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Paying Adolescents for Health Screenings Works[†]

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Abstract

With regard to their future health, adolescents are at a critical stage. Previous evaluations have shown that health screenings, counselling, and other intervention programmes during this phase of life are important, particularly for those with a low socio-economic background. Unfortunately, adolescents tend to have little interest in preventive programmes. We designed a field experiment to evaluate the effectiveness of financial incentives to promote participation in health screenings. Our study comprises more than 10,000 participants, observed via high-quality administrative data from Austria. The treatment group received a €40 shopping voucher if they participated in an age-specific health screening. On average, the financial incentive increased the likelihood of participation by 280 %. Treatment effects are comparably larger for children in families with a higher socio-economic status, and of parents with a revealed preference for secondary health prevention.

JEL Classification: I12, J13, I18, I14, H51, H75.
Keywords: Health screenings, financial incentives, adolescence, early intervention, secondary prevention.

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1 Introduction

Adolescence and puberty are marked by important physiological and psychological changes. Particularly during these turbulent periods, young people face choices with potential consequences for their future health and human capital. A healthy lifestyle, positive social influences, and educational achievements affect current health, schooling, and family life, but they also co-determine adult outcomes (van den Berg et al., 2014). In high-income countries, the vast majority of adolescents are healthy by traditional medical standards, but they face a number of significant threats to their health in this phase of life. This age group is at particular risk of starting smoking tobacco, alcohol and drug abuse, experiencing self-harm and interpersonal violence, and engaging in unprotected or non-consensual sex. These behaviours have an impact on the trajectory of life and contribute to adult morbidity and mortality.

Longitudinal studies demonstrate that this period is also an age of opportunity that can help adolescents to break early patterns that may lead to ill health and social disadvantage (Richter, 2006). Interventions such as guidance on a healthy lifestyle, support from family and school, and access to supportive services are recommended to promote adolescents' well-being. Medical advice in the field of primary prevention and the early recognition of potential health deficits are important instruments of health promotion at this age. Moreover, the use of medical counselling and participation in secondary health screenings may generate benefits for adult well-being, and even the next generation of children. Hendren and Sprung-Keyser (2020) demonstrate that direct investments in low-income children's health have historically had the highest return among a large number of US tax and expenditure policies.[1]

The *American Academy of Pediatrics* (AAP) currently recommends an annual preventive visit for adolescents and young adults through age 21 years (American Academy of Pediatrics, 2021). While there is a wide variation in estimated preventative visit rates for the US (ranging from 25 to 81 percent, see Appendix Table A.1) and other countries (see

[1]Importantly, the return to health policies (captured by the so-called "marginal value of public funds") is constant across all ages (Hendren and Sprung-Keyser, 2020), and does not diminish with age as previously assumed (Heckman, 2006).

Appendix Table A.2), it is clear that a significant share of adolescents do not follow AAPs recommendation. Those with low socio-economic background are less likely to receive a preventative care visit in the US (Yu et al., 2001; Irwin, Jr et al., 2009) and abroad (see, for instance, for Germany Hagen and Strauch, 2011).

One possibility to increase participation in health screening exams are financial incentives. To evaluate this strategy, we performed a field experiment with more than 10,000 adolescents observed using high-quality administrative data from Austria. Our randomised controlled trial (RCT) was conducted in cooperation with an Austrian statutory health insurance provider.[2] The screening examination itself, referred to as the *Health Check Junior (HCJ)*, is free of charge. It comprises a detailed anamnesis, including a general health check and extensive medical advice on age-specific health risks and lifestyle issues. This set-up has several methodological advantages. First, we could draw our participants from a well-defined and accessible subject pool. Second, we have access to administrative records, which allow us to observe participants before and after treatment. Thus, we have precise information on outcomes, and are able to generate rich control and stratification variables. Third, the health screenings are offered in a standard outpatient setting by contracted primary-care physicians. We were able to measure our outcome variable, screening participation, without any extra effort and free of error.

The treatment group was offered a €40 shopping voucher for participation in an age-specific health screening programme. The control group received an equivalent invitation, but without a financial incentive. Our results revealed a statistically significant treatment effect of 6.7 percentage points (pp). Relative to the low participation of 2.4 % in the control group, the treatment effect represents an increase of 280 %. We find evidence for substantial treatment effect heterogeneity. The incentive was found to work significantly better for children in families with a higher socio-economic status (SES), and of parents with a revealed preference for secondary health prevention.

Our findings add to a small body of literature. To date, there are only a handful of

[2]Our partner, the "Social Insurance Institution for Businesses" (*Sozialversicherungsanstalt der gewerblichen Wirtschaft*) provides compulsory health insurance for all self-employed people and their relatives.

studies on financial incentives for health screenings of adolescents. Evidence is available for specific programmes, such as treatment for latent tuberculosis infection (Kominski et al., 2007), HPV vaccination programme (Mantzari et al., 2015), glucose monitoring adherence and glycaemic control, (Wong et al., 2017) and HIV testing (Kranzer et al., 2018).[3] There is comparably more evidence for children (below the age of five)[4] and adults[5], which demonstrates the effectiveness of financial incentives for secondary prevention.

The remainder of this paper proceeds as follows. Section 2 outlines the relevant institutional background. Section 3 describes our experimental design and the collected data. Section 4 presents our estimated treatment effects, and section 5 concludes the paper.

2 Institutional setting

In this section, we briefly describe the relevant institutional setting. First, we provide general information on the Austrian health care system. Second, we discuss existing health screening programmes and introduce the new programme for adolescents.

[3]Among these studies, only Mantzari et al. (2015) examine responses by SES. The authors do not find evidence that the impact of financial incentives on HPV vaccinations rates varies by social deprivation (proxied by respondents' postcode). Comparably more evidence is available based on observational studies on large-scale policy initiatives. These find that low SES families are less aware of and participate less in financially incentivised programmes (see, e.g., Spence et al., 2010; Owen et al., 2020).

[4]The majority of these studies are from low- and middle-income countries. Recent meta-analyses conclude that financial incentives are effective in increasing the use of preventive services (Lagarde et al., 2007; Bassani et al., 2013). Evidence from high-income countries is rare. One recent exception is an evaluation of an Austrian developmental screening programme for children at the ages of 2, 3, and 4 years (Halla et al., 2016). A financial incentive of €185 increased the likelihood of participating in all three examinations by about 46 %. A smaller number of studies have tested financial incentives for primary intervention. In particular, there is evidence on the effectiveness of financial incentives for the consumption of fruits and vegetables at lunchtime in primary schools (Just and Price, 2013; Belot et al., 2016; Loewenstein et al., 2016).

[5]Evidence for adults is from high-income countries and available for chlamydia testing (Dolan and Rudisill, 2014), colorectal cancer screening (Gupta et al., 2016; Mehta et al., 2019), and faecal occult blood tests (Kullgren et al., 2014). There are also a number of studies on financial incentives in the promotion of primary prevention, such as breastfeeding (Relton et al., 2018), exercise (Charness and Gneezy, 2009; Royer et al., 2015), nutrition (Mochon et al., 2017), smoking cessation (Volpp et al., 2009), weight loss (Volpp et al., 2008; Jeffery, 2012; Cawley and Price, 2013), and comprehensive workplace wellness programmes (Jones et al., 2019).

2.1 Austrian health care system

Austria has a Bismarckian-type health care system with almost universal access to high-quality medical services. Depending on occupation and place of residence, individuals are assigned to one (out of 18) particular health insurance fund. Insurance is mandatory and there is no choice regarding the insurance fund or package. All health insurance funds cover almost all medical expenses in the inpatient and outpatient sector including medication. The outpatient expenditures are funded by social security payments. Expenditures for hospitalisation are co-financed by social security contributions and tax revenues from different federal levels. Patients usually pay a prescription charge for medication, and a small deductible per day for hospitalisation. Our study focuses on children of self-employed persons. This group is insured with the "Social Insurance Institution for Businesses" (*Sozialversicherungsanstalt der gewerblichen Wirtschaft*, SVA).[6]

2.2 Existing health screenings programmes

Traditionally, the Austrian health care system has offered two structured and nation-wide health screening programmes. First, the so-called "Mother-Child-Pass Examination Program (MCPEP)" has been advocated for pregnant mothers and their newborns. Over time, the aim and scope of this programme have expanded, and it now lasts until the 5th year of the child's life (Halla et al., 2016). Second, insurants beyond 18 years old are offered a general health screening (Hackl et al., 2015). In both programmes, screening examinations are conducted by primary-care physicians and fully covered by health insurance funds. Until 2016, there was no screening programme available for the 6 to 17 year age group.[7] Regardless, this age group also has very good access to primary care.

[6]SVA merged after our sample period. As of January 1, 2020 the SVA and the "Social Insurance Institution for Farmers" (*Sozialversicherungsanstalt der Bauern*, SVB) have been merged into the "Social Insurance Institution for the Self Employed" (*Sozialversicherungsanstalt der Selbständigen*, SVS). In contrast to most other Austrian health insurance funds, the SVA/SVS charges a 20 % co-payment for outpatient medical treatment. Minors are exempt from this payment. There are no further important peculiarities.

[7]The exception to this are school health checks during compulsory education. They include the child's medical history as reported by the parents and a physical examination by a school doctor with a focus on the development status of the child or adolescent. However, the examinations are neither centrally organised nor are the data collected in a structured way.

Children and adolescents can use the services of general practitioners and pediatricians at any time without co-payments. Whether and to what extent these services are used for preventive purposes is, however, not documented.

2.3 New programme: Health Check Junior

On October 1, 2016, the SVA introduced a nation-wide health screening programme for children and young people between 6 and 17 years of age. The HCJ programme closes the gap between the aforementioned nation-wide screening programmes. The medical examinations are also conducted by primary-care physicians (general practitioners or paediatricians) and are fully funded by the SVA.[8] It distinguishes between a track for younger (6-11 years) and older (12-17 years) participants, which differ in content to account for age.

The aim of HCJ is to identify health risks in young people at an early stage, strengthen health awareness, implement preventive measures in the event of unhealthy lifestyles, and provide support in important developmental phases such as school enrolment or puberty. The primary-care physician determines the health status of children and adolescents and addresses the most relevant lifestyle issues for these age groups such as nutrition, exercise, media consumption, and substance abuse.[9] Until now, the SVA (SVS) is the only health insurance fund that offers a screening programme for this age group.

3 Field experiment

Our RCT was implemented during the pilot phase of HCJ. From 2013 until September 2016, the programme was offered only in the federal states Burgenland and Vienna.[10] These two federal states comprise about one quarter of the Austrian population. In an attempt to test the effectiveness of a financial incentive for participation in this new health screening programme, the experiment was conducted in collaboration with the SVA.

[8] In 2020, the honorarium for physicians amounts to €80.70 per HCJ examination.
[9] The medical examination form (translated from German) is included in Appendix Figure A.1.
[10] In the meantime, the screening programme has been extended to cover the whole of Austria.

3.1 Sample definition

The SVA register provided us with a well-defined and accessible subject pool. For our trial, we selected all families with at least one child between 9 and 17 years of age.[11] The principal insured parent must have lived in the federal state of Vienna or Burgenland and have been insured with the SVA at least from 2012 to 2014. Another inclusion criterion was positive health care expenditures in either 2012 or 2013. Conversely, families with a child whose two-year health care expenditures (2012 and 2013) were above the 98th percentile of €8,378 were excluded. This provided us with a sample of 10,727 adolescents.

3.2 Randomisation

Although programme participation is basically a joint decision between parents and children, depending on the age of the child, we reached out directly to those concerned. All adolescents in our subject pool received an age-specific invitation letter via mail.[12] This letter introduced the new HCJ programme and encouraged them to participate. It included an age-appropriate explanation of the rationale for secondary prevention:

> *The great thing about preventive health screenings is that you don't see the doctor when you are sick, but before, when you are still healthy. This way you can help your body not to get sick in the first place.*

We randomly assigned approximately 38 % of all children to the treatment group (N = 4,103), and 62 % to the control group (N = 6,624). The control group was only motivated by the provided information. For the treatment group, the letter included additional information on the financial incentive. This group was offered a € 40 shopping voucher if they participated in the HCJ. The wording of the additional text included in the letter (translated to English) is as follows:

> *For participating in HCJ, you will receive a shopping voucher worth €40 for Mariahilfer Strasse in Vienna as a thank you. The SVA will send you this*

[11] We did not include children between 6 and 8 years since our focus is on puberty/adolescence.

[12] The letters (translated into English) sent to young (9-11 years) and older (12-17 years) subjects are included in Appendix Figure A.2 and Figure A.3.

voucher as soon as you have completed the medical check-up.

The rationale for using a shopping voucher as a financial incentive (rather than cash) is threefold. First, our partner in this experiment, SVA, had a strict preference for shopping vouchers (over cash). Second, since the experiment addresses children and adolescents who may not have their own bank account, it is easier to organize a financial incentive by means of a shopping voucher. Third, shopping vouchers can be be sent without much bureaucratic effort, so that no bank transfers are necessary. The "Mariahilfer Strasse" is the largest shopping street (about 1.8 kilometers) in the city of Vienna. It hosts hundreds of shops including flagship stores, boutiques and supermarkets. It caters to a wide range of consumers. Thus, the shopping voucher can be used to purchase all kinds of products, and should be a close substitute to cash.

In families with multiple children, all children were assigned to the same group. The SVA distributed the letters via mail around June 1, 2014. This was the first information campaign addressing insurance holders. Contracted physicians were informed about the pilot phase of HCJ in the first quarter of 2014. They received detailed information about the intention and content of the programme, as well as their reimbursement, but not about our subsequent intervention.

3.3 Pre-determined variables

One particular strength of our field experiment is that we can observe our subjects before and after treatment via high-quality register data. The adolescents were typically co-insured with the principal insured parent, who can also be observed in the register. Information about father and mother is available, if both parents are self-employed, or if one parent is co-insured with their spouse. For the 10,727 adolescents in the sample, we observed 4,485 principal and 2,604 co-insured mothers, and 7,321 principal and 582 co-insured fathers.[13] We can link these data to other administrative records, most importantly to the *Austrian Social Security Database* (ASSD). These data include administrative records to verify pension claims and provide information on earnings (Zweimüller

[13]If both parents are self-employed, we define the mother as the principal parent.

et al., 2009).

We use information on the adolescent's sex, age, and place of residence to generate basic demographic control variables. In further specifications, we additionally control for the socio-economic background of their family, and the principal insured parent's health screening behaviour. The former is captured with different indicators, such as migration background, parental education, and earnings. The latter is based on information on past participation in general health screening for adults. We also used this information to explore treatment effect heterogeneity.

Table 1 provides an overview of all pre-determined variables used. Adolescents are on average 12.8 years old, roughly half of them are female, and 87 % live in Vienna. About a quarter of principal insured parents have foreign citizenship. This means that the proportion of those with a migration background is significantly higher than the 19 % in the Austrian population (Statistics Austria, 2021b).

The principal insured parent's annual median income between 2012 and 2014 amounted to €20,746 for fathers, and €11,727 for mothers. We use this sex-specific income to differentiate between adolescents with low- and high-income parents. The income levels correspond to the 30th percentile of the income distribution of the large group of employees in Austria (Statistics Austria, 2021a). Thus, the households in our sample have a relatively lower socio-economic status compared to the Austrian population. One fifth of principal insured parents participated in the general health screening for adults in either 2012 or 2013.

In line with our randomisation, we see that all adolescents' and their parents' characteristics are balanced across control and treatment group. Thus, there are no significant differences. This also holds true for adolescents' health at birth. For the majority (about 85 %) of observations, we obtain information on gestation, birth weight, and the Apgar score.[14]

[14]This information is provided in the *Austrian Birth Register*. Not all adolescents can be linked to this data source, most notably because births outside Austria are not recorded in this register.

4 Estimation results

To examine the effect of the treatment voucher_i on the likelihood of screening participation HCJ_i, we estimate a simple linear probability model,

$$\text{HCJ}_i = \beta \cdot \text{voucher}_i + \gamma \cdot \text{female}_i + \delta \cdot \text{age}_i + \eta \cdot \text{Vienna}_i + \epsilon_i \tag{1}$$

where we control for subject's sex (female_i), age (age_i), and place of residence (Vienna_i) in the baseline specification. In further specifications, we also control for the principal insured parent's income and health screening behaviour, and the mother's level of education. The error term is denoted by ϵ_i. We calculate standard errors clustered at the family level. Our sample comprises 5,103 families with one child, 2,155 with two children, and 419 with three or more children.

4.1 Average treatment effects

The estimation results are summarised in Table 2. Column (1) shows the unconditional treatment effect. The financial incentive of a €40 shopping voucher increases the average treated subject's likelihood of participation by 6.7 pp. The effect is statistically (p-value < 0.01) and economically significant. Given the participation rate of 2.4 % in the control group, the estimated coefficient represents an increase of 280 %. As expected, due to randomisation, the impact of the shopping voucher on HCJ participation does not depend on the inclusion of controls. In column (2), we control for the subject's age, sex, and place of residence. In columns (3) to (6), we additionally stepwise control for the principal insured parent's income, their health screening behaviour, and the mother's educational attainment. The estimated treatment effects remain unchanged.[15]

Figure 1 illustrates the development of HCJ participation over time in the treatment and control groups. Participation is found to have increased continuously in both groups

[15]The estimation output reveals a higher HCJ participation for females (1.2 pp) and for adolescents who live in Vienna (1.6 pp), while the participation rate decreases by 0.3 pp with each year of age. We also find a significant and positive impact on participation if the principal insured parent earns an income above the median (1.4 pp), and if they themselves had participated in a general preventive health check in 2012 or 2013 (2.7 pp). The mother's level of education is *ceteris paribus* not statistically significant.

after receipt of the invitation letters as of June 1, 2014 (the dotted vertical line). However, the gradient in the treatment group is comparatively steeper. The participation rate among the treatment group is around 8 % after one year. The equivalent rate for the control group amounts to less than 2 %. A small number of adolescents had already participated in HCJ before our intervention. This participation was initiated by contracted physicians, who had known about HGJ since the first quarter of 2014.

Since we have no information who would open the letter, our treatment effect (of being mailed the letter) differs from a treatment effect of knowing about the financial incentive. The final responses can be observed, whereas the intermediate stages, such as opening and reading the mail piece remain concealed. Marketing literature deals with opening rates in direct mailing. Feld et al. (2013) analyze 700 mail campaigns based on a unique commercial direct mail panel from GfK (*Growth from Knowledge* Society for Consumer Research) including 3,000 representative German households. Panel participants collected the received mail pieces and sent GfK all letters they did not want to keep (opened or unopened) and a list of pieces they chose to keep. The authors find an opening rate — the ratio of opening to total recipients — of almost 90 %, a result consistent with previous evidence (e.g., Stone and Jacobs, 2008). We expect that the opening rate in our experiment is also very high. The sender is not a more or less well-known firm but the individual's statutory health insurance fund. This institution communicates all matters by mail, and in the vast majority of cases, the letters contain important information about the recipient's health insurance.

4.2 Treatment effect heterogeneity

To test whether the shopping voucher has a different impact across subgroups, we repeated our analysis using sub-samples. We consider three dimensions: basic demographic characteristics, socio-economic background, and parental health screening behaviour. Figure 2 shows point estimates and corresponding 95% confidence intervals based on several sample splits. The p-values reported next to the bars indicate the statistical significance

of the difference between these two estimated coefficients.[16]

First, we consider the sample splits by subject's sex. Female subjects are somewhat more responsive (7.3 vs. 6.1 pp), but the difference is not statistically significant. Second, we are interested in the adolescents' socio-economic backgrounds. We see two main channels. One the one hand, households with a lower socio-economic background could be more responsive due to an income effect. On the other hand, attention and interest towards preventive health care may require a certain level of health literacy, which can be expected to be lower in households with a lower socio-economic background. We use three different indicators for the socio-economic background: citizenship, educational attainment, and earnings. Generally, we measure these indicators for the principal insured parent.[17] However, due to the higher number of missing data entries for fathers' educational attainment, we use maternal education in our baseline specification. Adolescents with a foreign principal insured parent respond comparably less (4.9 vs. 7.2 pp). The difference is significant at the 8% level only. Existing language barriers and lack of knowledge about the health care system in general may explain their lower health literacy.[18] Responsiveness increases with mother's educational attainment. Children of mothers with upper secondary or tertiary education show the highest treatment effect (8.1 pp), and those with mothers with compulsory schooling show the lowest (2.9 pp). An equivalent pattern is present for children of a principal insured parent with a low (5.6 pp) versus high (7.7 pp) income. Thus, across all indicators, we find consistent evidence for stronger treatment effects among adolescents with a higher SES.[19] This is in line with the idea that awareness/preference for secondary prevention compensates for any income effect. Notably, the social gradient in the effectiveness of the financial incentive is less pronounced

[16]These p-values are based on estimations using the full sample with interactions between the respective group indicator and all other covariates. Appendix Table A.3 includes detailed estimation output for these (and other) split-sample analyses.

[17]We obtain equivalent results if we use the father's or mother's (instead of the principal insured parent's) characteristics (see Appendix Table A.3).

[18]The fact that foreign-born mothers are less responsive to monetary incentives is supported by the results of the aforementioned study on participation in a nation-wide developmental screening programme for pre-schoolers in Austria (Halla et al., 2016). The authors find that foreign-born mothers react significantly less to the financial incentive than their Austria-born counterparts and mention a lack of language proficiency and institutional knowledge as plausible explanations for this finding.

[19]This result is, for example, in contrast to Just and Price (2013) who find that the impact of incentives for healthy eating are higher in lower income schools.

in terms of relative treatment effects (measured in %), since baseline participation rates tend to be lower among households with lower socio-economic backgrounds (see column 2 of Appendix Table A.3).

Third, interesting results emerge with regard to differentiation as to whether the parents themselves attend health screenings. The voucher effect for adolescents whose principal insured parent attended a general health check in the past runs up to 10.1 pp. In comparison, the treatment increases participation by only 5.9 pp for children whose main insured parent did not participate in this programme. Again, we obtain equivalent results based on father's or mother's characteristics (see Appendix Table A.3). This substantial gradient underlines the importance of awareness/preference for secondary prevention within the household for the effectiveness of the financial incentive.

In summary, the analysis of treatment heterogeneity suggests that the financial incentive is comparably less effective among adolescents from households with a stronger baseline resistance to secondary prevention.

5 Conclusions

We performed a large-scale field experiment to evaluate the effectiveness of financial incentives in promoting health screening examinations among adolescents. A €40 shopping voucher increases participation from 2.4 to 9.1%. Thus, the financial incentive almost quadruples participation relative to a personalised invitation, which provides information only. Our finding adds to the existing evidence documenting the effectiveness of financial incentives for secondary prevention among other age groups.

We do not find support for the hypothesis that financial incentives have a stronger impact for families with a lower SES, who are likely to benefit more from early intervention. Rather, our results indicate that the financial incentive is more effective among children from families with a higher SES, and those with a revealed preference for own (adult) health screenings. Thus, any income effect seems of minor importance relative to the higher health awareness and health literacy more present among families with a higher SES. It is well-known that parents tend to pass on their health behaviour to their children.

Our finding suggests that financial incentives for secondary prevention are not able to resolve any pre-existing social gradient, but rather amplify differences.[20]

We conclude that financial incentives help to increase participation in health screening exams among adolescents and could have a positive influence on subsequent health (behaviour). Unfortunately, the tool is comparably less effective in engaging those groups who would benefit the most. A further downside is that substantial financial incentives within public health care would shift costs onto lower-income and probably unhealthier insurance holders if these groups continue to participate at lower rates. However, a comprehensive incidence analysis must also take the different contribution rates of socio-economic groups into account.

The economic efficiency-based argument for early intervention, resting on the simple comparison between the costs of intervention (today) and the costs of non-intervention (later) is intuitive, and proponents assume that early intervention is more cost-effective than later remedation (Conti and Heckman, 2013). Likewise, we expect the studied health screening examinations among adolescents to be cost effective. However, it is hard to gauge actual cost savings, since there are no credible estimates for this type of screening available in the literature.

[20] Jones et al. (2019) document an equivalent selection pattern for adults in the context of a comprehensive workplace wellness programme in the US.

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6 Tables and Figures to be placed in paper

Table 1: Average pre-determined characteristics of treatment and control group

	(1) Control	(2) Treated	(3) Difference	(4) p-value
Individual characteristics				
Age	12.9	12.8	0.1	0.255
Female	0.49	0.50	-0.01	0.471
Lives in Vienna	0.88	0.87	0.01	0.225
Principal insured parent's characteristics				
Foreign citizenship	0.26	0.25	0.01	0.311
General health check participation[†]	0.20	0.19	0.00	0.913
High income [‡]	0.53	0.52	0.01	0.471
Mother's education				
Compulsory education	0.11	0.12	-0.01	0.322
Vocational/lower sec. educ.	0.26	0.24	0.02	0.071
Upper sec./tertiary educ.	0.39	0.38	0.01	0.173
Missing information	0.24	0.26	-0.02	0.009
Health at birth				
Gestation (completed weeks)	39.6	39.6	0.0	0.812
Birth weight (grams)	3344	3343	1	0.927
Apgar score (5 min. after birth)	9.8	9.8	0.0	0.236
Missing information	0.15	0.16	-0.01	0.351

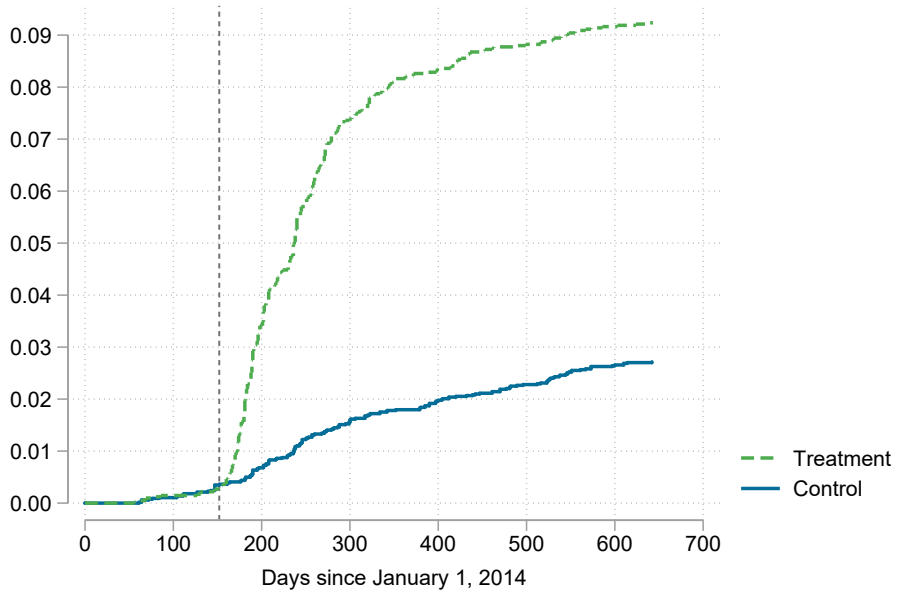
Notes: This table reports average characteristics for individuals in the treatment (column 1) and control (column 2) group. Column 3 shows the difference between the two group averages. Column 4 presents the p-value of the respective t-test. [†] Refers to the years 2012 and 2013. [‡] We use the sex-specific principal insured parent's median income in the sample to differentiate between between adolescents with low- and high-income parents.

Table 2: Estimated impact of the shopping voucher on health screening participation

	(1)	(2)	(3)	(4)	(5)
Shopping voucher (€40)	0.067***	0.067***	0.067***	0.067***	0.067***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Female		0.012***	0.012***	0.012***	0.012***
		(0.004)	(0.004)	(0.004)	(0.004)
Age		-0.003***	-0.004***	-0.004***	-0.003***
		(0.001)	(0.001)	(0.001)	(0.001)
Lives in Vienna		0.012*	0.012*	0.016**	0.016**
		(0.007)	(0.007)	(0.007)	(0.007)
High income of principal insured parent			0.017***	0.017***	0.014***
			(0.005)	(0.005)	(0.005)
Health check participation of principal insured parent				0.028***	0.027***
				(0.007)	(0.007)
Mother's level of education (Base: *missing*)					
Compulsory					-0.011
					(0.007)
Vocational/lower sec.					0.002
					(0.006)
Upper sec./tertiary					0.009
					(0.006)
Constant	0.024***	0.051***	0.044***	0.035***	0.032**
	(0.002)	(0.013)	(0.013)	(0.013)	(0.015)

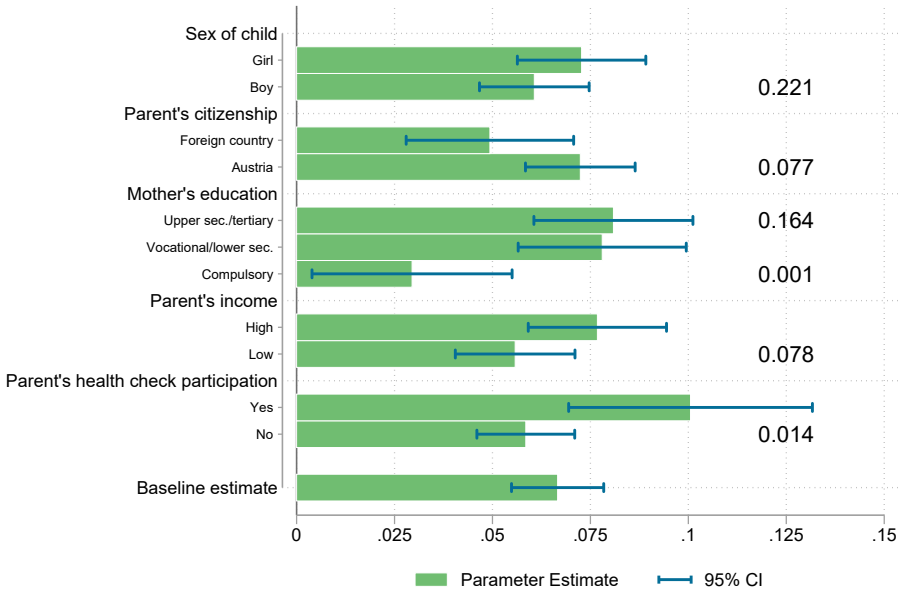
Notes: This table summarises estimation results of the effect of shopping vouchers on adolescent's health check participation. Each column reports coefficients from a regression of a binary indicator for health check participation on a binary indicator for the offered shopping voucher and varying control variables. The number of observations is 10,727. Standard errors in parentheses are clustered at the family level, * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

Figure 1: Group-specific cumulative participation rate over time



Notes: This figure illustrates the cumulative share of participating adolescents in the treatment and control groups over time. The vertical line indicates June 1, 2014, the day from which the invitation letters were sent out.

Figure 2: Estimated impact of the shopping voucher in various sub-samples



Notes: The figure summarises estimation results of the effect of shopping vouchers on adolescent's health check participation. We split the sample according to sex of child, principal insured parent's citizenship, mother's level of education, principal insured parent's income, and their general health check participation. Table A.3 includes detailed estimation output. Next to the bars, we report p-values based on estimations using the full sample with interactions between the respective group indicator and all other covariates.

Web Appendix

This Web Appendix (not for publication) provides additional material discussed in the paper "Paying Adolescents for Health Screenings Works" by Martin Halla, Gerald J. Pruckner, and Thomas Schober, which is forthcoming in the *American Journal of Health Economics*.

A.1 Additional Tables and Figures

Table A.1: Estimates of preventive health care utilization among adolescents in the United States

Authors	Publication Year	Data type	Data source	Age range	Sample period	Utilization of preventive care†
Yu et al. (2001)	2001	Survey	NLSAH	11 to 21	1994 to 1996	68
Ma et al. (2005)	2005	Survey	NAMCS	13 to 18	1993 to 1996	47
			NHAMCS	13 to 18	1997 to 2000	39
Rand et al. (2007)	2007	Survey	NAMCS; NHAMCS	11 to 21	1994 to 2003	No rates reported
Irwin, Jr et al. (2009)	2009	Survey	MEPS	10 to 17	2001 to 2004	38
Nordin et al. (2010)	2010	Admin	HealthPartners (a Minnesota health plan)	13 to 17	1998 to 2007	70
Tsai et al. (2014)	2014	Admin	Commercial Claims & Encounters database	11 to 21	2003 to 2010	2003: 24.6
						2010: 41.1
Adams et al. (2015)	2015	Survey	NHIS	10 to 17	2011	74.4
			NSCH	10 to 17	2011 to 2012	81.2
			MEPS	10 to 17	2011	43.0
Rand and Goldstein (2018)	2018	Survey	MEPS	9 to 21	2014	35
Thakkar et al. (2019)	2019	Survey	NLSY	9 to 24	2006/2008	61
Leidner et al. (2021)	2021	Admin	HEDIS	12 to 21	2018	50

Notes: NLSAH: National Longitudinal Study of Adolescent Health (Add Health); NAMCS: National Ambulatory Medical Care Survey; NHAMCS: National Hospital Ambulatory Medical Care Survey MEPS: Medical Expenditure Panel Survey; NHIS: National Health Interview Survey; NSCH: National Survey of Children's Health; BRFSS: Behavioral Risk Factor Surveillance System; NLSY: National Longitudinal Survey of Youth; HEDIS: Healthcare Effectiveness Data and Information Set. † Faction of adolescents who had at least one preventive care visit in the previous 12 months.

Table A.2: Estimates of preventive health care utilization among adolescents in non-U.S. countries

Authors	Country	Data type	Data source	Age range	Sample period	Utilization of preventive care†
Ascione et al. (2017)	Italy	Survey	School Survey in area Salerno	5 to 18	2014 to 2015	54.8
Zhu et al. (2003)	China	Survey	National Oral Health Survey	12 and 18	1996	18.7 - 37.1 (2 years)
Medina-Solís et al. (2009)	Mexico	Survey	School survey in Navolato	6 to 12	2003	20.5
Hagen and Strauch (2011)	Germany	Survey	KiGGS	14 to 17	2003-06	No annual rates reported
Rattay et al. (2014)	Germany	Survey	KiGGS	7 to 13	2003-06; 2009-12	No annual rates reported

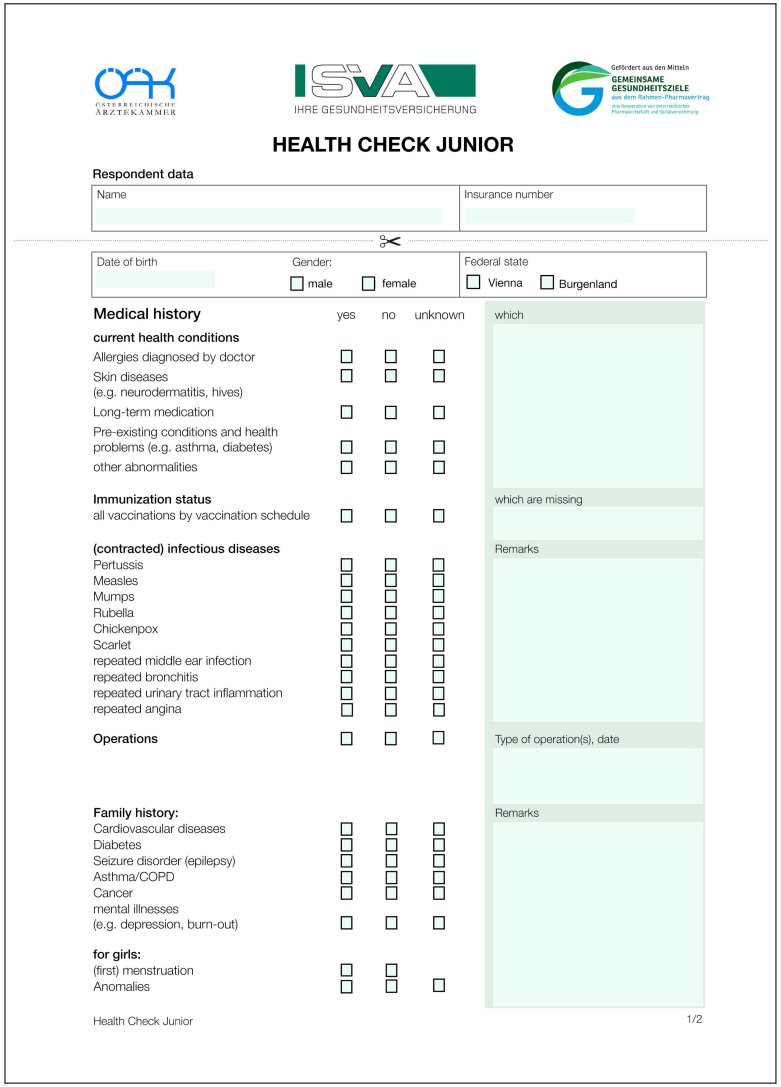
Notes: KiGGS: Kinder- und Jugendgesundheitssurveys

Table A.3: Estimated impact of the shopping voucher in various sub-samples

	(1) N	(2) Participation	(3) Estimate	(4) SE	(5) p-value
Female					
Boy	5,441	0.021	0.061***	(0.007)	0.221
Girl	5,286	0.027	0.073***	(0.008)	
Panel A: Characteristics of principal insured parent					
Citizenship					
Austria	7,939	0.024	0.072***	(0.007)	0.077
Foreign country	2,788	0.022	0.049***	(0.011)	
Income					
Low	5,103	0.019	0.056***	(0.008)	0.078
High	5,624	0.028	0.077***	(0.009)	
Health check participation					
No	8,635	0.022	0.059***	(0.006)	0.014
Yes	2,092	0.032	0.101***	(0.016)	
Panel B: Characteristics of mother					
Citizenship					
Austria	6,362	0.022	0.073***	(0.008)	0.069
Foreign country	2,584	0.031	0.048***	(0.012)	
Education					
Compulsory	1,242	0.023	0.029**	(0.013)	0.001
Vocational/lower sec.	2,731	0.017	0.078***	(0.011)	
Upper sec./tertiary	4,116	0.029	0.081***	(0.010)	0.164
Missing information	2,638	0.024	0.053***	(0.010)	
Income					
Low	4,594	0.027	0.053***	(0.009)	0.091
High	4,586	0.021	0.075***	(0.009)	
Health check participation					
No	5,720	0.024	0.058***	(0.008)	0.027
Yes	1,318	0.033	0.107***	(0.020)	
Panel C: Characteristics of father					
Citizenship					
Austria	6,270	0.025	0.073***	(0.008)	0.087
Foreign country	2,295	0.022	0.049***	(0.012)	
Education					
Compulsory	737	0.030	0.031	(0.019)	0.010
Vocational/lower sec.	2,417	0.017	0.075***	(0.011)	
Upper sec./tertiary	2,978	0.030	0.091***	(0.013)	0.084
Missing information	4,595	0.023	0.054***	(0.008)	
Income					
Low	4,339	0.020	0.055***	(0.008)	0.095
High	4,338	0.029	0.077***	(0.010)	
Health check participation					
No	6,523	0.023	0.061***	(0.007)	0.113
Yes	1,339	0.031	0.093***	(0.019)	

Notes: This table summarises estimation results of the effect of shopping vouchers on adolescent's health check participation. Each row reports the estimated treatment effect based on a separate regression. All regressions control for individual age, sex, and place of residence. Column 1 reports the number of observations. Column 2 reports the mean of the dependent variable for the control group. Column 3 reports the estimated treatment effect. Column 4 shows the corresponding standard error clustered at the family level. Column 5 reports p-values that are based on estimations using the full sample with interactions between the respective group indicator and all other covariates. * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

Figure A.1: Medical examination form (translated from German)



HEALTH CHECK JUNIOR

Respondent data

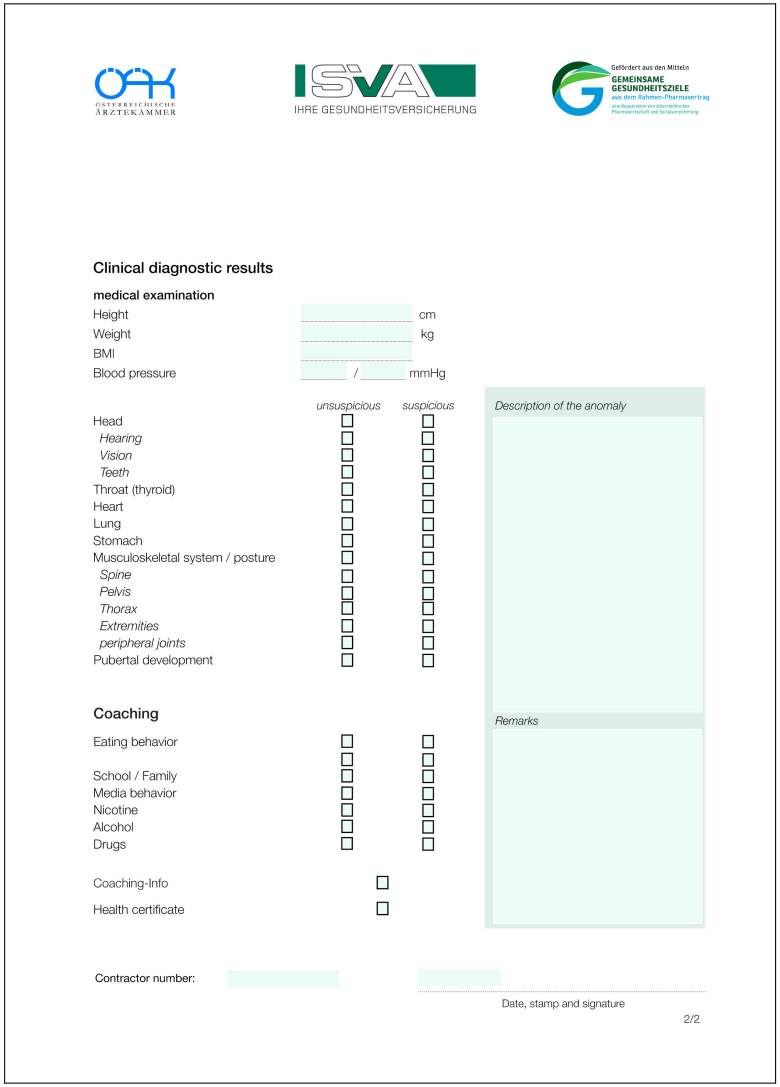
Name | Insurance number

Date of birth | Gender: ☐ male ☐ female | Federal state ☐ Vienna ☐ Burgenland

Medical history	yes	no	unknown	which
current health conditions				
Allergies diagnosed by doctor	☐	☐	☐	
Skin diseases (e.g. neurodermatitis, hives)	☐	☐	☐	
Long-term medication	☐	☐	☐	
Pre-existing conditions and health problems (e.g. asthma, diabetes)	☐	☐	☐	
other abnormalities	☐	☐	☐	
Immunization status				which are missing
all vaccinations by vaccination schedule	☐	☐	☐	
(contracted) infectious diseases				Remarks
Pertussis	☐	☐	☐	
Measles	☐	☐	☐	
Mumps	☐	☐	☐	
Rubella	☐	☐	☐	
Chickenpox	☐	☐	☐	
Scarlet	☐	☐	☐	
repeated middle ear infection	☐	☐	☐	
repeated bronchitis	☐	☐	☐	
repeated urinary tract inflammation	☐	☐	☐	
repeated angina	☐	☐	☐	
Operations	☐	☐	☐	Type of operation(s), date
Family history:				Remarks
Cardiovascular diseases	☐	☐	☐	
Diabetes	☐	☐	☐	
Seizure disorder (epilepsy)	☐	☐	☐	
Asthma/COPD	☐	☐	☐	
Cancer	☐	☐	☐	
mental illnesses (e.g. depression, burn-out)	☐	☐	☐	
for girls:				
(first) menstruation	☐	☐		
Anomalies	☐	☐	☐	

Health Check Junior 1/2

(a) Front page



Clinical diagnostic results

medical examination

Height ____ cm
Weight ____ kg
BMI ____
Blood pressure ____ / ____ mmHg

	unsuspicious	suspicious	Description of the anomaly
Head	☐	☐	
Hearing	☐	☐	
Vision	☐	☐	
Teeth	☐	☐	
Throat (thyroid)	☐	☐	
Heart	☐	☐	
Lung	☐	☐	
Stomach	☐	☐	
Musculoskeletal system / posture	☐	☐	
Spine	☐	☐	
Pelvis	☐	☐	
Thorax	☐	☐	
Extremities	☐	☐	
peripheral joints	☐	☐	
Pubertal development	☐	☐	

Coaching

			Remarks
Eating behavior	☐	☐	
	☐	☐	
School / Family	☐	☐	
Media behavior	☐	☐	
Nicotine	☐	☐	
Alcohol	☐	☐	
Drugs	☐	☐	

Coaching-Info ☐

Health certificate ☐

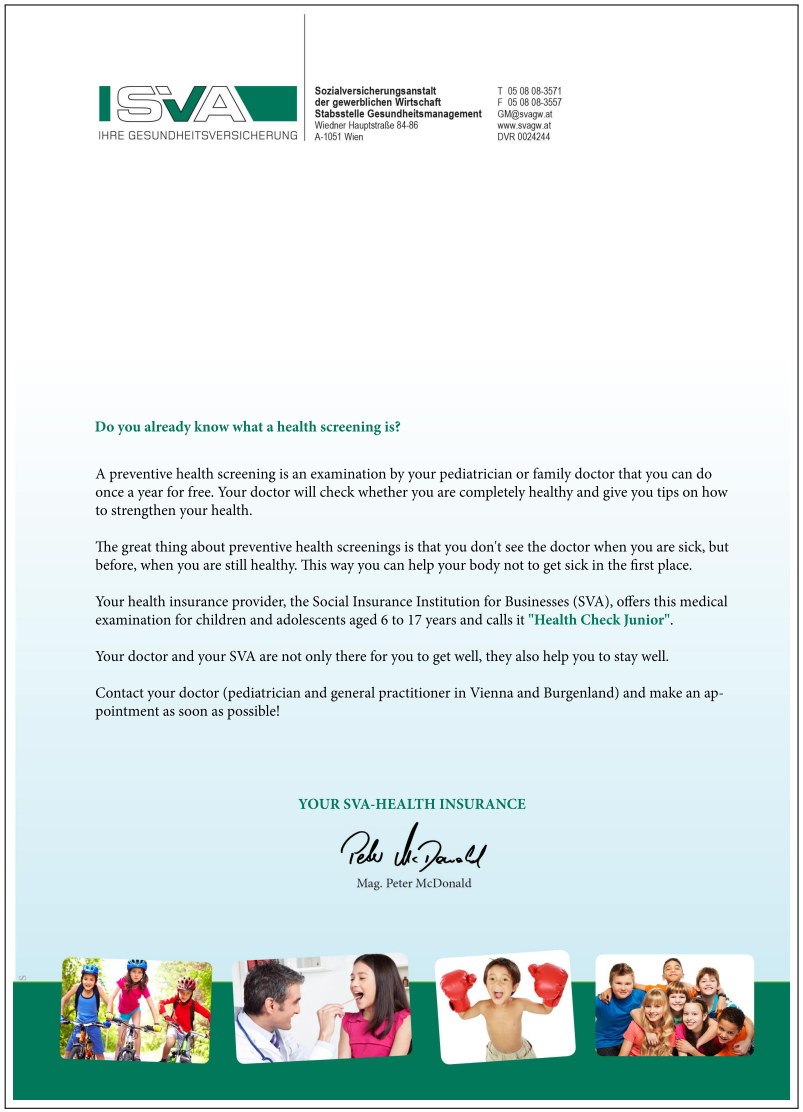
Contractor number: ____ ____

Date, stamp and signature

2/2

(b) Back page

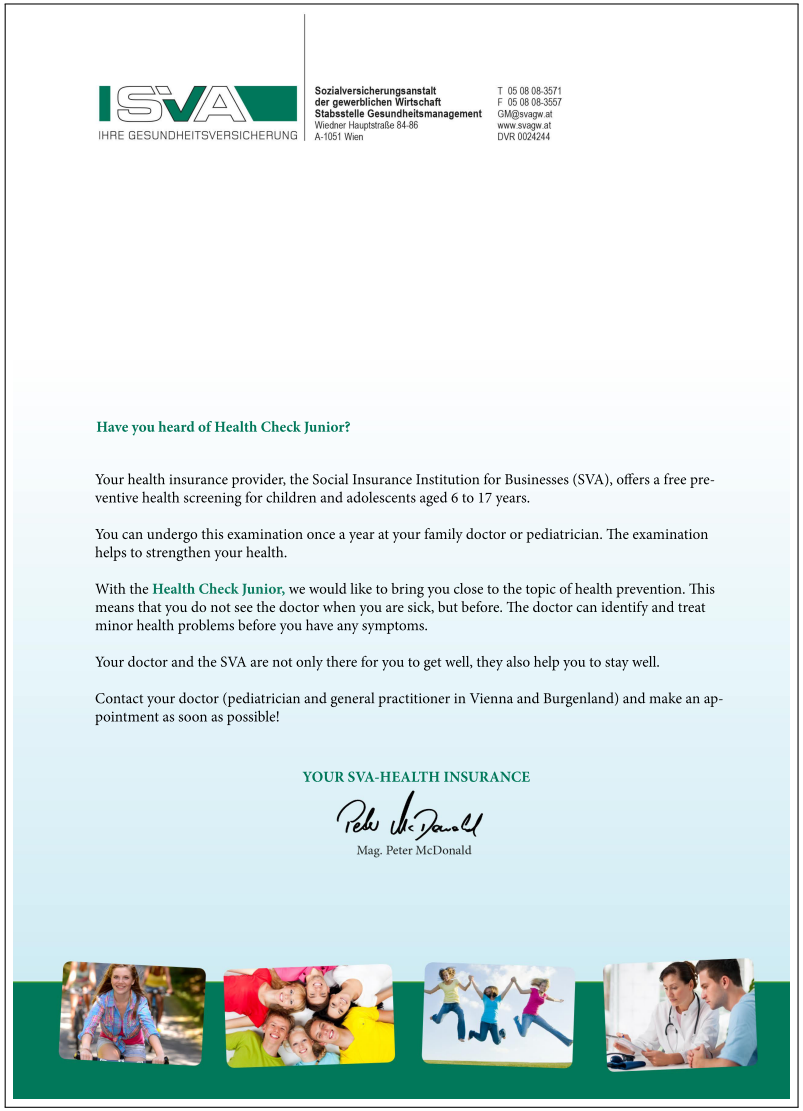
Figure A.2: Invitation letter sent to subjects between 9 and 11 years old (translated from German)



(a) Control group

(b) Treatment group

Figure A.3: Invitation letter sent to subjects between 12 and 17 years old (translated from German)



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IHRE GESUNDHEITSVERSICHERUNG

Have you heard of Health Check Junior?

Your health insurance provider, the Social Insurance Institution for Businesses (SVA), offers a free preventive health screening for children and adolescents aged 6 to 17 years.

You can undergo this examination once a year at your family doctor or pediatrician. The examination helps to strengthen your health.

With the **Health Check Junior,** we would like to bring you close to the topic of health prevention. This means that you do not see the doctor when you are sick, but before. The doctor can identify and treat minor health problems before you have any symptoms.

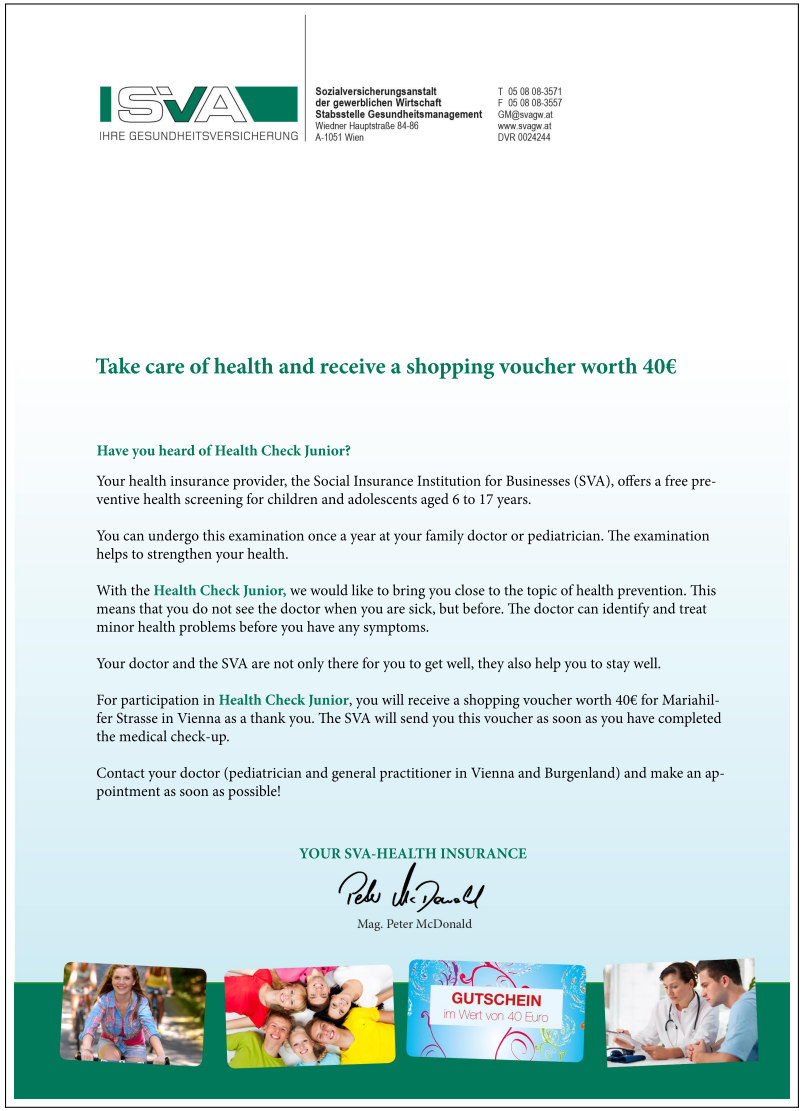
Your doctor and the SVA are not only there for you to get well, they also help you to stay well.

Contact your doctor (pediatrician and general practitioner in Vienna and Burgenland) and make an appointment as soon as possible!

YOUR SVA-HEALTH INSURANCE

Mag. Peter McDonald

(a) Control group



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IHRE GESUNDHEITSVERSICHERUNG

Take care of health and receive a shopping voucher worth 40€

Have you heard of Health Check Junior?

Your health insurance provider, the Social Insurance Institution for Businesses (SVA), offers a free preventive health screening for children and adolescents aged 6 to 17 years.

You can undergo this examination once a year at your family doctor or pediatrician. The examination helps to strengthen your health.

With the **Health Check Junior,** we would like to bring you close to the topic of health prevention. This means that you do not see the doctor when you are sick, but before. The doctor can identify and treat minor health problems before you have any symptoms.

Your doctor and the SVA are not only there for you to get well, they also help you to stay well.

For participation in **Health Check Junior**, you will receive a shopping voucher worth 40€ for Mariahilfer Strasse in Vienna as a thank you. The SVA will send you this voucher as soon as you have completed the medical check-up.

Contact your doctor (pediatrician and general practitioner in Vienna and Burgenland) and make an appointment as soon as possible!

YOUR SVA-HEALTH INSURANCE

Mag. Peter McDonald

(b) Treatment group