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Bridging the Research to Practice Gap: A Case Study Approach to Understanding EIBI Supports and Barriers in Swedish Preschools

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Abstract

The present study examined proximal and distal barriers and supports within the Swedish service system that may affect implementation of early and intensive behavioral intervention (EIBI) for children with autism. A case study approach with roots in ethnography was chosen to explore this issue. Two preschools exemplifying 'high quality practice' were studied and information was collected through multiple sources during a 12 month period, this included participant observations, direct observations, semi-structured interviews with key informants; paraprofessionals, parents, special educators, habilitation specialists and a focus group interview. Interview transcripts and field notes were combined and analyzed using an abductive grounded theory approach. Findings highlight the relevance of researchers understanding and taking into consideration the effect that distal variables have on implementation within proximal settings. A theoretical model of factors affecting implementation was conceptualised to include: staff entry knowledge and competence, development through supervision, the role of the preschool administrator, as well as distal influences and inter-organizational tensions, values, and bridges. Findings are discussed within the context of implementation science. Implications for future research are discussed as well as areas in need of further development to bridge the gap between research and practice.

Keywords: Autism, Case-study, Distal, EIBI, Implementation science

Introduction

Research supports that early and intensive behavioral intervention (EIBI), grounded in the principles and procedures of applied behavior analysis (ABA), is highly effective in producing substantial, meaningful and long term gains for children with autism (see

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Matson & Konst, 2014; Warren et al., 2012). There is indication, however, that the research is not translated effectively into common practice (e.g., Bibby, Eikeseth, Martin, Mudford, & Reeves, 2001). As in many areas of early intervention, translation of highly controlled research findings to usual care settings is a complex process involving a number of interacting components (Odom Cox, & Brock, 2013). In this paper we will first describe the background and research related to EIBI and the importance of high procedural fidelity in interventions. We will then present a qualitative analysis of the supports and barriers affecting implementation of EIBI for children with autism in Swedish early childhood settings. An implementation science approach in which interactions between proximal components necessary for high quality implementation as well as more distal organizational variables will be used to interpret findings (Fixsen, Naoom, Blase, Friedman, & Wallace, 2005). This paper explores the interaction of these variables in the high stakes context of early and intensive behavioral interventions.

Autism and early intensive behavioral interventions

The prevalence of autism spectrum disorder (ASD) has increased dramatically and is estimated to be as high as 1 in 68 (Centre of Disease Control, 2014). ASD is a lifelong neurodevelopmental disorder, with onset in early childhood, defined by significant impairments in socio-communicative interactions across contexts, as well as restricted stereotyped interests, activities and patterns of behavior (American Psychological Association, 2013), other characteristics associated with autism are resistance to environmental change, unusual sensory experiences, and lack of skills necessary to learn naturally from the environment. ASD often co-occurs with intellectual disabilities as well as with other diagnoses and problems, such as ADHD and speech language impairments (Bölte, 2014; Jang et al., 2013). Though neuro-biologic in origin, recent research in neuro-psychology highlights the importance of recognizing the brains ability to be shaped through repeated learning experiences and this is especially salient in the developmental period, strengthening the potential of early intervention to "have significant impact on both overall developmental gains, lessening of autism symptomatology, and even changes in the social brain" (Volkmar, 2014, p. 2979). Furthermore, interventions that are effective produce humane benefits as well as significant economic benefits (Chasson, Harris, & Neely, 2007).

While the mean age for an ASD diagnosis ranges from 36 to 120 months, children with autism can now be reliably identified as young as 24 months of age and "a consistent finding is that age of diagnosis is decreasing over time. This finding is encouraging because it suggests that more children are being identified early enough to confer the most benefit from intensive services" (Daniels and Mandell, 2014, p. 593), but it is also placing new and greater demands on preschools as well as habilitation centers to meet the needs of a growing population (Stockholm County Council, 2014).

The first major study to demonstrate the effectiveness of EIBI was a quasi-randomized study conducted through University of California in Los Angeles (UCLA) by Ivar Lovaas (1987) which compared 19 preschool children with autism who received 40 hours one-to-one intensive behavioral intervention per week under close supervision of UCLA staff with a control group which received 10 hours behavioral interventions per week over a two-year time span. Children in the experimental group made significant gains in IQ and adaptive behavior skill improvement and 9 of the 19 obtained "best outcome" results meaning IQs in the normal range and when starting school were not in need of special educational placement. These improvements were maintained in a six-year follow-up (McEachin, Smith, & Lovaas, 1993). While there is an abundance of controlled research published that documents the effectiveness of EIBI (e.g. Matson & Konst, 2014; National Autism Center at May Institute, 2014; Smith & Iadarola, 2015), there is also growing

recognition that translating empirically supported findings, also referred to as evidence based practice (EBP), to usual care settings is not a straightforward process. Central to translation of research evidence to practice is the process of identifying clinical concerns, selecting and evaluating the best available research, and understanding basic principles and mechanisms in order to create a contextual fit (Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996) as well as the interventions per se being implemented with high procedural fidelity. In the context of EIBI, Stahmer et al. (2015) defines procedural fidelity requiring continual data-based decision making so that providers within relevant settings are using "procedures required to execute the treatment as intended" (p. 182). Furthermore, an understanding of the specific philosophic tenets of ABA is also required as well as the skills to practice with wisdom, to engage in informed decision making , and conduct on-going and systematic evaluations (Slocum et al., 2014). The ethics of engaging in evidence-base practice in EIBI are enormous and involves many specialized skills in the context of hundreds of behavior change programs with a limited window of opportunity for dramatic neurological and environment pliability (Ala'i-Rosales & Zueg, 2010; Volkmar, 2014). Eikeseth and colleagues note several specific issues related to effective or ineffective implementation of EIBI in community settings; training, retention and supervision of staff; parent involvement; and treatment fidelity (Eikeseth, Klintwall, Jahr, & Karlsson, 2012). Understanding and allegiance to the conceptual and research evidence has also been noted as an important factor in implementation (Långh, Hammar, Klintwall, & Bölte, 2016).

Findings from four naturalistic studies evaluating child related outcomes of EIBI in "usual care settings" demonstrate mixed results. Taken together, these studies highlight the challenges encountered when attempting to translate well controlled research to practice. The first study conducted by Bibby et al. (2001) involved 66 preschool aged children with ASD who had obtained parent-managed intensive interventions based on the UCLA model in the UK over an average of 31.6 months in which pre-post assessments indicate lack of IQ score improvement and while adaptive behaviors had improved to some degree none of the children in this study met best outcome criteria as reported by Lovaas (1987). Potential threats to effective implementation described by the authors include questionable competence among direct care therapists, consultation provided by non UK consultants in which sessions were reduced over the course of the year from weekly to once every three –months, also none of the consultants met recommended competency requirements as defined in the UCLA study, and therefore it was not possible to assert the standard of provisions obtained. In addition, there was suspected (though not documented) high staff turnover.

The second and third studies were conducted in Sweden. Eikeseth et al. (2012) evaluated the adaptive behavior outcomes of children enrolled in a Swedish EIBI program (35 children, mean intake age of 3.11) and matched children receiving treatment as usual in Norway (24 children, mean intake age of 4.5). Both groups were evaluated after one year using the Vineland Adaptive Behavior Scales and the children in the EIBI group scored significantly higher. Within the EIBI group, those children with socially mediated reinforcers scored higher.

Fernell and colleagues (Fernell et al., 2011) conducted a prospective naturalistic longitudinal study over an approximate 2-year period between 2005 and 2008 in the Stockholm region to examine whether intensity of ABA based interventions affected adaptive functioning. Participants consisted of a population based cohort of 198 children with an ASD diagnosis who were between 1.5-4.5 years at the onset of the study and for whom pre-post Vineland Adaptive Behavior Scales and the Autism Behavior Checklist assessments were conducted. Results showed no significant outcome differences between

high intensity and low intensity intervention groups. Information regarding whether interventions were carried out as intended in preschools and home was not available, thus the conditions of implementation ('how') were not clearly documented. The authors note that paraprofessionals had differing educational backgrounds with approximately 2/3 having a high school diploma or other and only a third had a preschool teacher degree or equivalence.

In contrast, Leaf et al. (2011) presented outcome data on a sample of 64 children between 37- 42 months of age in which community based EIBI supports were provided for children, families and preschools in California, Hong Kong, Australia and the UK. The EIBI package was based on an updated version of the UCLA Young Autism Model which included incorporation of advanced language developmental strategies, developing parental expertise, proactive procedures to address problem behaviors, and focus on both observational learning and on learning how to learn. The average hours of direct intervention was documented to be approximately 22 hours per week and each program was tailored to the individual child's specific needs. These results are similar to findings in Lovaas (1987; McEachin et al., 1993) in which two best outcome groups evolved with one group consisting of children with higher intake IQ and a second group with lower IQ intake, never the less significant improvements in IQ, adaptive behaviors and overall quality of life were noticed in all groups. Like Eikeseth et al. (2012), the supervision was rigorous, fidelity was a central issue, and the investigators were trained directly within the UCLA model. Unlike the Bibby et al. (2001) and Fernell et al. (2011) all supervisors in Leaf et al. (2011) were certified behavior analysts, and direct care therapists were expected to have a bachelor degree in either behavior analysis, psychology or education and were given rigorous competency based training, weekly supervision and monthly in-service meetings with other direct care staff combining work-shop and hands-on methodologies. Although cultural variations existed between countries concerning parental acceptance of diagnosis, perception of the role of professionals and funding sources for direct care staff (public sources versus private), it should be noted that the structure, leadership, sophistication of skills, administrative support, and philosophy of intervention in Leaf et al. (2011) were similar to previous research in which the effectiveness of EIBI has been demonstrated.

Several scholars have looked at factors affecting research to practice gap. For example, Brookman – Frazee and colleagues (Brookman-Frazee, Baker-Ericzén, Stadnick, & Taylor, 2012; Brookman-Frazee, Drahota, Stadnick, & Palinkas, 2012) concluded from analysis of a series of studies that factors such as inter-organizational structures (e.g., the relationship between the special education and mental health systems), lack of specialized training in ASD interventions (e.g., ABA) and lack of strategies for working with parents (e.g., collaborative versus directive) can contribute to the disconnect between research and practice. Similar to Brookman-Frazee and colleagues, Love, Carr, Almason and Petursdottir (2009) found considerable variation in training, supervision, and intervention practices among 211 practicing EIBI supervisors. Taken as a whole, it is apparent that there are a number of interacting components within natural settings which directly and indirectly affect child related outcomes i.e. staff competence, philosophic beliefs, leadership, supervision and collaboration between help-providing organizations.

EIBI within an implementation science framework

The growing emphasis of the importance of usage of empirically based interventions in combination with the difficulties of translating EBP into practice has led to the evolution of implementation science (Fixsen et al., 2005). Inherent is the recognition that implementation does not exist in a vacuum but within organizations that consist of numerous identified and unidentified barriers and supports. In particular, the authors

highlight the often overlooked effect of distal influences which; "Like gravity, organizational and external influence variables seem to be omnipresent and influential at all levels of implementation" (Fixsen et al., 2005, p. 58). On a pragmatic level the purpose of implementation science is to decipher supporting conditions and amend barriers affecting the implementation of an effective innovation (i.e. an evidence based innovation or new model of service) (Metz, 2016). As illustrated in Figure 1 Metz (2016) characterized implementation science as a multiplicative equation in which the effective innovation (the "what") is multiplied by efforts to produce high fidelity procedures (the "how") and by factors that lead to an enabling context (the "where") resulting in positive outcome.

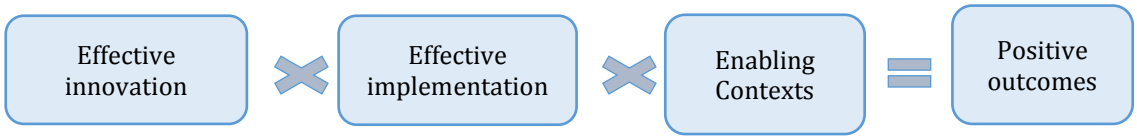

Figure 1. *"Active Implementation Formula (Metz, 2016)" permission to use formula granted by NIRN (09/14/2016)*

According to this formula an effective innovation is based on best available knowledge, has a research base and meets the needs of a specific population. Yet, as the authors note, whether or not an effective innovation produces positive outcomes in a given population depends on "how" the innovation is implemented, the quality of which is effected by variables such as staff competencies, the technological replication (procedural fidelity), usage of data collection to improve the practice as well as evaluation of the practice. The third variable effecting outcome is the context in which the innovation is implemented, questions to consider are whether resources are sufficient (e.g., staff to child ratio), adult learning opportunities, if the learning environment is conducive for implementation (e.g., physical and psychological learning climate) and whether key stakeholders are engaged in the process (Metz, 2016).

Within implementation science there is an emphasis on "cycles for improvement", in that systems are created that allow for monitoring, questioning, revising, and learning. All cycles are created with the intent of improving the intended outcomes (National Implementation Research Network, NIRN, 2016). The present study explores factors influencing the EIBI implementation cycle in Sweden. The foci is on the "how" and "where" factors that affect quality of implementation.

Overview of the usual care context in Sweden

EIBI of varying quality has been put into practice in parts of Sweden. Almost all children in Sweden between two and five years of age attend preschool including children with ASD. Following diagnosis a child with ASD and the family will be referred to a publically funded regional or district based habilitation center (health care sector). Each child and family is assigned to a multi-professional team which often consists of a psychologist, special educator, speech language pathologist, social worker, occupational therapist and physical therapist some of whom may (or may not) have theoretical and competency based training in ABA. In fact most professionals lack formal education in this area (see Keenan et al., 2014; Roll-Pettersson & Ala'i-Rosales, 2009) and preschool staff report having little theoretical knowledge concerning ASD and the basic principles and procedures of ABA (Långh et al., 2016; Zakirova Engstrand, & Roll-Pettersson, 2012). Parallel to support from a habilitation centre the preschool in which the child is enrolled obtains central funding from the local education authority/ municipality to employ a para-professional to work with the child (see Eikeseth et al., 2012). In cases involving EIBI the preschool will commit

to providing about 15 hours and parents 10 hours weekly of structured interventions over a two-year period. During this period, the habilitation centre will provide supervision (usually weekly the first year and twice a month the second year) to the family, child and paraprofessional at the centre (personal knowledge). However, habilitation has little direct control over how well, how often, or whether interventions are actually implemented in the preschool or home setting. Lack of implementation with in preschools has been noted in a self-report pilot study by Zakriova Engstrand and Roll-Pettersson (2012) in one municipality involving 21 preschool teachers of children with ASD who reported that the children received on average 2,56 hours per week of one-to-one support.

The importance of educational interventions being based on evidence and best practice is mentioned in the Swedish Education Act (The Swedish National Agency for Education, 2010b) although, to date, there are no Swedish guidelines or recommendations for preschool teachers or special educators concerning what constitutes EBP for preschool children with ASD. The Swedish National Curricula for Preschool (Lpfö 1998 revised 2010; The Swedish National Agency for Education, 2010a) highlights the importance of democracy, every child's right to express their own opinion and make choices, and that preschool should prepare all children for lifelong learning, be enjoyable, safe, and provide a rich learning environment built on the child's experiences, interests, needs and opinion, and free of any kind of discriminatory influences. On a parallel note, the Swedish habilitation guidelines (Bromark & Granat, 2012) recommend early (as soon as ASD is identified), developmentally appropriate, comprehensive and intensive interventions based on ABA, e.g. embedded, naturalistic, incidental teaching, discrete trial teaching, addressing the key symptoms of autism. In sum, one factor of concern for implementing EIBI in the Swedish system is that inter-organizational epistemological and philosophical differences between habilitation (health care) and preschool (educational system) may create tensions that affect professionals' skills, values and allegiance in the context of implementation.

The aim of the present study is to obtain a clearer picture of existing barriers as well as supports effecting implementation of EIBI in Sweden. Our assumption is that by utilizing a case-study approach we will make visible the interplay between cultural components, beliefs, and tensions not otherwise evident in either experimental or naturalistic prospective design studies. It is also our assumption that the findings derived from the present study may contribute to obtaining a deeper understanding of possible systemic contingencies which may in part explain differing results as evidenced in Fernell´s et al. (2011) naturalistic study.

Methods

Though scholars have investigated a number of features effecting implementation of EIBI there are to date no qualitative studies (to our knowledge) based on a case study approach (Yin, 2009). The case study was chosen as the method of choice because it can be used to contextually explore and analyze why an efficacious treatment is working/failing within a human service setting, it is an "empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context especially when the boundaries between phenomenon and context are not clearly evident" (Yin, 2009, p.18), as is the case of implementation of EIBI. The goal of the case study is to generalize and expand theoretical propositions rather than establish a causal relationship between independent and dependent variables. Data is collected through key-informants using multiple sources of evidence (Yin, 2009).

The case study described in this paper evolved around two preschools and two children with autism, affiliated habilitation centers and municipalities within the same geographical region and borrowing from the field of ethnography participant observation was used to obtain a deeper picture of contextual and cultural aspects affecting implementation of EIBI. This involved multiple visits to the preschools, taking field notes, unobtrusive observations which entailed taking part in daily activities within the preschool, conversing with staff, and helping out in general activities, such as meals, circle time or learning activities involving the child with ASD.

Procedure

Two habilitation centers with adjacent municipalities were contacted by the authors to participate in the project. The habilitation centres were specifically chosen due to having a history of using EIBI practices, staff who have studied behavior analysis at university level meeting the requirements of the Behavior Analyst Certification Board (2016; see BACB.com), as well as, having research and development projects with a basis in ABA and/or EBP. These centers also provide introductory, "first step" work-shops for paraprofessionals and parents concerning ASD and the basic principles and procedures of ABA. The centers were requested to recruit one to two families with a child diagnosed with autism who has been in a "high quality" EIBI program for at least one year. Parents interested in participating were provided with a written description of the methods and purpose of the project and of the rights of participants. A meeting at the habilitation was arranged in conjunction with a supervision session in which the parents as well as preschool paraprofessional were presented with the purpose of the study, ethical guidelines and written consent forms were signed. The parents of the other children in the preschool groups were provided with basic information concerning the project. In order to obtain a holistic picture of the contextual variables effecting implementation, interviews with habilitation specialists and special educators focused primarily on distal aspects while observations and interviews with the paraprofessional and parents focused on proximal processes. The project was ethically approved through the Department of Child and Youth Studies, Stockholm University. Data were collected using multiple sources of information during a 12 month period. As can be seen in Table 1, the sources of evidence used in this study were participant observations, semi-structured interviews with key informants, a focus group interview, and direct observations.

Table 1. *Participants and sources of information.*

Type	Sources
Literature review	Peer review data bases.
Participant observations	Observations were conducted in two inclusive preschools covering in total approximately 20 hours per site.
Direct observations	1) Introductory course for paraprofessionals at habilitation center. 2) Two supervision meetings at habilitation centres in which paraprofessional from the pre-school and parents participated; components included review of goals, role-play and feedback.
Individual interviews	Seven semi-structured interviews were conducted: two parents, two paraprofessionals, two municipality based special educators; a district level special education administrator responsible for granting resources and goal-setting; a behavioral special education specialist and a senior supervisor behavioral psychologist.
Focus group	At habilitation center; behavioral speech language therapist, behavioral psychologist and social worker.

Preschool settings

Preschool 1. Ludvig is five years old and attends a preschool outside of a large city, he has had an autism diagnosis since he was three years of age, and he lives with both parents who have academic degrees and a younger brother three years of age who attends the same preschool. There are in total 120 children between one and five in the preschool and about 20 children in Ludvig's group, due to the large number of children and limited spatial area several groups share on rotating basis the various preschool facilities. Christina, the paraprofessional, was employed by the municipality at the time Ludvig obtained his diagnosis to work on a fulltime basis with Ludvig. She has a degree in preschool education and has worked with several children using EIBI over approximately a 10 year period with supervision from the habilitation center. Since she started working with Ludvig there have been three intermediate level supervisor turnovers, however, the senior supervisor with extensive experience of supervising EIBI has been consistent. Both Christina as well as Jessica (Ludvig's mother) report continual staff turn-over at the preschool. Christina and the parents visit the habilitation center for supervision with the senior supervisor and program follow-up on a four to six week basis. In addition, Jessica, comes to the preschool in the morning once a month in which she and Christina go through the programs, materials, goals and discuss progress.

Preschool 2. Lewis is also five years old and has autism, he lives with both parents who are professionals with academic degrees and his older sister. His mother, Nina, is Spanish and the family moved to Sweden two years before he was born. He attends a small preschool in the center of a large city. His parents moved him to this preschool when he was diagnosed with ASD three years ago. Birgitta, the paraprofessional was employed at the preschool prior to his enrollment. She has university degree in social work and has worked with children with autism for the past six years. The family and preschool has had the same senior supervisor Sarah proficient in EIBI from the habilitation center whom they meet with on a monthly basis. In addition parents meet on a monthly basis at the preschool together with Birgitta and Anne. Anne is a municipality based behavioral special educator, and holds a position comparable to habilitation's intermediate level supervisor. She provides weekly onsite behavioral coaching and support to Birgitta. Anne is also present at all supervision meetings and contacts the senior supervisor for advice when needed.

Data analyses

The individual and focus group interviews were recorded and transcribed verbatim. In the data analysis process the interview transcripts and field notes were combined and informed by a grounded theory approach. The first and second authors separately read the transcripts and used line-by-line coding to identify categories and patterns. Then they met, compared categories and reached consensus concerning rubrics and content, and they utilized an abductive analysis process to relate findings with previous research to generate interpretation (Dey, 2012). All interviews were conducted in Swedish, citations included in this article were translated from Swedish to English by the first or second authors who are proficient in both languages.

In conclusion of the data analysis process member checks (Lincoln & Guba, 1985) were made to ensure credibility of findings. This entails that participants were sent a draft of the manuscript and were requested to verify the accuracy of their citations as well as the relevance of the text. This resulted in comments from one of the special educators clarifying her role, resulting in changes in the manuscript, and from one of the mothers supporting findings, however she pointed out that now when her child now goes to school there is much less competence among pedagogical staff.

According to Pring (2006) an overriding ethical principle is the importance of respecting the dignity and confidentiality of the informants. In order to keep within this principle the description of informants and preschools has been kept at a bare minimum and names of persons, organizations and places have been omitted or changed. The habilitation centers and the two preschools in which participant observations took place were selected as examples of high quality EIBI to minimize the risk of researchers being put in the dilemma of possibly having to breach trust with informants through disclosure of possible of wrong doings. In situations in which sensitive information of relevance for the project is disclosed only information triangulated by both parents and paraprofessional is presented. Habilitation and municipality professionals were asked general questions concerning implementation of EIBI within the region and not questions pertaining to the specific cases.

Results

From the analysis of interviews and field notes a model evolved illustrating factors affecting implementation. As can been seen in Figure 2 there is an interconnected relationship between the core category "Implementing EIBI in accordance with research and best practice" and the five interconnected categories (a) Entry knowledge and competence, (b) Development and competence through supervision, (c) Preschool administrator - leadership, (d) Distal influences, and (e) Inter-organizational tensions, values and bridges.

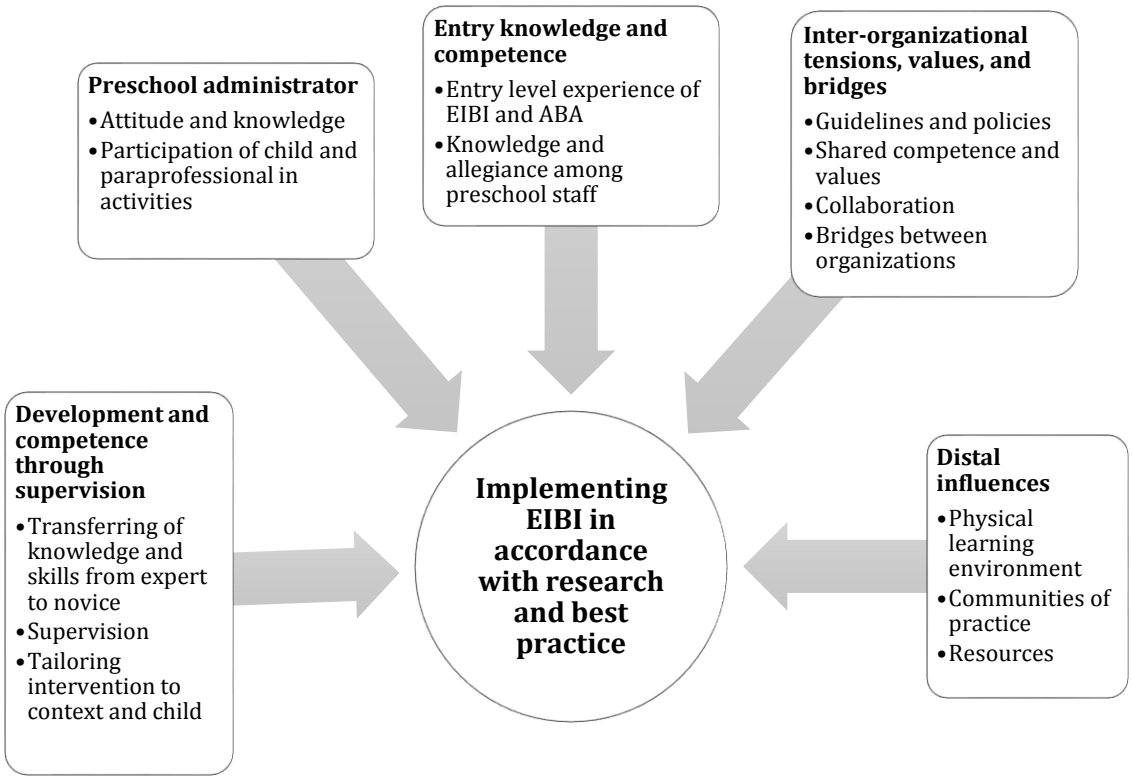

Figure 2. *Theoretical model of factors effecting implementation and of the interrelatedness between core category and categories.*

Entry knowledge and competence

The one aspect perceived as necessary to ensure implementation of high quality EIBI was the knowledge and skills of persons in the child's most proximal environments, the home and preschool. Participating paraprofessionals found or made instructional materials congruent with child related goals e.g. laminating pictures, making games, drawing visual prompts for song texts; bringing puzzles from home etc. According to Leaf et al. (2016) teachers need to be able to make an "in- the- moment" assessment of the learner and use the assessment, along with clinical judgement, to adapt instruction immediately and based on child responding as illustrated in the following field note;

> *"When I came in the room Ludvig was lying on the floor playing with a train, he was repeatedly saying to himself- as if he were the conductor, 'The doors are closing, please make room for other passengers', 'please move to the middle of the train' etc. He appeared oblivious to the fact that I just came in to the room. Christina asked him to tell me why the train is with him at the preschool today, she had to do a lot of verbal prompting before he said it was his birthday. After a few minutes she asked him to please put the train away because it was time to work- this appeared to agitate him and he started repeating irrelevant phrases at a quicker tempo and higher volume such as 'could you be so sweet as to leave' 'silly child' etc. Christina was firm but totally calm, she began by trying to divert his attention away from the train to the table, and he kept repeating phrases, the tenseness of the situation seemed to balance on a fine line between finding calmness or turning into a full blown temper tantrum, the air seemed to stand still. She was composed the whole time, 'we are going to work a little while' 'sit by the table' (I decided to leave the room, feeling that my presence might further ignite the tantrum). While I was out I could hear the intensity of his phrases becoming calmer and after a couple of minutes I went back in. Christina had taken out a token economy ladder and laminated pictures which she had made with texts 'STOP don't kick, you'll make someone sad' or 'a hug makes someone happy', he became involved in talking about stop, hugs, what makes people happy, sad etc. Christina explained that the purpose of these pictures is also to help him understand what he can do instead of kicking."* (Field note)

She also began filming play situations involving two to three children to show and discuss with parents and supervisors. In regard to the specific cases the paraprofessional registered what was done and how often and participant observations in the preschools confirmed that documentation was conducted on a daily basis.

When discussing acceptance of EIBI, the participating habilitation specialists and special educators said that in their experience preschools with prior experience of EIBI are more motivated to provide EIBI than preschools lacking experience.

> *"It is fantastic when a child gets a paraprofessional with previous experience with this, but that is almost never the case, we usually have to start with completely new and inexperienced resource staff, which we have to teach everything and it, is very rare that person will continue."* (Senior supervisor behavioral psychologist)

Lack of basic knowledge and skills might entail that a practitioner changes or omits a core component rendering an effective practice ineffective or at worse detrimental (see Ala'i-Rosales et al., 2010; Eikeseth et al., 2012; Scheuermann, Webber, Boutot, & Goodwin, 2003);

> *"The picture that they give is that they have obtained nothing concerning learning psychology and very little about disabilities in either their teacher degree or special education programs."* (Focus group)

Similarly, referring to own observations in various preschools;

> *"An unskilled person might move too quickly, or change the program….or inadvertently reinforce the wrong behavior, or give too many verbal or detailed instructions to a child*

> *(with autism) who does not understand. It is not so strange if the child becomes frustrated or gets angry."* (Behavioral special educator)

Participating habilitation centers provide "first-step" work-shops introducing ABA and EIBI to paraprofessionals, however involving only one person in the work-shops and intervention process i.e. the paraprofessional may be problematic.

> *"What we noticed is that when staff (paraprofessionals) have attended the 'first step' course they become a bit 'alone' concerning having this knowledge... which entails that it is only when that person is at the preschool that the child gets the support that he or she needs. And when the person goes home then no one else knows what to do and thus the entire responsibility rests on the person responsible for the child."* (Focus group)

> *"I now contact every preschool director and motivate them to send personnel…my strongest argument is that this knowledge (ABA) is not only of importance for children with autism but for all children and they are very positive…now when I phone they say 'yes, yes, we need to send everyone or we will send two now and two in the autumn, it has really become popular."* (Focus group)

Development and competence through supervision

According to Denne, Hastings, Hughes, Bovellc, and Redford, (2011) competency is an acquired attribute consisting of the knowledge and skills required of an individual to perform job related tasks. Research to date emphasizes that competency-based skill acquisition is attained through high quality supervision which combines instruction with performance criterion, rehearsal, practice procedures such as role modelling and systematic feedback (see Dunst, 2015; Roll-Pettersson, Ala'i-Rosales, Kennan, & Dillenburger, 2010). This type of supervision is imperative for the development of implementation proficiency and to transfer the theoretical underpinnings of ABA to real life settings, the idea being that within the two-year time span the paraprofessional and parents will have learned techniques and approaches which they will be able to transfer to new or similar situations;

> *"For example now when a child has gotten rid of one behavior that was causing problems – let's say 'he didn't like the sound of vacuum cleaners' but then he gets into another environment and there is fan at that place- hopefully the parents (or paraprofessional) will be able to figure out what they can do so that the child gets use to the sound of fans."* (Senior supervisor behavioral psychologist)

Whilst supervision regarding clinical judgement (detecting, analyzing, and responding to problems in everyday learning situations) was highlighted by participants the type and degree obtained in the two cases differed.

Participants highlighted the importance of onsite supervision away from the contrived environment of habilitation with the purpose of being able to observe what is actually being done, which materials are being used (or not being used) and thereby design more functional individualized interventions of higher contextual social validity. The degree of on-site supervision from habilitation centers appeared to be correlated with number of staff (i.e. senior and intermediate level supervisors) competent in ABA as well as number of caseloads. Though onsite supervision was infrequent the citation below provides an additional example of the positive effects both at home and in preschool.

> *"When we needed help with toilet training, Anne, Birgitta and Sarah came home to us on several occasions and trained him at home…and Sarah, how she sat with him and how she worked with him! We started the toilet training at home, and then continued to the preschool and now he can go to the toilet all by himself…it is so wonderful that he has learnt this and I think it is so wonderful that we have received such good support."* (Nina, Lewis' mother)

In the preschool:

> *"Sarah was here and saw what he did and did not do and how he made contact with the other boy … they played with cars and Lego dolls. I was really moved because they played so nicely … instead of giving verbal instructions I am to point so that he would look at him (other boy). They played for almost an hour."* (Paraprofessional)

Preschool administrator- leadership

Consistent with previous research (Pinkelman, MacIntosh, Rasplica, Berg, & Strickland-Cohen, 2015) the present findings confirm that leadership support affects the learning climate, acceptance and sustainability of EBP. The citation below identifies the importance of the preschool administrator communicating to staff the role of the paraprofessional.

> *"Positive attitude toward this (EIBI) and creating a working environment with prerequisites needed so that the paraprofessional can be used for the child which means communicating this with the rest of the staff so that when we come with a program describing what the paraprofessional needs to do - which might seem contrary to what staff in preschool think - that the paraprofessional will be supported in doing that".* (Senior supervisor behavioral psychologist)

Clearly, support/lack of from the preschool administrator impacts the learning climate in which implementation takes place. Paraprofessionals employed to support the learning of a child with autism may be expected to fulfill general needs within the preschool group, such as substituting for other staff. One of the paraprofessionals described her situation;

> *"Very messy…… I work on the side, so to speak and that is problematic because I cannot be with the rest of the staff and discuss. I never participate in reflection time, or planning, as a paraprofessional you are not really part of the group, this is a very difficult situation."* (Paraprofessional)

Exclusion from staff meetings reduces the likelihood that the child with ASD will participate in preschool activities; both because the person with most competence concerning the child cannot influence the planning and because not being informed about the planned activities at preschool hinders the paraprofessional preparing the child for planned activities reducing possibilities for observational learning, natural language acquisition and generalization of skills (Leaf et al., 2011).

Distal influences

Distal factors influence proximal environments in which an intervention is delivered and thereby its effectiveness, quality, and sustainability (Fawcett, 1991; Odom et al., 2013). There has been little research, however which address how these issues relate to factors such as evidence-based practice skills (Slocum et al., 2014) or communities of practice and collaboration (Kelly & Tincani 2013; Kucharczyck et al., 2012). In the present cases, paraprofessionals discussed how they fit within the organizational structures. Though they worked in separate municipalities they both discussed the importance of belonging to a "community of practice" in order to learn about ABA, develop competencies, discuss concerns, reduce the feeling of isolation, share experiences and meet other paraprofessionals (see Odom et al., 2013).

> *"We use to have meetings in which we would meet ….but we don't have them anymore, they (municipality) cannot arrange these meetings and I think that is a great pity, because they were really good…. We could talk about things concerning our child, progress etc. We could also share suggestions ideas… or sometimes we discussed an article or reading, a real pity."* (Paraprofessional)

Municipality guidelines and standards concerning staff- child ratio, number of children, and the physical environment also affect implementation. For example the physical

environment and large number of children lead to limited access to small rooms for the paraprofessional to work one-on- one with the child. She said that this lead to her feeling she was always in someone else's way.

> *"I manage myself, if I say so, I put up work based on the program I have ... sometimes I feel I am always in the way, wherever I am, there is always someone else who wants to get in there."* (Paraprofessional)

Inter-organizational tensions, values and bridges

In a dualistic support system the need to build bridges between stakeholders is accentuated. According to the special education administrator responsible for granting resources collaboration, transparency and trustful relationships between health care and municipality are the basic foundations promoting implementation and these aspects need to be nurtured on both distal and proximal levels. One of her bridging roles is to invite participants in the child's network to meet and discuss goals and ways to collaborate and she highlights the importance of preschool staff listening to parents' expectations and also to explain why some things will or will not be done in preschool.

> *"In the first place I think that the municipality and health care need to have consensus on what this entails (EIBI) - they need to communicate with each other about own tasks and responsibilities. That must clearly be the first matter and secondly they need to have actual physical encounters and with the parents....there is a need to be better coordinated. It needs to be transparent. I think it is very unclear. It has happened that paraprofessionals indicate that 'I cannot do what I am supposed to do".* (Special education administrator)

An example of inter-organizational collaboration was that one of the municipalities employed a behavioral special educator as an intermediate level supervisor to provide more frequent as well as more supervision at the preschool than allocated by habilitation, thereby creating a bridge between organizations. The relevance of this position is highlighted by both Nina (Lewis' mother) and Birgitta (Lewis' paraprofessional):

> *"She is like a bridge .... She is very important for this (implementation) at the preschool ... she visits and checks on Lewis, it feels very important for us, she is a special educator and provides a lot of support and is in control of the whole situation. I do not think things would work out without her."* (Nina, Lewis' mother)

Birgitta commented that she turns to her with pedagogical questions regarding Lewis.

> *"…'This is what I am doing now, I need support so that I advance. What are your suggestions? Ideas?' or 'Now I did it this way, what do you think? Is it good?' I discuss things with her and she helps me put together a plan concerning how I should proceed."* (Paraprofessional)

Organizational values are transmitted through professional guidelines and differences can lead to tensions. Habilitation expressed following "their" guidelines supporting early intensive behavior intervention for children with autism (Bromark & Granat, 2012) while preschools follow the national preschool curriculum (Lpfö 1998 revised 2010)

> *"…which literally can be interpreted as allowing the child with autism to fixate on a specific item as much as he/she desires while an approach based on applied behavior analysis might use the child's interest in in "step-based developmental manner" to obtain specified learning goals….it is often perceived as contrary to preschool curricula…which is grounded on promoting each child's influence and I often hear from staff (preschool) that this is dog-training, … The whole time I have to think: - 'What are our guidelines in preschool and how can we apply the preschool curriculum with this way of working.' …"* (Behavioral special educator)

The importance of recognizing the effects of differing perspectives and values between the health care system and municipality was discussed and medical terminology such as "client" and "treatment" can further accentuate existing barriers.

> *"In health care, you have a certain language and preschool has another language ... It would be much easier for them [habilitation], I think, to reach out to preschools if they had another way of expressing themselves."* (Behavioral special educator)

Noted in interviews are that negative attitudes toward EIBI is generated by the role of habilitation as being "experts" and preschools "dependents" and some habilitation centers require written contractual agreements entailing that preschools are required to adhere to provide a minimum number of hours of EIBI otherwise habilitation would withdraw supervision if it is disclosed that the preschool breaches on the agreed upon commitments creating a:

> *"…'we and them' stance which in reality reduces the probability that preschools will agree to provide EIBI interventions."* (Special education administrator)

In addition collaboration between preschool and habilitation is a matter of choice.

> *"They (preschools) may decline to provide intensive behavioral supports and in that case parents will then have to move their child to another preschool".* (Special education administrator)

Lewis's parents took him out of the preschool he had been attending following diagnosis, his mother described the preschool as having a negative attitude concerning implementation of EIBI, a very poor learning climate, continual staff turnover, and personnel lacking knowledge of his needs.

Discussion

For an individual child with ASD the long term effects of high quality EIBI may make the difference between a life full of opportunities, making choices and belonging or institutionalization, restricted choices and loss of meaningful control. Though the case study method does not demonstrate cause and effect relations, it does provide information which can be used to inform why an efficious intervention is working / not working with in a given culture (Yin, 2009). While findings from the present study describe a number of variables supporting implementation of EIBI, barriers were also noted reinforcing findings from previous studies concerning lack of knowledge and implementation of EIBI in preschool settings (e.g. Zakirova Engstrand & Roll-Pettersson, 2012). At a minimum, findings from the present study serve to question whether the broader structural foundation as well as the infrastructure with in Swedish preschools are conducive to implementation of EIBI at the level needed to produce positive child related outcomes. Taken together findings underscore the importance of researchers conducting naturalistic studies considering the effects that broader contextual variables have on child learning outcomes (Fawcett, 1991).

As previously noted, Metz's (2016) implementation equation consists of three factors which when multiplied lead to positive outcomes; 1) an effective innovation, 2) supported by effective implementation, and 3) enabling contexts. Barriers evidenced in both field notes and interviews effecting implementation were isolation of the paraprofessional as well as limited involvement of other preschool staff in the didactic planning, implementation or evaluation of EIBIs. This infrastructural disconnect is problematic and as noted in the focus group interview entails that absentee (e.g., sick leave, changes of jobs) involving the paraprofessional will entail lack of implementation. Indeed, limited involvement of others and isolation of the paraprofessional lead to reduced opportunities for the child with ASD to engage in and learn from naturalistic learning opportunities

involving typically developing peers. This stands in direct contrast to the philosophical underpinnings of Lpfö 98 (2010), which state that Swedish preschools should provide rich learning contexts for all children and for all children to experience "being an asset to the group" (p.5). The extended role of paraprofessionals noted in the present study was unexpected; they functioned as both "drivers" and "negotiators" within an EIBI implementation framework. As drivers they were responsible for pushing EIBI forward, being analytic, managing high intensity and individualized learning opportunities exhibiting the competence and skills to catch and utilize in the moment learning opportunities, document progress and being responsible for planning and even making educational materials. As negotiators they were responsible for integrating EIBI into the preschool context, a context in which they and the child with autism are perceived as "visitors" supervised by habilitation (health care system) of which they are not a part.

Differing guidelines between habilitation and pre-school create loyalty and turf issues, this in combination with differing terminology (medical vs educational) and the need for collaboration between organizations reduces the likelihood of adherence to EIBI (cf. Cook & Odom, 2013). The behavioral special educator described negotiating guidelines when working in preschool settings, i.e. finding connections between and within guidelines which in this case can on a short term basis mediate control and counter-control mechanisms between organizations. However, for change to occur on a broader and long term basis clearly formalization of policy partnership between habilitation and preschools are needed. Metz (2016) describes and highlights the key role of implementation teams and an iterative process involving key stakeholders in order to improve the fit and the sustainability of evidence based practices in regular settings. In regard to the Swedish system this would entail involving preschool staff (other than paraprofessional) and preschool leadership within an evidence based framework by incorporating goals and values as expressed in Lpfö. This clearly would increase preschools motivation to engage actively and to support implementation (see Odom et al., 201.3). Callahan et al. (2016) maintains that adequate empirical evidence of an intervention is not sufficient to ensure widespread usage in naturalistic settings. The authors underscore the importance of recognizing stakeholder's perception of the social validity of interventions, such as satisfaction with the goals, procedures and whether outcomes are of value (Callahan et al., 2016). It is important to note that while meaningfulness and social validity of interventions are key components for implementation, the competence and knowledge of direct care staff and supervisors are also an absolute necessity (Ala'i-Rosales et al., 2010; Eikeseth et al., 2102; Keenan et al., 2014; Leaf et al., 2016; Schereumann et al,. 2003; Shook, Ala'i-Rosales, & Glenn, 2002). Dillenburger et al. (2014) highlight the importance of preparation for professionals involved in EIBI (e.g. educators, speech language therapists, psychologists) and recommend university based "dual competencies" in regard to area of practice as well as the conceptual and procedural orientation (e.g., speech and ABA or special education and ABA). Dillenburger and colleagues maintain that without this combination it is likely that the EIBI 'interventions' children and families obtain will be ineffective eclectic approaches. This is supported in the empirical research (Howard, Sparkman, Cohen, Green, & Stanislaw, 2005; Howard, Stanislaw, Green, Sparkman, & Cohen, 2014). The predominance of dual competencies among related service professionals, psychologists and special educators on a national level in Sweden are questionable (see Roll-Pettersson, Ek, & Ramnerö, 2010) and an area of relevance for further study. Clearly basic lack of knowledge will lead to ethical concerns regarding interventions affecting both treatment quality and effectiveness of implementation.

With a basis in Metz (2016), a review of the literature, and from the findings of present study, we propose a multidirectional transactional implementation science formula to enhance the "fit" of EIBI within regular mainstream settings and across organizational

cultures. It should be noted, however, that the starting point is to have an explicit plan for implementation that involves designed improvement cycles. This study as well as previous investigations suggest that lacking is a systemic implementation plan for successful adoption of EIBI in Sweden. This is problematic in that system change process is difficult without a planned design and communication at proximal and distal levels (NIRN, 2016).

Given a formation of an implementation team (see Odom et al., 2013), the current study suggests an expansion of the implementation cycle to include contextual validity assessments. Figure 3 presents a graphic representation of an adaptation of improvement cycles described by NIRN. The components are similar to Metz (2016), in that the flow from innovation to implementation is part of the equation. As can be seen valued outcomes are a central feature of the recursive cycles. A focus on valued outcomes at each stage insures that key stakeholders (parents, preschool and habilitation) collaboratively discuss contextually relevant short and long term goals and values. Within the proposed transactional framework each part of the formula affects the other – valued outcomes affect the goals chosen, which effects how and where the EBP is implemented. At the level of innovation, stakeholder validity is part of what informs the design and redesign of the innovation. The present study suggests that the usability testing phases include explicit testing of the contextual and cultural validity.

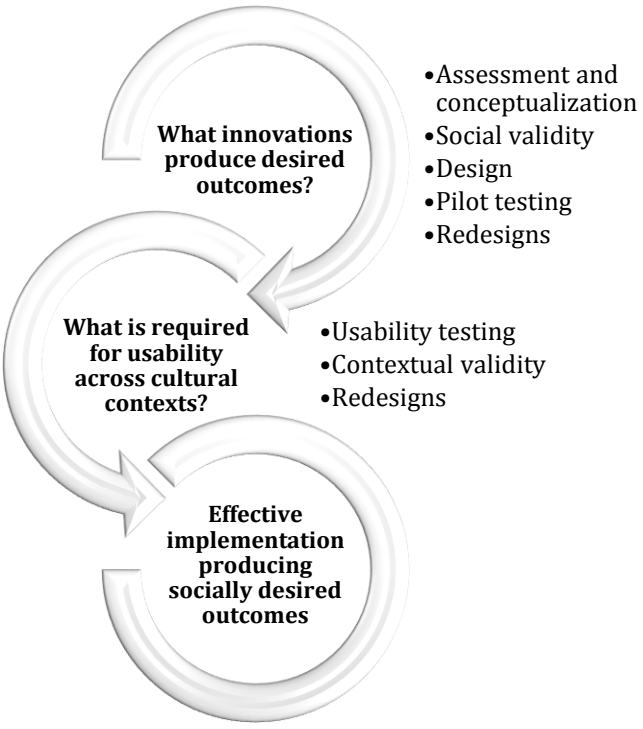

Figure 3. *Transactional implementation framework of EIBI across cultures including family, preschool and habilitation.*

The valued outcomes chosen by stakeholders thereby affect which interventions (EBPs) will be selected as mechanism(s) for change; this will include clarity and agreement concerning "core components" and mechanisms for ensuring procedural fidelity of the critical features of formats and settings. Contextual usability testing would include evaluation of shared mission and language, building of communities of practice involving preschool team, clarity and extension of who will be involved in implementation and supervision/coaching, both on site and at habilitation centers, to enhance continual skill

development and participation. The enabling context i.e. support from leadership, resource allocation, staff, space and time would also be evaluated and strengthened, if necessary. As interventions are innovated, implemented, developed, and redesigned across contexts, we will learn more about how to create both social and contextually valid interventions that improve the lives of children and families.

Strengths, Limitations, and Implications for Future Research

In sum, the findings from different sources provided an understanding of factors effecting the implementation of EIBI for children with autism in Swedish preschool settings. There are several limitations with the present study, which need to be highlighted. Firstly only two cases were chosen and neither were representative of typical cases (they were examples of high quality practice). Thus it is highly likely that there are considerably more obstacles in habilitation centers and preschools lacking these prerequisites. International comparisons are of interest. How do other countries deal with the issue of translating research to practice? What content is provided in higher education for teachers and allied health professionals involving autism, ABA and evidence based practices? What is mandated? We are living in world in which boundaries between countries are blurring and thus cross cultural comparative studies are clearly needed. Along these lines, future research could also collect large-scale regional data concerning staff knowledge, attitudes, efficacy and turn-over and how these correlate with child related outcome. Within and across culture studies are warranted.

It might be beneficial to include other measures and participants in future case studies. For example, other preschool staff and preschool administrators were not formally interviewed (though they were observed and spoken with during the visits at preschools) and including these groups would have further extended the knowledge base on the importance of staff and administrative leadership for the implementation of EIBI.

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