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The influence of formal education, years of service and team meetings on the quality of interaction in Austrian centre-based settings for children under 3 years

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ABSTRACT: Previous studies have reviewed positive correlations between the formal education levels of educators in Early Childhood Education and Care (ECEC) centres and the quality of interactions, but the findings have not been consistent (Early et al., 2007; Manning et al., 2017). Moreover, informal learning processes seem to be important too (Pianta et al., 2016). The present paper addresses this and explores how education levels of ECEC staff, years of service, and the frequency of team meetings relate to the quality of interactions in Austrian centre-based settings for children under 3 years. The interaction quality was measured among early

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childhood educators and assistants (N = 116) using the Graz Scale of Interaction Quality for Children between 0 and 3 years (GrazIAS 0-3) (Walter-Laager, Flöter et al., 2019). The results of multiple regression models indicate that the frequency of team meetings strongly positively correlates with both the subscales of interaction quality, 'ensure relationships and wellbeing' and 'support learning'. Further, the level of education of the ECEC staff and their years of service positively correlate with the subscale 'support learning' with low-to-medium effect sizes. The findings also suggest that team meetings might be important for increasing the quality of interactions at ECEC centres.

Keywords: *interaction quality, education of early childhood educators, effects of team meetings*

Introduction

Decades of research concerning Early Childhood Education and Care (ECEC) has revealed that out-of-home care has a positive impact on children's development if it is of high educational quality (Bäuerlein et al., 2013; Burchinal et al., 2008; Melhuish et al., 2015; National Institute of Health and Human Service [NICHD], 2002, 2006; Sylva et al., 2014) and that the gains of ECEC are especially evident among children from lower socioeconomic families (Beckh et al., 2014: Côté et al., 2013; Kulic et al., 2019; Magnuson et al., 2004; Van Huizen & Plantega, 2018; Watamura et al., 2011).

Studies focusing on interaction quality have demonstrated that the quality of ECEC educator–child interactions has an influence on the development and wellbeing of young children (Pianta et al., 2016; Sylva et al., 2004). Various studies have revealed that the extent and quality of educator–child interactions are associated with the development of children's social-emotional and cognitive skills (Dearing et al., 2018; Mashburn et al., 2008; Melhuish et al., 2015; NICHD, 2006; Ruzek et al., 2014; Sylva et al., 2011) as well as with their positive self-image, self-regulation, and inhibitory control (Cadima et al., 2016; Hatfield et al., 2016).

Among the myriad indicators that impact ECEC quality, the high qualifications of ECEC educators have been discussed by researchers as one of the strongest predictors (Manning et al., 2017). However, the findings are not always consistent (Early et al., 2007), and further factors seem to be relevant to evaluate the professionalism of ECEC staff: This includes the number of years of experience in ECEC (Jamison et al., 2014) or the reflection processes, for example, adopted by the team (Pianta et al., 2016; Wertfein et al., 2013).

In Austria, data regarding the quality of ECEC centres is widely missing. The present analysis aims to examine how the ECEC staff's education levels, years of service, and

frequency of team meetings are related to the interaction quality in Austrian centre-based settings for children under 3 years. In this investigation, ECEC educators and assistants were included to carry forward the work of previous research.

Educator–child interaction quality as a part of process quality

Process quality relates to children's daily experiences. This encompasses daily routines, activities, materials with which children interact as well as the frequency and nature of interactions between children and ECEC staff (Barros et al., 2016; Harms et al., 2015). The quality of interactions as a part of process quality is considered highly important in promoting child development. To elaborate, high-quality interactions are characterised by an educator–child relationship in which children's individual needs are responded to in a sensitive manner (Remsperger, 2013; Wadepohl et al., 2017). Furthermore, high-quality interactions provide sufficient encouragement and cognitive stimulation (Burchinal et al., 2008; Cadima et al., 2010; Downer et al., 2012; Pianta et al., 2016).

Since empirical studies have revealed that the educator–child interaction is pivotal for children's development, several instruments to measure this interaction quality have been developed. According to Smidt (2018), a distinction can be made between group-based (for example, Classroom Assessment Scoring System: LaParo et al., 2012; Pianta et al., 2008) and individual-based measurement instruments (for example, Individualized Classroom Assessment Scoring System: Downer et al., 2010). However, numerous studies in different countries have observed low-to-mediocre interaction quality levels in ECEC settings, especially in the area of learning support (Bücklein et al., 2017; Hamre et al., 2013; La Paro et al., 2014; Suchodoletz et al., 2014; Wertfein et al., 2015). The prioritised activities of early childhood educators often include organising and managing the group of children (Åström et al., 2020; König, 2009; Kucharz et al., 2014).

Relations between the education level of ECEC staff, years of service, professional exchanges in teams, and interaction quality

The quality of ECEC depends significantly on the relatively permanent structural framework conditions, which are primarily regulated at the state or federal level. These include the educational level of the ECEC staff, the staff–child ratio, and the group size. It has been empirically demonstrated that structural characteristics influence the quality of educator–child interactions (De Schipper et al., 2006; Melhuish et al., 2015; Organisation for Economic Co-operation and Development [OECD], 2018; Phillips et al., 2001; Pianta, 2017; Viernickel & Fuchs-Rechlin, 2016).

The qualifications of early childhood educators have emerged as a key structural indicator. More qualified educators foster enriched stimulating environments and high-

quality interactions (Barros et al., 2016; Manning et al., 2017). For example, the Effective Provision of Pre-school Education (EPPE) research project discovered a positive relationship between early childhood educators' qualifications and the interaction quality in ECEC settings. In particular, a professional teaching training at university level (Bachelor or Postgraduate Certificate in Education) appears to be associated with greater cognitively stimulating interactions (Sylva et al., 2004). Similarly, the NICHD study (2002) indicated that the frequency of cognitively stimulating professional-child interactions increased with early childhood educators' education level and experience. When those with less training work together with an academically trained professional, the low-qualified educator also exhibits higher interaction quality (Oberhuemer et al., 2010; Son et al., 2013).

A more recent comprehensive meta-analysis concerning the relationship between the quality in ECEC centres and the education level of educators summarized findings from 48 studies with 82 independent samples; it indicated that higher qualifications among educators correlated positively with overall ECEC qualities, as measured by the environment rating scales (ERS) (Manning et al., 2017). However, the results are not definite. To illustrate, Early et al. (2007) examined the results of seven major studies and found no association between educators' education levels and ECEC quality. Manning et al. (2017) did not find any statistically significant correlations between educators' education and the factor subscales 'provisions for learning' and 'language and interaction'. According to Manning et al. (2017), 9 out of 14 studies did not report a significantly positive effect in the ERS subscale 'quality of interactions'. Further, Jamison et al. (2014) reported nonsignificant correlations between CLASS–Infant dimensions and teacher education.

Many studies on the quality of ECEC centres focused on educators but not assistants. Considerable differences in professional profiles and training prevail across Europe between early childhood educators and assistants (Oberhuemer et al., 2010; Urban et al., 2011). For example, in some European countries, the minimum initial qualification for assistants is ISCED level 4 (for example, in Germany and Greece) or ISCED 3 level (in France, Finland or Slovenia); in other countries, no formal qualification as an assistant is required (for example, in Italy, Hungary, and Denmark). In addition, there are countries in which no assistants are used (for example, in Ireland and Croatia) (European Commission, 2019). In countries where there is an occupational profile for low-skilled supplementary staff, the group makes up a significant part of the total educational staff, in some countries up to 40–50% (Urban et al., 2012).

To increase the effectiveness of early childhood education, a broad range of more or less formal professional development activities and support for ECEC staff is considered important (Aasen & Sadownik, 2019; LiBetti, 2018; Portilla et al., 2020). Pianta et al. (2016) explain that educators' interactions with children can be significantly and systematically improved through targeted further education. Zan and Donegan-Ritter (2014) reported significant increases in the quality of interaction (measured with CLASS), after a year of professional development through video-based self-reflections, peer coaching, and mentoring. Additionally, they found similar changes for teachers with and without college degrees.

In view of more informal settings, a qualitative multi-case study determined that a facilitating team atmosphere supports collective reflection loops, which are important for professional growth (Ohlsson, 2013). There are also indications that the frequency of professional exchanges in ECEC teams may explain differences in the quality of interaction in ECEC centres. In a sample of 104 day-care centres, Wertfein et al. (2013) were able to show that structural characteristics do not have a distinct influence on the quality of interaction but are fully mediated by team quality, as assessed by the German version of the ITERS-R. Similar results were reported from another data analysis of 335 day-care centres, where regular professional exchanges within the team were positively associated with the development of language-related process quality (Resa et al., 2018). However, qualitative studies have reported that assistants perceive greater barriers participating in such informal learning settings (Schei & Nerbø, 2015; Ho et al., 2016). To summarize, collaborative and more informal learning settings, such as team meetings, may influence the quality of interaction. But this has not been explored in-depth yet.

Analyses of the relationship between years of service and quality have yielded inconsistent results (Barros et al., 2016). For example, the NICHD study (2000) indicated positive relations between interaction quality and how long early childhood educators had been in the profession. This is attributed to their familiarity with the role, and the associated pedagogical actions appear to be more focused on developmental appropriateness. In contrast, a study in German kindergartens (Tietze, 1998) revealed that interaction quality (as measured by the German version of the ECERS) increases with work experience between 0 and 5 years and then remains constant for a few years, after which it steadily decreases. Smidt (2012) also notes that early childhood educators with more work experience exhibit lower interaction quality than their less experienced colleagues. This is attributed to their relatively high workload.

Thus, while research has identified indicators that may influence interaction quality, the results are not always clearcut, and due to the national specifics of educational systems, they are not necessarily transferable to other countries, such as Austria, because of cultural and country-specific conditions.

Early childhood education and care in Austria

ECEC settings in Austria include centre-based settings for children aged 0 to 3 years (*Kinderkrippen/ crèches*), kindergartens for children aged 3 to 6 years, and age-extended groups, which children attend up to age 15 (Hartel et al., 2019). The present article focuses on centre-based settings for children under 3 years (*Kinderkrippen/ crèches*). In Austria, as in many other European countries, institutional education and particularly care for children under the age of 3 have undergone considerable expansion in recent years (OECD, 2017). While 19.7% of children aged 0 to 2 years attended an institutional setting in 2010/11, 27.6% did so in 2020/21 (Statistik Austria, 2021). The reasons for this expansion include the need to combine family and work and efforts to promote equality of opportunity (Viernickel & Fuchs-Rechlin, 2016; Walter-Laager & Meier Magistretti, 2016).

In Austria, political responsibility for many structural conditions in early childhood institutions is split across the nine federal states, each of which regulates staffing, scheduling, planning, and funding in its own way. For example, toddler groups in centre-based settings are typically accompanied in their daily educational routine by a trained early childhood educator, and depending on the state, one or two assistants are available to provide additional support. The group size also varies between the federal states, typically found to be between 8 and 15 children (Hartel et al., 2019; Krenn-Wache, 2017; Walter-Laager, Bachner et al., 2019).

The curriculum for ECEC services is the 'Bundesländerübergreifender BildungsRahmenPlan für elementare Bildungseinrichtungen in Österreich' (Framework Curriculum for ECEC institutions in Austria) (Charlotte Bühler Institut [CBI], 2009). The legal recognition of the educational mandate of ECEC centres represented an important milestone toward quality assurance. This also precipitated the focus to shift from the basic provision of care and move towards holistic and co-constructivist learning (Hartel et al., 2019). However, the implementation of the frame curriculum is again within the responsibility of the federal states and institutions.

The education of early childhood educators in Austria

In Austria, group-leading early childhood educators must complete a Bundesbildungsanstalt für Elementarpädagogik (BAfEP). It is a higher vocational school and can be started at the age of 14. Graduation occurs after five years with a school-leaving examination (EQF level 5). The BAfEP education is a combination of 54% vocational and 46% general education (Eichen & Krenn-Wache, 2020). Alternatively, a part-time two-year college degree can be completed at any age, if a school-leaving examination is passed (Smidt, 2018). It should be noted that the qualifications of early childhood educators in Austria are still on a non-academic level and remain at a relatively low level compared to other European countries (Krenn-Wache, 2017; Oberhuemer et al., 2010; OECD, 2014). Since 2018, several university courses for qualified early childhood educators have been introduced at the academic level (Krenn-Wache, 2017; Smidt, 2018), but full academic training remains absent.

An analysis of the current curriculum (BGBl. II No. 204/2016) of the BAfEP related to the term 'interaction' reveals that this topic has been addressed in the school subject 'pedagogy' and 'practice'. For example, in the fifth school year, interaction and communication strategies with children aged 0 to 3 years are addressed. The topic of relationship building and associated linguistic models are also addressed in the curriculum. In both cases, it is unclear to what extent this is implemented in the training of the educators.

In Austria, the group-leading early childhood educators are supported by assistants. As the nine federal states are responsible for the training of assistants, official regulations differ considerably. Some regions require no specific prior training, while others require the completion of theoretical and practical courses (Krenn-Wache, 2017), with a maximum of 300 hours of theory and 160 hours of internships (Baierl & Kaindl, 2011; Klamert et al., 2013). For example, in the Styrian curriculum, interaction and eight other subject areas are allotted to a total of 38 hours. Thus, approximately four hours are dedicated to the topic of interaction, and such a level of exposure cannot practically be more than marginal (LGBl. Nr.54/2010).

In addition to the very low formal training level of assistants, they are given few opportunities to participate in further trainings. Moreover, time for planning and reflection with other staff members is often not incorporated into the work schedule (Peeters et al., 2016). Hence, the CoRE study (Urban et al., 2012) refers to assistants as the 'invisible workforce'. Despite their large numbers, they are often excluded from policy and academic discussion. Furthermore, it should be noted that the socioeconomic and cultural background of this group differs from that of group-leading early childhood educators (Peeters et al., 2016).

Early childhood research in Austria

In 2010, the first chair for early childhood research was established at an Austrian university. The empirical data on the quality of the ECEC system is relatively limited. The European study on childcare and education (Tietze et al., 1996 cited in Smidt, 2018) and studies by the Charlotte Bühler Institute from 2003 and 2004 (Linke et al., 2012) indicate that the process quality in Austrian ECEC centres, as in other European countries such as Germany, tends to be merely mediocre (Tietze et al., 2013). The study 'European Seal of Quality for Early Childhood Education Centers' (Walter-Laager, Bachner et al., 2019) conducted a survey among parents and staff from ECEC centres in five countries, which revealed that structural, process, and orientation quality as well as the quality of family relationships were all rated 'very important' to 'important' (Schneider & Tietze, 2018). However, interaction quality was highlighted as a particularly central quality feature across all countries and subsamples (Walter-Laager, Bachner et al., 2019).

The study 'Effekte der Interaktionsqualität auf Krippenkinder' (EIK; 'Effects of Interaction Quality on Young Children') aimed to determine interaction quality in centre-based settings for children under 3 years (*Kinderkrippen*) by using the observation instrument GrazIAS. According to Petritsch and Walter-Laager (2021), interaction quality in Austrian centre-based settings for children under 3 years is mediocre. Further, interaction quality is also currently being researched in a longitudinal project called 'Quality of Children's Interactions in Preschool' using the instrument inCLASS in Austria. Initial partial results have shown low-to-medium interaction quality. The results indicate that preschool early childhood educators do not provide sufficient cognitive stimulation to children (Smidt & Embacher, 2020).

In summary, research findings for Austrian ECEC institutions are rare. We have few insights about interaction quality between educators and children in Austrian ECEC centres.

Aim of the study

Previous quality studies have confirmed correlations between the quality of interactions and the education level of early childhood educators, although the findings are not always consistent. In Austria, where there are two categories of ECEC staff with different education levels (ECEC educators and assistants), data regarding the ECEC quality and its relation to education is nearly completely missing. By including ECEC educators as well as assistants, the present study expands previous findings on this topic, as most of the studies only include group-leading educators from ECEC centres. Apart from formal education, the ECEC staff may also develop the ability to create high-quality interactions over the course of their work experience and through more informal learning processes

such as professional exchanges in team meetings. The extent to which the education level of ECEC educators and assistants as well as frequency of their team meetings are related to quality of interactions has not been explored in depth yet. The aim of the present study is to expand knowledge on the supporting conditions for high-quality interactions with regard to Austria by addressing three research questions:

(1) How do the ECEC staff's education levels relate to interaction quality in centre-based settings for children under 3 years?

(2) How do the ECEC staff's years of service relate to interaction quality in centre-based settings for children under 3 years?

(3) How does the frequency of team meetings relate to interaction quality in centre-based settings for children under 3 years?

Based on previous studies, it is hypothesised that higher education, more years of service and more frequent team meetings are all positively related with interaction quality.

Method

Participants and sampling procedure

The data collection for the present study was part of a wider research project, namely the study 'Effekte der Interaktionsqualität auf Krippenkinder' (EIK; 'Effects of Interaction Quality on Young Children'). It was a longitudinal study of children and their development in ECEC settings with three measurement points. In the EIK study, a sample of 35 Austrian centre-based settings for children under 3 years was recruited randomly from all centre-based settings in one large city, one town, and one rural area. It yielded responses from 29 centre-based settings. They are distributed as follows: 17.3% large cities, 51.7% towns, and 31% rural areas.

In the 29 randomly drawn centres, the selection of one group and its ECEC staff was made on a voluntary basis and ethical guidelines were followed (for example, informed consent, confidentiality, and safe data storage). A total of 116 ECEC staff members participated in the study: Between one and five persons were observed in one group of the ECEC centres, depending on factors such as working hours (the educational staff had to be present for at least two hours), point of measurement (due to fluctuations and sick leave, the same employees were not always present), and the pedagogical concept (for example, open concepts). In this analysis, the data from the second measurement point was used,

supplemented by data from ECEC staff who were present at one of the other two measurement points.

The age of the 116 observed ECEC staff members ranged from 19 to 60 years (M = 37.08, SD = 11.78). Further, 13.8% of them had a first language other than German. All the participants in the sample were female. This is not atypical of the general population of Austrian staff in ECEC centres, in which only 1.5% is male (Statistik Austria, 2021).

Data on the educational level of the ECEC staff, their years of service, and the frequency of team meetings are included in the analysis. The educational qualifications varied from assistant level (EQF level 2) to vocational school level (EQF level 5). No early childhood educator had a university degree (EQF level 6 and higher). The educational level was categorized into two groups (dummy code): The category 'high-to-middle qualifications' was used if the person had a vocational school level (44.8%), and 'low qualification' was used for all lower qualifications (55.2%). All educators and 3.2% of all assistants had a qualification on a vocational school level (EQF level 5); all the other assistants absolved a training course on EQF level 2. The years of service varied in both groups widely, with some study participants in their first year of service and others who had worked in centre-based ECEC settings for 40 years (M = 6.49, SD = 7.24, N = 40 in the group with 'high-to-middle qualification'; M = 7.45, SD = 5.28, N = 37 in the group with 'low qualification'). The number of team meetings varied in the group with 'middle-to-high qualifications' (N = 38) from daily (2.1%) to weekly (10.6%), to every two or three weeks (6.4%), to monthly (57.4%), and to less frequent team meetings (23.4%). The group with 'low qualification' (N = 41) attended team meetings with variations from daily (4.2%) to weekly (4.2%), to every two or three weeks (6.3%), to monthly (64.6%), and to less frequent team meetings (20.8%).

Data collection and measures

The Graz Scale of Interaction Quality for Children between 0 and 3 years (GrazIAS 0–3) (Walter-Laager, Flöter et al., 2019) was used to measure the quality of interactions. The data collection was executed with two researchers, who were involved in the development of the scale. The interrater agreement was ensured by a trial rating of a five-hour observation in one ECEC centre and was calculated using an exact agreement of items (without point deviation). An interrater agreement of 83% and a Krippendorff's alpha of .83 was established for the GrazIAS.

The observational data measured with the GrazIAS was collected between October 2018 and May 2019. The observers aimed to not disturb the staff and children in their daily routines and practices (non-participating observation): They positioned themselves near the ECEC staff, where they could clearly observe staff interactions and ongoing activities

in the group, and they were moving around to observe educators and assistants in different situations (play activities, care situation, and daily routines, such as micro transitions).

The GrazIAS focuses on the performance of each early childhood educator. Over a four-to five-hour observation period, the instrument captures characteristics of interaction quality that exert a positive influence on child development and wellbeing, relationships with the ECEC staff as well as with other children, and appropriate learning and developmental stimulations. The operationalization was based on a literature analysis, which can be found in the booklet 'Visualizing Best Practices in the Education and Care of Children Aged 0-3 Years' (Walter-Laager et al., 2018).

The GrazIAS consists of two subscales: 'ensure relationships and wellbeing' (17 items) and 'support learning' (19 items), encompassing a total of 36 items, as shown in Table 1. The subscales were subdivided into characteristics to make it easier for the ECEC staff to gain an overview in reports on the results or feedback meetings in quality development processes.

TABLE 1 Overview of subscales and items in GrazIAS

SUBSCALES	*CHARACTERISTIC*	*ITEMS*
Ensure relationships and wellbeing	Being present	1. Emotional availability 2. Appreciation
	Experiencing relationships	3. Arriving 4. Peer interactions 5. Group rituals
	Introducing rules and adhering to them	6. Number/system 7. Mode of behaviour/breaking rules
	Supervising conflicts	8. Intervening 9. Consoling 10. Intensity of reaction 11. Solution strategies
	Considering individual needs	12. Flexibility in daily routines 13. Structure of transitions 14. Rooms/areas
	Supporting the regulation of emotions	15. Verbalizing emotions 16. Reaction of education professional 17. Regulation of emotions
Support learning	Enabling participation	1. Accessibility and diversity of materials 2. Choices 3. Participation in daily routine and bodily care 4. Announcement of events 5. Independent orientation
	Offering and allowing sensory experiences	6. Allowing sensory experiences 7. Encouraging sensory experiences
	Providing stimuli (verbal/nonverbal)	8. Disrupting activities 9. Changing the rooms for exploration 10. Stimuli for actions 11. Difficult activities 12. Encouragement
	Communicating in a stimulating way	13. Opportunity to speak 14. Language contributions 15. Corrective feedback 16. Playful usage of language 17. Using terms 18. Verbalizing experiences 19. Questions

Each item is rated on a four-point scale based on indicators, where 1 is 'insufficient', 3 means 'minimal', 5 indicates 'good', and 7 signifies 'excellent'. Level 1 ('insufficient quality') refers to a completely insufficient demonstration of the respective item. Level 3 ('minimum') stands for low quality, in which the requirements for one item are bare minimum. Level 5 ('good') indicates an appropriate performance, wherein children can undergo experiences that are developmentally appropriate. Level 7 ('excellent') presents an excellent level of quality, in which children are intensively supported and stimulated individually (Walter-Laager, Flöter et al., 2019).

The psychometric criteria of the scale were examined in three different study samples by Flöter, Petritsch, and Walter-Laager (2022). Results from the factor analysis and scree plot check reveal a one-factorial structure for all samples. The Cronbach's alpha varies between .905 and .928 in the three samples. Flöter et al. (2022) contend that a theory-based division of two subscales can be retained and reported a Cronbach's alpha between .850 to .929 for the subscale 'ensure relationships and wellbeing' and a Cronbach's alpha between .849 and .869 for the subscale 'supporting learning'. The content validity was ensured by experts (Walter-Laager, Flöter et al., 2019). The test-retest reliability was tested in a longitudinal study. Flöter et al. (2022) reported a significant correlation of .711 between the scale scores from the first and second measurement points. Further, they exposed intercoder reliabilities with Krippendorff alpha values between .893 and .927 after two-day training courses in five cases of observation (Flöter et al., 2022).

In the GrazIAS data reported here, conflicts among children were rarely observed. Hence, it was not always possible to rate all items in the characteristic 'supervising conflicts' as the assessment requires multiple conflict cases: 2.6% of the data for the item 'intervening', 67.2% for 'consoling', 30.2% for 'intensity of reaction', and 31.9% for 'solution strategies' were missing. Because of that high number of missing data, these four items were excluded in the present data analysis. In the present study, Cronbach alphas without these items were as follows: .920 for the overall 'interaction quality' (32 items), .876 for 'ensure relationships and wellbeing' (13 items), and .868 for 'support learning' (19 items).

In addition to other facility data, the education of ECEC staff is collected in the GrazIAS using a master data sheet, which was filled out by the observers based on the staff's self-report. There, the education level is measured by a nominal polytomous question with eight options, according to the classification by the European Qualifications Framework (EQF) (European Union, 2021).

A supplementary questionnaire was used in the EIK study to record complementary data on the facility context and the staff. The years of service were measured metric and the frequency of team meetings ordinal (dummy coded as 1 = several times per month to daily and 0 = once a month or less).

Analysis

Statistical analyses were produced using SPSS. Missing data on the years of service was 33.6% and on the frequency of team meetings 18%. Missing data was excluded pairwise.

The Shapiro–Wilk test was used to examine the distributions of the variables. According to the test, the variable 'support learning' has a normal distribution, while 'ensure relationships and wellbeing' and 'years of service' deviate from the normal distribution. The examination of skewness and kurtosis (Kim, 2013) showed z-scores within the range +/– 1.96 for 'relationship and wellbeing' but not for 'years of service'. Therefore, non-parametric tests were selected for statistical correlation analysis (Spearman) to explore the bivariate associations between the variables. In the next step, multiple regression analyses were conducted (Backhaus et al., 2021; Kuckartz et al., 2013). Based on Flöter et al. (2022), the two GrazIAS subscales 'ensure relationships and wellbeing' and 'support learning' were used as dependent variables to get more detailed information on the quality of interaction. Education level, years of service, and frequency of team meetings served as independent variables. Due to missing data for team meetings (N = 94) and years of service (N = 76), complete data was available for 73 ECEC staff members; 35 of these had 'high-to-middle qualifications' and 38 had a 'low qualification'.

Results

Descriptive statistics for all independent and dependent variables are presented in Table 2. Interaction quality ranged between a low and moderate level. In addition, Table 2 indicates bivariate correlations between all variables.

TABLE 2 Descriptive results and intercorrelations between study variables

	VARIABLES	*N*	*M*	*SD*	*1*	*2*	*3*	*4*
1	Ensure relationships and wellbeing (subscale)	116	4.32	1.15				
2	Support learning (subscale)	116	4.05	.99	.62**			
3	Education level (dummy, 0 = low, 1 = middle to high)	116	.55		.05	.18		
4	Years of service	76	6.95	6.35	.12	.27*	-.18	
5	Frequency of team meetings (dummy, 0 = once a month or less, 1 = several times per month to daily))	94	.85		.43***	.41***	.38	-.01

Note: *N* = sample size, *M* = mean, *SD* = standard deviation. Spearman correlations were computed. 1 = Ensure relationships and wellbeing (subscale), 2 = Support Learning (subscale), 3 = Education level (dummy coded), 4 = Years of service, *p < .05, **p < .01, ***p < .001.

Significantly positive correlations were evident between the frequency of team meetings and ensuring relationships and wellbeing ($r_s(94) = .43$, $p < .001$) as well as supporting learning ($r_s(94) = .41$, $p < .001$). Years of service correlated positively with the quality of supporting learning ($r_s(76) = .27$, $p = .017$). No significant correlation could be found for the education level. Note that there were also no significant correlations between independent variables.

Regression analyses were executed to assess whether the education level, years of service, or frequency of team meetings were related to the GrazIAS subscales. Table 3 shows the results of the multiple regression analysis for the dependent variable 'ensure relationships and wellbeing'.

TABLE 3 Prediction of ensuring relationships and wellbeing through ECEC staffs' education, years of service and frequency of team meetings (N = 73).

VARIABLE	*B*	*SE*	β
Constant	3.893	.254	
Education level (Dummy, 0 = low, 1 = middle to high)	.107	.256	.046
Years of service	.026	.025	.115
Frequency of team meetings (dummy, 0 = once a month or less, 1 = several times per month to daily)	1.292	.342	.412***
F / R^2 / adj. R^2		5.152** / .183 / .147	

Note: *B* = unstandardized regression coefficient, *SE* = standard error, β = standardized regression coefficient;
# $p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$.

The regression model was significant ($F(3,69) = 5.15$, $p < .001$, $N = 73$). The R^2 for the overall model was .183 (*adj.* R^2 = .147), indicative for a moderate goodness-of-fit according to Cohen (1992). The frequency of team meetings was positively related to the quality of those interactions, which ensures relationships and the wellbeing of children. ECEC staff who attended team meetings several times a month to daily had a significantly higher score of 1.292 in the subscale, compared to their colleagues who attended team meetings once per month or less. The regression did not show significant effects for the staff education level and years of service.

Table 4 shows the result of the multiple regression model with the dependent variable 'support learning'.

TABLE 4 Prediction of support learning through the ECEC staff's education, years of service, and frequency of team meetings (N = 73)

VARIABLE	*B*	*SE*	β
Constant	3.231	.197	
Education level (Dummy, 0 = low, 1 = middle to high)	.447	.199	.225*
Years of service	.066	.019	.342**
Frequency of team meetings (dummy, 0 = once a month or less, 1 = several times per month to daily)	1.159	.265	.431***
F / R^2 / adj. R^2		11.254*** / .329 / .299	

Note: *B* = unstandardized regression coefficient, *SE* = standard error, β = standardized regression coefficient;
# $p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$.

The frequency of team meetings, years of service, and ECEC staff education level were significantly associated with supporting children's learning ($F(3,69) = 11.254$, $p < .001$, N

= 73). The education level, years of service, and the frequency of team meetings explained 32.9% (*adj.* R^2 = .299) of the variance in the quality of learning support, which indicates a high goodness-of-fit according to Cohen (1992). Once again, the strongest effect was observed for team meetings: When the ECEC staff participate in team meetings more often, they score 1.16 points higher in learning support than the ECEC staff gaining team meetings less often. Each year of service increases the score in interaction quality by .07 points. In addition, the education level was also positively associated with the quality of 'support learning'. Early childhood educators with middle to high levels of education achieved .447 points more than the low educated reference group.

Discussion

On a descriptive level, the present study found that the quality of interaction has mean values of 4.23 for 'ensure relationships and wellbeing' and 4.05 for 'supporting learning' and is, therefore, on a medium quality level. This is consistent with previous research findings confirming early childhood educators' low-to-medium interaction quality, especially in learning support (Bücklein et al., 2017; Hamre et al., 2013; La Paro et al., 2014).

A plethora of studies conclude that higher education leads to better scores in interaction quality (Manning et al., 2017; Sylva et al., 2004). The present study connects to these findings and also includes professional experience and the frequency of team meetings in its evaluations. If these two variables are controlled, the higher education of ECEC staff is related to higher interaction quality scores in supporting children's learning in an appropriate manner. This subscale of GrazIAS includes, that professionals enable the children to have many learning experiences and enrich them through sustained shared thinking. They support them in overcoming obstacles in learning processes (scaffolding) and allow them to enact challenging, but manageable, activities themselves. The professionals provide the children with empathetic reassurance or confirmation through their guidance. This also includes enabling participation or language stimulating dialogues.

In contrast, no effects of education level could be found for the subscale 'ensure relationships and wellbeing'. This subscale measures whether children are supported in building stable relationships with the ECEC staff and other children, whether conflict situations are accompanied by regulation, if individual child needs are considered, and if ECEC staff perceive, recognise, and verbalise emotions and support children in regulating them. Ultimately, the findings do not differ entirely from the findings of previous studies (Early et al., 2007). For example, Manning et al. (2017) show in their meta-analysis that

the education level of early childhood educators is positively correlated with overall ECEC qualities measured by the environment rating scale. However, they did not find any statistically significant correlations between early childhood educators' education and the factor subscales 'provisions for learning' and 'language and interaction' (Manning et al., 2017).

For the further interpretation of current findings, it is notable that the level of education in Austria is exceptionally low overall and that vocational high school students are very young. It is not only vocational training but a combination of a high general education and profession-related learning content (ratio 54% to 46%) (Eichen & Krenn-Wache, 2020). Around 600 students are currently in a bachelor's degree program, while the BAfEP educate around 10,000 pupils (Federal Ministry Republic Austria Education, Science and Research, 2019; Koch, 2020). In addition to the various subjects, didactics for teaching young children consume a large part in the curriculum of the BAfEP (Pölzl-Stefanec, 2020). The prospective professionals employ practical knowledge of how they can accompany learning processes. In contrast, those items that are measured in the subscale 'ensure relationships and wellbeing' are not clearly anchored in the curriculum (BGBl. II No. 204/2016).

This assumption is supported by the finding that there is a strong correlation between team meetings and the quality of interaction. More frequent team meetings have a positive and strong effect in both regression models. Here, non-formalized educational processes seem to play a role. It can be assumed that frequent team meetings are used to deal not only with organizational items but also with items of quality assurance and development, including the exchange of information concerning children's development and wellbeing. Reflection in teams seems to make an important contribution to increasing professionalization and, thus, the quality of interaction.

The mixed high school and vocational training at BAfEP between the early age of 14 and 19 has been discussed critically in Austria for a long time regarding the development of reflective skills (Krenn-Wache, 2017; Oberhuemer et al., 2010; OECD, 2014). The training occurs in the phase of life in which people detach themselves from their parental home and grow into their adult role (Eichen & Krenn-Wache, 2020). Practical training periods at the BAfEP provide the opportunity to act in ECEC settings and reflect on one's own actions during sessions with early childhood educators. However, in-depth reflection is likely to be limited in adolescence and interlinked with one's own childhood experiences.

The situation of assistants is different: They often start training during their second education path of adulthood, but during their training, reflection formats are limited due to the short training sessions they undergo with a maximum of 300 theoretical hours and 160 practical hours (Baierl & Kaindl, 2011; Klamert et al., 2013). This could be the reason

the present study reveals such strong effects for the frequency of team meetings. It is assumed that frequent team meetings open opportunities for reflection that make a significant contribution to the development of one's professionalism (Aasen & Sadownik, 2019; Fröhlich-Gildhoff et al., 2014). This is also consistent with other studies that indicate affiliations between team meetings or in-service training formats for the ECEC staff and an improvement in the quality of interaction (Barenthien et al., 2019; Pianta et al., 2016; Resa et al., 2018; Wertfein et al., 2013; Zan & Donegan-Ritter, 2014). Further analysis of team meetings, reflection formats, and collaborative learning processes in ECEC teams must be forced in the light of the study findings.

In the current analysis, years of service relate positively with the subscale 'learning support' but not with 'ensure relationships and wellbeing'. This aligns with previous studies, which have yielded inconsistent results. The NICHD study (2002, 2006) and Jamison et al. (2014) found a correlation between years of service and levels of interaction quality, whereas other studies did not find any correlation (Barros et al., 2016; Smidt, 2012).

The present study has limitations that must be considered when drawing conclusions. Although the sampling was designed as a quota sample and encompassed rural, urban, and metropolitan conditions, the sample had a relatively limited size of 116 people from 29 institutions in two federal states of Austria. Moreover, there is a high number of missing data, so that regression models could be accomplished with 73 subjects. Due to the small number of cases at the centre and individual level (1 to 5 subjects per ECEC centre), the multi-level structure of the data was not considered in present analyses (Hox et al., 2018; Pötschke, 2014). Therefore, nested effects cannot be excluded, and the standard errors may have been underestimated in the multiple linear regression models.

It should also be mentioned that data from different measurement times were included in the analysis. Therefore, the comparability of the observation data from ECEC staff might be critical. At the same time, however, Flöter et al. (2022) reveal that the interaction quality of ECEC staff remain relatively stable over three measurement points. Differences in the operationalization of the quality of interaction reduce the comparability with other studies. The GrazIAS focuses on the performance of each individual early childhood staff, whereas measuring instruments such as ECERS/ITERS also record environment aspects. In addition, the level of education was limited to two, albeit different, education levels corresponding to the graduation rates in the Austrian ECEC system. Therefore, the findings are only conditionally comparable to the findings from studies that include the effects of bachelor's or higher-level degrees. Further qualifications of the educational staff, such as training or in-service education, were recorded in the present study in an undifferentiated manner and were, therefore, not included in the analysis. This could have

led to a bias in the assessment of the effects of education levels. In addition, like many others, the present study cannot show any effects or differences associated with individual learning paths and higher qualifications. Further research is required here, also because Austria is currently on the way to tertiarization.

In summary, the data reveals that the quality of ECEC staff–child interaction is related to the frequency of team meetings, which should go hand in hand with more exchanges and reflections in teams (for example, collaborative learning and reflections on practice). Like in previous studies (Barenthien et al., 2019; Resa et al., 2018; Wertfein et al., 2013), the present results support the notion that forcing processes of reflection on one's own professionalism through regular team exchanges or certain other formats, such as coaching, professional consultations, in-house training courses, and the promotion of theory–practice reflections in advanced training, can make a decisive contribution to increasing the quality of interaction.

The findings are also relevant to policymakers and the regulation of the ECEC system: There seems to be effects in those areas, which are subjects of formal education of ECEC educators in Austria. However, they are subject to various limitations. Hence, the efforts in Austria to raise ECEC education to the tertiary level must be promoted. With a tertiary education, reflection, discourse, and abstraction skills of the educators could be encouraged. Profession-oriented, research-based, and practice-related content are relevant for the professionalization of aspiring educators and assistants (Aasen & Sadownik, 2019; Portilla et al., 2020). In summary, we recommend addressing multiple factors in the education as well as training, such as mentoring, monitoring, coaching, and supervision, of group-leading educators and assistants.

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