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Crèche attendance and children's intelligence and behavior development

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ABSTRACT

Early childhood education is intended to further cognitive and general development. Studies on the impact of regular crèche (preschool for children under age 3) attendance outside the U.S. are rare. Two complementary studies conducted in Austria are presented: In Study 1, 62 kindergarten children (aged 4–6 years) who previously attended crèche were matched to kindergarten children who had not attended crèche. Crèche attendance was strongly and positively associated with cognitive ability (10 IQ points), social–emotional and motor development, but negatively associated with behavior rated by kindergarten teachers. In Study 2 with 118 fourth graders (aged 8–10 years), the association between crèche attendance and cognitive ability was weaker than in Study 1 at kindergarten age and was masked by a negative correlation with learning behaviors. A path model indicated direct positive (3 IQ points) and indirect negative effects (−1 IQ point) via learning behaviors on intelligence at primary school age.

1. Introduction

Early childhood education has been seen as a means to further cognitive development and to reduce ability inequalities (Hunt, 2011; Nisbett et al., 2012). Minority children in the U.S. and immigrants in Europe are thought to particularly gain from extensive and high quality early childhood programs (cf. Cunha, Heckman, Lochner, & Masterov, 2006). Meta-analyses and reviews of research in the United States (Camilli, Vargas, Ryan, & Barnett, 2010; Duncan & Magnuson, 2013) and internationally (Nores & Barnett, 2010) find supportive results across a wide range of populations and contexts. For example, Camilli et al. (2010) found substantial effect sizes for cognitive outcomes ($d = 0.23$, $k = 81$ studies; cf. Table 5 of Camilli et al., 2010), although effects decreased over time after leaving preschool. In the well-known Perry Preschool study it was found that even when IQ effects diminished in the long run, there were lasting positive effects on behavior, school learning and personality that yielded positive economic returns (Heckman, Moon, Pinto, Savelyev, & Yavitz, 2010; Schweinhart, 2005, p. 5).

German-speaking countries have relatively few studies that investigate the impact of preschool education, commonly provided in form of crèches, on child development. The aim of the present studies was to investigate the associations between crèche attendance and child development 2 to 10 years later, that is, at kindergarten age and at primary school age of the former crèche attendants.

In Germany, Austria and Switzerland, an institutional distinction is made between crèche and kindergarten: Crèche is a preschool for children from some weeks after birth through the end of age 2. Other terms are "pre-K", "day nursery", "nursery" (in German: "Kinderkrippe"). Kindergarten is provided for children from the age of 3 years until 5.11 years, usually followed by primary school. Kindergarten is provided for children from the age of 3 through 5 years, usually followed by primary school at age 6. In the American and British context, crèche and kindergarten are provided by early childhood education and care (ECEC) arrangements that sometimes change at age three (e.g., Early Head Start followed by Head Start in the United States).

1.1. Possible effects of crèche attendance on child development

The Abecedarian program (Ramey, Sparling, & Ramey, 2012) is a preschool education program from birth to age 5 that encompasses both the European crèche and beginning of kindergarten; however, this program was more intense. Its long-term impacts have been studied in a randomized trial with disadvantaged children (families with a low educational level, living in poverty, African Americans, children's mean IQ at 84). The program began in the first few months of life and provided full-day, year-round child care up to school entry.

The key elements of the Abecedarian program (cf. Ramey et al., 2012) which are also present in crèches and should promote child development include: (1) explaining the world with its rules to the children promotes brain processes of classification and prediction (Ramey et al., 2012); (2) encouraging children to initiate their own activities in a safe and developmentally appropriate environment (autonomy & challenge; Pino-Pasternak & Whitebread, 2010); (3) stability and contingency in care (De Schipper, Van IJzendoorn, & Tavecchio, 2004;

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Pino-Pasternak & Whitebread, 2010); (4) teaching language and communication skills enabling children to express their needs in a socially acceptable way; and (5) modeling positive social interactions, behavior management, and consideration towards others in order to prepare children for school and life in general.

The Abecedarian program produced a stable increase in intelligence of around 5 IQ points (through age 21; e.g., Barnett & Masse, 2007). School achievement test scores and high school graduation were improved. Former participants in the Abecedarian program gained more years of education, were more likely to have a "full-time, higher status employment and higher income" (Ramey et al., 2012, p. 259), and they achieved significantly lower rates of teen pregnancy and drug use. The effects can be explained by cognitive ability increases that push development in a more socially successful "middle class" (burgher) direction (Rindermann, Flores-Mendoza, & Woodley, 2012).

However, several studies in the United States have raised concerns about possible negative effects (e.g., Loeb, Bridges, Bassok, Fuller, & Rumberger, 2007; Morrissey, 2010). For example, children who received more hours of center care (i.e., from the first 54 months of age till school enrollment) not only exhibited a superior cognitive development, but also more "teacher-reported externalizing problems" occurred, though the scores did not reach clinical levels (NICHD ECCRN & Duncan, 2003). A randomized trial of Early Head Start (birth to age 3) found only modest positive effects that largely disappeared by kindergarten (age 5; Love & Brooks-Gunn, 2010); nevertheless, in contrast to the NICHD study (NICHD ECCRN & Duncan, 2003), sustained positive effects on behavior were found (Love & Brooks-Gunn, 2010). Studies from the U.K. found modest positive effects on cognitive development persisting for at least several years into school, and mixed (but very modest) effects on social development and behavior (Melhuish et al., 2008; Sylva, Melhuish, Sammons, Siraj-Blatchford, & Taggart, 2004).

Cross-country comparisons of the impacts of preschool education especially corroborate the aforementioned positive findings on school achievement and intelligence (Rindermann & Ceci, 2009). In the long run, through shaping behavior of individuals and institutions, early childhood programs that increase cognitive human capital result in economic growth, more democratic and liberal societies, and better health (Rindermann, 2012).

1.2. German and Austrian situation and studies

In Germany, Austria and Switzerland, as in most European countries, almost all children between the ages of 3 and 6 attend kindergarten (e.g., in Germany in 2010: more than 92%; Bock-Famulla & Lange, 2011). However, German and Austrian crèche participation is much less common except in Eastern (former Communist) Germany. Recent policy reforms in Germany give parents of 1 to 2 year old children the right to a place in a crèche which will probably increase crèche enrollment rate to 1 to 2 thirds of the age cohort. In Austria, only 7% of children attended crèche in 2009–2010 even though 78% of the mothers worked part- or full-time (Statistik Austria, 2009/2010). Crèche is usually hosted in different buildings than kindergarten, and group sizes are smaller. However, education and salaries for educators (more than 90% women) are similar in the two preschool sectors.

In German-speaking countries, few studies have investigated the associations between crèche attendance and cognitive development and performance at school. In Germany, Fritschi and Oesch (2008) found that *crèche* attendance (below age 3) increased the later probability of a University-preparatory school track enrollment (German "Gymnasium", a high level secondary school track from age10/11 on) in secondary school, especially for children from a disadvantaged background (e.g., immigrants, parents with a limited amount of education), even after controlling for covariates (i.e., level of parental education and income, number of siblings, gender, birth cohort, country of birth). Some more studies have been conducted on kindergarten. For example, kindergarten attendance was found to have a positive impact on school achievement (cf. Tietze, 1987). Moreover, the earlier and longer disadvantaged children attended *kindergarten*, the less often they later failed and had to repeat a class (Kratzmann & Schneider, 2008). Another German study found that children from immigrant backgrounds especially profited by attending *kindergarten* because they improved their German language skills, cognitive abilities, and attention skills (Becker & Biedinger, 2006; Biedinger, Becker, & Rohling, 2008). As a result, these children were enrolled in school at an earlier age.

1.3. Parental effects

Family factors strongly influence children's development, particularly *parental education*, as an indicator of a developmentally appropriate home environment (e.g., providing books enabling reading; Iltus, 2006; Rindermann, Michou, & Thompson, 2011) and unknown genetic endowment. The quality of family environment typically has more influence on children's cognitive outcomes (e.g., attention, memory) than out-of-home child care environments (NICHD ECCRN, 2005). Further, parents influence development through their selection of and influence on preschool, kindergarten (e.g., Fuller, Holloway, & Liang, 1996; Grogan, 2011; Riley & Glass, 2002; Rose & Elicker, 2010) and school education. Therefore, it is important to control for both direct (e.g., educational behavior) and indirect (e.g., parents' education, income, family structure) parental influence when studying the impact of early care and education on child development. In non-experimental studies, this is partly possible, for example, by combining matching with statistical controls such as partial correlation (cf. Fritschi & Oesch, 2008) and path analysis. Therefore, these methods of empirical and statistical control were applied in both studies.

2. Overview of studies 1 and 2

We present two studies investigating for children in Austria (1) the associations of crèche attendance with cognitive and general development at kindergarten age, and (2) the associations of crèche attendance with cognitive development, learning behavior, and school achievement at the end of primary school. From previous studies, it was expected that children who formerly attended crèche would have better developmental outcomes than children who did not attend crèche, with the possible exception of behavioral problems (e.g., Camilli et al., 2010). That is, teachers may report more behavior problems of children who formerly attended crèche compared to children who did not (NICHD ECCRN & Duncan, 2003). Further, we expected that the associations between crèche attendance and child development would be stronger for younger children (i.e., at kindergarten age) than for older children (i.e., at primary school age) because effects of early education generally decrease over time (Camilli et al., 2010). In addition, children with an immigration background are expected to gain more from crèche attendance (e.g., Cunha et al., 2006). Associations between crèche attendance and children's development were compared to and controlled for parental factors (e.g., level of formal education).

In Study 1, children in kindergarten age who had no crèche experience were *matched* to children with crèche experience, based on the children's and parents' background characteristics. This approach to controlling for characteristics at entry reduces bias in the estimated relationships between crèche attendance and child development. However, matching also prevents us from estimating associations between parental attributes and crèche attendance. Therefore, we chose for Study 2 a *non-matching* procedure. In Study 2 in primary school age, all relationships between crèche attendance and child development were estimated statistically controlling for parental background characteristics (cf. Fritschi & Oesch, 2008). Study 1 investigates short- to middle-term associations (1–5 year interval), Study 2 middle- to long-term associations (6 to 10 year interval) with crèche attendance. Together these studies with *different age groups*, *different assessments*, and *different designs* (matching vs. not) provide a more robust