frontiers | Frontiers in Education

TYPE Original Research
PUBLISHED 31 October 2022
DOI 10.3389/feduc.2022.1003750

OPEN ACCESS

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SPECIALTY SECTION
This article was submitted to Special Educational Needs, a section of the journal Frontiers in Education

RECEIVED 26 July 2022
ACCEPTED 17 October 2022
PUBLISHED 31 October 2022

CITATION
André A, Despois J, Amiot L and Deneuve P (2022) Dynamics of the interaction between adults and a preschool child with autism: Transition from segregated to inclusive settings. *Front. Educ.* 7:1003750. doi: 10.3389/feduc.2022.1003750

Dynamics of the interaction between adults and a preschool child with autism: Transition from segregated to inclusive settings

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This study explores the dynamics of the interaction between the engagement of a preschool child with autism spectrum disorder and the participation of adults, notably during the child's transition from a segregated to inclusive setting. Nine classroom sessions were filmed over an 8-month period with a focus on two types of activities: free play and adult-led gross motor activities. Our results showed that the interactions evolved differently over time for the two activities. During gross motor activities, the active engagement of the child associated with the passive participation of adults, which increased in the segregated setting, continued to develop in the inclusive setting leading to the emergence of active engagement with peers at the end of the school year. During free-play, the child engagement progressed in the segregated setting. Though initially in a state of passive observation, the child became independently active, either with or without the guidance of adults. The transition from the segregated setting to the inclusive setting without adult participation leads to a momentary drop in the child's active engagement before the reemergence of independent active engagement. The results of this study question the methods used and the resources invested in preschools to favor the inclusion of young children with autism. They highlight the importance of adults' participation during the transition between segregated and inclusive settings. In addition, they encourage adults to accept the temporary regression in child engagement in order to attain desirable outcomes such as independent engagement at a later time.

KEYWORDS

inclusion, early childhood education, child engagement, autism spectrum disorder, dynamics, adult participation

Introduction

The Salamanca Statement on special needs education states that mainstream schools can provide effective education for the majority of children (UNESCO, 1994). Over the past 25 years, many countries have adopted more inclusive laws to encourage mainstream schools to include children with disabilities from the youngest age (Ruijs and Peetsma, 2009). In inclusive education, children with disabilities are supported alongside their peers with typical development (TD) and encouraged to take an active part in all classroom activities in order to maximize their developmental potential (Booth and Ainscow, 2000; Ainscow, 2005; Nilholm and Göransson, 2017). The full participation of children with disabilities involves their engagement in learning tasks as well as their positive social interactions with peers and adults. However, this remains a major challenge for education professionals. Previous research showed that simply placing children with special needs, especially autism spectrum disorder (ASD), in preschools is not beneficial in itself (Reszka et al., 2012; Odom, 2019). Despite the potential benefits of inclusive center-based programs for children with ASD, there are many difficulties associated with the inclusion of these children in programs designed for TD children (Kishida and Kemp, 2009; Odom et al., 2021). Children with ASD have persistent deficits in social communication and social interaction and have restricted, repetitive patterns of behavior, interests, or activities (American Psychiatric Association, 2013; Sharma et al., 2018). For example, they usually display deficits in social-emotional reciprocity and in nonverbal communicative behaviors used for social interaction. They could also display stereotyped or repetitive motor movements and inflexible adherence to routines. Without the appropriate support, children with ASD are likely to be socially isolated from their peers and to engage in repetitive behaviors (Anderson et al., 2004; Sam et al., 2016; Brodzeller et al., 2018).

In France, more and more children with ASD do attend preschool autism teaching units (*unités d'enseignement en maternelle*, UEMA) which were set up in 2015. These units, limited to a maximum of seven children with ASD, are located in inclusive preschools. Their aim is to enable young children with ASD to progressively benefit from schooling in an inclusive setting in an adapted manner. Children with ASD are usually grouped together in the UEMA and taught by a specialized team that prepares them for their inclusion in an inclusive classroom. Throughout the school year, some of the children are then included in the inclusive setting. The transition from segregated to inclusive settings thus represents a crucial phase. It therefore seems interesting to explore the evolution of child engagement and social interactions with peers and adults during this key phase of transition from segregated to inclusive settings.

Many studies use child engagement as a key indicator of the quality of inclusion during early childhood (e.g., McWilliam and Bailey, 1995; Kishida and Kemp, 2009; André et al., 2016, 2019a; Sam et al., 2016). Engagement in early childhood settings such as preschools was broadly defined as the child's involvement with the material and people (McWilliam and Ware, 1994; Kontos and Keyes, 1999). More specifically, it refers to the amount of time that children spend interacting with their environment (with adults, children, or objects) in a manner that is developmentally appropriate (McWilliam et al., 1985). Promoting child engagement is a major goal for early childhood education professionals, because this period is critical for social, emotional, and cognitive development (Darling-Churchill and Lippman, 2016; European Agency for Special Needs and Inclusive Education, 2017). However, previous research has demonstrated that children with ASD are more passive and have higher levels of non-engagement than their typical peers (Wolfberg, 1995; Odom et al., 2003; Kishida and Kemp, 2009; Kemp et al., 2013). When engaged, they are more likely to be self-absorbed or engaged with objects rather than with people. For instance, Odom et al. (2003) found that the engagement level of children with ASD (51%) was lower compared with TD children (59%). Kemp et al. (2013) observed that children with ASD were engaged during free play activities for only 47.6% of the time compared with children with other disabilities who were engaged in the same activities for 84.6% of the time.

Adults in classrooms play a key role in fostering child engagement (McWilliam et al., 2003). Adult participation is defined as the adult's behavior toward a focal child and is usually classified into three categories (Powell et al., 2008; Sam et al., 2016). First, active adult participation is characterized by direct interaction with the focal child. Second, passive adult participation is defined as the presence of an adult close to the focal child and/or a group interaction including the focal child but without direct interaction. Finally, no adult participation is qualified as the absence of direct interaction and a lack of close distance between the adult and the focal child. Numerous studies have demonstrated that the level of adult participation affects the degree of child engagement (McWilliam et al., 2003; Powell et al., 2008; Tsao et al., 2008; Sam et al., 2016; André et al., 2019a). For example, Sam et al. (2016) showed that preschool children with ASD were less likely to be engaged when adults were participating with them. Studies also found that when adults initiated the activity, children with special needs interacted more frequently with adults as opposed to the other children (Tsao et al., 2008; André et al., 2016). Other studies have shown that adult participation and engagement depend on the type of activity (Powell et al., 2008; Kemp et al., 2013). For example, Powell et al. (2008) found that adult participation was lower in activities chosen and led by children (e.g., free play) compared with adult-led activities (e.g., academic activities). Kemp et al. (2013) also observed that children with ASD were more engaged in child-led activities than in adult-led activities. Finally, in a longitudinal study, André et al. (2019a) revealed that the interactions between adults and a child with ASD developed differently depending on the activity. During the adult-led activities, the child's observation behaviors grew with the passive

participation of the adult, whereas active engagement behaviors, with or without adult participation, increased meaningfully during free play.

Numerous studies have investigated child engagement and adult participation in segregated settings compared to inclusive settings (e.g., Beckman and Kohl, 1987; Hundert et al., 1998; Foreman et al., 2004; Kishida and Kemp, 2009). For example, Kishida and Kemp (2009) revealed that children with ASD were more actively engaged with material in segregated settings than in inclusive settings. Adult interaction was significantly higher in segregated settings, although only inclusive settings favored peer interaction. Beckman and Kohl (1987) found that positive social interaction involving children with disabilities was greater in inclusive settings than in segregated settings. Similar findings were obtained from a study conducted in different school settings. Foreman et al. (2004) found that the communicative interactions of children with profound and multiple disabilities were significantly more frequent in inclusive than in segregated settings.

Previous quantitative studies have compared segregated and inclusive settings while focusing on child engagement and adult participation. However, these studies, which used intergroup analyses, do not elucidate how the adult–child interactions developed over time during the child's transition from a segregated to inclusive setting. The aim of this study is therefore to explore how the dynamics between the type of Kate's engagement and adults' participation vary in the frequency of segregated and inclusive settings. These dynamics will be studied in two contrasting activities (i.e., free play and adult-led gross motor activities), which are organized on a daily basis at the preschool.

Materials and methods

Design

This descriptive study focused on the interactions between one child with ASD and the adults working in the special education and inclusive preschool classrooms. As Walsh and Kemp (2013) stressed, single-subject studies are appropriate for research on inclusion, particularly of students with ASD given the high variability in this population. More specifically, this study uses the method of complex dynamic systems, which provides a deeper understanding into dynamics over time and has already been successfully used in previous research on adult-child interactions (Steenbeck et al., 2012; André et al., 2019a). This method allows us to study the dynamical process of interaction as it unfolds over time (Hollenstein, 2007; Steenbeck et al., 2012). Indeed, students and teachers have been described as being engaged in a mutual process in which the behaviors of students determine the behaviors of the teacher and vice versa (Steenbeck et al., 2012). Furthermore, typical patterns of interaction emerged in a self-organizational manner (Lewis et al., 1999; Granic and Hollenstein, 2003). These typical patterns are known as attractors, which are stable and recurrent interactions that occur over time (Granic and Hollenstein, 2003). Finally, the interaction process is characterized by nonlinearity in the form of intra-individual variability. Variability represents the degree to which the interactions change over time and the degree of the stability in the system (Hollenstein, 2007). A temporary increase in variability could highlight a transition phase, which represents a major change in the interaction patterns (Hollenstein, 2007). Conversely, low variability could indicate fluctuations in relatively stable interaction patterns.

Participants

The UEMA is a program designed for preschool children with ASD who are grouped together in segregated setting (i.e., a specific classroom with special education professionals). The UEMA classroom is situated within an inclusive preschool with the aim to progressively integrate the children with ASD into the inclusive classrooms. The UEMA described in the present study is implanted in a preschool located in a disadvantaged urban area in northern France. The school has six classes with children aged 3–5 years. The UEMA has seven children with ASD aged 3–5 years who were diagnosed by the Regional Resource Center for Autism (CRAHN). Of these children, this study focuses on Kate, as she was the only child who began in the UEMA at the start of the school year and then moved from the segregated to inclusive setting during the course of the year. At the start of the school year in September 2018, Kate was aged 3 years and 2 months. She had been diagnosed with ASD with severe symptoms in July 2018 (CARS-II). Aside from the UEMA program, she did not benefit from any other health care services. Kate had language and communication deficits. She did not express herself verbally and had no social interactions with her peers. She also had difficulty understanding instructions. However, she used imitation. In terms of her behavior, Kate had difficulty remaining seated and presented attention deficits although she did not present major behavioral problems such as aggressiveness. Finally, her motor development was typical for her age.

The team of professionals in the UEMA was comprised of a special education teacher, two early childhood educators, and two teaching assistants who work full-time. A psychologist is also present 2 days per week.

The inclusive setting included 16 neurotypical children aged 3–4 years with a teacher with over 10 years of experience as well as an assistant teacher.

The current study is part of a larger research project, which aims to explore the school inclusion of children with ASD. Ethical approval was obtained from the university ethics committee and the local education authority. Consent to participate in the study was obtained from the children's parents.

Procedure

Two professionals from the education department filmed the classroom sessions once a month for 8 months (i.e., from December to July) except in May when two observations were made because Kate moved from the segregated to inclusive setting. More specifically, the segregated setting was observed from December to May and the inclusive setting from May to July. Two activities proposed on a daily basis were observed more closely: welcome time and gross motor activities. Welcome time is characterized by free play in which the children can freely choose their games. It is the first stage of child-led learning. This period of adaptation allows the child to move from an individual activity to a shared one. The gross motor activities generally included group activities and motor skills courses set up by adults to develop the children's basic motor skills (jumping, climbing, balancing, throwing, etc.).

Measures

The levels of adult participation and child engagement were independently assessed. Two coders, who were members of the research team, coded the behaviors every 5 s.

Adult participation was coded into three categories (Sam et al., 2016): (1) active participation (i.e., an adult is directing coded behavior toward the focal child, including adult support, adult approval, and adult comments); (2) passive participation (i.e., an adult is directing coded behavior toward a group of children including the focal child and/or an adult is in close proximity to the focal child); and (3) no participation (i.e., no adult is directing coded behavior toward the focal child or toward a group of children including the focal child, and no adult is in close proximity to the focal child).

An observational tool combining the Individual Child Engagement Record (Kishida and Kemp, 2006) and social participation categories (Guralnick et al., 1996) was used to assess child engagement. This tool, which has been successfully applied in previous research (Despois et al., 2016; André et al., 2019a), included the following six categories: (1) passive non-engagement (child is unoccupied); (2) active non-engagement (child exhibits inappropriate active behavior); (3) passive engagement (child observes peers or adults); (4) independent active engagement (child exhibits appropriate behavior in a specific task but different from peers); (5) active engagement alongside peers (child exhibits appropriate behavior in parallel with other children undertaking the same activity); and (6) active engagement with peers (child exhibits appropriate behaviors in a collaborative task with peers).

The video recordings were independently coded by two researchers who had participated in three 3-hour training sessions to code the engagement of children with ASD and the participation of adults. All the videos were double-coded. Interobserver agreement was good for child engagement (k = 0.81; variation between 0.72 and 0.93 for each individual code) and for adult participation (k = 0.83; variation between 0.80 and 0.86 for each individual code). In addition, intra-rater agreement, which was estimated from eight randomly selected videos, was very good for both measures (k = 0.94 on average).

Data analysis

State space grids were used to study the dynamics of the adult–child interactions over time (Hollenstein, 2007). This tool takes into account the changing and stable states of the complex dynamic system. The Gridware program allows to model and graphically visualize the interaction between two variables. On the one hand, state space grids highlight the degree of attraction between different states by measuring the frequency and duration of each state in the system in order to identify any attractors. On the other hand, dispersion is a measure used to describe the variability of the system (Hollenstein, 2007), with lower dispersion indicating a more stable system (see **Supplementary material**).

This quantitative analysis is supplemented by a qualitative description of various situations taken from the sessions. This description allows us to illustrate the attractors and better understand the interactions between adult participation and child engagement in the proposed situations.

Results

Four time points were chosen to analyze the results. The first two points (December and May) highlighted Kate's evolution in the segregated setting. The second observation in May showed the transition from the segregated to inclusive setting. Finally, the observation in June revealed her evolution in the inclusive setting. The results for these four time points are presented in **Tables 1**, **2**.

Dynamics of interaction at welcome time

In December, the analysis of the interaction revealed the high dispersion of the system (D = 0.682), indicating that the interactions between child engagement and adult participation were variable. The analysis of the content of the interactions showed that the system was attracted by three states (**Figure 1**). The first state concerns the active engagement of the child with the active participation of the adult (f = 0.36). The other two states are characterized by the absence of adult participation along with the child's passive engagement (f = 0.33) or her

TABLE 1 Frequencies of states, child engagement, and adult participation during free play.

Setting	Month	*D*	PN/ NP	AN/ NP	PE/ NP	IAE/ NP	AEA/ NP	AEW/ NP	PN/ PP	AN/ PP	PE/ PP	IAE/ PP	AEA/ PP	AEW/ PP	PN/ AP	AN/ AP	PE/ AP	IAE/ AP	AEA/ AP	AEW/ AP
Segregated	December	0.772	0	0.08	0.26	0	0	0	0.05	0.17	0	0	0.07	0	0.01	0.01	0.05	0	0.31	0
Segregated	May	0.652	0	0.05	0	0	0.10	0	0	0	0.11	0	0	0	0	0.06	0.06	0.61	0	0
Inclusive	May	0.172	0.03	0	0.93	0.01	0	0.01	0	0	0	0	0	0	0.02	0	0	0	0	0
Inclusive	July	0.414	0	0	0.27	0	0.72	0	0	0	0	0	0	0	0	0	0	0.01	0	0

D, dispersion; PN, child passive non-engagement; AN, child active non-engagement; PE, child passive engagement; IAE, child independent active engagement; AEA, child active engagement alongside peers; AEW, child active engagement with peers: NP, no participation of adults; PP, passive participation of adults; AP, active participation of adults.

TABLE 2 Frequencies of states, child engagement, and adult participation during gross motor activities.

Setting	Month	*D*	PN/ NP	AN/ NP	PE/ NP	AEA/ NP	AEN/ NP	AEW/ NP	PN/ PP	AN/ PP	PE/ PP	AEA/ PP	AEN/ PP	AEW/ PP	PN/ AP	AN/ AP	PE/ AP	AEA/ AP	AEN/ AP	AEW/ AP
Segregated	December	0.702	0	0	0.05	0.01	0	0	0	0.04	0	0	0.24	0	0	0.07	0.06	0.43	0.10	0
Segregated	May	0.514	0	0	0.09	0	0	0	0	0	0.13	0	0.57	0	0	0	0.02	0	0.18	0
Inclusive	May	0.274	0	0	0	0	0	0	0	0	0	0.04	0	0.88	0	0	0	0.03	0.02	0
Inclusive	July	0.469	0	0.1	0.01	0	0	0	0	0	0.07	0	0.77	0.13	0	0	0	0	0	0

D, dispersion; PN, child passive non-engagement; AN, child active non-engagement; PE, child passive engagement; IAE, child independent active engagement; AEA, child active engagement alongside peers; AEW, child active engagement with peers: NP, no participation of adults; PP, passive participation of adults; AP, active participation of adults.

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active non-engagement (f = 0.17). For example, games and toys (e.g., abacus, car, doll, robot, puzzle) were freely available to the children. Three adults supervised the group of six children (one child was absent), while the other two adults prepared the upcoming activities. When the adults interacted individually with the other children to stimulate them or channel their energy, Kate wavered between observation and wandering around the classroom for several minutes. An adult then urged her to play with the car that she was holding in her hand. This was followed by a period in which Kate played with the car on a mat in the presence of an adult who stimulated and encouraged her. Once the adult moved away, however, Kate began to observe the class and wander once again.

In May, variability slightly diminished (D = 0.652). The system became concentrated around the attractor of independent active engagement and active adult participation (f = 0.61), while the two other attractors observed in December disappeared. Aside from this attractor, another state emerged, as Kate was actively engaged without the help of an adult (f = 0.10). For example, Kate took a puzzle and asked an adult to help her. When the adult went away, Kate continued to do the puzzle alone.

In May, Kate's move to the inclusive setting was accompanied by a substantial decrease in variability (D = 0.172). Moreover, the landscape of attractors dramatically changed and became polarized around a new attractor, notably passive engagement in the absence of adult particpation (f = 0.93), while the attractor of independent active engagement and active adult participation that was present in the segregated setting disappeared. To given an example, in this classroom, Kate was with 12 first-year preschoolers with TD as well as two adults. During free play, games and toys were freely available to the children, and the adults did not intervene. Kate's lack of participation was constant. She remained in passive engagement for lengthy periods; without moving, she stared at the other children playing with each other in the doll corner. A clear regression in her engagement can therefore be observed.

Finally, in July, variability increases (D = 0.414) with the appearance of a new attractor, notably active engagement alongside peers without adult participation (f = 0.72). Passive observation behavior diminishes (f = 0.27). For example, in a corner of the classroom, Kate was playing with a car on a race track alongside two other children. Even though the two TD children were spatially close to her and interacted with each other, no interaction occurred with Kate (f = 0).

Dynamics of interaction for gross motor activities

In December, the system was highly dispersed (D = 0.702), attesting to the large variability in the interactions. Two attractors can be identified (**Figure 2**): Kate was actively engaged alone with the active participation of the adult (f = 0.43) or alongside other children with the passive participation of the adult (f = 0.24). For example, a target-throwing game was set up with three adults supervising four children. Like the other children, Kate had to wait her turn. When it was her turn, she made several attempts to make the targets fall while the adult encouraged her and helped her pick up the targets.

In May, the dispersion was less pronounced (D = 0.514), with the system forming a strong attractor, notably active engagement alongside peers with passive adult guidance (f = 0.57). Two secondary attractors were also present. Kate was engaged alone with the active participation of the adult (f = 0.18), while she also observed the other children with passive guidance (f = 0.13). To give an example, a motor skills course requiring balancing, crawling, climbing, and jumping was set up (beams, obstacles, etc.). Kate was very active on this obstacle course. The special education teacher supervised the group and gave the group instructions, while the early childhood educator stood at a strategic position (elevated obstacle) in order to individually help each child, including Kate. In this situation, Kate's observation behaviors occurred when she was waiting her turn.

In the inclusive setting in May, the variability in gross motor activities dropped even further (D = 0.274). The system centered around and reinforced one attractor: active engagement alongside peers coupled with passive adult participation (f = 0.88), while active adult participation fell sharply (f = 0.05). For example, the preschool teacher and assistant teacher were supervising the 12 children, including Kate. During the motor skills courses, Kate engaged in a sequence of actions like her TD peers: crawling, balancing, climbing, and jumping. When she froze in front of the beam, the teacher held her hand to reassure her.

In July, the dispersion increased (D = 0.469). Although the attractor of active engagement alongside peers and passive adult participation remained strong (f = 0.73), a new attractor emerged, notably the engagement with peers accompanied by the passive participation of the adult (f = 0.13). To give an example, on the same motor skills course as in May, Kate, who had previously frozen in front of an obstacle (i.e., beam), still asked for the help of an adult. However, the adult did not come to help but instead asked a TD child to do so. During each round of the motor skills course, Kate waited in front of the obstacle, and the same TD child spontaneously came to help her.

Discussion

This study sheds light on how interactions between the engagement of a child with ASD and the participation of adults develop over time, notably when the child moves from

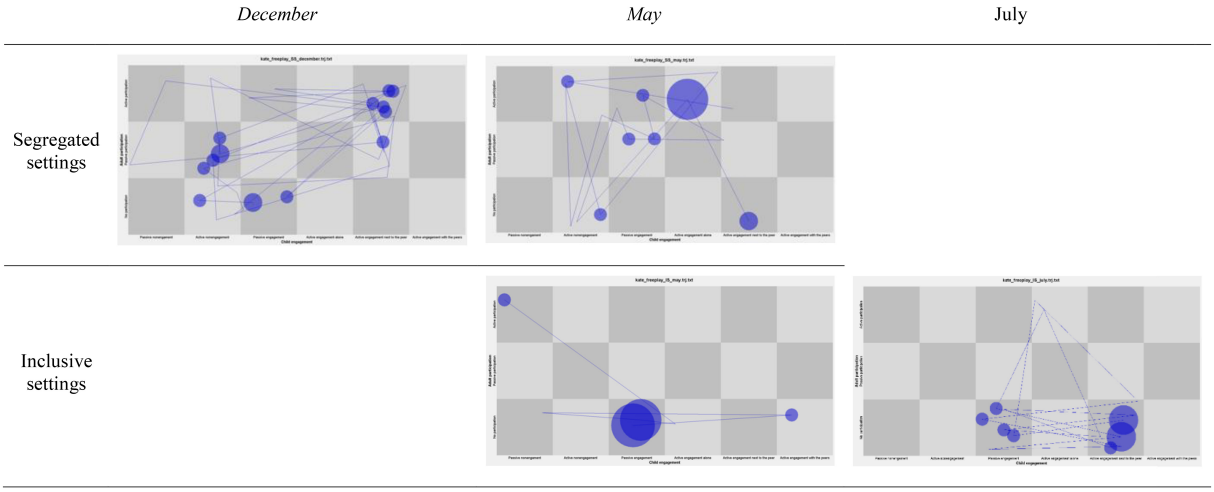

FIGURE 1
State space grids during free play.

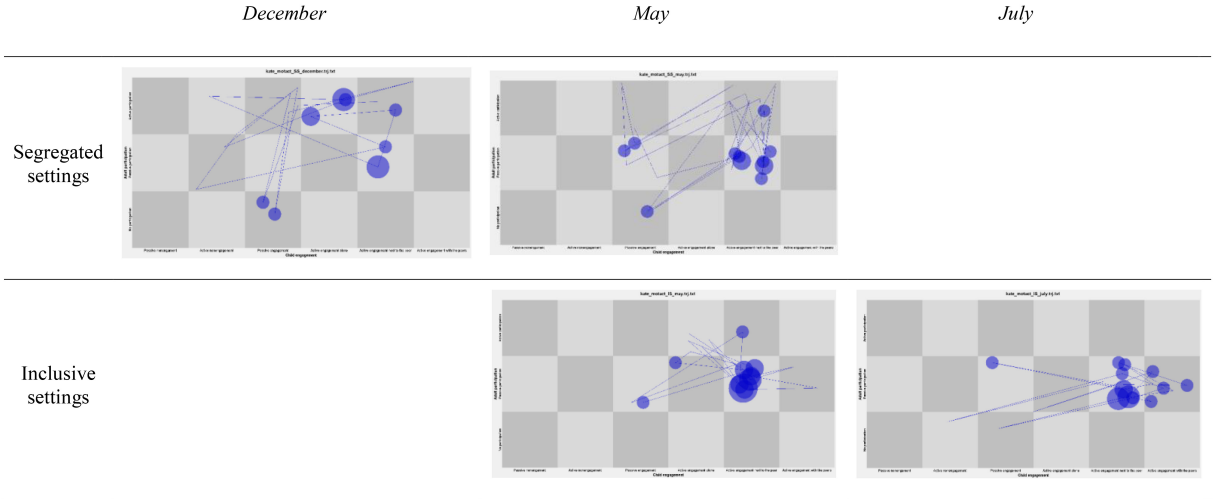

FIGURE 2
State space grids during gross motor activities.

a segregated to inclusive setting. Our results revealed that the child's evolution throughout the school year could be characterized by three phases: an initial phase from December to May in the segregated setting, a transition phase from the segregated to inclusive setting, and a third phase from May to July in the inclusive setting.

First phase: Segregated setting

In the segregated setting, Kate's degree of engagement increased from December to May, whereas the adults' degree of participation differed depending on the activities.

During welcome time, Kate's engagement progressed. Though initially in a state of passive observation, Kate became independently active, either with or without the guidance of adults. We can assume that Kate needed adults to encourage her active engagement in December. As shown by Sam et al. (2016), children with severe autism and communication disorders benefited more from adult participation than other children. Kate was guided minimally during welcome time, as the adults gave priority to the other children who, unlike Kate, could exhibit inappropriate behavior that could interfere with the functioning of the class. In May, Kate's degree of active engagement increased substantially, being higher than that found in other studies on free play (e.g., Kemp et al., 2013). Kate

began to use language, learned to ask adults for help and did not hesitate to ask them to play with her. This individual guidance was possible due to the high adult-child ratio of the segregated setting (Kishida and Kemp, 2009). Nevertheless, when the adult moved away, Kate, after gaining independence during the course of the year, also actively engaged on her own.

In the gross motor activities, in December, Kate was activity engaged with the individual guidance of the adult. The adults' degree of participation remained very high. These results confirm that in this type of adult-led activity, guidance is more important (Odom et al., 2003; André et al., 2019b). The adults urged, accompanied, and encouraged Kate to participate in the proposed activities. Given her age-appropriate motor development, Kate was rapidly successful in this type of activity. In May, the proposed tasks no longer occurrred on an individual basis but in parallel with the other children who undertook the same activity at the same time in order to foster their independence. These tasks favored the active engagement of Kate alongside the other children with the collective guidance of the adults.

In both activities, Kate never interacted with her peers. In this context of children with ASD who present social skill deficits, interactions between peers can prove difficult (Odom et al., 2003; Foreman et al., 2004). Moreover, no collaborative activities were proposed by the educational team, as their main priority was to develop the children's appropriate engagement with the material without their peers.

Second phase: Transition from segregated to inclusive setting

The transition between the two settings showed different trajectories for the two activities.

During welcome time, Kate clearly regressed, as she shifted from an active to passive engagement. The level of her engagement decreased, thus confirming previous results showing the greater engagement of children with materials in segregated settings compared to inclusive settings (Kishida and Kemp, 2009). This regression may have been due to the loss of her points of reference. Even though the two classrooms had a similar material environment, the social environment (i.e., adults and children) changed. The modes of guidance also changed, as Kate was no longer individually or passively guided by the adults. This change was related to several factors. First, the adult-child ratio decreased substantially in the inclusive classroom. Second, welcome time is frequently described by teachers as a period in which children should be independent (André et al., 2019a). Finally, Kate may have been reluctant to speak to the adults in the inclusive classroom as she had done in the segregated setting, because she did not know them very well.

By contrast, in the gross motor activities, despite the new social environment, Kate remained highly engaged alongside the other children. This high level of engagement may be associated with the continuity of the modes of guidance. Indeed, the passive guidance of the adults was present in both settings, allowing for continuity in the proposed situations (motor skills group activities and courses). As in the segregated setting, the teaching professionals did not propose collaborative activities. This choice may have been motivated by the desire to facilitate the inclusion of children with ASD by proposing activities that did not require many social skills, which are lacking in this population (Gillis and Butler, 2007; Mahoney and MacDonald, 2007). In addition, it can be thought that the gross motor skills activities and circuit highly motivated Kate which impacted on her active engagement.

Third phase: Inclusive setting

Kate's engagement progressed in the two activities. During welcome time, she evolved from passive observation to active engagement alongside her peers. As mentioned by Odom et al. (2003), observation is a crucial step toward active engagement, as it allows children with ASD to imitate their socially competent peers. Even in the absence of adult guidance, Kate developed new points of reference, helping her to adapt to her environment. These findings confirm previous research showing that during welcome time, children with ASD need time to engage with the available games and toys without the presence of adults (André et al., 2019a).

In the gross motor activities, we assume that the continuity in the modes of guidance and the proposed situations allowed Kate to maintain a very high degree of engagement. Moreover, these activities led to positive social interactions with her peers. These results confirm that the inclusive setting is favorable to the social interactions of children with ASD, as they can benefit from socially competent peers (Beckman and Kohl, 1987; Foreman et al., 2004). For Odom et al. (2003), inclusion provides the opportunity for children with disabilities to learn social skills by observing their socially competent peers with TD and thus becoming familiar with the typical patterns of social interactions. These collaborative exchanges were rendered possible by the teacher who deliberately chose not respond to Kate's request for help; she instead stepped back, observed, and encouraged the positive interactions with her peers (Tsao et al., 2008).

Limitations and perspectives

Although this study highlighted variations in the configurations of adult–child interactions for two different activities at a preschool, notably during the transition from the segregated to inclusive setting, these results should be considered with caution. First, this study only describes the

behavior of one child with ASD, which limits the generalizability of our findings. Given the high variability within the ASD population (Gillis and Butler, 2007), further studies should be conducted on several children with ASD to identify potential similarities or differences in the interaction trajectories in diverse classroom contexts (Pennings et al., 2014).

Moreover, the natural setting of this study did not allow us to control the type of activities (e.g., individual vs. collaborative tasks). In future research, it would be interesting to work more closely with teaching professionals to propose collaborative activities, which would allow us to study the social interactions of children and the guidance of adults in such situations. The analysis of this study highlighted the evolution of adult–child interactions over a duration of 8 months. It would be interesting to pursue these observations in the next school year to identify possible continuities or discontinuities from one year to another. Finally, this descriptive study does not shed light on the perceptions of the adults during the transition process. This research could therefore be enriched with more qualitative methods based on interviews to better understand the concerns of the adults and the collaboration between special education professionals and inclusive teachers.

Conclusion and implications for practice

The results of this study question the methods used and the resources invested in preschools to favor the inclusion of young children with autism. They highlight the importance of the transition between segregated and inclusive settings. The findings show that the transition phase is facilitated when there is continuity in the modes of guidance between the two settings. In this context, the passive participation of adults seems to be favorable, as it allows the children to develop an optimal degree of autonomy. This means that the adults should prepare the semi-independent engagement of children in the segregated setting and then pursue it in the inclusive setting, which requires close collaboration between the special education professionals and the inclusive teachers.

Our study shows that this type of adult participation could facilitate the positive social interactions between peers. Even though previous studies demonstrated that the active participation of adults could be detrimental to the social interactions of children with ASD (Tsao et al., 2008), our study highlighted that the child's social interactions fail to emerge in the absence of adult participation.

Furthermore, the transition from the segregated setting with the active participation of adults to the inclusive setting without adult participation during free play leads to a momentary drop in the child's active engagement before the reemergence of independent active engagement. This finding should encourage adults to accept the temporary regression in child engagement in order to attain desirable outcomes such as independent engagement at a later time.

Finally, state space grids can be a useful visual tool to make teachers aware of their own inclusion profiles. Coupled with videos, this tool can be incorporated into teacher training to help teachers analyze their own practices from another perspective and to implement changes (Gaudin and Chaliès, 2015).

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by the Ethics Committee of Universty of Rouen Normandy. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

Author contributions

AA and JD conceptualized the study design, wrote the original draft, and including the visualizing tables and figures. PD and LA were responsible for the data management and analysis, contributed substantially to the data collection and manuscript revisions, and provided critical feedback. AA continued editing and finalized the manuscript. All authors contributed to the article and approved the submitted version.

Funding

The current study is a part of a larger research project that aims to explore the inclusion of children with ASD. We acknowledge the financial support of the French Public Health Research Institute, and the PIA3 (Programme Investissement Avenir n°3) "IDT" (Inclusion: un Défi, un Territoire).

Acknowledgments

We would like to thank the professionals from the autism teaching unit (UEMA) and the preschool teachers who welcomed us into their classrooms.

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.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/feduc.2022.1003750/full#supplementary-material

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