we acknowledge that these do not capture all elements of ECEC practices. There are also other dimensions within free play and scaffolding (e.g. different types of play and the content of scaffolding, as discussed above), that were not available in the current study. Such dimensions are of interest for further investigations to advance the knowledge of how pedagogical practice may improve children's development.

Conclusion

This investigation suggests that free play in ECEC is beneficial for mental health within the ECEC years, but that it might increase the risk of increased mental health issues in school for children with higher emotional temperament. Practicing scaffolding during free play can reduce this risk, thereby highlighting two important pedagogical elements in the children's developmental environment. Thus, ECEC-teachers could opt for a combination of both free play and scaffolding practices, as their interactions with children during free play matters. From a public health perspective, these results are important to help prevent development of mental health problems and promote school readiness. The findings also contribute to required literature to lay the foundation for establishing policies for practice in early childhood education. Further research of potential mediators between practices and mental health, e.g. peer and teacher interactions and types of play, can enhance our understanding of *how* free play is beneficial for children's mental health, and of *how* teachers can best scaffold children during play to facilitate mental health, both concurrently and longitudinally.

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Appendix

Table A1. Items with standardised factor loadings and ordinal alpha for the two practice measures.

	Factor loading	Per cent responses per category					
		1	2	3	4	5	6
Free Play ($\alpha = .61$)							
The children can mostly play undisturbed	0.493	0.6	3.0	7.9	24.2	43.2	21.1
The children initiate play groups themselves	0.588	1.0	3.6	10.3	29.6	38.7	16.8
The children can choose their own activities	0.683	0.3	2.3	8.2	29.1	42.6	17.4
Scaffolding ($\alpha = .70$)							
The teachers are actively looking for opportunities to guide children during play	0.497	1.7	4.6	9.5	29.2	39.7	15.3
We focus strongly on giving the children the knowledge they need	0.671	0.2	1.1	3.2	14.7	44.4	36.5
We challenge the children by accommodating for trying activities which are slightly harder than the activities they usually do	0.638	0.3	2.7	7.4	30.9	45.1	13.6
Through conversations with the children, they show their maturation level and the teachers adjust the conversation to the same level	0.484	0.6	2.7	3.0	14.7	43.0	36.0
We challenge the children's comprehension by adjusting the conversation slightly above the children's level	0.449	2.1	4.4	8.1	26.4	41.8	17.2

Note: The percentage of number of responses for each category from 1-*very uncommon practice* to 6-*very common practice*.