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"Now We All Share the Same Knowledge Base"-Evaluating Professional Development Targeting Preschool Staff's Understanding of Autism and Inclusion Skills

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Using a mixed-methods intervention approach this study examined the impact and process of a professional development and whether it induces changes in attitudes and practices related to autism among preschool professionals. We assessed professionals' understanding of autism and their inclusion skills using questionnaires, audio-recorded seminars, and interviews pre- and post-intervention. Professionals, autistic children, and their parents participated. The results indicate that professional development improved attitudes and inclusive practices related to autism as experienced by professionals and parents but not as evident by autistic children. We conclude that professional development is likely to improve preschool staff's autism knowledge and skills that may be beneficial to create inclusive education and enhance equity and learning outcomes for autistic children. We discuss organizational prerequisites as decisive for the implementation of professional development.

Keywords: autism, preschool education, professional development, inclusive education, mixed-methods

INTRODUCTION

It has been argued that research in the health service delivery field requires the use of both quantitative and qualitative approaches due to its "investigation of complex, multilevel processes and systems" (Fetters et al., 2013, p. 2134). We suggest that this claim applies equally well to education, especially in the areas of special educational needs, disabilities, and inclusive education. Therefore, this practice-based study examined how a web-based professional development program impacts preschool professionals' autism-related attitudes, practices, and inclusion skills. Naturalistic multiple-informant research involving preschool professionals, autistic children and their parents was conducted using a mixed-methods intervention design (Creswell and Creswell, 2018).

In Sweden, preschool is not mandatory; however, in 2020, approximately 85% of all Swedish children aged 1–5 years attended preschool (The Swedish National Agency for Education [SNAE], 2021). The Swedish Education Act (2010, p. 800) states that all students, regardless of disabilities,

special educational needs, or non-disability, must be supported and stimulated in their learning and personal development to reach their full potential. It is possible that autism have not been detected in preschool children and that it may not be identified until later on. Yet, as mentioned above, in Sweden, support should be given based on the need of the child, regardless of a diagnosis or not. This is also stated in the curriculum "Children who need more support and stimulation, either temporarily or permanently, should be provided with this, structured according to their own needs and conditions" (Swedish National Agency for Education [SNAE], 2019, p. 7).

However, the formulations in the regulatory documents are general and since the Swedish school system are highly decentralized it is up to the municipality, principals and professionals to interpret them into practice (Lundqvist et al., 2016). Furthermore, the general formulations leave little support to professionals on how to implement everyday teaching activities for children with special needs and disabilities (Almqvist et al., 2018), and all children in need of special support do not receive more or additional support than what is granted to all children (Lundqvist et al., 2016; Almqvist et al., 2018).

Principals have overarching responsibility for preschool operations, while preschool teachers are responsible for operative planning and the evaluation of students' education in agreement with the goals outlined in the curriculum (Swedish National Agency for Education [SNAE], 2019). Professional teams working at preschools in Sweden consist primarily of preschool teachers with a university degree and childcare workers with a high school education. In this paper, the term "preschool professionals" is used to refer to both preschool teachers and childcare workers. The Swedish preschool education is followed by a preschool class placed in the same organization as of the elementary school. However, it is possible for children to postpone the preschool class by a year and stay within preschool education for an additional term. Thereafter, the children can either enter the preschool class in elementary school or directly begin in school year one in elementary school (Swedish National Agency for Education [SNAE], 2019).

The prevalence of autism spectrum disorder (ASD) has increased in the last 30 years, and the present estimate of the proportion of children diagnosed with autism is at least 1.5% in developed countries (Lyall et al., 2017). This implies that all preschool professionals should be prepared to meet and educate autistic children (Odom et al., 2018). However, such children's multifaceted needs often demand substantial educational resources (Lavelle et al., 2014), and teachers have reported insufficient training to support and teach autistic children (Bölte et al., 2021). There are also teachers reporting that they feel unprepared and worried to educate students with autism (Roberts and Simpson, 2016; Roberts and Webster, 2020). Furthermore, results from a systematic literature review indicate that there is a need for professional development to strengthen teachers' ability to manage the challenges linked to the inclusion and teaching of autistic children (Petersson-Bloom and Holmqvist unpublished). Consistent with this, Anderson (2020) has presented results indicating that parents of autistic children experience limited knowledge of autism and

adaptation of the learning environment to their children's needs in educational settings, Holcombe and Plunkett (2016) reached a similar conclusion.

Autism is characterized by social communication and interaction alterations in the presence of restricted interests, repetitive behaviors, and sensory alterations causing a multitude functional impairment in educational, vocational and other significant life domains (DSM-5; American Psychiatric Association [APA], 2013). However, autistic functioning profiles vary vastly and also include talents and strengths (Bölte et al., 2019). Living with autism affects education, including the time spent at preschool (Syriopoulou-Delli et al., 2019). Therefore, it is important to identify what works in practice to achieve inclusive environments for autistic students. The structure of the learning environment and how teachers screen and oversee children's needs, performance, and well-being are key aspects (Olsen et al., 2019). Modifications made to the learning environment to accommodate the needs of autistic children and facilitate learning opportunities have been demonstrated to be of paramount importance (Fleury et al., 2014). This is in line with the United Nations (UN) Convention on the Rights of Persons with Disabilities (CRPD), Article 24 United Nations [UN] (2008), which stipulates that individuals with disabilities should be given the support they need to obtain an effective education toward sustainable academic and social development. These aspects are also emphasized in the General Comment of Article 24, which states that inclusive education refers to changes in the whole school system, encompassing aspects such as structures, methods, strategies, and approaches, as well as pedagogical content (United Nations [UN], 2016).

Professional Development and Inclusive Education

There is agreement that teacher competence is associated with education quality and young children's developmental progress (Egert et al., 2018; Kelchtermans et al., 2018). Regarding preschool professionals' attitudes toward inclusive education for autistic children, Engstrand and Roll-Pettersson (2014) did not find a link between teachers' self-efficacy and their attitudes toward inclusive education. However, they identified a link between teachers' participation in professional development and self-efficacy. The term "self-efficacy" is defined as the extent to which people believe that they can meet the challenges encountered in the setting in which they are acting. If people view themselves as having sufficient competence to manage challenging situations, they tend to experience greater achievement (Bandura, 1977).

Regarding the make-up of professional development, focusing on top–down instruction, which directs teachers how they should organize their teaching and leaves little space for insight and flexibility, has been shown to yield few sustainable effects (Greenwood and Abbott, 2001). Instead, professional development, using a more transformative approach (Appleby and Andrews, 2012) that accommodates and acknowledges preschool professionals' experiences, thinking, and motivation as the basis for their reflection on and exploration of their

own practices appears to be far more promising (Vujicic and Camber Tambolaš, 2017). Furthermore, research has indicated that professional development that seeks to strengthen staff's collective growth, shared values, and collegiality, rather than individual skills, has produced promising results (Owen, 2014). Indeed, some researchers have argued that improvement in educational settings only transpires when pedagogical competencies transform from individual to collective action (McLaughlin and Talbert, 2006; Vescio et al., 2008). Vujicic and Camber Tambolaš (2017) concluded that "the professional development of preschool teachers should result not only in advances in knowledge but also in changes in their beliefs and behavior" (p. 1584).

Including the Views of Parents and Autistic Children

It is more common for research to include professionals' views rather than those of the parents of autistic children, autistic children themselves, or a combination of perspectives (Petersson-Bloom and Holmqvist unpublished). This is surprising, as including autistic individuals and their families is vital to derive better practices and policies (Pellicano et al., 2013). Additionally, it is in alignment with the Convention on the Rights of the Child (CRC) (United Nations [UN], 1989), which stipulates that children have the right to be included in decisions regarding their lives. While some studies have included autistic students, they mostly included secondary school students (Warren et al., 2020).

Aim and Research Questions

The objective was to examine the process and impact of a professional development aimed at expanding preschool professionals' knowledge, attitudes, and inclusion skills for educating autistic preschool children. Furthermore, we sought to investigate potential changes noted by parents of autistic children and the children themselves following their preschool staff's professional development. Three research questions were addressed: (i) How does professional development change teachers' attitudes and practices? (ii) How can professional development explain perceived changes in attitudes and practices? (iii) How are the potential changes perceived by autistic children and their parents? We hypothesized that (1) The professional development would lead to changes in preschool teachers' attitudes and inclusion skills and (2) that the changes would be perceived by autistic children and their parents.

MATERIALS AND METHODS

Design

We applied an embedded mixed-methods intervention design (Creswell and Creswell, 2018), where the professional development is regarded as the intervention. In this type of mixed-methods design, one type of data (qualitative or quantitative) is primarily collected to support the other type of data. The design is especially useful when a researcher wants to use qualitative data in a quantitative design, for instance to achieve a deeper understanding of treatment processes or outcomes (Fetters et al., 2013; Creswell and Creswell, 2018). In this study, a combination of convergent (the qualitative strand during the intervention) and explanatory sequential strategies (the qualitative strand after the intervention) (Creswell and Creswell, 2018) were applied. An outline of the overall research design and data collection is presented in **Figure 1**. The research project included one intervention preschool where a full professional development was administered and one preschool that served as an active comparison group. The latter only received a 2 h web-based introduction to autism, which represents a part of the full program (**Table 1**). The professional development was offered during the spring of 2020.

Professional Development Program

The professional development program examined in this study was developed by the Swedish National Agency for Special Needs Education and Schools [SPSM] (2022). The program is web-based and targets in-service teachers and other professionals working in preschools and other schools. It aims to increase participants' knowledge about autism and other neurodevelopmental disabilities by conveying information about improving educational inclusion for these groups of students, as well as strategies for making necessary adjustments to the learning environment to enhance equality and learning opportunities (**Table 2**). The program includes video-recorded lectures, other short films, written documents, and group discussions. The professional program combines asynchronous (self-studies) with synchronous (collaborative) design. A crucial program component is the collaborative learning process, to provide schools and municipalities with easy access to and hands-on tools for initiating and facilitating professional development. In this study, Communities of practice (CoP) were formed. CoP can be defined as a group of people sharing a concern for or interest in something and seek learning strategies for better performance as they interact with each other. Key characteristics of CoP are a shared domain of interest, engagement in joint activities, information sharing and relationship building among members, and development of a shared repertoire of resources for practice (Lave and Wenger, 1991; Wenger et al., 2002; Wenger-Trayner et al., 2015). Program participation and the materials were free of charge. It takes approximately 20 h to complete. In addition to the 20 h program, the intervention also included excerpts from a 2 h web-based introduction to autism, provided by the National Autism and Asperger Society. As previously mentioned, this was also delivered to the preschool comparison (**Table 1**).

Sampling Methods, Settings, and Participants
Sampling

The study was conducted in two urban preschools in the southern Swedish region of Skåne. Different sampling methods were used depending on the stage of the research process, which is a common procedure in mixed methods research

FIGURE 1 | Research design and data collection.
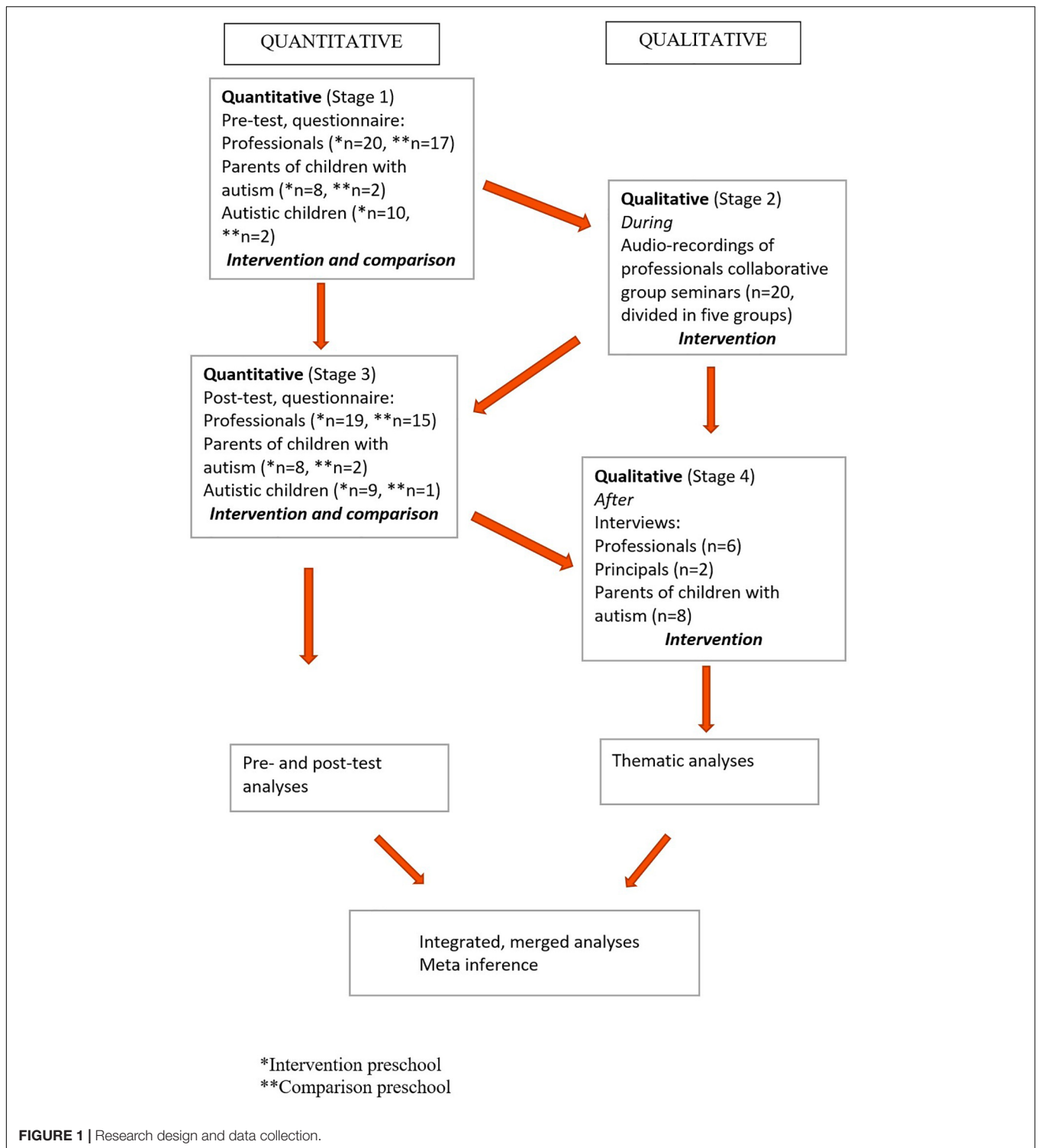
(Teddlie and Tashakkori, 2009). At the first step, volunteer sampling (Muijs, 2011) was used. An e-mail invitation to participate in the study was sent to all municipalities in Skåne. Five principals responded; however, after receiving more detailed information about the project (both written and oral), four preschools remained. To assign each preschool to either the

professional development intervention or the active comparison group, the preschools were randomized using randomizer.org. However, one preschool assigned to the intervention and another assigned to the active control group subsequently withdrew from the study due to challenges related to the COVID-19 pandemic. Two preschools remained. To recruit autistic students and their

TABLE 1 | Intervention group and active comparison group assignments.

Intervention group assignment	Comparison group assignment
Web-based introduction to autism (National Autism and Asperger Society) Approximately 90 min Followed by the web-based PD (SPSM) including both self-studies and collaborative group seminars wled by a moderator assigned by the principals and held within their regular teams. The professional development consists of five themes, each including self-studies (approximately 2 h) followed by collaborative group discussions (approximately 2 h). Each theme consists of several filmed lectures, texts to read and questions to consider during the self-studies. The collaborative group seminaries consist of reflective questions and discussions, e.g., How can we implement what we learned in our context?	Web-based introduction to autism (National Autism and Asperger Association). Approximately 90 minu. Assigned as self-studies. The active control group assignment did not include any collaborative group discussions.

TABLE 2 | Content and structure of the professional development, intervention group.

Content of the professional development, intervention group					
Introduction	Theme 1	Theme 2	Theme 3	Theme 4	Theme 5
Web-based Introduction to autism (national Autism- and Asperger society) Conducted as self-studies, approximately 60 min. Did only include parts of the full introduction (e.g. no collaborative elements)	Collaboration with parents, understanding autism and other NDC Week 1. Recordings with secondary school students and adult with NDC giving their view on the school. Recordings with parents explaining their situations. Lectures on collaboration with parents (e.g., *Understanding parents, strategies for communication*) Documents/texts to read	Cognition and sensory processing Week 3. Lecture on perception (e.g., *sensory overload, hypo sensitive*) Lecture on cognition (e.g., *theory of mind, executive functions, central coherence*) Documents/texts to read	Strategies, in the learning/educational context Week 5. Lectures (part 1 and 2) on educational strategies (e.g., *Strategies in the educational context: strategies to assess the individual child's need, adaptations, modification, how to use visual support*) Lectures connects to Education Act and curriculums. Documents/texts to read	Understanding challenging situations Week 7. Lectures (part 1 and 2) on understanding, preventing difficult situations (e.g., *views on difficult situations, the ice berg metaphor, strategies to use to prevent difficult situations*) Lectures connects to Education Act and curriculums. Documents/texts to read	Accessibility in the learning/educational context Week 9. Lectures (part 1 and 2) on how to create an inclusive and accessible learning environment (e.g. *social, physical, and pedagogical- strategies*) Lectures connects to Education Act and curriculums. Documents/texts to read
	Week 2. Collaborative group seminars.	Week 4. Collaborative group seminars.	Week 6. Collaborative group seminars.	Week 8. Collaborative group seminars.	Week 10. Collaborative group seminars.
Each theme included self-studies (approximately 2 h) containing video-recorded lectures, short films, texts to read and questions to reflect upon (e.g., New insights gained, what do you need to change and develop in your practice, based on the specific theme). The self-studies were followed by collaborative group discussions (approximately 2 h) led by a moderator assigned by the principals and held within their regular teams at the preschool. The collaborative group seminaries consisted of reflective questions and discussions, e.g., Which insights did we gain? How can we implement what we learned in our context? What do we need to change and develop in our practice? Focusing on the professionals' experiences, exploration and development of their own practice.					

parents, principals informed the autistic students' parents that their preschool is participating in a research project and asked the parents to come to the preschool for the information session about the project. In the next step two separate information sessions were held. The first included teaches and childcare workers (intervention and comparison preschools), and the second parents of autistic children (intervention and comparison). At the sessions the staff and parents received written and oral information about the research project. The information sessions were followed by question-and-answer sessions, after which consent forms were collected. Parents who agreed to participate were asked to inform their children.

Settings and Participants

Both preschools were located in the same municipality and school districts. As such, they share the same management structure, which consists of a principal and a deputy principal. The principals chose to participate in the study because the staff at both preschools had recognized the need to increase their autism knowledge. Both principals participated in the study.

Background information in presented in **Table 3**. The intervention preschool had six classes and professional teams, and a total of 20 professionals, all of whom were female. One of the classes at the intervention preschool focuses only on autistic children.

The comparison preschool had four classes/professional teams and 17 professionals. However, since two of the staff members ended their employment during the research project, we decided to exclude them, leaving 15 staff members in the comparison group (14 females, 1 male). The teams at both preschools were composed of both teachers and childcare workers. However, the distribution of preschool teachers and childcare workers was

uneven; the intervention preschool had more staff members who were preschool teachers, that is, 13 out of 20, while the comparison preschool had 8 out of 15. At the intervention preschool, work experience ranged from 11 participants with more than 21 years, two with 16–20 years, four with 11–15 years, and two with 6–10 years. A comparison of preschool professionals showed a wider range of work experience. Five professionals reported having more than 21 years, two had 16–20 years, one had 11–15 years, two had 6–10 years, two had 1–5 years, and three had less than 1 year. The professionals working in the intervention preschool stated their autism experience to range from none to extensive ($M = 1.30$, $SD = 0.923$). At comparison preschool the professionals' autism experience ranged from none to fairly extensive ($M = 1.13$, $SD = 0.516$). In both preschools 11 professionals stated limited experience.

Participating Children

In total 13 children with autism attended the preschools. Eleven of them were in the intervention preschool, all but one child's parents accepted to participate. All participating children in both the intervention ($n = 10$) and comparison ($n = 2$) groups were formally diagnosed with autism. Two children (one from the intervention group and one from the comparison group) were also formally diagnosed with intellectual disability. Furthermore, two children (one from the intervention group and one from the comparison group) received their intellectual disability diagnosis when they started elementary school in the autumn of 2020. At the beginning of the research project, the ten participating children at the intervention preschool consisted of nine boys and one girl. Their ages ranged from 48 to 80 months ($M = 61$). As explained in the introduction children can extend their preschool education until the year they turn age seven, and this was the case for some of the participating autistic children in our study. The duration of preschool attendance ranged from six to 54 months ($M = 30$). The two children in the comparison group were boys aged 36 and 72 months ($M = 54$). They spent 6 and 18 months in preschool, respectively ($M = 12$). The duration of school attendance varied across participating children. There were several reasons for the variation, such as some of the children having attended other preschools previously, or having recently moved to Sweden from another country. The number of participating parents corresponded with the number of preschool children included in the study. Ten parents had children at the intervention preschool, and two had children at the comparison preschool.

Data Collection

Quantitative and qualitative data were collected at different stages (see **Figure 1**). Quantitative data collection aimed to capture the differential effect of the professional development on preschool professionals' understanding of autism and inclusion skills from pre- to post-intervention in the full vs. partial program. The qualitative data collection involved participants from the full intervention preschool. Qualitative data were collected to capture and understand how the participants experienced the process and the full intervention program, examine the fidelity of the implementation of the intervention, assess any changes in participants' attitudes during and after the professional development, and deepen the understanding of the quantitative findings (Creswell and Creswell, 2018; Creswell and Guetterman, 2019). Principals, professionals, and parents were interviewed. The interviews included different sampling methods for different groups of participants. Both principals and parents were asked to give an interview seeking a complete collection (Cohen et al., 2011). Professionals were sampled purposively (Creswell and Guetterman, 2019); principals selected and assigned one professional from each team to take part in the focus group interview. The selection was based, on professional's responsibility of planning the educational goals and activities, as such all but one were preschool teachers.

Pre- and Post-test Questionnaires; Professionals and Parents

Questionnaires were collected from professionals (self-report) and parents (informant report) pre-and post-intervention to measure preschool professionals' understanding of autism and their acquisition of skills toward the goal of developing inclusive education. Pre-testing was conducted as close as possible to the start of the professional development (Creswell and Creswell, 2018). The post-assessment was administered to all groups (professionals in the intervention and control groups, as well as parents) approximately 6–7 weeks after the professionals completed either the full professional development or the active control group assignment. The questionnaires directed to the professionals were derived from a scale used by Petersson Bloom (2021). The questionnaire contains a total of 28 items

TABLE 3 | Background information participants intervention- and comparison preschool.

Preschool information	Intervention $n = 20$	Comparison $n = 15$
Gender		
Female	20	14
Male		1
Profession		
Preschool teachers	13	8
Child care workers	7	7
Years in profession		
>1		3
1–5		2
6–10	2	2
11–15	4	1
16–20	2	2
<21	11	5
Experience autism		
None	3	1
Limited	11	11
Fairly extensive	3	3
Extensive	3	
Number of autistic children	10	2
Number of autistic children in special class	5	
Number of children with autism in regular class	5	2

(plus some additional sub-items), of which the first six cover background variables such as sex, profession and years of work experience. Nine items are closed-ended questions in a Likert-type format (scores ranging from 1 to 4), operationalizing perceived competence or degree of comfort to form a professional efficacy scale with scores ranging between 1 and 36, and increasing scores indicating higher teacher efficacy Cronbach's alpha for this scale in the given sample of preschool professionals was r_α = 0.96. Examples of close-ended items are: "I have sufficient competence to teach autistic children and I have sufficient skills to adjust and adapt the learning environment to meet the needs of autistic children.

The subsequent 12 items were open-ended questions that asked participants to provide examples. For instance, "Give examples of modifications to make the teaching situation understandable for autistic children." At the intervention preschool, 20 participants completed the pre-assessment, and 19 completed the post-assessment. The numbers differ because one professional participant terminated their employment while the project was ongoing. At the control preschool, 15 participants completed the pre-assessment and 13 completed the post-assessment, as one participant was on sick leave during the post-assessment period and the other quit. The parent questionnaires covered the same areas as the questionnaires for professionals, although the former comprised fewer items. The parents' questionnaires included three background questions covering, for example, their children's age and the duration of their preschool attendance, as well as seven closed-ended items with a Likert-type format (scores ranging from 1 to 4). Parents obtained information about the professionals understanding of autism and teaching efficacy in an indirect way. They captured this information during their regular and naturalistic encounters with the professionals (e.g., leaving and picking up their child, communicating with staff members, collaborative meetings). The total scores were between 1 and 28 for the perceived teacher efficacy. Cronbach's alpha for this scale in the given sample of parents was r_α = 0.83. The number of parents who completed both the pre-and post-assessment was eight in the intervention preschool and two in the comparison group. Since the comparison group comprised only of two parents, we decided to not include that data in the result.

Children's Pictorial Assessment

The children's assessment was derived from Hill et al. (2016), who investigated the school experiences of children with multiple needs by having them sort pictures into three categories ("like," "dislike," and "don't mind"). In the current study, owing to the children's young age and their level of support needs, the assessment was adapted to suit their level of functioning. The original questionnaires were converted into a pictorial assessment to enable the children to judge their participation experience in different activities and teaching situations. All children had some experience of using visual information. Each composition of images was unique to each child; that is, compositions consisted of 6–10 photographs of the child during preschool teaching activities. We chose photographs since we wanted the child to be included in the photograph, based on the assumption that it

FIGURE 2 | Example of material used in children's pictorial assessment.

would be more understandable. Professionals took photographs during the week before the pre-and post-assessments. During the assessments, the children sorted the photographs into two categories ("happy face" or "thumbs up" vs. "sad face" or "thumbs down"), indicating a positive or negative recalled experience of the activity, respectively an example of the assessment material is shown in **Figure 2**. The parents administered the assessment to their children based on the instructions provided by the researcher. To create a secure environment, parents could choose between conducting the assessment at home or the preschool. The majority chose the latter. The researcher video-recorded the assessments. Nine children at the intervention preschool completed the pre-and post-assessments; the tenth child was absent during and after the program due to the COVID-19 situation. In the comparison group, one child completed the questionnaire. The other child could not because the material was too difficult for their level of functioning. Since the comparison group comprised only one child, we decided to include only the results derived from the data of the nine children in the intervention group.

Audio Recordings of Professionals' Exchange

The data collected during the intervention consisted of collaborative group seminars where the professionals discussed and exchanged ideas about how the content could inform their practice. The professional exchange was audio-recorded and aimed to capture the program's utility and the professionals' learning process. The collaborative group seminaries were led by a team member operationalizing the instructions of the professional development. Four of the group seminaries were held within the regular teams, the fifth seminar was a merged group containing two teams. The researchers did not participate in the group seminars.

Interviews

Eight to ten weeks after the post-assessment, guided qualitative interviews were conducted with professionals and parents. All interviews were audio-recorded. The interviews directed to the professionals aimed to examine potential sustainable changes in the teachers' practices, such as in the organization of

teaching in general, classroom strategies, and attitudes toward the professional development. When interviewing the parents, the aim was to capture their experiences as the parents of preschool children with autism and ascertain whether they perceived any changes in the practices implemented at the preschool following the professionals' development. The interview questions were semi-structured, not fully standardized, based on the items in the questionnaires. The semi-structured interview allows the use of follow-up questions in addition to predetermined questions (McGrath et al., 2019). The interview venues/modes varied due to the pandemic. A focus group interview with six professionals was held at the preschool, where the principals were also interviewed. However, all parent interviews were conducted virtually. Some parents consented to individual and non-group interviews. Therefore, the parent interviews were a mix of group and individual interviews. All the interviews were conducted by the first author.

Data Analysis
Quantitative and Qualitative Analyses of Questionnaires

Quantitative data from the closed-ended items were analyzed using SPSS 25. Descriptive statistics were computed using mean and standard deviation. Owing to the small sample size, non-parametric statistics using the Wilcoxon signed-rank test were computed to explore significant pre-and post-assessment differences between the intervention and comparison preschools for each item and the total professionals' efficacy scale score. Effect sizes (Cohen's d) were provided for within-group total score differences. Regarding the children's pictorial assessment, analysis was based on within-group differences in the number of photographs that received a thumb up versus a thumb down in the intervention group. To analyze the pre-and post-assessment differences, the quotient of the number of thumbs up answers in relation to all given answers (% thumbs up) was calculated, followed by a Wilcoxon test. All inference statistics used a 5% alpha level, and p-values between 0.05 and 0.10 were interpreted as trends. The given alpha and the parent ($n = 10$) and professional ($n = 32$) sample sizes in the *post hoc* analysis (G-Power 3.1.9.7) yielded the power (1-beta) to detect small, medium, and large effects of 20, 41, and 73%, respectively, for the parent data, and 49, 85, and 99%, respectively, for the professionals' data.

To qualitatively analyze the questionnaire data, the first author thematically coded the open-ended items to create categories. Next, the senior author independently checked and cross-validated the results. No significant discrepancies requiring modification of the thematic structure emerged between the first and the senior authors. Finally, examples from professionals and parents were counted to indicate the extent of feedback and level of detail. A comparison was then made between the pre -and post interventions.

Analyses of Qualitative Data Derived From Professionals' Exchange and Interviews

Qualitative data were analyzed thematically, following Braun and Clarke (2006). All data from collaborative discussions and interviews were transcribed verbatim by the first author, who also performed the initial coding using Nvivo (release 1.3). The transcripts were read and re-read several times to identify patterns and meaningful quotes, and then coded inductively based on patterns. The codes were changed and reworked flexibly, and then checked and cross-validated by the senior author. A consensus was reached among the authors. The first author then organized the codes into potential themes and subthemes.

Analyses of Integrated Data

In the third step of the analysis, quantitative and qualitative data were structured, compared and concurrence and/or discrepancies were used to achieve a fuller understanding of the results (Creswell and Creswell, 2018).

RESULTS

As expected in hypothesis 1 the results showed that the professional development program contributed to significant changes in attitudes and practice amongst preschool professionals. In hypothesis 2 we expected that the changes would be identified by both parents to autistic children and the children themselves. The result shows that the parents did identify significant changes. However, there were no statistical changes detected amongst the autistic children. Quantitative and qualitative findings were congruent and the qualitative results provided a fuller understanding. The results will be presented using a contiguous approach. Quantitative results are presented first, followed by qualitative and integrated results (Fetters and Freshwater, 2015) jointly displayed in a matrix (Fetters et al., 2013) which will be further elaborated upon in the "Discussion" section.

Quantitative Results

The results of the professional questionnaire are shown in **Tables 4**, **5**, where the information based on items in the questionnaires are presented.

Professionals' Questionnaire

The total score for teacher efficacy increased following the intervention ($M = 16.7$, $SD = 6.94$ pre-, $M = 23.2$, $SD = 4.57$ post; $Z = -3.63$, $p = < 0.001$), yielding a large effect size ($d = 1.10$). The total score also increased in the active comparison group ($M = 15.23$, $SD = 5.13$ pre-, $M = 16.92$, $SD = 4.66$ post; $Z = -2.05$, $p = 0.040$), but the effect was modest ($d = 0.34$). As shown in **Table 2**, there was a statistically significant self-reported change at the intervention preschool between the pre- and post-intervention assessments for seven out of nine items. Significant change was observed for the following: "Sufficient autism competence" ($Z = -3.05$, $p = 0.002$), "Confidence teaching autistic children" ($Z = -3.61$, $p = < 0.001$), "Sufficient competence modifying/adapting the learning environment" ($Z = -3.56$, $p = < 0.001$), "Sufficient competence at organizing education to optimize learning for autistic children" ($Z = -3.36$, $p = 0.001$ post), "Sufficient competence at using visual support" ($Z = -3.42$, $p = 0.001$),

TABLE 4 | Pre- and post-test questionnaire data for professionals in the intervention and comparison groups.

Variables, items in questionnaires	Intervention, n = 19***						Comparison, n = 13****					
	Pre-test		Post-test		Wilcoxon		Pre-test		Post-test		Wilcoxon	
	Mean	SD	Mean	SD	Z	P	Mean	SD	Mean	SD	Z	p
Sufficient autism competence	1.89	0.875	2.47	0.697	−3.05*	0.002	1.77	0.599	1.92	0.641	−1.00*	0.317
Confident teaching children with autism	1.95	1.08	2.63	0.895	−3.61*	0.000	1.77	0.832	2.00	0.816	−1.73*	0.083
Confident collaborating with parents	2.42	1.12	2.68	0.820	−1.51*	0.132	2.00	0.913	2.31	0.630	−1.41*	0.157
Adequate class preparation time	1.53	0.612	1.63	0.597	−1.00*	0.317	1.62	0.506	1.77	0.599	−1.00*	0.317
Sufficient modification/adaptation competence	1.84	0.834	2.68	0.749	−3.56*	0.000	1.46	0.660	1.85	0.555	−2.24*	0.025
Sufficient organizational competence	1.74	0.933	2.58	0.769	−3.36*	0.001	1.54	0.660	1.77	0.599	−1.73*	0.083
Sufficient competence at using visual support	2.26	0.991	3.05	0.621	−3.42*	0.001	1.69	0.630	1.85	0.689	−1.41*	0.157
Sufficient competence at preventing difficult situations	1.68	0.885	2.68	0.582	−3.75*	0.000	1.69	0.630	1.92	0.641	−1.73*	0.083
Need for professional development	1.42	0.692	2.79	0.713	−3.60*	0.000	1.69	0.751	1.54	0.660	0.577**	0.564

*Based on negative ranks.
**Based on positive ranks.
***One participant from the intervention group did not take the post-test and is not included.
****Two participants from the comparison group did not take the post-test and are not included.

TABLE 5 | Pre- and post-test questionnaire data for parents in the intervention groups.

Variables, items in questionnaires	Intervention, n = 8					
	Pre-test		Post-test		Wilcoxon	
	Mean	SD	Mean	SD	Z	P
Staff have sufficient skills	2.62	0.518	3.50	0.535	−2.33*	0.020
Education quality	2.75	0.463	3.38	0.518	−2.24*	0.025
Comfortable collaborating	3.25	0.707	3.63	0.518	−1.73*	0.083
Staff have enough time to prepare for classes	2.50	0.535	2.50	0.535	0.00***	1.00
Sufficient modification/adaptation skills	2.75	0.707	3.63	0.518	−2.65*	0.008
Sufficient skills to prevent difficult situations	2.63	0.518	3.75	0.463	−2.71*	0.007
Staff need PD	2.25	1.04	3.50	0.535	−2.43*	0.015

*Based on negative ranks.
**Based on positive ranks.
***The sum of negative ranks equals the sum of positive ranks.

"Sufficient competence at preventing difficult situations" ($Z = −3.75$, $p = < 0.001$), and "Need for professional development" ($Z = −3.60$, $p = < 0.001$). The quantitative improvements were also endorsed by the examples participants provided in response to the open-ended items. An increase in examples was often notable for categories related to strategies, pedagogical content, and approaches (i.e., professionals' responses to the children). The latter can be illustrated by examples provided in response to the following item: "If an autistic child reacts negatively to a requirement, how do you manage the situation?" Increases were observed in the following categories: "Change strategies" and "Consider changing my approach/response." This is also noted in item "Give examples of modifications to make the teaching situations understandable for autistic children" where the result shows an increase in several categories for example "Visual support," "Approaches," and "Strategies." Analyses of the open-ended responses also revealed a change in the item "Describe your need for professional development with respect to educating autistic children." Here, a decrease in examples in the "Professional development for understanding autism"

category and an increase in "Reflection and in-depth discussions" appeared post-intervention.

Parents' Questionnaire

The total score for teacher efficacy increased significantly pre- and post-intervention in the full program ($M = 18.75$, $SD = 2.91$ pre-, $M = 23-87$, $SD = 2.42$ post; $Z = −2.53$, $p = 0.012$), showing a large effect size ($d = 1.91$) for parent ratings at the intervention preschool.

On the item level, significant changes emerged for: "Staff are sufficiently competent" ($Z = −2.33$, $p = 0.020$), "Education quality" ($Z = −2.24$, $p = 0.025$), "Sufficient skills to adapt/modify the learning environment" ($Z = −2.65$, $p = 0.008$), "Sufficient skills to prevent difficult situations" ($Z = −2.71$, $p = 0.007$), and "Need for professional development" ($Z = −2.43$, $p = 0.015$) (**Tables 2**, **3**). The latter corresponds with analytical findings from the open-ended item "Preschool professionals' need for professional development," for which parents gave fewer examples in the "Understanding autism" and "Modifications and adaptations" categories post-intervention.

Children's Pictorial Assessment

Regarding the children's responses, there were a slight and descriptive tendency for a more positive assessment about the teaching activities in the photos taken in their learning environment following the intervention (63.1–65.7%; $Z = -3.52$, $p = 0.07$). Five children gave more pictures a thumbs up, and one child gave the same quantity a thumbs up in the post-intervention assessment.

Qualitative Results

Themes Identified in Professionals' Exchange

Three themes were identified within professional exchanges: (1) changes and development in preschool practices, (2) influencing factors: challenges and prerequisites, and (3) program feasibility and acceptance.

Changes and Development in Preschool Practices

Three subthemes were recognized: (i) changes in understanding and attitudes, (ii) strategies, and (iii) the organization.

Changes in Understanding and Attitudes. Professionals discussed the need to be more responsive to the children, in addition to being flexible and understanding. A participant stated, "We have to show understanding and familiarize ourselves with the situation. Why do they think this situation is difficult and what can we do to help?" Another participant said, "You [should be] flexible and always think. it is not me who should get my way rather, it is the child who should have a good learning situation and well-being." This sub-theme also includes professionals discussing and exhibiting an understanding of autism. The participants reflected on the consequences of autism and were connected with explanations for and an understanding of different behaviors. One emphasized that autistic children may experience difficulties in understanding how to play: "I also think about understanding play and interaction, that some children may not have understood the signals."

Strategy Changes. The emphasis here lies in the development of visual support to accommodate the diverse needs of autistic children. This includes different types of visual support (e.g., digital pictures, photographs, objects) applied flexibly in different contexts (e.g., portable, at preschool or during community activities). According to the participant,

> We could use schedules in a much better way; for example, the children could take the pictures with them to the activity, and then the pictures become fewer gradually during the day so that the child can see that [they are starting] to approach the end of the day.

Another strategy change regarding planning educational goals and learning activities entails gathering information, using existing screening tools, and finding new tools when working with autistic children. A participant said, "We could use it more operationally and make it accessible. You [often] do not look [at] it until it is time to evaluate."

Organizational Changes. The professionals acknowledged the importance of dividing the classes into smaller groups to better meet the needs of children with and without autism. One participant advocated working in smaller groups "because it [allows for] possibilities to identify the [children's] needs." Furthermore, the importance of team discussions and other contexts, such as conversing with colleagues from different units to reach a consensus on approaches and strategies was highlighted as a necessary organizational change. One participant said, "I have talked with…the other teams about being allowed to sit in other group constellations and discuss," while another emphasized receiving "insights from other teams so that we can share."

Influencing Factors: Challenges and Prerequisites

Two sub-themes were identified: (i) educational barriers and (ii) organizational barriers.

Educational Barriers. The participants discussed different educational barriers, such as inadequate demands and expectations in the face of the children's challenges. One professional said: "We have 16 children, and it is challenging to do well for everyone." The most challenging educational task is to enhance children's ability to influence their learning environment. One participant stated, "One difficulty can be teaching children to exert their will because it can be difficult for children with autism. Some of them are unable to verbally convey what they want." The physical environment has also been identified as a potential hindrance. One participant said, "This open physical environment that seems to be what many strive to develop nowadays…[is] not suitable for younger children, especially… children with autism."

Organizational Barriers. Many organizational barriers are related to a lack of resources, such as time to plan, develop, and prepare for classes, staffing, and the unit ratio of professionals to children. Commenting on the lack of resources, one participant said, "Although it is possible to split the class into smaller groups, there may not be enough teachers."

Program Acceptance

This theme captures how the participants perceived the professional development. Two sub-themes were identified: (i) attitudes toward the program and (ii) connecting with and referencing the program material.

Attitudes Toward the Program. Most professionals had a positive participation experience and found the program interesting and useful. One said, "I have a better understanding now. I already knew some things, but there were others that I had never thought about or reflected on. Autism is so much more than what I knew before." Even participants with vast experience educating autistic children acknowledged that they gained new insights. One said: "Much of the content is beneficial and directly usable. I may have known some before, but you need to be reminded, and the professional development [allowed me to gain a] comprehensive understanding." Unanimous program participation was identified as a strength, as it created a shared understanding among staff. One participant described the program as "a common basis for everyone, as a starting point."

Connecting With and Referencing Program Material. The group seminars revealed that professionals were connected with the

program discussions and materials, including filmed lectures and texts. A participant reported, "It is precisely that insight that she talked about in the lecture: Behind every problem behavior there is a lack of ability."

Themes From Interviews With Professionals, Principals, and Parents

The interviews with professionals and principals yielded largely the same four themes as the professional exchange: (1) changes in preschool education and classroom teaching, (2) teacher efficacy, (3) program feasibility and acceptance, and (4) barriers in preschool practice. Analysis of the parent interviews generated two themes: (1) preschool experiences and (2) changes in preschool education and classroom teaching.

Professionals and Principals

Changes in Preschool Education and Classroom Teaching

Professionals and principals identified a shift in attitudes, understanding, and approaches to autistic children. Two staff members observed that there is "more knowledge now than before" and "[more] understanding, too." This concurs with the principals' views: "Above all, I hear that something has changed in the way they think and speak" and "Yes, they have risen to a new level, and now the focus is even more so on the fact that they have to change their approaches." Regarding changes at the classroom level, the professionals recognized that they had not yet implemented all the necessary changes. However, changes regarding a larger variety of visual support and an understanding of *why*, as well as including autistic students in planning teaching activities have been made. One participant stated, "We are much better at preparing instruction and teaching activities."

Teacher Efficacy

The professionals recognized that the development program increased their sense of efficacy and shared values: "I do not have to argue and explain my case now. I know and can expect that we all share the same knowledgebase." The principals echoed this: "We have children that require a lot; not having enough knowledge is frustrating. I think this has helped."

Program Feasibility and Acceptance

The professionals confirmed the program's practicability with positive comments such as: "[The] filmed lectures and other contents have given me many insights." The principals also expressed positive attitudes: "Everyone has talked positively about participating." The importance of including all team members to facilitate shared experiences was highlighted again: "[Because of] the intervention. ...we have seen and heard the same things, leading to greater openness, and it is easier to discuss how to act in different situations." The principals emphasized the importance of professionals' awareness of their need for additional qualifications: "We agreed to take part in the research project since analyses of improvement areas identified professional development on autism, based on the fact that most of the staff had informed us about this need."

Barriers in Preschool Practice

Team members and principals described difficulties implementing changes in practice due to challenges such as limited time and staff resources, and large classes: "I think that a lot of what we need is time. Reflection [on] and discussions [about] how to develop and change education require a lot of time."

Parents

Preschool Experiences

Interviewed parents were satisfied with the educational quality their children's preschools delivered, often positively evaluating the staff's understanding of autism and the need to modify learning environments. Parents made few negative comments concerning the physical environment but reported that staff sometimes had difficulty understanding the children: "Some days [my son] cried and wanted to come home or did not want to go to preschool in the morning."

Changes in Preschool Education and Classroom Teaching

Some parents found it difficult to evaluate changes in preschool practices, since, at the time of the interviews, some children had been at home for long periods due to COVID-19 regulations or had started elementary school: "Actually, due to corona, my child did not attend preschool in March and April, and then he was there [for] only a few weeks before summer vacation started, and now he [has] started school, so we really cannot say." Nevertheless, observed changes were often reported to be connected to the professionals' understanding of autism.

Earlier, some staff did not understand much about autism and thought that [my son could] behave and perform like all the other children, and it does not work like that. In the beginning, it was not so good, but it has gotten better now after the professional development.

Another parent stated, "They have [invested] a little extra effort and focus now. I [have noticed] that everyone on the staff is a bit more attentive."

In summary, the qualitative findings both enhanced and explained the quantitative findings, and no significant discordance was identified. The merged results are compared and presented in **Table 6** and discussed further below. Joint reporting of the results may contribute to strengthening the study's validity and reliability (Creswell and Plano Clark, 2011).

DISCUSSION

The objective of this study was to examine the process and impact of a web-based professional development program aimed at enhancing professionals' understanding of autism as well as their inclusion skills. The experiences of professionals, parents of autistic children, and autistic children were included. An embedded mixed-method intervention was then applied. The qualitative findings contributed to an understanding of the quantitative findings, and merging provided comprehensive insight and illuminated that the findings were largely congruent. The congruence between the quantitative and qualitative strands indicates validity (Alatinga and Williams, 2019).

TABLE 6 | Comparison of information derived from quantitative and qualitative data- metainference.

	Impact of PD (professionals), RQ1	Outcome explained by PD (RQ2)	Impact of PD (parents and children) (RQ3)
Quantitative findings Findings from open-ended items	Pre-and post-test data suggest significant changes at intervention, and item levels: ● Sufficient autism competence. ● Confidence teaching children with autism. ● Sufficient modification/adaptation competence. ● Sufficient organizational competence. ● Sufficient competence at using visual support. ● Sufficient competence at preventing difficult situations. ● Need for professional development Items regarding collaboration and sufficient class planning time did not yield evidence of significant change. Increased examples related to pedagogical strategies to develop preschool practices.	The significant changes identified may indicate high feasibility and acceptance of professional development. There was also a low level of non-completion of the questionnaires.	Pre- and post-test data suggest significant change at the intervention and item levels: ● Staff have sufficient autism competence. ● High-quality education ● Sufficient skills to adapt/modify the learning environment. ● Sufficient skills to prevent difficult situations. ● Existence of a need for PD. Items regarding collaboration with staff and staff having sufficient time to prepare for classes did not yield evidence of significant change. The children's data revealed no statistically significant change between pre- and post-intervention. Decreasing trend regarding staff's need for PD in the "Understanding autism" and "Modifications and adaptations" categories.
Qualitative findings (during)	Identified themes: *Changes and development in preschool practice*; sub-themes: Changes in understanding and attitudes, Strategy changes, Organizational changes *Influencing factors: Challenges and prerequisites;* sub-themes: Educational barriers, Organizational barriers	Identified theme: *Program acceptance;* sub-themes: Attitudes toward the program, Connecting with and referencing program material	
Qualitative findings (after)	Identified themes: *Changes in preschool education* *Changes in classroom teaching* *Changes in teacher efficacy*	Identified themes: *Program feasibility and acceptance* *Barriers in preschool practice*	Identified themes: *Preschool experiences* *Changes in preschool education and classroom teaching*
Meta-inference	The qualitative findings support the quantitative findings and provide additional insights. Results are congruent. Changes in attitudes, approaches, and strategies are revealed.	The quantitative and qualitative findings are congruent. Acceptance of and connections with the PD may explain the program outcome.	The qualitative findings support the quantitative findings, and parent data are congruent with the professional data.

Our results indicate that professional development can increase professionals' understanding and skills in several areas important for inclusive education, such as promoting their confidence in teaching autistic children and preventing difficult situations, as well as enhancing the skills they need to modify learning environments. Previous research has identified these skills as important to optimize learning for autistic children (Fleury et al., 2014; Olsen et al., 2019). Enhancing such skills is in line with the key aspects of inclusive education (United Nations [UN], 2016). We identified several factors that could explain this study's outcomes. These explanations also provide an understanding that the design of professional development may have contributed to the participants' changed attitudes and practices. The program did not focus exclusively on individual practitioners' knowledge, which has been identified as a strength in previous research (Appleby and Andrews, 2012; Owen, 2014; Vujicic and Camber Tambolaš, 2017). Rather, participants shared their experiences through a transformative approach. This is also in agreement with communities of practice, where professionals share their interests and learn to improve their practices (Wenger et al., 2002; Wenger-Trayner et al., 2015). Professionals' approval of the program is reflected in the themes related to feasibility and connection with the content. Additionally, this study included all staff members, which are repeatedly underlined by professionals and parents as an important factor for the outcome. To not only

include teachers in professional development is also in alignment with Ravet (2011), who presented the importance of targeting all education professionals, in the interest of inclusive education.

Professional participants reported feeling more confident about teaching autistic children and having sufficient competence to do so, which implies that professional development increased teacher efficacy, in line with Engstrand and Roll-Pettersson (2014). The importance of strengthening professionals' feelings of being prepared to educate children with disabilities, including understanding of inclusive education and/or education of children with disabilities, is also suggested by Chadwell et al. (2020). Increasing teacher efficacy is also important for preschool system sustainability since previous research indicates that solid teacher efficacy prevents teacher burnout (Lauermann and König, 2016).

The content of the professional development program includes a variety of elements, such as general information on autism as well as strategies to provide structure, approaches regarding modifications in the learning environment, ways of assessing the specific need of the individual child, individual support strategies, and pedagogical content and instruction. This variety could have influenced the positive outcome. The professional development program combines a specific content (self-studies), with the possibility to transform the content into practice (e.g., strategies, individual support, teaching strategies)

and focus on what is needed to be developed in current practice in the specific work team. That the content of the professional development, served as framework and allowed for the content to take the specific context into consideration (Vangrieken et al., 2017), was likely a part that provided the positive outcome.

Interestingly, we also found a small effect in the comparison group that engaged in self-studies and participated in only a small part of the professional development. This suggests that minor efforts may also induce participants' understanding, which has also been presented in previous research (Leifler, 2020; Petersson Bloom, 2021).

We broadened participant type because previous research identified a gap regarding including parents, and especially autistic children (Petersson-Bloom and Holmqvist unpublished). Our results indicated that parents detected changes in preschool practices. Interestingly, the two areas where parents reported the largest changes were preventing difficult situations and adapting learning environments, in line with the professional data. This is important because previous research shows that parental satisfaction with preschool education is often associated with caring professionals who understand autism and the individual child's needs (Starr and Foy, 2012).

This study also detected barriers to the impact of professional development that could hinder the generalization and sustainability of the effects. Professionals reported having limited time to prepare for classes. Additionally, a lack of resources for educating autistic children has also been identified as a concern (Lindsay et al., 2013). Importantly, the professionals seem to experience tension between the diverse needs of children in the preschool classroom, where the interests of the few seems to collide with the interest of the many this is an area that needs further addressing and problematizing (Gillett-Swan and Lundy, 2021).

The assessment made by the children themselves pre- to post-intervention did not reveal any statistically identified changes following professional development. The inclusion of young autistic children in research projects is still an exception to the rule, especially regarding research on students with pronounced autism traits or high symptom expression (Fayette and Bond, 2018) and younger children in pre-and elementary school (Warren et al., 2020). As previously mentioned, due to the children's young age and their challenges, we generated a pictorial assessment to suit the children's level of functioning. However, despite these efforts, coupled with trends showing improvement in the preschool practice through the children's experience we recommend caution when interpreting our results, as the psychometric validity of the child evaluations was not tested *a priori*.

Limitations and Future Directions

The present study had several limitations. First, the small sample size might have affected the generalizability of the results (Mulhern and Greer, 2011). Second, the study may have been affected by selection bias due to preschools' voluntary participation coupled with the aforementioned small sample size. Third, differences between the intervention and comparison groups, such as more preschool teachers and autistic children

in the intervention group, may have influenced the results. Finally, drawing conclusions based on the data that include the children is difficult. More individualized methods should be used to gain a better understanding of the evaluation. It is possible, that retesting several times could have increased the assessment reliability, and thus possibly, but not necessarily, validity. On the other hand, it might also increase children's fatigue and challenge their attention and motivation span. We decided that psychometric advances and risks were balanced applying our procedure. Hence, we hope that the research community will continue to identify and develop creative ways to include young autistic children in research projects. Furthermore, more studies investigating how parents and autistic children evaluate different type of development strategies in educational setting are needed. We also identified that there is a need for research that includes parents to autistic children and autistic children themselves in the earlier planning process off interventions. This could provide an increased understanding of autism and different type of support and strategies in the educational context. Importantly, our study did not include principals and school leaders in professional development, which might be crucial for the development of top–down, not only bottom–up professional school development for autistic students. Finally, we do not know about the stability of professional development effects found in the current study. Thus, there a multiple avenue for future research directions and options to improve the shortcomings of the current work.

Implication for Preschool Education

The results admit us to derive some implications that could be considered when designing professional development for preschool professionals educating autistic children with autism. Shared practice using participants' own experiences and applying a more transformative approach was in focus. We argue that these practice-based implementations contributed to program outcomes and feasibility and are implications that could be useful in designing professional development programs in educational settings. The challenges and barriers identified may serve as a guiding post to practitioners, foremost school leaders, who are at the onset of implementing a professional development program. The parents were overall positive to be included in the research project and that the preschool was willing to both contribute to research and to invest in improving the education for their autistic children, which could be an important building stone for a solid partnership between parents and preschool professionals.

An important implication is that even if the point of locus has been autistic children in this study, the participating professionals acknowledge that the development and changed practice may serve other children with special educational needs and disabilities as well.

CONCLUSION

To the best of our knowledge, few studies have focused on the impact and processes of professional development regarding autism understanding, professionals' practice, and inclusive education in a preschool context, including all staff members.

Furthermore, the inclusion of both parents, particularly autistic children, to evaluate professional development is even more unusual.

The professional development seems to have contributed to changes in attitudes and skills among preschool professionals, which may entail greater support for professionals in fulfilling their responsibilities according to the Education Act and curriculum. We further conclude that the design of professional development, especially when collective action is prioritized, is important to the outcome and the inclusion of all staff members. This corresponds with previous research indicating the importance of collective action in improving pedagogical competencies (McLaughlin and Talbert, 2006; Vescio et al., 2008). Furthermore, it may be important to acknowledge that the research project was implemented during the COVID-19 pandemic, which entailed challenges; on the other hand, it may be important to conclude that despite the strains, the professional development was feasible and had an overall high acceptance from both school management, professionals, and parents. This could imply that it is possible to implement a comprehensive professional development during challenging times with positive outcomes and sometimes we cannot afford to wait on the optimized conditions before we act.

However, it is important to acknowledge while the study shows promising results for professional development, it is observational in character, not experimental, and not allowing causal inferences at this stage. In addition, we must recognize that effective inclusive education has organizational prerequisites (e.g., the number of children in preschool classes and adequate class preparation time for teachers) that cannot be satisfied by increasing professionals' understanding of autism and enhancing their inclusion skills. The barriers identified should be taken under consideration for sustainability.

Lastly, Pellicano et al. (2014) and Macmillan et al. (2021) propose that research in the autism field needs to focus more on what serves autistic persons and, thus, a greater focus on applied science. Hence, we suggest that despite limitations reported above, our study contributes a novel understanding of implementation professional development to maximize the implications for practice in a regular preschool setting and by this supporting the practice in making necessary adjustments to the learning environment, develop strategies, achieve the educational goals and by this enhance equality and learning opportunities for autistic children.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, after additional anonymization of qualitative data.

ETHICS STATEMENT

The study involved human participants and was reviewed and approved by the Swedish Ethical Review Authority (2019-05323). Written consent was obtained from all participants included in the study. Regarding the participating children, informed consent was obtained from legal guardians.

AUTHOR CONTRIBUTIONS

LP-B conceived and designed the study, collected the data, wrote the first draft of the manuscript, and performed the analyses under the supervision of SB who also performed data validity checks. SB critically revised the manuscript. Both authors worked on the article's revision and approved the final manuscript.

FUNDING

ACKNOWLEDGMENTS

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