



Feasibility Study of a New Approach to Balance Job Demands and Resources¹

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ABSTRACT

Childcare workers are faced with high job demands. The use of selection, optimization, and compensation strategies (SOC) may help reach a better balance between job demands and resources. We aimed to develop and evaluate the feasibility of a participatory intervention to increase the collective use of SOC strategies among childcare workers. Five childcare institutions participated in the development and evaluation of the intervention. Feasibility of the intervention was evaluated through interviews, observations, and a questionnaire survey. We transformed the SOC terminology into the more practical applicable terminology 'PEX': Prioritize tasks, Explore resources, and use of eXternal resources, and developed a dialogue tool. The PEX approach seems feasible to use in childcare institutions, and to have the potential to increase the collective use of SOC strategies and thereby improve employee well-being. Also, the study illustrates how important it is that feasibility studies allow for adjustments based on the active participation of employees.

KEYWORDS

childcare workers / participatory interventions / preschool teachers / selection optimization and compensation / well-being

1. Background

Childcare institutions in Denmark, and other Nordic countries, are currently experiencing a shortage of personnel, particularly employees with formal pedagogical training, and this shortage expected to intensify in the coming years (EVA, 2024; Jensen, 2023; Kamp, 2017). Therefore, it is important to create attractive workplaces to motivate people to seek careers within childcare (BUPL, 2023). Although childcare workers report the interaction with children to be the strongest source of job satisfaction (Hall-Kenyon et al., 2014), it can also be very demanding causing psychological and physical strain. Childcare workers are among the job groups with elevated risk of affective and stress-related disorders (Wieclaw et al., 2006), and in Denmark, they report above average levels of stress (Arbejdstilsynet, 2021). Studies have shown that childcare workers are faced with high levels of physical, cognitive, and emotional demands (Clipa & Boghean, 2015), and several elements of their work are associated with stress and reduced well-being. Stressors at

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work include noise (Baumgartner et al. 2009), crying children (Clipa & Boghean 2015), lack of staff (Baumgartner et al. 2009), and lack of time to take a break (Clipa & Boghean 2015), children's challenging behavior (Baumgartner et al. 2009; Clayback & Williford 2021; Jeon et al. 2018; McGrath & Huntington 2007), high number of children per childcare worker and workload (McGrath & Huntington 2007), and childcare chaos (Jeon et al. 2018). Furthermore, transitions (Baumgartner et al. 2009; Clipa & Boghean 2015) such as getting the children inside and outside, lunchtime, children arriving, and the end of the day have been identified as situations with many stressors. In addition, childcare workers are also exposed to ergonomic strains, for example, sitting on the floor and on child-sized furniture, or moving heavy equipment (McGrath & Huntington 2007).

Thus, to enhance the well-being of childcare workers, there is a need for efforts to support childcare workers handling the demands they are facing during their workday.

1.1. Balancing demands and resources

Balancing job demands and available resources is central to individual work ability (Ilmarinen et al. 1997) and important for the health and well-being of employees (e.g. Bakker & Demerouti, 2007). The use of selection, optimization, and compensation strategies (SOC) (Baltes & Baltes 1990) may help reach a better balance between job demands and resources. The SOC model was developed in the research field of successful aging, to explore how people can age successfully despite declining resources (Baltes & Baltes 1990). The SOC model identified three types of action strategies individuals use to manage a limitation in resources. *Selection* is the setting and prioritization of goals as a response to a limitation of resources. *Optimization* is the allocation of resources and investment of means to reach the goal. *Compensation* is the use of alternative means or external resources to reach the goal (Baltes & Baltes 1990). A number of studies (Moghimi et al. 2017) have applied this theoretical model in work contexts as a theoretical basis to understand how employees may benefit from managing their resources. The use of SOC strategies has been found to be positively associated with important work-related outcomes such as work ability (e.g., Riedel et al. 2015), well-being (e.g., Wiese et al. 2002), work engagement, job performance, and job satisfaction (for a review and meta analysis see Moghimi et al. 2017).

For decades, scholars in the field have called for researchers to explore the use of SOC strategies beyond the individual level (e.g., Baltes & Carstensen 1999; Moghimi et al. 2019). It has been argued that when using SOC strategies collectively, members of the social group can contribute in defining goals (selection), in providing improved means (optimization), and in offering alternative means when the individuals' own fail (compensation), potentially leading to higher levels of functioning for all (Baltes & Carstensen 1999). The use of collective strategies may be of particular relevance for childcare workers because of the interdependent characteristics of their work (Leana et al. 2009). Recently, research exploring the use of SOC strategies in teams has emerged (Karlsen et al. 2022; Meng et al. 2021, 2022). Results indicate that the use of SOC strategies in teams is associated with better well-being and higher job satisfaction ((Meng et al. 2021), as well as with better work ability (Meng et al. 2022).

1.2. Interventions in the childcare setting

So far, few intervention studies have been conducted using the SOC model. None of these use a collective approach, but focused on the individual use of SOC strategies. Becker et al. (2017) found that physiotherapy combined with coaching in SOC strategies showed stronger effect on pain severity and self-rated work ability than physiotherapy alone. Furthermore, SOC training has been found to be associated with increased use of SOC strategies (Müller et al. 2018), and increase in well-being and job control among nurses (Müller et al. 2015). However, the training was rather comprehensive and posed a challenge with high dropout rates. Also, because the focus was on the individual's use of SOC strategies, some of the participants experienced problems with implementing their strategies because of their interdependence with colleagues in performing their work tasks (Müller et al. 2015). Nevertheless, these findings indicate that it is indeed possible to train employees to increase their use of SOC strategies and that this has positive effects on their well-being.

Applying a collective focus on the use of SOC strategies may enable finding collective solutions that improve handling work demands for the entire team and not just for the individual. In addition, since SOC strategies are embedded in the operational practice of employees when performing their work tasks, it is in itself a participatory process because strategies need to be developed through a discussion process among employees. Participation has been identified as a central aspect for successful workplace interventions (e.g., Gray et al. 2019). Furthermore, Framke et al. (2016) found that a participatory intervention focussing on the core tasks reduced the risk of short-term sickness absence among childcare workers. A participatory approach will often be particularly appropriate in Nordic workplaces because these commonly display high levels of democracy (Christensen et al. 2020), with employees having relatively high levels of influence and are often being involved in decision-making processes (Berg et al. 2024; Sørensen et al. 2012) and in the management of health risk (Frick 2013).

1.3. The benefit of feasibility studies

Interventions not only have to be effective, they also need to be feasible to implement (van Oostrom et al. 2009). Gadke et al. (2021) strongly recommend to conduct feasibility studies when developing interventions and before conducting largescale effect studies. They argue that feasibility studies help discovering obstacles both for the implementation of an intervention and for the evaluation of its effect. An advantage of feasibility studies, as opposed to effect studies, is that a feasibility study provides a flexibility to make adjustments to an intervention along the way to improve its feasibility. Furthermore, feasibility studies can potentially close the research or theory to practice gap by exploring if an intervention, that is based on theory or research, is practically feasible and understandable in real-world settings and, by engaging the target group in the further development of the intervention, if needed, to make it feasible to implement in practice. Effect studies focus on the question 'does this work', where feasibility studies focus on the intervention process and aim to answer the questions 'can this work' and 'how does it work' (Orsmond & Cohn 2015). Thus, a feasibility study is a reasonable choice when trying out an established intervention on a new target group or, when



there are few previously published studies or existing data using a specific intervention approach (Bowen et al. 2009). In the present study, we applied an intervention based on the SOC model on a new target group and addressed the collective rather than individual use of SOC since this has not been done before. Thus, a feasibility study was considered most suitable.

1.4. Aim of the study

The aim of the present study was to develop a participatory intervention to increase the collective use of SOC strategies among childcare workers and to evaluate the feasibility of this intervention. We evaluated the following four feasibility dimensions (Gadke et al. 2021):

- *social validity*, also referred to as acceptability, exploring the question: Do the participants perceive the intervention as appropriate, reasonable, and potentially effective?
- *Practicality*, that is, can the intervention be implemented with the available resources, time, training, and materials?
- *Integration*, that is, to what extent is the intervention aligned with the infrastructure of the practice setting or system?
- *Effectiveness*, that is, is there preliminary evidence of potential for bringing about positive change?

2. Method

2.1. Design

We addressed the four feasibility dimensions. A total of five childcare institutions participated in the intervention. We conducted the study in two rounds. In Round 1, three of the institutions participated and in Round 2, the remaining two institutions participated. To further test the feasibility of the PEX approach, we conducted a workshop in three additional childcare institutions at the end of the study, where we received feedback on the final version of the intervention approach, we had developed.

2.2. Participants

In Denmark, approximately 40% of 0-2 year olds and 95% of 3-5 year olds attend childcare institutions (StatBank 2023). In the law about childcare institutions, the purpose of the institutions is formulated as follows: ‘Childcare institutions should promote children’s well-being, learning, development and education through safe and pedagogical learning environments where play is fundamental and where a child’s perspective is taken as a starting point’ (Retsinformation 2023). Thus, the focus in childcare institutions is very much on play activities, and as such, they do not resemble schools. The children are commonly divided into smaller groups, based on their age, and physically

placed in separate rooms in the institution; however, they commonly share the outdoor playground and sometimes also a common room. The childcare workers are usually organized in teams that are responsible for a certain group of children.

Inclusion criteria for workplaces to participate in the study were private childcare institutions, either nursery (0-2 years), kindergarten (3-6 years), or integrated (combining nursery and kindergarten) (0-6 years). The reason for focusing on private childcare institutions was that they, in contrast to public institutions in Denmark, do not have free access to external consultants to help them improve their working environment (Andersen 2022). This is why we wanted to develop an intervention that they could apply independently without the need for additional resources.

We used a variety of recruitment strategies: Advertisements in the membership magazine of a national interest organization and the LinkedIn profile of the external facilitator associated to the project, direct contact by phone, and through network. The aim was to recruit five larger institutions that were geographically spread throughout the country. However, we only managed to recruit small institutions (See Table 1 for an overview). All pedagogic staff and the manager in each institution participated in the study. In most of the institutions, there was some turnover among the employees during the study.

Table 1 Overview of the participating childcare institutions

| | Round 1 | Round 2 |
|---|---------|---------|
| Number of institutions | 3 | 2 |
| <i>Type of institutions</i> | | |
| Kindergarten (3–6 years) | 2 | 1 |
| Integrated (0–6 years) | 1 | 1 |
| Size (number of staff at the beginning of the study in the respective institutions) | 7, 7, 9 | 10, 11 |
| <i>Geographical location of institutions</i> | | |
| Area of Jutland (western Denmark) | 2 | 1 |
| Area of Zealand (eastern Denmark) | 1 | 1 |

2.3. The intervention

The intervention consisted of an introduction meeting and four facilitated workshops. Table 2 provides an overview of activities planned in the intervention.

The main objectives of the intervention were to (1) familiarize the participants with the SOC model, (2) increase awareness of the collective SOC strategies they used already, (3) train them in identifying SOC strategies to reduce stress in work situations, and (4) practice applying SOC strategies in the daily work. Round 1 was conducted in the time period from April to June 2021. Round 2 was conducted in the time period from September 2021 to March 2022.

The overall plan for the number of workshops, meetings, and the overall content of the workshops had been planned in advance. However, the specific exercises, tools,

and materials used to facilitate the process during each workshop were planned to be selected and developed as we progressed.

The participatory aspect of the intervention was operationalized by inviting employees to discuss which aspects of their daily routines that they felt most straining. Then, they were invited to use the SOC model to discuss which SOC strategies may reduce the strain in these aspects of the daily routines. Finally, they were invited to choose which strategies they wanted to try out. These discussions were carried out in a series of workshops facilitated by an external facilitator. All employees at the child care institutions participated in these workshops. Participants were also encouraged to use the SOC model between workshops either at team meetings or during the workday whenever possible. The goal was that the employees should integrate the SOC model into their work routines so they continuously could improve their working environment by making adjustments to work routines that they experienced as straining. Referring to the conceptualization by Abildgaard et al. (2020), the intervention thus aimed to include participation over both content and process, to have direct participation, and to have participation as a goal in itself.

The external facilitator had worked professionally with facilitation of workshops and change processes to improve the working environment for about 30 years in a wide range of workplaces. The role involved facilitating the workshops and discussions during the workshops as well as introducing various methods to support the participants' use of the SOC model. The first author (AM) assisted in the introduction of the SOC model in the workshops in Round 1. Prior to the intervention, the first author, who had done research on the SOC model for several years, introduced the external facilitator to the SOC model. The research team discussed observations from the workshops and feedback from the participants and used this as input to planning adjustments to the intervention with the external facilitator.

Table 2 Overview of activities planned in the intervention

| Activity, duration and participants | Content |
|---|---|
| Intro-meeting (1½ hours) The manager, an employee representative, researcher and facilitator | Introduction to the study and the SOC model. Selection of cases (work situation(s), that are perceived as stressful) to work with in workshop 1. |
| Workshop 1 (1½ hours) The manager, all pedagogic employees, researcher and facilitator | Introduction to the study and up-coming activities. Introduction to the SOC model. Discussion of their own use of SOC. Discussion of cases selected at the intro-meeting and finding SOC strategies to make the work situation(s) less stressful. Selection of which of the SOC strategies to try out until next workshop. Tasks until next time: think of new work situations to work with at the next workshop. |
| Workshop 2 (after 3 weeks) (1 hour) The manager, all pedagogic employees, researcher and facilitator | Overview of upcoming activities in the intervention. Short reintroduction to the SOC model. Follow-up on tasks. Applying the SOC model on new work situations and selection of which of the identified SOC strategies to try out until next workshop. Tasks until next time: think of new situations to apply SOC to and try it out. |

| Activity, duration and participants | Content |
|--|--|
| Workshop 3 (After 3 weeks) (1 hour) The manager; all pedagogic employees, researcher and facilitator | Overview of up-coming activities. Follow-up on tasks. Discussion on what it takes to use SOC in daily work. Tasks until next time: work independently with applying SOC in daily work. |
| Workshop 4 (after 3 weeks) (45 minutes) The manager; all pedagogic employees, researcher and facilitator. | Status on the study activities. Follow-up on tasks. Discussion of what it will take to continue using SOC in the future. |

2.4. Evaluation of the feasibility of the intervention

We used observations, interviews, and questionnaire data to evaluate the feasibility of the intervention. The observational data provided input to aspects of the intervention that needed to be adjusted along the way and allowed us to evaluate whether the adjustments led to the desired improvements. The interviews provided more detailed insights into how the participants experienced the intervention; if it made sense to them, if they perceived it as relevant, if they found it useful and why. The questionnaire data quantified how large a proportion of the participants evaluated the feasibility aspects positively and negatively. Triangulating these three data sources allowed for a thorough evaluation of the feasibility of the intervention drawing on different perspectives.

2.4.1. Qualitative evaluation

Observations

All workshops completed in both rounds of the study were observed by the first author. An observation guide including the following themes was used: Attendance and reasons for absence; engagement in workshop; distractors taking attention away from workshop; response to the SOC model; response to exercises, tools, and materials. Notes from the observations were included in the analysis of the qualitative data. In addition, in Workshop 3 in Round 1, time was reserved for evaluating the exercises and tools used so far and need for adjustments.

Interviews

The interviews were conducted after the intervention period by the first author. At each institution, we had planned to conduct an individual interview with the manager and three of the employees. However, one institution in Round 1 declined to participate



in the interviews because the manager became ill during the intervention period. For practical reasons, two employees were interviewed together in another of the institutions. Thus, in Round 1, two interviews with managers, four individual interviews with employees, and one ‘group’ interview with two employees were conducted. In Round 2, two individual interviews with managers and six individual interviews with employees were conducted (for more details see Supplementary materials A). The interviews were audio-recorded, semi-structured and lasted on average 35 minutes. Since we focused on collecting factual information, which is less sensitive to small nuances, following Halcomb and Davidson (2006), who argue that verbatim transcription is not always needed, we did not transcribe all the interviews verbatim. We decided to focus more on the adjustment of the intervention than evaluating the feasibility of the intervention in Round 1. Therefore, in Round 1, the content of the interviews was summarized according to the relevant themes based on the interview guide (see below). In Round 2, recordings were transcribed verbatim, however, repetitions, talk outside the topic, and sounds such as ‘eh’ were left out. In both rounds, timestamps were used at regular intervals in the transcripts (McMullin 2021) to make it easier to go back to the recordings and verify quotes.

The interview guide included the following topics:

| | |
|---------------------------------------|---|
| <i>Background information</i> | - Education, years working in the field, years working in the institution |
| <i>Participation in the workshops</i> | - How was it to participate in the workshops? |
| <i>The SOC approach</i> | - How was it to work with the SOC model? - What do you think of the three terms selection, optimization, compensation? - Is there any gain in using the framework of SOC as opposed to e.g. doing a brainstorm, when finding solutions to challenging situations? - Did you manage to implement the solutions (SOC strategies) you developed? - What supported the implementation? Which obstacles did you encounter? - Did using the SOC strategies have any effect (positive and/or negative)? |

Qualitative data analysis

Thematic analysis was applied when analyzing the data (Braun & Clarke 2006). Written summaries from the interviews in Round 1 and the transcriptions from interviews in Round 2 as well as observation notes from both Rounds were included in the data analysis. The software program NVivo 11 was used to assist the analyses. Because in Round 1, the focus was on the further development of the intervention, the analysis focused on strength and weaknesses in the SOC approach and suggestions for improvements. This information was used to ensure that all relevant adjustments had been made to the intervention before we tested the feasibility of the adjusted version of the intervention in Round 2. When analyzing the data from Round 2, we first coded the data focusing on strengths and weaknesses of the approach as well as examples of solutions they had come up with using the approach, and references to effects of using the approach. Then, the data were categorized according to the four dimensions of feasibility (*social validity, practicality, integration, effectiveness*).

2.4.2. The digital questionnaire

As part of assessing the feasibility dimensions of social validity, practicality, and effectiveness, we asked the participants to evaluate the intervention and the effect of the intervention (See Tables 5 and 6 in the Results section for the exact questions).

The questionnaire survey was conducted approximately a week after the last workshop had been completed in each institution. To ensure highest possible participation, the participants received two to three reminders. In cases where the response rate was very low, managers were contacted and asked to encourage employees to respond.

Because n was low, data were only used to show descriptive results showing the proportion of the participants giving positive or negative evaluations on the items reflecting the four feasibility dimensions. We also compared the participants' evaluations before and after having adjusted the intervention (i.e., between Round 1 and Round 2).

2.5. Ethical considerations

According to Danish Law, Act on Research Ethics Review of Health Research Projects (Consolidation Act no. 1338 of September 1st, 2020), studies that include questionnaire or interview data only do not require neither approval by ethical or scientific committees nor written informed consent. To ensure informed consent to participate in the study and to protect the participants from unintended nuisances from participating, we took the measures described as follows.

The decision to participate in the study was made by the managers of the childcare institutions. All employees were informed about the research project and their institutions role in the project at the first workshop. They were informed about the purpose of and activities in the study.

All workshops were facilitated by a professional and experienced external facilitator. Thus, the facilitator had the skills required to deal with any conflicts or tensions that may arise when applying a participatory approach, where the employees and managers are required to discuss problems and solutions in the daily work routines.

The first author observed all the workshops. The workshop participants were informed about the purpose of the observations, and it was emphasized that it was the intervention that was being evaluated and not the individuals.

Before each interview, participants were informed about the purpose of the interviews that there was no right or wrong answers, and that they should not hesitate to share negative feedback because it would serve as valuable input to the evaluation of the intervention. They were also informed that they did not have to answer any questions, they did not feel comfortable with. They were informed that information from the interviews would be anonymized before publication so it would not be possible to track information back to who said it. Finally, they were informed about the purpose of recording the interview and asked if they agreed with the interview being recorded. Nobody objected and all interviews were conducted as planned. The same procedure was applied for the evaluation workshops in Round 2 that were recorded.

The questionnaire was electronic. The first page of the digital questionnaire informed about the study, the purpose, and that any information obtained from the data would be pseudonymized before publication, so it could not be back-tracked to a respondent. They



were also informed that they could skip questions they did not wish to answer. By answering the questionnaire, they thereby consented to participate in the questionnaire survey.

3. Results

After the first couple of workshops in Round 1, it became evident that adjustments were needed. Consequently, the remaining workshops in Round 1 were mainly used to adjust the intervention in cooperation with the participants. In the Results section, we first describe the further development of the intervention approach and present the PEX (Prioritize tasks, Exploit resources, eXternal resources) tool that was developed during this process. Then, we present the results of the evaluation of the feasibility of the PEX approach in Round 2. Lastly, we present an overview of the SOC strategies that the participants developed during both rounds of the study.

3.1. Further development of the intervention

During the workshops in Round 1, the external facilitator and the first author introduced the employees to the SOC model and the facilitator introduced various exercises aiming to support the employees in becoming familiar with the SOC model, and with the development of SOC strategies to respond to demanding situations.

The expectation had been that Round 1 would result in the identification of the most appropriate exercises to support the participants in using the SOC model to develop collective SOC strategies. However, it turned out that it was not feasible to apply the SOC model directly to practice. The employees found it very difficult to grasp the terminology of selection, optimization, and compensation, particularly differentiating between the three types of strategies. Furthermore, the participants thought it helpful to have questions to guide them in the process of developing SOC strategies. Because it helped them understand which types of changes to daily practice SOC strategies could be, the participants also found it very helpful when they were presented with examples of SOC strategies from their own daily work. Furthermore, they underlined that visual presentations of the examples improved their understanding. In addition, during the discussions, they realized that they sometimes performed work tasks that were not necessary out of habit or because it had made sense in another context. Thus, they suggested to start the whole process by considering why it was important to perform the work task that one was considering to adjust.

Based on this feedback, the research team, in cooperation with the external facilitator, developed questions to guide the development of SOC strategies and pictograms with examples of SOC strategies from the daily work of childcare workers. At the following workshops in Round 1, to ensure that the material was relevant and easy to understand, participants were asked to give feedback on these. Furthermore, in the last workshops in Round 1, the project team introduced different formulations and terminology to achieve a more meaningful description of and a clearer distinction between the three types of strategies: selection, optimization, and compensation. The workshops in Round 1 thus focused on cooperation between the project team and the participants in the further development of the intervention tools. This resulted in the abandonment of the terms selection, optimization and compensation, and the use of the more practical applicable terms Prioritize tasks, Exploit resources, and the use of eXternal resources, which are

summarized into the acronym PEX. Combined with the guiding questions, it resulted in the dialogue tool 'PEX' (See Figure 1 for the final version) and pictograms with examples to use as inspiration when applying the PEX tool (see supplementary materials B).

In Round 2, we kept the same overall approach with facilitated workshops; however, instead of trying out various exercises, tools and materials, the focus was on testing the PEX dialogue tool and pictograms, we had developed during Round 1 and evaluating the feasibility of these as an approach to enhance the collective use of SOC strategies. Furthermore, the participants in Round 1 pointed out that they had lacked enough time to try out the development of SOC strategies independently because there was insufficient time between the workshops. Thus, in Round 2, we extended the time period between Workshop 3 and 4 from three weeks to two months, which in practice ended up being four months due to the Christmas break and challenges finding new dates for the workshops. We also expanded Workshop 4 from focusing mainly on their continued work with the development of SOC strategies, to also include an evaluation of the PEX approach and their independent work with it. Therefore, we audio-recorded this workshop and included it in the qualitative analysis. In Table 3, we present an overview of the intervention process in Round 2 and a description of the activities at the respective workshops. Because Workshop 4 now included an evaluation, we conducted the interviews already after Workshop 3 to collect information on the participants' initial experiences with the PEX approach. The questionnaire survey was conducted after Workshop 4 as in Round 1.

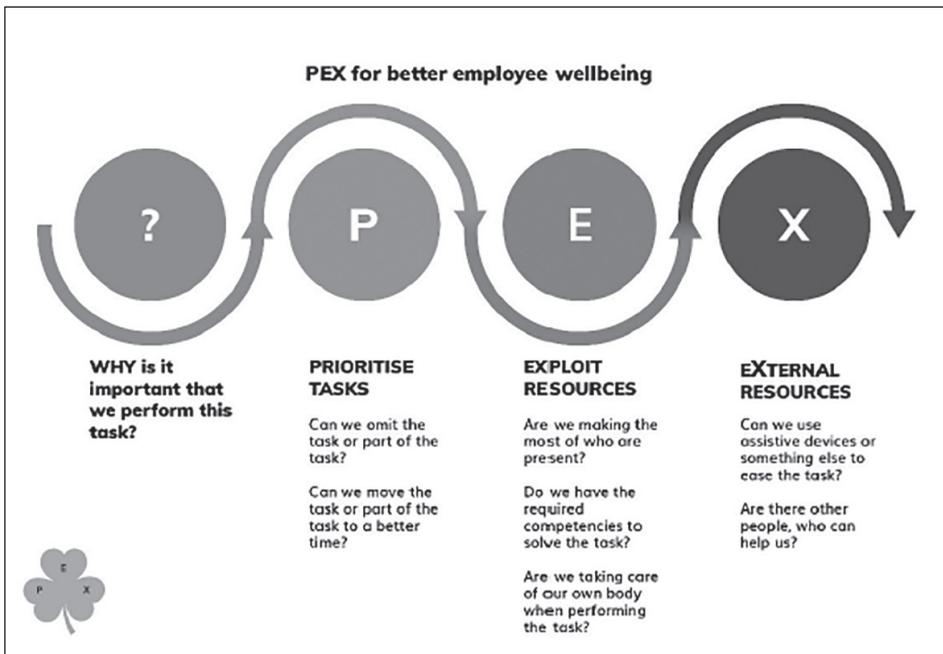
Table 3 The intervention process for Round 2 and content of the workshops

| Activity, duration and participants | Content |
|---|--|
| Workshop 1 (1½ hour) The manager, all pedagogic employees, researcher and facilitator | Introduction to the study and upcoming activities. Introduction to the PEX tool and materials. Group work applying the PEX tool on own cases. Selection of which PEX solutions (SOC strategies) to try out until next workshop. Tasks until next time: think of new work situations to work with on the next workshop. |
| Workshop 2 (after 4 weeks) (1 hour) The manager, all pedagogic employees, researcher, and facilitator | Overview of upcoming activities in the intervention. Short reintroduction to the PEX tool and pictograms. Follow-up on tasks. Applying the PEX tool on the new work situations and selection of which PEX solutions to try out until next workshop. Discussion on what it takes to use the PEX approach in daily work. |
| Workshop 3 (after 4 weeks) (1 hour) The manager, all pedagogic employees, researcher and facilitator | Overview of upcoming activities in the intervention. Short reintroduction to the PEX tool. Short talk on how it has been to use the tool and follow-up on tasks. Discussion of what it will take to continue using the PEX approach independently the next three months. Task until next time: find a minimum of three work situations to apply the PEX tool to, describe the situation and the P, E and X solutions they find.* |
| Workshop 4 (after 4 months) (1 hour) The manager, all pedagogic employees, researcher and facilitator. | Discussion of their independent work with the PEX approach, how did they apply it? How was it to use it? Strengths and weaknesses of the PEX approach. Evaluation of the pictograms. What will it require of them to continue using the PEX approach? |

* It was not possible to complete Workshop 3 in one of the institutions because it was not possible to meet up physically because of COVID-19 and technical problems made it impossible to complete the workshop online. The project team emailed some working questions to the institutions as well as tasks to be completed before the last workshop.

The observations of the workshops in Round 2 revealed that minor adjustments were still needed to the guiding questions in the PEX tool that we had developed during Round 1. For example, a question ‘are we looking after ourselves and each other physically and mentally?’ turned out to be too broad to be helpful for finding SOC strategies. First, it did not make the participants think about the concrete situation they were aiming to improve. Second, it covered too much (physically and mentally) and did not, in line with intentions, lead the participants to consider ergonomic strains. Thus, in the final version, we changed the question to ‘are we taking care of our own body when performing the task?’ to emphasize the ergonomic focus, and abandoned the ‘mentally’ part because it can be argued that the whole process of prioritizing tasks and exploiting resources better, should result in less mental strain. This illustrates how very detailed adjustment to the phrasing and choice of specific words was a large part of the process of developing the PEX tool. Figure 1 shows the final version of the PEX tool.

Figure 1 The PEX tool



To further test the feasibility of the PEX approach, we conducted a workshop in additional three small private childcare institutions at the end of the study, where the participants were introduced to and applied the final version of the PEX tool and the pictograms. At these workshops, some of the participants developed solutions to situations with ergonomic strains. It thus appeared that the minor adjustments to the wording of the questions, we had made after Round 2, had had the intended effect. In addition, it also seemed that one workshop may be enough to introduce the PEX approach to the workplace as the participants did not appear to have difficulties grasping the concepts and working with the tool.

3.2. Results from the evaluation of the feasibility of the PEX approach

Above, we have described the further development of the intervention from applying the SOC model into applying the PEX tool and pictograms. We now move on to presenting the results of the evaluation of the feasibility of the PEX tool and pictograms as an approach to enhance the collective use of SOC strategies. First, we present the results from the qualitative data from Round 2, evaluating the following four feasibility dimensions of the intervention: (a) social validity, (b) practicality, (c) integration, and (d) effectiveness. Illustrative quotes from the qualitative material, translated from Danish to English for the purpose of this article, can be found in Supplementary materials C. They are referred to as Q1, Q2, etc., in the text.

Thereafter, to assess whether the further development of the intervention between Round 1 and Round 2 improved the feasibility, we present the participants' evaluation of the intervention from the questionnaire survey in Round 1 and Round 2, respectively.

a. Qualitative results on the social validity dimension

An important dimension of the feasibility of an intervention is that it is perceived as meaningful and appropriate (acceptable) by the target group. Below, we present what the participants said when asked about these aspects in the interviews.

1. Need for tools that address the well-being of childcare workers and the practical daily work challenges

Several participants highlighted that the focus commonly is on various pedagogic approaches and teaching plans, and what is best for the children. Participants appreciated the fact that the PEX approach addresses the small practical challenges one encounters during the workday and focus on staff well-being, and pointed out that the children also gain from less stressed childcare workers (Q1; Q2).

2. Fits well with the way childcare workers think

A few of the participants pointed out that the PEX approach is very similar to the way they think and approach things, so in that sense it is natural to use it. One participant reported that some employees had been a bit frustrated because they thought there was nothing new to the approach, that it was what they had always done. But she pointed out herself that they had not worked with it in such a structured way (Q3; Q4).

3. The PEX approach structures the dialogue and makes problem solving more efficient

Several of the participants pointed out that the PEX tool helped them structure the dialogue so they stayed on track and made the problem-solving process more efficient (Q5).

4. The PEX approach helps finding new ways of doing things

Some of the participants pointed out that the PEX approach helped them taking new perspectives and getting out of routines that might not be meaningful anymore (Q6).



b. Qualitative results on the practicality dimension

Although an intervention is useful and meaningful to the target group, it does not necessarily mean that it is feasible to use from a practical perspective. This is why we explored whether the participants found it manageable to use the PEX approach and which barriers they encountered when using it. Below is what they highlighted when asked about these aspects.

5. Easy and simple to use

The majority of the participants found that the PEX tool was easy and simple to use. A manager pointed out that because the PEX approach did not require to have theoretical knowledge, it was particularly suitable for childcare institutions because staff groups often are a mix of both skilled and unskilled workers (Q7). However, one participant found it difficult to understand the concept only through written material and appreciated that the tool was explained by the external facilitator (Q8). Also, a participant who had just started working in childcare highlighted that it can be difficult for new employees to use because they do not know what can be expected in the daily routines, or which changes may lead to improvements (Q9).

6. The pictograms support the use of the PEX approach

Many of the participants pointed out that the pictograms with examples had helped them understand the concept of P, E, and X and therefore been very helpful when being introduced to the PEX approach. They also mentioned that it worked very well that they showed examples that they recognized from their own work. One participant stressed that she liked that it was pictograms rather than written examples (Q10). However, another participant mentioned that she had no need for pictograms (Q11).

7. External facilitator to introduce the PEX approach

One employee appreciated that the PEX approach had been introduced to the them by an external facilitator because it induced a greater sense of obligation. Also, it supported them in understanding the concept because there was someone whom they could ask (Q12). A manager also mentioned the value of an external facilitator who follows up on the use of the approach. Specifically, the manager doubted that they would have managed to keep using the PEX approach if the external facilitator and researcher had not returned after the first workshop (Q13).

8. Time pressure and competing activities/issues

Several participants mentioned time pressure and other activities as barriers to implementing the PEX approach. Participants mentioned that both at meetings where there may be many other important points on the agenda and during the busy days, it could be a challenge to find the time to use the PEX approach (Q14; Q15). It was also mentioned that it helped when they were a bit more experienced in using it and did not have to write it down, because it was more difficult to find the time to sit with the tool and write down the possible solutions (Q16).

9. Instability in the organization

Both institutions experienced instability such as staff turnover, sickness absence, COVID-19 restrictions, and restructuring of teams that had posed a challenge to their use of the PEX approach. One participant thought that it was easier to use the PEX approach if the employees knew each other well, which is why it had been challenging for a newly formed team to use the PEX approach (Q17). Also, several participants pointed out that it can be difficult to use the PEX approach without an existing work routine because then it is difficult to identify the demanding situations and try out new solutions (Q18; Q19). Furthermore, lack of staff also made it more difficult for colleagues to withdraw to work with the PEX tool because then there would not be enough adults to look after the children (Q20).

c. Qualitative results on the integration dimension

For an intervention to be feasible to apply in a real-world setting, it is important that it is aligned with the infrastructure of the practice setting. In other words, it needs to fit into the work routines of the workplace. Below is what the participants mentioned concerning this aspect.

10. The PEX approach used both at meetings and during the workday

Participants reported to have used the approach both at meetings and during the workday. At staff meetings, participants had worked with the PEX approach both in their teams and in the entire staff group. A manager reported that they had regular team meetings where they checked if anyone had a challenge that they would like to apply the PEX approach to. Moreover, the manager reported that they for minor challenges that needed to be solved right away sometimes just used the PEX approach spontaneously without taking anything down in writing (Q21). One participant did, however, mention that it is necessary to withdraw when using the PEX approach because it is important to write down the solutions to be able to remember them. When asked at the evaluation workshops (Workshop 4), the participants reported that it had taken them between 12 and 20 minutes to apply the PEX approach to a specific challenge.

11. Support from the manager

Both employees and managers pointed out that it is important that the manager supports the use of the PEX approach. It could for example be by ensuring that there is time at meetings to work with the approach, or to help ensure that it is possible for staff to withdraw to use the PEX tool (Q22). A manager also highlighted that it is important that the managers take the solutions the employees come up with seriously and support the implementation (Q23).

12. Team effort and culture of openness

Some of the participants pointed out that it is important that the whole team takes ownership of the work with the PEX approach and engages in the process of finding



the solutions and trying them out (Q24). A manager stressed that someone has to take the lead when trying out new solutions. This manager also pointed out that taking a leading role can make one 'unpopular' among colleagues and that this can be a barrier for implementing solutions (Q25). Lastly, several participants pointed out that using the approach requires a culture of openness (Q26).

d. Qualitative results on the effectiveness dimension

Finally, we explored whether there was evidence indicating a potential for the PEX approach to bring about positive changes. Below is what the participants responded to this question.

13. Working situations are more calm and peaceful

The most common effect the participants reported from applying the solutions they came up with when using the PEX approach was that work was now more calm, peaceful, and quiet. Several participants reported that the improvements led to a better flow, and it was now easier to relax and nicer to be in the situations they had applied the PEX approach to (Q27; Q28).

14. Helps seeing possibilities rather than obstacles

A participant reported that using the PEX approach had helped them getting better at seeing solutions (Q29). A manager reported to have observed that the employees had become better at seeing solutions rather than limitations and she believed it was partly due to the PEX approach (Q30).

15. Increases cooperation across teams

In both institutions, the managers pointed out that partly because of COVID-19, the teams had been strictly separated. They thought that the PEX approach had helped them thinking about the possibility to include colleagues from the other teams again (Q31).

16. Makes it more legitimate to bring up problems

At Workshop 4 in one of the institutions, the participants talked about how they felt that using the PEX approach made it more legitimate to point at stressful situations (Q32). Before they thought they were more likely to think that they had to be able to cope with these situations or that they were the only ones experiencing these situations as stressful.

17. Negative effects of using the PEX approach

In the interviews, the participants were asked if they had experienced any negative effects when using the PEX approach. They all replied no (e.g., Q33). However, a manager pointed out that it could have negative effects if the management claimed that the PEX approach solves everything (Q34).

3.3. Survey results on the feasibility of the intervention

To assess whether the further development of the intervention between Round 1 and Round 2 improved the feasibility, we present the participants' evaluation of the intervention from the questionnaire survey in Round 1 and Round 2, respectively.

In Table 4, we present the descriptive results from the participants' evaluation of the approach from the questionnaire survey in the two rounds. Because n is very low, one has to be careful when comparing the results from the two rounds. Nevertheless, the results show that overall, a larger proportion of the participants evaluate the approach positively in Round 2 than in Round 1, indicating that the feasibility of the approach increased as a consequence of the change of terminology used and use of the PEX tool and pictograms. Particularly, the following three elements appear to have improved between the two rounds 'the approach is intuitive and easy to work with', 'it was easy for me to grasp the meaning of the concepts', and 'it makes sense to use the approach in our type of work', which address the practicality and social validity dimensions, respectively.

Table 4 Participants' evaluation of the approach

| | Round 1 ($n = 14$) | | | Round 2 ($n = 13-15$) | | |
|--|---------------------------------------|-------------------|------------------------------------|---------------------------------------|-------------------|------------------------------------|
| | Strongly disagree/ disagree (%) | Neither or (%) | Agree/ strongly agree (%) | Strongly disagree/ disagree (%) | Neither or (%) | Agree/ strongly agree (%) |
| -The approach* is intuitive and easy to work with | 36 | 21 | 43 | 0 | 0 | 100 |
| -The approach* is a good method for analyzing and finding solutions to situations, where we are under pressure | 7 | 36 | 57 | 0 | 7 | 93 |
| -The approach* helps you to come up with new solutions to cope with stressful situations | 7 | 29 | 64 | 0 | 27 | 74 |
| -It makes sense to use the approach* in our type of work | 14 | 43 | 43 | 0 | 0 | 100 |
| -It was easy for me to grasp the meaning of the concepts** | 36 | 43 | 21 | 0 | 0 | 100 |
| -It is easy to use the approach* in everyday life | 29 | 50 | 21 | 7 | 27 | 67 |
| -I will recommend other childcare institutions to use the approach* | 36 | 43 | 21 | 0 | 20 | 80 |

(Continued)

**Table 4** (Continued)

| | Round 1 (n = 14) | | | Round 2 (n = 13–15) | | |
|---|---------------------------|----------------|---------------------------|---------------------------|----------------|---------------------------|
| | Strongly disagree/ or (%) | Neither or (%) | Agree/ strongly agree (%) | Strongly disagree/ or (%) | Neither or (%) | Agree/ strongly agree (%) |
| <i>After having participated in the study where we have been working with the approach*</i> | | | | | | |
| ...are we using the concepts** when we discuss stressful situations | 57 | 36 | 7 | 7 | 40 | 53 |
| ...have I become more aware of when we (use) the concepts** during work | 29 | 36 | 36 | 0 | 20 | 80 |

* In Round 1, it was formulated 'SOC-approach' and in Round 2 'PEX-approach'.

** In Round, 1 it was formulated 'selection, optimization, and compensation' and in Round 2 'prioritise tasks, exploit resources, and external resources'.

We also asked to what extent the participants experienced that working with the approach had an effect on how they conducted their work (effectiveness dimension). The results show that the majority generally report changes for the better, but there does not appear to be much difference between the two rounds (see Table 5). Lastly, we asked if they expect to continue to use the approach in their team, which taps into several feasibility dimensions. The results show that a larger proportion of the participants in Round 2 answered that they think they will continue to use the approach (see Table 5).

Table 5 Participants' evaluation of the effect of the approach

| Working with the approach* has changed how good we are at... | Round 1 (n = 13–14) | | | Round 2 (n = 11–15) | | |
|--|-------------------------|---------------|----------------|-------------------------|---------------|----------------|
| | Yes, for the better (%) | No change (%) | Yes, worse (%) | Yes, for the better (%) | No change (%) | Yes, worse (%) |
| handling situations where resources are scarce | 71 | 29 | 0 | 92 | 8 | 0 |
| prioritize our work tasks | 57 | 43 | 0 | 82 | 18 | 0 |
| doing things in the most appropriate order | 77 | 23 | 0 | 67 | 33 | 0 |
| doing things at the most appropriate time | 77 | 23 | 0 | 83 | 17 | 0 |
| looking after ourselves while working | 64 | 36 | 0 | 64 | 36 | 0 |
| using our available resources | 50 | 50 | 0 | 83 | 17 | 0 |

| Working with the approach* has changed how good we are at... | Round 1 (n = 13–14) | | | Round 2 (n = 11–15) | | |
|---|-------------------------|---------------|------------------------|-------------------------|---------------|------------------------|
| | Yes, for the better (%) | No change (%) | Yes, for the worse (%) | Yes, for the better (%) | No change (%) | Yes, for the worse (%) |
| sharing knowledge and competencies | 43 | 57 | 0 | 42 | 58 | 0 |
| asking for help from persons outside our team | 43 | 57 | 0 | 77 | 23 | 0 |
| using assistive devices | 50 | 50 | 0 | 42 | 58 | 0 |
| | Yes (%) | Maybe (%) | No (%) | Yes (%) | Maybe (%) | No (%) |
| Do you think you will continue to use the approach in your team to handle stressful situations? | 21 | 43 | 36 | 87 | 13 | 0 |

* In Round 1, it was formulated 'SOC-approach' and in Round 2 'PEX-approach'.

3.4. The SOC strategies developed by the participants

In both rounds during and between the workshops, the participants developed SOC strategies to situations they found demanding or stressful. In Round 1, it was through referring to the SOC model while in Round 2 it was by using the PEX tool. In Table 6, we provide an overview of the strategies the participants developed and relate them to the SOC model. When using the PEX tool (SOC model in Round 1), the idea was to suggest solutions in all three categories (P, E, and X), and then choose which solutions to implement. Consequently, not all strategies presented in Table 6 were implemented.

Table 6 Overall types of SOC strategies the participants developed during the study, frequency of these in the two rounds of interventions and concrete examples of strategies

| Strategy | Frequency Round 1 | Frequency Round 2 | Examples |
|--|-------------------|-------------------|---|
| <i>Selection</i> | | | |
| Move some tasks to another time instead of doing all at once | 5 | 9 | 1: Change nappies on some of the children earlier instead of all at the same time 2: Get the children inside in small groups at a time instead of everyone at once 3: Do some of the lunch preparations before going out to the playground instead of just before lunch |
| Omit doing tasks | 4 | 2 | 1: No longer automatically help the older children when they need to use the bathroom 2: No longer put the water bottles into the fridge so the children can get them themselves 3: Skip the 'silent time' before lunch if it causes too much fuss |

(Continued)

**Table 6** (Continued)

| Strategy | Frequency Round 1 | Frequency Round 2 | Examples |
|---|-------------------|-------------------|--|
| <i>Optimization</i> | | | |
| Share knowledge/ competencies | 1 | 1 | 1: One employee had been on a course and shared the new knowledge with the colleagues 2: Language responsible pedagogue introduces tools for language work to the colleagues |
| <i>Compensation</i> | | | |
| Acquire or start using things/assistive devices | 4 | 3 | 1: Buy extra glasses so running the dishwashing machine can be postponed until later 2: Put a shine on the doorstep so the children can roll the rolling table to the kitchen without help 3: Give the children books while they wait for the lunch to get ready |
| Solve the task in another way | 2 | 2 | 1: Make a plan for when staff have time for administrative tasks rather than finding the time ad hoc 2: One of the groups use the back entrance rather than getting all the children in through the main entrance |
| Get help | 0 | 6 | 1: Get the children to serve their own food 2: Get the children to help each other getting the jackets and shoes on and off instead of having to help all children 3: Get a colleague from another group to help preparing activities |

4. Discussion

The aim of the study was to develop and evaluate the feasibility of a participatory intervention to increase the collective use of SOC strategies among childcare workers. Through close cooperation between the researchers, the external facilitator, and study participants, the terminology of SOC was changed into PEX, and the PEX tool and pictograms were developed. Results from the evaluation of the feasibility of the PEX approach provided support for all four feasibility dimensions evaluated in this study: social validity, practicality, integration, and effectiveness.

4.1. From SOC to PEX

During the workshops in Round 1 of the study, it became evident that the participants found it very difficult to understand and distinguish the terms selection, optimization, and compensation. This problem illustrates the challenges that may be associated with applying research or theory to practice. In a previous intervention study applying the SOC model (Müller et al. 2015), the participants also had difficulties with the terminology, but probably because the intervention addressed the individual use of SOC, this was less of

an issue because these difficulties could be addressed individually (personal communication about study findings with Andreas Müller). In our intervention, we used a collective approach where the participants were required to discuss which SOC strategies may provide solutions to the demanding situations they wanted to improve. Thus, they were required to have a better understanding of the concepts to be able to discuss them. This may explain why the terminology posed such a great challenge in our study. Nevertheless, through the close cooperation between the researchers, the external facilitator, and the participants, we were able to develop terms that are better suited to understand and communicate about SOC strategies. In addition, the results suggest that the PEX approach was at least as good at eliciting SOC strategies as when the SOC terminology had been used, indicating that using the PEX terminology does not have a negative impact on the development of SOC strategies. The questionnaire results suggest in particular that the social validity and practicality dimensions improved between Round 1 and Round 2, while the effectiveness dimension did not appear to change much. This fits with the findings that the translation of the SOC model to the PEX tool and supporting materials made it easier to use the approach, which may additionally have contributed to the larger proportion of participants reporting that it made sense to use it in their type of work. Despite it requiring a lot more effort in Round 1 when using the SOC model, participants in both rounds developed collective SOC strategies, which may explain why we did not see any notable change in the effectiveness dimension of feasibility between the two rounds.

4.2. The feasibility of the PEX approach

Social validity dimension of the feasibility of the PEX approach

The results indicate high social validity of the PEX approach. The participants highlighted that there is a need for tools focusing on their well-being instead of exclusively on the well-being of the children they take care of. The participants also appreciated the focus on the small practical challenges that create a lot of frustration. The PEX approach thus fulfils a need in the target group. Participants also highlighted that the PEX tool helps structuring the problem-solving process, making it more efficient. Thus, the PEX approach may be particularly relevant in Nordic workplaces where employees often are involved in decision processes (Berg et al. 2024; Sørensen et al. 2012) and in the management of health risks (Frick 2013), and therefore often will be required to discuss challenges associated with performing work tasks and find solutions to these.

Participants also mentioned that the approach fits in well with the way they think, indicating that it is meaningful for them to use. In addition, participants reported that the PEX approach helped them taking new perspectives and getting out of routines that are no longer meaningful. Changes at childcare institutions are common due to, for example, new groups of children starting or changes in seasons. Thus, it can be beneficial to evaluate the daily routines on a regular basis. Furthermore, all participants in the survey agreed that it makes sense to use the PEX approach in their type of work. This is also supported by the fact that the challenges they chose to work with often were related to transitions, which have been highlighted as stressful in the literature (Baumgartner et al. 2009; Clipa & Boghean 2015) further supporting the relevance and, thus, social validity of the PEX approach for childcare workers.



Practicality dimension of the feasibility of the PEX approach

Regarding the practicality dimension, the participants generally reported that the PEX tool was easy and simple to use and that the pictograms with examples were helpful. Furthermore, all participants in the survey reported the PEX approach to be intuitive and easy to work with and that it was easy to grasp the meaning of the concepts. Nevertheless, it takes time to integrate the PEX approach into practice. The barriers that were mentioned are common barriers to intervention implementation: time pressure, competing activities, and instability in the organization (Damschroder et al. 2009; Fleuren et al. 2004). Participants highlighted the value of the external facilitator to introduce the approach. Overall, the PEX approach itself appears to be straightforward to apply but some effort is still needed to implement it into the practice of the workplace. In our study, the intervention process entailed three to four workshops. However, at the end of the study, when we presented the PEX approach to three additional childcare institutions that had not heard about the approach before, one workshop seemed to be sufficient for the participants to understand it. Nevertheless, more research is needed to explore how to best implement the approach.

Integration dimension of the feasibility of the PEX approach

The participants used the PEX approach both at meetings and during the working day, indicating that it is possible to integrate the approach into the work organization of childcare institutions. Furthermore, using the collective approach made it possible to address aspects of work that need to be coordinated within the team. The participants often focused on aspects of the work that cannot be changed by the individual employee, but needs common decisions among team members. This suggests that the PEX approach fits well into the team structure common in childcare institutions and the great reliance on teamwork (Leana et al. 2009) especially in Nordic workplaces (Sørensen et al. 2012). Importantly in this context, the participants emphasized that the whole team has to engage itself in the use of the PEX approach and that there has to be a workplace culture where it is legitimate to point out challenges and need for improvement. Although the PEX approach can be used autonomously by employees, the participants stressed that manager support was important. The crucial role of support from management or supervisors for the successful implementation of workplace interventions has not only been found in studies conducted in other sectors (e.g. Meng et al., 2019) but also in childcare institutions (Roczniowska et al. 2023).

Effectiveness dimension of the feasibility of the PEX approach

The use of the PEX approach led to the development of collective SOC strategies suggesting that the approach is indeed an effective method for developing SOC strategies. Furthermore, the participants reported that the solutions they had come up with led to a more calm and peaceful atmosphere in the workplace indicating a better balance between job demands and resources, which again can be expected to increase the well-being of employees (e.g., Bakker & Demerouti 2007). Participants also found that the

PEX approach helped them seeing solutions to problems and increased the cooperation between teams. While pointing out that using the approach required a culture where it was OK to bring up problems, they also reported that the approach made it more legitimate to point out need for improvements, indicating that working with the PEX approach increased the psychological safety in the team (Edmondson 2003). Together, these findings suggest that the PEX approach has the potential to support the development of collective SOC strategies and to bring about positive effects such as increased employee well-being and psychological safety in the teams.

These findings suggest that increasing the collective use of SOC strategies may benefit all members of the team (Baltes & Carstensen 1999), and that it is thus meaningful to apply interventions to increase the collective use of SOC.

The findings imply that applying the PEX approach in childcare institutions may contribute to the need in Denmark for making these workplaces more attractive and thereby support recruitment (BUPL 2023). Given that childcare institutions play a central role in the Danish society with 40% of the 0-2 and 95% of the 3-5 year olds attending child care institutions (Retsinformation 2023), this must be regarded as a high priority.

The aim of our study was to answer the question 'Is there preliminary evidence of potential for bringing about positive change?' which Gadke et al. (2021) label 'effectiveness'. Although a feasibility study does not allow for conclusions regarding the effects of the intervention on the working environment and well-being of the employees, based on the positive feedback from the participants, we conclude that the intervention has the potential to bring about positive change. Nevertheless, prior to widespread implementation it is necessary to conduct a larger study with before and after measurements to confirm these findings.

4.3. Strengths and limitations

Workplace intervention studies commonly focus on large workplaces and often within the health care sector (Aust et al. 2023). Only very few intervention studies have been conducted with childcare workers and at very small workplaces. A strength of our study is, thus, that the PEX approach was developed especially for and with childcare workers at very small workplaces. However, this also means that it still needs to be tested in larger childcare institutions and other job groups as well as in childcare institutions outside Denmark.

The childcare institutions in the study were all private. Private childcare institutions in Denmark have to obey the same rules and regulations as public ones and have to be approved by the municipality. However, they have more freedom to prioritize how they use their resources (DLO 2020), which may cause that they may differ from public childcare institutions in various way. Thus, caution needs to be taken when generalizing the results to public childcare institutions in Denmark.

The PEX approach is a participatory approach, which may be a particular strength in Nordic workplaces (Berg et al. 2024; Christensen et al. 2020; Frick 2013; Sørensen et al. 2012). However, it is important to bear in mind that the solutions found, when using the PEX approach, may pose financial cost, such as acquiring technical assistive devices or reorganizing of work routines. Therefore, engaging management is important when using the PEX approach.

The study was conducted during the COVID-19 epidemic, which had detrimental consequences for many studies. Considering this, a strength is that we only had to cancel



one workshop and slightly postpone a few workshops, which did not seem to have caused any negative consequences for the study.

A weakness of the study is that the researcher conducting the interviews was also involved in the workshops. The participants may thus have been reluctant to provide negative feedback. We aimed to reduce this potential bias by emphasizing that negative feedback was very valuable to us. The fact that we actually received negative feedback, particularly in Round 1, shows that we at least to a certain extent were able to overcome this limitation.

Another strength of the study is the close cooperation between researchers, the external facilitator, and members of the target group in the development of the PEX approach. This cooperation made it possible to transform theory into a practical tool and thereby closed the research to practice gap (Gadke et al. 2021).

In addition, the study provides further support for the recommendation that feasibility studies should be conducted prior to large scale effect studies (Gadke et al. 2021). The flexibility of the feasibility design allowed us to make meaningful adjustments along the way supporting the development of a promising approach that in its original version, would not have been feasible to apply.

Lastly, the PEX approach is a very simple intervention that has its limitations concerning the problems that can be addressed. It is not suitable to solve relational conflicts such as bullying or negative acts in the workplace, and other more complex challenges. However, the PEX approach appears to be good at addressing small practical problems that can be very irritating and tiring, and that might not take much to solve. Nevertheless, these minor irritations often persist because no one takes the initiative or time to deal with them. The results of our study indicate that even small changes can contribute to better work organization and thereby potentially better balance between job demands and resources.

5. Conclusion

We developed an easily understandable approach that guides employees to increase the collective use of SOC strategies. Results indicate that it is feasible to use the PEX approach in childcare institutions and that it has the potential to lead to better well-being among employees. Conducting this feasibility study allowed us to further develop our intervention approach during the study and thereby made it possible to transform research knowledge and theory into practice. While the PEX approach is simple and easy to use, it may also yield positive effects. However, research is needed to confirm the results and to further investigate how to best implement the PEX approach so it becomes an integrated part of the systematic occupational health and safety work. Given the simplicity of the PEX tool, it may be less demanding to implement than larger and more complex interventions. As such, the PEX approach may be suitable for small workplaces that often only have scarce resources to improve the working environment and well-being of employees.

Contribution of the study

The study contributes to both research and practice. It provides practitioners with a simple and feasible approach to increase the collective use of SOC strategies in childcare

institutions. It contributes to research by indicating that it is possible to enhance the collective use of SOC strategies in work teams to potentially increase employee well-being. Furthermore, the study illustrates the importance of not only conducting feasibility studies before large-scale studies, but that it is essential that these studies provide possibilities for adjustments and for the active participation of employees.

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Conflicts of interest

The authors declare no conflicts of interest.

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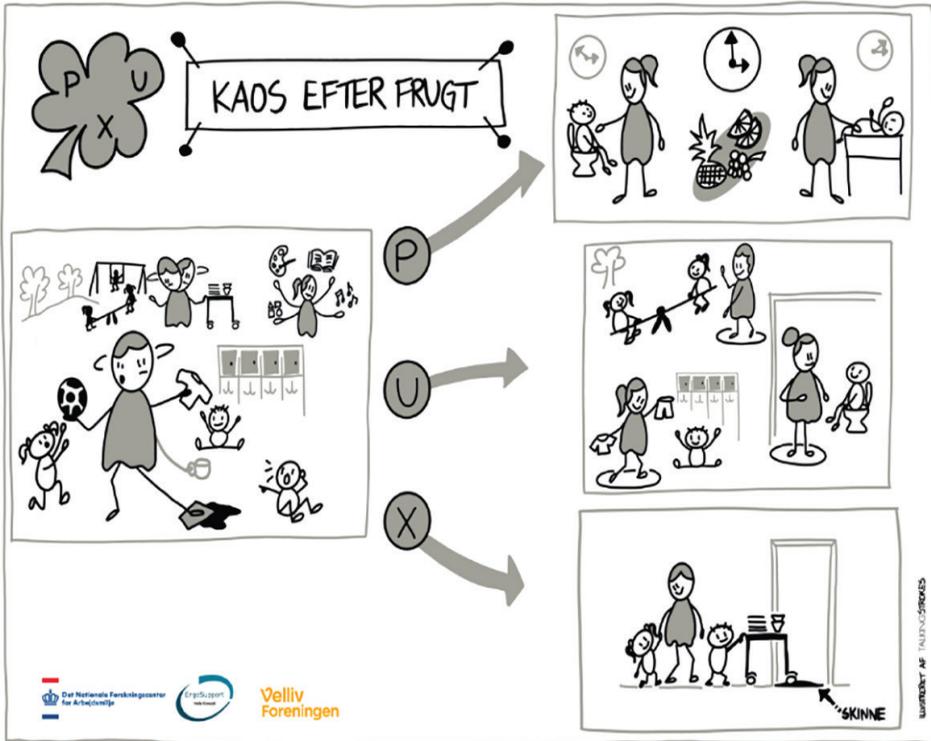
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Supplementary material A: Overview of interviewees

| | Position | Gender | Years of experience in field | Years employed in current institution |
|----------------|---------------------|---------------|---|--|
| Round 1 | | | | |
| Interviewee 1 | Manager (Pedagogue) | Male | 17 years with young criminals and 6 years in day care institutions. | 3 |
| Interviewee 2 | Manager (Teacher) | Female | 29 years in special schools and 2 years in day care institution. | 2 |
| Interviewee 3 | Pedagogue | Female | 3 | 3 |
| Interviewee 4 | Pedagogue | Female | 12 | 8 months |
| Interviewee 5 | Pedagogue | Female | 40 | 10 |
| Interviewee 6 | Pedagogue | Male | 21 | 10 |
| Interviewee 7 | Pedagogue | Female | 37 | 10 |
| Interviewee 8 | Assistant | Female | 8 | 8 |
| Round 2 | | | | |
| Interviewee 1 | Manager (Pedagogue) | Female | 25+ | 12 (founder) |
| Interviewee 2 | Manager (Pedagogue) | Female | 30 | ½ |
| Interviewee 3 | Assistant | Female | 3 months | 3 months |
| Interviewee 4 | Pedagogue | Female | 16 | 9 |
| Interviewee 5 | Pedagogue | Female | 12 | 11 |
| Interviewee 6 | Assistant | Female | ½ | ½ |
| Interviewee 7 | Pedagogue | Female | 33 | 24 |
| Interviewee 8 | Pedagogue | Female | 16 | 16 |

Supplementary material B: Three pictograms with examples of common stressful situations and suggestions of P, E, and X solutions (note that 'PEX' is called 'PUX' in Danish)

1. Chaos after Fruit



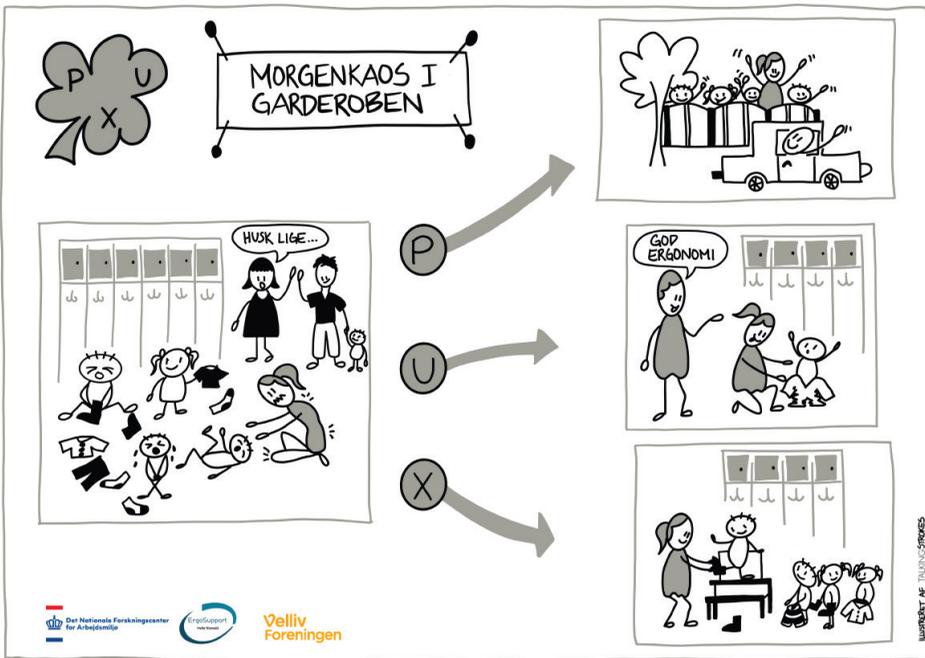
The situation: After the children have had their afternoon fruit, a lot of things have to be done at the same time which the staff feel can be a bit chaotic. The pictogram gives examples of PEX solutions that could be used.

P (Prioritize tasks): Instead of having to help the older children to the bathroom at the same time as changing nappies and tidying up after the fruit, it is decided to move the task 'helping the older children to the bathroom' to before the afternoon fruit. Thus, there will be one task less to be done after fruit.

E (U) (Exploit resources): Instead of the staff following the children around helping them to the bathroom then helping them getting dressed for getting outside and finally take them to the playground, each member of staff 'takes a certain position' either bathroom, wardrobe, or playground. The children are then sent to the adults at the different positions to get help. Thus, a better way to solve the task where the staff is making better use of the available resources is achieved.

X (use external resources): The doorstep prevents the children from rolling the rolling table into the kitchen without help. By getting a shine (which can be considered as an assistive device) placed on the doorstep, the children can help by taking over the task of rolling the table into the kitchen. Thus, external resources (assistive device and the children) are added to reduce the strain on staff resources.

2. Morning chaos in the wardrobe



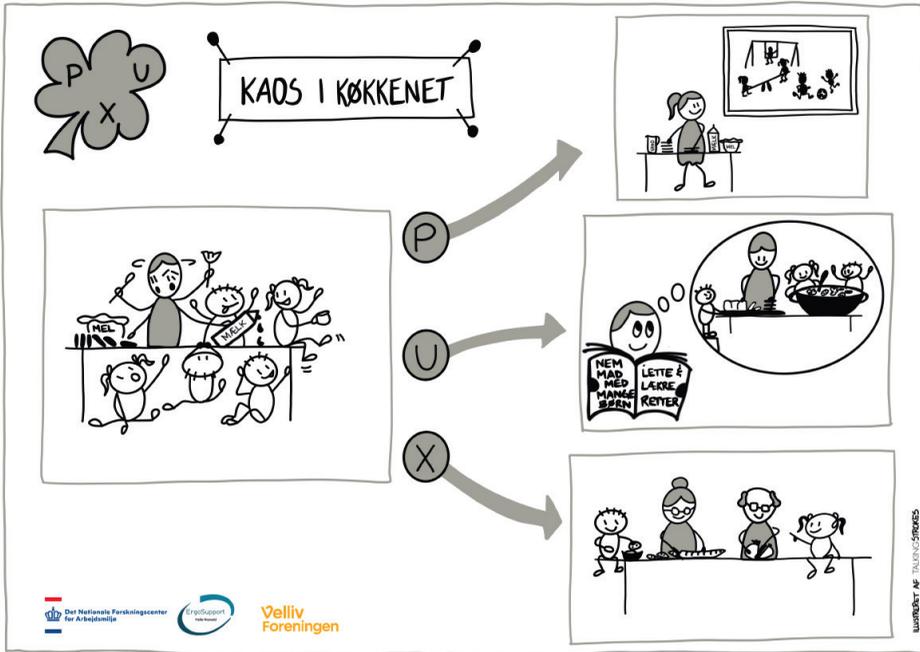
The situation: In the mornings when the children arrive, a lot of things have to be taken care of at the same time: Children who need help with the outdoor clothes, some might need to be comforted, and some parents give messages to the staff. At the same time, the staff often finds themselves using awkward working postures putting a strain on their bodies. The pictogram gives examples of PEX solutions that could be used.

P (Prioritize tasks): It is decided that the children no longer should be received inside the institution in the mornings, instead, they are received outside in the playground. Thus, the task of receiving the children inside and thus the task of helping with the outdoor clothes is omitted, resulting in less strain on staff resources.

E (U) (Exploit resources): When staff are busy helping the children in the morning, they often forget to pay attention to their own work postures. An agreement to remind each other to use less straining ergonomic work postures, when receiving the children in the wardrobe, is made in the team. Thus, the team takes shared responsibility to look after their resources (physical health) by reducing unnecessary strain on their own bodies.

X (use external resources): The manager agrees to buy a dressing bench for the wardrobe so the staff does not have to sit on the floor or bend down. Thus, external resources are added to reduce physical strain on the staff.

3. Chaos in the kitchen



Situation: Once a week the children are invited to help prepare the lunch. Although this is meant to be a good learning experience for the children, it often results in a very stressful situation for the staff. The pictogram gives examples of PEX solutions that could be used.

P (Prioritize tasks): Decide that the children no longer should join in the cooking. Thus, the task of including the children is omitted to reduce the strain on staff resources.

E (U) (Exploit resources): Members of staff participate in a course on how to cook easy meals with many children. Thus, staff resources are increased by gaining new competences on how to cook with many children, thereby making it less straining on their resources to solve the task.

X (use external resources): Grandparents are asked if they would be willing to come in and help cooking with the children. Thus, external resources are added resulting in less strain on staff resources.

Supplementary material C: Quotes illustrating the results from the qualitative evaluation of the four feasibility dimensions

| Feasibility dimensions | Quotes illustrating the points |
|---|--|
| 1. Social validity dimension | |
| 1.1. Need for tools that address the well-being of childcare workers and the practical daily challenges | <p>Q1: In general, I think that being allowed to focus on our own wellbeing when performing the work tasks rather than it always being the children or our pedagogic approach [is very good]..... that it is ok to change some things because it's better for us I think it's fantastic that there now is a tool for this, because often if there are conflicts or anything else it's always about what's best for the children, but often it's also better for the children if we don't get stressed. So, I think it's wonderful that this [tool] has a different focus.... I think this has been missing. (Employee)</p> <p>Q2: I think that it [the PEX tool] is very practice-oriented in the way that it relates to some very concrete things and I think that can be a really good approach and something that we have not really worked so much with because it has otherwise very much been these curricula, the theoretical and pedagogical approaches that have been very much in the last many years that you have focused a lot on, so you may have forgotten a little to look at those practical everyday tasks. (Manager)</p> |
| 1.2. PEX fits well with the way childcare workers think | <p>Q3: It's a simple tool and it's not far from our way of thinking already, so it's a no-brainer ... (Manager)</p> <p>Q4: Some were perhaps a little frustrated by [feeling] 'haven't we always done this' and yes we have, but not in such a concrete way. It has been nice that it was concrete and that you could question whether we should do this in this way. (Employee)</p> |
| 1.3. PEX structures the dialogue and makes problem solving more efficient | <p>Q5: Yes, it creates some structure and keeps you focused on doing what you have to do when you have to solve a problem, and then it's really good at getting everyone together on it, so we start with P and then we go to E and then we end up with X. Instead of 'we can also do this and blah blah blah', it can take a long time. (Employee)</p> |
| 1.4 PEX helps finding new ways of doing things | <p>Q6:I think it's [PEX] really good because it makes you or at least me think a little differently or come up with some other things you can do. (Employee)</p> |
| 2. Practicality dimension | |
| 2.1. Easy and simple to use | <p>Q7: ... therefore I also think that it can be good for a mixed staff group, as there is in most childcare institutions, where the other approaches make a little more demands on the theoretical and perhaps pedagogical knowledge. That's what I think is great about this method, when you have tried it a few times, then everyone can use it. (...) You don't need theoretical or pedagogical knowledge, (...). So I think it can easily be useful in many places, also because it shows that there are actually some things you can solve relatively easily and simply, just by using a very simple method. (Manager)</p> |

(Continued)

Supplementary material C (Continued)

| Feasibility dimensions | Quotes illustrating the points |
|--|--|
| 2.2. The pictograms support the use of PEX | <p>Q8: I think I benefited a lot from you coming out to us [the facilitator and researcher coming to the workshops] so I could get things explained because it was a little difficult when you got it on a piece of paper and some pictograms and find the meaning of it. It's very different, some people are good at figuring it out [by themselves], but I just had a really hard time with it. So, if you hadn't come out to us, I don't think I would have gotten anything out of it. (Employee)</p> <p>Q9: ...when you don't know how the final product should be like. How am I supposed to know how the situation in the wardrobe ideally should be? And how should I know whether it's me who thinks it's a little hard right now or is it always like that? Or is it because I'm new? So no, when you are new to the field, it's difficult to have to relate to [the challenging situations] – I don't know any of the answers and I don't know if the current situation could be improved.. (Unskilled assistant who had been in the field for 2-3 months)</p> <p>Q10: but there is a reason why you put pictures in books, it gives something extra, it stimulates the brain in a different way and brings out the thoughts. So yes, it could just be a pamphlet [with written examples], but I think it's much nicer with the pictures. (Employee)</p> <p>Q11: We only looked at the poster with illustrations of examples [pictograms] once in the beginning. Between workshops, we actually only used the process poster [the PEX tool]. Interviewer: So the pictures weren't that important? No, I could have just talked - but I can talk too! I don't think it would have been a necessity for me that they [the pictograms] were there. (Employee)</p> |
| 2.3. External consultant to introduce PEX | <p>Q12: I would say that it gives you more when someone comes out [to the workplace] so you don't just get a pamphlet and then a link to how to do it. Then you also have to put yourself together and take part in it, it gives you a greater sense of responsibility when someone comes and shows you something. (Employee)</p> <p>Q13: I also think that there has been an obligation in you coming back, we should have worked on it and we reminded the teams to work on it. If you had only been out once and told us about it and we didn't see you again, I think it would have fallen by the wayside. (Manager)</p> |
| 2.4. Time pressure and competing activities/issues | <p>Q14: We have mostly used it during the workdays because it can be difficult to prioritize the time for it at the team meetings because there're so many other important things... (point made at evaluation workshop (workshop 4))</p> |

Feasibility dimensions

Quotes illustrating the points

2.5. Instability in the organization is an obstacle

- Q15: Well, in my team we were supposed to do it [try out PEX between two workshops], but then suddenly a lot of other things happened and then we didn't find the time to do it. But I know that other teams managed. (Employee)
- Q16: It's the oral part that makes us want to keep using it, because when are we going to find the time to take out the paper? Writing it down was important in the beginning when we had to learn it, but now it's here [pointing to her head], the thoughts are there now and now we might say it too. (Employee)
- Q17: I can certainly see that the team that was the least successful [in using PEX] was a newly formed team, they needed to get to know each other and find out who could take on what responsibilities. It's easier [to use the PEX tool] when you've worked together for several months and know each other. (Manager)
- Q18: We are a newly formed team, so we had many other issues to talk about first – we didn't have our everyday in order, so it wasn't easy for us to say it's here or here that something is not working, so it wasn't easy for us to do it [use PEX]. (Employee)
- Q19: There has been some illness, which meant that there have been some different shift schedules and you are moved around a bit between the teams. This meant that you are not in the daily routine and then it becomes more difficult [to use PEX]. (Employee)
- Q20: ...we have had extremely much sickness absence where you can then say that you really need to find some solutions, but it must still be justifiable to leave the children and there we prioritize the children. (Employee)

3. Integration dimension

3.1. PEX used both at meetings and during the workday

Q21: At our weekly team meetings, we review the work routines, whether there's something we need to focus on. E.g., 'have we run a PEX at a previous meeting which we need to evaluate to ensure that it [the solution] is still alive and does not stall?'. Sometimes it's also spontaneous, if there's something that needs to be solved quickly, then you just talk to each other. It's a fact that it [PEX] has become a way of thinking so you don't have to write it down or wait until the next meeting, you do it on an ongoing basis. (Manager)

3.2. Support from the manager

Q22: But also that time is given for it [PEX], that you are reminded of it at the team meetings. It could also be at the staff meetings, where the management is a little closer; that you could go out team by team and work on a problem, so that it also becomes visible to the others what you are working on. It also requires something of the management that it [PEX] is allowed to take up some of a staff meeting, so it's not just out in the corners ... and there may also be some challenges that are a bit about the other teams. (Employee)

(Continued)



Supplementary material C (Continued)

| Feasibility dimensions | Quotes illustrating the points |
|--|--|
| 3.3. Team effort and culture of openness | <p>Q23: It's important that we as management support it, and if they [the employees] reach the conclusion that they need external resources, that we then take it seriously, when it is articulated that we have been sitting in the team and we can't solve this ourselves and bring in management, then we must take it seriously. (Manager)</p> <p>Q24: I think it's important that you participate actively in the team if you have a challenge that needs to be solved with PEX...The fact that you are all in it together and not just one person takes ownership of it. (From wrap-up exercise in workshop 4 on what it takes from the team to keep using PEX – Employee)</p> <p>Q25: There must be someone who ... takes the leadership and says 'now we try this out'..... I think in the pedagogical field, there is a catch, that even though some childcare workers can organize, they would rather not go in and say "now we do this" because then you can become unpopular among your colleagues, but that's just what it takes [when using PEX]. (Manager)</p> <p>Q26: It requires that there is a culture where you can articulate that you have a challenge.... If there isn't, you don't say anything and then you don't move forward, so that is perhaps a weakness of it [PEX]. (Employee)</p> |
| 4. Effectiveness dimension | |
| 4.1. Working situations more calm and peaceful | <p>Q27: [we changed the eating situation] so that they [the children] served their own food and then they could sit down and then we could actually sit and have some conversations with the children, which you might not have had because before you had to hurry to eat your food and then you had to get up and serve food and then you could sit down again [could not remember] where did we just come from... that's how it goes when you have to feed 14 children. But now, we sit and it [the food] was put in bowls on the table and then they had to ask for the water and ask for the sauce, and it was super good because we implemented that instead of us running around playing waitresses, the children could serve themselves just like if you were sitting at home for dinner. (Employee)</p> <p>Q28: [Before the children sat in the hallway with a book and waited to be helped to the toilet before lunch. They had changed this, so the children now sat in the room with a book and waited. This way there would be an adult present] It made it more peaceful and was easier than when they sat out in the hallway because you can't keep an eye on them all the time there. (Employee)</p> |

| Feasibility dimensions | Quotes illustrating the points |
|---|--|
| 4.2. Helps seeing possibilities rather than obstacles | <p>Q29: [They had moved the gym hour to start a little earlier because they always finished a bit late which created a stressful situation when preparing lunch] We talked about that, that we would like them to start a little earlier and looked at how many people there were and in fact it was quite possible that at least someone went up and started making a lane [preparing a lane of physical exercises for the children's gym hour] so that they could start on time. So now, they have actually been good at finishing on time There it has always been 'well, it's not possible', but it was actually possible. (Employee)</p> <p>Q30: I can't say whether it's just PEX, but I think some of it is PEX because the staff see opportunities rather than limitations. That's part of the shift I think there has been in it. Now I don't hear so much that it can't be done because of this and that, now things are being implemented and there is a good structure and then I see the professional boost in the house. (Manager)</p> |
| 4.3. Increases cooperation across teams | <p>Q31: During Corona [the COVID-19 pandemic], we were divided [into the teams that were not allowed to have physical contact] and I think that PEX has subconsciously helped us to think as a whole house again. We had gotten used to not being able to help each other across teams, so PEX has helped us think about whether we can involve someone from the other teams [when finding solutions to challenging work routines]. (Manager)</p> |
| 4.4. Makes it more legitimate to bring up problems | <p>Q32: I personally think that now that we have focused on it [bringing up challenges/work routines that did not work well with the purpose of applying PEX to find solutions], it has become more legitimate or easier to say if something is stressing you out. I think it was harder before, when you thought that this I have to be able to handle. (Employee)</p> |
| 4.5. No negative effects from using PEX | <p>Q33: Interviewer: Did you experience any negative effects from using the PEX approach? No, I don't feel that. You find some new ideas and then the question is whether you get them done, but there hasn't been anything negative. (Employee)</p> <p>Q34: Interviewer: Did you experience any negative effects from using the PEX approach? I don't think so: But I can see that it could have a negative effect, but it hasn't had that here. If you have a management that says that it's always only about how you organize yourself, then you're in the wrong ditch, because it's not always the case. Of course, resources and how you treat each other also matter. (Manager)</p> |
