

BMJ Open Quality Professionals' experiences of using an improvement programme: applying quality improvement work in preschool contexts

Sofia Kjellström ¹, Ann-Christine Andersson ¹, Tobias Samuelsson ²

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¹School of Health and Welfare, Jönköping University, Jönköping, Sweden

²School of Education and Communication, Jönköping University, Jönköping, Sweden

Correspondence to
Dr Sofia Kjellström;
sofia.kjellstrom@ju.se

ABSTRACT

Background Improvement work can be used in preschools to enrich outdoor environment for children's better health. Effective improvement work can facilitate the necessary changes, but little is known about professionals' experiences of participation in improvement interventions. The aim was to evaluate how preschool staff experience quality improvement work, using the Breakthrough Series Collaborative improvement programme, to enhance outdoor environments.

Methods An improvement intervention using a breakthrough collaborative was performed at 9 preschools in Sweden and examined with a longitudinal mixed method design. Staff completed questionnaires on 4 occasions (n=45 participants) and interviews took place after the intervention (n=16 participants).

Results The intervention was successful in the sense that the staff were content with the learning seminars, and they had triggered physical changes in the outdoor environment. They integrated the quality improvement work with their ordinary work and increasingly involved the children. The staff tested improvement tools but did not find them entirely appropriate for their work, because they preferred existing methods for reflection.

Conclusions The challenges in quality improvement work seem to be similar across contexts. Using the Breakthrough Series Collaborative in a public health intervention is promising but needs to be integrated with preunderstandings, current reflections and quality tools and models.

INTRODUCTION

Improving population health can be done by working upstream with prevention and applying quality improvement (QI) methods in new settings. In Sweden, 83.8% of all children aged 1–5 years attend preschool for an average of around 30 hours/week.^{1 2} Preschool in Sweden is a care establishment and an educational institution with a curriculum. The curriculum states that children in preschool should be given opportunities to participate in physical activities. Moreover, preschool should also promote the joy of physical activities to children to 'stimulate their interest in health and well-being'.³

Preschool staff have an important task to care for and educate children and to improve the quality of the work and the environment.⁴

Outdoor spaces that promote physical activity and health

The physical environment plays a critical role in promoting physical activity and health.^{5–7} The importance of supporting multifunctional outdoor environments in preschools is increasingly mentioned as a factor with many positive effects, such as increased sustainability, learning and mental and physical health in children. Climate adaptation and sustainability can be achieved by the creation of spaces that provide and supporting ecosystems.⁸ The potential health and educational benefits of public health interventions are supported by decades of research linking children's engagement with nature to positive learning and health outcomes.^{9–14}

Improving the outdoor spaces for children in early care and educational facilities is a prioritised task to support children's early development.¹⁵ A key aspect is the physical outdoor environment at preschools; this must be a safe and creative environment that promotes physical activities for children. Boldemann *et al*¹⁶ reported that children with access to play spaces integrated with the natural environment increased their physical activity by >20% and relative sun exposure decreased by 35%–40% compared with children in low-score environments. Vegetation integrated in play is thus protective for more outdoor time with an increase in physical activity with free mobility without sunburn risk.

Quality improvement work

In 2017, an improvement project was initiated by the Public Health Department in Region Jönköping County (RJC), Sweden, to inspire and promote multifunctional outdoor spaces. The background to this RJC project

was a regional public health action strategy for the period 2016–2025 presented in 2015. The RJC emphasised the value of sustainable outdoor environments for children's health and indicated a need to improve the outdoor environments where children spend a great part of their day. RJC's intervention was based on the Breakthrough Series Collaborative Methodology.^{17 18} This methodology was originally designed to reduce the gap between knowledge and practice by promoting forms of collaboration that increase learning and improvements. The Breakthrough Series Collaborative Methodology brings together teams from various organisations to create joint learning experiences, learn skills for improvement and lead change within their organisations using small-scale rapid tests of change. Teams that share common problems collaborate by sharing ideas and best practices to increase the pace of improvement. The goal is to identify key components of an ideal system based on existing best practices and evidence, breaking the system down into manageable parts and allowing participants to focus on specific aspects within the system.

The Breakthrough Series Collaborative Methodology is often used in healthcare settings but has also been used in child welfare agencies and the children's mental health field.^{19–23} A strength of the Breakthrough Series Collaborative method is its focus on changing organisational culture and beliefs and promoting sustainability, and implementation in real-world settings.¹⁹ The Breakthrough Series Collaborative Methodology is sometimes also referred to as Quality Improvement Collaboratives (QIC). Reviews show that these are complex and time consuming, but that they are largely effective in improving intended outcomes.²⁴ Previous reviews also show that on-site QI activities or engagement in local improvement initiatives are infrequently and insufficiently described.^{24–26} There is a need for more detailed descriptions of the specific features that drive change.²⁶ Thus, it could be of value to study how participants of a Breakthrough Series Collaborative experience the QI work.

Aim

This study is a contribution to research because there is a need for studies that examine how staff experience QI work, particularly in a context where the intervention and tools are rarely used. The focus in this study is on how the staff experience being part of a Breakthrough Series Collaborative improvement programme. Thus, the aim was to analyse how preschool staff experience work within a QI intervention process regarding the physical environment, using the Breakthrough Series Collaborative improvement programme.

METHODS

The study was designed as a longitudinal mixed method study using a repeated questionnaire and qualitative interviews. The aim was to evaluate an improvement process in preschool regarding the physical environment,

using the Breakthrough Series Collaborative improvement programme.

The project

The Public Health Department at RJC and Jönköping University were responsible for the project. The Public Health Department was responsible for the intervention and conducting the seminars given during the intervention period, but the planning of the content of the seminars, for example, discussions on which lecturers to invite, was done in collaboration with the researchers from the university. Jönköping University was responsible for planning and conducting the research.

The intervention had two goals: to involve preschool teachers and children in improvement work; and to develop multifunctional outdoor preschool environments with enhanced ecosystems designed to promote health and sustainable development. The intervention was tailored according to a QI collaborative model with four learning seminars. Four themes were used as the target of the improvement work: gardening (particularly forest gardens), physical activities, rest/recovery and ultraviolet (UV) protection.

Study populations

Letters of invitation were sent by mail to the principals of all preschools in RJC at the end of 2016, informing them about this outdoor environment QI project and inviting them to participate. Twenty-three units volunteered to participate by sending in a letter of intent, and nine were selected based on criteria designed to capture a profile of schools that was representative of the variety of preschools in the region in terms of urban/suburban/rural demographics and geographic distribution. We have given the preschools the following fictional names: the Ant, the Bear, the Cat, the Dog, the Elk, the Fox, the Goose, the Horse and the Impala. All participating preschools volunteered, and they received no compensation. All participation was based on informed consent by all staff involved.

During the intervention, employees from each preschool participated in a series of four learning seminars, and each unit was allowed to have a team of four to five persons present at each seminar. The preschools organised the teams themselves, and the preschool staff at the different preschools volunteered to be part of the teams. The average number of participants in the learning seminars was 40, and the number in the teams varied from 3 to 7 (figure 1). The teams in breakthrough series are usually multiprofessional, but in preschools the only professions are preschool teachers and preschool directors. The preschool directors participated in three of the teams. One of the teams also invited the head gardener of the municipality as a team member.

The intervention

The intervention consisted of four 7-hour in-person learning seminars, but the preschool staff also took part in a 2-hour premeeting at each of the preschools,

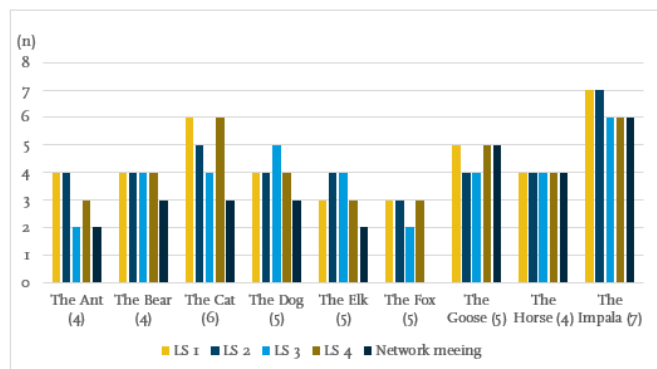


Figure 1 Participation in the learning seminars.

a postintervention network meeting and a dissemination seminar. The premeetings took place in February 2017 and the final learning seminar in October 2017. Each learning seminar included QI education, inspirational thematic expert lectures, team planning sessions and cross-site sharing of experiences and work accomplished. Sharing often consisted of the preschools presenting illustration/posters followed by questions and discussion. The QI education was carried out by expert QI coaches from RJC and the thematic lectures by national external experts (researchers and practitioners). Homework based on improvement methods was assigned to the preschools for completion between the meetings. Activities between meetings included QI coaching (few used it), email contact concerning the presentations and upcoming meetings. At times, the researchers' visits to conduct research also resulted in supportive conversations on matters related to the improvement work.

The project started with formal precollaborative preparation through a visit to the preschools by RJC (two to three persons) and Jönköping University (one to five persons). The preschool staff got additional information about the project and the staff presented the preschool and the yard through a walk. At these meetings, the preschool staff were assigned homework: to anchor the improvement work among their co-workers, to identify members and form teams, to conduct a current state analysis and set preliminary goals.

The first learning seminar consisted of an introduction to improvement work (current state analysis, root cause analysis (fish-bone diagrams) and plan-do-study-act (PDSA) cycles).²⁷ The thematic focus presented in a lecture by a researcher was on how to change preschool outdoor environments to increase physical activity and UV protection.^{9 16} A short introduction to ecosystems was presented. During the day, there was time for teamwork; at the first meeting, this focused on establishing the current status at the preschool, setting goals and priorities and planning tests and measurements. Homework for the next seminar was to settle on goals, finish the fish-bone diagram and complete the first PDSA cycle and prepare a presentation of the work for the following seminar.

At the second learning seminar, all the preschools presented their preschool yard and their planned improvement work. The day also included QI education at which the lecturer recapped the information presented at the first learning seminar and added measurements of variations. The theme addressed during the day was forest gardening²⁸ with children²⁹ led by a self-taught practitioner. A short follow-up lecture on the results of the ecosystem analysis was delivered by one of the researchers. The teamwork involved making plans for measurements. The homework for the third seminar was for the preschool teams to work on their plan for their yard, conduct tests and measure variations across time.

The third learning seminar included education on different measurements and ways to present data. Three themes were addressed at this seminar. First, students from Jönköping University presented the mini-forest garden they had created at the university. Second, the preschool teachers were given a presentation on how hens could be included in their preschool yards. Third, they were given a presentation on the usefulness of biochar as a means to counteract the climate crisis by sequestering carbon in the soil and at the same time improving soil fertility. This was presented as a pedagogical example of the importance of using knowledge about the carbon cycle constructively in practice to tackle the climate crisis. All the teams presented their homework from the second seminar and they were given a new homework assignment: to wrap up the testing and produce a report and presentation for the final seminar.

At the fourth learning seminar, all preschool presented their final projects. The theme was recovery and an experiential introduction to mindfulness was given. In total, 46 participants attended, 23 of whom attended all 4 learning seminars.

At the learning seminars, the staff described the fundamental changes in the physical environment; they had taken down fences to increase physical activity, initiated processes to expand the outdoor areas, planted flowers, vegetables, edible trees and bushes and added insect hotels and birdhouses.

A network meeting was held in May 2018, 6 months after the final learning seminar; all the participating preschool staff were invited. The aim of this meeting was to follow-up the work and provide additional inspiration for the preschools to continue their work. The theme was outdoor activities through experiential learning, and additional work was done in cross-sectional groups on how to further the work done so far. Finally, a dissemination seminar took place 10 October 2018. Other preschool units were invited to this final network meeting, and other interested stakeholders attended the meeting.

Context of the research study

The study is part of a larger research project. All units undertook an ecosystem analysis (Riksbyggen), which also provided the opportunity to talk about the design and ecosystem provided at each preschool.³⁰ Additional



research to be reported elsewhere was conducted at some of the units with a focus on what features the children prefer in their preschool yard and pedagogy in early childhood education for sustainability.³¹

Surveys

The Swedish Improvement Measurement Questionnaire (SIMQ)³² was slightly amended and improved for this context, because the survey was developed initially for a healthcare context. Based on experiences from use of the survey,³³ some changes were made; some wording was simplified, some questions that had been found difficult or inadequate, and therefore seldom answered in the study by Andersson *et al.*³³ were removed, and context-related issues were changed to suit the preschool context. The wording was confirmed by using face validity and checked that it was understandable with people within the context. The Likert scale alternatives were adjusted regarding wordings and using the same order to make them clearer and more consistent. Cronbach's alpha coefficient was calculated for the factors in all four datasets and found to be between 0.73 and 0.83, which was considered sufficient due to the small sample. The survey consisted of demographic data, questions and statements using a 5-point Likert scale, with different wording depending on the question (eg, 'not at all', 'a little', 'some', 'quite a bit', 'a lot') or a statement (eg, 'absolutely do not agree', 'mostly do not agree', 'neutral', 'mostly agree', 'absolutely agree'). In addition, there were some open-ended questions and opportunities to make comments.

The first survey set was distributed at the first meeting with a prepaid envelope, and all participants were asked to send their completed questionnaire at least a week before the second learning seminar. This strategy required several reminders to the leaders through emails, so the collection method was changed. The second set was distributed at the second learning seminar and collected at the third in person. The third set was distributed at the third learning seminar and collected at the fourth seminar. The fourth set was mailed to all participants 2 weeks before the network meeting.

Interviews

Fifteen preschool teachers and one preschool director were interviewed for this study, representing the nine preschool units taking part in this project. We used a convenience sample for the interviews, the preschools chose who should be interviewed among their participants in the improvement programme. During the course of the improvement programme, various changes had taken place in the preschools regarding personnel. In some preschools, staff had moved on to positions in other preschools in or outside the region. In other preschools, several teachers were on long-term sick leave or parental leave. Given these various circumstances, our aim was to at least recruit interviewees from every preschool, and if possible, more than one person. This was possible in all but two cases. However, to make this possible one of

the teachers even chose to come in from her sick leave to attend the interview. To fit the interviews into the staff's busy work schedule, the interviews were at times done in groups.

Consequently, three of the interviews were done in groups involving staff from two different preschools at the same time. The first interview included two teachers from the Ant preschool and two from the Elk preschool together in a group of four. In the second interview, we met two teachers from the Fox and two from the Goose, again in a group of four. In the third interview, we met with two teachers from the Cat and two from the Bear in a group of four. In one interview, a pair of preschool teachers from the Dog preschool were interviewed together. In one interview, a preschool teacher from the Impala preschool was interviewed individually. Finally, the preschool director from the Horse preschool was also interviewed individually.

A semi-structured approach was used in the interviews. The interviews took between 35 and 60 min, and all the interviews were recorded and transcribed verbatim. The names used in the article are fictitious to protect the identity of the interviewees.

Data analysis

The surveys were analysed by descriptive statistics, with mean and median values for each set (see online supplemental file 1).

In the analysis of the interview material, we tried to identify information that was complementary to the questionnaire answers. The analytical process for the interviews was thus directed by the questionnaire answers. To do this, we analysed the material using a qualitative thematic analysis method.³⁴ We read the material several times to identify themes. In our search for themes, we looked for things such as conversation topics and recurring activities.³⁴ Using the interviews in combination with the survey, we triangulated and studied the material from more than one perspective, 'to map out' and 'explain more fully, the richness and complexity' of our material.³⁵

Patient and public involvement statement

No children or preschool teachers were included in the research process design, but we worked closely with Public Health Department.

RESULTS

Demographic data and participation

A total of 45 individuals participated in the survey sets: set I, n=40; set II, n=35; set III, n=32 and set IV, n=28. Participants ranged in age from 27 to 59 years (mean, 45 years; median, 46 years). There were 21 preschool teacher, 15 child carers and 9 others (administrators and preschool directors). Their experience in their profession ranged from <1 year to 35 years (mean, 16.5 years; median, 18 years). In total, 46 participants attended the learnings seminars, 23 of whom attended all four.

Table 1 Time spent on quality improvement (QI) work during the last month

Statement	Mean/Median (range) in hours (missing (n))			
	Set I	Set II	Set III	Set IV
Q9: time spent on QI-related work	7/5 (1–20) (1)	4.5/2.5 (0–20) (3)	10/7 (3–25) (0)	6/3.5 (0–26) (0)
Q10: time spent with the children	1/0.5 (0–5) (3)	1.5/1 (0–10) (1)	3/1 (0–10) (0)	4/2 (0–20) (2)
Q11a: supervise co-workers	3/1 (0–32) (1)	0.5/0 (0–2) (2)	1.5/1 (0–6) (0)	1/1 (0–5) (3)
Q11b: develop measurements	0.5/0 (0–2) (5)	0.5/0.5 (0–3) (1)	1/0 (0–5) (2)	0.5/0 (0–5) (6)
Q11c: discuss with users/stakeholders	2/2 (0–6) (1)	2/1 (0–10) (1)	2/1.5 (0–7) (0)	2/1 (0–15) (1)
Q11d: acquire funds/resources	1/0.5 (0–5) (4)	0.5/0 (0–8) (4)	0.5/0 (0–6) (2)	0.5/0 (0–3) (2)
Q11e: coordinate with other units	2/1 (0–10) (3)	1/0.5 (0–4) (1)	1.5/1 (0–8) (2)	1/1 (0–4) (4)
Q11f: prepare results and reports	2/2 (0–10) (2)	1/1 (0–4) (0)	4/3 (1–10) (2)	1/1 (0–4) (4)
Q11g: administration and planning	3/1 (0–15) (2)	1/1 (0–4) (1)	3.5/2 (0–20) (0)	1/1 (0–4) (4)
Q11h: personal education	3/1 (0–15) (3)	0/0 (0–2) (2)	1/0.5 (0–8) (1)	1/0.5 (0–8) (7)
Q11i: apply changes in practice	1/0 (0–15) (4)	1/1 (0–5) (2)	2/1 (0–10) (1)	3/2 (0–20) (1)

The participation in the learning seminars and network meeting is shown in [figure 1](#). There was a slightly higher participation in the seminars than answers on the survey sets. The Impala preschool was divided into four different units, but the participation was so small, they were analysed as one unit. The four units worked together on the improvements.

Use of time and integrating children in quality improvement work

The time spent on the work was measured in total (Q9), together with the children (Q10) and on specific activities (Q11) ([table 1](#)). The time spent varied a lot both between the activities and between the survey sets. In the third set, most time overall were spent on the QI work (mean, 10 hours). Administration and planning took the most time, and less time was used for acquiring. Most activities were carried out without the children, but the amount of activities carried out with the children increased during the study from a mean of 1 hour in the first set to a mean of 4 hours in the fourth set (maximum 5 hours for set I to a maximum of 20 hours for set IV). The results are presented in [table 1](#) (range, mean and median values, and number of missing values).

In all but one of the interviews, the interviewees explained that they did not get any extra time to work on the project. The exception was the teachers from the Cat preschool who were given some extra time every week to work on matters concerning the intervention. In the other preschools, so that they could manage the work, they tried to involve the children in the project and include improvement work in their everyday activities with the children.

Quality improvement work

The participants' previous experience of improvement work was low (Q4 set I: mean, 1.5; median, 2). Few participants stated that they had previous training in the use of QI tools (Q5 set I: mean, 0.4; median, 0) The

number of answers missing was high in some survey sets. Results regarding experience and training in QI tools are shown in [figures 2 and 3](#). The commitment was high during for all survey sets (Q6) and most stated they had used QI methods and tools previously in the III survey set (Q8: mean, 2.2). The participants thought that they could influence the goals and activities but were not aware of economic decisions taken (Q12). In the questionnaires, few expressed experiences of difficulties with the QI work (Q15), and most of the participants also expressed that they felt free to say what they thought of the QI work and how it developed (Q20). Disagreements seldom arose (Q22). With regard to competition, there was slightly more at the beginning, most with regard to finance and time (Q24). The participants expressed that they were satisfied with the progress (Q26 and Q28), and that the QI work contributed to the improvement of the unit (Q27). The questions on regulations were mostly answered with the 'do not know' alternative; there were also some missing, therefore this section of the survey is not presented.

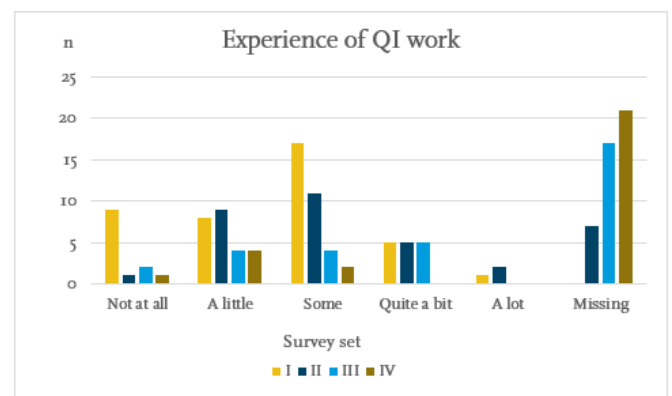


Figure 2 Experience of improvement work before the project. QI, quality improvement.

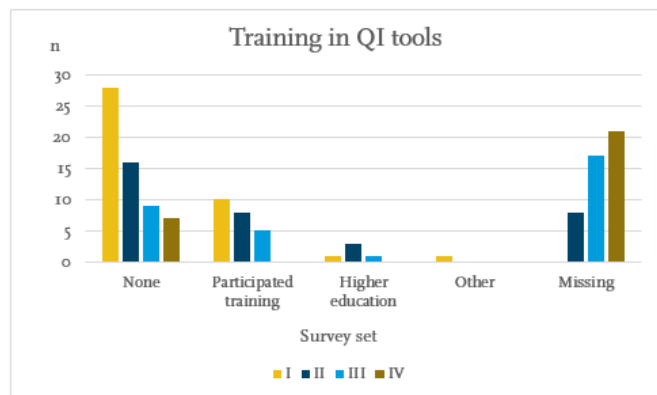


Figure 3 Training in improvement work/tools. QI, quality improvement.

The staff expressed that they had tried all the improvement methods that were assigned as homework, but it became clear that they had used these in a piecemeal fashion. The preschool director from the Elk explained that “We did not think it was useful, we mostly felt it was something we were ordered into doing”. Questions on measuring in the interviews seemed to make the interviewees somewhat uncomfortable; some expressed that this was their ‘bad conscience’; others mentioned that it was hard to find time for measuring in everyday life at preschool. The preschools had picked and chosen from the suggested methods for measuring and had only done the parts they felt comfortable with. At times, the measuring seems to have boiled down to interviews with the children to get their perspective on a planned alteration in the preschool yard. Even though some of the interviewees expressed that they experienced that it was valuable (eg, actually measuring something challenged their assumptions), they all suggested that they had not continued to use it. Some mentioned that they already had pre-existing reflection models that they preferred and explained that they would probably continue using their old methods rather than the ones suggested in the intervention. Nevertheless, they also expressed that they had learnt to make more structured observations during work and that they had at times been surprised by the results from the observations they had made. At the Elk, the preschool teachers observed the children’s movements during outdoor play and expressed surprise concerning the level of movement among the children. One of the two preschool teachers from the Elk stated “My god, they move around much more than I thought; that became very evident”.

Collaboration

There was not much collaboration stated (set I, n=4; set II, n=6; set III, n=2 and set IV, n=4). As mentioned earlier, most collaboration was between the four units in the Impala preschool; they were handled as one unit due to the small sample. Those questions are therefore not presented further.

In the interviews, collaboration with children, co-workers, parents and their partners who helped out with some practical things was mentioned. Because the improvement work often involved changes to the physical environment, the preschool yard, the interviewees expressed that they would have liked support with building and gardening. Some preschools got help from their janitors. On the question of external cooperation, different preschools also mentioned they had some cooperation from external partners such as their housing company, a local school training construction workers and sponsors such as the local IKEA that provided outdoor equipment. One preschool mentioned that they had cooperated closely with the municipality head gardener. A few interviewees also mentioned that they collaborated with volunteer organisations on organic gardening or outdoor life.

Learning seminars

The survey did not include any questions about the learning seminars. Nevertheless, in the interviews, the staff expressed that they were very content with the seminars. The seminar days were not just days when they did not have to do their regular work. Taking part in learning seminars created opportunities to bond with staff. Also, the interviewees found most of the content presented at the seminars very useful. The preschool teacher from the Jackal explained that “I have never left the seminars feeling it was a waste of time” and “I feel I have learned stuff”, and said the seminars gave her ‘energy’. Similarly, the preschool teachers from the Dog expressed they liked the seminar days, but mentioned that some of the content and some of the suggested changes that could be done in a preschool yard were too challenging for them. Nevertheless, overall, the preschool teachers felt they returned to their preschool units and colleagues with inspiration and useful ideas for change. In addition, the staff wished that more of their co-workers had been able to attend.

DISCUSSION

Staff were very content with the learning seminars, which triggered improvement work and physical changes in the outdoor environment, which is in line with research suggesting that one of the strengths of QI collaboratives is that it exerts a normative pressure and provides an opportunity to disseminate inspiring success stories.³⁶ The QI work was integrated with ordinary work, and the children were increasingly involved, which is a strength because one of the essential ingredients in QI work is to achieve clearly positive results that are of value to the end users.^{17,37} Previous research has shown that children value taking part in these kinds of activities.³⁸ The staff experienced challenges to improvement work, and they tested improvement tools but did not find them entirely appropriate for their work, because they preferred existing methods for reflection.

This study is unique because it applies a QI intervention stemming from healthcare into a new context of

education and preschools. The results show that staff experiences seem to be similar across contexts, demonstrated by the responses to the SIMQ when doing improvement work using the Breakthrough Series Collaborative. Both this study and the study by Andersson *et al*³³ show that the participants experienced a high level of impact of the QI work, and that they could express what they wanted. The commitment was also high, and problems were seldom raised. On the other hand, they also expressed that time was lacking, and the feedback from support could have been better, which also correspond with study by Andersson *et al*.³³ Thus, it seems that in performing QI work in public organisations, similar obstacles are encountered in healthcare and the educational context.

But there were also specific questions regarding the educational context. When initiating a QI initiative, there are assumptions that the staff involved have enough skills to adopt the competences needed, but some competences connected to QI efforts can also be developmental challenging.³⁸ Thus, there seem to be challenges in using QI interventions and tools in new contexts.³⁹ Regarding improvement tools, the message seems to be clear: the preschool staff had tried these tools but did not continue to use them and/or will not continue to use them. This does not mean the staff disliked improvement work. Rather, several of the interviewees referred to previous and/or ongoing systematic quality work and mentioned that they already had methods for reflection that they used regularly in their ongoing improvement work, methods they were used to and felt comfortable with. Valuable lessons can be learnt from this. The introduction of new tools and methods in a work setting often tend to give rise to processes of localisation, processes in which the new tool or method is adapted and adjusted to local circumstances by the users.⁴⁰ In this project, it would have been of value if the QIC intervention leaders had made an inventory of the methods the preschools were using before the intervention, and then, if possible, choose new methods and protocols that complemented the existing methods. QI support was offered, but not by continuously checking progress with a coach for each team, which is common in breakthrough programmes.¹⁸ That would have been favourable in a context where the staff were not used to these kinds of tools.

Another proposal is to work on the engagement of leaders both regarding this project and working with QI competences, which is often proposed as essential for QIC success.^{23 36} Overall, three preschool directors did participate in the different teams taking part in the improvement work. The level of practical involvement in the improvement work by the directors was different at different preschools. In some, the director was working only with administration, whereas at others they combined their administration work with teaching as well as more hands-on improvement work. Thus, the directors were involved hands-on in the improvement work in different ways. In retrospect, it would have been valuable to scrutinise the level of involvement of the directors further.

However, only one director volunteered to participate in the interviews, and thus we could not examine this further. Another lesson is that making time for QI work is important for motivating professionals.⁴¹ Previous studies in healthcare have shown that in well-functioning units, time and structures are allocated to QI work and that has a positive effect on the working climate.^{39 41 42}

An interesting result was that the children were integrated more and more in the QI work. There were examples of children participating in measurements, and in actions to improve the yard, such as picking up trash, planting plants and digging. This can be seen as example of co-production where a service is being co-produced with those who will use.⁴³ Previous work has shown that children appreciate being allowed to contribute and participate in gardening work.²⁹

Methodological considerations

The SIMQ survey was previously developed for health and welfare settings.³² Because the survey was found to be long and difficult to complete,³³ modifications were made to address that and to adapt it to the context of preschool settings. However, the participants in this study still expressed in the interviews that the survey was long and difficult. The improvement work and terminology were new and unfamiliar to most of the study participants; not many had any previous knowledge or training in QI tools. Dücker *et al*⁴⁴ highlight that it is important to support teams in gaining understanding and knowledge about QI methods. Possibly, this could explain some of the low response rates. This also raises other concerns, because one of the aims of breakthrough methodology is to train improvement teams so they will continue the improvement work afterwards, which presumes enough developmental skills.³⁸ A Swedish study on the long-term success of such QI programmes showed that the most important factor was that the organisations were able to make use of the knowledge that the teams gained after the programme ended.⁴⁵

The questionnaire was developed further because of contextual differences and responses from earlier participants that it was long and difficult to understand and answer. In the version used in this study, context-specific parts were made more general, with the aim of making the questionnaire easy to use for different public organisations without too much adaptation. The wording in the questions and the Likert scale were tested by asking people familiar with the context before use, but still difficulties were expressed. Another difference was that in the study by Andersson *et al*,³³ the survey was sent electronically, and automatic reminders were also sent electronically. In this study, due to circumstances, the surveys were handed out on paper, and had to be collected. This made the reminder process more difficult, which perhaps can explain some of the low response rates, although the response rate was not that high in studies by Andersson *et al* either.^{32 33} Generally, response rates have been decreasing for some time in all kinds of research.⁴⁶



A review of QI collaboratives estimates a dropout rate of 30%.²⁴ In this study, an overall total of 45 participants answered the survey four times (40, 39, 35 and 38). So even though some dropped out, new participants joined over time.

CONCLUSIONS

The contribution of this study is the study of using health-care QI tools in new contexts. Using a Breakthrough Series Collaborative in areas of public health, education and environment is promising. Staff in different contexts seem to be experiencing similar challenges when participating in QI work in Breakthrough Series Collaboratives. But when using QI in new contexts, it is important to make an inventory of reflection and quality work methods in current use and choose methods and tools that connect with, add to and complement these methods. This would probably increase sustainability and promote the future use of methods and tools. We also conclude that involving the children is key to finding time for the work and this can also be meaningful for the children.

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Patient consent for publication Not required.

Ethics approval Ethical considerations and principles were central to the project and had an influence on the research design with the purpose of respecting the integrity, autonomy and privacy of the participants. An informed consent process was accomplished in several steps. First, the preschool leaders were informed that the intervention would include research. Second, the staff were informed orally and in written format about the research ethics at the premeeting at each of the preschools and at the intervention. The questionnaire was accompanied by a written information letter informing about the procedure, privacy, confidentiality and right to withdraw at any time. Third, at the time of the interview, a further informed consent process was accomplished by mutual communication whereby the researcher provided accurate information and listened to the individual participants to make sure that they comprehended and made voluntary choices about participating at recruitment and throughout the interview. No ethical review has been done in connection with this study because Swedish law does not require ethical approval for interviews with humans on non-sensitive issues.

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Data availability statement Data are available on reasonable request. Research data at Jönköping University is regulated under the Freedom of the Press Act and the Public Access to Information and Security Act as public records/official documents. Research data registered and archived at the School of Health and Welfare can be requested anonymously by anyone for a fixed fee according to the

Fee Regulation. If the research data contain sensitive information, such as personal data and/or trade secrets, that information is protected by the Confidentiality and Secrecy by the Public Access to Information and Security Act and requests for such information will be denied with the possibility of appeal in the Court of Appeals. Secret or confidential research data can be accessed by other researchers if they receive permission from the Regional Ethics Review Board. The lawful basis for transmission of secret and/or confidential information is then based on the Law of Ethics Review for Research on Humans.

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ORCID iDs

Sofia Kjellström <http://orcid.org/0000-0001-8952-8773>

Ann-Christine Andersson <http://orcid.org/0000-0003-0409-1985>

Tobias Samuelsson <http://orcid.org/0000-0002-0555-8367>

REFERENCES

- 1 Statistics Sweden. Barnens tid med föräldrarna, 2004. Available: https://www.scb.se/statistik/BE/LE0102/1990102/LE0102_1990102_BR_BE51ST0401.pdf
- 2 Statistics Sweden. Förskola – Barn och grupper -Riksnivå, 2017. Available: <https://www.skolverket.se/skolutveckling/statistik/sok-statistik-om-forskola-skola-och-vuxenutbildning?sok=SokC&verkform=F%C3%B6rskola&omrade=Barn%20och%20grupper&lasar=2017&run=1>
- 3 Curriculum for the preschool Lpfö 18, 2019. Available: <https://www.skolverket.se/publikationsserier/styrdokument/2019/curriculum-for-the-preschool-lpfo-18>
- 4 Batalden PB, Davidoff F. What is "quality improvement" and how can it transform healthcare? *Qual Saf Health Care* 2007;16:2–3.
- 5 Bancroft C, Joshi S, Rundle A, *et al*. Association of proximity and density of parks and objectively measured physical activity in the United States: a systematic review. *Soc Sci Med* 2015;138:22–30.
- 6 Ferdinand AO, Sen B, Rahurkar S, *et al*. The relationship between built environments and physical activity: a systematic review. *Am J Public Health* 2012;102:e7–13.
- 7 Huang TTK, Wyka KE, Ferris EB, *et al*. The physical activity and redesigned community spaces (PARCS) study: protocol of a natural experiment to investigate the impact of citywide Park redesign and renovation. *BMC Public Health* 2016;16:1–12.
- 8 Bolund P, Hunhammar S. Ecosystem services in urban areas. *Eco Econ* 1999;29:293–301.
- 9 Boldemann C, Blennow M, Dal H, *et al*. Impact of preschool environment upon children's physical activity and sun exposure. *Prev Med* 2006;42:301–8.
- 10 Fjørtoft I. The natural environment as a playground for children: the impact of outdoor play activities in pre-primary school children. *Early Child Educ J* 2001;29:111–7.
- 11 Mårtensson F, Boldemann C, Söderström M, *et al*. Outdoor environmental assessment of attention promoting settings for preschool children. *Health Place* 2009;15:1149–57.
- 12 Mårtensson F, Lisberg Jensen E, Söderström M, *et al*. Den nyttiga utevistelsen? Forskningsperspektiv på naturkontaktens betydelse för barns hälsa och miljöengagemang [Research perspective on the importance of contact with nature for children's health and environmental commitment]. Rapport 6407. *Naturvårdsverket* 2011.
- 13 Tzoulas K, Korpela K, Venn S, *et al*. Promoting ecosystem and human health in urban areas using green infrastructure: a literature review. *Landsc Urban Plan* 2007;81:167–78.
- 14 Gill T. The benefits of children's engagement with nature: a systematic literature review. *Child Youth Environ* 2014;24:10–34.
- 15 LaRowe TL, Tomayko EJ, Meinen AM, *et al*. Active early: one-year policy intervention to increase physical activity among early care and education programs in Wisconsin. *BMC Public Health* 2016;16:607.
- 16 Boldemann C, Dal H, Mårtensson F, *et al*. Preschool outdoor play environment may combine promotion of children's physical activity and sun protection. Further evidence from southern Sweden and North Carolina. *Sci Sports* 2011;26:72–82.
- 17 Kilo CM. A framework for collaborative improvement: lessons from the Institute for Healthcare Improvement's Breakthrough Series. *Qual Manage Healthcare* 1998;6:1–13.

- 18 Institute for Healthcare Improvement (IHI). *The Breakthrough Series. IHI's collaborative model for achieving breakthrough improvement. IHI's Innovation Series white papers*. Boston, MA: Institute for Healthcare Improvement, 2003.
- 19 Daily S, Tout K, Douglass A, et al. *Culture of continuous learning project: a literature review of the Breakthrough Series Collaborative (BSC), OPRE Report #2018-28*. Washington, DC: Office of Planning, Research and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services, 2018.
- 20 Agosti J, Conradi L, Halladay Goldman J, et al. *Using trauma-informed child welfare practice to improve placement stability breakthrough series collaborative: promising practices and lessons learned*. Los Angeles, CA, and Durham, NC: National Center for Child Traumatic Stress, 2013.
- 21 Ebert L, Amaya-Jackson L, Markiewicz JM, et al. Use of the breakthrough series collaborative to support broad and sustained use of evidence-based trauma treatment for children in community practice settings. *Adm Policy Ment Health* 2012;39:187–99.
- 22 Haine-Schlagel R, Brookman-Frazee L, Janis B, et al. Evaluating a learning collaborative to implement evidence-informed engagement strategies in community-based services for young children. *Child Youth Care Forum* 2013;42:457–73.
- 23 Terao M, Hoffman JM, Brilli RJ, et al. Accelerating improvement in children's healthcare through quality improvement collaboratives: a synthesis of recent efforts. *Curr Treat Options Pediatr* 2019;5:111–30.
- 24 Wells S, Tamir O, Gray J, et al. Are quality improvement collaboratives effective? A systematic review. *BMJ Qual Saf* 2018;27:226–40.
- 25 Schouten LMT, Hulscher MEJL, van Everdingen JJE, et al. Evidence for the impact of quality improvement Collaboratives: systematic review. *BMJ* 2008;336:1491–4.
- 26 Nadeem E, Olin SS, Hill LC, et al. Understanding the components of quality improvement Collaboratives: a systematic literature review. *Milbank Q* 2013;91:354–94.
- 27 Langley GJ, Moen RD, Nolan KM, et al. *The improvement guide: a practical approach to enhancing organizational performance*. 2nd edn. San Francisco, CA: Jossey-Bass, 2009.
- 28 Crawford M. *Creating a forest garden: working with nature to grow edible crops*. Totnes, UK: Green Books, 2012.
- 29 Almers E, Askerlund P, Kjellström S. Why forest gardening for children? Swedish forest garden educators' ideas, purposes, and experiences. *J Environ Educ* 2018;49:242–59.
- 30 Askerlund P, Almers E, Tuvendal M. Creating multifunctional preschool yards with strengthened ecosystem services. Teachers' narratives and account of developing children's ecological literacy.
- 31 Almers E, Askerlund P, Samuelsson T, et al. Children's preferences for schoolyard features and understanding of ecosystem service innovations – a study in five Swedish preschools. *J Adventure Educ Outdoor Learn* 2020.
- 32 Andersson A-C, Elg M, Perseus K-I, et al. Evaluating a questionnaire to measure improvement initiatives in Swedish healthcare. *BMC Health Serv Res* 2013;13:48.
- 33 Andersson A-C, Idvall E, Perseus K-I, et al. Evaluating a breakthrough series collaborative in a Swedish health care context. *J Nurs Care Qual* 2014;29:E1–10.
- 34 Taylor SJ, Bogdan R. *Introduction to qualitative research methods. The search for meanings*. New York: John Wiley, 1984.
- 35 Cohen L, Manion L, Morrison K. *Research methods in education*. London: Routledge, 2007: 141.
- 36 Zamboni K, Baker U, Tyagi M, et al. How and under what circumstances do quality improvement collaboratives lead to better outcomes? A systematic review. *Implement Sci* 2020;15:1–20.
- 37 Batalden PB, Stoltz PK. A framework for the continual improvement of health care: building and applying professional and improvement knowledge to test changes in daily work. *Jt Comm J Qual Improv* 1993;19:424–47.
- 38 Kjellström S, Andersson A-C. Applying adult development theories to improvement science. *Int J Health Care Qual Assur* 2017;30:617–27.
- 39 Andersson A-C, Golsäter M, Gäre BA, et al. Learning through networking in healthcare and welfare: the use of a breakthrough collaborative in the Swedish context. *Int J Healthc Manag* 2020;13:236–44.
- 40 Samuelsson T, Berner B. Swift transport versus information gathering: telemedicine and new tensions in the ambulance service. *J Contemp Ethnogr* 2013;42:722–44.
- 41 Kjellström S, Avby G, Andersson Bäck M, et al. Work motivation among healthcare professionals: a study of well-functioning primary healthcare centers in Sweden. *J Health Org Manage* 2017;31:487–502.
- 42 Areskoug Josefsson K, Avby G, Andersson Bäck M, et al. Workers' experiences of healthy work environment indicators at well-functioning primary care units in Sweden: a qualitative study. *Scand J Prim Health Care* 2018;36:406–14.
- 43 Brandsen T, Verschuere B, Steen T. *Co-production and co-creation engaging citizens in public services*. London: Routledge, 2018.
- 44 Dückers MLA, Spreeuwenberg P, Wagner C, et al. Exploring the black box of quality improvement Collaboratives: modelling relations between conditions, applied changes and outcomes. *Implement Sci* 2009;4:74.
- 45 Øvretveit J. Understanding the conditions for improvement: research to discover which context influences affect improvement success. *BMJ Qual Saf* 2011;20(Suppl 1):i18–23.
- 46 Beullens K, Loosveldt G, Vandenplas C, et al. Response rates in the European social survey: increasing, decreasing, or a matter of fieldwork efforts? Survey methods: insights from the field, 2018. Available: <https://surveyinsights.org/?p=9673>