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Preschool Programs for the General Population

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Introduction

There are well-known small-scale randomized controlled trial (RCT) studies from the US documenting the benefits of curriculum-led experimental preschool programs for long-term educational, occupational and social outcomes for disadvantaged children.[1] Additionally, a larger-scale quasi-experimental study in Chicago found similar benefits up to age 28 of sustained early education in terms of improved education, socio-economic status, health and crime for a disadvantaged population.[2] Such programs are cost-effective with groups at high risk for poor outcomes, in that the savings outweigh any costs.[3] Nevertheless, besides benefits for disadvantaged groups there is strong evidence that preschool education, whether specialized or routine provision, can be beneficial for the general population.

The Organisation for Economic Cooperation and Development (OECD) examined educational attainment data for 65 countries, finding that literacy at age 15 was strongly associated with preschool participation in countries where a large proportion of the population use preschool, where preschool is for more months, and where there were measures to maintain the quality of preschool.[4] They concluded that widening access to preschool can improve performance and equity by reducing socioeconomic disparities, but also importantly noting that this will be the

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case only if extending coverage does not compromise quality.[4] A meta-analysis of 125 studies concluded that preschool was associated with substantial effects for both cognitive and socio-emotional outcomes often through to adulthood, and educationally-oriented programs appeared to have larger effects.[5]

A more recent comprehensive review has delineated how a range of factors affect the influence of early childhood education and care (ECEC) upon child outcomes.[6] Studies of population-representative US samples reported benefits for school readiness of prekindergarten experiences,[7,8] greater if preschool started at 2 years of age.[9] Similar evidence also exists in the UK[10,11] and the effects are long-term with improved qualifications, employment and earnings in adulthood.[12] In France, école maternelle provides universal, free, preschool education from age three. During the 1960s and 1970s large-scale expansion in France enrollment of 3-year-olds increased from 35% to 90% and of 4-year-olds from 60% to 100%. Analysis of state-collected data revealed sizable and persistent effects indicating that preschool helped children succeed in school and obtain higher wages in the labor market, with greater effects for children from less advantaged backgrounds.[13] Similar population-wide evidence has been found from national data in Switzerland where preschool expansion was associated with improved intergenerational educational mobility, with children from disadvantaged backgrounds benefiting most.[14] Further evidence comes from the expansion of preschool education in Norway during the 1970s, where using national datasets and examining differential local implementation found that preschool participation was associated with strong benefits for later educational and labor market outcomes across the population.[15]

More recently, in the US a study of children who attended New Jersey's public preschool program found long-lasting educational benefits for a population of largely black and Hispanic children. The effects persisted until age 16 and were larger for 2 years than 1 year of the preschool. Grade retention was significantly lower and special education placements were reduced with preschool participation.[16] Similarly, a study in Oklahoma found persistent benefits on math attainment and grade retention through middle school.[17]

Developing countries

Most research on ECEC has occurred in developed countries. However, some research has focused on the potential for ECEC to improve general population outcomes for developing countries. Sometimes the preschool program is coordinated with a health and/or nutrition

program, and such programs appear to be very successful.[18] Examples of the benefits of preschool education has been found for several developing countries across the globe. For example, preschool was found to boost primary school achievement in Bangladesh,[19] with similar results reported in a review of studies from ten countries.[20] With the expansion of preschool provision in Uruguay comparisons were possible of a) siblings with and without preschool and b) regions varying in preschool expansion. The study revealed clear benefits in terms of academic achievement from preschool up to secondary school.[21] Similar analyses in Argentina found that one year of preschool was associated with primary school attainment increases by a moderate but important degree.[22] Also, a study in Chile showed that preschool attendance starting in the first two years of life had a positive impact on cognitive skills, academic outcomes and self-regulation.[23] A review of research in developing countries[24] concluded that increasing preschool enrolment is amongst the most effective ways of improving child outcomes, with a very favourable benefit-to-cost ratio.

Quality

The long-term benefits are not evident in all research with some studies finding that children who did and did not attend preschool programs converge on educational measures after some years,[25] but there are discrepancies amongst studies. Some studies find persistent effects when preschool and later school education is high quality.[26] Others find persistent effects for children whose alternative learning environments are not conducive to developmental progress.[27] While persistent effects are the most common finding, quality is of relevance.[17] Critically, in experimental intervention studies[2,3,28] the quality of the preschool was high. General population studies from the US[29] and England[10,11] have provided evidence on preschool education with greater variability in quality and indicate that the quality of universal preschool is influential. For example, in England, controlling for background influences, quality as measured by standardized observations, revealed effects for literacy and numeracy that were important for later educational progress, with low-quality preschool having virtually no beneficial effect.[10,11] The beneficial effects of high quality preschool education on educational achievement and social development have been found up to age 18 in this English study.[11] Similar results were obtained in Northern Ireland; children who attended high quality preschool were 2.4 times more likely to attain the highest grade in literacy at age 11, and 3.4 times more likely in mathematics, than children without preschool.[30] Looking at evidence across public preschool programs in five US states with adequate resourcing and high quality programs (Maryland, Massachusetts, New

Jersey, North Carolina, and Oklahoma), there were positive effects on educational attainment which was in contrast with null effects for programs in other states without evidence of high quality provision.[31] Thus, it could be concluded that high quality programs produce benefits but poorly implemented programs may have limited or no effects.

Effectiveness

Preschool experiences can improve children's longer-term executive functioning,[32] linked to enhanced cognitive and social-emotional outcomes. Similar long-term effects can be seen for specific areas of educational attainment such as mathematics,[10,30,33] scientific thinking[34] and literacy.[11,30] This is consistent with the proposition that later cognitive and non-cognitive skills build upon skills learnt in early childhood, and greater early learning can put children on a more beneficial developmental trajectory. Thus, investment in early childhood education can result in greater benefits per unit than investment in later childhood. Similar propositions include those that preschool education, through improving both cognitive skills in language, literacy, and math as well as socio-emotional skills such as self-regulation, motivation/engagement, and persistence, can improve children's ability to maintain a positive academic trajectory.[35] The size of such preschool effects upon subsequent development has been debated often and a meta-analysis of 22 high-quality experimental and quasi-experimental studies conducted between 1960 and 2016 found that, on average, participation in preschool education leads to statistically significant reductions in special education placement (d = 0.33 SD, 8.1 percentage points) and grade retention (d = 0.26 SD, 8.3 percentage points) and increases in high school graduation rates (d = 0.24 SD, 11.4 percentage points).[36] Such results support the proposition that preschool education can reduce later education costs and also promote child well-being.

Determining Causality

Randomized controlled trial designs are generally not feasible with preschool provision for the general population, and non-experimental designs are the norm. Hence it is possible that the associations found between preschool experience and development, reflect selection effects. These issues have been discussed extensively,[37] and while it remains possible that unmeasured variables are the basis of a selection effect (omitted variable bias) the interpretation that associations are the result of casual effects of preschool experiences is strengthened by the inclusion of statistical control for many possible basis-for-selection covariates, reflecting child, family and sometimes neighbourhood characteristics, as for example in the EPPSE (effective

preschool, primary & secondary education) study.[10,11]

Another approach to this problem is the use of change models. If differences exist prior to preschool experience this would support the selection effect interpretation; conversely if developmental differences emerge after preschool this supports a casual interpretation. As preschool experience has been found to be not only associated with post-preschool development, but also with enhanced progress over the preschool period,[38] this further supports a casual interpretation. Similarly, “difference in differences” approaches have supported the beneficial effects of preschool education, as in a study exploiting variation in preschool provision across birth cohorts and municipalities amongst Norway’s population.[39] Another strategy is the regression-discontinuity design. Comparing “young” kindergarten children who had just completed preschool to “old” preschool children just beginning preschool, the results clearly indicated preschool effects upon school readiness test scores.[40]

Other evidence supportive of a casual interpretation of preschool effects comes from a study of twins.[41] Longitudinal data from a nationally-representative sample over 600 monozygotic and dizygotic twin pairs shows the contributions of genes, shared environment and non-shared environment to cognitive development for children varying in preschool experience. Attending preschool was associated with reductions in shared environmental influences on academic skills at kindergarten entry and was prospectively associated with reduced family-level influences on academic skills. Before preschool the contribution of shared environment influences on cognition was similar for preschool and non-preschool groups but after preschool, shared environment influences were 43-47% of variance for the preschool group, while for the non-preschool group they were 72-83% of the variance.

In summary the evidence overwhelmingly supports a causal interpretation of the long-term effects of preschool education.

Research and Policy

Comparing data from before and after post-policy changes indicates that policy can improve preschool quality and reduce variation amongst the population.[42] In countries where policy has improved leading to universal coverage of preschool education and reduced variation in preschool quality, the effects of preschool education and particularly preschool quality effects upon child development are less apparent, as appears to have happened in the UK,[43] and possibly

in Norway,[39] by largely eliminating poor quality with universal state-funded and monitored provision. This evidence of reduced effects for preschool education, when variation in provision and quality of preschool education amongst the population is reduced, can be interpreted as good news in that apparently most of the population are benefitting from better quality preschool experience.

The overwhelmingly positive evidence of the benefits of preschool education has increased interest in the universal preschool provision to improve school readiness and later educational attainment and subsequent social, economic and occupational success.[3,44] Indeed some have argued that preschool experience is critical for children's future competence, coping skills, health, success in the labor market, and consequently the social and economic health of the nation.[45] In a technologically sophisticated world a population's educational competence is likely to be increasingly important for a nation's economic development. Hence preschool education benefits not only disadvantaged groups but advances educational and social development for all, and becomes part of the infrastructure for a nation's economic and social development. This message is increasingly being heeded by governments. In France, école maternelle has proved so valuable for the country as a whole that from 2019 it was made compulsory for all French children over three years of age to attend until the start of school (https://www.education.gouv.fr/l-ecole-maternelle-11534), and France became the first country to integrate preschool education into a compulsory education system. While in other countries, notably the Nordic countries, UK and others, preschool education, while not compulsory, is almost completely universal resulting from government funding of preschool facilities. This means that research in such countries can examine variations in preschool education, but comparing preschool versus no preschool attendance is not longer an option.

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