



'Dose-response' relations between participation in integrated early childhood services and children's early development



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ABSTRACT

This study investigated the effects of participation levels (dose) on child development (response) in five school sites offering integrated early childhood services as part of the Toronto First Duty (TFD) demonstration project. The TFD model offered an integrated school-based service array for children under 6, including public school kindergarten, childcare, family literacy, parenting supports and other early childhood services. While investigating program dose effects, this study also considered the social ecology of the child, including family- and school-level characteristics that might alter the effectiveness of community-level service integration efforts to improve child development outcomes in kindergarten as children enter school. The ecology of participation effects was examined through generalized linear modeling techniques analyzing a linked dataset ($N = 272$) including intake data on family demographics and parents' goals on service use, systematic tracking data on hours of program use, service integration level data across school sites, and child development data across five domains on the Early Development Instrument (EDI). The results provide evidence that the early childhood integrated service model has potential to improve children's developmental outcomes: participation dose predicted children's physical health and well-being, language and cognitive development, and communication and general knowledge, after taking into account demographic, parent engagement and site factors. Parents' being less child-centered in their goals for service use and less interested in school involvement were significant risk factors associated with children's developmental outcomes. This study has implications for understanding the ecological complexities of early human development and integrated service supports in a school-as-hub model.

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1. Introduction

A strong conceptual argument has been made for integrating multiple early childhood services on the basis of a social-ecological analysis of how complex social contexts affect child development and parenting (Lerner, Rothbaum, Boulos, & Castellino, 2002; Patel & Corter, 2011), following Bronfenbrenner (1979) theory. In short, if services are to be effective, they need to affect multiple points in the child's social ecology, in mutually reinforcing ways. In terms of social ecology, service integration can work to improve service and family microsystems where bi-directional interactions directly shape the child's development. Service integration also bridges the mesosystem—the dynamic links among microsystems supporting

the child, including connections among child and family services and between services and home. Service integration also operates beyond the front lines of the child's microsystems and their direct mesosystem connections. At the exosystem level, it necessarily entails local organizational support for integrated community-level service delivery, and at the macrosystem level it reflects the broad social policy environment (Lerner et al., 2002).

Kindergarten, childcare, and other early childhood community programs represent multiple microsystems where the interactions surrounding children help to support development. Time spent in, or dose of, high-quality program microsystems should enhance development, and there is evidence that settings where programs are integrated on site are higher in quality than their separate equivalents (Cortner et al., 2009; Melhuish et al., 2007; Sylva, Melhuish, Sammons, Siraj-Blatchford, & Taggart, 2004). Arguments for service integration have also been made on the basis of the importance of building continuity across the mesosystem linking

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service microsystems with each other and with the microsystem of the home (Corter, Patel, Pelletier, & Bertrand, 2008; Pelletier & Corter, 2006). Continuity works horizontally as the parent and child move across settings and vertically as the child moves through developmental transitions in time (Saracho & Spodek, 2003). Service integration can work horizontally and vertically, and it may help foster greater continuity in programming and fewer daily transitions, as well as easing developmental transitions across home, early childhood programs, and school (Pelletier, 2012; Regional Educational Laboratories' Early Childhood Collaboration Network, 1995). When integrated services include parent–child programming such as family literacy, continuity in terms of language learning opportunities may develop between home and program microsystems. When integrated services include public school kindergarten programs in a school-as-hub model, these links may produce greater engagement between parents and schools (Patel & Corter, 2013; Zigler & Finn-Stevenson, 2007).

Evidence from qualitative process analysis also suggests that an integrated community of multiple services at a single site may have more diverse appeal to families and may thus help bridge the mesosystem between home and services in other ways, for example, by facilitating outreach and enrolment (Patel & Corter, 2008) and by building family-service relationships and parents' motivations, with parents being more confident in supporting learning at home and in communicating with professionals, as well as drawing more social support from them (Arimura & Corter, 2010; Patel & Corter, 2013). In turn, such mesosystem engagement may enhance the quality of the child's microsystems. Service integration may also change the organizational exosystem surrounding service microsystems in ways that benefit their quality and thereby indirectly enhance child development outcomes. For example, service integration has been shown to bring about practical improvements in organizations through opportunities for staff support (Selden, Sowa, & Sandfort, 2006), professional development and collaboration (Corter et al., 2008).

Beyond conceptual arguments for service integration and the evidence to date on processes through which it may support early development, the interest and experimentation have extended to international contexts for program and policy development. In the UK, the Sure Start national policy initiative targeted multiple service supports to low economic neighborhoods with a shift from service networks to integrated neighborhood centers as the policy was refined on the basis of evidence from the EPPE study pointing to the value of integrated care and education programs (Melhuish, Belsky, & Barnes, 2010). In the US and Canada, a number of integrative initiatives have provided school-linked services for young children and parents in low economic neighborhoods, including the Chicago Child-Parent Center (CPC) program (Reynolds, 2004b), the Ontario Better Beginnings, Better Futures (BBBF) project (Peters et al., 2010), and the Schools of the 21st Century (21C) initiative implemented across a number of states in the US (Zigler & Finn-Stevenson, 2007). The evaluation evidence from these initiatives is promising. Short-term and long-term benefits for children and for parenting were found in both the CPC (Reynolds, Temple, & Ou, 2010) and BBBF evaluations (Peters et al., 2010); benefits for parents were found in Sure Start, although there were no lasting benefits for children (Melhuish et al., 2010).

Outside of Western countries, integrated early childhood programs targeting families with lower socioeconomic status often integrate health with education, as in India's Project Grow Smart program, which combines nutrition supplementation and support for parenting and early learning through home visiting (Fernandez-Rao et al., 2014). International interest in the integration of early education and care is also seen in the policy work of the Organisation for Economic Co-operation and Development (OECD, 2006) and United Nations Educational, Scientific and Cultural Organiza-

tion (UNESCO; Kaga, Bennett, & Moss, 2010), with related program initiatives extending beyond Western countries. Both UNESCO and OECD promote integration of child care and early education as a universal approach to supporting child development for all by optimizing the auspice and delivery of services, not simply as a targeted approach to risk.

1.1. Program participation and 'dose-response' effects

Who enrolls and how much they attend are critical questions for examining the effects of programs, whether they involve targeted or universal approaches, and whether they involve single services or multiple services with varying degrees of integration. Across different types of early childhood programs, child and family participation typically varies from one family to the next (Gomby, 1999; Gomby, Culross, & Behrmann, 1999; St. Pierre, Layzer, & Barnes, 1995). Furthermore, evaluated programs often are not delivered with the same level of intensity that program developers planned for (Gomby, 1999). Although such variability in participation is an important contributor to outcomes (Spath & Redmond, 2000), it is rarely accounted for in research on program effectiveness (Hill, Brooks-Gunn, & Waldfogel, 2003). Thus, the role of "dose," "dosage," or "intensity" has been identified as one of the most influential, yet poorly researched, aspects of early childhood interventions (Reynolds, 2004a; Shonkoff & Phillips, 2000). Studying the effectiveness of programs at different doses or intensities has implications for understanding what might be an appropriate program intensity (Warren, Fey & Yoder, 2007), and the topic is timely given the growing attention to implementation processes in approaches such as implementation science (Odom et al., 2010).

The findings in the Effective Provision of Pre-School Education Project (EPPE) study in the UK showed developmental benefits of quantity of formal, quality early childhood programming, based on a variety of service types, at school entry and up to seven years of age (Sammons, 2010; Sylva et al., 2004). The EPPE study examined children whose experience came from play groups, nursery classes, child care, or integrated care and education, although only about 6% of participants were in integrated programs. Since program effects are likely to reflect both quantity and quality of program experience, it is notable that program quality of integrated care and education in this study was higher than for other program types. With respect to quantity, duration of program experience across program types and measured in months predicted better child development outcomes at school entry on a variety of cognitive measures; number of sessions attended also predicted cognitive development, but not as strongly. Effects on social development at school entry were more modest. Interestingly, while the number of individual sessions attended, months of experience, and years of experience were predictive, half-time vs. full-time enrolment was not predictive, although this comparison was complicated by program type since few types were full-time (Siraj-Blatchford, 2010). While the EPPE results show that cumulative program experience was key, along with the quality of service, the half-time vs. full-time finding illustrates that exposure-outcome relations may not always be linear, and that there may be both ceiling and threshold effects (Nicholson, Lucas, Berthelsen, & Wake, 2010).

Research investigating program participation in comprehensive early childhood programs with multiple services targeted to risk has primarily focused on investigations comparing the intervention group to a control group who did not participate in the intervention (Campbell & Ramey, 1994; Reynolds, 2004b), or on program duration defined by naturally occurring variations in number of years of enrolment (Reynolds, 2004b), or half-day vs. full-day participation (Reynolds et al., 2014), or "high" participation dose group versus "low" participation dose group comparisons within a treatment group (Hill et al., 2003). In summary, there has been

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