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## **Impatience Among Preschool Children and Their Mothers**

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**ZEW**

Zentrum für Europäische  
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Centre for European  
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## Nontechnical Summary

Economists study the intergenerational transmission of skills and optimal human capital investment. Recent research has examined intergenerational associations of cognitive skills, trust and risk attitudes, income and educational attainment. We contribute to the literature on human capital formation by examining the intergenerational relationship of time preferences among mothers and their children, based on experimental measures of impatience.

Impatience is an important parameter in models of human capital investments, with implications for job search, credit card borrowing, and many other economic decisions. A common finding is that children become more patient during development. A potential explanation is that the limbic system, which drives immediate gratification, develops early in life, while the long-run orientated frontal cortex is still developing until the end of teenage age.

Although parent-child interaction is said to be the “cradle of action” there is not much evidence on the intergenerational relationship between impatience among preschool children and their mothers. One may hypothesize that a child’s impatience is directly influenced by the mother’s impatience through observational learning and thus constitutes an important channel for the intergenerational transmission of human capital.

In this study, the child’s impatience stems from a delay of gratification experiment. Mothers’ impatience has been assessed by a choice task where the mothers faced trade-offs between a smaller-sooner and a larger-later monetary reward with a delay of six or twelve months. The findings demonstrate an intergenerational relationship in short-run decision making. Controlling for mother’s and child’s characteristics the child’s impatience at preschool age is significantly correlated with the six month maternal reservation interest rate.

To sum up, the findings demonstrate an intergenerational relationship in short-run decision making. Mother’s and child’s impatience, an important part of human capital, are correlated when the child is at preschool age. Policies that are designed to improve mother’s patience would be able to develop the important patience competencies of her children.

## **Das Wichtigste in Kürze**

Ökonomen erforschen die intergenerationale Transmission von Fertigkeiten, Kompetenzen und Kenntnissen. Unter anderem wurde bereits die Transmission von Intelligenz, Risikopräferenzen, Vertrauen, Bildungsabschlüssen und den Arbeitsverdiensten untersucht. Diese Studie untersucht den Zusammenhang zwischen den Zeitpräferenzen von Kindern im Alter von fünf bis sechs Jahren und ihren Müttern, basierend auf experimentellen Messungen von Geduld.

Das Verhalten von Kindern und ihren Müttern wird in einem Experiment beobachtet, bei dem sich die Kinder zwischen einer Belohnung, welche sofort erhältlich ist und einer größeren Belohnung, auf die sie warten müssen, entscheiden können. Die Kinder erhalten, wenn sie warten, zwei Tüten Gummibärchen. Wenn sie nicht warten, erhalten sie eine Tüte Gummibärchen. Das Experiment wurde in der Wohnung der Familie durchgeführt. Ein zweites Experiment diente dazu, die Zeitpräferenzen der Mütter zu erfassen.

Die Fähigkeit zum Aufschub von Belohnungen gilt als wichtige Vorstufe für die Ausbildung der Handlungskontrolle, die wiederum eine Grundlage für den Schul- und Arbeitsmarkterfolg und die Integration in die Gesellschaft ist. Aus ökonomischer Sicht haben Zeitpräferenzen eine herausgehobene Bedeutung für alle Investitions- und Sparentscheidungen, insbesondere auch für die Investitionen in Bildung und das Humankapital.

Aus Sicht der Bildungspolitik ist beispielsweise die Frage von erheblicher Bedeutung, ob und ggf. in welcher Entwicklungsphase man die Ausdauer und Geduld von Kindern und damit das Leistungsvermögen verbessern kann. Im Kontext dieser Diskussion wird in der Forschung vermehrt das Verhalten im Vorschulalter untersucht, da grundlegende kognitive und nicht-kognitive Fähigkeiten im Kindesalter den Schulerfolg prognostizieren. Die vorliegende Studie möchte dazu beitragen, eine wichtige Forschungslücke zu schließen, da über die Determinanten von Zeitpräferenzen von Kindern im Vorschulalter und deren Müttern bisher wenig Evidenz vorliegt.

Zusammenfassend bestätigt die Studie, dass die Geduld von Kindern bereits im Vorschulalter eine signifikante Varianz aufweist. Während 78% der Kinder in der verwendeten Stichprobe als geduldig erscheinen, sind 22% der Kinder in diesem Alter aufgrund des experimentellen Tests eher ungeduldig. Unsere multivariaten Ergebnisse zeigen, dass die Geduld von Mutter und Kind signifikant zusammenhängen, auch wenn für weitere Eigenschaften des Kindes und der Mutter kontrolliert wird. Eine geduldigere Mutter trägt dazu bei, dass ihr Kind bereits im Vorschulalter ebenfalls geduldiger wird.

# **Impatience among preschool children and their mothers**

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## **Abstract:**

Using experimental data of children and their mothers, this paper explores the intergenerational relationship of impatience. The child's impatience stems from a delay of gratification experiment. Mother's impatience has been assessed by a choice task where the mothers faced trade-offs between a smaller-sooner and a larger-later monetary reward with a delay of six or twelve months. The findings demonstrate an intergenerational relationship in short-run decision making. Controlling for mother's and child's characteristics the child's impatience at preschool age is significantly correlated with the six month maternal reservation interest rate.

## **Keywords:**

Time preferences, impatience, intergenerational transmission, field experiments.

**JEL-classification:** C93, D03, D90

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## **Introduction**

Economics studies the intergenerational transmission of skills and optimal human capital investment. Recent research has examined intergenerational associations of cognitive skills (e.g. Black et al., 2008), trust and risk attitudes (e.g. Dohmen et al., forthcoming), income (e.g. Eisenhauer and Pfeiffer, 2008) and educational attainment (e.g. Bjorklund et al., 2006, for a summary see also Black and Devereux, 2010). We contribute to the literature on human capital formation by examining the intergenerational relationship of time preferences among mothers and their children, based on experimental measures of impatience.

Impatience is an important parameter in models of human capital investments (e.g. Krebs, 2003), with implications for job search (e.g. Pasermann, 2008), credit card borrowing (e.g. Meier and Sprenger, 2010), and many other economic decisions. To the best of our knowledge, our study is the first to examine the intergenerational relationship of impatience based on experimental measures in a sample of preschool children and their mothers (see Bartling et al., 2010).

A common finding is that children become more patient during development (e.g. Bettinger and Slonim, 2007). A potential explanation is that the limbic system, which drives immediate gratification, develops early in life, while the long-run orientated frontal cortex is still developing until the end of teenage age (e.g. Giedd et al., 1999).

Although parent-child interaction is said to be the “cradle of action” (Heckhausen and Heckhausen, 2008: 394) we are not aware of experimental evidence on the intergenerational relationship between impatience among preschool children and their mothers. One may hypothesize that a child’s impatience is directly influenced by the mother’s impatience through observational learning and thus constitutes an important channel for the intergenerational transmission of human capital.

## **Dataset and experiments**

A sample of 213 mother-child pairs, who were visited by trained interviewers in their homes is utilized. The sample was taken from a pretest with 291 mother-child pairs for the German Socio-Economic Panel Study (SOEP) performed in 2008, called “Mutter-Kind-Pilot” (Bartling et al., 2010). First, our sample is restricted to children who like gummy bears to ensure incentive compatibility. Second, to control for confounding effects, only biological mothers with German citizenship who breastfed their child and for whom all variables are available are included.

The restrictions reduce the number of observations to 213.

The experimental setting concerning the children's patience is an adaption of the delay of gratification experiments by Mischel et al. (1989). In our setting the interviewer opened a bag of gummy bears and explained that the child could either eat them now or wait until the end of the mother's interview and receive an additional bag. Thus, children were faced with the decision between receiving a smaller reward (one bag of gummy bears) sooner, or waiting and receiving a larger reward (two bags of gummy bears) later. 22.1% of the children took the opened bag before the interview ended. They are classified as impatient. 77.9% waited and received two bags of gummy bears. They are classified as patient.

Concerning the mothers' impatience a classical choice task was used where the mothers faced a table of trade-offs between a smaller-sooner and a larger-later monetary reward (e.g. Dohmen et al., 2010). They had to decide between a fixed amount of 100€, available without a delay, or a higher amount, available after a delay. All mothers went through two versions of the experiment, the first with a delay of six months and the second with a delay of twelve months. Incentive compatibility was implemented by a 1-in-7 chance that the participant received the result of one randomly selected decision. The larger-later reward started with 100€ plus 2.5% p.a. and increased successively by 2.5% p.a. but at most 19 times. After the first choice of the larger-later reward, the participant was informed that it was assumed that she also prefers all higher delayed rewards. This design slightly deviates from Dohmen et al. (2010).

The successive increase of the larger-later amount reveals the interval at which the mother is indifferent to receiving the smaller-sooner or the larger-later reward. The middle of this interval is used as a proxy for the value of indifference. Lower or upper bounds of the indifference values are obtained for those mothers who either always preferred the delayed or always preferred the non-delayed reward. These censored observations have been either used directly or have been replaced by their conditional expectation from Tobit estimates, using a set of available socio-economic variables and survey questions.

A short-run reservation interest rate (SIR) is calculated based on the indifference value concerning the six-month delay and a medium-run reservation interest rate (MIR) based on the indifference value concerning the twelve-month delay. Concerning both measures, an annual interest rate has been calculated assuming semi-annual compounding. The mean and standard deviation has been computed including the conditional expectations from Tobit estimates for the censored observations. We yield a mean (standard deviation) for SIR of 37.3% p.a. (24.0% p.a.) and for MIR of 30.3% p.a. (20.3% p.a.). These average reservation interest rates for adults are relatively high, a finding not uncommon in experiments (Frederick et al., 2002).

## **Exploring the intergenerational relation of impatience**

If there is an intergenerational relation, an impatient mother could be expected to have a higher probability of having an impatient child. Since the delay of gratification experiment reflects a short-run decision, we expect particularly the mothers' short-run reservation interest rate to be related to the child's impatience. To explore this relation, we performed Probit analyses, with the child's impatience as the dependent variable and the mother's (standardized) reservation interest rate and several controls as right-hand variables (Table 1).

Table 1 demonstrates that a higher value of mother's SIR (more impatience) is associated with a higher probability that her child cannot delay the gratification (is impatient) (column 1). The inclusion of child and mother characteristics increases the relationship slightly (column 2). Child and mother characteristics contribute to explaining impatience. For instance, older aged children and children with a higher weight at birth have a lower probability of being impatient, which seems to be in line with the literature (e.g. Bettinger and Slonim, 2007). These results are available upon request.

If censored observations are replaced by their conditional expectations, results do not change much (column 3). An increase of one standard deviation (24.0% p.a.) of mother's SIR evaluated at sample means increases the probability that the child is impatient by about 6,8% ( $p=.033$ ) (estimates from column 3). The correlation concerning mother's MIR (columns 4, 5 and 6 in Table 1) is also positive but measured only with a low degree of precision.

To sum up, the findings demonstrate an intergenerational relationship in short-run decision making. Mother's and child's impatience, an important part of human capital, are correlated when the child is at preschool age. More research is necessary to highlight intergenerational transmission also in longer-run decision making.

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**Table 1: Probit analysis**

1:Impatient Child						
	(1)	(2)	(3)	(4)	(5)	(6)
Standardized SIR (6 months delay)	.052*	.069**	.068**			
	(.030)	(.033)	(.032)			
Standardized MIR (12 months delay)				.031	.039	.038
				(.028)	(.032)	(.032)
Child Characteristics	No	Yes	Yes	No	Yes	Yes
Mother Characteristics	No	Yes	Yes	No	Yes	Yes
Censored IR predicted	No	No	Yes	No	No	Yes
Observations	213	213	213	213	213	213
McFadden's Pseudo R-squared	.014	.140	.140	.005	.125	.125

The dependent variable is one for impatient children and zero for patient children. Reservation interest rates refer to experimentally revealed indifference points and are standardized (mean=0, standard deviation=1). Controls concerning the child are age, age squared, sex, birth weight, the duration of breastfeeding, and dummies indicating the point in time since the last bigger meal. Controls concerning the mother are age, age squared and dummies indicating house ownership and whether the child has to share his room, both serving as proxies for wealth. The reported coefficients are average marginal effects evaluated at sample means; bootstrapped standard errors in parentheses (10,000 replications); \*\* (\*) indicates significance at the 5% (10%) level.