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ORIGINAL ARTICLE

Using Causative Methods to Determine System-Level Factors Driving the Uptake and Use of Evidence-Based Practices in a Public Early Intervention System

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Abstract
Part C Early Intervention (EI) systems are an entry point to services for autistic toddlers and can be leveraged to facilitate access to autism evidence-based practices (EBPs). However, EI systems are complex and limited research has examined how an EI system's infrastructure (i.e. system-level factors) impacts the adoption and implementation of EBPs. To address this gap, 36 EI providers and 9 EI administrators completed a semi-structured interview or focus group about factors impacting the implementation of autism EBPs. Qualitative analysis included a combination of grounded theory and causative coding. Analyses were refined by input from providers, administrators, and family stakeholders in the form of round tables and presentations at the state's interagency coordinating council. Primary themes centered on: (1) the costs associated with independent contracting structures; (2) operational demands; (3) workforce stability; (4) communication consistency; and (5) implementation supports for EBP implementation. Causative coding helped to demonstrate the perceived relationships between these factors and underscored the important role of incentivization structures, collaboration opportunities, and championing in supporting the use of EBPs within a system that primarily uses independent contracting structures. The current study extends previous research by demonstrating how several system-level factors are perceived to play a role in the adoption and implementation of EBPs by independently contracted EI providers. These findings underscore the need for implementation strategies, such as incentivization strategies and social network building, to increase providers' implementation of autism EBPs within EI systems.

Keywords Early Intervention · Evidence-based practice · Outer context · Implementation strategy

Introduction

The detected prevalence of autism among school-age children is 2.87 percent (Maenner et al., 2023). Autistic features (see Bottema-Beutel et al., 2021) often occur alongside other psychological and medical conditions (e.g., Lai et al., 2019; Mazzone et al., 2018) and can reduce the quality of life of autistic individuals and their families (Buescher et al., 2014; Mason et al., 2018; Vasilopoulou & Nisbet, 2016). Evidence-based practices (EBPs) provided at a young age may support the vocational, educational, and mental health outcomes of autistic individuals (Cidav et al., 2017; Iadarola et al., 2018). Yet, autistic individuals and their families continue to face considerable barriers to accessing high quality services in the community (Boyd et al., 2022), in part due to a failure to effectively deliver these services and supports within health and educational systems (Bottema-Beutel et al., 2021). In order to improve access to care, it is critical to understand and address the system-level barriers that impact access to EBPs for autistic children.

For young autistic children and those who have an increased likelihood of being autistic, implementation efforts have centered on translating EBPs into Part C Early Intervention (EI) systems. Federal funds through Part C of the Individuals with Disabilities Education Act (IDEA) are allocated to each state to implement a statewide EI system that delivers comprehensive, multidisciplinary services to

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infants and toddlers (U.S. Department of Education, 2021). EI systems are uniquely positioned to provide EBPs to young autistic children as they are federally mandated to provide family-centered services to children under 3 years with developmental delays. Over 360,000 U.S. toddlers are served by Part C systems (U.S. Department of Education, 2022). Approximately 46.6 percent of autistic, school-age children were at served within EI systems prior to age three (Shenouda et al., 2022). Thus, EI systems are also well positioned to deliver EBPs to many young children with an elevated likelihood of having autism.

Recent implementation efforts within EI systems have resulted in providers improving their fidelity to the delivery of autism EBPs (Rogers et al., 2022; Stahmer et al., 2020) and have demonstrated the increasing reach of autism EBPs over the course of several years (Rieth et al., 2022). At the same time, EI provider participation within implementation trials has been inconsistent and relatively low (e.g., Pickard et al., 2023; Rogers et al., 2022; Stahmer et al., 2020) when considering the size of the EI workforce (Bruder et al., 2021). Further, EI provider fidelity to autism EBPs has been less robust than expected in response to training and ongoing consultation (Pickard et al., 2023; Rogers et al., 2022). The inconsistent adoption and implementation of autism EBPs may highlight the complexity of EI systems, yet limited research has systematically examined this complexity and the factors that directly drive the uptake and use of autism EBPs.

Implementation science offers a set of models and frameworks that can be used to understand the multi-level factors that impact the uptake and use of EBPs within EI systems (e.g., Bauer & Kirchner, 2020; Nilsen, 2020). Many frameworks include factors related to the alignment of the intervention being implemented (i.e., intervention-level factors), the providers implementing the intervention (i.e., provider-level factors), the agencies or organizations in which an EBP is being implemented (i.e., inner context factors), and the systems in which implementation efforts are occurring (i.e., outer context factors) (e.g., Damschroder et al., 2009; Moullin et al., 2019). To date, most research studies within EI systems have focused on intervention-level and provider-level factors impacting autism EBP use. For example, at the individual level, EI providers represent a multitude of disciplines (Aranbarri et al., 2021; U.S. Department of Education, 2021). Accordingly, EI providers have varied attitudes towards providing EBPs to infants and toddlers, with many providers also endorsing the need for further training in EBPs for autistic children (Aranbarri et al., 2021; Pickard et al., 2021; Stahmer & Mandell, 2007). At the intervention level, EI providers report adapting autism EBPs in response to families who present with priorities and concerns that may be outside the scope of some manualized autism EBPs (Pickard et al., 2023). EI systems serve autistic children and families often underrepresented in traditional efficacy trials (Steinbrenner et al., 2022), which may further contribute to issues of EBP fit (Jones & Mandell, 2020).

The role of system-level factors in driving the uptake and use of autism EBPs within EI systems has been explored (e.g., Aranbarri et al., 2021) but largely overlooked despite reports that hint at the complexity of EI system funding structures and policies (e.g., Noyes-Grosser et al., 2018). Examining system-level factors may provide a more holistic picture of how these factors interact to impact the scale up of EBPs within public EI settings (e.g., Fagan et al., 2019). This project was specifically grounded in the SPR MAPS IV task force framework that delineates system-level factors that affect the implementation and scale-up of EBIs across a variety of public systems (Fagan et al., 2019). This framework was selected given its emphasis on system-level factors, including workforce stability, funder capacity, incentivization structures, leadership support, and the capacity to collect and evaluate implementation outcome data (Fagan et al., 2019). As Fagan and colleagues argue, these factors may have a sweeping impact on the scale-up and sustainability of EBPs across systems (Fagan et al., 2019) and may also exert influence on individual provider factors (e.g., Becker-Haimes et al., 2021).

Research has yet to systematically examine how the infrastructure of EI systems impacts the adoption, implementation, and sustainability of EBPs including those relevant for autism. To unpack this complexity, it is important to understand which system-level factors matter, how the factors act to affect change, and why they have the impact that they do. This contextual understanding can help to generate hypotheses about potential mechanistic pathways, which is imperative for the design of implementation strategies targeted at potential mechanisms driving the adoption and use of EBPs within this system (Lewis et al., 2020, 2022). In response to this need, aims of this study were to use causative qualitative methods adapted from attributional theory (Munton et al., 1999; Saldaña, 2021) to: (1) identify the system-level factors that impact providers' adoption and implementation of EBPs; and (2) generate hypotheses on potential pathways by which these outer context factors impact EBP adoption.

Methods

Study Setting

This study was conducted as part of an ongoing contract and partnership with the Georgia EI system housed within the state Department of Public Health. The EI system consists of 18 public health districts that oversee EI services within one or more counties. Research procedures were approved by the Emory University Institutional Review

Board and the Georgia Department of Public Health; all participants provided written consent prior to study participation. Participants were providers working within the EI system as well as EI coordinators, or administrators who oversee service delivery.

Procedures

This study was situated within a larger survey study that assessed EI provider's reported use of autism evidence-based practices (Hendrix et al., 2023). As part of participation in the survey study, participants indicated whether they would be interested in participating in a follow-up interview or focus groups about the factors influencing their participation in EBP training initiatives and the subsequent implementation of these practices. The emphasis on both training participation and implementation was important given that many EI providers do not have formal training in autism EBPs (e.g., Pickard et al., 2021) and thus their implementation of these practices is often contingent on receiving training in them first. Providers and administrators who indicated interest participated in a virtual semi-structured interview or focus group. Qualitative methods incorporating conventional content analysis and causative coding (Saldaña, 2021) were used to assess the impact of system-level factors on EI providers' implementation of autism EBPs. These data were used to model causal networks of facilitators and barriers to training and supervision. Extensive member checking in the form of round tables and presentations involving administrators, providers, and caregiver stakeholders occurred at multiple timepoints across data collection and analysis. See Data Analysis section for greater detail.

Recruitment

An email describing the research study was sent to EI administrators and directly to EI providers as part of statewide email listservs. Following completion of the survey assessing autism EBP implementation within the EI system ($n = 100$; Hendrix et al., in press), 44 EI providers indicated interest in participating in a semi-structured focus group or interview. Of the 44 providers who expressed interest, 36 participated in an interview or focus group. The extent to which providers participated in an interview or focus group depended on provider preferences and overlapping availability. Of the 11 EI administrators who expressed interest in an interview, 9 completed semi-structured interviews. All participating EI administrators were EI Coordinators who oversee the delivery of EI services within a health district representing one or more counties.

Interview and Focus Group Procedures

The first and second authors developed semi-structured qualitative interview guides based on knowledge of EI systems and systems with independent contractor workforces. To increase the generalizability of study findings to the breadth of EBPs used within EI systems, the interview protocol was framed around system-level factors impacting the adoption and use of autism EBPs as well EBPs for children with other developmental delays (e.g., language delays). Provider questions centered on their role within the EI system, experiences with independent contracting, access to and engagement in training and clinical supervision, and proposed strategies that may support EI providers in the delivery of EBPs. In addition to these questions, the EI coordinator interview guide included questions about past implementation efforts, factors that impacted the adoption and sustainability of these efforts, and training and supervision initiatives that could be leveraged to support the delivery of EBPs. Interview guides consisted of open-ended questions and probes for clarification and elaboration. As data collection progressed, the interviewers integrated content from past focus groups and interviews in an iterative fashion. The interview guide is included as supplementary material.

Interviews and focus groups were conducted virtually via Zoom by the first and last authors. They were audio-recorded and transcribed verbatim. Written notes were used to supplement audio recordings in instances of poor audio quality. Transcriptions were then checked for accuracy. Interviews ranged from 36 to 75 min ($M = 50$ min).

Data Analysis

Qualitative analysis data collected across EI provider and coordinator focus groups and interviews were analyzed using MAXQDA software (VERBI Software, 2021). The first and second authors conducted separate analyses of the interview transcripts using iterative processes grounded in conventional content analysis (Hsieh & Shannon, 2005; Miles et al., 2019). Meaning was derived from the verbal content within the transcriptions; no codes were identified before reviewing transcripts. The first author reviewed two transcripts and developed a list of descriptive codes related to values, priorities, and contextual constraints within the EI system related to training. The second author reviewed this proposed list and supported refinement. Both authors then independently applied the codebook to one EI provider interview and revised the codebook to accommodate new codes that had not been present in the first two transcripts. Their coding was reviewed by the third author, who facilitated consensus coding and revision of the codebook to include relevant new codes. This process continued across

11 additional interviews or focus groups until saturation was reached and no new codes emerged.

Grounded theory was integrated through the inclusion of causative coding (Saldaña, 2021). Causative coding is an adaptation of attributional theory and coding, which involves the "everyday causal explanations that people produce when they encounter novel, important, or unusual or potentially threatening behavior and events" (Munton et al., 1999). Causative coding extracts attributions of causal beliefs from participant data, including antecedent conditions and mediating conditions that lead to a particular outcome. It can serve many purposes including preparatory work to diagram or model processes, including determinant factors perceived to directly impact the uptake and use of EBPs. Within the current study, statements that included a causal inference were coded with this separate causative code. Examples of causal inference included sentences with the word "because" (e.g., "I don't attend training *because* I don't get paid), if–then statements (e.g., "if there was more peer-to-peer connection, I would feel more supported to use EBPs), and statements using "so" or "that" to make directional linkages (e.g., "the paperwork is so high *that* I don't have time to attend training").

All 146 causative codes were extracted into a separate excel dataset and were broken into antecedents, mediating events, and outcomes. Causative codes were then grouped based on the causal relationship between specific implementation determinants and outcomes to synthesize key causal relationships as reported by EI providers and coordinators. These data were then used to model causal networks of facilitators and barriers to training and supervision (e.g., Miles et al., 2019). The main causative relationships were initially member checked with study participants and other stakeholders, including through the presentation of study findings at round tables which included a total of 58 EI providers and administrators. Round tables were conducted virtually and four groups that consisted of: two groups of EI providers, one group of EI coordinators, and one group of state-level EI administrators. Detailed notes were taken during the round tables and were used to confirm study findings and to make small modifications that were integrated and used to generate a causative diagram that was presented back at a state interagency coordinating council meeting, consisting of EI administrators, providers, and caregivers.

Results

All participants identified as female with an average provider age of 50.6 years old ($SD = 11.0$, range = 28–68) and average administrator age of 48.3 years ($SD = 11.2$, range = 28–62; see Table 1). Providers reported an average of 8.9 years of experience within EI systems ($SD = 7.3$, range = 0–30), and coordinators reported an average of 16.0 years of experience ($SD = 8.0$, range = 3.5–23 years). Within the provider sample, reported experience with autistic children or children with social communication differences was about evenly divided among 1 to 3 years of experience ($n = 11$), 4 to 10 years ($n = 11$), and 11 to 20 years ($n = 12$); two providers reported having 20 or more years of experience.

Table 1 Study participant demographic characteristics

	EI Providers ($n = 36$)	EI Coordinators ($n = 7$)*
Gender		
Female	100.0%	100.0%
Mean Age in Years (SD)	50.6 (11.0)	47.9 (10.3)
Mean Years in EI System (SD)	8.9 (7.3)	15.9 (7.3)
Rac Ethnicity		
White/Caucasian	75.0%	71.4%
Black/African American	25.0%	14.3%
Latinx/Hispanic	0.0%	14.3%
Asian American/Pacific Islander	0.0%	0.0%
Education		
Bachelor's degree	19.5%	14.3%
Master's degree	72.2%	85.7%
Doctoral degree	8.3%	0.0%
Provider Discipline		
Special instructor	50.0%	–
Speech and language pathologist	19.4%	–
Occupational therapist	5.6%	–
Service coordinator	13.8%	–
Social worker	5.6%	–
Other (psychologist, Board Certified Behavior Analyst, nurse)	5.6%	–
Independent Contractor		
Yes	83.3%	0.0%
No	16.7%	100.0%
Bilingual		
Yes	2.8%	28.6%
No	97.2%	71.4%

Missing data from n = 2 administrators

EI providers and coordinators described a number of factors that were perceived to drive the uptake and use of autism EBPs. These factors fell into six broad themes comprised of one or more specific codes (see Table 2). Given the emphasis on delineating potential causative relationships, the themes are described below in relationship to one another and to implementation outcomes: (1) independent contracting costs, (2) operational demands, (3) workforce stability, (4) provider experiences, including those of burnout; (5) instability, and (6) implementation supports. Exemplar quotes are

Table 2 Primary themes, codes, definitions, and example quotes

Theme	Code	Definition and perceived causal relationships	Example quote
Independent contracting costs			
	Financial reimbursement	EI providers and coordinators explained that independent contractors were not compensated for non-billable tasks, leading to dis-incentivization to participate in training	And if I don't do [a training], it's because of the time factor. I do three evals a week, so if it falls during that billable time, I don't even consider it… I'll email and say, "Hey, is this going to be recorded?
	Part-time labor force	Given contracting structures, providers split their time between the EI system as well as other part- or full-time professional positions	So even though I have that many special instructors, a lot of them are part-time, so they only see children between, let's say, four and six o'clock, you know what I mean, during the week
Operational demands			
	Timely documentation	Providers and coordinators described that there is a strong emphasis on documentation to meet required reporting practices that drives burnout and turnover	And gathering paperwork and all of that. I mean it's still a little cumbersome. So it's difficult to get somebody [onboarded] and then spend all that time and then they're like, "Oh, you know what? This is not what I expected. See ya." So it's really frustrating
	Training in required documentation	EI coordinators and provides shared that training is often dedicated to operational procedures	I just find that notes, that's what's been a challenge for me, is that I'm still trying to figure out a way to get my notes in and how to do that after I leave the child
Provider experiences			
	Burnout	Participants shared that the high operational demands drove feelings of burnout and fatigue	But mainly, I mean we are so overwhelmed with scheduling, evaluations, making sure that those evaluations go to families, that we get in on time, all of those things, that we are tired and have yet… to get to that point where [we] will be able to visit with [the family]
	Under-valued	Participants who were independent contractors indicated that contracting structures influenced perceptions of lower skillset and having lower value as a provider	I think the bad part of being an independent contractor with Babies Can't Wait is that I feel that the state does not necessarily understand the value of what we do
Workforce Stability			
	Recruitment challenges	EI coordinators described that independent contracting costs and operational demands made it difficult to attract a skilled workforce with experience in early intervention	We're still struggling to fill [positions]. And we had a really good candidate. But people want a position. They want employment. They don't want a contract
	Provider turnover	Providers and coordinators described variability in turnover rates across districts, with some districts impacted to a great degree by providers leaving the EI system	But it's the unpaid time because face to face is one thing but then it's all the [non-billable] paperwork outside of that. And most trainings are not reimbursed. And so they start saying, "I'm not making enough money to do this," and go out and do a different job
	Agency turnover	Coordinators described challenges in maintaining partnerships with community agencies, impacting access to providers	It's not lucrative to their business. And honestly, if they have a company, so they keep a certain amount of [EI system clients], and then they have to do private just to be able to stay afloat
	State administrator turnover	Participants indicated that changes at the state level drive changes in protocols, procedures, and priorities	You had mentioned getting a new supervisor. I did as well right after COVID… You just realize when they come in, everything changes… I did what I was taught to do; now I have to do it this way
Communication Consistency			
	Shifting communication and priorities	EI coordinators described that personnel changes at the state level have resulted in shifting priorities related to various EBP initiatives	I've been here four years and I think there has been three directors at the state office. Three. So, the turnover is humungous. And honestly, it's almost as if Babies Can't Wait is a moving target. Just when you think, "Okay, I've got this," no, we're switching

Table 2 (continued)

Theme	Code	Definition and perceived causal relationships	Example quote
Implementation Supports			
	Incentivization	Providers and coordinators described variable levels of training and relevant experiences for incoming providers to the EI system	And people would see that as a great reimbursement because I have to pay for most of my CEUs. So if I can get an hour for free, that's huge. And that would be a really strong incentive for a lot of licensed providers to actually do trainings
	Provider networks within team meetings	Providers and coordinators consistently reported team meetings providing opportunity for case consultation, whether as a designated segment of these meetings or informally following these meetings	We have a team meeting every other week, and we send our service coordinator a list of kiddos who we want to discuss and maybe a little sentence what we want to discuss about that child. And it really helps when other disciplines who are also working with this child so we can bounce ideas back and forth
	Informal provider networks	Providers and coordinators described training and supervision occurring most often through peer professional networks. These supervision activities included phone call and text message contacts, co-visits to shared clients, and shadowing	I'm actually working with someone… she's an occupational therapist who is also doing service coordination. And she is helping me so much. I feel like I call her every day and.I need it. I've gone to her house. And she's not getting compensated at all for it
	Need for leader support and championing	Description of how funding structures limit the amount of incentivization that can be provided and, thus, the necessity of leaders advocating for and encouraging providers to attend training	Our money [at the health district level] cannot go to independent providers. So we can't provide an incentive. So I'm driving home to them it's for their benefit because they're doing extra work and the work that they're doing, it can be decreased. So I'm trying to drive home the message it's for your benefit; I promise you it is

used to represent both causative codes in addition to more general codes intended solely for definition.

Independent Contracting Costs

The Georgia EI system is structured in a manner such that most providers directly contract with the state but work within a health district that represents one or more counties. EI providers and coordinators noted that independent contracting allows for flexible caseloads and work schedules while highlighting contracting disadvantages that they perceived to directly relate to burnout and workforce stability. **Financial reimbursement** was one of these described disadvantages. Providers and coordinators noted that independent contractors are not reimbursed for costs like travel to families' homes and time needed to complete operational responsibilities. Further, independent contractor compensation is based upon completed direct service hours, resulting in financial disincentives to attend EBP training and non-reimbursed supervision activities. One provider shared that with regards to training: "*And for some of the [contracted] providers, it was not worth the money they were paid for versus them being able to see kids during that hour to two hours [of training].*"

Financial disincentives meant that many EI providers were delivering services out of the goodness of their hearts and as a result of a deep passion for supporting young children and their families. One provider described:

> "You have to come into it with an understanding that you're not in it to make all the money in the world. And so you're really doing it out of the goodness of your heart and you want to serve the community."

Yet participants also described how the financial costs of providing contracted services can dampen that passion and cause providers to leave their role and the system. For example:

> "You feel like you're really making a difference with kids this young… That's probably the reason why most of us are in this field—because the financials are starting To outweigh the practicality of doing the job."

The financial costs of independent contracting also directly related to the system's ability to maintain its stable workforce. One EI coordinator described, "*We do have a lot of turnover, and particularly with special instructors, I have a lot of turnover. And I honestly think it's the pay that's the issue.*" Another individual explained that turnover was worsened by the COVID-19 pandemic: "*When COVID started, a lot of [independently contracted special instructors] had to leave or work part time because they weren't seeing children; therefore, they couldn't get any income*."

Operational Demands

Workforce stability, provider experiences, and the implementation supports for EBP implementation were each described as being impacted by the weight of operational demands within the EI system. Providers and coordinators explained that the time required for ongoing operational demands, such as submitting **timely documentation** and collecting data required for federal priorities, was significant and non-reimbursable, contributing to burnout and in turn workforce turnover. One provider stated, "*For one child, you could [document] for 15 to 20 min. I have 30 plus kids. Do the math.*"

In addition to the need for timely documentation, providers and coordinators described that **training in required documentation** often absorbed time that could be devoted to training and supervision to support EBP implementation and service quality. As one provider described, "*There is such an emphasis to teach you about procedures and policies*." Although there was recognition of the importance of operational compliance, providers suggested that the operational emphasis could be more balanced with dedicated time to support provision of evidence-based care.

Provider Experiences

Providers and EI coordinators shared that the structure of independent contracting and the number of operational demands drove providers, especially independent contractors, to feel **burnt out** and, at times, **undervalued**. As one provider noted: "*I think the bad part of being an independent contractor with Babies Can't Wait is that I feel that the state does not necessarily understand the value of what we do*." These perceptions, paired with high operational demands, were reported to fuel burnout and make providers and administrators more likely to leave the system.

> "But mainly, I mean we are so overwhelmed with scheduling, evaluations, making sure that those evaluations go to families, that we get in on time, all of those things, that we are tired and have yet... to get to that point where [we] will be able to visit with [the family]."

Workforce Stability

The financial costs associated with working within the EI system and substantial operational demands were reported to cause workforce instability, including **recruitment challenges**, **provider turnover**, **agency turnover**, and **state administrator turnover**. EI providers and coordinators shared that the tasks associated with onboarding were time-consuming and, at times, intimidating, resulting in providers leaving the system before providing direct services: "*It's difficult to get somebody in and then spend all that time, and then they're like, 'Oh, you know what? This is not what I expected. See ya.'*" EI coordinators also shared that recruiting providers could be challenging given pay rates, available benefits, and the high burden of onboarding. They indicated that the difficulty recruiting skilled providers resulted in them needing to onboard a greater number of providers without an early childhood background. As one coordinator reported: "*The newbies coming on—it's been really hard to capture people. Plus, how many people really have birth-to-three experience?*"

Once onboarded, turnover was reported at the provider and agency level, often in response to burnout caused by the costs and operational demands of the system.

As a result of provider shortages, children within some health districts were reported to have reduced access to specialty therapy services and, thus, other providers felt the need to stretch beyond their areas of competence to serve these children. One provider explained, "*[Though] speech and language isn't my primary profession, occupational therapy isn't my primary profession… I have to be able to meet those goals*." Many providers and administrators shared that contracting with local community agencies that employ speech language pathologists, occupational therapists, and physical therapists was a strategy to increase the number of specialty providers within their health districts. However, EI providers and coordinators consistently reported challenges retaining agency partners due to the operational expectations of holding a contract with the EI system.

Finally, EI coordinators explained that reductions in federal and state funding and turnover amongst state administrators led to vacant state-level positions intended to support training initiatives, thus, placing the responsibility of training on individual health districts, some of which struggled with this added responsibility.

> "It just wasn't a focus anymore. We had probably I think funding issues and then the personnel coming and going and not dedicated to training… Some districts don't put on very many workshops. It takes a lot of manpower and if you're short-staffed or don't have an [Interagency Coordinating Council] that's active, you just don't have the ability to do it."

Communication Consistency

Turnover amongst EI coordinators and state administrators was reported to cause instability within the system, including **shifting communication and priorities**. As participants shared, turnover results in process changes, ranging from how operational tasks need to be completed to system-level

values, felt within each health district. Although new leadership sometimes led to beneficial changes (e.g., "*Since we have new people in the [district] office that have taken over in the last six months… every month, we get an updated provider list now, which is amazing.*"), the frequency of leadership change was exacerbated by a decentralized system structure in which health districts operate relatively independently. One EI coordinator described the impact of turnover on system communication and priorities as:

> "The turnover is humongous… It's almost as if [the EI system] is a moving target. The way we do things is always a moving target. Just when you think, okay, I've got this, no, we're switching that to this. It just seems that when there's a turnover, then there [are] new processes."

Implementation Supports

Many EI providers and coordinators identified need for more consistent support for providers to adopt and use EBPs. Participants shared that implementation support would require formal **incentivization** for EBP use, including dedicated financial and educational incentives. For example, in addition to providing reimbursement for lost billable time during training and increased pay for the delivery of EBPs, participants noted that incentivization could take the form of continuing education credits. One provider shared: "*I have to pay for most of my CEUs… If I can get an hour for free, that's huge. And that would be a really strong incentive for a lot of providers*."

Once trained in an EBP, EI providers and coordinators reported that informal peer networks were frequently used and critical to support the implementation of EBPs and other practices. These **provider networks** were described as occurring within existing team meetings or through informal provider-initiated collaboration. Although these networks were described as supporting ongoing EBP implementation, participants indicated these informal networks were used inconsistently given their lack of formality and that there could be greater incentivization for creating and participating in teaming, supervision, and peer consultation networks. Given the absence of formal incentivization structures to support formal supervision opportunities, many EI coordinators noted their discomfort with attempting to enforce supervision models. One individual shared:

> "Sometimes at the beginning, we say, 'Here's Bianca, she's offered for you to go out with her,' that kind of stuff. But then I hate doing that because Bianca doesn't get paid to be the mentor… And these people are asking questions of them all the time, and I feel, it's like, oh, it's just not fair to them to be this mentor."

Previously specified system- and health district-level factors were also perceived to impact the extent to which providers sustain their delivery of EBPs through support from supervision, teaming, and communication networks. Providers identified opportunities to enhance training and supervision through existing teaming meetings. One provider suggested: "*We have the monthly meetings, and the agenda is pretty much the same. We're talking about new cases, we're talking about closed cases, we're talking about kids who have aged out. There could very well be a training component.*"

Discussion

The present study used causative coding methods to examine the system-level factors driving the adoption, implementation, and sustainment of EBPs within a Part C EI system (Saldaña, 2021). Semi-structured interviews and focus groups were conducted with EI providers and coordinators and were then refined by input from providers, coordinators, and other stakeholders across presentations at round tables and the state interagency coordinating council. Causative coding helped to develop a preliminary picture of how system-level factors are perceived to impact EBP training engagement and use. This study expands previous research examining the role of EI provider factors impacting EBP adoption and implementation within EI systems by exploring the system-wide factors that may impact access to and engagement in EBP training and supervision initiatives.

Qualitative results highlighted how the infrastructure of an EI system drove providers' uptake of EBPs, including those for autism, through training participation and the subsequent implementation of these practices. These relationships, as summarized in Fig. 1, were consistent with many factors described in the SPR MAPS IV task force framework (Fagan et al., 2019). As can be seen in Fig. 1, these factors included a decentralized system comprised of independently contracted providers, federal reporting priorities, and the accessibility of federal and state funds dedicated to training and supervision. These factors appeared to drive both high operational demands and high costs associated with being an EI provider or coordinator. Operational demands and costs were then perceived to be causally linked to provider and coordinator burnout, influencing a cycle of workforce turnover and subsequent recruitment challenges. Persistent workforce shortages and turnover were reported to result in shifting priorities around service delivery and more limited access to high-quality care for families seeking EI services.

Participants' descriptions of the factors contributing to workforce turnover were largely consistent with models of workforce capacity and stability in other health fields. That is, findings from other research studies highlight the relationship between job-related compensation and costs,

operational requirements, career advancement opportunities, burnout, and turnover (Herschell et al., 2020; Strolin-Goltzman et al., 2007; Willard-Grace et al., 2019). For systems with a high proportion of independent contractors, factors contributing to turnover may be particularly salient and have a negative impact on EBP implementation (Woltmann et al., 2008). Further, it is critical to invest in training opportunities that boost provider self-efficacy and perceived value to possibly reduce turnover.

Despite the importance of having training in EBPs, the amount and types of support for providers to participate in training varied considerably across health districts. Some of this variability was reportedly a reflection of health district and provider autonomy, and limited state-mandated training. Further, participants shared that inconsistent communication about training requirements and availability contributed to eclectic training experiences across providers.

In addition to the need for more consistent dissemination and messaging around EBP training and implementation, participants consistently underscored the importance of leadership support in their ability to adopt and implement available EBPs. Participants' description of the amount and types of support that would be most useful (e.g., financial support for lost therapy time, continuing education credits, recognition and championing from leadership) were consistent with previous research in EI systems (Aranbarri et al., 2021; Pickard et al., 2021) and research demonstrating the importance of transactional and transformational leadership in EBP adoption and implementation (Aarons et al., 2016; Farahnak et al., 2020). Most research examining implementation leadership to date has focused on leadership within organizations (Aarons et al., 2015). Findings from this study suggest the importance of multilevel leadership, including leadership at the state- and district-level, within decentralized systems with a high proportion of independent contractors who are not operating within agencies.

Participants reported both the need for greater consistency and support for EBP training and the perceived impact that this might have on the quality of training, supervision, and care within the EI system. In response to the current system structure and leadership needs, participants described the importance of co-creating strategies that support the implementation of EBPs among independently contracted providers. The need to co-create strategies was voiced as particularly important given previous attempts to implement more traditional strategies with varying success (e.g.,

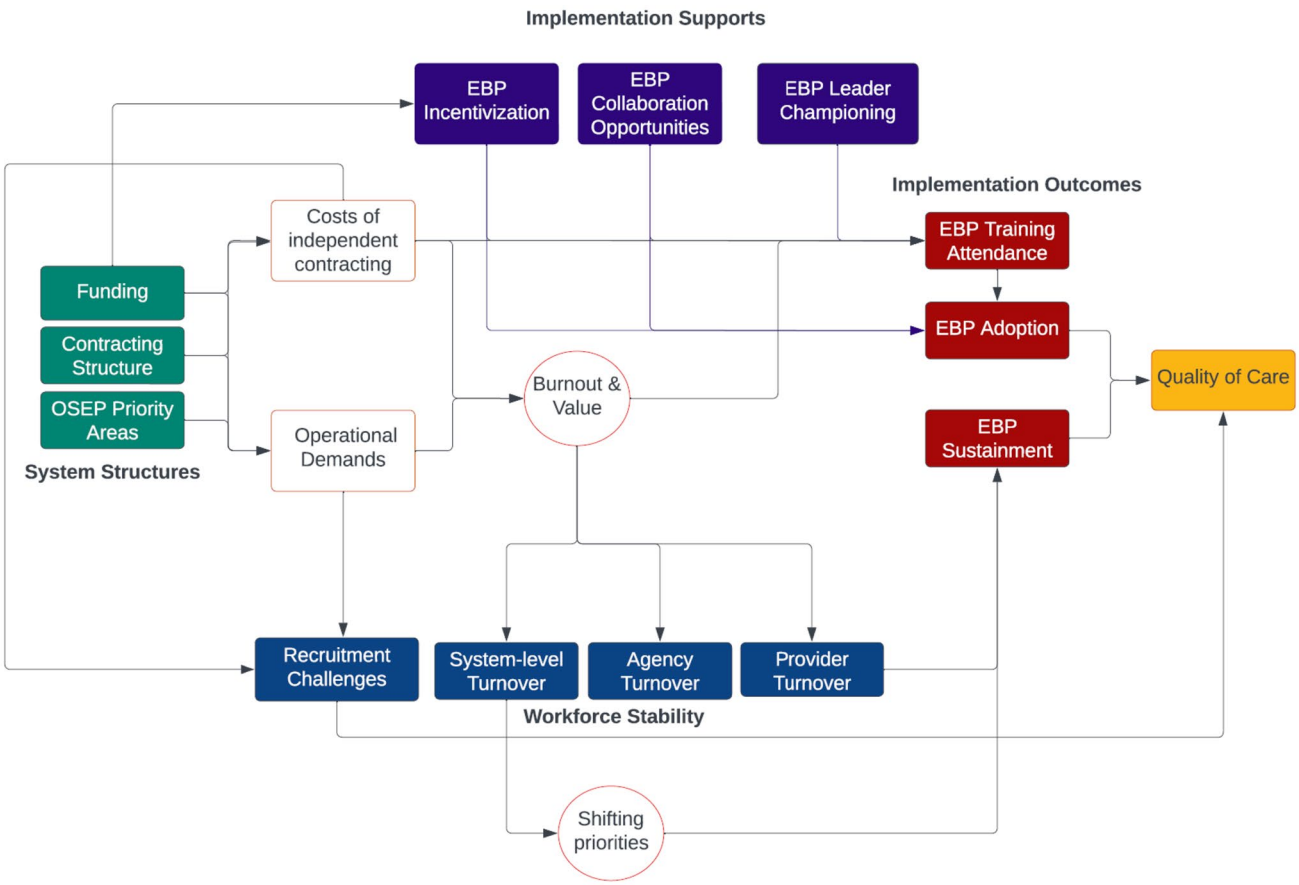

Fig. 1 Causal relationships reported by EI providers and coordinators related to provider training participation and EBP implementation

train-the-trainer models being inconsistently successful). Given independent contracting structures, participants suggested the use of strategies that build provider networks and, thus, opportunities for peer-to-peer support. For this change to be effective though, providers across disciplines would need to be incentivized through, for instance, expected attendance, compensation for attending these meetings aligned with hourly pay rates, and/or continuing education credits. Other participants recommended avenues forward centered on supporting leaders to formalize existing communication and mentorship structures to support EBP training and supervision.

Implications

With increasing efforts to translate autism EBPs into EI systems (Rogers et al., 2022; Stahmer et al., 2020), greater investment in implementation efforts (e.g., Cervantes et al., 2021) requires not only financial investment but also investment in understanding the systems in which EBP adoption, implementation, and sustainability are proposed. Many implementation efforts for autism EBPs have capitalized on training EI providers who work within agencies that contract with EI systems. However, results from the current study suggest that developing and using implementation strategies may require thoughtful consideration of decentralized systems that employ a high number of independent contractors. Consideration of system-level factors within implementation frameworks may be critical for developing implementation strategies aimed at increasing engagement in EBP training within this and other similarly structured EI systems (e.g., Lui et al., 2021; Regan et al., 2017). This could include supporting system- and health-district championing of EBP usage, increased promotion of accessible EBP training opportunities, creation of provider networks focused on EBP use, and incentivization for EBP use.

Attempts to implement and scale up EBPs within public health systems like EI systems face challenges with workforce stability and funding availability observed in other systems (e.g., Fagan et al., 2019) but are further complicated by factors such as workforce readiness to engage with specified EBPs (e.g., Douglas et al., 2020; Pellecchia et al., 2022). Implementation efforts must then consider how to support EI systems experiencing workforce instability, including identifying implementation strategies that respond to workforce needs (Brabson et al., 2020) while also recognizing and responding to the distinct impact of leadership turnover. For example, whereas leadership turnover may result in shifting priorities that alter the availability of certain EBP training opportunities, workforce turnover may impact the sustainability of concerted EBP training efforts as skilled providers leave the system (e.g., Pascoe et al., 2021). Thus, both types of turnover are critical to respond to.

Given workforce stability and recruitment challenges, future research is needed to understand and appropriately respond to the skillsets of providers entering EI systems. This will be particularly important given that many EBP training and consultation models have been developed or piloted for providers with a more uniform skillset. Research is needed to examine tailored training and supervision activities, including those that can be embedded into existing onboarding and teaming forums within EI systems. Finally, implementation work in community systems including but not limited to EI systems must integrate collaboration with stakeholders to develop and adapt implementation strategies that appropriately respond to the top priorities and implementation challenges experienced by systems. Given EI system complexity and the critical role of multilevel factors in driving EBP use, it may be important to pilot strategies aimed at multiple levels of EI systems (e.g., considering adaptive implementation trial designs; Nahum-Shani & Almirall, 2019) and to partner closely with EI systems to prioritize implementation targets.

Limitations

There are several limitations to the present study. First, despite extensive member checking, the study sample may not reflect the perspectives of all providers and administrators within this EI system. Moreover, the results of this study are based upon the perceptions of participating providers and administrators within one EI system. Despite similar federal guidelines governing all EI systems in the U.S. (U.S. Department of Education, 2021), EI systems vary considerably across states. The findings of this study may not reflect the infrastructure of other EI systems. Additionally, the study was framed around system-level factors impacting the adoption and use of both autism EBPs as well EBPs for children with other developmental delays (e.g., language delays) to increase the generalizability of study findings to the breadth of EBPs used within EI systems. However, given the research team's expertise in autism EBPs, it is possible that study findings are influenced by reporting of training and supervision initiatives that primarily relate to autism. Finally, although this study intentionally solicited community partner input at multiple points, it did not use more formal and collaborative group model building techniques to involve partners iteratively and throughout the model building process (Gerritsen et al., 2020; Hovmand et al., 2011).

Conclusion

EI systems are a service entry point for many families, including those with young autistic children. The present research study highlights the complexity of EI systems and

the important role of system-level factors on the uptake and use of EBPs. These findings underscore the importance of partnering with stakeholders and using causative methods to understand these factors and to identify and prioritize targeted implementation strategies to increase EBP adoption and access to quality care within complex and decentralized systems.

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Declarations

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