

## ORIGINAL ARTICLE

# Enhancing staff capacity to support children with intellectual disability receiving residential services: A realist evaluation of an improvement program

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## Abstract

Children with intellectual disability receiving residential support, according to the Swedish Disability Act, need substantial support to cope with everyday life. These children have cognitive and communicative limitations, entailing difficulties for staff in consulting the children regarding their support arrangements. In addition, due to lack of research there are knowledge gaps and uncertainties concerning how staff can provide the children's support. To deliver high qualitative support, research suggests that disability organisations should (1) continuously work with quality improvement, (2) adopt a multi-dimensional framework that explains human functioning and disability as a basis for understanding individual support needs, and (3) use person-centred approaches. Based on these principles, this study has applied a realist evaluation to identify enablers and barriers during the implementation of an improvement programme aimed at improving staff's ability to provide support to children living in special residences.

## KEYWORDS

children, intellectual disability, practice, residence, working methods

## INTRODUCTION

Residences with special services for children and adolescents in Sweden come within the framework of the Swedish Disability Act (SFS, 1993: 387, Swedish acronym: LSS). Their purpose is to provide specially adapted accommodation for children/adolescents who, due to their disability, cannot live in the parental home. This implies that during the formative years the children live wholly or partly outside the family home and are therefore in need of care by professional staff for a good and

safe living environment and associated care efforts. Staff focus on covering the children's total care needs, including strengthening the children's confidence in their abilities. Thereby, the children are given the opportunity to participate in everyday life and develop self-determination and independence. The requirement for residential support according to LSS is that the child has a diagnosis within the autism spectrum or an intellectual disability. Difficulties in social interaction and communication, flexibility, and restricted interests are common among persons living with a diagnosis within the autism

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spectrum (American Psychiatric Association, 2013). Intellectual disability implies that a person has reduced intellectual ability, combined with problems in adaptive behaviour resulting in difficulty dealing with everyday life autonomously (Schalock et al., 2010). Common to both individuals with intellectual disabilities and individuals with autism is that they have unique support needs due to limitations in everyday functioning and social contexts (Shogren et al., 2017). The target group has cognitive and communicative limitations, entailing challenges in expressing what they want, and whether they feel that the support meets their needs (Wallin et al., 2021). Therefore, supplying and ensuring effective staff support is associated with challenges.

There is a lack of research from everyday practice within LSS organisations where residential services are included; thus knowledge gaps exist concerning working methods (SBU, 2017). Moreover, knowledge about mechanisms and effects is relatively low regarding support interventions (Karlsson & Eriksson, 2016), implying that staff support efforts are linked with great uncertainties regarding quality and accuracy and that more research is needed. By using realistic evaluation to report on an improvement programme, with the aim of enhancing staff capacity to support children in LSS residences, valuable knowledge regarding working methods in this area can be generated.

## Theoretical frameworks

Three theoretical frameworks guide this study: Quality Improvement (QI), everyday functioning and person-centredness.

The framework of QI has traditionally been organised through the model of improvement and learning processes based on Plan, Do, Study, Act (PDSA) cycles (Portela et al., 2015). Collecting and compiling data is an important feature when conducting PDSA cycles as this contributes to learning, the evaluation of goal fulfilment and provides feedback to identify further improvements. An important learning aspect is to visualise data over time with several measuring points to reveal trends and phenomena (Langley et al., 2009). In disability organisations, data-generated, iterative PDSA cycles are proposed as a working method for continuous planning, implementation and follow-up of support in relation to individual results (Buntinx & Schalock, 2010). To ensure that the need for improvement is adequately perceived, PDSA initiatives need to be part of an overall methodology developed using associated improvement tools (Reed & Card, 2016). It is suggested that an improvement coach should provide technical assistance and

guide participants during the improvement process (Godfrey, 2013). Furthermore, improvement initiatives benefit from being clarified through the formulation of a program theory. Program theory specifies the components of a program (or intervention) that are expected to activate the expected outcomes as well as provide conditions for assessing these outcomes (Davidoff et al., 2015).

Everyday functioning in accordance with the International Classification of Functioning, Disability and Health (ICF) constitutes the second framework. The ICF constitutes a biopsychosocial multi-dimensional framework to understand human functioning and disability. The ICF is organised in a five-dimension model: (a) body functions (including physiological and psychological functions) and structures, (b) activities, (c) participation, (d) environmental factors, and (e) personal factors (WHO, 2021). The dimensions activity and participation together constitute life areas and are important for understanding a person's everyday functioning (Adolfsson et al., 2011). Environmental factors (e.g., physical, attitudes, technical) and personal factors (e.g., age and interests) prevent or influence participation in life areas. The ICF can be employed as a tool in everyday life planning, as the classification can be used to support staff and ensure that information about the most important factors in an individual's functioning in his or her environment is identified (Talman et al., 2018).

The third framework draws on person-centredness, meaning that the understanding of needs should be combined with approaches of user involvement to ensure that support and care are consistent with individual preferences and goals (Santana et al., 2018; Shogren et al., 2017). Skivenes and Strandbu (2006) argue that enabling children's involvement in decision-making needs to be based on highly individual approaches in relation to communication styles, abilities, experiences and consideration of when and how they should participate. From this point of view, LSS staff need to develop innovative methods for person-centred approaches and have the capacity to develop support when there are limited opportunities for dialogue with the children.

This article applied realistic evaluation to identify barriers and enablers when an action research-driven improvement programme was implemented in an LSS residence for children. The article is consistent with 'RAMESE II reporting standards for realist evaluations' (Wong et al., 2016).

## Evaluation objective

To identify barriers and enablers when a theory-driven improvement programme was implemented to enhance

staff's working methods to deliver child-individual support in LSS residences.

## METHOD

### Rationale for using realist evaluation

Mechanisms and local context are factors which affect the implementation and outcomes of improvement interventions (Davidoff, 2019). Realist evaluation (RE) is a theory-driven, practice-orientated method to evaluate programmes and interventions by closely examining how mechanisms and contexts interplay to produce outcomes (Pawson & Tilley, 1997). RE is suitable for evaluating this theory-driven improvement programme in residences with special services for children. It does so specifically by identifying the mechanisms that, through local contexts, influence the implementation and outcomes of the program, as a basis for derivations of enablers and barriers.

### Evaluation environment

The improvement programme was carried out in a non-profit-organisation that offered primary school and

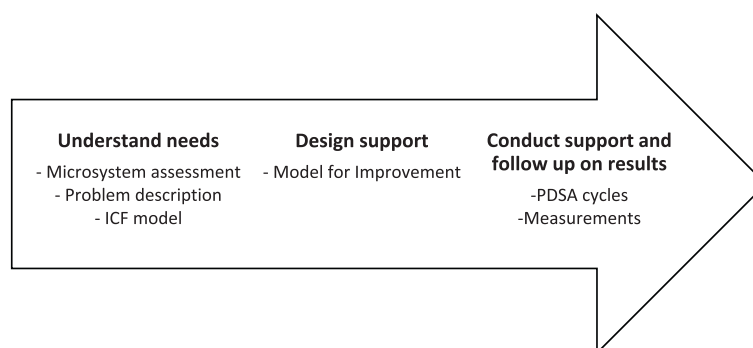
residential services according to LSS, to children with intellectual disability aged 6–16 years. The starting point for promoting participation in everyday activities (e.g., performing daily routines) and developing self-determination (e.g., choice of leisure activities) was established in the children's individual implementation plans (IPs). An IP should include details of how the staff organises support to meet the child's/adolescent's goals and needs and how he or she has participated in the planning. The staff within the residential units had routines and time set aside for working with the children's IP via weekly staff planning meetings. However, there was a lack of working methods and tools for systematically identifying support needs, implementing support, and monitoring goal fulfilment as well as actively engaging the children in support planning. To facilitate support development, an improvement programme was piloted with one residential team from September 2016 to March 2017. The experiences from the pilot test (Wallin, 2017) received a positive organisational response, leading to the management deciding to run the improvement programme in all six LSS residences from 2020 to 2023. This study is the first evaluation part of the improvement programme that took place from January 2020 to June 2021. The improvement programme was run at three LSS residences (Table 1). Each residence had four to six children and five to nine permanent staff, including hourly substitutes. Staff worked on a rolling work-shift schedule including weekends, evenings, and nights. Most of the staff had vocational education at high school level.

**TABLE 1** Information on residences participating in the improvement program

Period	Residence	Number of permanent staff	Individual child cases
202001–202006	A	5	2
202009–202103	B	9	2
202101–202106	C	5	2

### Improvement program

The programme was built on workshop sessions where participating staff teams worked through an improvement methodology (Figure 1) for one child at a time during the staff's weekly planning meetings. The respective



**FIGURE 1** Improvement methodology and associated tools for identifying, planning, implementing and following up on individual child support

team chose which child to work with. To complete all steps of the improvement methodology each individual child case required 8–12 sessions.

### Understand needs (1–3 workshops)

To explore the child's residential system and identify a problem area in his/her everyday life, an adapted micro-system assessment (Nelson et al., 2011) was performed by the staff. 'A problem' referred to recurring situations where the child exhibited difficulties in everyday functioning, such as carrying out daily routines, choosing leisure activities and managing their behaviours. The identified problem served as the starting point for applying the ICF model. To facilitate understanding, a local improvement coach prepared a checklist containing summaries of ICF categories sorted under psychological functions, activity/participation, environmental factors and personal factors. The staff team used the checklist to map possible causal problem factors under each ICF model dimension to establish an Ishikawa diagram (Bergman & Klefsjö, 2012, p 245) on a whiteboard (see Figure 2).

### Design support (1–2 workshop)

The Model for Improvement (Langley et al., 2009) was used to establish (1) goal-description (2) measurement design: variations in the children's behaviour, relating to the identified problem, were translated into quantifiable estimation measures (child behaviour example: level of intensity of outburst in specific everyday situations). The values were incorporated into a data collection template

where staff documented ongoing estimates. (3) Identify ideas that could be translated into a support intervention.

### Conduct support and follow-up on results (4–6 workshops)

The designed support was translated into an action plan via the PDSA cycle. Estimates were documented before support changes (baseline) and when the staff introduced a support intervention to find out if changes led to improvements. In the next step, the local coach compiled the estimates in a control chart and presented it back to the staff. The aim was to facilitate staff learning and conclusions about the effectiveness of the support intervention by visualising data over time using measurement summaries.

The local coach (first author [Pontus Wallin]) provided improvement skills and tools to facilitate the improvement process, collected data for the follow-up research, and encouraged the staff to involve the children in different aspects of their support arrangements.

### Realist evaluation design

Realist evaluation assumes that positive programme outcomes only occur when the programme activates certain mechanisms in certain contexts (Pawson & Tilley, 1997). RE aims to understand the underlying mechanisms (M) that produce change, the contextual factors (C) necessary to activate these mechanisms, and how the combination of context and mechanisms produces outcomes (O). Pawson and Tilley (1997) describe this process as creating context-mechanism-outcome

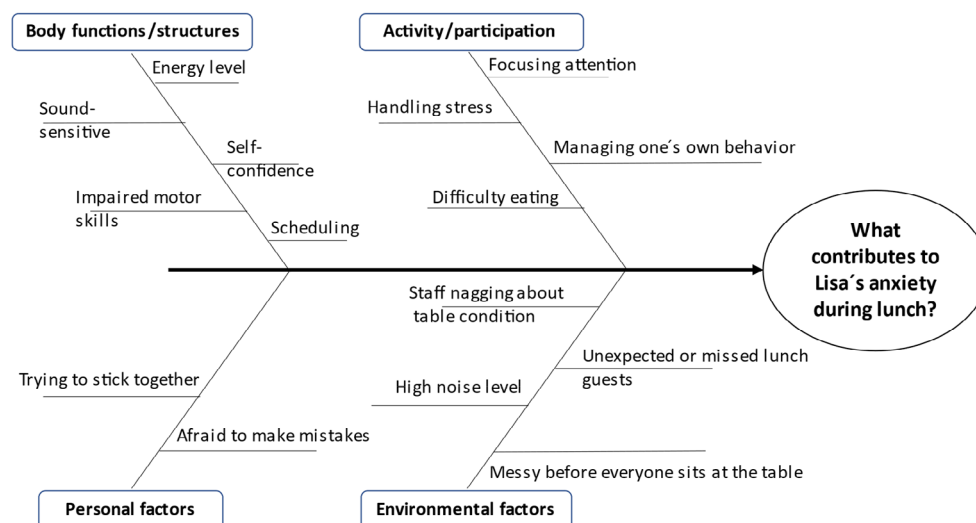


FIGURE 2 Fictitious International Classification of Functioning, Disability and Health (ICF) model mapping

(CMO) configurations. Describing potential CMOs (baseline) before the programme run helps specify what might work, for whom, and under what circumstances, and provides traceability to identify and refine CMO constellations in evaluation (Ogrinc & Batalden, 2009).

The methodological design in this study followed the cycle proposed by Pawson and Tilley (1997): theory–hypotheses–observations–programme specifications.

## Theory

A programme theory was developed by the first author (Pontus Wallin) based on the results from the pilot test (Wallin, 2017) and the theoretical frameworks of QI, everyday functioning, and person-centredness.

‘If staff groups in LSS residence participate in weekly quality improvement workshops led by a local coach, team learning is created to offer needs-driven support by training the staff to apply a multi-dimensional approach to understanding the child’s functioning as a starting point for planning, implementing, evaluating, and improving individualised support for the children.’

## Hypotheses

In accordance with Dalkin et al. (2015) this study divides the concept of mechanism into its basic parts of resources and reasoning, which provides the following formula:

$$M (\text{Resources}) + C \rightarrow M (\text{Reasoning}) = \text{Outcomes.}$$

To hypothesise how a resource (M1) was introduced into a current context (C) in a way that changed

the staff’s reasoning/behaviours (M2) to produce outcomes (O), the programme and their interrelationships were broken down into potential compilations (Table 2).

## Observations

In this study, several observations and data collection methods were used: field notes, child-individual case studies and group interviews. Data were collected continuously during the improvement programme process (202001–202106).

## Field notes

To capture staff experiences during the improvement process, the staffs were asked to conduct and document evaluation notes after each workshop session. The notes added contextual understanding in relation to the different steps of the improvement methodology (Figure 1).

## Child-individual case studies

The participation of the individual children in the improvement work was documented continuously. The generated data included descriptions of everyday problems, ICF model mapping, goal setting and measurement designs, PDSA cycles, and extent of goal fulfilment based on measurement summaries. Informed consent was obtained for four of the six children, and those four children-individual-cases contributed to the empirical evaluation base. All case studies were de-identified by excluding, name, age, residential belonging and gender.

TABLE 2 Hypothesis of MCMO formulas

Theory framework	Mechanism 1	Context	Mechanism 2	Outcome
Quality improvement	Improvement methodology and time set aside for staff participation in coach led improvement	Structures and culture for weekly staff meetings and interactions	Staff engage in systematic improvement work	Team learning for planning, implementing, and evaluating child support
Everyday functioning	Coaching in ICF model	Staff interactions	Changed staff reasoning about the children’s everyday problems	Prerequisites for matching needs-adapted support
Person-centredness	Child involvement	Staff closely engaged with the children	Increased staffing efforts to involve children in support development	Higher degree of child involvement in support arrangements

## Group interviews

Fifteen staff members agreed to participate, which gave the following composition: Residence A = 4 participants, residence B = 6 participants and residence C = 5 participants. Each group interview was scheduled for 1–4 weeks after the last improvement programme session. The interviews were digital (via Zoom) and moderated by the last and second authors. The interviews were semi-structured, following an interview-guide based on the programme theory and associated MCMO formulas. The interviews were audio-recorded and transcribed verbatim. The first interview was transcribed by the first author (Pontus Wallin) and the remainder by an administrative assistant not taking part in the improvement program.

## Analysis of the observations

The hypothesis of MCMO formulas (Table 2) served as a thematic lens for identifying underlying sub-group MCMO patterns. The first author (Pontus Wallin) read and coded the transcriptions, starting by identifying staff quotes referring to positive outcomes in relation to one of the three theory frameworks (QI, everyday functioning and person-centredness). Established outcomes served as a starting point for tracing associated context and mechanism interactions through an iterative discussion process between the first and last author based on the empirical material. Observations from all data sources were then summarised and critically analysed to confirm, explain, nuance or refute identified MCMOs. Twelve sub-group MCMO formulas were identified (Appendix 1; Tables A1–A3). Table 3 demonstrates one example of the analytical process.

## Programme specifications

By comparing the identified sub-group MCMO formulas with the hypothesis and relevant research in the discussion, conclusions about general enablers and barriers could be drawn as a basis for refining the programme theory.

## RESULTS

The analysis identified five sub-group MCMO patterns (Appendix 1) related to the theoretical framework of QI as a basis for identifying enablers and barriers.

TABLE 3 Analytical sample of established sub-groups of MCMO formulas

Theory framework	Quote	Mechanism 1 Context	Mechanism 2	Outcome	Explanation
Quality improvement	'So we thought it fit very well doing research and seeing if it got better, even on paper and being able to show others what we had done...And above all that we got measurable results'.	Measurement summaries Staff were open to new follow-up methods	Measurement summaries triggered discussions and insights about the appropriateness of support interventions	Evaluative support interventions.	According to the child case studies, measurements to assess whether the support intervention contributed to an improvement, were possible in 3 of 4 cases. In one case, the evaluability was hindered by inadequate link between goal-description and measurement design.

## Quality improvement

The assumption before testing the improvement programme was that the principles of QI and associated tools (Microsystem assessment, Model for Improvement, PDSA and measurement summaries) offered a systematic process (Figure 1) for staff to plan, implement and evaluate children's individual support. As the staff became involved in the improvement programme a systematic approach was created to work in detail with the children's support interventions. New elements were that the staff prepared measurement designs, collected data, and studied measurement summaries to assess whether the support interventions contributed to improvements for the children. Measurement designs comprised staff translating the degree of goal fulfilment into differentiable child behaviours. The behaviours were then translated into quantifiable estimation measures as a basis for staff to collect data before (baseline) and during support implementation:

'It was much easier to work[...]we could document estimates 1-4' (Staff, Residence A)

Collection of data was performed with varying regularity, which meant that an element of the weekly workshops consisted of staff tracing back how the child behaved during the previous week. The coach compiled measurements that were presented to staff at the workshop sessions. The feedback contributed to professional pride as the measurement summaries gave a sense of local proof of whether the staff's support effort had worked or not:

'So we thought it fit very well and research and seeing...if it got better, even on paper, and being able to show others what we had done ..... And above all that we got measurable results'. (Staff, Residence A)

In three of four child-individual case studies, measurement summaries helped to show whether the support intervention contributed to an improvement. In the fourth case, an insufficient link between goal description and measurement design hindered evaluation. Overall, the staff teams relied on coach guidance in terms of measurement management.

In addition to using measurements, the staff's compliance with the steps in the improvement programme increased team focus and learning about the children, which was considered an important outcome in its own right:

'I would like to say that you learn more about the children that way. That is a result'. (Staff, Residence B)

One staff group said that the improvement programme promoted team learning through the common steps and tasks that needed to be performed to move forward. This led to a commitment that was expressed in closer staff dialogues and better focus on various aspects of the children's support development. Experience of ownership and time were cited as important factors for promoting staff engagement:

'...that you get the time from the employer, that you sort of free up time and space to be able to do it for a longer period'. (Staff, Residence A)

## Everyday functioning

The analysis identified four sub-group MCMO patterns (Appendix 1) related to the theoretical framework of everyday functioning as a basis for identifying enablers and barriers.

The ICF model was introduced as a tool to enhance the staff's understanding of support needs in relation to the children's everyday problems. The key elements consisted of identification, formulation of an everyday problem, and mapping the problem according to the ICF model. The group interviews showed that these were new elements that created enablers as well as barriers:

'It was difficult to identify the problem we wanted to address'. (Staff, Residence C)

One difficulty was that the staff were inclined to describe problems based on the children's inability rather than to identify participation restrictions in daily activities. To encourage staff to think of problems in terms of participation, the coach asked the teams open-ended questions such as: 'What obstacles does the child face during the day? When do they happen?' In the next step, established problem descriptions were used to formulate questions on a whiteboard as a starting point to identify influential factors under each ICF dimension. The staff appreciated that there was a pre-prepared guide with overall explanations of ICF categories sorted under activity/participation, environmental factors, and psychological functions:

'ICF covers everything from physical to psychological, the environment and everything. [...] there are quite a few parts there that we

do not use. We only use those that suit us. But it is very good. (Staff, Residence C)

Although the staff had support from the ICF model and the guide, training and coaching were needed as the ICF was perceived as complex. It was difficult to distinguish categories from each other and difficult to translate certain ICF categories into everyday language for the individual child's everyday problems.

Out of respect for the integrity of the participating children, the authors have chosen not to reproduce any of the staff-conducted ICF model mappings. But since the ICF model was a key element in the improvement program, we established a fictitious example (Figure 2). The ICF model mapping is based on 'Lisa's problem' (having difficulties participating in school lunches). Participation was hindered by the fact that she was often stressed and anxious.

Using the ICF model drew the staff's attention to how insufficient environmental conditions in relation to the child's inherent difficulties created obstacles to participation in the given situation. These insights were reflected in staff support interventions, all of which included various forms of environmental adaptations such as spatial adjustments, changed routines, and the provision of cognitive aids.

## Person-centredness

The empirical analysis identified three sub-group MCMO patterns (Appendix 1) related to the theoretical framework of person-centredness as a basis for identifying enablers and barriers.

To operationalise the theories of QI and everyday function into practical working methods, resources were added in terms of established improvement tools, the ICF model and coaching guidance. Similar resources were not used to promote person-centredness. There was rather a principled attitude from the outset that participation in the programme meant that staff were willing to explore how the children could be actively involved in their support development process. In practice, this took place by the coach having discussions with the staff groups about when, how, and to what extent the children could be engaged in different steps. In two child-individual case studies, the discussions led to increased staff collaboration with the children in the planning and design of the support. The support including setting aside staff time for individual conversations and adapting conversation strategies. A staff member recounted experiences of a conversation that aimed to get the child's opinion before a new support intervention was designed:

'Yes, but what do you think, what would you be helped by'? 'How can we help you'? And then add a few more words: 'Would it help if we did this or if you did this'? And then it came more and more from the child as well' (Staff, Residence A)

Collaboration between children and staff was promoted by individual staff taking on the role of a contact person who had regular conversations with the child and fed these back to the workshops. This created value, partly by allowing the staff group to understand the children's views and preferences, and partly by the staff group being able to help the contact person to develop further conversation opportunities. By contrast, the other two child-individual case studies did not demonstrate staff and child dialogues. Those children were considered by the participating staff to have communication impairments that were too severe for them to be actively involved in the design of their support.

## DISCUSSION

The aim of this study was to identify enablers and barriers when staff teams participated in an improvement programme to enhance capacity to deliver support to children living in LSS residences. In line with the programme theory, the empirical data confirm that the improvement programme created a structured process for the staff to work systematically with support at the child-individual level. Staff compliance, coaching support, the creation of a learning culture and the establishment of infrastructure for measurements enabled the implementation of the improvement program. These are important factors in QI (Godfrey, 2013; Greenhalgh et al., 2004; Neubeck et al., 2014).

The improvement programme was linked to the very essence of the organisation's purpose—to provide qualitative support for the children in their everyday life. In addition, there were enabling factors in place that the programme could utilise, such as weekly workshops and an insider coach who knew the local context and culture. The weekly regularity of workshops enabled backtracking to compensate for shortcomings in the previous week's data collection. Designing measurements with coaching support was perceived as meaningful and relevant, which contributed to the staff's commitment and compensated for their lack of previous knowledge. The programme design was intended to overcome measurement problems, such as lack of data collection and low commitment (Devi et al., 2021).

The staff's experience of increased learning can be explained by compliance with the PDSA, which provides



a structured experimental learning methodology to engage in change work (Reed & Card, 2016). The iterative approach supported an ongoing analysis and reflection process, which gradually deepened the staff teams' knowledge of the children. The social interaction that occurs when people analyse phenomena and solve things together, is an important learning aspect of improvement work (Norman, 2015). Skills development for staff who support individuals with intellectual disabilities is promoted by multiple components such as workshops, coaching and feedback (Simpson et al., 2022), which build up the current improvement programme.

In summary, the improvement programme harmonised with the organisational objectives, utilised existing structures and resources, and catalysed organisational learning, which constitute important principles in organisational interventions (von Thiele Schwarz et al., 2021).

The ICF model provided a framework for staff to recognise disability-related factors affecting the children's everyday functioning. Barriers consisted of difficulties in framing the children's everyday problems, and unfamiliarity with the ICF structure. Articulating a well-defined problem description proved to have a major impact on the subsequent improvement activities which were: ICF model mapping, goal descriptions, measurement designs, and choice of support interventions. This study indicates that the staff need guidance to shift the focus from the children's body functions and activity limitations to a well-defined problem description based on recurring obstacles in the children's daily lives. Adolfsson (2015) claiming that ICF as an aid for support development requires the everyday problem to be formulated based on participatory restriction in the child's everyday life. When the problem is clearly described, a concise question can be extracted to guide staff in identifying and sorting relevant disability factors using the ICF model (Figure 2). In accordance with Buntinx and Schalock (2010), the ICF model helped staff in our study to organise and systematise available inputs of limitations as the basis for individual support development. When environmental barriers limited participation, individual functioning could be stimulated by providing support that improved personal capacity (e.g., targeting activity limitations) or that reduced the demands of the environment (Dean et al., 2016).

In the present study, the staff needed coaching support to use ICF in practice as the structure was perceived as complex and the categories needed translation to the local context. However, the translation elements contributed to the local validity of the ICF model mapping because the associated discussions created clarity about what the categories meant in relation to the child's everyday problems.

In terms of person-centredness, participation in the improvement programme led to a high degree of involvement in their support development for two of the children. Enabling factors consisted of staff allocating time, customised conversation strategies and the appointment of a contact person. Increased involvement entails staff adapting language use and interactions to suit the user's premises (Whaley et al., 2019). In this regard, the weekly workshops made it possible for the staff to get involved in creative planning concerning how and when the child conversations could take place. The appointment of a contact person meant that the division of roles and responsibilities was clarified regarding the promotion of the children's input. In addition, the improvement methodology itself facilitated the contact person's organisation of the child conversations as it gave opportunities to structure questions and communication based on defined steps in the improvement process. The recurring conversations contributed to relationship building and child empowerment as the children's preferences were fed into decision-making regarding their support arrangements.

Barriers to involvement for children with complex communication needs are highlighted in research (Clarke et al., 2011) and the intention of this improvement programme was to enhance children's involvement in their own everyday support. However, in our study, two of the children were considered by staff to have communication difficulties that were too extensive for them to be actively engaged in the design and planning of their support. Nevertheless, the experience from this improvement programme is that the systematic way of working can create value for children who have difficulties in expressing themselves. Glicksman et al. (2017) characterise person-centred planning as a discovery process through recurring conversations, observations and assessments. Although communication barriers hindered conversation, ongoing observation and evaluation helped staff to develop individualised support that enhanced the children's everyday functioning. Future research on how communication barriers can be overcome is important to enhance individualised support.

## Strengths and weaknesses

Using RE is challenging due to its limited methodological support for identifying mechanisms, contexts and outcomes. Using Dalkin's (2015) formula as a support to establish and evaluate the MCMOs was facilitating and strengthened the analytic process. The validity of the RE was further strengthened by using data triangulation from several data sources (Baker, 2011). The findings can

help practitioners and stakeholders to organise improvement programmes in their local contexts, even though the study sample was small.

## CONCLUSIONS

Using a programme theory based on QI, everyday functioning and person-centredness to implement an improvement programme to strengthen staff's capacity to drive support development in residence with special services for children with intellectual disabilities is promising. The integration of ICF with improvement knowledge enabled the staff to identify support needs and goals, link goals to measurements, and collect and systematise data to monitor the support interventions and identify needs for further improvements. Enabled contextual conditions were the staff's openness to new ways of conducting development work, close workshop frequency and coaching support, which together aided the staff's learning progress. At the same time, an overall barrier was the improvement programme, and its elements require extensive coaching, especially when applying the ICF model and measurements. To be useful in practice, prospective coaches need to be educated and trained. Finally, future improvement programs should make efforts to overcome barriers to promoting the involvement of children with severe communication difficulties.

## AUTHOR CONTRIBUTIONS

Pontus Wallin: Principal investigator and main writer of manuscript. Christina Petersson: Project team member, contributing writer and development of manuscript. Kristina Areskoug Josefsson: Project team member, contributing writer and development of manuscript. Annika Nordin: Project team member, contributing writer and development of manuscript. Contributor to analysis of data.

## CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

## FUNDING STATEMENT

The study was funded by and conducted at 'Solberga village', a disability care organisation in Sweden. The first author (Pontus Wallin) is employed by 'Solberga village' and detached as a doctoral student at the Jönköping University. The management of 'Solberga village' has not had any insight or involvement in research data and publishing strategies. Furthermore, the research team involved external researchers with no connections to Solberga village.

## ETHICS STATEMENT

Ethical approval was obtained from the Regional Ethical Review Authority, Sweden (2019-04778). Written informed consent was obtained from all residential staff prior to the data collection. For anonymity, the residences are called A, B and C. Parents received information letters describing the study purpose and procedure before agreeing to the children's participation in the research for the improvement program.

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## APPENDIX A

## A.1 | MCMO FORMULAS

TABLE A1 MCMO formulas of quality improvement

	<b>Mechanism 1</b>	<b>Context</b>	<b>Mechanism 2</b>	<b>Outcome</b>	<b>Explanation</b>
1	Measurement summaries	Staff are open to new follow-up methods	Measurement summaries trigger discussions and insights about the appropriateness of support interventions	Evaluable support interventions	According to the child case studies, measurements to assess whether the support intervention contributed to an improvement were possible in 3 of 4 cases. In one case, the evaluability was hindered by an inadequate link between goal description and measurement design.
2	Improvement systematics	Staff compliance	The staff collaborate within the framework of the improvement process	Team learning	Staff said that the improvement programme promoted team learning through the common steps and tasks that needed to be performed to move forward.
3	Allocated time	Staff follow PDSA	Interest and patience in monitoring changes over time	Sustainable improvement initiatives	Experience of ownership and time were cited as important factors encouraging staff to engage. This meant that the staffs were given the opportunity to work with improvements systematically over time.
4	Templates for data collection	Staff willing to perform tasks between workshops	Staff document data	Basis for measurement summaries	Staff collection of data was performed with varying consistency. The weekly regularity of workshops enabled backtracking to compensate for shortcomings in the previous week's data collection.
5	Measurement design to assess goal-fulfilment	Staff are engaged to create behaviour measurements	Differentiation of everyday problems to different degrees of observable behaviours	Prerequisites for evaluation	Measurement designs comprised staff translating the degree of goal fulfilment into differentiable child behaviours. The behaviours were then translated into quantifiable estimation measures as a basis for staff to collect data before (baseline) and during support implementation. Staff needed substantial coaching support to establish measurements designs.

TABLE A2 MCMO formulas of everyday functioning

	<b>Mechanism 1</b>	<b>Context</b>	<b>Mechanism 2</b>	<b>Outcome</b>	<b>Explanation</b>
1	Coaching in formulating problem descriptions	Staff open to new perspectives on the children's problems	Staff interact to formulate a concrete everyday problem	Consensus on the child's everyday problems	Staff needed coaching and reflection to identify and frame participation restrictions in the children's everyday life as a starting point for problem descriptions.
2	ICF model	Conference room, whiteboard, and ICF guide	Staff engage in coached training	Prerequisites to apply the ICF model	Staff perceived the ICF model and associated guide as complex. It was difficult to distinguish categories from each other and difficult to translate certain ICF categories into everyday language for the individual child's everyday problems. Training and coaching were needed.
3	Human functioning knowledge	Staff allow themselves to be guided by the ICF model	Staff reason from a multi-dimensional perspective	Documented ICF assessments	Data demonstrate that ICF assessment were conducted for all participating children.
4	Documented ICF assessments	Staff creativity	ICF assessments lead staff to identify disability factors	Prerequisites for support interventions	The individual child case studies show that the support interventions were aimed at reducing several disability factors identified by the children's individual ICF assessments.

TABLE A3 MCMO formulas of person-centredness

	<b>Mechanism 1</b>	<b>Context</b>	<b>Mechanism 2</b>	<b>Outcome</b>	<b>Explanation</b>
1	Appointment of a contact person	Children are viewed as verbally competent actors	Responsibility for child involvement	Prerequisites for child involvement	The appointment of a contact person was dependent on the participating child being considered capable of contributing verbally. Data shows that two out of four participating children were considered by the staff to have communication difficulties that were too extensive for them to be actively involved.
2	Improvement methodology	Contact person is appointed.	Contact persons prepare conversation	Targeted conversations with children	Organising the child conversations based on the improvement programme made it easier for the contact person to create a step-by-step process where the child's needs and preferences gradually became apparent.
3	Staff and child conversations	Contact person and staff group attach importance to the child's preferences and wishes.	Shared decision-making in support design	Child involvement in support design	The data demonstrate that child involvement in support design was gradually developed through recurrent interactions between the contact person and the child.