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Profiles of State and Trait Engagement of Preschool Children

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ABSTRACT

Research Findings: This study examined the engagement of 494 preschool children in Sweden ($M = 53.44$ months, $SD = 10.64$) using both teacher questionnaires to measure global engagement (trait) and observations to measure momentary engagement (state). Using a person-oriented approach with cluster analysis, we identified five distinct profiles of global and momentary engagement, with four of them showing discrepancies between global and observed engagement levels. We found that age, hyperactivity, and second language learner (SLL) status were related to a specific engagement profile. Specifically, children high in hyperactivity tended to be in clusters with higher momentary engagement than global engagement, whereas second language learners were overrepresented in clusters with lower momentary engagement. *Practice or Policy:* The findings suggest that global and observed measures of engagement capture different aspects of children's engagement and should not be used interchangeably. Children with low engagement ratings on both measures of engagement are more likely to have an extreme score on the global engagement measure, indicating that difficulties they experience will be more noticeable in their global engagement. On the other hand, displays of high levels of momentary engagement could signal children's inherent potential, prompting tailored encouragement and support within Early Childhood Education and Care (ECEC) settings and promoting their overall engagement levels.

Introduction

Child engagement refers to the level of active goal-directed behavior and attention exhibited by a child and has been the focus of increased attention in educational research in recent years (Astin, 1999; Eccles, 2016; Martins et al., 2022). It is a dynamic process that occurs when a child interacts with their environment and is influenced by both the child's characteristics and environmental factors (Imms et al., 2017; Sinclair et al., 2003). Numerous environmental factors have been found to promote child engagement in preschool and school, including the quality of the learning environment, the teacher-child relationship, and the behavior of peers (Assor et al., 2005; Buhs et al., 2006; Cadima et al., 2015; Coelho et al., 2019; Furrer & Skinner, 2003; Hughes et al., 2006; Kindermann, 2007; Sinclair et al., 2003; Sjöman et al., 2016; Skinner et al., 2008; Vitiello et al., 2012).

Engaging children in preschool activities provides several benefits, both in the short and long term. For instance, child engagement is related to learning, vocabulary, school readiness skills, motivation, and achievement (Greenwood et al., 2021; Ladd & Dinella, 2009; Williford et al., 2013). Additionally, engagement has been associated with mental health and well-being and may contribute to the mitigation of problem behaviors and serve as a safeguard against mental health challenges like depression (Savahl et al., 2020; Skinner & Pitzer, 2012; Upadyaya & Salmela-Aro, 2013). Educators

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may seek to promote child engagement as a goal in itself or as a means of improving learning outcomes (Ponitz et al., 2009; Virtanen, 2016).

Whereas the concept of child engagement may appear intuitively clear, there is a lack of consensus on what engagement encompasses and subsequently what is the most appropriate way to measure it in research (Fredricks & McColskey, 2012; Reschly & Christenson, 2012). Whereas it is expected that researchers' assumptions about generalizability, specificity, and temporality of engagement will reflect on the choice of measurement method, those assumptions are not always explicit, and sometimes they are not in accordance with the measurement approach (Ritoša et al., 2023). In school settings, engagement is considered to be influenced by contextual factors, including school practices and policies, as well as interactions with adults and peers (Sinclair et al., 2003). Less often it is conceptualized as a stable attribute or a trait of the child. Still, school engagement is typically assessed via surveys that ask about student's typical engagement (Assor et al., 2005; Buhs et al., 2006; Fredricks et al., 2004; Furrer & Skinner, 2003; Hughes et al., 2006; Skinner et al., 2008).

In preschool settings, engagement is defined as happening in interaction between the child and environment, and only rarely it is seen as a stable ability, competence, or a trait (Ritoša et al., 2023). Observations are the dominant approach to assessing young children's engagement in ECEC settings, although teacher surveys are also commonly employed for this purpose (Cadima et al., 2015; Coelho et al., 2019; Ritoša et al., 2023; Vitiello et al., 2012; Williford et al., 2013).

The choice of measurement method may influence findings about child engagement. For example, when comparing young dual-language learners to single-language learning children, higher engagement and classroom functioning are found in dual-language learning children when it is measured via teacher ratings (e.g., Guhn et al., 2016; Halle et al., 2012; Luchtel et al., 2010), whereas research using systematic observations shows that dual-language learning children demonstrate less engagement and social interactions in the classroom (Dominguez & Trawick-Smith, 2018; Rojas et al., 2021). Furthermore, the relationship between externalized behavior problems and hyperactivity in children and their engagement levels appears to depend on the approach to assess child engagement. Teacher ratings consistently reveal a negative association between hyperactivity and child engagement (Coelho et al., 2023; Searle et al., 2013; Sjöman et al., 2016). Conversely, studies relying on observations of engagement reveal lower associations or a lack of significant associations (Coelho et al., 2023; Roorda et al., 2017; Vitiello & Williford, 2016). In conclusion, the question of the temporality of engagement and the state-trait approaches to measuring child engagement warrant further exploration in the field of educational and developmental research. Moreover, to refine our understanding of the interplay between certain child characteristics and different aspects of child engagement, we also aim to investigate how children's age, gender, hyperactive behavior, and second language learner (SLL) status are associated with particular engagement profiles.

State and Trait Approaches to Measuring Child Engagement

Human behavior can be characterized as both situational and general (Epstein & O'Brien, 1985). Child engagement has been studied both as a situational and temporary state, as well as a more general trait of the child or person. Some researchers, such as Ryan and Deci (2009), define child engagement as an inherent drive to be curious and social and to understand our surroundings and ourselves. In general, if the context of preschool and school is stable, child engagement is expected to exhibit recognizable behavioral patterns, which can be summarized as the child's global engagement level (Fredricks et al., 2004; Vitiello et al., 2012). This perspective links engagement to child-specific characteristics such as self-regulation, compliance, executive functioning, and emotion regulation (Brock et al., 2009; Cadima et al., 2015; Rimm-Kaufman et al., 2009). Surveys intended to assess child engagement as a trait are commonly administered to teachers who have long-term experiences observing the child and can provide a more global picture of the child's behavioral tendencies (de Kruif & McWilliam, 1999). These surveys are based on the

assumption that teachers' ratings of a child's engagement can provide valuable insight into their overall engagement levels (Fredricks et al., 2004; Virtanen, 2016).

On the other hand, observations in natural environments or experience sampling methods can be used (Fredricks & McColskey, 2012; Kemp et al., 2013; Ponitz et al., 2009; Reszka et al., 2012) to allow for comparisons across different activities and conditions (Coelho et al., 2021). If engagement is seen more as a state, observations in natural environments or experience sampling methods can be used to investigate variations in engagement dependent on context (Fredricks & McColskey, 2012; Kemp et al., 2013; Ponitz et al., 2009; Reszka et al., 2012).

Most studies on child engagement rely on a single measure to assess it, meaning that a choice is made between a trait or state approach. However, a few studies have explored the relationship between different methods of assessing engagement, which can provide insights into the different aspects of engagement captured in each measure (Coelho et al., 2023, de Kruif & McWilliam, 1999; Doumen et al., 2012). A review of multimethod child engagement assessments found low to moderate correlations between trait engagement assessed by teacher surveys and observed state engagement (Ritoša, 2023).

In their review of the link between engagement and learning, Fredricks et al. (2004) noted the need for more detailed descriptions of engagement despite the strong evidence for its importance. A more comprehensive understanding of the concept can be gained by examining both trait and state engagement. Trait engagement refers to a child's typical level of engagement, which can reveal their strengths and weaknesses in terms of engagement and how they are likely to respond to different learning situations and tasks. On the other hand, state engagement refers to a child's level of engagement at a particular time, providing insight into how engagement varies over time in response to different circumstances (Coelho et al., 2021).

Study Purpose

This study aims to investigate patterns of global engagement, which relates to trait-like engagement, and observed engagement, which pertains to state-dependent engagement, among a sample of preschool children in Sweden. In this study, trait engagement will be operationalized by using a teacher-reported measure of children's global engagement, the Child Engagement Questionnaire (CEQ; McWilliam, 1991), whereas Child Observation in Preschool (COP; Farran & Anthony, 2014) will be used to obtain a measure of children's average state engagement throughout a day in preschool. Specifically, the research aims to accomplish three objectives: 1) identify clusters of children with homogenous patterns of global and observed engagement within a Swedish preschool sample, 2) determine the proportion of children who demonstrate each pattern of global and observed engagement, and 3) investigate the associations between belonging to a particular cluster and other child characteristics, including age, gender, hyperactive behavior, and second language learner status.

Materials and Methods

The current study used two methods to assess child engagement: (1) the Child Observation in Preschool (COP; Farran & Anthony, 2014), which is an observational instrument that records brief and repeated observations of a child's engagement in the preschool environment, capturing the dynamic nature of engagement that can vary across situations, making it a more state-like measure of engagement, and (2) the Child Engagement Questionnaire (CEQ; McWilliam, 1991), which is a survey measure that assesses a child's overall engagement in various environments and situations, providing a global trait-like measure of engagement (de Kruif & McWilliams, 1999).

A traditional variable-oriented approach can reveal average trends between variables, but it fails to account for groups of individuals who exhibit rare combinations of characteristics, which may be crucial for understanding the phenomena of interest. Thus, a person-oriented approach (Bergman & Wängby-Lundh, 2014) was employed in this study to offer a more nuanced perspective on the concept of child engagement and its variations.

Procedure

Data was collected from two larger research projects: Anonym (2015) and Anonym (2014). Data collection took place in 2014 and 2015 in preschool classes located in southern Sweden. Researchers approached the preschools through the school principals and teachers, and informed consent was obtained from parents for each child. Teachers were the main informants, and they voluntarily provided information about the child's age, gender, and second language learner status, and completed the Child Engagement Questionnaire (CEQ) and Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997) for children whose parents agreed to participate. The data collection also involved structured observations using the COP protocol conducted by three trained observers during one or two-day visits to preschools. COP observations took place for a full day (8 am to 3.30 pm), during the fall seasons of 2014 (Anonym Project 1) or 2015 (Anonym project 2). The more detailed descriptions of methodology for the survey and observational data collection have been provided by Sjöman et al. (2016) and Åström et al. (2022), respectively.

Participants

Forty-one preschools, of which 22 were public and 19 were private, across 12 Swedish municipalities located in the southeast region of Sweden, were included in this study. In total, 494 children are included in this study, 229 girls and 265 boys, with a mean age of 53.44 ($SD = 10.64$) months. The inclusion criteria for children were complete teacher questionnaires, SDQ and CEQ, and 10 or more obtained observations with COP. Parental permission to collect observational and questionnaire data was obtained for all the participating children.

An average preschool unit had 20 children, ranging from 10 to 42. In this sample, units were represented by on average 7 children, ranging from 1 to 14. In percentage, 37% of children attending the unit were included in the sample, ranging from 3% to 90%.

Notably, no data was collected about the socioeconomic status of the children's families. However, it was found that 74 children (15%) had a right to educational support in their mother tongue. For two children, this information was missing. Educational support in the mother tongue is provided to children who speak Swedish as a second language and also speak another language at home with family. We used this information as an indicator of the second-language learner status. Furthermore, 21 children (4.3%) officially received special support due to a clinical diagnosis or disability. Information about special support was missing for five children in the sample. Children receiving special support were more likely to attend public preschools, $X^2(1, N = 489) = 4.71, p = .03$. Second language learners were also more likely to attend public preschools, $X^2(1, N = 492) = 11.71, p < .001$.

Measures

Child Observation in Preschool (COP; Farran & Anthony, 2014) is a systematic approach to observing and recording the behaviors of preschool children in a classroom setting. The method involves identifying a child to observe, monitoring their behavior for three seconds, and then coding their observation on 11 dimensions. Ten of these dimensions are categorical, and the eleventh dimension *Involvement*, is ordinal. This procedure is repeated for every child in the group, allowing for a comprehensive understanding of the behaviors of all the children in the classroom. After all the children in the group have been observed for three seconds each, the procedure is repeated multiple times throughout the day to ensure a representative picture of children's engagement.

For the purpose of this study, we analyzed the *Involvement* dimension as a measure of state engagement. The *Involvement* dimension assesses how engaged children are in their activities on a scale from one to five. A rating of one indicates low involvement, meaning the child is not engaged in the activity and may be off-task or not paying attention. A rating of two indicates medium-low involvement, where the child is not persisting in the activity and may be inconsistently looking at the

teacher or materials. A rating of three indicates medium involvement, where the child is on-task but slightly distracted and may be looking around and then returning to the task. A rating of four stands for medium-high involvement, where the child is persistent in the activity, attentive to the material, and eager to participate with a positive affect. A rating of five indicates high involvement, where the child is intensely focused on the activity and difficult to distract, seemingly oblivious to noise and other non-related stimuli.

In this study, a five-point scale was reduced to a three-point scale by merging the ratings for low and medium-low involvement and ratings for medium-high and high involvement. Treating the *Involvement* dimension as a three-point scale has been shown to improve indices of inter-rater reliability and internal consistency (Åström & Almqvist, 2022; Åström et al., 2022). In the present sample with a minimum of 10 observations per child, Cronbach's alpha improved from .71 to .86 after merging the five-point involvement scale to a three-point involvement scale. Another COP dimension, *Schedule*, was used to exclude observations that took place during transition times and meals, so that the analysis can be performed only on observations that took place when the child was with the whole group, in the small group, play centers, or the playground (Åström et al., 2022). For more information on adaptations of the COP instrument to the Swedish preschool environment, please refer to Coelho et al. (2021), and Åström et al. (2022).

Child Engagement Questionnaire (CEQ; McWilliam, 1991) is a measure of a child's global level of engagement as reported by an adult familiar with the child. The original instrument, developed in the US, consists of 32 items that describe behaviors of varying complexity and are accompanied by examples to facilitate understanding. The four-point rating scale ranges from (1) "not at all typical" to (4) "very typical," with "typical" indicating that the child spends a lot of time engaged in an activity. In the Swedish version of the questionnaire, only 29 items were used, as three items were deemed irrelevant in the Swedish preschool context (Sjöman et al., 2016). The rating scale was adapted to Swedish by Björck-Åkesson (1994; as cited in Sjöman, 2018), with responses ranging from (1) "almost never happens" to (4) "happens very often." CEQ has been found to have different underlying factor structures by various researchers. The American version has four factors: competence, persistence, undifferentiated behavior, and attention (de Kruif & McWilliam, 1999). The Swedish version has shown good intra-rater reliability across the three dimensions: attention to adults, differentiated behavior/play, and problem solving/persistence (Almqvist et al., 2018). Another Swedish study identified two underlying factors: core engagement, which has a low positive correlation with age, and developmental engagement, which has a moderate positive correlation with age (Sjöman et al., 2016). In the current study, CEQ was used as a unidimensional measure of children's global engagement in preschool, as reported by their teachers, concerning their interactions with peers, adults, and materials. Cronbach's alpha for the CEQ in the present study was very good, with a value of .94.

Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997) is a short questionnaire used to screen for mental health problems in children and youths. It consists of 25 items divided into 5 subscales and can be completed by parents and teachers or self-reported by older children. In our analysis, we used the hyperactivity/inattention subscale of the SDQ, which consists of five items that assess the symptoms of attention-deficit/hyperactivity disorder as described in DSM-V: inattention (two items), hyperactivity (two items), and impulsiveness (one item). The items are rated on a three-point Likert scale, with scores ranging from 0 to 2, where 0 indicates "not at all," 1 "only a little," and 2 "quite a lot." Scores on the hyperactivity/inattention scale can range from 0 to 10, and scores tend to be positively skewed with only a small number of children obtaining high scores. Those that score in the highest 10% are categorized as "highly hyperactive," those that score one point less are categorized as "borderline hyperactive," and the rest are categorized as "low in hyperactivity." In this study, a score of six or higher on the hyperactivity/inattention subscale was used to indicate high hyperactivity ($n = 50$, 10.4%). This cutoff score was chosen based on previous research in Swedish preschool settings (Gustafsson et al., 2016). Using a higher cutoff score, as suggested in studies from the US (Goodman, 2001), would have resulted in a much smaller proportion of children being categorized as "highly hyperactive." Cronbach's alpha for the five hyperactivity items in the present study was good, with a value of .84.

Analysis Plan

Data from project participants who had at least 10 observations in COP and a completed CEQ questionnaire were included in the analysis. We calculated the mean number of observations per child to be 20.03 ($SD = 5.35$). For each participant, we calculated the mean CEQ score and the mean rating for the involvement dimension in COP. The COP ratings were only included if they occurred while the child was with the whole group, in the small group, play center, or playground, and not during meal and transition times.

We used ROPstat statistical software (Vargha et al., 2015) to perform cluster analysis, following the analytical steps provided by Vargha et al. (2015). Pearson's r was calculated to investigate associations between the two measures of engagement and to check for multicollinearity between variables in the cluster analysis. A residue analysis with an averaged-squared Euclidean distance (ASED) of 0.45 was performed to identify outliers, however, no outliers were detected. We ran hierarchical classification based on Ward's method to establish the number of clusters. After identifying an acceptable cluster solution based on EESS (>67%) and HC indexes (<1 in the start solution) (Bergman et al., 2003), we ran the K-means classification with a determined number of clusters to establish the final solution.

A subsequent comparative analysis of clusters was run in IBM SPSS Statistics 27, using ANOVA with post hoc tests to investigate age differences between clusters and three chi-square tests to investigate associations between clusters and gender, hyperactivity categories, and SLL status. The sample size could differ for each comparison due to missing values. For 12 participants, SDQ data was missing, and information about the right to language support was missing for 2 participants. To visualize the cluster solution data, the analysis was run in R (R Core Team, 2021) program using packages *factorextra* (Kassambara & Mundt, 2023) and *ggpubr* (Kassambara, 2023).

Ethics

Research projects ANONYMOUS were approved by the Regional Ethical Review Board in Linköping (dnr. ANONYMOUS, respectively). Both research projects had the aim to investigate the relations between child characteristics and preschool environment and this study therefore fits under the aims for which ethical approval was granted for both projects.

Results

We examined the association between the mean scores on the two measures of engagement, CEQ and COP, and found a low correlation, $r = .105$, 95%, (95% CI [.02, .19]), $p < .05$.

In the next step, we performed an exploratory cluster analysis and identified five clusters with homogeneity coefficients ranging from 0.43 to 0.88. The EESS was 67.11%, indicating a good solution. We found significant differences between the five clusters in both CEQ scores, $F(4, 489) = 329.17$, $p < .001$, $\eta^2 = .73$, and COP ratings, $F(4, 489) = 193.59$, $p < .001$, $\eta^2 = .61$. We used the K-mean procedure to relocate cases in five clusters (Vargha et al., 2015), and observed slight differences in the end solution, which is reported in Table 1.

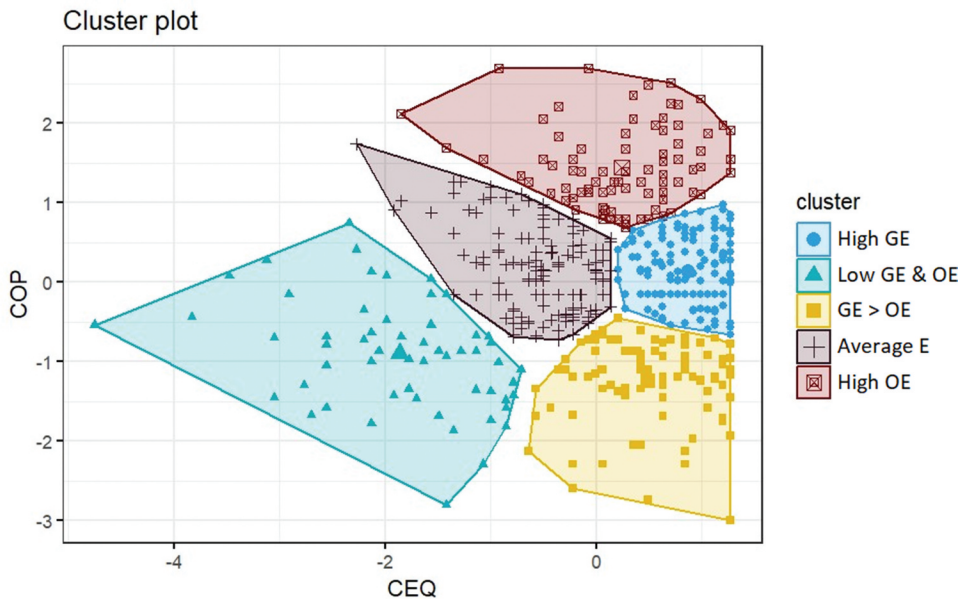
The five identified clusters are presented in Table 1, and a visual representation of all the five clusters is represented in Figure 1. Cluster four included a large group of children with average observed and global engagement levels, whereas other clusters exhibited discrepancies between global and observed engagement levels. Clusters one and three had higher global engagement ratings than observed engagement ratings, whereas clusters two and five had higher observed engagement ratings than global engagement ratings.

Associations between belonging to a cluster and child characteristics such as age, gender, hyperactivity status, and SLL status were investigated next. We observed significant differences in age between the five clusters, with the ANOVA test showing $F(4, 489) = 9.02$, $p < .001$, $\eta^2 = .069$. There were also significant differences in hyperactivity between the clusters, $\chi^2(4, N = 482) = 18.23$, $p < .001$,

Table 1. Patterns of global and observed engagement and associations between identified clusters and child characteristics.

Cluster	CEQ mean	COP mean	Size	HC	Age in months	SLL status (%)	Gender (% female)	Hyperactivity (%)
1. High GE	0.85 (H)	.28	132	0.29	56.84 ^a	9.8	50.8	3.1 ^{*-}
2. Low GE & OE	-1.97(L ⁺⁺⁺)	-0.84(L)	53	1.22	47.78 ^c	30.2 ^{*+}	41.4	19.6 ^{*+}
3. GE > OE	0.63(H)	-1.22(L ⁺)	86	0.54	50.84 ^b	22.1 ^{*+}	55.8	7.4
4. Average E	-0.41	-0.18	126	0.34	53.87 ^{ab}	15.2	42.1	10.6
5. High OE	-0.11	1.38(H ⁺)	97	0.79	53.65 ^{ab}	7.3 ^{*-}	40.2	17.5 ^{*+}
Total	3.38 (.49)	2.06 (.35)	494		53.44	15	46.4	10.4

Standardized means are provided as descriptive values for the mean scores on CEQ and COP for each cluster. GE = Global engagement, OE = observed engagement, E = engagement, . = Average, H = High, L = Low, more extreme levels in either direction are indexed with more pluses, superscript ^{abc} in Age column = same letters mark groups that do not differ significantly in age, SLL = Second language learner, *⁺ marks groups significantly higher observed than expected frequencies, and *⁻ marks groups significantly lower observed than expected frequencies.

**Figure 1.** Visual representation of Kmeans analysis for 5 clusters based on global engagement (CEQ) scores and observed engagement (COP) scores.

$\varphi = .19$. Children high in hyperactivity were more likely to be in the second and fifth clusters whose observed engagement is higher than global engagement, and less likely to be in the first cluster, whose global engagement is higher than observed engagement. Second language learners were more likely in clusters two and three, which have low observed engagement, and less likely in cluster five, which have high observed engagement, $\chi^2(4, N = 492) = 20.16, p < .001, \varphi = .20$. Belonging to a certain cluster was not significantly associated with gender, $\chi^2(4, N = 494) = 7.03, p = .134$.

Cluster two stood out due to low values on both engagement measures. As shown in Table 1, this cluster was the youngest, and had a higher proportion of children high in hyperactivity and second language learners. Teacher ratings of their engagement were lower than observed engagement ratings. In comparison to cluster two, cluster three had lower observed engagement ratings, but relatively high global engagement. This cluster also included a high proportion of second language learners and was the second youngest but included a relatively small proportion of children high in hyperactivity.

The other three clusters had average to high engagement ratings. The first cluster was the largest and was characterized by high global engagement and average observed engagement. Children in this cluster were significantly older, and only a low proportion of children was high in hyperactivity. The

fourth cluster was average in all the variables included in the cluster analysis and comparative analysis. The fifth cluster was characterized by high observed engagement and average global engagement, was more likely to include children high in hyperactivity, and less likely to include second language learners.

Discussion

In this study, we analyzed the engagement levels of preschool children in Sweden using two measures, the rating scale CEQ measuring global, or trait engagement, and the observation instrument COP, measuring observed, or state engagement. The two measures of child engagement were in a low correlation, indicating that state and trait aspects of engagement are qualitatively different, and the terms should not be used interchangeably in research. This may appear surprising but is in accordance with findings from other studies where a multimethod assessment of engagement is implemented (Alamos & Williford, 2020, Doumen et al., 2012; Finn & Pannozzo, 2004).

Our findings underline the importance of approaching child engagement measurement with multiple methods. Children with high scores on teacher questionnaires of child engagement might not be perceived as highly engaged by external observers who only see the child for a short time, and vice versa, children perceived as highly engaged while observed might be perceived by their teachers as average or low in engagement.

Further on, by conducting a cluster analysis, we identified five distinct patterns of global engagement and observed engagement among the children. Interestingly, only the fourth cluster showed the same (average) level of engagement in both measures. Additionally, children in the second cluster had low scores on both engagement measures but more extremely so on the measure of global engagement. Overall, the results indicate that global and observed engagement may not always align. Averaging the observed state aspects of engagement does not provide a good picture of stable individual characteristics captured with the engagement questionnaire based on the teacher's experience of a child over a long time. Moreover, the study found that the patterns of state and trait engagement were associated with different child characteristics.

The first and largest cluster showed average observed engagement but high global engagement. These children were the oldest and less likely to exhibit hyperactivity. In contrast, the second cluster was the smallest and included children with low observed and very low global engagement. This cluster was youngest and more likely to include second language learners and those high in hyperactivity, factors previously identified as related to lower momentary and global engagement, respectively (Finnman et al., 2021; Sjöman et al., 2016).

The third cluster with high global engagement and low observed engagement was more likely to include second language learners. This is in accordance with previous findings indicating that second-language learners show good overall functioning and high teacher-rated engagement, whereas their observed engagement is low (Dominguez & Trawick-Smith, 2018; Guhn et al., 2016; Halle et al., 2012; Luchtel et al., 2010; Rojas et al., 2021). Other studies showed that second language learners spend less time in associative play which requires verbal interactions (Åström et al., 2022). This indicates that language barriers might be impeding the social engagement of these children, reflecting on their momentary engagement rating, despite their general ability for high functioning noticed by their teachers.

The fifth cluster had high observed engagement but average global engagement and was more likely to include children high in hyperactivity but less likely to include second language learners, indicating that children with hyperactivity may be very good at finding opportunities to be highly engaged, but are in general not perceived as highly engaged by their teachers, a trend opposite to what is noticed with second language learners.

All together, these findings suggest that the global engagement ratings and the summary of momentary observations reveal different aspects of child engagement and the discrepancies between observed and global engagement among the majority of the sample highlight this.

It is important to note that both second-language learners and children high in hyperactive behavior are present in all identified clusters and these risk statuses are not necessarily indicative of lower engagement. Overall, children high in hyperactivity were more commonly found in clusters where observed engagement ratings were higher than global engagement ratings. Similar findings were noted by Coelho et al. (2023), who identified a robust connection between children's hyperactivity and self-regulation skills and their global engagement ratings, while the association with observed engagement was comparatively weaker. The three-second rating of attentive behavior in COP captures the intensity of engagement, but it does not capture the duration of engagement since each observation only lasts three seconds and observations are repeated at inconsistent intervals depending on how long it takes to observe all the children in the preschool group. This also partly explains why children high in hyperactive behavior were found to have higher observed engagement than global engagement scores.

In a longitudinal study by Sjöman et al. (2021), hyperactivity predicted lower global engagement, as rated on CEQ, only if the child had difficulties with social interactions. A longer observation period would provide more insight into how well the child sustains their interest and attention in tasks and especially in peer interactions. Teachers who observe children for a longer time are more likely to have a better understanding of a child's behavior over time, which makes them better equipped to notice how inattentive and hyperactive behavior reflects on engagement. However, it is important to note that teachers may also show bias in interpreting a child's behavior based on their preconceptions or expectations (Garcia et al., 2019). This is in contrast to observers who have no knowledge and expectations of the children they observe.

Previous research has shown that responsive teachers and positive interactions within the preschool group can enhance children's global engagement, even for children who exhibit hyperactivity (Sjöman et al., 2016, 2021). The study by Åström et al. (2022) reported that certain environmental characteristics, e.g., teacher's emotional tone, were related to higher observed engagement. It would be valuable to identify other factors predicting higher child engagement, especially environmental factors interacting with hyperactivity and other risk factors to gain a better understanding of effective strategies for engaging children with hyperactivity and other challenges in preschool activities.

In studies with less variation in chronological age of children, COP observations of engagement were previously reported not to be associated with age (Nesbitt et al., 2015). In this study that included preschool children of a broader age range, age seems related to observed engagement since the second and third clusters show the lowest observed engagement and are also the youngest. There are several potential explanations for this. The rating scale for involvement in COP relies on observers' interpretations of whether the child was attentive and focused on the task or easily distracted and off-task. Self-regulation of behavior and selective attention improves with age (Hagen & Hale, 1973; Jones et al., 2003), and it's problematic that a measure of engagement relies on assessing children's attention.

Additionally, recognizing the attentive behavior of a three-year-old might be a harder task for the observer than recognizing the attentive behavior of a six-year-old, and observers did not calibrate their expectations and rating criteria based on children's age. It could also be the case that preschool environments are better at engaging older children and thus older children show higher engagement in preschool. Some young children did show high engagement levels and it would be valuable to further investigate other factors that predict their high engagement.

The study emphasizes that high state engagement in children indicates potential and strength, which may not be fully reflected in global engagement ratings. When children show high state engagement, it means they can focus intensely on a task, provided that the environmental conditions are conducive. However, brief observations of children's engagement only consider focus and social interactions at a specific moment. Therefore, some of the differences between global and observed engagement ratings may disappear if the observation period were extended.

Interestingly, a group of children demonstrated low engagement in both global and observed engagement. This relatively small group included younger children, many children with high levels

of hyperactivity, and second-language learners. It would be worthwhile to investigate whether belonging to this cluster puts them at greater risk for future school failure and mental health problems compared to children in cluster five, which includes children with high levels of hyperactivity, but average global engagement and high observed engagement.

Limitations

As visible from [Figure 1](#), children's scores on CEQ are skewed toward high values. Due to this ceiling effect, no participants could stand out as highly engaged. Adapting the questionnaire or choosing another measure of global engagement that differentiates better between children on the high engagement spectrum would be desirable. We believe that a measure with more nuances in the high engagement end would have been beneficial for discovering additional engagement patterns that might have been missed in this analysis due to low variations in global engagement scores.

Although the COP instrument (Farran & Anthony, 2014) should allow for comparison of engagement levels across different activities, and our primary intention was to calculate mean engagement separately for structured and free-play activities and use it as separate variables in the cluster analysis, due to a low number of observations in structured activities, as typical for Swedish preschools (Åström et al., 2022), this analysis wasn't possible. Whereas merging the involvement scale to a three-point scale improved all the reliability and consistency indices (Åström & Almqvist, 2022; Åström et al., 2022) it may be considered problematic that this was necessary.

Additionally, categorical variables about hyperactivity, gender, and SLL status were not suitable for the planned profile analysis (Bergman & Wångby-Lundh, 2014). For this reason, we decided to run a comparative, variable-oriented analysis. This approach allowed us to explore how children's engagement profiles are related to other child characteristics. However, it's important to note that children's global engagement and hyperactivity symptoms were evaluated by the same raters, their teachers, employing the CEQ and SDQ questionnaires. Consequently, the observed associations between global engagement and hyperactivity status may have been amplified due to common method variance, as discussed by Podsakoff et al. (2003).

Implications for Research

This study highlights the distinct nature of global and observed measures of child engagement. Researchers in early childhood settings should recognize that teacher rating and observational measures capture different facets of engagement. It is imperative not to interchange these measures but rather acknowledge their unique contributions to comprehensively assess children's engagement. By implementing a multimethod approach when assessing child engagement, it is possible to gain comprehensive insights into children's engagement patterns.

Observations of child engagement are more suitable for identifying contextual aspects that promote children's engagement in preschool activities. On the other hand, global engagement measures such as CEQ can help identify children who tend to exhibit lower engagement independent of context. Such measures can be considered more sensitive to difficulties in everyday functioning. Notably, there is a need for refined measures of global engagement that avoid ceiling effects and capture a broader spectrum of engagement levels among children. Tailoring measures to discern nuances in high engagement levels could aid in identifying additional engagement patterns.

Implications for Practice

Children's manifestations of engagement vary, warranting tailored strategies to nurture child engagement within preschool settings. Tailored support and encouragement based on a child's specific engagement profile could significantly impact their overall engagement levels. For instance, children

displaying high momentary engagement may benefit from targeted encouragement and support to foster sustained engagement over time.

Special attention should be given to second language learners experiencing language barriers impeding their social engagement, despite demonstrating high functioning noticed by teachers. Strategies that facilitate verbal interactions and mitigate language barriers in classroom settings could improve their momentary engagement levels. Similarly, children with hyperactivity might excel in finding engagement opportunities, yet they might not be perceived as highly engaged by teachers. Understanding their specific needs and implementing supportive strategies within the classroom environment is essential for optimizing their engagement experiences.

The utilization of a person-oriented analysis method facilitated the identification of distinct groups of children that could potentially benefit from targeted early intervention programs, irrespective of their specific diagnoses or demographic characteristics. Moreover, it unveiled resilient groups of children exhibiting high engagement despite facing challenges such as hyperactivity or being second language learners.

Implementing tailored interventions and strategies based on these identified engagement profiles holds promise in enhancing overall engagement experiences within early childhood settings, fostering inclusive and supportive learning environments for all children.

Conclusion

To gain a comprehensive understanding of child engagement, investigating both trait and state aspects of child engagement is crucial, since observed child engagement and teacher-reported global engagement are often discrepant. Person-oriented analysis offers a distinct advantage by revealing specific profiles that integrate various independent risk factors such as second language learning (SLL) status and early childhood hyperactive behavior, and positive outcomes such as child engagement.

While groups considered “at-risk,” such as second language learners and children high in hyperactivity, were more inclined to belong to clusters showing congruently lower engagement levels, it’s important to note that they were present across all clusters. Many children high in hyperactivity had a high observed engagement, and many second language learners had a high global engagement. Observations of engagement seem to be less sensitive to hyperactive symptoms of children in comparison to teacher questionnaires, probably due to short observations allowing only a limited insight into difficulties their teacher may be familiar with. It is also likely that CEQ may capture broader aspects of daily functioning beyond engagement, as well as a teacher bias, resulting in high associations with hyperactivity status and other developmental outcomes. Conversely, observations of child engagement seem more sensitive to detect variations in engagement related to SLL status, identifying cases where second language learners showed lower observed engagement despite higher global ratings. Facilitating social interactions for second language learners and adapting the learning environment to promote sustained engagement for children with high levels of hyperactivity could contribute to leveling out engagement disparities among diverse groups of children in educational settings.

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