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Article

The role of preschool in reducing inequality

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The role of preschool in reducing inequality

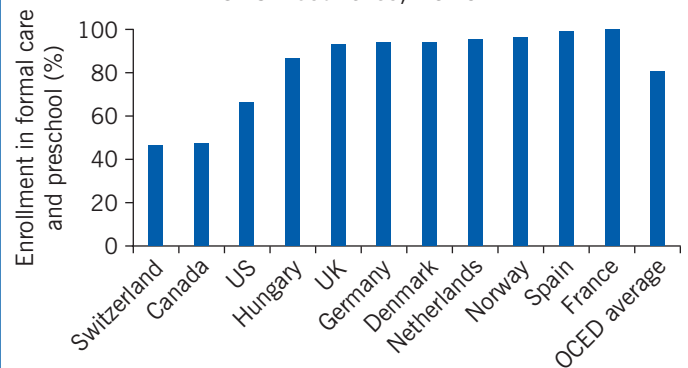
Preschool improves child outcomes, especially for disadvantaged children

Keywords: preschool, inequality, child development

ELEVATOR PITCH

Children from disadvantaged families have lower levels of school readiness when they enter school than do children from more advantaged families. Many countries have tried to reduce this inequality through publicly provided preschool. Evidence on the potential of these programs to reduce inequality in child development is now quite strong. Long-term studies of large publicly funded programs in Europe and Latin America, and newer studies on state and local prekindergarten programs implemented more recently in the US, find that the programs do improve outcomes for young children, particularly for those from disadvantaged families.

The share of children aged 3–5 in preschool varies across OECD countries, 2010



Source: OECD Family Database. Online at: <http://www.oecd.org/social/family/database>

KEY FINDINGS

Pros

- + Small model preschool programs improve child outcomes, especially for children from disadvantaged families.
- + Large public programs delivered at scale improve outcomes for children from disadvantaged families.
- + Preschool programs raise children’s school readiness.
- + The benefits of high-quality preschool programs persist into adolescence or young adulthood and, in most cases, are larger for more disadvantaged children.
- + High-quality preschool pays for itself, both by raising students’ overall achievement and by reducing inequality of achievement.

Cons

- High-quality preschool programs are expensive.
- Highly educated and well-trained preschool staff and reasonable class sizes and teacher–student ratios are required for high-quality preschool.
- Results of studies of the effects of preschool programs may not be generalizable across countries.
- As children enter school more ready to learn, schools need to be positioned to support and build on those gains.
- Evidence is stronger with regard to positive short-term effects; but benefits are not always maintained in the long term.

AUTHOR’S MAIN MESSAGE

Universal preschool programs implemented in many countries in the 1970s and 1980s led to improvements in academic achievement and other positive outcomes, particularly for children in disadvantaged families. A new generation of preschool programs being implemented in some US cities and states have also had positive outcomes. Good-quality preschool programs more than pay for themselves by boosting achievement and reducing inequality of achievement. That is good news, especially for countries with persistent and high levels of inequality—and a good reason to expand preschool programs in countries where enrollment is far from universal.

MOTIVATION

Many countries face high levels of inequality of child development. In particular, there are dramatic gaps in school readiness and achievement between children from low socio-economic status families and those from high socio-economic status families, as well as gaps by immigrant status. This inequality is already evident in early childhood, suggesting a potential role for public policy interventions in that period.

One approach to addressing this inequality of child development has been to implement programs that aim to improve parenting in early childhood. However, parenting programs have had a mixed record of effectiveness in reducing inequality.

Another approach has been to expand and improve the quality of preschool programs. Evidence on these programs is strong and positive. Accordingly, high-quality preschool programs improve child achievement, especially for disadvantaged students, such as children from low socio-economic or immigrant families who are less likely to be enrolled in preschool programs and most likely to benefit from attending them. This evidence suggests that preschool is a potentially promising intervention to promote equality.

DISCUSSION OF PROS AND CONS

What do we know about first-generation universal preschool programs?

The oldest evidence on preschool programs comes from a few randomized controlled trials of small model programs delivered to very disadvantaged young children in the US (typically, children from very low-income families) at a time when little other preschool provision existed. The best-known of these programs include Perry Preschool, which provided part-day preschool and home visiting to very disadvantaged three- and four-year-old children in Ypsilanti, Michigan, and the Abecedarian Project in North Carolina, which provided very high-quality childcare and home visiting to disadvantaged children starting in infancy. Randomized controlled studies found that these programs were quite effective and delivered large benefits relative to their costs. Children served by these programs have been followed into adulthood and the evidence continues to be very positive, showing that small model programs can improve outcomes for disadvantaged children.

Other studies confirm these positive outcomes, but also raise questions about whether such large effects can be achieved when programs are taken to scale. The US experience with Head Start, which was inspired by the early model programs, has yielded mixed results. It is widely agreed that Head Start, which provides comprehensive early childhood education, health, nutrition, and parent involvement services to low-income children and their families, produces benefits in the short term, but concerns have been raised about whether those effects persist. Many studies have found that short-term effects on test scores fade as children move through school. However, careful econometric studies have documented long-term benefits of Head Start for adult outcomes such as school attainment, crime, and employment.

It is also clear from the research that the effects of a program such as Head Start depend on the counterfactual—what would have happened in the absence of the program? Head Start will have larger effects for children who would otherwise not

have attended any preschool and will have smaller effects for children who would have attended preschool even without Head Start. It is also important to note that, as a national program, Head Start is made up of many different centers, of varying quality. Thus, part of the lesson from Head Start is that it is challenging to achieve consistently high quality when a program is taken to scale.

Most recently, a meta-analysis of 65 studies of preschool programs found that such programs raise children's school readiness, but with smaller average effects than in model programs such as Perry Preschool and the Abecedarian Project. This meta-analysis provides important suggestive evidence that such programs could reduce inequality. However, there is still the question of whether good-quality preschool can be delivered at scale through large public programs.

Two bodies of evidence speak to the effects of large public programs implemented at scale. The first concerns the effects of public preschool programs introduced in many countries in the second half of the 20th century. The second concerns the effects of state and local prekindergarten programs that have been implemented more recently, for instance, in the US.

Effects of large-scale public preschool programs

A good deal of evidence has accumulated on large publicly funded preschool programs in the second half of the 20th century. These programs are now widespread and typically provide early education to children in the year or two before school entry [1]. Countries differ a great deal in the administration and organization of the programs. In some countries, preschool programs are viewed as early education and are administered by education departments, while in others they are seen as a form of childcare and are administered by social services departments. Standards for the programs also vary widely, with some countries emphasizing highly trained teachers or caregivers, while others emphasize small class sizes or low child-staff ratios. But a common feature in many countries is that these programs are now seen as a core part of the welfare state and serve virtually all children in the year or two before school entry.

Since the full literature on these programs cannot be reviewed here and since the research varies in quality, this paper considers only studies that have applied rigorous methods and that provide evidence on medium- or long-term effects by following children into the school years or beyond. Obtaining this kind of medium-term and long-term evidence is particularly important given the concerns raised about whether the effects of preschool persist or fade out over time.

Long-term studies following children into adolescence and adulthood

Studies of preschool programs in three countries—Denmark, France, and Norway—have followed children into adolescence or adulthood and thus offer estimates of the longest-term effects. These studies consistently demonstrate benefits of preschool that persist into adolescence or young adulthood and that in most cases are larger for more disadvantaged children.

One of the first long-term studies is the Danish study that used variation in preschool expansions in the late 1970s and early 1980s to estimate the effect of local preschool availability for children aged zero to six on their completed schooling and earnings at ages 22–30 [2]. The study used a natural experiment approach taking advantage of the fact that preschool availability varied by locality, and thus whether children were able to attend preschool depended on local policy rather than parental choice. In this rigorous analysis, preschool availability is found to be associated with more completed schooling and higher adult earnings. Especially important, the study found some evidence that these effects are larger for children from disadvantaged families. (Later Danish studies, which follow children to age seven or 11 also find benefits; see [1] for details.)

Another long-term study was carried out in France. This study also used a natural experiment approach, taking advantage of regional variation in the availability of preschool to examine the effects of expansions of preschool for three and four year olds in the 1960s and 1970s on the wages of young adults [3]. The study found positive effects of preschool on adult wages. It also found medium-term effects of preschool on reduced grade repetition, higher test scores, and higher rates of high school graduation. Effects were largest for children who were not from advantaged backgrounds.

The third long-term study comes from Norway, again applying a natural experiment approach. The Norwegian study examined expansions of preschool in the 1970s for children aged three to six and showed evidence of positive effects on labor market outcomes for young adults, as well as less reliance on welfare [4]. In addition, it found medium-term effects on high school dropout, years of education, and college attendance. Effects were largest for children of less-educated mothers. (Some other Norwegian studies that followed children into adolescence also found similar results.)

Medium-term studies following children into their school years

In addition to the long-term studies for these three countries, which observed children who received preschool into adulthood, several medium-term studies followed children into their school years and sometimes into adolescence. These studies include a range of countries, from Germany, Spain, and Sweden in Europe to Argentina and Uruguay in Latin America. Again, the evidence from these studies points to positive benefits, and more so for children from disadvantaged backgrounds.

The German study, using data from the German Socio-Economic Panel for 1984–1994, found that kindergarten attendance is related to improvement in the type of school in which the child was placed in grade seven (an important marker of school achievement) for immigrant children but not for non-immigrant children [5]. In Spain, a study of the expansion of high-quality preschool for three year olds in the early 1990s showed that preschool reduces grade retention in primary school and improves children’s reading skills at age 15 [6]. The effects are largest for disadvantaged children and for girls. In Sweden, a study looked at the effects of preschool attendance on test scores at age 13 for four cohorts of children born between 1967 and 1982, a period when preschool enrollment increased dramatically [7]. It finds that preschool attendance significantly reduces the gap in test scores between children of immigrants and those of native-born parents.

There are also studies from Latin America, where researchers have taken advantage of recent government expansions in preschool to study its effects. In Argentina, following an expansion in public preschool provision between 1993 and 1999, a study found that an additional year of preschool increases third grade language and mathematics test scores by 0.23 standard deviations, with larger effects for children living in poor areas [8]. The expansion also led to improved attention, effort, class participation, and discipline among children who had the opportunity to attend preschool. Similarly in Uruguay, a government-sponsored expansion in preschool during the late 1990s to early 2000s found that children who attended preschool were more likely to be enrolled in school at ages 7–15 and had completed more grades [9]. Again, the effects were particularly large for children with low-educated parents or from areas outside the capital, Montevideo.

A strong case that preschool provision can reduce inequality

Taken together, the evidence from rigorous studies of large public programs is quite compelling. Preschool improves children's achievement and other educational and labor market outcomes. The effects are present not just in the short term, but also in the medium and longer term. And, especially important, the effects are greater for children from disadvantaged backgrounds and immigrants than for their more advantaged peers, both because such children have more to gain from quality preschool and because such children are less likely to attend preschool in the absence of public funding. These findings present a strong case for the proposition that preschool provision can reduce inequality.

New generation universal preschool programs

Preschool is primarily, for instance in the US, a state and local responsibility

While most European countries and some countries outside of Europe have had universal preschool for several decades, it is newer in the US and still does not exist nationwide. Recent estimates by the National Institute for Early Education Research indicate that 29% of four year olds were in publicly funded universal prekindergarten programs administered at the state or local level in 2013–2014. This figure represents dramatic growth since 2002, when only 14% of four year olds were enrolled in such programs, but it is still a long way from universal nationwide coverage. Enrollment of three year olds in public prekindergarten programs is much lower (just 4.4% in 2013–2014).

Enrollment in preschool in the US is not only low, but it is also highly skewed by parental resources. Center-based programs are costly, and in the absence of government funding, children from high-income families are much more likely to be enrolled. While there is no gap in enrollment in kindergarten for five year olds, which is provided free of charge by public schools, there are pronounced gaps by family income in enrollment in preschool for four year olds and, especially, three year olds. Thus, in the absence of government funding, preschool serves to widen gaps in school readiness, rather than narrow them.

Thus, there is an important role for government in the US in expanding access to preschool provision. However, another distinctive aspect of the US situation is that early education, like primary and secondary education, is primarily a state and local responsibility rather than a federal one. Thus, universal prekindergarten programs are established at the state or local level, and their design, funding, and quality vary widely. Of the 53 state or local programs operating in 2013–2014, about 30% offered just half-day programming, and a majority (70%) did not require teachers to have a bachelor's degree. On average, states and local jurisdictions spend \$4,679 per child for preschool programs, considerably less than the \$12,449 they spend on children enrolled in primary or secondary school. The range across states is broad, from a high of \$12,157 per child in New Jersey to a low of \$1,543 per child in Arizona. Assessments of classroom quality in prekindergarten programs have found wide variation as well. This is an important finding because there is considerable evidence that quality—in particular, the quality of teacher–child interactions—matters for child development. Government programs will be able to boost achievement, and narrow gaps, only if the programs are of sufficiently good—and uniform—quality.

Programs improve school readiness, especially for the disadvantaged

For the most part, the evidence from thorough evaluations of universal preschool programs in the US is consistent with the evidence from the first generation of universal preschool programs in other countries. These evaluations of US state and local universal preschool programs have generally found that the programs improve school readiness, especially for children from disadvantaged families. The most rigorous studies have been carried out in Tulsa, Oklahoma; Boston, Massachusetts; a five-state sample; and, most recently, Tennessee.

The universal prekindergarten program in Tulsa, Oklahoma, has high standards compared with programs in other states. Teachers must have a bachelor's degree and certification in early childhood education; requirements for class size (20) and student–teacher ratios (10:1) are in line with those recommended for high-quality programs. The Tulsa program has been extensively evaluated. One study took advantage of the strict age cutoff for entry into the program, comparing students just above the age cutoff with those just below the cutoff. Across several cohorts of students, the study found substantial and significant effects of prekindergarten participation on children's language, literacy, and mathematics skills. The study found larger effects for poor children (those eligible for free school meals because they live in households with incomes up to 130% of the line) and near-poor children (those eligible for reduced price school meals, with household incomes of 130–185% of the poverty line) than for their more advantaged peers. Some of the effects were quite large at program completion. For example, among children entering kindergarten in 2006, prekindergarten was associated with nearly a one standard deviation gain in letter-word identification, a 0.75 standard deviation gain in spelling, and a 0.33 standard deviation gain in applied problems (a mathematics assessment) on the Woodcock Johnson composite test [10]. Some, but not all, of these effects persisted to grade three, the latest point at which children in the study were assessed.

The universal prekindergarten program in Boston, Massachusetts, is a full-day, academically oriented program. The carefully designed program uses a standardized language and literacy curriculum as well as mathematics curriculum and includes coaching and professional development to help teachers implement the curricula and manage children's behavior. A rigorous evaluation found that the program led to substantial and significant improvements in children's vocabulary and mathematics skills, along with smaller, but still meaningful, improvements in children's executive function and socioemotional development [11]. For some outcomes (numeracy, inhibitory control, and attention), the effects were significantly larger for children from poor or near-poor families than for children from more advantaged backgrounds.

The results of a five-state study of prekindergarten programs in Michigan, New Jersey, Oklahoma, South Carolina, and West Virginia are generally consistent with those of the programs in Tulsa and Boston [12]. The five-state study found generally positive effects on children's development, although the effects varied somewhat by state and outcome, with the largest and most consistent effects across states found for a measure of children's pre-reading skills (print awareness).

However, the results of a recent study of Tennessee's universal prekindergarten program are somewhat different. Using a random assignment design, the study analyzed the effects of Tennessee's universal prekindergarten program for a sample of 1,076 children whose families applied for prekindergarten [13]. The study found more modest effects than did the Tulsa or Boston studies on school readiness at the end of the prekindergarten year (a gain of 0.24 standard deviations on the Woodcock Johnson composite test). For the most part, the effects of the program are no longer significant at kindergarten or first grade. The study also assessed children's behavioral development and found no significant differences at kindergarten or first grade. However, the study did find that children assigned to prekindergarten were significantly less likely to be retained in kindergarten or first grade, an outcome that may have long-term benefits.

The weaker results for Tennessee compared with those for Tulsa and Boston may be due to the lower quality of the program. In 2009–2010 (when the randomized study began), Tennessee spent an average of \$4,445 in state funding per child on its full-day prekindergarten program, considerably less than the \$7,853 that Oklahoma spent per child on its full-day program that year. Boston's full-day program was even more expensive, at an estimated \$15,000–\$17,500 per child. In addition, Tennessee's program did not have a central vision or carefully selected curriculum, as was the case in Tulsa and Boston. Rather, Tennessee's initiative contained many different preschool programs, depending on the local area. Thus, it is perhaps not surprising that the overall results were disappointing.

Taken together, the evidence from the recent US expansions in preschool programs at the state and local levels suggests that public preschool programs can raise children's school readiness, particularly for children from disadvantaged families. At the same time, questions persist about the quality and consistency of programs implemented at scale. The US still has a long way to go to provide preschool to all young children and to deliver high-quality programs consistently.

LIMITATIONS AND GAPS

While rigorous studies of public preschool programs provide compelling evidence that preschool improves children's achievement and other school and labor market outcomes, especially for children from disadvantaged backgrounds, some caveats apply. Most important, not all preschool programs are equally effective. If the quality of the program is poor or uneven, children will not derive the cognitive or social and emotional gains found for high-quality programs. This is evident in the many studies of Head Start programs in the US and also in the recent evaluation of prekindergarten in Tennessee [13].

And, of course, no preschool program is a panacea. There are many other influences on child development, particularly in the early years. The earliest model preschool programs combined preschool provision for children with home visiting for parents. Although many home visiting and other parenting programs have been ineffective, some have produced important gains, especially for children from disadvantaged families. So there is also a role for home visiting and parenting programs, alongside quality preschool programs.

In the US, the Obama administration has reviewed the evidence on home visiting and parenting programs and identified those that rigorous evaluations have shown to be effective. This is a very useful base from which to expand such programs. And even the best preschool programs cannot protect children from the stresses of poverty and hardship. Safety net programs that protect children from such stresses continue to be vitally important. The evidence on such programs is reasonably strong. It shows that children benefit when programs provide their families with income support that reduces financial strain and hardship. There are also well-documented benefits of food and nutrition programs.

SUMMARY AND POLICY ADVICE

Evidence on the potential of preschool programs to reduce inequality in child development is quite strong. It has been clear for some time that small model preschool programs can lead to substantial improvements in school readiness for children from disadvantaged backgrounds who would otherwise have little access to high-quality early childhood care or education and who have the most to gain from high-quality programs. This early evidence suggested that preschool might be an effective way to reduce inequality.

But the question has always been whether universal programs, provided at scale, could deliver on that promise. Many policymakers are aware that the Head Start program in the US has had mixed results, delivering some benefits that persist in the long term but with other benefits that have tended to fade out over time. And it is well known that the quality of Head Start programs and other public programs can vary widely. These concerns have led observers to continue to question whether large-scale public preschool programs can deliver the kind of benefits that the early model programs did.

Newer evidence from larger-scale public programs suggests that the answer is yes. Universal preschool programs implemented in the 1970s and 1980s, in Europe and elsewhere, have led to gains in academic achievement, social and emotional

development, and other outcomes, particularly for children from disadvantaged backgrounds. The same appears to be true for a newer generation of universal preschool programs now being implemented in several US states and cities.

While it is too soon to tell what the long-term effects of the programs in the US will be, the evidence from medium and long-term studies carried out in Europe and elsewhere is promising. Those studies make it clear that universal preschool programs, delivered at scale, can provide benefits not just in the short term, but in the medium and longer terms as well.

In preschool programs, as in many other areas of social policy, we get what we pay for. High-quality preschool requires highly educated and trained preschool staff and reasonable class sizes and teacher–student ratios. While the costs of high-quality programs are considerable, it is also clear that high-quality preschool pays for itself several times over, both by raising students’ overall achievement and by reducing inequality of achievement. Especially for countries such as the US where inequality is high and persistent, that is surely good news—and a good reason to move forward with expanding preschool access.

There also needs to be complementarity and coordination between preschool and school policies, an aspect of preschool expansion that is often neglected. As preschool is expanded, and as new cohorts of children enter school more ready to learn, and more equally prepared, schools need to be positioned to support and build on those gains. Thus, the material that is taught in kindergarten and primary school can and should change. If not, the gains that are realized in preschool will not be maintained. This is particularly likely to be a challenge when preschool provision is less than universal and when teachers face incoming students who are unequally prepared. There is clearly a need for ongoing dialogue and interaction between preschool programs and primary school programs, as these programs expand.

And because there are many other influences on early child development, policymakers would be wise to ensure that parenting and income support policies buttress their preschool efforts, rather than undermining them.

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Competing interests

The IZA World of Labor project is committed to the *IZA Guiding Principles of Research Integrity*. The author declares to have observed these principles.

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REFERENCES

Further reading

Bradbury, B., M. Corak, J. Waldfogel, and E. Washbrook. *Too Many Children Left Behind: The US Achievement Gap in Comparative Perspective*. New York: Russell Sage Foundation, 2015.

Yoshikawa, H., C. Weiland, J. Brooks-Gunn, M. R. Burchinal, L. M. Espinosa, W. T. Gormley, J. Ludwig, K. A. Magnuson, D. Phillips, and M. J. Zaslow. *Investing in Our Future: The Evidence Base on Preschool Education*. Ann Arbor, MI: Society for Research in Child Development, 2013.

Key references

- [1] Ruhm, C., and J. Waldfogel. "Long-term effects of early childhood care and education." *Nordic Economic Policy Review* 1:1 (2012): 23–51.
- [2] Bingley, P., and N. Westergaard-Nielsen. "Intergenerational transmission and day care in Denmark." In: Ermisch, J., M. Jantti, and T. Smeeding (eds). *Cross-National Research on the Intergenerational Transmission of Disadvantage*. New York: Russell Sage Foundation, 2012; pp. 190–204.
- [3] Dumas, C., and A. Lefranc. "Early schooling and later outcomes: Evidence from pre-school extension in France." In: Ermisch, J., M. Jantti, and T. Smeeding (eds). *Cross-National Research on the Intergenerational Transmission of Disadvantage*. New York: Russell Sage Foundation, 2012; pp. 164–189.
- [4] Havnes, T., and M. Mogstad. "No child left behind: Subsidized child care and children's long-run outcomes." *American Economic Journal: Economic Policy* 3:2 (2011): 97–129.
- [5] Spiess, C. K., F. Büchel, and G. G. Wagner. "Children's school placement in Germany: Does kindergarten attendance matter?" *Early Childhood Research Quarterly* 18:2 (2003): 255–270.
- [6] Felfe, C., N. Nollenberger, and N. Rodriguez-Planas. "Can't buy mommy's love? Universal childcare and children's long-term cognitive development." *Journal of Population Economics* 28:2 (2015): 393–422.
- [7] Fredriksson, P., C. Hall, E. Johansson, and P. Johansson. "Do pre-school interventions further the integration of immigrants? Evidence from Sweden." In: Johansson, E. (ed.). *Essays on Schooling, Gender, and Parental Leave, Economic Studies 121*. Uppsala, Sweden: Uppsala University Department of Economics, 2010; pp. 45–68.
- [8] Berlinski, S., S. Galiani, and P. Gertler. "The effect of pre-primary education on primary school performance." *Journal of Public Economics* 93:1–2 (2009): 219–234.
- [9] Berlinski, S., S. Galiani, and M. Manacorda. "Giving children a better start: Pre-school attendance and school-age profiles." *Journal of Public Economics* 92:5–6 (2008): 1416–1440.
- [10] Gormley Jr., W. T., T. Gayer, and D. Phillips. "Preschool programs can boost school readiness." *Science* 320:5884 (2008): 1723–1724.
- [11] Weiland, C., and H. Yoshikawa. "Impacts of a prekindergarten program on children's mathematics, language, literacy, executive function, and emotional skills." *Child Development* 84:6 (2013): 2112–2130.
- [12] Wong, V. C., T. D. Cook, W. S. Barnett, and K. Jung. "An effectiveness-based evaluation of five state prekindergarten programs." *Journal of Policy Analysis and Management* 27:1 (2008): 122–154.
- [13] Lipsey, M. W., K. G. Hofer, N. Dong, D. C. Farran, and C. Bilbrey. *Evaluation of the Tennessee Voluntary Prekindergarten Program: Kindergarten and First Grade Follow-up Results from the Randomized Control Design*. Vanderbilt University Peabody Research Institute Research Report, 2013.

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