What's Behind Her Smile? Looks, Self-Esteem, and Labor Market Outcomes

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Abstract

We explore how improving dental health affects economic, social, and psychological outcomes. Using a randomized intervention whereby an impoverished group in Chile received free dental care, including access to prostheses, we find that the treatment in the short-run: (i) significantly improved dental health of both men and women, (ii) had a significant and positive effect on women's self-esteem, and (iii) positively impacted both employment rates and earnings among women. In the medium run, the effects on dental health and self-esteem persist but the treatment effects on labor market outcomes become statistically non significant, although still economically relevant among women with low levels of self esteem and among women missing at least one front tooth at baseline. We also find treatment effects on spending on appearance-related items, and improvements in the quality of relationships with partners including a reduction in verbal violence. The employment effects come mostly from the informal sector. Using several pieces of evidence, we document that the employment effects are consistent with a combination of increases in productivity and labor supply jointly with a possibly much smaller response of labor demand in the formal sector.

1   Introduction

Research on the impact of visible attributes on labor market outcomes has motivated an increasing body of literature in economics (e.g., see Hamermesh and Biddle, 1994, Biddle and Hamermesh, 1998, and Mobius and Rosenblat, 2006, for beauty; Case and Paxson, 2008 and Persico et al., 2004, for height; and Averett and Korenman, 1996, and Conley and Glauber, 2006, for obesity). The goal of this research is to estimate the labor market premia to different physical attributes and to identify the channels that explain them. Notably, dental conditions have a visible component that is more malleable than other observable attributes, which might also affect labor market outcomes.

Poor oral health is associated with functional limitations, pain and a number of negative general health conditions (Slade et al., 2005; Sanders et al., 2006; Lamster et al., 2008), and with labor market opportunities as well (Glied and Neidell, 2010). For example, oral health disorders may restrict work activities due to discomfort or may limit the ability to find jobs in occupations that require costumer and worker interaction. Moreover, poor dental health may affect psychological attributes such as self-esteem, which in turn can lead to additional economic impacts (Bowles et al., 2001; Almund et al., 2011; Benabou and Tirole, 2002; and Blau and Kahn, 2017).

Access to high quality health care in general and to dental care in particular is limited in emerging and developing countries, and even for the less well-off in developed countries. As a consequence, socioeconomic gradients in dental health outcomes tend to be steep (Gallego et al., 2017). Due to biological, economic, and cultural reasons, limited access to oral health is correlated with gender. Thus socioeconomic gradients of oral health outcomes tend to be even more pronounced for women (Tchicaya and Lorentz, 2014). In turn, these disparities may affect economic outcomes directly through differences in access to labor market opportunities and indirectly through psychological factors such as self-esteem and self-confidence. Blau and Kahn (2017) have recently documented that differences in psychological attributes are a relevant explanation for gender differences in labor market outcomes, that in turn may be particularly relevant for poor women who are more likely to be self-employed or employed in informal jobs than men (World Bank, 2012).

The aim of this paper is to explore the effect of providing access to a treatment that discretely improves dental health to an impoverished group in an emerging economy (Chile) with a special focus on women. In particular, the treatment affects an observable component of dental health: the smile. We study the effects of this treatment on health, psychological, social, and economic outcomes. To this end, we designed and implemented

a randomized intervention to evaluate the impact of a program offering free dental health services, including dental prosthetics, with an estimated market price of about US$800 for the complete treatment. The program's goal was to offer access to high quality dental care to poor people with a special emphasis on the potential impact of dental health on self-esteem and appearance. For this purpose, the prostheses played a key role.

In early 2011, 799 applicants enrolled in the program. The target population included adults between the ages of 18 and 60, enrolled in the public health care system (FONASA), and living in the greater Santiago area in Chile. We randomly allocated 350 of these subjects to receive the intervention and 449 to the control group. The sample was stratified by income, age, gender, and self-esteem. We collected baseline data on clinical conditions, self-perceived oral health, self-esteem, socioeconomic status, labor market status, and a number of other relevant covariates. We also collected data in two follow-up surveys, about one and three years after the treatment was completed. In both follow-ups we again collected information on oral conditions, self-esteem, labor market and other social outcomes. In addition, we took pictures of subjects in the first follow-up and used them to study the effects on appearance using ratings from external observers.

The sample we analyze is mostly comprised of poor women, with relatively important dental health problems -especially related to oral health appearance-, and who are attached to the labor market. In particular, 70% of subjects are female, are on average 48 years-old, with 11 years of education and an employment rate of about 70%. Nearly 33% work in informal jobs at the baseline.[1] There is gender heterogeneity in labor market outcomes at baseline; the employment rate is 88% for men and 64% for women, and the share of informal employment is 24% for men and 39% for women. In terms of dental health, the average person had more than 10 missing teeth (with an average of 1.5 missing front teeth). Over 90% of the subjects were clinically assessed as needing prosthetics. In terms of appearance at baseline, 99% of the subjects said they were not happy with their smiles, and about 75% said they felt totally uncomfortable with their smiles.

We report five main sets of results. First, we find that subjects who were offered the program improved their oral health in several dimensions. On the one hand, access to dental services comparable to the ones provided by the program (i.e., including access to dental prostheses) improved by 45 percentage points (*p.p.*, hereafter) in the first follow-up

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[1]We classify a job as informal whenever it is not regulated by a labor contract, and therefore lacks legal protection and social security coverage. This includes self-employment.

and 30 *p.p.* in the second follow-up.[2] On the other hand, objective evaluations of dental health improved significantly among lottery winners. They have 1.2 fewer teeth with cavities (equivalent to 0.34 standard deviations, σ hereafter) and 3.4 fewer teeth in need of dental treatment (equivalent to 0.79σ). The effects are much stronger for men than for women. We also find significant effects of the treatment on self-perceived oral health in both follow-ups. We find intention-to-treat (ITT) estimates that imply an improvement of 0.94σ in our measure of self-perceived oral health (the oral health related quality of life index, OHIP) in the first follow-up. In the second follow-up, ITT estimates drop to 0.55σ. These subjective effects are larger for women (their ITT estimate is 1.01σ versus 0.78σ for men in the first follow-up). It is interesting to contrast the gender differences in the effects on objective and subjective measures of dental health. In line with the differences documented by Blau and Khan (2017), our results suggest that the subjective component of oral health is more relevant for women than for men.

Second, we find a significant impact on self-esteem in both follow-ups, but it is only significant for women. That is, the average impact of 0.27σ in the first follow up is explained by a 0.42σ impact on women's self-esteem and a null effect on men's self-esteem. This effect on women remains large and significant in the second follow-up (0.25σ); i.e., the impact persists three years after the treatment was completed. These results suggest that the psychological channel may only be relevant for women, confirming the special role that subjective oral health plays for them.

Third, we find positive labor market effects for women especially in the short term. We find a significant effect on the extensive margin of employment of women (a rise of 6 *p.p.* in the first follow-up's employment rate) and a very small and non-significant effect for men. Given that women in our experiment have relatively high employment rates at baseline, these results are noteworthy. While extensive margin effects decrease in size and become statistically insignificant in the second follow-up, we cannot reject the null hypothesis that the impacts are equal across surveys (p-value of 0.20). We also find an economically important impact on the intensive margin -log earnings for people who were working at baseline. That is, women's log earnings rise by 0.19σ in the first follow-up survey, with no effect for men. This effect on female earnings decreases and becomes statistically insignificant in the second follow-up. However, again we cannot reject the hypothesis that treatment effects are equal in both surveys (with a p-value

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[2]The decrease in the impact on access over time is due to a reduced access for treated subjects -both men and women- because the prostheses had a limited lifespan. In addition, the men in the control group gained more access to dental care over time. According to our follow-up survey more than 80% of the subjects in the control group who received a prosthesis did so using private funds.

of 0.25). We also document that these average results hide significant heterogeneity as we find that there is a persistently larger effect on employment rates and earnings for women missing front teeth at the baseline and for women with initial low levels of self-esteem (after controlling for age effects and for missing non-front teeth as a proxy for general dental conditions).[3] All in all, while we cannot reject that the effects are equal across surveys, we do find suggestive evidence that the effects for women are stronger in the short term and that they are persistent for women whose smile at the baseline showed at least one missing tooth and low initial levels of self-esteem.

Fourth, we find that the program had other effects on the behavior of treated women improving their life quality. In particular, we find that treated women spent more on items related to appearance such as hair styling, clothing and beauty products. This result may be due to both income effects and a higher return to investments that complement a new smile. Moreover, we document that while the treatment does not have effects on the extensive margin of the marriage/partnership market (i.e., formation and dissolution of marriages, cohabitation or informal partnerships), we do find that relationship quality improved significantly for women; they went out more often with their partners and exchanged gifts more frequently as well. Most notably, the incidence of verbal violence was reduced. Some of these results may be direct consequences of income effects but might also reflect a rise in women's bargaining power within the household.

Finally, we study the mechanisms underlying the effects on labor market outcomes in order to understand whether the effects are related to changes in productivity, labor supply, and different reactions in the formal and informal markets. Our findings suggest that both supply side and productivity effects are mostly driving the results. We first document that the labor market effects are basically associated with an impact on jobs in the informal sector and on self-employment, and that both employment and wage effects are stronger for people who were working in the informal sector or were self-employed at the baseline. The absence of effects on formal employment and for people formally employed at the baseline suggests that labor demand for this group of workers does not react significantly, perhaps due to their age and labor history. We also document significant treatment effects on willingness to job search and preference for jobs with face-to-face interactions, which suggest that labor supply increased as a consequence of the treatment. Moreover, the impacts on different components of the OHIP score suggest significant decreases in pain and increases in functionality, which are probably correlated with improvements in productivity. Finally, we use the ratings of pictures

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[3]As we discuss below, this is not due to a heterogeneous take up of dental services that is related to these covariates.

of the subjects to measure the potential impacts of the treatment on labor demand, especially in the formal sector.[4] We find that women who won the lottery are more likely to show their teeth and smile in their pictures, and that they also have better ratings in social competence and psychological dimensions. In turn, we do not find evidence of significant effects on perceptions of intellectual ability, relationship satisfaction and job performance. We also find positive but smaller and imprecisely estimated effects on proxies for labor demand in the ratings of pictures. Taken together, these results suggest that labor demand probably does not react much as a consequence of improvements in the appearance of treated subjects, at least as captured in their pictures.

The paper contributes to several lines of research. First, to the best of our knowledge, this study is the only random evaluation of provision of free dental services and, therefore, provides us with a unique opportunity to estimate the causal impact of improving dental health and physical appearance on several economic and social dimensions. Our results complement the pioneering study of Glied and Neidell (2010) that exploits the quasi-random timing of the adoption of community water fluoridation in the US in the 1960s and 1970s to identify the impact of fluoridation exposure during childhood on earnings in adulthood. Their results imply that access to water fluoridation during childhood increases earnings, with an effect that is concentrated on women -mostly those from low income families-, with no effect for men. We extend this literature to an emerging country context and to the study of additional economic, social, and psychological outcomes, allowing us to analyze the impacts in a more comprehensive way. Moreover, understanding the ways in which dental aestethics affects employment and earnings may help understand the relevance of other observable attributes such as gender and race.

Second, our results also shed light on the mechanisms behind the effects of looks and visible attributes on labor market outcomes. To our knowledge, this is the first paper to study the effects of a discrete change in appearance on labor market outcomes. Several theories have been proposed for why markets reward observable attributes (Blinder, 1974; Killingsworth, 1977; Hamermersh and Biddle, 1994; Persico et al., 2004; Case and Paxson, 2008) including a preference for these observable attributes among employers, better self-image, and a correlation between observable attributes and investments made in earlier stages of the life-cycle. Our results produce mixed evidence. While we find

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[4]We borrow from the literature that studies how first impressions affect beliefs about social, psychological and job performance of people (Willis and Todorov, 2006; Todorov et al., 2005). We use the scales of Eli et al. (2001) and Kershaw et al. (2007) to rate the pictures. It is worth noting that in countries like Chile, pictures are used extensively in formal labor markets to sort workers and that pictures in CVs do have impacts on labor demand. See Marlowe et al. (1996) and López Boo et al. (2013).

economically and statistically significant effects on labor maket outcomes, especially for subjects lacking some specific attributes, we also find that these effects are concentrated in informal labor markets and self-employment.

Third, we also contribute to the research on gender differences in the determinants of economic outcomes. We find suggestive evidence that both self-esteem and observable attributes drive the effects of our treatment for women. The finding that self esteem affects labor market outcomes for women but not for men is consistent with the evidence reviewed in Blau and Kahn (2017) for the United States. We complement this literature with evidence coming from the labor market of an emerging economy. This is important as we find that the impacts seem to be driven by effects in informal employment rather than by those in formal labor markets. This finding also complements previous research on the role of informality in labor market opportunities for poor people (e.g., World Bank, 2012; Bandiera et al., 2017).

Fourth, our results also contribute to the literature on the determinants of self-esteem and psychological welfare. For example, Haushofer and Shapiro (2016) estimate the impact of an unconditional cash transfer program in Kenya on psychological well being, finding a significant positive impact on happiness and life satisfaction and a significant negative impact on stress and depression. Even though the authors find no significant effects on self esteem for their complete sample, they do observe an impact of 0.23σ on self esteem in households where women receive the transfer. This is consistent with our results of an important effect of the treatment for women. To the best of our knowledge, this is the first paper in the economics literature to provide experimental evidence on the impact of oral health and physical appearance on self esteem.[5] In addition, our paper contributes to the research on the effects of interventions on poverty's psychological aspects in addition to the effects on objective outcomes (e.g., Duflo, 2012; Haushofer and Shapiro, 2016; Devoto et al., 2012). Interestingly, we find that effects of the program are more persistent for self esteem than for economic outcomes.

Finally, and related to the latter, our results on the improvement of the quality of women's relationships with their partners contributes to the empirical literature on the bargaining power of women in collective household models (Duflo, 2012). Our results could be interpreted as an improvement in the women's outside option if they separate from their partners. Alternatively, the improvement in women's looks and self esteem may lead to happier partners. Although we cannot disentangle these explanations, our

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[5]Some research on the impact of oral health on self esteem and social anxiousness can be found in the medical literature (e.g., Albino et al., 1994; Bennett et al., 1995; Birkeland et al., 1997; and Jung, 2010).

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results are important for this literature as they suggest that the improvement of women's dental health also affects their welfare. This relates to research for developing countries that finds a direct impact of gender-based income shocks on the bargaining power of women within the household and an indirect effect on several economic and non-economic outcomes (e.g., Attanasio and Lechene, 2002; Djebbari, 2005; Rubalcava et al., 2009; Bobonis, 2009 and 2011; Bobonis et al., 2013).

The remainder of the paper is structured as follows. Section 2 briefly describes the background of our experiment by providing an overview of the dental health care system and labor markets in Chile. Section 3 describes the research design and methods used in the analysis. Section 4 describes the main results, while Section 5 provides further evidence on the mechanisms underlying the effects on labor market outcomes. Finally, Section 6 concludes.

2   BACKGROUND

As in many middle-income countries, access to dental services is limited in Chile, especially among the most vulnerable populations. A nationally representative survey found that 28.7% of adults had not visited a dentist during the past five years, including 4.5% who had never had a dental check-up (*Encuesta Nacional de Salud*, ENS 2009-2010).[6] The correlation between the utilization of dental care services and socioeconomic status is strong; the fraction of individuals who had not visited a dentist within the past five years is twice as high for those in the lowest quintile of the income distribution than as those in the top quintile.

As a consequence, dental health care outcomes in Chile are poor. For example, 72% of adults are missing at least one tooth (ENS 2004). The problem is particularly acute among low income individuals (18% of individuals in the lowest strata have complete dentition versus 49% of individuals in the highest socioeconomic strata) and women (36.6% of women have fewer than 20 teeth compared to only 27.8% of men). This pattern is consistent with dental health outcomes in emerging and developing countries and even with those of the less well-off women in developed countries (Gallego et al., 2017).

The steep socioeconomic gradients observed in access to dental care services and in dental health outcomes are partly explained by the limited supply of services for the poorest groups in the public sector. In Chile, individuals make mandatory contributions to health insurance, choosing between the single public insurance (National Health

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[6]See Ministry of Health, Chile, 2010.

Fund or *Fondo Nacional de Salud*, also known as FONASA) and several private health insurance companies. Approximately 80% of the population is insured via FONASA (*Encuesta de Caracterización Socioeconómica Nacional*, CASEN 2011). FONASA offers very basic dental care services that do not include treatments related to comfort and appearance. In particular, dental prostheses are not available for FONASA affiliates who must acquire them at private dental clinics and pay for the full treatment. Although we do not have sufficient evidence with respect to the services offered by private clinics, anecdotal evidence suggests that in some cases they can be of very low quality.[7] In fact, 21.1% of individuals who wear dental prostheses declare to be highly dissatisfied with them (ENS 2009-2010).

As many have pointed out, poor dental health might be a factor contributing to poverty, especially among women given that "no one hires women without teeth".[8] This has led to the emergence of solidarity campaigns attempting to address the issue. Particularly relevant is the *Sonrisa de Mujer* campaign implemented in 2000 by Chile's First Lady. The program sought to improve women's self esteem by offering dental prostheses to women missing their front teeth. It helped more than 25,000 women. More recently, in 2012 the government launched a program offering approximately 1,500 dental prostheses to FONASA beneficiaries. These short-lived programs were relatively small in size and thus in no way addressed the vast amount of the population in need of dental services and prostheses.

Chile's labor market for poor workers is also similar to that of other developing and emerging countries. Overall 70.1% of men and 43.5% of women are active in the labor market (CASEN, 2011). However, participation rates are much lower among poor people: 53% of men and 27.6% of women among the poorest 20% of the population. Employment rates of low income people are also much lower than the average: while overall 65.6% of men and 39.3% of women are employed, only 43.2% of men and 20.2% of women at the lowest quintile of the income distribution have a job. Formal employment is low as well, especially among poor workers. According to CASEN 2011, 66.5% of employed males and 63.4% of employed women have a contract. However, only 58% of employed men and 42.3% of employed women at the lowest quintile of the income

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[7]For example, we found 5,560 complaints against dentists on a very popular web site in Chile (www.reclamos.cl). This is a sizeable number if we compare it to the number of complaints against pediatricians (1,540), surgeons (2,120), physical therapists (1,292), or even complaints against all types of medical doctors (14,660). Information assessed on September 14, 2018.

[8]Quote from Chile's Labor Minister Evelyn Matthei in 2011. See http://www.lasegunda.com/Noticias/Nacional/2011/03/636613/Ministra-Matthei-afirma-que-Gobierno-esta-evaluando-una-reforma-al-sistema-de-salas-cunas.

distribution have contracts. Similar rates emerge when formality is defined by social security coverage. These labor market outcomes place Chile in a similar position as Mexico, South Africa, Turkey, and Ukraine, which suggests that the context of our study is likely to be representative of labor markets in other countries.[9]

3   Research Design and Methods

In this section we describe the intervention and the data sources. We also assess the balance in covariates in the baseline and in the follow-up surveys. In addition, we describe the methods used to estimate the impact of the program.

3.1   Construction of the Experimental Sample and Program Implementation

A free dental service program was designed and implemented by the evaluation team and a private network of dental clinics. The program included the following services: a diagnostic exam, a panoramic x-ray, a personalized treatment plan, dental hygiene, simple extractions, crown polishing, fillings, seals, and removable metal-acrylic prostheses. All these services had an estimated total price of about US$800 for the complete treatment. In order to be eligible for the program, individuals had to meet the following criteria: (i) they had to live in the greater Santiago Area[10], (ii) be between 18 and 60 years-old (to target the working age population), and (iii) be enrolled in the public health system (FONASA). To participate, individuals had to first apply by phone or by registering online. They were then asked to attend to a dental revision appointment.

The program was announced on January 2011 on mass media -including radio, newspapers and television-, through pamphlets given out on various locations, and through letters sent to several local government offices. A total of 3,243 individuals completed the enrollment process. Of these, 1,419 individuals went to the dental appointment. Compared to all eligible individuals, the pool of individuals who completed the enrollment process and attended the appointment had higher educational levels, were older, and were more likely to be employed (with a high incidence of part time jobs).[11]

Individuals who attended the dental appointment had to complete a baseline survey that included questions on self-perceived oral health, self-esteem, and socioeconomic characteristics. Those who had preexisting conditions, specifically hypertension, dia-

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[9]According to the World Bank DataBank in https://data.worldbank.org/indicator/ accessed on July 2018.

[10]Because of the location of the clinics involved in the program.

[11]These results arise from comparing the data from the enrollment process to the data of all eligible individuals in the 2011 CASEN household survey (see Gallego et al., 2017, for more details).

betes, acute gingivitis or hemophilia, or were under treatment for cardiac conditions were not eligible to receive the program due to medical risks. The sample was further restricted in order to target participants who had relatively serious dental health problems, i.e., those: (i) missing at least one front or premolar tooth, and (ii) in need of upper and/or lower prostheses. These requirements restricted the sample to 799 individuals from which 350 were randomly selected to receive the program. The sample was stratified by income, age, gender, and self-esteem.[12] It is worth noting that the socioeconomic characteristics of the final sample are not statistically different of those of the complete pool of applicants. The exceptions are age and dental health conditions (i.e., the final sample individuals are older and with worse dental health; see Gallego et al., 2017, for more details).

The program implementation began on May 2011. The treatment started with a diagnostic exam, after which each patient received an offer of a free treatment plan. The patients were also informed about treatment options not covered by the program. The initial goal was to implement the program within 2 to 3 months. However, the implementation agenda had to be adjusted as some dentists and clinics, which already had patients assigned to them, dropped out of the program. Thus even though the first patients began their treatment on May, there were a number of patients who began their treatment in August, September and even October of 2011. Furthermore, on October 2011 two of the largest clinics dropped out of the program, leaving 115 individuals with unfinished treatments. On December 2011, these patients were reassigned to a new clinic with 100 of them completing their program before April 2012. In the end, all the subjects who won the lottery received an appointment to assess their treatment needs but only two-thirds completed the program.

3.2 DATA

Data in this study comes from three main sources: a baseline and two follow-ups. The baseline considered an oral health diagnosis performed by odontology students[13] and a survey. The survey includes the following items:

- The Oral Health Impact Profile (OHIP). In order to measure oral health-related quality of life, each participant answered the 14 questions of the Oral Health Impact Profile (OHIP-14) developed by Slade (1997), translated into Spanish.

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[12]All these variables, except gender, were grouped into terciles.

[13]The dental examination was conducted on the basis of protocols designed by the World Health Organization (1997). It lasted approximately 10 minutes.

The instrument collects information on seven dimensions: functional limitations, physical pain, psychological discomfort, physical disability, psychological disability, social disability and handicaps. Each question is answered on a Likert scale basis. Scores range between 0 and 56; a higher score indicates a worse perceived oral health-related quality of life.[14]

- The Rosenberg Self-Esteem Test. To measure self-esteem, we use the Rosenberg self-esteem test (Rosenberg, 1965). The instrument consists of 10 statements on overall feelings of self-worth evaluated on a four-point Likert scale. Scores range between 0 and 30; a higher measure indicates higher overall self-esteem. We use the Spanish version validated for Chilean adults by Rojas-Barahona et al. (2009). This scale has been extensively used in psychology and more recently in economics (e.g., Bowles et al., 2001; Almlund et. al., 2011).

- Socioeconomic Variables. We collected data on a wide range of demographic and socioeconomic variables, including age, sex, marital status, number and age of children, labor market outcomes, education and income.

We conducted two follow-ups. The first was carried out in the second half of 2012 (on average one year after the treatment was completed); the second was carried out in late 2014 and early 2015 (on average three years after the treatment was completed). Both follow-up surveys included the OHIP, the Rosenberg self-esteem scale, and questions related to labor market conditions. In addition, in the first follow-up there was an oral health examination performed by odontology students and a photograph of each survey participant was taken; while in the second follow-up survey we included questions related to the marriage market, family outcomes, and to expenditures on items related to appearance.

3.3 BALANCE AND ATTRITION

In order to study the validity of random assignment, we test for differences between treatment and control groups in a number of baseline variables both for the complete sample and for the subsample of individuals who we were able to contact for each follow-up. In each case, we present summary statistics for individuals in each group and the mean-difference test after controlling for the stratification variables.

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[14]To ease interpretation, in the econometric analysis of this paper we transformed the scale so that an increase in the index reflects improvement in perceived oral health.

Table 1 presents descriptive statistics for the samples at the baseline, in the first follow-up and in the second follow-up. At the baseline we consider the 799 individuals included in our experiment. The sample is comprised of individuals who are on average 48 years old. Most of the participants are female (70%), heads of household (76%), and are either married or have a domestic partner (58%). A large fraction has not completed secondary education (44%). Notably, 71% of the individuals are employed, of which 66.2% have a work contract.

The FONASA plan individuals are enrolled in serves as a good proxy for socioeconomic status (Gallego et al., 2017). FONASA is structured into four plans –from plan A, which covers the most vulnerable individuals, to plan D for the least vulnerable–depending on income.[15] Most of the individuals in our sample (61%) are in plans A or B.

With respect to self-esteem, individuals in the baseline sample have an average Rosenberg score of 17 (on a 0 to 30 scale), with 26% of them having scores below 15 (which suggests low self-esteem). In terms of oral health, individuals are missing on average 11 teeth, of which 1.5 are front teeth. The average OHIP score is 36 on a scale from 0 to 56 (where higher scores indicate worse oral health).

Overall, our baseline sample is characterized by high employment rates, low self esteem and poor subjective and objective oral health status, with a vast part of the sample being female.

Columns (2) and (3) of Table 1 present averages divided by gender in the baseline; column (4) reports the p-value of a test of differences in means across gender. While we do not observe significant differences for variables such as age, household size and composition, and objective oral health conditions, we do observe significant differences in some important characteristics: women are less likely to be married or to be the head of the household, are less educated, are less likely to be employed (and if so, are less likely to have a work contract), more likely to be in the lowest category of FONASA, and have worse outcomes in the OHIP and Rosenberg self-esteem scales. That is women tend to have worse economic, psychological, and subjective dental outcomes at the baseline. It is particularly noteworthy that labor market outcomes for women in the sample are better than for the average impoverished population in Chile (in terms of employment rates) but with higher rates of informality at the same time.

Table 2 provides balance tests. When comparing individuals in the control and

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[15]Individuals in plan A have no income; individuals in plan B have monthly income below US\$420 (CLP\$210,000); individuals in plan C earn incomes between US\$420 and US\$613 (CLP\$306,600) per month; and individuals in plan D have monthly earnings above US\$613.

treatment groups, we observe that they are extremely similar in terms of socioeconomic variables, self-esteem, and oral health (Panel A). We only observe differences in the percentage of individuals who are heads of household (79% in the treatment group compared to 73% in the control group), and in the fraction having more than 12 years of education (14% in the treatment group compared to 21% in the control group).[16]

We observe an attrition rate of 19.6% and 31.5% for the first and second follow-up surveys, respectively. The attrition rate in the first follow-up survey was 17.1% for the treatment group and 21.6% for the control group; however, this difference is not statistically significant (p-value of 0.17). This pattern is also present in the second follow-up survey, with an attrition rate of 29.1% in the treatment group and 33.4% in the control group. Again, the difference is not statistically significant (p-value of 0.27).

Panels B and C of Tables 1 and 2 report the descriptive statistics of the samples in the first and second follow-ups. We do not observe relevant changes over time in the composition of the sample. Panel B of Table 2 presents differences between the control and treatment groups for the subsample of 661 individuals in the first follow-up. Again, we observe a significantly higher percentage of individuals in the control group who have more than 12 years of education (14% compared to 21%). The unbalance in the baseline regarding the fraction of individuals who are heads of household is also noticeable in the first follow-up, but this time it is not statistically significant. Finally, Panel C of Table 2 shows the differences between the treatment and control groups in the subsample of 547 individuals in the second follow-up. Again, we observe a significantly higher percentage of individuals in the treatment group who are heads of household (80% versus 71%); however, there also appears a small difference in one of the FONASA categories (33% of individuals in plan B in the treatment group compared to 26% in the control group).

All in all, our reading of these results is that there are no systematic differences between treatment and control groups in most of the relevant variables. These results imply that the main cost of attrition relates to sample sizes and to having a less-powered experiment –especially for the second follow-up– without significant changes in observable characteristics.

3.4 STATISTICAL METHODS

The random assignment of the treatment across eligible applicants allows us to estimate the effect of offering access to the dental treatment simply by comparing average out-

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[16]Notice, however, that there is no statistical difference between the treatment and control groups in average years of education.

comes for the treated and control groups. These estimations allow us to measure the impact of the program on a number of relevant social, economic, and psychological variables. We also report instrumental variable estimates in order to measure the impact of having a dental prosthesis (a key component of the program) on the same outcomes.

To estimate the direct impact of being offered the program (the ITT effect), we simply run the following OLS regression:

$$Y_i = \alpha + \beta T_i + \gamma X_i + \epsilon_i \tag{1}$$

where Y_i is the outcome of interest for individual i, T_i is a dummy variable that equals 1 if the person was offered the program, and β captures the impact of the program. X_i is a set of control variables that includes years of education, head of household status, and dummies for the randomization strata, the dependent variable and employment status at baseline. Note that given that treatment assignment is random, β should not change when including control variables; we add them to increase precision and also because some of these variables are not balanced at the baseline.

We implement a number of exercises within the same framework. First, we report results for the complete sample and by gender. Second, we explore heterogeneous effects by adding an interaction term with age, baseline self-esteem, baseline number of missing front teeth, and baseline number of missing non-front teeth. Testing for heterogeneous effects may help us identify mechanisms through which the intervention operates; in doing so, we also try to answer some of the conceptual questions posed in the introduction. Finally, we estimate the effects for each follow-up survey separately, and we also test whether the treatment effects are statistically different across follow-ups.

We also estimate IV regressions, given that some people in the treatment group did not receive the program and some people in the control group may have accessed dental services similar to those offered by the program. To do so, we estimate the following equation:

$$Y_i = \alpha + \beta^{IV} P_i + \gamma X_i + \epsilon_i \tag{2}$$

where all the variables are the same as in equation (1), except for P_i, which is an indicator variable equal to 1 if the person received a dental treatment comparable in quality with the one offered by the program. We experimented with several definitions of dental treatment: whether the subject was wearing a dental prosthesis that was installed after the baseline, whether the subject received a set of interventions comparable to those offered by the program after the baseline, and whether the subject spent a comparable amount of money to the cost of the program after the baseline. In practice, all of them

yield similar results. Thus we present results using a dummy variable for whether the subject was wearing a dental prosthesis that was received after the baseline. As receiving a prosthesis is arguably determined by unobservable characteristics, this indicator is presumably endogenous. Therefore, we instrument it using the intention-to-treat dummy T_i. β^{IV} is then interpreted as a local average treatment effect for the subjects who were impacted by the program. In terms of exclusion restrictions, we recognize that the program may have affected outcomes above and beyond the effect of the prostheses and, therefore, we interpret the effect of P as the effect of the overall program on outcomes.

4 Results

In this section we present the main results of the estimation of treatment effects. We first report estimates of the effects on access to dental services and on objective measures of dental health. We then move to the estimates of the effects on subjective oral health, self-esteem, and labor market and other outcomes in both follow-up surveys.

4.1 Access to Dental Services and Objective Dental Health Outcomes

Table 3 presents our findings on self-reported access to dental services among all participants, both winners and non-winners of the treatment lottery. We use different definitions of access to dental services to better understand the implications of winning the lottery. We first report the impact of winning the lottery on the probability of receiving the treatment. This effect is equal to 66 *p.p.*, which implies that two-thirds of the winners actually completed the treatment. Women are more likely to complete the treatment than men (69 *p.p.* versus 58 *p.p.*).

However, as we discussed before, people in the control group also have access to dental services outside the program. In order to account for this, we study the effect on two dimensions of access to dental services. First, we consider the extensive margin: the probability of receiving any dental service in the year before each follow-up survey. Results in Table 3 show that the effect of the intervention on the likelihood of having received any dental service is 16 *p.p.* in the first follow-up and 6 *p.p.* in the second follow-up. That is, a significant share of the population in our experiment has access to basic dental services. Possibly, this relates to the fact that participants are individuals with dental problems. We do not find economically relevant differences across gender in this margin.

Second, we consider the impact of the intervention on the intensive/quality margin of access to dental services. We study whether the intervention increased the probability

of wearing a dental prosthesis at the moment of each follow-up survey. Results imply that the effect of the intervention on the likelihood of wearing a prosthesis is 45 *p.p.* in the first follow-up survey and 30 *p.p.* in the second. This represents a large effect on access to quality dental services, an effect that is somewhat attenuated by the fact that 30% and 34% of the subjects in the control group report wearing a prosthesis in the first and second follow-ups respectively.

We also study whether access to prostheses varies across gender. We find that the effect of the program on access to prostheses is higher for men than for women in the first follow-up survey (53 *p.p.* versus 42 *p.p.*), a pattern that reverses in the second follow-up (34 *p.p.* for women versus 19 *p.p.* for men). This smaller effect for men in the second follow up survey is partly due to an increase in take-up in the control group between the two follow-ups (from 25% to 38%; the increase for women is much smaller, from 32% to 33%). Between both follow-up surveys, the use of prostheses in the treatment group fell, with a larger fall among men (from 79% to 56% for men versus from 74% to 66% for women).

Table 4 presents our findings for objective measures of oral health according to the results of the dental examination performed in the first follow-up. We use two measures of dental health: the number of teeth with cavities and the number of teeth in need of dental treatment. Both margins intend to capture whether the treatment improved dental conditions in an objective way. We find significant effects in favor of the treatment group in both dimensions. Treated individuals have 1.2 fewer teeth with cavities (equivalent to 0.34σ) and 3.4 fewer teeth in need of dental treatment (equivalent to 0.79σ). Interestingly and consistent with the evidence for prostheses, we find that the effects are stronger for men: men in the treatment group have 1.9 fewer teeth with cavities and 5.1 fewer teeth in need of dental treatment (versus 1.0 and 3.0, respectively, for women).

All in all, these results suggest that winners of the lottery improved their access to dental services and consistently showed improvements in objective dental health conditions. In the first follow-up all the effects are stronger among men. In turn, in the second follow-up the effects of the program on prostheses' use are stronger among women (due mostly to an increase in use among men in the control group).

4.2 Effects on Main Outcomes

We now present the results for the main outcome variables of this experiment: the OHIP subjective oral health score, the Rosenberg scale of self-esteem, employment rates, and the earnings of people who were employed at the baseline. In the tables below we report

the treatment effects for all these variables in each follow-up survey in order to compare their sizes. We present both ITT and IV estimates. The results for the complete sample are presented in Table 5, whereas Table 6 displays the results for men and women separately.

4.2.1   Effects on Self-Perceived Oral Health

Results in the first row of Table 5 reveal very large effects of the intervention on self-perceived oral health status (0.94σ for the ITT estimate and 2.20σ for the IV estimate). As we previously discussed, the OHIP scale captures the self-perception of oral health-related quality of life. Given its scope and the fact that it captures the subjective effects of dental conditions, it is not surprising that the estimated effects are stronger than for measures of objective health.[17]

Results in Panel B of Table 5 show that the treatment effects decrease in magnitude but are still large and statistically significant three years after the treatment was implemented (an ITT estimate of 0.55σ). The reduction of the effect may reflect that the subjects become used to the higher welfare brought by the improvement in oral health. It may also be associated with the reduction of the differential access to dental services between the treatment and control groups over time. However, the IV estimate decreases much less, from 2.20σ to 1.84σ, a fall that is statistically significant at the 10% significance level (Panel C). These results suggest that a relevant part of the decrease in the impact on self-perceived oral health when comparing winners and non-winners is related to a decrease in the impact of the program on access to dental services rather than to a hedonic adaptation to the treatment over time (Galiani et al., 2015).

Table 6 shows heterogeneous effects by gender. In contrast to the results for the objective measures of oral health reported in Table 4, we find that in the first follow-up both estimated treatment effects are larger for women than for men. This suggests that improvements in objective oral health have stronger effects on the subjective dimensions of oral health for women. Treatment effects are somewhat smaller in the second follow-up survey but still large and statistically significant.

Summing up, the estimation results show that there is a large and positive impact of the program on self-perceived oral health. The effect is smaller, but still significant, in the second follow-up. This seems to be driven by changes in take-up rates' differentials between treated and control individuals rather than by adaptation to the treatment. Moreover, the effects for women tend to be larger than for men.

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[17]We do not present IV estimates for men because the first stage is not powerful enough.

4.2.2 Effects on Self-Esteem

Table 5 reveals a large positive effect of the intervention on self-esteem (0.27σ). However, as reported in Table 6, this is a combination of a significant effect of 0.42σ for women and a null effect for men. The average effect decreases to 0.18σ in the second follow-up (Panel B). Again, this effect is explained by a significant 0.25σ effect for women and a null effect for men. Results in Panel C of Table 5 imply that we cannot reject that the effects found in the first and second follow-ups are equal.

Interestingly, the IV estimates suggest that a relevant part of the decrease of the estimated effect between follow-ups is related to a change in the differential take up of treated and control individuals over time. That is, we find that the effect for the full sample remains mostly unchanged between follow-ups (0.61σ and 0.62σ, respectively). However, consistent with the results for the OHIP score, IV estimates do suggest a moderate decrease of the impact on womens' self-esteem over time.

Our results indicate that there is a large and persistent impact of the program on self-esteem concentrated in women. We conjecture that good oral health and an attractive smile are attributes that are significantly more important for women because of economic, psychological, cultural, and social reasons.

4.2.3 Effects on Labor Market Outcomes

Finally, we discuss the effects on labor market outcomes. We begin with the estimation of the effects of the intervention on employment rates, i.e., the effects on the extensive margin of the labor market. It is worth noting that the subjects in our experiment tend to have a strong attachment to the labor market.[18] Panel A of Table 5 shows an ITT effect on employment rates of about 5 *p.p.* in the first follow-up survey. The impact is larger (6 *p.p.*) and statistically significant only for women. The IV estimates show a similar pattern but with larger impacts: access to a prosthesis increases employment rates by 12 *p.p.* for the overall population and by 16 *p.p.* for women.

These impacts decrease and become statistically insignificant for the second follow-up survey. That is, the effect of access to prostheses only has a short-term effect on the extensive margin in spite of the persistent effects we observe for oral health and self-esteem. However, results in Panel C of Table 5 suggest that due to the imprecision of the estimates we cannot reject that the effects are constant across surveys.

Next we study the effect of the program on log earnings for people who were working

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[18]Notice also that the reduction in the sample size due to non-selective attrition implies that we may not have enough statistical power to identify small effects. This may particularly be in the case of men.

at baseline. Results show a significant ITT effect of 0.14σ for the full sample. However, as in the case of self-esteem and employment rates, results in Table 6 show that the effect is statistically significant and economically relevant for women only. Again, the impacts decrease in the second follow-up survey and the low precision of the estimates implies that we cannot reject the hypothesis that the effects are equal across surveys.

In sum, the results suggest that there is an impact of oral health conditions on labor market outcomes in the short-term for women. In Section 5 we study heterogeneous effects for women to try to understand the potential mechanisms behind these effects and their persistence.

4.3 Effects on Other Outcomes

Finally, we study the impact of the treatment on other outcomes. First, we report the impact on investments that complement the improvements in dental health (Table 7). We then present treatment effects on aspects related to the marriage market and the quality of intra-household relationships (Table 8). We concentrate on women given our results on self-esteem and on labor market outcomes.

The second follow-up survey includes a set of questions that help us understand whether the improvements in appearance and dental health led subjects to invest more time, money, and effort in complementary investments such as changes in hair style; dieting and exercising; and spending on clothing, personal care items, and cosmetic treatments. To estimate these impacts, we define a set of dummy variables that indicate whether the individuals invested in each of these items. We also consider the sum of all these different investments.

We identify treatment effects on several of these dimensions. We find a significant impact on changes in hair style equal to 9 *p.p.* (from an average of 63% in the control group), investments in jewelry and accessories (12 *p.p.* from an average of 47% in the control group), investments in clothing (8 *p.p.* from an average of 64% in the control group), spending on personal care and hygiene products (14 *p.p.* from an average of 54% in the control group), and the use of make-up and fragrances (11 *p.p.* from an average of 48% in the control group). We do not find an impact on dieting and exercising, or on cosmetic treatments and plastic surgery, which may be related to the age of the subjects in our sample and to the shadow price of these investments. In sum, when we combine all the dimensions considered, the total impact equals 0.57 (from an average of 3.27 in the control group). That is, there is a significant impact of the program on complementary

investments.[19]

We also study the effect of the treatment on outcomes related to the marriage market and to the quality of intra-family relationships using questions included in the second follow-up survey. The treatment may change the bargaining power of subjects -in particular of women- which may in turn affect the extensive margin of the marriage/partnership market (formation and dissolution). In addition, the treatment may affect the quality of the relationships with the partner and with other household members. We study both margins. Panel A of Table 8 reports treatment effects on partnership status; Panel B reports treatment effects on the quality of the relationship with the spouse or partner; Panel C reports the impact on different aspects of family life.

Results in Panel A show that the program did not have a significant effect on the extensive margin, i.e. we do not find that lottery winners have a different partnership status relative to women in the control group (we consider both formal and informal partnerships). Moreover, we do not find significant effects on a dummy on whether they looked for a partner in the period after the treatment was completed. Consistent with this, we do not find effects on a dummy identifying whether they had a new partner. It is worth noting that our sample is composed of relatively old people with more or less permanent partners (e.g., only 4% of women in the control group searched for partners in the period after the treatment was delivered). This may explain why we do not find effects on the extensive margin.

In turn, Panel B presents results on the quality of the relationships with the subjects' partners. We asked participants about the interaction with their partners. Specifically, we asked whether they: (i) went out with their partner, (ii) received gifts from their partner, (iii) gave gifts to their partner, (iv) had serious arguments with their partner, (v) were not allowed by their partners to do any particular activity, (vi) suffered verbal violence from their partner, and (vii) suffered physical violence from their partner. We also asked who manages finances at home (the subject herself, jointly with someone else, or someone else entirely). All these dimensions intend to capture relationship quality and bargaining power within the household.[20]

Interestingly, and in contrast to results in Panel A, Panel B shows that women who won the lottery experienced an improvement in their spousal relationships. We find that lottery winners increased the probability of receiving or giving gifts (both equal to 12 *p.p.*

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[19]We are unable to disentangle the substitution and income effects that explain these results. Nevertheless, this is of second order importance given the objectives of this exercise.

[20]We asked these questions only to those who had a partner. However, given we do not find treatment effects on the extensive margin, these results thus capture effects on the quality margin.

from an average in the control group of 30% in the case of receiving gifts and of 26% in the case of giving gifts), decreased the probability of having strong arguments with their partners (16 *p.p.* from an average of 15% in the control group), decreased the probability of not being allowed by their partners to do something (7 *p.p.* from an average of 9% in the control group), and decreased the probability of suffering verbal violence (11 *p.p.* from an average of 8% in the control group). We do not find a statistically significant effect on the probability of going out with their partners or on suffering physical violence. We also find no statistically significant effect on who manages the household's finances.

Finally, Panel C studies the effects on the quality of family life. We asked women who lived with other members of their family how often: (i) she worries that everyone in the household feels happy, (ii) the family has a good time together, (iii) family members treat each other respectfully, (iv) the family does activities together, and (v) she feels that her opinions matters to other family members. For each of these questions we created a dummy variable that indicates whether the subject answers "always."[21] We only find a significant impact of 10 *p.p* on the first item (from an average of 72% in the control group), i.e. if the individual worries that everybody in the household feels happy.

In sum, these results suggest that the program had real effects on the behavior of treated women and that it improved the quality of their lives. In particular, it had an impact on the quality of their spousal relations.

5 Labor Market Effects: Mechanisms

In this section we look into the mechanisms behind the labor market results we obtained, particularly those for women. We begin by presenting a heterogeneity analysis that includes interaction effects with variables measured before the treatment. In particular, we are interested in the difference between missing visible (front) and non-visible (non-front) teeth. We also study heterogeneous effects related to age and baseline self-esteem.

We then show the results of a number of exercises with the aim of analyzing whether the evidence is consistent with demand factors, supply factors, or a combination of both. First we present treatment effects on several factors related to the labor supply, in particular about functional limitations and pain due to a poor objective oral health and about the willingness to work in jobs with interpersonal contact. Second, we study employment effects on formal and informal employment, where labor supply and labor

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[21]Results are qualitatively the same if instead we use a dummy that indicates whether the individual answers "always" or "almost always." Results are available upon request.

demand features play different roles. Finally, we present evidence based on the ratings of pictures, trying to more directly capture demand-side factors.

5.1 HETEROGENEITY

In order to explore heterogeneous effects and to understand the mechanisms underlying the impacts we find, we present estimates of interaction effects with age, self-esteem, number of missing front teeth, and number of missing non-front teeth, all measured at baseline.

We use age as a proxy for the different stages of the life cycle and to capture cohorts effects. We use age in deviations from the sample mean to ease the interpretation. In turn, we define a dummy to indicate whether the subject is missing at least one front tooth. With this interaction we intend to capture differences in employment outcomes that are related to a key, visible component of dental health. Similarly, we define a dummy indicating "many non-front missing teeth" whenever the individual is missing at least 12 non-front teeth (which corresponds to the 75th percentile of the variable's distribution). The idea is to identify effects of non-visible dental health on employment outcomes. Finally, we define a dummy for individuals with low self-esteem: a baseline score in the Rosenberg scale below the 25th percentile.[22]

Tables 9 and 10 present heterogeneity in employment effects. Table 9 shows the effects on employment rates for all women, whereas Table 10 shows the effect on log earnings for women employed at the baseline. The first panel of each table presents the estimated impacts for the first follow-up; the second panel presents the results for the second follow-up. We only present ITT estimates because we do not find significant interaction effects with any of the variables of interest in the first stage of our IV estimation (with wearing a prosthesis as the endogenous variable). Therefore, any heterogeneity in results should not be related to differences in take up.[23]

We begin the discussion by analyzing the results for the first follow up survey. First, we test for the existence of heterogeneous effects by age. Results in columns (1) of both tables show no clear pattern of interactions of the treatment with age for any of the employment outcome variables. Next, we analyze heterogeneous effects according to the visibility of missing teeth in columns (2) of both tables. We include the two dummies together to jointly identify heterogeneous effects for visible and non-visible

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[22]The results remain qualitatively unchanged when we use other percentiles of the respective distributions.

[23]Appendix Table 1 presents heterogeneous effects estimations for several definitions of take up and measures of objective dental health.

dental health conditions. Results for employment status suggest that the visible component has a strong and significant effect (with a point estimate of 18 *p.p.*), while the non-visible component has a negative and statistically insignificant point estimate. Interaction effects for earnings of women working at baseline confirm these results; we find a statistically and economically significant interaction effect of 0.50σ for women missing front teeth. Conversely, the interaction effect with the dummy for non-front missing teeth is again negative and not statistically significant. That is, similar to the effects on employment rates, the effects on earnings are concentrated among women who were missing at least one front tooth. This confirms the relevance of the visible component of the treatment in explaining its effects on labor market outcomes.

We also add interactions for women with initial low levels of self-esteem in columns (3) of both tables. We find an economically relevant interaction effect for the employment rate. The size of this effect is similar to the one for women missing front teeth but it is not precisely estimated. In the case of earnings of people who were initially employed, we find a large but also imprecisely estimated effect.

Finally, in column (4) we include all the interactions at the same time. The results confirm the previous findings: missing front teeth increases the treatment effect for both outcome variables in an economically and statistically significant way. In turn, results for a low initial level of self-esteem are large but not precisely estimated.

We now turn to the analysis of heterogeneous treatment effects in the second follow-up. We know from previous results that average treatment effects are lower in the second follow up survey. Still, results in columns (5) through (8) of Tables 9 and 10 suggest that most of the patterns for employment outcomes found in the first follow-up persist, although the results are now imprecisely estimated. As a matter of fact, the effects remain economically large and most of them statistically significant when we assume that the effects are constant across follow ups.[24] These results confirm the relevance of both the visible component of dental health and self-esteem as potential mechanisms in explaining our main results.

In sum, this subsection presents suggestive evidence that treatment effects on labor market outcomes are stronger for women missing front teeth and with low initial levels of self-esteem. In turn, this suggests that these may be relevant mechanisms through which the treatment effects occur.

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[24]See Appendix Table 2.

5.2 Effects on the Dimensions of Subjective Oral Health

Dental health may affect employment decisions through different dimensions. We now investigate this further by directly studying the impact of the treatment on the different items of the OHIP index.

Table 11 presents the results for the first follow up survey. We find that the program has a direct effect on all OHIP items, confirming its effect on the different dimensions of quality of life related to oral health. Moreover, all impacts are large. Interestingly, the subjects perceive a strong effect on difficulties performing activities (their usual jobs, question 12) and on being unable to function because of oral health conditions (question 14). These effects are statistically significant and economically relevant (0.44σ and 0.46σ respectively), and suggest that the labor productivity of the treated group increased as consequence of the program. At the same time, we find that several of the OHIP psychological dimensions relevant to the intervention also improved. For example, we find significant decreases in self-consciousness (1.0σ, question 5), difficulty to relax (0.52σ, question 9), and being embarrassed (0.92σ, question 10). These results suggest effects on labor supply as the subjects experienced a decrease in the disutility of interaction with others, interactions that usually happen while working.

Overall, these results show that the treatment mitigates limitations that restrict daily activities like work that are associated with poor oral health. These results are thus consistent with an effect of the program on increases in productivity of subjects and also with increases in the labor supply of its participants.

5.3 Effects on Employment in Occupations with Interpersonal Contacts

We now look into the effects of the treatment on the types of jobs people hold. Given the employment effects and the heterogeneity we find, in this subsection we ask whether women are now working in jobs with more interpersonal contact. In Panel A of Table 12 we present evidence on employment rates in jobs with face-to-face interactions at the time of each interview.[25] This is measured using a dummy variable and was collected in both follow-ups.

We report the average ITT effect in the first follow-up in column (1). The 6 *p.p.* point estimate is comparable to the employment effect in Table 6 (Panel A), suggesting that most of the employment effects we find are related to jobs with face-to-face interactions. However, the estimate is not statistically significant. Columns (2) to (5) add interaction effects to allow for heterogeneity. The results suggest that the impacts are

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[25]Implicitly we assume that those who are not employed have no interpersonal interactions at work.

significantly larger for women at the average age of our sample. We also find a positive, economically, and statistically significant effect of the treatment for women with low initial levels of self-esteem in the first follow-up. Results for the interaction with missing front teeth produce positive and relatively large point estimates; however, the results are not statistically significant. In the second follow-up, none of these interactions remain statistically significant, although we still observe an economically large effect for those with low initial self-esteem. Results for the interaction with the dummy for missing front teeth are also positive and relatively large in the second follow-up, but they are not precisely estimated.

It is worth noting that these results are a mix of demand- and supply-side factors. In order to disentangle these factors, we also present evidence for two proxies of how potential face-to-face interactions affect labor supply: the willingness to search for jobs with more face-to-face interactions and preferences for jobs with face-to-face interactions. Unfortunately, we only asked these questions in the second follow up survey. Each question is answered on a Likert scale basis, which we standardize.[26]

We present standardized effects in Panel B of Table 12. Results in columns (1) and (6) imply a positive average treatment effect of 0.18σ and 0.20σ, respectively. This is a non-trivial increase in labor supply for jobs that require interaction with costumers and other workers. The other columns present interaction effects with the variables used in the previous subsections. Results are not precisely estimated but tend to suggest much larger effects for women missing front teeth. The effects of low levels of self-esteem also seem to be relevant, but the point estimates are smaller in magnitude.

Taken together, the evidence in Table 12 suggests that labor supply did change in response to the treatment. It is interesting to note that the effects on labor supply seem to be more persistent than the effects on employment rates, thus suggesting that labor supply responds more than labor demand to the changes produced by the program.

5.4   Effects in Informal and Formal Labor Markets

Previous results document the existence of average and heterogeneous treatment effects on the employment and earnings margins. Moreover, in the previous subsection we document significant and persistent effects on labor supply. Here we complement these findings by studying whether treatment effects operate differently in informal employment relative to formal employment. We hypothesize that the margin of response is more

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[26]The Likert scale has five categories going from feeling very comfortable doing the activity to feeling very uncomfortable doing the activity.

important in the informal labor market given its high incidence of self-employment and of short-term labor relationships, i.e., given its higher flexibility. On the contrary, more structured and long-term labor relationships characterize jobs in the formal market.

Panel A of Table 13 presents the estimated effects on female employment by different initial labor market status: not-employed, employed, employed in a formal job, employed in an informal job and self-employed.[27] The table shows the effects on total employment and on the different employment categories. Columns (1) to (4) present the results for the first follow-up, whereas columns (5) to (8) show the estimated effects for the second follow-up.

The first follow-up's effects on employment are not different for women employed and unemployed at baseline (a 7 *p.p.* effect that is statistically significant only for women who are initially employed). This is interesting as potentially reflecting the volatility of employment among poor women in Chile (Novella et al., 2015). The results in columns (2) to (4) suggest that the effect on employment rates is concentrated in informal jobs, some of which are self-employed. The effect on employment in the formal sector among those initially employed is negative and imprecisely estimated. Results in columns (5) to (8) confirm the pattern of decreasing employment effects in the second follow-up. The exception is a large and statistically significant effect on employment among women employed in the informal sector at baseline, which is matched by a same-sized but not significant effect on self-employment.[28]

Results in Panel B of Table 13 confirm the earnings outcomes for people with employment at the baseline. We find that the positive increase in earnings in the first follow-up is economically large and statistically significant for people initially working in the informal sector. This effect becomes even larger in the second follow-up and remains statistically significant. Within those in the informal sector, the effect is particularly large among the self-employed, especially in the second follow-up where we estimate a statistically significant impact of 0.78σ.

In sum, while some of these results are not precisely estimated, results in Table 13 suggest that most of the impacts on employment and earnings are mainly through jobs in informal labor markets, particularly through self-employment.

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[27]We define self-employed as those who do not have an employer. Recall that we define informality as lacking a contract. Thus, all self-employed are classified as informal, as well as all employees who have not signed a contract with their employers.

[28]Notice that some positive effects on formal employment tend to appear in the second follow-up. This may imply that access to formal and better opportunities take time to realize. However, the results are not precisely estimated.

In this subsection we study the effects of the treatment on the perceptions of observers of the appearance of the experimental subjects. Five observers independently rated the pictures taken in the first follow-up survey on a number of dimensions that are expected to be correlated with labor demand.[29] In particular, we use the instrument developed by Eli et al. (2001) and Kershaw et al. (2007) that considers appearance ratings on four personality traits: social competence, intellectual ability, psychological adjustment, and relationship satisfaction. Given that this instrument does not include questions that are directly related to dental aspects, labor demand, and job performance, we added three sections: one with questions on whether the subjects were showing their teeth and smiling in the picture, one on expected performance on the job, and another on labor demand. It is worth noting that CVs with pictures are extensively used in Chile and other emerging countries (e.g., Marlowe et al., 1996 and López Boo et al., 2013). Moreover, previous research stresses how "first impressions" affect the perceptions of the traits of others (e.g., Willis and Todorov, 2006; Todorov et al., 2005).

Table 14 presents the treatment effects for women on each question and dimension.[30] Panel A presents the results for two mechanical questions related to the study: whether the person depicted in the picture is showing her teeth and whether she is smiling. Women in the treatment group are 14 *p.p.* more likely to show their teeth in the picture (from a share of 49% in the control group) and 13 *p.p.* more likely to smile (from a share of 55% in the control group). Thus the treatment indeed increases the probability of women showing the improvements in their dental health, which in many cases entails a new smile.[31]

Next, we study whether treated women were rated more highly in the four personality traits of the Eli et al. (2001) and Kershaw et al. (2007) questionnaire. The table presents standardized effects.[32] First, we find a higher rating of social competence (0.20σ) for treated women, mostly driven by a higher perception of how friendly they look (0.28σ), with much smaller effects on the perceptions of how popular and trustworthy they are perceived.

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[29]The observers hold studies equivalent to BA degrees in business and management. We use the average of their ratings. We also experimented with the median with similar results.

[30]Interestingly, we do not find any significant effect among men, even for the questions on whether they are showing their teeth and/or smiling in the photograph. Results are available upon request.

[31]As previously mentioned it is quite remarkable that men show no treatment effects on these aspects. Moreover, the share of men in the control group showing their teeth and smiling is higher than the respective shares of women in the control group: 63% of men show their teeth and 67% of them smile in the picture.

[32]Each question is answered on a Likert scale with four categories.

Second, we do not find an effect on perceptions about intellectual ability with very small effects on all dimensions. Third, we find a significant effect of 0.25σ on the perception about psychological adjustment, driven by significant effects on the perception of how extroverted and happy the person appears to be. We find no effects on how self-confident the individual looks, which may imply that the documented improved self-esteem might not be visible at first glance. Fourth, we do not find significant treatment effects on perceptions of relationship satisfaction. All in all, these results suggest that first impressions about individuals are affected by the treatment, but that these are concentrated in specific dimensions, mainly those related to the subjects' appearance. In contrast, the perception of deeper traits such as those related to intellectual ability and social dimensions are not affected by the intervention.

Finally, we study potential effects on dimensions related to job performance and labor demand. The only dimension in which we find a statistically significant effect is on the perception of how pleasant it would be to work with a subject, where we find a treatment effect of 0.23σ. In contrast, we find no effect on the perception of job performance. We find a small effect on the probability of considering the person for a position (a treatment effect of just 0.06σ). We find larger effects on the probability of considering the subject as a candidate for customer service (treatment effect of 0.15σ), for interacting with colleagues (treatment effect of 0.15σ), and for buying a good or service from her (treatment effect of 0.12σ). However, none of these effects is statistically significant. In sum, these results indicate that most labor-market related ratings of the treated women do not change much as a consequence of the intervention. This contrasts with the fact that they increased the visibility of their teeth and smile, and also improved their ratings in some dimensions related to appearance.

Our main conclusion from these results is that it is unlikely that the treatment significantly changed the perception of potential employers about the treated subjects (relative to the control group) based on pictures. This is key since the Chilean formal labor market intensively uses CVs with pictures (López Boo et al., 2013). This may help to explain why our results suggest that most of the labor market effects are in informal labor markets. For the subjects of this experiment, it may be "too little" or "too late" to change the opportunities in the formal market in a significant way by simply changing the visible component of dental health.

6 Conclusions

Poor people are often confronted with the challenges of living with bad dental health conditions and its economic, psychological, and social consequences. This challenge seems to be even more pressing for poor women; because of cultural reasons they seem to face the negative consequences of a poor oral health status in a particularly intensive way, especially if that poor health affects their appearance. This paper examines the effects of improving oral health with a special emphasis on dental appearance.

We designed a randomized experiment to test whether several economic, social and psychological outcomes respond to the provision of a private program that aimed to discretely improve dental health in Chile. A key component of the program is the supply of prostheses that have significant and visible effects on oral health and its appearance. The sample is comprised of people who applied to the program in 2011. Participants were mainly middle-aged women with high prevalence of clinically assessed oral health problems and with limited access to good dental health services. We implemented three detailed surveys to study the effects of the program on a number of relevant economic, social and psychological dimensions, one at the baseline, one a year after treatment, and the other three years after treatment.

Our results show that providing dental treatment with especial emphasis on appearance leads to statistically significant improvements in objective and subjective oral health conditions for men and women in the two follow-up surveys. Self-esteem improves among women in both follow-up surveys, whereas labor market outcomes only improved for the first follow-up. Average treatment effects on labor market outcomes for the second follow-up survey are not precisely estimated. We find no effects on men's self-esteem or labor market outcomes.

We also find that the effects found in both follow-ups are stronger for women missing front teeth and with low pre-treatment self-esteem. This suggests that the new smile provided by the prostheses and self-esteem may be factors driving labor market results. Moreover, we find that labor market effects are concentrated among participants who were initially self-employed or held informal jobs. Most of the effects are also stronger for labor market outcomes in informal jobs. This suggests that the higher flexibility in these markets (mainly through self-employment) allows for a larger response relative to the more structured formal market. This conclusion is reinforced by the rating participant's pictures by outside observers. Given the role of first impressions and the extensive use of CVs with pictures in formal labor markets in developing and emerging countries like Chile, the difference for results in the formal versus informal market is not overly

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surprising.

We also find that the program had an impact on spending that complemented dental appearance changes such as hair styling, clothing, and beauty accessories. Moreover, we also find that, even though the intervention did not significantly affect the extensive margin of the marriage and partnership market, it did improve the quality of the spousal relationships of women who won the lottery of this study. These two results confirm that the intervention has real consequences in the lives of women in the experiment.

Taken together, our findings indicate that improving poor women's access to dental treatments enhances their economic, psychological, and social outcomes. In contrast, the improvement in dental conditions does not have anywhere near the same impact on men. This supports the results of previous research finding the importance of the role of observable and psychological attributes in the labor market for women. This is an important result in a context so important worldwide as many in developing and developed countries lack access to good quality dental care.

The effects we find are more likely to rationalize increases in labor supply coupled with increases in productivity than changes in labor demand in formal markets. This highlights how adult poor women interact in the labor market in an emerging economy like Chile. Future research can shed additional light on the effects of treatments that improve self-esteem and other dimensions of appearance.

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Table 1: Descriptive Statistics

	Panel A: Baseline				Panel B: First Follow-up				Panel C: Second Follow-up			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Mean	Men	Women	Diff. p-value	Mean	Men	Women	Diff. p-value	Mean	Men	Women	Diff. p-value
Age	47.87	48.10	47.77	0.59	48.11	48.67	47.89	0.26	48.47	49.18	48.20	0.15
Women	0.70	0.00	1.00	.	0.72	0.00	1.00	.	0.73	0.00	1.00	.
Married or cohabitating	0.58	0.71	0.52	0.00***	0.58	0.72	0.52	0.00***	0.60	0.76	0.53	0.00***
Head of household	0.76	0.92	0.68	0.00***	0.74	0.94	0.67	0.00***	0.75	0.95	0.67	0.00***
Number of HH members	4.27	4.26	4.27	0.99	4.30	4.39	4.27	0.38	4.32	4.47	4.26	0.21
Residents under 5 years of age in HH	0.34	0.32	0.35	0.61	0.34	0.32	0.34	0.74	0.34	0.36	0.33	0.69
Residents between 5 and 18 years in HH	1.14	1.03	1.19	0.05**	1.16	1.08	1.20	0.22	1.18	1.10	1.21	0.27
Adults in HH	2.66	2.73	2.63	0.30	2.67	2.80	2.63	0.09*	2.70	2.85	2.64	0.07*
Residents over 65 years in HH	0.15	0.16	0.14	0.66	0.15	0.17	0.15	0.50	0.14	0.15	0.14	0.71
Education: 8 years or less	0.25	0.19	0.28	0.01***	0.24	0.16	0.27	0.00***	0.24	0.21	0.26	0.19
Education: between 9 and 11 years	0.19	0.21	0.19	0.43	0.19	0.23	0.18	0.14	0.19	0.22	0.18	0.36
Education: 12 years	0.38	0.44	0.35	0.03**	0.38	0.44	0.36	0.05**	0.39	0.44	0.37	0.13
Education: more than 12 years	0.18	0.16	0.18	0.54	0.18	0.17	0.19	0.56	0.17	0.13	0.19	0.10
Years of education	10.71	10.99	10.58	0.04**	10.75	11.11	10.61	0.02**	10.75	10.85	10.72	0.58
Employed	0.71	0.88	0.64	0.00***	0.71	0.88	0.64	0.00***	0.70	0.88	0.63	0.00***
Has an employment contract	0.47	0.67	0.39	0.00***	0.47	0.67	0.39	0.00***	0.46	0.67	0.39	0.00***
Fonasa A	0.32	0.26	0.34	0.02**	0.32	0.24	0.35	0.00***	0.32	0.25	0.35	0.02**
Fonasa B	0.29	0.27	0.30	0.40	0.29	0.27	0.30	0.42	0.29	0.29	0.29	0.86
Fonasa C	0.27	0.28	0.26	0.63	0.27	0.29	0.26	0.54	0.27	0.27	0.28	0.94
Fonasa D	0.12	0.19	0.09	0.00***	0.12	0.20	0.08	0.00***	0.11	0.19	0.08	0.00***
OHIP14 score	36.04	33.10	37.29	0.00***	35.97	32.37	37.37	0.00***	36.12	32.21	37.59	0.00***
Rosenberg score	17.40	18.68	16.85	0.00***	17.41	18.91	16.82	0.00***	17.33	18.71	16.81	0.00***
Number of missing teeth	10.65	10.64	10.65	0.97	10.70	11.01	10.58	0.41	10.97	11.16	10.90	0.65
Number of missing front teeth	1.45	1.58	1.40	0.30	1.45	1.66	1.37	0.15	1.55	1.72	1.48	0.28
Upper prosthetic needed	0.94	0.96	0.94	0.18	0.94	0.96	0.93	0.24	0.95	0.95	0.94	0.92
Lower prosthetic needed	0.92	0.91	0.93	0.48	0.93	0.91	0.93	0.27	0.93	0.92	0.93	0.57

Notes: This table presents averages for the complete sample, and for women and men separately. The table also presents the p-value of the test of differences of means between women and men in each sample. The sample size for the baseline is 799 subjects, 661 for the first follow-up, and 547 for the second follow-up.

***Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

	Panel A: Baseline			Panel B: First Follow-up			Panel C: Second Follow-up		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Treatment	Control	Diff. p-value	Treatment	Control	Diff. p-value	Treatment	Control	Diff. p-value
Age	48.15	47.65	0.38	48.41	47.85	0.38	48.45	48.48	0.96
Women	0.71	0.69	0.51	0.73	0.71	0.56	0.75	0.71	0.25
Married or cohabitating	0.57	0.58	0.94	0.58	0.57	0.76	0.57	0.62	0.31
Head of household	0.79	0.73	0.04**	0.77	0.72	0.17	0.80	0.71	0.01**
Number of HH members	4.35	4.20	0.20	4.31	4.30	0.95	4.32	4.32	0.97
Residents under 5 years of age in HH	0.34	0.34	0.88	0.31	0.36	0.36	0.33	0.34	0.90
Residents between 5 and 18 years in HH	1.15	1.13	0.75	1.15	1.18	0.73	1.13	1.22	0.31
Adults in HH	2.71	2.62	0.30	2.67	2.68	0.86	2.69	2.70	0.93
Residents over 65 years in HH	0.16	0.13	0.30	0.18	0.13	0.22	0.17	0.12	0.18
Education: 8 years or less	0.26	0.25	0.75	0.25	0.23	0.58	0.23	0.25	0.58
Education: between 9 and 11 years	0.20	0.18	0.52	0.20	0.19	0.61	0.21	0.18	0.53
Education: 12 years	0.40	0.36	0.23	0.40	0.37	0.34	0.42	0.36	0.23
Education: more than 12 years	0.14	0.21	0.01***	0.14	0.21	0.02**	0.15	0.20	0.11
Years of education	10.58	10.80	0.24	10.58	10.89	0.15	10.71	10.79	0.75
Employed	0.72	0.71	0.60	0.71	0.70	0.74	0.71	0.69	0.67
Has an employment contract	0.48	0.47	0.78	0.47	0.47	0.99	0.46	0.46	0.98
Fonasa A	0.31	0.32	0.67	0.31	0.33	0.52	0.30	0.34	0.26
Fonasa B	0.32	0.27	0.21	0.32	0.27	0.14	0.33	0.26	0.04**
Fonasa C	0.25	0.28	0.35	0.25	0.28	0.38	0.26	0.29	0.41
Fonasa D	0.12	0.12	0.91	0.12	0.11	0.96	0.11	0.11	0.94
OHIP14 score	35.88	36.16	0.72	35.61	36.26	0.47	35.52	36.61	0.27
Rosenberg score	17.46	17.35	0.71	17.44	17.38	0.86	17.41	17.27	0.71
Number of missing teeth	10.81	10.52	0.48	10.98	10.47	0.25	11.27	10.72	0.27
Number of missing front teeth	1.41	1.49	0.59	1.47	1.44	0.87	1.59	1.51	0.67
Upper prosthetic needed	0.94	0.94	0.79	0.93	0.94	0.64	0.94	0.95	0.87
Lower prosthetic needed	0.93	0.92	0.40	0.93	0.92	0.42	0.94	0.93	0.69

Notes: This table presents averages for treatment and control groups in the baseline and in the two follow-up surveys. The table also presents the p-value of a test of the difference in means between the treatment and control groups in each sample. The sample size for the baseline is 799 subjects, 661 for the first follow-up survey, and 547 for the second follow-up survey.

***Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 3: Take-Up of Dental Services

Measure	(1) All	(2) Men	(3) Women
Panel A: First Follow-Up			
Completed treatment	0.66***	0.58***	0.69***
	(0.03)	(0.05)	(0.03)
Received any dental service in the previous year	0.16***	0.14**	0.14***
	(0.04)	(0.07)	(0.04)
Wears a dental prosthesis at the time of the survey	0.45***	0.53***	0.42***
	(0.04)	(0.06)	(0.04)
Panel B: Second Follow-Up			
Received any dental service in the previous year	0.06**	0.12*	0.03
	(0.03)	(0.07)	(0.03)
Wears a dental prosthesis during the survey	0.30***	0.19**	0.34***
	(0.04)	(0.09)	(0.05)

Notes: This table presents estimated effects of different definitions of take-up for lottery winners. Control variables include randomization-strata fixedeffects. The complete sample size for the second follow-up survey is 547 subjects. The sample size for women is 397 and for men is 150. Robust standard errors are reported in parentheses.

***Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 4: Objective Measures of Dental Health

Measure	(1) All	(2) Male	(3) Female
Number of teeth with cavities	−1.18***	−1.89***	−0.95***
	(0.15)	(0.40)	(0.16)
Number of teeth in need of dental treatment	−3.43***	−5.05***	−3.04***
	(0.72)	(1.43)	(0.84)

Notes: This table presents estimated effects on different objective measures of dental health. Control variables include randomization-strata fixed effects. The complete sample size is 642 subjects. The sample size for women is 462 and the sample size for men is 180. Robust standard errors are reported in parentheses.

***Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 5: Main Outcomes (Full Sample)

Dependent Variable	Panel A: First Follow-Up			Panel B: Second Follow-up		
	(1)	(2)	(3)	(4)	(5)	(6)
	ITT Estimate	IV Estimate	Obs	ITT Estimate	IV Estimate	Obs
Subjective Oral Health (OHIP)	0.94***	2.20***	651	0.55***	1.84***	546
	(0.09)	(0.22)		(0.08)	(0.31)	
Self Esteem (Rosenberg Test)	0.27***	0.61***	652	0.18**	0.62**	539
	(0.08)	(0.18)		(0.08)	(0.27)	
Employment Rate	0.05*	0.12*	661	0.01	0.04	547
	(0.03)	(0.06)		(0.03)	(0.10)	
Log of Earnings (If working at baseline)	0.14*	0.34**	549	0.03	0.12	460
	(0.07)	(0.16)		(0.08)	(0.30)	

Panel C: Test of Differences Across Surveys (P-Values)

	(1)	(2)
	ITT Estimates	IV Estimates
Subjective Oral Health (OHIP)	0.00	0.09
Self Esteem (Rosenberg Test)	0.19	0.64
Employment Rate	0.20	0.31
Log of Earnings (If working at baseline)	0.25	0.49

Notes: This table presents estimated treatment effects on outcome variables in the first and second follow-up surveys (Panels A and B, respectively) for the full sample. ITT effects are the estimated treatment effects of winning the lottery. IV estimates are the instrumental variable estimates when using a dummy for winning the lottery as an instrument and a dummy for wearing a prosthesis at the time of the survey as the endogenous variable. Control variables include outcomes at baseline, employment status at baseline, a dummy for being head of household at baseline, years of education at baseline, and the randomization strata fixed effects. Panel C presents the p-value of a test of equality of the estimated effects in the first and second follow-up surveys.

***Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 6: Heterogenous Effects by Gender

Panel A: Women

	First Follow-Up			Second Follow-Up		
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable	ITT Estimate	IV Estimate	Obs	ITT Estimate	IV Estimate	Obs
Subjective Oral Health (OHIP)	1.01***	2.62***	468	0.56***	1.73***	397
	(0.10)	(0.32)		(0.09)	(0.34)	
Self Esteem (Rosenberg Test)	0.42***	1.03***	468	0.25**	0.74**	391
	(0.10)	(0.25)		(0.10)	(0.29)	
Employment Rate	0.06*	0.16*	474	0.01	0.04	397
	(0.04)	(0.09)		(0.04)	(0.12)	
Log of Earnings (If working at baseline)	0.19*	0.51**	378	0.03	0.10	315
	(0.10)	(0.25)		(0.12)	(0.36)	

Panel B: Men

Dependent Variable	ITT Estimate	IV Estimate	Obs	ITT Estimate	IV Estimate	Obs
Subjective Oral Health (OHIP)	0.78***	1.39***	183	0.59***	-	149
	(0.17)	(0.28)		(0.16)		
Self Esteem (Rosenberg Test)	−0.08	−0.16	184	0.05	-	148
	(0.13)	(0.24)		(0.14)		
Employment Rate	0.01	0.02	187	0.00	-	150
	(0.03)	(0.06)		(0.03)		
Log of Earnings (If working at baseline)	0.03	0.01	171	0.08	-	145
	(0.09)	(0.15)		(0.10)		

Notes: This table presents estimated treatment effects on outcome variables in the first and second follow-up surveys for women and men (Panels A and B, respectively). ITT effects are the estimated treatment effects of winning the lottery. IV estimates are the instrumental variable estimates when using a dummy for winning the lottery as an instrument and a dummy for wearing a prosthesis at the time of the survey as the endogenous variable. Control variables include outcomes at baseline, employment status in the baseline, a dummy for being head of household at baseline, years of education at baseline, and the randomization strata fixed effects. Robust standars errors are reported in parentheses.

***Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 7: Complementary Investments - Women

Dependent Variable	Treatment Effects	Average of Control Group	R^2	Obs
Hair Styling	0.09** (0.04)	0.63	0.12	397
Dieting	0.05 (0.05)	0.24	0.12	397
Physical Exercise	−0.01 (0.05)	0.28	0.11	397
Jewelry and Accesories	0.12** (0.05)	0.47	0.12	397
Clothing	0.08* (0.05)	0.64	0.13	397
Personal Care and Hygiene Products	0.14*** (0.05)	0.54	0.10	397
Use of Make-Up and Fragrances	0.11** (0.05)	0.48	0.10	397
Cosmetic Treatments	−0.01 (0.02)	0.04	0.06	397
Plastic Surgery	−0.00 (0.00)	0.00	0.12	397
Total Effects	0.57*** (0.21)	3.27	0.12	397

***Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 8: Effects on Intrahousehold Relationships - Women

Panel A: Effects on Partnership Status

Dependent Variable	Treatment Effects	Average of Control Group	R^2	Obs
Married or cohabitating	0.03 (0.05)	0.63	0.25	397
Engaged to be married or planning to cohabitate	−0.01 (0.02)	0.04	0.07	397
Single or widowed	−0.02 (0.05)	0.33	0.24	397
Recently changed relationship status	−0.02 (0.04)	0.14	0.09	396
Searching for a partner	0.00 (0.02)	0.04	0.08	397

Panel B: Effects on Interactions with Partner

Dependent Variable	Treatment Effects	Average of Control Group	R^2	Obs
Went out together	0.09 (0.07)	0.40	0.13	241
Received a present from partner	0.12* (0.07)	0.30	0.15	241
Bought a present for partner	0.12* (0.07)	0.26	0.13	241
Had a strong discussion	−0.16*** (0.05)	0.15	0.20	241
Was not allowed to do something by partner	−0.07* (0.04)	0.09	0.15	241
Suffered from verbal violence	−0.11*** (0.04)	0.08	0.17	241
Suffered from physical violence	0.01 (0.01)	0.00	0.08	241
Subject manages household finances on her own	0.09 (0.07)	0.52	0.13	224
Subject manages household finances jointly with partner	−0.06 (0.07)	0.24	0.15	224
Somebody else manages household finances	−0.04 (0.05)	0.24	0.14	224

Panel C: Quality of Family Life

Dependent Variable	Treatment Effects	Average of Control Group	R^2	Obs
"I worry that everyone at home feels happy"	0.10** (0.05)	0.72	0.14	350
"My familiy has a good time together"	−0.01 (0.05)	0.54	0.13	350
"Family members treat each other respectfully"	−0.02 (0.05)	0.79	0.09	350
"Family members do activities together"	−0.00 (0.06)	0.37	0.08	350
"My opinions matter to my family"	0.06 (0.05)	0.65	0.11	350

***Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

Table 9: Dependent Variable: Employment - ITT Estimates - Women

	First Follow-Up				Second Follow-Up			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment	0.08*	0.02	0.04	0.02	0.01	−0.03	−0.02	−0.06
	(0.05)	(0.05)	(0.04)	(0.05)	(0.05)	(0.05)	(0.04)	(0.06)
Treatment*$(Age-48)^2$	−0.00			−0.00	0.00			0.00
	(0.00)			(0.00)	(0.00)			(0.00)
Treatment*(Age-48)	0.01			0.01	0.01*			0.01*
	(0.01)			(0.01)	(0.01)			(0.01)
Treatment*Missing at Least One Front Tooth		0.18*		0.16*		0.16		0.14
		(0.10)		(0.10)		(0.11)		(0.10)
Treatment*Missing Many Non-Front Teeth		−0.06		−0.12		−0.01		−0.06
		(0.10)		(0.10)		(0.12)		(0.12)
Treatment*Low Self-Esteem			0.14	0.13			0.17	0.13
			(0.10)	(0.10)			(0.12)	(0.11)
R^2	0.18	0.18	0.17	0.20	0.19	0.16	0.17	0.21
Obs	474	474	474	474	397	397	397	397

Notes: This table presents estimated heterogeneous ITT effects on the probability of employment in the first and second follow-up surveys among women. Control variables include randomization strata fixed effects. Robust estimated standard errors are reported in parentheses.

***Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 10: Dependent Variable: Log Of Earnings (Standarized Effect) - ITT Estimates - Women

	First Follow-Up				Second Follow-Up			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment	0.27**	0.00	0.10	0.10	−0.03	−0.14	−0.07	−0.23
	(0.13)	(0.12)	(0.12)	(0.15)	(0.15)	(0.15)	(0.12)	(0.17)
Treatment*$(Age-48)^2$	−0.00*			−0.00*	0.00			0.00
	(0.00)			(0.00)	(0.00)			(0.00)
Treatment*(Age-48)	0.02			0.02	0.02			0.02
	(0.02)			(0.02)	(0.02)			(0.02)
Treatment*Missing at Least One Front Tooth		0.50*		0.44*		0.23		0.18
		(0.26)		(0.26)		(0.31)		(0.30)
Treatment*Missing Many Non-Front Teeth		−0.09		−0.18		0.43		0.33
		(0.27)		(0.27)		(0.36)		(0.34)
Treatment* Low Self-Esteem			0.31	0.32			0.37	0.28
			(0.27)	(0.26)			(0.33)	(0.33)
R^2	0.16	0.17	0.14	0.20	0.21	0.17	0.17	0.24
Obs	378	378	378	378	315	315	315	315

Notes: This table presents estimated heterogeneous ITT effects on the log of earnings in the first and second follow-up surveys for women who were working at baseline. Control variables include randomization strata fixed effects. Robust estimated standard errors are reported in parentheses.

***Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 11: Subjective Oral Health (OHIP): Treatment Effects by Item - Women

Dependent Variable	Treatment Effects	Average of Control Group	R^2	Obs
1. Trouble pronouncing words	0.19** (0.09)	-0.04	0.01	474
2. Worsened sense of taste	0.76*** (0.09)	0.02	0.13	472
3. Painful aching	0.29*** (0.10)	-0.04	0.02	474
4. Uncomfortable eating	0.50*** (0.10)	-0.04	0.05	474
5. Self-consciousness	1.01*** (0.11)	-0.07	0.14	473
6. Felt tense	0.84*** (0.10)	-0.07	0.13	474
7. Diet has been unsatisfactory	0.51*** (0.09)	-0.06	0.06	473
8. Interrupted meals	0.35*** (0.09)	-0.10	0.03	474
9. Difficult to relax	0.52*** (0.09)	-0.06	0.06	474
10. Been a bit embarrassed	0.92*** (0.10)	-0.10	0.16	474
11. Been a bit irritable	0.42*** (0.09)	-0.02	0.05	474
12. Difficulty doing usual jobs	0.44*** (0.09)	-0.03	0.05	473
13. Life less satisfying	0.77*** (0.09)	-0.05	0.13	473
14. Totally unable to function	0.46*** (0.08)	-0.04	0.06	474

***Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 12: Employment in Occupations with Interpersonal Contact - Women

Panel A: Employment Effects in Jobs with Face-to-Face Interactions

	First Follow-Up					Second Follow-Up				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Treatment	0.06	0.16***	0.06	0.01	0.10	−0.01	0.09	−0.04	−0.05	0.03
	(0.05)	(0.06)	(0.06)	(0.05)	(0.07)	(0.05)	(0.07)	(0.06)	(0.06)	(0.08)
Treatment*$(Age-48)^2$		−0.00***			−0.00***		−0.00**			−0.00**
		(0.00)			(0.00)		(0.00)			(0.00)
Treatment*(Age-48)		−0.00			−0.00		−0.01			−0.01
		(0.01)			(0.01)		(0.01)			(0.01)
Treatment*Missing at Least One Front Tooth			0.13		0.09			0.12		0.10
			(0.11)		(0.11)			(0.13)		(0.13)
Treatment*Missing Many Non-Front Teeth			−0.15		−0.15			−0.04		−0.00
			(0.12)		(0.13)			(0.14)		(0.15)
Treatment* Low Self-Esteem				0.25**	0.26**				0.19	0.15
				(0.11)	(0.12)				(0.13)	(0.13)
R^2	0.08	0.10	0.09	0.09	0.12	0.09	0.10	0.09	0.10	0.12
Obs	471	471	471	471	471	397	397	397	397	397

Panel B: Treatment Effects on Preferences for Jobs with Face-to-Face Interactions (Second Follow-Up Survey)

	Willingness to Search for Jobs with Face-to-Face Interactions					Preferences for Jobs with Face-to-Face Interactions				
Treatment	0.18*	0.21	0.08	0.16	0.07	0.20**	0.30**	0.15	0.19*	0.24*
	(0.10)	(0.13)	(0.12)	(0.11)	(0.17)	(0.10)	(0.12)	(0.12)	(0.10)	(0.14)
Treatment*$(Age-48)^2$		−0.00			−0.00		−0.00			−0.00
		(0.00)			(0.00)		(0.00)			(0.00)
Treatment*(Age-48)		−0.01			−0.02		0.00			0.00
		(0.01)			(0.01)		(0.01)			(0.01)
Treatment*Missing at Least One Front Tooth			0.32		0.30			0.26		0.22
			(0.23)		(0.23)			(0.21)		(0.22)
Treatment*Missing Many Non-Front Teeth			0.01		0.14			−0.18		−0.19
			(0.26)		(0.28)			(0.25)		(0.26)
Treatment* Low Self-Esteem				0.11	0.10				0.11	0.10
				(0.25)	(0.25)				(0.27)	(0.28)
R^2	0.14	0.15	0.16	0.14	0.17	0.09	0.09	0.09	0.09	0.10
Obs	388	388	388	388	388	397	397	397	397	397

***Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 13: Treatment Effects by Status at Baseline - Women

Panel A: Employment Effects

		First Follow-Up				Second Follow-Up			
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent Variable	Employed	Employed in Formal Job	Employed in Informal Job	Self-Employed	Employed	Employed in Formal Job	Employed in Informal Job	Self-Employed
Status at Baseline	Not Employed	0.07	0.03	0.04	0.06	−0.00	0.02	−0.02	−0.03
		(0.08)	(0.06)	(0.07)	(0.06)	(0.08)	(0.07)	(0.08)	(0.07)
	Employed	0.07*	−0.04	0.11**	0.06	0.02	−0.04	0.06	0.04
		(0.04)	(0.06)	(0.05)	(0.06)	(0.04)	(0.06)	(0.06)	(0.04)
	Employed in Formal Job	0.05	−0.01	0.06	0.02	−0.05	−0.09	0.04	−0.00
		(0.04)	(0.06)	(0.05)	(0.06)	(0.04)	(0.07)	(0.06)	(0.04)
	Employed in Informal Job	0.11	−0.07	0.18**	0.11	0.16*	0.08	0.08	0.10
		(0.07)	(0.08)	(0.09)	(0.06)	(0.08)	(0.09)	(0.10)	(0.09)
	Self-Employed	0.18	0.05	0.12	0.01	0.16	0.13	0.03	0.04
		(0.11)	(0.09)	(0.13)	(0.06)	(0.13)	(0.11)	(0.16)	(0.17)

Panel B: Effects on Earnings

	First Follow-Up	Second Follow-Up
	(1)	(2)
Status at Baseline	Log Earnings	Log Earnings
Employed in Formal Job	0.08	−0.18
	(0.13)	(0.13)
Employed in Informal Job	0.35**	0.39*
	(0.16)	(0.20)
Self-Employed	0.52	0.78*
	(0.32)	(0.41)

***Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

Table 14: Treatment Effects on Picture Ratings - Women

Dependent Variable	Treatment Effects	R^2	Obs
Visual Evaluation			
The individual is showing her teeth	0.14*** (0.05)	0.02	398
The individual is smiling	0.13*** (0.04)	0.02	398
Average Effect	0.13*** (0.04)	0.02	398
Social Competence			
The subject works for a large organization. Rate how popular you think the individual is among her colleagues	0.11 (0.10)	0.00	398
How friendly does the individual appear to be?	0.28*** (0.10)	0.02	398
How trustworthy does the individual appear to be?	0.06 (0.09)	0.00	398
Average Effect	0.20** (0.10)	0.01	398
Intellectual Ability			
Rate how successful you think the individual was at school	0.03 (0.09)	0.00	398
How intelligent does the individual appear to be?	0.01 (0.09)	0.00	398
How likely do you think the individual will be successful in her career path?	0.03 (0.10)	0.00	398
Average Effect	0.02 (0.09)	0.00	398

Robust standard errors in parentheses.

***Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 14: Treatment Effects on Picture Ratings - Women

Dependent Variable	Treatment Effects	R^2	Obs
Psychological Adjustment			
How introverted or extroverted does the individual appear to be?	0.26*** (0.10)	0.02	398
How happy does the individual appear to be?	0.27** (0.11)	0.01	398
How self-confident does the the individual appear?	0.06 (0.10)	0.00	398
Average Effect	0.25** (0.11)	0.01	398
Relationship Satisfaction			
How attractive is the individual?	0.00 (0.12)	0.00	398
How sexually fulfilled does the individual appear?	0.08 (0.11)	0.00	398
How likely is the individual to be in a relationship?	0.11 (0.11)	0.00	398
Average Effect	0.08 (0.12)	0.00	398
Job Performance			
How adequate do you think is the individual job performance?	0.01 (0.09)	0.00	398
How pleasant do you think it is to work or interact with the individual?	0.23** (0.10)	0.01	398
Average Effect	0.14 (0.09)	0.01	398

Robust standard errors in parentheses.

***Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 14: Treatment Effects on Picture Ratings - Women

Dependent Variable	Treatment Effects	R^2	Obs
Labor Demand			
If you were an employer, would you consider hiring the individual?	0.06 (0.09)	0.00	398
If you were an employer, would you consider hiring the individual for a costumer-facing position?	0.15 (0.11)	0.00	398
If you were an employer, would you consider hiring the individual for a position with frequent interaction with colleagues?	0.15 (0.10)	0.01	398
If you were a costumer, would you consider buying goods or services from this individual?	0.12 (0.09)	0.00	398
Average Effect	0.13 (0.10)	0.00	398

Robust standard errors in parentheses.

***Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Appendix Table 1: Take-Up and Objective Measures of Health, Heterogeneous Effects

Panel A: Take-Up of Dental Services - First Follow-Up

Variable	Completed Treatment			Received Any Dental Service in the Previous Year			Wears a Dental Prosthesis at the Time of the Survey		
	(1) All	(2) Men	(3) Women	(4) All	(5) Men	(6) Women	(7) All	(8) Men	(9) Women
Treatment	0.65***	0.60***	0.68***	0.15***	0.19*	0.14**	0.54***	0.59***	0.51***
	(0.04)	(0.08)	(0.05)	(0.06)	(0.11)	(0.07)	(0.05)	(0.10)	(0.07)
Treatment*$(Age-48)^2$	−0.00	0.00	−0.00	−0.00*	−0.00	−0.00*	−0.00	−0.00	−0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Treatment*(Age-48)	0.01*	0.02***	0.00	0.00	0.02**	−0.00	0.00	0.01	0.00
	(0.00)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)
Treatment*Missing Many Non-Front Teeth	−0.05	−0.13	−0.04	0.05	−0.13	0.11	0.01	0.03	−0.03
	(0.06)	(0.13)	(0.07)	(0.09)	(0.18)	(0.11)	(0.10)	(0.16)	(0.12)
Treatment*Missing at Least One Front Tooth	0.08	0.07	0.08	0.08	0.03	0.07	−0.16**	−0.17	−0.17
	(0.06)	(0.12)	(0.07)	(0.08)	(0.16)	(0.10)	(0.08)	(0.14)	(0.10)
Treatment*Low Self-Esteem	0.08	−0.23*	0.12	0.09	−0.14	0.13	0.04	0.45**	0.02
	(0.07)	(0.13)	(0.07)	(0.09)	(0.23)	(0.10)	(0.09)	(0.20)	(0.10)

Panel B: Take-Up of Dental Services - Second Follow-Up

Variable				Received Any Dental Service in the Previous Year			Wears a Dental Prosthesis at the Time of the Survey		
				All	Men	Women	All	Men	Women
Treatment				0.05	0.05	0.05	0.28***	0.24*	0.32***
				(0.05)	(0.11)	(0.06)	(0.06)	(0.13)	0.08)
Treatment*$(Age-48)^2$				−0.00	0.00	−0.00	−0.00	−0.00	−0.00
				(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	0.00)
Treatment*(Age-48)				0.00	0.02*	−0.00	0.00	−0.00	0.01
				(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	0.01)
Treatment*Missing Many Non-Front Teeth				0.09	−0.13	0.19*	0.18	0.24	0.13
				(0.08)	(0.18)	(0.10)	(0.11)	(0.25)	0.13)
Treatment*Missing at Least One Front Tooth				0.04	0.07	0.00	−0.10	−0.10	−0.07
				(0.07)	(0.16)	(0.08)	(0.09)	(0.19)	0.12)
Treatment*Low Self-Esteem				0.01	−0.12	0.03	0.08	0.28	0.03
				(0.08)	(0.26)	(0.09)	(0.11)	(0.32)	0.12)

Panel C: Objective Measures of Dental Health

Variable				Number of Teeth with Cavities			Number of Teeth in Need of Dental Treatment		
				All	Men	Women	All	Men	Women
Treatment				−1.10***	−2.29***	−0.75***	−2.38**	−2.88	−2.56*
				(0.24)	(0.71)	(0.22)	(1.14)	(2.38)	1.34)
Treatment*$(Age-48)^2$				−0.00	0.01	−0.00	0.01	−0.01	0.02
				(0.00)	(0.01)	(0.00)	(0.01)	(0.02)	0.01)
Treatment*(Age-48)				0.02	0.05	0.01	−0.03	−0.07	0.04
				(0.02)	(0.06)	(0.02)	(0.10)	(0.20)	0.12)
Treatment*Missing Many Non-Front Teeth				0.50	−0.12	0.84**	−2.37	0.93	−4.38**
				(0.40)	(0.89)	(0.40)	(1.82)	(4.12)	2.13)
Treatment*Missing at Least One Front Tooth				0.01	1.01	−0.25	−1.76	−3.72	−0.57
				(0.39)	(0.86)	(0.42)	(1.78)	(3.90)	2.10)
Treatment*Low Self-Esteem				−0.91*	−4.38	−0.78*	−2.79	−10.80**	−1.80
				(0.51)	(2.67)	(0.42)	(1.86)	(5.45)	2.00)

***Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

Appendix Table 2: ITT Estimates Assuming Constant Effects Across Follow-Ups

Interaction	Employment Dummy				Log Earnings			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment	0.05	−0.00	0.02	−0.01	0.16	−0.05	0.02	−0.02
	(0.03)	(0.03)	(0.03)	(0.04)	(0.10)	(0.10)	(0.09)	(0.12)
Treatment*$(Age-48)^2$	−0.00			−0.00	−0.00			−0.00
	(0.00)			(0.00)	(0.00)			(0.00)
Treatment*(Age-48)				0.01**				0.03**
				(0.00)				(0.01)
Treatment*Missing Many Non-Front Teeth		−0.03		−0.09		0.06		−0.12
		(0.08)		(0.08)		(0.23)		(0.23)
Treatment*Missing at Least One Front Tooth		0.17**		0.15**		0.43**		0.36*
		(0.07)		(0.07)		(0.21)		(0.21)
Treatment*Low Self-Esteem			0.15**	0.13*			0.43*	0.36
			(0.07)	(0.07)			(0.22)	(0.22)
R^2	0.17	0.16	0.15	0.18	0.22	0.19	0.19	0.23
Obs	871	871	871	871	842	842	842	842

***Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.