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Patterns of observed child participation and proximity to a small group including teachers in Swedish preschool free play

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The participation of all children in preschool activities is the main outcome of inclusive Early Childhood Education and Care (ECEC). The current study used the Child Observation in Preschool (COP) to explore the observed participation patterns in the free play of a sample of 3–5-year-old Swedish preschool children ($N = 453$), and to examine the characteristics of the resulting clusters in terms of child and preschool unit characteristics. Based on a series of hierarchical and K-means cluster analyses, we identified eight distinct and meaningful clusters that could be ranked from very high to very low observed participation. Four of the clusters indicated average-to-very high observed participation. Two clusters indicated low-to-very low observed participation. The cluster displaying low observed participation had high proximity to a small group including teachers. On average, children in this cluster came from preschool units with significantly more second language learners. The cluster displaying a very low observed participation had low proximity to a small group including teachers. On average, children in this cluster were significantly more often second language learners, and the children came from units with a significantly higher number of resource staff. No significant differences appeared in the number of children with special educational needs across the clusters, although tendencies emerged. The results imply that the children in this sample had a varied degree of observed participation. Two clusters of children appeared to have difficulties in participating in free play activities where second language learners and children from preschool units with more second language learners were more common. Preschool teachers need to identify children who participate less in preschool activities and who might benefit from more teacher proximity. Teachers also need to reflect on how their proximity impacts the participation of children differently and on the type of support they provide when being close to the children.

KEYWORDS

preschool, participation, inclusion, engagement, free play, special needs, second language, person-oriented

Introduction

The goal of inclusive Early Childhood Education and Care (ECEC) is to ensure that every child participates in preschool activities and feels part of the group (Nilholm and Göransson, 2017). This is especially important for children with disabilities, special educational needs (SEN; Odom et al., 2011; Bartolo et al., 2016), and disadvantaged children, including second language learners (SLL; OECD, 2018). In Swedish ECEC, termed preschool, the activities mostly take place within the frame of *free play* where teachers offer the children a relatively large freedom and agency to decide what they do and where they go. More than half of a typical preschool day is spent in free play indoors and outdoors and children interact as often with peers as with teachers (Åström et al., 2022). This places free play as a key activity setting in the preschool microsystem of children in Swedish preschools (Bronfenbrenner and Morris, 2006; Merçon-Vargas et al., 2020). Knowledge of to what extent children participate in Swedish preschool free play is, however, scarce.

Swedish preschools are not described by the concept of inclusive since preschool is universally welcoming to all children. Most children aged 1 and 5 years (86 %) and almost all children aged 4 and 5 years (95 %) attend preschool on a regular basis (Swedish National Agency for Education, 2022a). Most children with established disabilities or special educational needs (SEN) are served in the same preschools as other children in their neighborhood. About 25 % of the children in Swedish preschools have a foreign background (Swedish National Agency for Education, 2022b), implying that the child or the child's caregivers are born abroad, with a large variation across preschools related to residential segregation (Delblanc, 2022). Many of these children are likely second language learners of Swedish. The national preschool curriculum, Lpfö 18 (Swedish National Agency for Education, 2019), governs all preschools. The curriculum stresses the importance of democratic values, a holistic approach to child development, and the importance of play for its role in children's learning and development and in its own value. Children should be provided with opportunities to learn both through their interaction with teachers and the other children in the group. Education should be of equivalent value throughout the country which requires differences in structure and resources. Teachers should specifically attend to children who for various reasons need extra support, permanently or temporarily, and all children's needs should be met. In a prevalence study (Lillvist and Granlund, 2010), about 15–20% of preschool children were estimated to have SEN. Some of these children were formally identified (e.g., by diagnosis) by external services, such as child health services, child habilitation, or child psychiatry. Most children were identified by preschool teachers only and can be referred to as informally identified children or teacher-perceived children with SEN. Both formally and informally identified children displayed similar problems, namely, problems with speech and language, peer interaction, and attention.

Previous Swedish observational studies conducted within and across free play (Lillvist, 2010; Luttropp and Granlund, 2010) compared the participation of children with disabilities, children with SEN, and typically developing children and found minor differences in the preschool activities that the children attended. Differences concerned less verbal interaction with peers among children with disabilities compared to typically developing children. Luttropp and Granlund (2010) also found that children with intellectual disabilities were more frequently observed in proximity to a teacher than their typically developing peers. No differences appeared in children's observed level of engagement. International research has shown that children with SEN spend less time with peers (Kuutti et al. 2021), participate less in social play (Suhonen et al., 2015; Kesäläinen et al., 2022), pretend play (Wong and Kasari, 2012), have smaller social networks (Chen et al., 2019, 2020), and spend more time unengaged in preschool (Wong and Kasari, 2012; Kuutti et al., 2021), compared to peers without SEN in ECEC. Other studies have shown that SLL children tend to display more behavior problems and lower levels of engagement in preschool activities (Finnman et al., 2021; Langeloo et al., 2021). Still, SLL children tend to receive less special support from teachers than non-SLL children (Almqvist et al., 2018).

In most of the reviewed studies of activities in preschool, the results are averaged across individuals in categorical groups (e.g., children with disabilities) which tend to neglect variation between children. This variable-based approach often leads to results that are valid for some, but not for all children in the study (Bergman et al., 2003). When a group is heterogenous, as with children with SEN, many interaction effects on participation are likely, leading to different outcomes for children belonging to the same categorical group. The variable-based approach also tends to focus on single outcome variables or analyzing them one by one. Considering patterns of variable values is instead preferred to explore child participation in preschool activities (Pinto et al., 2019; Gustafsson et al., 2021; Langeloo et al., 2021; Schnitzler et al., 2021). Studying child participation as an outcome of inclusive ECEC might therefore be better investigated with a person-oriented approach.

Cluster analysis is a person-oriented method that puts the subject (child) in focus and allows the exploration of homogenous structures or patterns of values in selected variables among a sample of individuals (Bergman et al., 2003). By using a person-oriented approach, a more detailed picture of child participation could be revealed. *Participation* is commonly defined by the International Classification of Functioning, Disability, and Health (ICF) as a person's involvement in

a life situation (World Health Organization, 2001). Recent suggestions state that participation should be assessed with at least two dimensions: (a) attendance, i.e., being there, and (b) involvement, i.e., the experience while being there (Imms et al., 2017; Maxwell et al., 2018). Attendance concerns the frequency and duration of being present in the preschool. The involvement dimension includes elements of engagement, which concerns the individual's focus or effort while being there (Imms et al., 2017). Usually, the participation of children is reported as a summary score (Adair et al., 2018), although participation might be better described as a pattern with variations dependent on the environmental setting.

Free play is characterized by a high degree of peer interactions and pretend play (Storli and Hansen Sandseter, 2019; Coelho et al., 2021; Åström et al., 2022). Pretend play is a special form of play beneficial for children's development of cognitive and social skills (Lillard et al., 2013; Weisberg, 2015; Goldstein and Lerner, 2018). Positive peer interactions have been found important for children's preschool engagement (Sjöman, 2018) and suggestions have been made to incorporate social participation into the ICF definition of participation (Piškur et al., 2014). Children's social belongingness has also been stressed as an important outcome of inclusion (Odom et al., 2011; Bartolo et al., 2021). Focusing on children's presence in social interactions and pretend play therefore appears central when assessing participation in free play.

Attending an activity is not enough to experience participation. Children need also to be active and focused on the free play activities, i.e., to be engaged. Children's observed engagement can be viewed as an indicator of proximal processes (Ponitz et al., 2009) that are the drivers of development in the bioecological theory (Bronfenbrenner and Morris, 2006; Merçon-Vargas et al., 2020). Children's engagement in ECEC and school activities have been found to predict achievement (Ladd and Dinella, 2009; Aydogan, 2012; Lei et al., 2018; Langeloo et al., 2020) to be a mediator in the association between teacher–child relationship status and child achievement (Roorda et al., 2017) and to be related to child well-being (Pietarinen et al., 2014). Children's engagement in preschool has moreover been shown to influence teacher responsiveness (Sjöman, 2018; Finnman et al., 2021), suggesting a role for child engagement in shaping the process quality of the preschool.

Providing support for children's participation is key in inclusive ECEC (Odom et al., 2011) and extends to free play activities. The role of teachers in children's play is much discussed (e.g., Rogers, 2010; Weisberg et al., 2013; Pramling et al., 2019), and there is an agreement that teacher involvement depends on the situation. To decide whether and how to enter children's play, teachers need to be close to the children and be responsive (Pramling et al., 2019). Empirical studies on teachers' proximity to children report both positive and negative effects on children's play (e.g., Legendre and Munchenbach, 2011; Kendrick et al., 2012; Test and Cornelius-White, 2013; Singer et al., 2014; Sam et al., 2016; Acar et al., 2017; Tajik and Singer, 2021). This indicates that the impact of having a teacher nearby is highly variable and likely related to both situational factors and individual child characteristics. Looking at children's proximity to teachers in a person-oriented study of child participation in free play can be an eye-opener for teachers to be attentive to children who might need teachers nearby to facilitate participation.

The purpose of the current study is first to explore the observed patterns of participation in preschool free play activities of a sample of 3–5-year-old Swedish preschool children using cluster analysis. The exploration will be based on four observed participation-related variables, namely, (a) children's attendance in *pretend play*, where roles are being enacted, scenarios are being developed, and play resolves around a specific theme, (b) children's attendance in *associative and cooperative interactions*, i.e., sharing material and interacting with others with or without a clear goal, rules, or organization, (c) the child's *level of engagement*, i.e., how focused and absorbed the child is, and finally, (d) the child's *proximity*, i.e., being within 1–3 meters, to a small group including teachers. Note that we use 'preschool teachers' to refer to all preschool staff caring for the children, i.e., including child-minders without a preschool teacher education. Second, the characteristics of the resulting clusters in terms of child and preschool unit characteristics will be examined.

Materials and methods

Participants

For the current study, 453 children participated. The children came from 56 different preschool units (35 public and 21 private non-profit) located in 12 municipalities. One municipality dominated the sample (43.27%). Participant characteristics are described in Table 1.

Children with SEN included both formally identified children (e.g., by diagnosis, $n = 16$) and informally identified children (i.e., teacher considering that the child either needed special support to function in preschool, or that the child had apparent to severe problems relating to developmental delay, disability, emotions, concentration, behaviors, or interaction with people, $n = 36$). Twelve children (2.65% of the sample) had both SEN and SLL status. For children observed at two timepoints (see the data collection section), an identification of SEN in either or both timepoints resulted in SEN status. No data were collected on the socioeconomic status of the families of participating children. As Swedish preschools are universal and children came from different municipalities, socioeconomic diversity was expected in the sample.

TABLE 1 Participant characteristics.

	n	%	*M* (*SD*)	Range
Child-level				
Boys/girls[a]	219/231	48.67/51.33	–	–
Mean age months (SD)	–	–	55.52 (9.69)	36 to 77
SEN status[b]	52	11.50	–	–
SLL status[a]	49	10.90	–	–
TUTI/PEPI project	41/412	9.05/90.95	–	–
Preschool unit-level				
Children in the unit[c]	–	–	19.84 (3.93)	10 to 42[d]
Preschool teachers[c]	–	–	3.81 (0.88)	2 to 7
Teacher-child ratio[c]	–	–	1:5	1:3 to 1:8[d]
Children with SEN status[c]	–	–	0.42 (0.69)	0 to 2
Children with SLL status[c]	–	–	2.02 (3.40)	0 to 21
Resource (extra) staff [c]	–	–	0.49 (0.66)	0 to 2

[a] N = 450. [b] N = 451. [c] N = 443.
[d] The unit with 42 children and 8 teachers combined children and teachers from two units; an approach called "storarbetslag" or large work team.

Materials

The child observation in preschool (COP)

An adapted version (Coelho et al., 2021; Åström et al., 2022) of the COP (Farran and Anthony, 2014) was used to assess children's attendance in pretend play, attendance in associative/cooperative interactions, children's level of engagement, and their proximity to a small group including teachers in Swedish preschools. The COP is a systematic observation instrument developed for the U.S. preprimary preschool contexts, utilizing a time sampling procedure. Each child is observed for 3 s, directly followed by coding of several categories on a tablet with the FileMaker Pro software. The goal is to observe and code each child for about 20 times (sweeps) spread evenly across the preschool day. Specifically, the observer starts by identifying each child to be observed with the help of the teacher and notes a brief description (e.g., clothing) in the observation protocol. Then, the first child on the list is observed and coded, followed by the second child, the third child, etc. The procedure is repeated until all children have been observed and coded once (one sweep). The observer then starts again with the first child on the list and continues in the list order until the end of the preschool day.

The focus of the COP is on academic learning activities in a broad sense. It assesses the current activity or behavior and engagement level of the individual in terms of nine categories. Eight categories are behavior counts where the observer uses definitions in the COP manual (Farran and Anthony, 2014) to identify the type of behavior or activity occurring. The codes can be used to calculate frequency counts of specified behaviors or activity characteristics, e.g., frequency of attendance. Frequency counts of combinations of codes are also possible, e.g., frequency of associative interactions when in free play. The ninth category, level of engagement, is measured by a rating scale. The COP categories focus on the following: (a) children's listening and verbal behaviors (b) to whom the verbal/listening behavior is directed), (c) activity setting (e.g., small groups led by teachers, indoor free play), (d) children's proximity to others, i.e., being within 1 meter to someone (e.g., a single child, a small group including teachers), (e) interaction state (e.g., parallel, associative), (f) type task, (g) material (e.g., toys and games, art), (h) learning focus (e.g., literacy, pretend play), and (i) level of engagement, i.e., how focused and absorbed the child is, from *Low* = 1 to *High* = 5. Each observation category has various coding alternatives, but codes are mutually exclusive.

The COP with minor adaptations (Coelho et al., 2021; Åström et al., 2022) has shown relevance for use in Swedish preschool settings and evidenced high inter-rater reliability for most categories. In brief, the adaptations involved performing observations also in the outdoor preschool environment; extending the definition of proximity to up to 3 meters outdoors; adding more examples for outdoor observations; and allowing a higher engagement level than low to be coded when the child was involved in an essentially social interaction, i.e., no learning-related interaction.

In the current study, only observations where the activity setting was coded as indoor or outdoor free play were used. Free play was coded when at least 75% of the children in the group were considered having free play opportunities. This was indicated by teachers declaring free play to the children or when no other activity was announced or obvious to the observers (e.g., no teacher-led activity, no transitioning to other activity). Variables from four of the COP categories (proximity, interaction state, focus, and level of engagement)

were used to form participation patterns. The exact inter-rater agreements (%) and Cohen's kappa (κ) for the categories used in the current study were the following: proximity: 84.79 %, κ = 81.1; interaction: 78.80 %, κ = 72.1; and focus: 73.73 %, κ = 61.4. The five-level engagement scale was collapsed to a three-level scale to increase inter-rater reliability (1 = *Low/Medium Low*, 2 = *Medium*, 3 = *Medium High/High*). The exact agreement of the three-level engagement scale was 72.69 %, κ = 53.3. The intra-class correlation was 0.84.

Child characteristics

Information on child characteristics, i.e., gender, age, SEN status, and SLL status was collected from a teacher-reported questionnaire on children's general behaviors in preschool that was part of the larger projects. Completed questionnaires were available for all children in the current study as this was a requirement (see the data analysis section). Child characteristics are described in Table 1.

Preschool unit characteristics

Preschool unit characteristics were provided by preschool directors/principals through a short questionnaire as part of the larger projects, including the enrolled number of children and teachers, the number of children identified with SEN, the number of SLL children, and the number of resource/extra staff. Preschool directors provided characteristics for 52 of the 56 preschool units to which the participating children belonged. Preschool unit characteristics of the participating children are described in Table 1.

Procedure

The current study builds on data from two projects sharing a focus on the participation and engagement of children with and without SEN in preschool, which also covers the aim of the current study. The project Participation and Engagement in Preschool International (PEPI, 2015—ongoing) focuses on the participation of children in preschool settings in different countries, and its relation to participation in the home environment. The project Early Detection-Early Intervention (TUTI, 2014–2018) focused on the detection of preschool children who might later develop mental illness and what support is provided to these children in Swedish preschools. The projects were approved by the Regional Ethical Review Board in Linkoping, Reference No 2014/479-31, and 2012/199-31, respectively.

Recruitment and sampling

Children in the study were recruited through their preschools, which were selected by non-probability sampling. Municipality preschools and non-profit private preschools located in the southeast region of Sweden targeting children aged 3–5 years and at least one child with a disability were prioritized.

Data collection

The preschool observations were conducted by three trained project-employed observers (one in each unit), all women with university degrees. The approach to data collection differed somewhat in the two projects. In the TUTI project, only one timepoint of data with a maximum number of 20 individual observations was available. In the PEPI project, two time points of data (∼6 months apart) with a maximum of 30 individual observations were available for each time point. The data collection occurred in the fall season of 2014 (September–December) in TUTI, the fall season of 2015 (September to December), and the spring of 2016 (April–June) in PEPI. Observational snapshots of children using the COP were performed continuously for a full preschool day, ∼7 h (8 am to 3.30 pm) and up to 2 days for PEPI. Observers took a short lunch break when the children had their lunch.

Questionnaires on child characteristics were handed to teachers at the time of the observations and were collected personally by the preschool observers about a month later. Preschool directors provided preschool unit characteristics by filling in questionnaires by e-mail/post at the beginning of the respective fall season.

Data analysis

The study had a combined person-oriented explorative design with a subsequent variable-oriented comparative design. Preparation of the analytic variables was done in IBM SPSS Statistics 27. Observational data and questionnaire data were merged into the same dataset to enable the analyses. The analytic variables representing children's observed patterns of participation in free play were the following: (a) mean level of engagement, (b) proportion of attendance in pretend play, and (c) proportion of attendance in associative/cooperative interactions (where associative interactions almost exclusively made up this variable). The analytic variable indicating proximity to a teacher in free play was (d) the proportion of being in proximity to a small group including teachers in free play. This variable was chosen based on a previous study (Åström et al., 2022) showing that children in Swedish preschools were seldom close to a single teacher.

Child observational data were summarized across indoor and outdoor free play observations, timepoints (for PEPI), and projects to allow for enough observational sweeps on individual children. Comparative analyses showed no significant

differences in the relevant variables across the two timepoints and informed a combined use. All the observational variables, except the level of engagement, were computed as proportions of observations in which the target activity occurred, out of the total number of free play observations per child. For the level of engagement, the COP data structure implied initial frequency calculations of the low, medium, and high engagement in free play, respectively, rather than a single overall rating. The frequencies were multiplied by its respective engagement value (i.e., *low* = 1, *medium* = 2, and *high* = 3) to provide scores. The summarized scores were divided by the total number of observations in free play to provide the average level of engagement in free play for each child.

Some restrictions were applied to the sample. First, only children with teacher questionnaire data for timepoint 1 (or timepoint 2 if a child was observed only at timepoint 2) were included in the sample to allow for subsequent comparative analyses of the clusters. Second, only children with a minimum of five observational sweeps were included. Finally, recognizing the focus on associative and cooperative interactions in the current study, the sample was restricted to children with a minimum age of 36 months. The restrictions resulted in 482 children being eligible for the study (a further reduction of the sample to 453 children is described below).

To conduct the person-oriented analyses, the data were exported from SPSS to ROPstat statistical software, a professional version, freely available after contact with the creators (Vargha et al., 2015). The cluster analytical steps provided by Vargha et al. (2015) were followed. Pearson's *r* was first used to examine associations and potential multicollinearity among cluster variables (see Table 2). No multicollinearity was evident, and no missing values existed in the cluster variables. As part of the cluster analyses, a residual analysis with the targeted cluster variables was performed to identify and remove outliers. Technically, participants with extreme data (outliers) can create bias in the cluster structure, and theoretically, all cases cannot fit into a relatively small number of homogenous clusters (Bergman et al., 2003, p. 58). Outliers were defined as cases with an averaged-squared Euclidean distance (ASED) of 0.2 from its first nearest neighbor, resulting in 29 cases (6 %) of the original sample being excluded. The reduced analytical sample after the removal of residuals consisted of 453 children. The mean number of individual child observations was 19.50 ($SD = 8.40$).

Having no expectation of the number of resulting clusters, an agglomerative hierarchical cluster analysis with Ward's method was used as a starting point. This analysis was followed by several additional cluster analyses with a specified number of clusters (i.e., 7, 8, 9), with both the original and the reduced samples, and with and without K-means relocation of cases, to compare different clustering solutions. The aim was to arrive at a solution that was optimal in terms of the following: maximizing the differences between clusters, and maximizing the similarity within clusters (Bergman et al., 2003, p. 61), with homogeneity coefficients of the clusters being well below 1 (Vargha et al., 2015), reaching a percentage of explained error sums of squares (EESS%) around 67 % (Bergman et al., 2003, p. 99) and by providing interpretable or meaningful clusters (Bergman and Wångby, 2014). All cluster variables were standardized to allow equal contribution to the cluster solution. Post-analyses were performed to further assess the stability of the cluster structure. A stable cluster structure means that a similar pattern or value combinations remain even if some children change cluster membership in the different cluster analyses, or are dropped from the analysis, i.e., the generalizability of the cluster structure is strengthened.

TABLE 2 Pearson correlations among cluster variables ($n = 482$).

Variable	1	2	3	4
1. Level of engagement	–			
2. Pretend play	0.44*	–		
3. Associative/Cooperative interaction	0.34*	0.31*	–	
4. Proximity to a small group including teachers	−0.18*	0.30*	−0.16*	–

* $p < 0.01$.

Comparisons of child and preschool characteristics by clusters were made using the Chi-square test of independence for nominal data, and the Kruskal–Wallis *H* test adjusted for ties for scale-level data because of evidence of non-normality. Both with critical $p = 0.05$. *Post-hoc* pairwise comparisons were made using the Chi-Square test of independence with Bonferroni correction for nominal data, and the Dunn–Bonferroni test for scale-level data.

Results

Patterns of observed child participation and proximity to a small group including teachers in Swedish preschool free play

Based on stated criteria and a thorough examination of several cluster solutions, we identified eight patterns with respect to children's observed level of engagement, their proportion of pretend play, the proportion of associative/cooperative interactions, and their proportion of proximity to a small group including teachers in free play. The patterns were based on an eight-cluster solution after relocation ($n = 453$). All pre-specified criteria were reached: the explained variance (EESS%) of this solution was 66.33%; the point-biserial correlation was 0.34; the Silhouette coefficient was 0.55; the mean homogeneity coefficient (HC) was 0.69; and the HC range was 0.46–0.86.

TABLE 3 Patterns of observed level of engagement, pretend play, associative/cooperative interactions, and proximity to a small group including teachers in preschool free play ($N = 453$).

i	Cluster label	Engagement level	Pretend play	Associative/cooperative	Proximity SGT	*n*	HC
1	Very high participation	H+	H+ + +	H+	L	46	0.83
2	Average+	(H)	H+	A	A	68	0.86
3	More socially complex	A	A	H+	A	73	0.61
4	High proximity to SGT	A	A	A	H++	52	0.73
5	Engaged, less socially complex	H	(L)	L–	A	47	0.78
6	Average–	L	(L)	A	A	92	0.46
7	Low participation, high proximity to SGT	L–	L	L–	H+	56	0.65
8	Very low participation, low proximity to SGT	L—	L	L–	L–	19	0.83

H, High; L, Low; A, Average; SGT, Small group including teachers; HC, Homogeneity Coefficient.
A = z – +/– 0.439.
(H/L) = +/– 0.440 <= |z| <= +/– 0.674 (p: 25–33%).
H/L = +/– 0.675 <= |z| <= +/– 1.000 (p: 16–25%).
+/– = +/– 1.001 <= |z| <= +/– 1.404 (p: 8–16%).
++/– = +/– 1.405 <= |z| <= +/– 1.644 (p: 5–8%).
+ + +/—— = +/– 1.645 <= |z| <= +/– 2.044 (p: 2–5%).
+ + ++/— = +/– 2.045 <= |z| (p: 0–2%).

Cluster labels were provided based on the most signifying mean/s in each cluster. The patterns are presented in Table 3.

Based on the pattern of the standardized means for three of the variables (level of engagement, pretend play, and associative/cooperative interactions), the clusters indicated different degrees of child participation and could be ranked from very high to very low observed participation. Most notable were two clusters that indicated low participation (clusters 7 and 8 in Table 3). Specifically, in cluster 7 labeled *Low participation and high proximity to a small group including teachers*, children displayed a very low average level of engagement, a very low proportion of associative/cooperative interactions (more than 1 *SD* below the mean for both), and below average in pretend play. Children in this cluster had a very high proportion of proximity to a small group including teachers (more than 1 *SD* above the mean). In cluster 8, labeled *Very low participation and low proximity to a small group including teachers*, children revealed an exceptionally low average level of engagement (between 1.6 and 2 *SDs* below the mean), a very low proportion of associative/cooperative interactions (between 1.4 and 1.6 *SDs* below the mean), and below average engagement in pretend play. Children in this cluster had a very low proportion of proximity to a small group including teachers (below 1 *SD* of the mean).

Contrary to the clusters indicating low observed participation, four of the clusters indicated average to very high participation (clusters 1–4 in Table 3). Specifically, cluster 1 labeled *Very high participation* displayed an exceptionally high proportion of pretend play (between 1.6 and 2 *SDs* above the mean), a very high average level of engagement, and a very high proportion of associative/cooperative interactions (more than 1 *SD* above the mean for both). Children in this cluster were below the mean in their proximity to a small group including teachers. Cluster 2 labeled *Average+* displayed a very high proportion of pretend play (more than 1 *SD* above the mean), a tendency for a high average level of engagement, and an average proportion of associative/cooperative interactions. An average proportion of proximity to a small group including teachers was noted for children in this cluster. Cluster 3, labeled *More socially complex*, was characterized by a very high proportion of associative/cooperative interactions (above 1 *SD* of the mean), an average proportion of pretend play, and an average engagement level. Children in this cluster were at an average rate in their proximity to a small group including teachers. Cluster 4 labeled *High proximity to a small group including teachers*, displayed the highest rate of proximity to a small group including teachers across the clusters (between 1.4 and 1.6 *SDs* above the mean), and average rates in the level

of engagement, proportion of pretend play, and proportion of associative/cooperative interactions.

Cluster 5, labeled *Engaged, less socially complex*, was the only cluster that revealed a mixture of high and low participation variables, with a high average level of engagement, a very low proportion of associative/cooperative interactions (below 1 *SD* of the mean), and a tendency for a low proportion of pretend play. Children in this cluster had an average proportion of proximity to a small group including teachers. Finally, cluster 6, labeled *Average-* displayed an average proportion of associative/cooperative interactions, a low level of engagement, and a tendency toward a low proportion of pretend play. Children's proportion of proximity to a small group including teachers was at an average rate in this cluster.

The postanalyses showed that the resulting cluster solution had identical to highly similar centroids, i.e., the multidimensional averages, for five clusters (clusters 3, 4, 5, 7, 8 in Table 3) compared to the clusters in the eight-cluster solution using the original sample. The remaining three clusters (cluster 1, 2, and 6 in Table 3) displayed similarities to clusters using the original sample but with differences in level. This shows that the two clusters indicating low participation had among the most stable cluster structures. The "Very high participation" cluster appeared the most dissimilar compared to the 8-cluster solution with the original sample.

Characteristics of children in the clusters

Teacher-reported child characteristics were used to compare clusters. The results are summarized in Table 4. Significant differences between the clusters were noted in child age and in the number of SLLs. The cluster More socially complex had on average a significantly higher child age compared to the Average+ cluster (corresponding to about 6 months). The Very low participation and low proximity to a small group including teachers cluster had on average a significantly higher number of SLL compared to the More socially complex cluster. A marginally significant difference was noted in the number of children with SEN in the clusters. None of the pairwise comparisons approached significance. Notably, there was a low number of children with SEN in the cluster called Very low participation and low proximity to a small group including teachers.

Characteristics of preschool units in the clusters

Director-informed preschool unit characteristics were used to compare clusters. The analyses are summarized in Table 4. Significant differences were noted between the clusters in the average number of children, resource (extra) staff, and SLL on the unit level. Specifically, cluster 3, More socially complex, and cluster 6, Average-, had more children coming from units with a significantly larger number of children, compared to cluster 4, High proximity to a small group including teachers (corresponding to about two to three children more). Cluster 8, Very low participation and low proximity to a small group including teachers, had more children coming from units with a significantly higher number of resource (extra) staff than the four clusters: the High participation, Average+, High proximity to a small group including teachers, and Low participation, high proximity to a small group including teachers cluster (corresponding to about half a resource staff more). Cluster 7, Low participation and high proximity to a small group including teachers, had more children coming from units with significantly more SLL compared to cluster 1, High participation, and cluster 3, More socially complex (corresponding to about three additional SLL). Although not significantly different from the other clusters (perhaps related to the small cluster size), cluster 8, Very low participation and low proximity to a small group including teachers, had the highest number of children coming from units with more SLL. Notably, the children in the Very low participation and low proximity to a small group including teachers cluster did not come from the same preschool units. In other words, they did not share the same preschool environment. Instead, the largest representation of preschool units was noted in this cluster with almost one unique preschool unit per child. The smallest representation of preschool units appeared in the largest cluster, Average-, with about 25 % of the children coming from two preschool units.

Discussion

In the current study, we used a person-oriented approach to provide a detailed picture of children's observed patterns of participation and proximity to a small group including teachers in free play for a sample of 3–5-year-old children in a Swedish preschool for all. We also examined the characteristics of the resulting clusters in terms of child and preschool unit characteristics. The cluster analysis resulted in eight distinctive and meaningful patterns that could be rank ordered from very high to very low observed participation.

Children in cluster 1 indicated a very high observed participation with low proximity to a small group including teachers, suggesting these children were high functioning and quite independent. Children in clusters 2 and 3 indicated a rather high observed participation. The children in cluster 2 displayed more participation in pretend play while the children in cluster 3 had more associative/cooperative interactions. Both clusters showed average proximity to a small group including teachers, and the children were probably well functioning in the

TABLE 4 Differences in child and preschool unit characteristics by clusters ($N = 453$).

	High participation ($n = 46$)	Average+ ($n = 68$)	More socially complex ($n = 73$)	High proximity to SGT ($n = 52$)	Engaged, less socially complex ($n = 47$)	Average– ($n = 92$)	Low partici pation, high proximity to SGT ($n = 56$)	Very low participation, low proximity to SGT ($n = 19$)	$\chi 2/H(7)$	p	Significant pairwise comparisons ($i > i$) [d]
i	1	2	3	4	5	6	7	8			
Child											
Girls *n* (%)	26 (56.52)	36 (53.73)	30 (41.10)	27 (51.92)	27 (58.70)	39 (42.39)	24 (43.64)	10 (52.63)	7.70 [a]	0.360	–
Age months *M* (*SD*)	55.65 (8.49)	51.78 (9.34)	58.11 (7.95)	56.74 (10.24)	56.55 (10.91)	55.76 (9.94)	55.52 (10.54)	51.48 (7.55)	19.35	0.007*	3 > 2
SEN *n* (%)	2 (4.35)	6 (8.82)	5 (6.85)	9 (17.65)	6 (12.77)	9 (9.89)	13 (23.21)	2 (10.53)	14.08 [b]	0.050	No sign.
SLL *n* (%)	3 (6.52)	5 (7.35)	4 (5.48)	5 (9.80)	7 (14.89)	8 (8.79)	11 (20.00)	6 (31.56)	18.32 [a]	0.010*	8 > 3
Preschool unit											
Teachers *M* (*SD*)	3.67 (0.79)	3.75 (0.98)	3.92 (0.81)	3.76 (0.78)	3.62 (0.81)	4.03 (0.86)	3.74 (0.96)	3.65 (1.06)	16.74 [c]	0.019*	–
Children *M* (*SD*)	19.80 (3.51)	19.70 (3.36)	20.92 (3.92)	18.42 (4.08)	19.64 (3.20)	20.66 (3.83)	18.78 (3.78)	19.65 (6.85)	22.56 [c]	0.002*	3 > 4 and 6 > 4
Children per teacher *M* (*SD*)	5.52 (1.03)	5.45 (1.08)	5.49 (1.27)	5.02 (1.23)	5.59 (1.12)	5.31 (1.31)	5.28 (1.53)	5.38 (0.83)	8.48 [c]	0.293	–
Resource staff *M* (*SD*)	0.39 (0.61)	0.44 (0.64)	0.55 (0.73)	0.31 (0.61)	0.53 (0.66)	0.52 (0.60)	0.44 (0.63)	1.01 (0.75)	19.89 [c]	0.006*	8 > 1, 2, 4, 7
SEN *M* (*SD*)	0.50 (0.78)	0.68 (0.83)	0.38 (0.70)	0.25 (0.59)	0.49 (0.70)	0.30 (0.57)	0.43 (0.63)	0.59 (0.71)	11.14 [c]	0.133	–
SLL *M* (*SD*)	0.89 (1.52)	1.42 (1.97)	1.40 (2.70)	1.46 (2.32)	2.38 (3.39)	2.21 (3.39)	3.80 (4.99)	4.12 (6.65)	20.60 [c]	0.004*	7 > 1, 3

SEN, special educational need; SLL, second language learner.
[a] N = 450. [b] N = 451. [c] N = 443. [d] Bonferroni adjusted P-values.
* P < 0.05.

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preschool group. Children in cluster 4 revealed an interesting pattern with very high proximity to a small group including teachers and an average rate of observed participation. Children in this cluster tended to come from units with a lower number of children in the group and less resource staff. The very high proximity to a small group including teachers could potentially reflect an ambition of the preschool teachers to be active in children's play. An Australian study (Devi et al., 2018) showed that the beliefs of preschool teachers about their role in the play were related to their proximity to children in play. The high proximity could also be related to the physical space of the preschools serving children in this cluster, which can vary from large preschool facilities to apartments (Åström et al., 2022). Cluster 5 was the only cluster that revealed a mixture of high and low in the observed participation variables, with children displaying a high level of engagement but low associative/cooperative interactions and pretend play. The cluster had an average rate of proximity to a small group including teachers and did not stand out in any other respect. Children in cluster 6 indicated a less than average observed participation and had an average rate of proximity to a small group including teachers. It was the largest cluster, but the children came from few preschool units indicating highly shared preschool environments. Children in the final clusters 7 and 8 seemed to struggle with participation in free play and will therefore be discussed more in-depth.

Children in cluster 7, Low participation and high proximity to a small group including teachers, were infrequently observed in pretend play activities, rarely observed in associative/cooperative interactions, and had a low average engagement level. The children were, however, often observed in proximity to a small group including teachers. This cluster was characterized by children coming from preschool units with a higher number of SLL. Similarly, a study in the US (Early et al., 2010) found that children in classrooms with proportionally more children of another ethnicity (Latino and African American) or in classrooms serving children from lower socioeconomic backgrounds were observed in less stimulating activities in preschool, i.e., less free play, less learning-related activities, indicating that second language and socioeconomic background might play a part in the lower observed participation in this cluster. It is also known that preschools in areas characterized by many SLL and low socioeconomic status experience problems in recruiting educated preschool teachers (Persson, 2012) which may weaken the process quality of the preschool and could impact negatively on children's participation. Unfortunately, the current study did not collect data on the number of educated and certified preschool teachers in the preschool units so this assumption could not be explored.

What is clear is that the higher proximity to a small group including teachers for children in cluster 7 did not seem to translate into sufficient support for children's participation. Unfortunately, the current study cannot determine who initiated the proximity to a small group including teachers, but it might be that more children in this cluster were shadowed or followed by teachers. Shadowing children has been identified as a teacher strategy to handle children with behavior difficulties in Swedish preschools (Almqvist et al., 2018). The same study showed that these children often received attention in terms of teachers responding to children's negative behaviors, a strategy not ideal for promoting positive behaviors, such as engagement, and decreasing disruptive behaviors of children (Leijten et al., 2019). On the other hand, it could also be that children in this cluster sought proximity to a small group including teachers more frequently. Considering children's indication of low observed participation, this could suggest that children felt too insecure to explore and engage in free play activities, despite proximity to a small group including teachers. Research has stressed that the teacher–child interactions of children characterized by dependency and shyness are generally less researched compared to the teacher–child interactions of children displaying externalizing or functional behaviors in preschool (Verschueren and Koomen, 2021) and deserves more research attention.

It is important to note that having many SLL children in the preschool unit is challenging for all parties. Verbal communication is important in most preschool activities and not sharing the same first language can make interactions between children more fragile and difficult, especially in free play, and children need intentional support from preschool teachers (Björk-Willén, 2018). The Swedish Schools Inspectorate (2017) examined preschool teachers' daily work with language support in a random sample of preschools and found that 25 % of the preschools did not provide sufficient support in Swedish to SLL children. Observations from these preschools were characterized by teachers communicating less with SLL children, mainly providing behavior reminders and prompts, and refraining from inviting them into communication. In interviews, it became clear that these preschools lacked strategies for multi-language development and support from the preschool director/principal. The challenges are likely increased when the SLL children speak several different first languages that cannot be matched to the languages of preschool teachers, although this can be identified as a success factor for the language development of SLL children (Swedish Schools Inspectorate, 2017). It is also known that the possibility to learn Swedish as a second language decreases as the proportion of children with different first languages increases in preschool settings (Cekaite and Björk-Willén, 2020) and that children with the same first language sometimes are encouraged by preschool teachers to speak their mother tongue, which can lead to the exclusion of other children (Puskás and Björk-Willén, 2017). The challenges of having many SLL children in the preschool unit extend to the collaboration with caregivers of SLL children. When the caregivers cannot communicate in Swedish, the necessary

communication between the home and the preschool might be absent (Swedish Schools Inspectorate, 2017) and could impact negatively on children's preschool participation. Involving caregivers in children's preschool education is important for children's development and well-being and especially in areas of low socioeconomic status where caregiver involvement can compensate for a lower educational level (see Persson, 2015). Without educated preschool teachers, strategies, collaboration with caregivers, and enough resources, children in units with many SLLs might experience lower participation in free play. This situation could also reproduce and reinforce segregation and social inequality contrary to the ambition of Swedish preschools (Persson, 2015).

Cluster 8, Very low participation and low proximity to a small group including teachers had children who were seldom observed in pretend play, very infrequently observed in associative/cooperative interactions, and displayed exceptionally low engagement levels. The children were also infrequently observed in proximity to a small group including teachers. These children were among the youngest ones in the sample, were more often SLLs, and tended to come from preschool units with more SLL children. This finding is similar to a study (Langeloo et al., 2021) where SLL children in Dutch kindergarten (4–6-year-old) were overrepresented in profiles with lower behavioral engagement. The generally lower age, higher SLL status, and coming from unique preschool units could indicate that these children are language novices (Blum-Kulka and Gorbatt, 2014) who tend to be silent and observe for a shorter or longer preschool period when they cannot interact using their first language. These children might not have achieved the language level needed to enter social play (Blum-Kulka and Gorbatt, 2014; Skaremyr, 2014; Cekaite and Evaldsson, 2017) and need a lot of language support from preschool teachers. Notably, despite the children's indication of very low observed participation, few children were considered by teachers to have SEN. These findings are in line with a previous study (Almqvist et al., 2018) showing that SLL children and children with low engagement in Swedish preschools seldom get special support from teachers. The lower participation in terms of pretend play and associative/cooperative interactions is especially worrisome for SLL children as access to pretend play activities with other children is important for their language development and social belongingness (Rydland et al., 2014; Cekaite and Björk-Willén, 2020). It could be that children in this cluster tend to be invisible to preschool teachers. Swedish preschool studies (Sjöman, 2018; Finnman et al., 2021) have shown that teacher responsiveness is related to children's general level of engagement, but also that children's general level of engagement is related to teachers' responsiveness. This means that if children tend to be less engaged, then teachers might be less responsive toward them, and the children risk being neglected. A Finnish preschool observational study (Syrjämäki et al., 2019) also found that when children provided non-verbal initiatives, especially children with SEN, it was more often ignored by preschool teachers. The risk of neglect is perhaps increased in preschools where teachers focus more on the child group rather than on individual children (Ginner Hau et al., 2020). Or similarly, if preschools have an organizational perspective in relation to children with SEN, where definitions are related to the demands on the organization, rather than to the child's needs and characteristics (Sandberg and Eriksson, 2010). Preschools with an organizational perspective would perhaps favor the identification of children showing externalizing behavior and disturbing the group activities, rather than children who tend to be passive and unengaged, although this remains to be confirmed. It can also be that preschool teachers have an over-reliance on the potential of free play for children's language and social development, not realizing that children need a basic level of Swedish before they can be invited into social play and that they need support from the preschool teachers to achieve a basic language level and learn the preschool norms (Cekaite and Björk-Willén, 2020).

Interestingly, there was no significant difference in the number of children with SEN across the clusters, although more children with SEN tended to appear in clusters indicating low to average observed participation, and less so in clusters indicating high observed participation. Children with SEN were, however, represented in all clusters. This relatively large spread in the observed participation among children with SEN is in line with other person-oriented studies, where children or youth with disabilities or impairments have shown a large variation in participation and functioning (e.g., Almqvist, 2006; Castro and Pinto, 2015; Andersson et al., 2017; Lygnegård et al., 2019). This stresses the importance of taking a broader non-categorical perspective when examining child participation. Utilizing a person-oriented approach in the current study allowed a diverse picture to be seen of children's observed participation in free play in Swedish preschools. It also allowed for the identification of children showing low participation in free play that might otherwise remain unnoticed using a variable-based approach.

Whatever the reasons, displaying low observed participation in free play is worrying as free play constitutes a major part of the Swedish preschool microsystem (Åström et al., 2022). If some children rarely become engaged in activities with other children or adults, objects, or symbols, on a regular basis over long periods of time, less proximal processes will occur, leading to a negative impact on child development (Bronfenbrenner and Morris, 2006; Merçon-Vargas et al., 2020). Children's health and well-being will probably also suffer as these outcomes are closely related to participation (e.g., Augustine et al., 2022). A recent Swedish longitudinal preschool study using cluster analysis (Gustafsson et al., 2021) showed that children displaying more extreme behavioral patterns (e.g., highly favorable or unfavorable) tend to display similar patterns over time, while children in clusters close to the mean tend to change patterns more often. Gustafsson et al. (2021) discussed that the more

extreme behavioral patterns were likely related to a higher number of risk- or protective factors, both on the individual child level and on the environmental level. These factors may work to stabilize children's behavioral patterns, similar to other findings (e.g., Wille et al., 2008). If the low observed participation patterns found in the current study remain stable across the preschool years, more efforts are needed to identify these children early. Preschool teachers need knowledge and resources to identify children who display low participation behaviors in free play and to reflect on how participation is best supported for each child. Such an approach is needed to ensure that the Swedish preschool is truly inclusive in the sense that it is meeting the social and educational needs of all children (Nilholm and Göransson, 2017).

Limitations

The current study has some limitations to consider when interpreting the findings. First, the preschool children were selected by non-probability sampling, which strongly restricts the generalization that can be made to Swedish 3–5-year-old preschool children in general. Yet, the relatively large number of participating children and preschool units provided a level of variability worthy to explore.

Second, the data in this study were collected some years ago and might not be a perfect reflection of the current preschool situation. Since the time of the data collection the number of SLL children in Swedish preschools has increased (Swedish National Agency for Education, 2019). Considering that the design of the current study is rare in Swedish preschool contexts, the study was still deemed informative.

Third, the data in the current study was based on children's free play activities across 1 or 2 days and might not be representative of how individual children generally behave in free play (McWilliam and Ware, 1994). Children were also observed in varying frequencies ($M = 19.50$, $SD = 8.40$) because of differences in the data collection procedures, some children spending fewer hours in preschool, and the extent of free play offered to children on the observational day/s. This might have introduced variation among children in the representativeness of the observations. On the other hand, the relevance of representativeness depends on the nature of the observed analytic variables, more specifically, where they can be placed on the continuum of behaviors: from context-based to generalized behavioral tendencies (Yoder et al., 2018). For more context-based variables, like the analytical variables in the current study, representativeness is not essential (Yoder et al., 2018). Even so, the careful analyses with comparisons of several cluster solutions and analyses of structural stability indicated a rather stable cluster structure and strengthens the external validity of the findings.

Fourth, the current study was based on cross-sectional data and the extent to which individual children change their observed participation patterns across their preschool years could not be examined. To examine the stability of individual children's observed participation patterns, more studies with longitudinal person-oriented approaches are needed.

Fifth, it must be recognized that two of the variables used to explore the observed participation patterns in the current study give weight to more developmentally complex behaviors, i.e., amount of pretend play, and amount of associative/cooperative interactions, and might then tap on children's development more than on observed participation (as also indicated by the statistical difference in age for some of the clusters). The situation highlights the importance of distinguishing participation outcomes from developmental outcomes (Elbaum, 2020) in future theoretical and intervention work. Nonetheless, the current study provides an indication of observed child participation in a normative sense.

Conclusion

This person-oriented study provides a unique and much-needed picture of children's observed participation in Swedish preschool free play for a sample of 3–5-year-olds. The results indicated that several clusters of children in this sample had average to very high observed participation in Swedish preschool free play, but that there were two clusters of children who had low to very low observed participation. Children in one of the clusters seemed to be noticed by preschool teachers, while children in the other cluster appeared unnoticed. SLL children and children from preschool units with more SLL were more common in these clusters.

Although the study findings cannot be generalized to all children in Swedish preschools, and the stability of the pattern for individual children across the preschool years needs further investigation, there is reason to worry. Preschool teachers should be aware that some children need intentional and promotive support by teachers to participate in free play. Teachers need to identify children who participate less in preschool activities and who might benefit from more teacher proximity. Teachers also need to reflect on how their proximity impacts the participation of children differently and on the type of support they provide when being close to the children. This seems especially important for SLL children and for children in preschools with many SLLs. Providing this support likely demands increased knowledge among preschool teachers, as well as adequate resources. This is important to fully realize the Swedish preschool vision of a universal preschool meeting the needs of all children.

Finally, the person-oriented approach in this study helped to display children who appeared to have lower participation in free play that would likely remain invisible using a variable-based approach, as neither SLL nor SEN status could fully characterize the clusters. Adopting a person-oriented approach in the study of children's participation in ECEC, therefore,

appears useful. More studies are however needed to understand why the two clusters of children appeared to have lower observed participation in free play and how it can be counteracted. Children's own perspectives on preschool participation would also be highly valuable.

Data availability statement

The datasets presented in this article are not readily available because the data includes personal and sensitive information protected by the GDPR. Metadata is available in Swedish National Data Service (SND) https://doi.org/10.57817/cavz-p910. Requests to access the datasets should be directed to SND.

Ethics statement

The studies involving human participants were reviewed and approved by the Regional Ethical Review Board in Linkoping, Sweden, Reference No 2014/479-31, and 2012/199-31. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin. Children were informed about the study aim and could decline to be observed.

Author contributions

FÅ and LA formulated the research idea together. FÅ was part of the project's data collection team, performed the data analysis and writing of the results, in discussion with LA, wrote the first draft of the article, and received input by LA on all parts. LA suggested the choice of design and analysis. All authors have read and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The handling editor VC declared a past collaboration with the authors FA, LA.

Publisher's note

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