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TOO SICK TO START: ENTREPRENEUR'S HEALTH AND BUSINESS ENTRY IN TOWNSHIPS AROUND DURBAN, SOUTH AFRICA

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Abstract

Unlike large firms with management teams, small businesses are usually run by one key person, the owner-entrepreneur, who bears almost all of the risks and makes almost all of the decisions related to the business. Because the owner-entrepreneur also embodies most of the firm-specific knowledge capital, health of the owner-entrepreneur is an important factor in the production process. Following a cohort of respondents in townships around Durban, South Africa, over a three-year period, we examined the relationship between an individual's physical health and the decision to start a business. Our results suggest that respondents who were recent business entrants were in better health than respondents who did not start new businesses. Moreover, respondents without a business at the beginning of the study who later opened businesses during the three-year study interval were significantly more likely to have better baseline health than those respondents who never started a new business. Hence, good health among entrepreneurs seems to be an important prerequisite to small business entry.

Keywords

Entrepreneurship; Health; Business Entry; South Africa; Microenterprise; Small Business

1. Introduction

Since the birth of the new democratic South Africa in 1994, starting one's own business has been an important means by which the formerly disadvantaged population could participate and reap the benefits of the country's economic expansion. These small businesses purportedly make a substantial contribution to economic growth, both through the establishment of new enterprises, and through the growth of existing small businesses (South Africa Business Guidebook, 2005 and 2006; Burger, 2000; Liedholm and Mead, 1999). The South African government has implemented various programs in the last several

years to help facilitate the activities of small businesses, including improvements in regulation, availability of financing, and advancement of black economic empowerment.

Although the size of a business in South Africa is defined by the number of employees, assets, and annual turnover of the business (Parliament of the Republic of South Africa, 1995; Rogerson, 1997; Polity.org.za), one important feature that distinguishes a small business from a large firm is that the small business is usually run by one key person, the owner-entrepreneur, who bears almost all of the risks and who makes almost all of the decisions related to the business. Because the owner-entrepreneur also embodies most of the firm-specific knowledge capital, health of the owner-entrepreneur may be an important factor contributing to the production process.

2. Literature Review

Although there is existing research on the relationship between health of *employees* and small business performance (Connelly and Rosen, 2005; Fraser *et al.*, 2002), the literature is very sparse on how health of owner-entrepreneurs affects their businesses. Holtz-Eakin, Penrod, and Rosen (1996), using U.S. data from the Panel Study of Income Dynamics (PSID) and the Survey of Income and Program Participation (SIPP), found that the health status of wage earners who transitioned to self-employment was not statistically significantly different from the health status of those who remained as wage workers. This finding was corroborated in another study using data from the Medical Expenditure Panel Survey (MEPS), where Perry and Rosen (2004) found that health not only had no effect on transitions from wage-employment to self-employment, but health also had no effect on the decision to exit self-employment into wage-employment. Based on these studies, evidence from the U.S. seems to suggest that health is not a significant predictor of transitions between wage- and self-employment.

In a separate paper (Chao et. al., 2007), we provided some of the first evidence to show that the health of small business owners may be a relevant determinant of business survival in South Africa, by showing that poor health was related to subsequent business closure and that deterioration in health over time was related to the probability of business closure over time. Two differences between Chao et al. (2007) and Perry and Rosen (2004) could potentially account for the opposing findings, in addition to the fact that the two studies examined entirely different populations. First, Perry and Rosen (2004) examined the effect of health on transitions between *wage-* and self-employment. Because South Africa has a relatively high unemployment rate, with official estimates around 40 percent or higher (Statistics South Africa, 2005a), transitions out of self-employment are more likely to end in unemployment (rather than wage-employment), and transitions into self-employment are more likely to be preceded by unemployment (rather than by wage-employment) (Kingdon and Knight, 2004). In fact, a nationwide survey in South Africa found that over two-thirds of all the self-employed respondents indicated that the reason they transitioned into self-employment was because of unemployment (Statistics South Africa, 2005b). Also, ill health may have an effect on transitions from working to not working (something that is also observed in the U.S.; McClellan, 1998), but no effect on transitions between wage and self employment. The second major difference between the two sets of studies is the health measure used. While Perry and Rosen (2004) used health utilization and a dichotomized health status (e.g., good versus poor health) variable, Chao et al. (2007) used a health status instrument that consisted of twelve questions that measured the multi-dimensional nature of health, including general health as well as the functional consequences of ill health. The health status instrument, thus, may be a more robust measure of health, especially for studies on health and labor supply (Strauss and Thomas, 1997).

3. Analytic Model and Hypothesis

The core theoretical proposition in this paper is that the amount of productive work a person will expect to supply per time period is a function, among other things, of his/her stock of health capital (Grossman, 1972). A highly simplified version specifies the supply of work “time” as a function of health capital H , the expected wage per hour worked W , and other influences Z :

$$T = T(W, H, Z). \quad (3.1)$$

What is really being supplied is not just time spent at some task but also effort, thought, and energy (which are subsumed in the time variable, T). If the person supplying time is also the owner of the business, the wage rate W is not set by some employer, but rather it is the difference between the gross revenue PQ (or the price P per unit of output multiplied by Q units of output produced by the business) and all costs CX borne to supply the goods (representing payment C for other variable- and fixed-inputs X , including factors of production such as materials, use of capital, labor other than T , etc.). A simplified version of the income function is then:

$$W = Y/T, \text{ where } Y = PQ - CX. \quad (3.2)$$

Output in turn is produced according to the production function:

$$Q = Q(T, X). \quad (3.3)$$

Furthermore, the revenue that the owner of the business receives has to be more than what she could get if she were able to find wage employment, or in the South African context where wage work is scarce, the revenue has to cover her opportunity cost of time in pursuing other activities (such as childcare and other home productions). We additionally make the key assumption for this paper that owning and running a business imposes some constraints of its own. It requires that a minimum amount of time T^* be devoted to the business, or else the business cannot function. For instance, for a shopkeeper this is the minimum amount of time she must be at the shop.

In this simple version, the effect of poor health is clear. One implication of the model is that if the entrepreneur's health H falls below some level such that the time (including effort, thought, and energy) he could supply to the business falls below T^* , then the entrepreneur will no longer be able to run the business and will be more likely to exit the market. This is shown empirically in Chao et al. (2007), where we found that existing businesses with owners who experienced poor health were more likely to subsequently close than those who did not experience poor health.

Because planning for and running a new business also requires some minimum level of health (and time), a potential entrepreneur with rational expectations and a low level of health will also be less likely to start a new business than another otherwise identical potential entrepreneur who exhibits good health. The hypothesis that we test in this paper is that owner-entrepreneurs who are new entrants have higher health, on average, at a point in time prior to entry than people who do not enter. Therefore, we are testing that in addition to the effect of entrepreneur's health on firm exit, the relationship between health and firm entry may also be important in explaining the dynamics of the small business market.

4. Methods

4.1. Sample and data collection

This study was part of a larger project that surveyed business owners and non-owners in townships with mostly African populations around Durban, South Africa (Chao et al., 2007). A two stage stratified cluster sampling method was adopted for the study. After consultation with local demographers, the first stage selected six enumeration areas (EAs), stratified by high, middle, and low income. A stratified quota sampling procedure was then followed for the second stage, whereby each EA was systematically canvassed for businesses and non-businesses to reach a quota of interviews with 10 owners of multiperson businesses that had at least one paid employee, 10 owners of single-person businesses with no other employees, 10 owners whose businesses had closed, and 10 respondents who never owned a business. Due to difficulty in coordinating field teams, a few extra interviews were conducted before the teams realized the quota had already been met, so some EAs ended up with more than 40 interviews. Since most small businesses do not register with the government for tax and other reasons (thus are mostly not part of any existing listing of businesses), we adopted a survey strategy of interviewing people in all physical structures (a stand, house, garage, store, etc.) in the chosen EAs.

We gave a health questionnaire to all respondents and a business questionnaire to those running businesses. The same respondents surveyed during the first wave interview in 2002 were followed as a cohort and re-interviewed in 2003 and 2004. New respondents were not added to the sample during the three-year study. Among the cohort of 279 respondents followed since the 2002 initial interview, 36 had missing health and demographic information and thus were deleted from the data, resulting in a working sample of 243 respondents. We had health and business information for all respondents at the baseline interview in 2002, and for most of the respondents in 2003 and 2004. However, there was attrition of almost 20 percent per year in 2003 and in 2004.

To examine the relationship between health and transitions from non-ownership to business ownership, we compared respondents who recently opened businesses (*new entrants*) with those who did not (*non-entrants*). To serve as a valid comparison group to new entrants, we defined non-entrants as all those who *potentially could have entered but had not yet entered* for that year. We classified respondents for each year. All respondents that were not currently running a business and who had not closed a business in the last 12 months were classified as potential entrants. Of these potential entrants, all who had not opened a business recently (see definition below) were classified as non-entrants. We chose not to include owners who closed their businesses very recently as part of the potential entrant group because these prior owners were actively closing their businesses prior to our interview. This is a more conservative approach, which may miss some serial entrepreneurs with rapid re-entry, but will not over-count potential entrants.

The second group, new entrants, was defined slightly differently for the three years. For the 2003 and 2004 data, we defined new entrants as those that had a business when we surveyed them but who did not have a business the previous time they were surveyed (a year before). For the 2002 data, new entrants were defined as those who entered at most six months prior to our interview visit, making them very recent entrants; their businesses were younger than six months. Because we did not have respondents' health data prior to 2002, restricting the definition of new entrants in 2002 to those with very young businesses served to minimize the possibility that the business affected the owner's health rather than the other way around.

4.2. Measures

Respondents, whether owners of small businesses or not, were asked about their health, age, education, gender, and marital status. The survey elicited details about business activities for respondents who were currently running a small business or who used to run a small business that had closed before the first interview wave.

Health, a key explanatory variable, was measured with the SF12 health status instrument (Ware et al., 1996). Since health status is multidimensional, survey instruments like SF12 that combine multiple symptoms into a single scale have been developed to aid comparison between studies and to ease statistical testing. Unlike a commonly used single question that measures self-reported general health status that asks respondents to classify their own health as excellent, very good, good, fair, or poor (with the five categories frequently collapsed into two in the statistical analysis), survey instruments like SF12 have been found to be less likely to suffer from systematic measurement error (Dow et al., 1997; Strauss and Thomas, 1998), especially in studies related to health and labor participation. SF12 not only includes the single-question on self-reported general health status, but it also includes 11 other items that track the functional consequences of ill health. For example, one item asks: “Do you have any health problems now that limit you in carrying out strenuous activities? For example, walking uphill for several minutes or up several flights of stairs. If so, how much?” Respondents are given three answer choices: “Yes, limited a lot; Yes, limited a little; No, not limited at all.” Another question asks: “During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?” Answers to the 12 items are then weighted according to an algorithm, and separate scores for physical and for mental health can be constructed (Ware et al., 1995).

SF12 is also useful for tracking functional decline from HIV disease. Although we did not test our respondents for HIV, the disease may be a major cause of morbidity in our respondent population, given the 30% HIV prevalence found in townships around Durban (Shisana et al., 2005). SF12’s physical (but not mental) component summary score has been shown to be able to discriminate between HIV infected patients stratified by disease severity in the U.S. (Delate and Coons, 2000). SF36, from which SF12 is derived (Ware et al., 1996), has also been validated globally and in South Africa and has been found to be able to track functional declines in early HIV disease (O’Keefe et al., 1996). Therefore, for this study, we used SF12 as the measure of health, but focused only on physical health, as measured by SF12’s physical component summary score (PCS12) in the baseline year interview in 2002.

5. Results

Table 1 tabulates the number of new entrants and non-entrants for each of the three survey years. A total of 77 respondents potentially could have become new business entrants by June 2002, our first wave interview. They included 40 respondents who never had a business and 16 who previously owned businesses but that were closed for at least 12 months prior to our interview visit in 2002 (not shown separately in the table). Among the 77 respondents who potentially could have started businesses, 21 actually did start between January and June of 2002, and were thus counted as ‘new entrants’ for 2002. The rest of the respondents who could have entered in 2002 but did not enter by June 2002 were tabulated as ‘non entrants.’ Therefore, prior to our interview visit every year, there exist a pool of respondents who could have started new businesses by the time of our interview visit; those who started new businesses were counted as ‘new entrants’ for that survey year, and those who did not start were counted as ‘non entrants’ for that survey year. Although our sample had 243 respondents during the 2002 survey, most of them already owned businesses at the time of the interview due to our oversampling of businesses and, thus, were not part of the pool of potential entrants that ‘could have entered’ in 2002.

Table 1 also shows that a total of 34 new entries occurred during the three years of the survey, with 21 new entries in 2002, five in 2003, and eight in 2004. The entry rate in the first year (27% of all respondents who could become new business owners) reflects our sampling strategy because we oversampled business owners in 2002. However, the entry rates in the second (7%) and the third (9%) year reflect the probability of opening a business by respondents who did not have an existing business. The observations in different cells of the table are not necessarily distinct respondents. For instance, respondents that did not enter in 2002, 2003, or 2004 were counted as non-entrants for each year, so they appear in the row of non-entrants for all three years. Similarly, a respondent that entered in 2002 and exited in 2003 but re-entered in 2004 was counted as a new-entrant in 2002 and 2004, but not counted as a potential entrant for 2003 (because owners of newly closed businesses were not counted in the pool of potential entrants).

Table 2 shows the summary characteristics, for all three survey years combined, of the whole sample and for the entrant and non-entrant subsamples. (Each distinct respondent was counted only once in table 2, in contrast to table 1 where a respondent could potentially appear in three separate cells.) The mean PCS12 score (measured at the baseline interview in 2002) for the whole sample is slightly less than the mean found in the U.S., suggesting that township residents in South Africa were only slightly less healthy than the average U.S. population. (The physical component summary score of the SF12 instrument was constructed to give a mean of 50 and a standard deviation of 10 for the U.S. population.) New entrants, however, are statistically significantly healthier than non-entrants; they are also younger and less likely to be married ($p < .01$ for all three variables by two-sample t -tests, not shown in the table). Educational levels did not differ by entry status ($p > .50$ by Kruskal-Wallis test, not shown in the table).

We next ran a logistic regression to measure the effect of physical health on entry, while controlling for the respondent's age, gender, marital status, education level, area in which they lived (by including fixed effects for the three income strata in which the respondents lived), and year fixed effects. The area fixed effect dummy variables not only control for the three income strata, but they also control for any factors (that are not included in the regression model) that are fixed within the areas that might contribute to business entry, such as the presence of local infrastructure, microfinance organizations, etc. The year fixed effect dummy variables control for any factors (not included in the regression model) that affect all respondents but that might vary by year; an example of such a factor is our sampling strategy that oversamples new businesses in 2002; another example of such a factor is economy-wide economic changes over time.

Since the observation level is that of the person-year, some respondents may contribute up to three observations in the regression equation, so we used robust standard error estimates and allowed for clustering of observations.

The regression results in Table 3 indicate that baseline physical health has a positive and significant relationship with entry. Respondents with better health in 2002 were statistically significantly more likely to start a new business in 2002, 2003, or 2004 than those with lower levels of health. A respondent whose physical health score was one point higher than the mean would be 8.7 percent more likely to start a new business than a respondent whose physical health score was at the mean. The odds of someone opening a new business who has a PCS12 that is 10 points (or one standard deviation) above the mean would be 2.30 times the odds of an otherwise identical person with PCS12 at the mean. The odds of someone with PCS12 that is 10 points below the mean would be only 43% of the odds of someone with PCS12 at the mean. Age and gender were not significant, but being married

was associated with lower odds of entry. The significant year fixed effect dummy variables reflect our strategy of oversampling businesses in the first survey wave.

Because our data collection only started in 2002, we did not have information on the respondents' health prior to 2002. The health data used in the regression in Table 3 for 2002 entrants and non-entrants were measured after entry had already occurred. The positive association found between good health and business entry, thus, could have been due to reverse causality: it was not good health that led to business entry, but business entry (and perhaps its associated financial gains that allowed for better nutrition, for instance) that led to better health among new entrants. The short time interval between the new entry and health measurement makes this explanation less likely, because the new business may not yet have had an effect on respondent health.

Nevertheless, to control for the possibility of reverse causation driving the results in Table 3, we ran another regression to examine whether good health is associated with *subsequent* business entry. We used health data collected during the baseline interview in 2002 and compared the health between entrants and non-entrants, but we restricted entries and non-entries to those occurring in the years 2003 and 2004 only. In this situation, 2002 entries are not included and cannot be driving our results.

Table 4 shows that physical health in the baseline year in 2002 prior to entry was statistically significantly associated with subsequent new entry in the following two years. Respondents in the low income strata, which are mostly informal settlement areas in South Africa with squatter camps and informal housing, were also more likely to start their own business than those living in high income areas. This may reflect the much lower outside employment opportunities for people in the informal areas (making them more likely to enter as necessity entrepreneurs) as well as the greater distance between these areas and commercial establishments (making them more likely to enter as opportunity entrepreneurs).

6. Discussion

The study presented here provides the first evidence that poor health deters potential entrepreneurs from starting new businesses, in the context of townships in South Africa. This builds on the findings of a prior study in which we showed that poor health among owners is an important factor in the demise of businesses (Chao et al., 2007). This finding is, however, in contrast to previous studies using US data that showed that health had no effect on transitions between wage and self employment (Holtz-Eakin et al., 1996; Perry and Rosen, 2004). We conjecture that the disparity between our results and those of previously mentioned studies is related to the distinction between opportunity and necessity entrepreneurs. While transitions from wage to self employment in the U.S. may be driven by opportunity identification and exploitation, most individuals in the South African townships we surveyed do not have other opportunities for employment. Starting a business is a way to transition out of unemployment and, thus, is most likely based on necessity. Although our data set does not contain information on outside employment opportunities for potential entrants (and some of them could be wage workers), in practice it is not likely that we have many wage workers in our sample. Because our interviews were conducted during the day, we were unlikely to find wage workers that generally work far from the areas in which they live, but instead found people that were at home when the interviews took place. One might question why the unemployed do not all enter into the informal sector if the unemployment rate in South Africa is so high. One reason is that although an alternative to unemployment, entry into the informal sector is still not 'free' or without barriers in South Africa (Kingdon and Knight, 2001). Starting and running even a basic small business involves some skills and capital, and as our simple model suggests, may also require a minimum level of health.

Another finding from our study is that the choice of the health measure used and the time at which health is measured may be important considerations. In particular, we used the SF12 health measure which encompasses the functional consequences of ill health. In separate regressions not reported in the tables, we found the results to be more robust with SF12 as compared to the results from using just a dichotomized health measure. We also caution about using health that is measured contemporaneously to entry. Planning and preparing for entry require time and energy, and potentially good health, and these activities often occur prior to entry, sometimes long prior to entry.

There are some possible qualifications to our findings. First, our small sample size and lack of data on respondent health before our first survey year limited us from applying more rigorous econometric methodologies to examine the determinants of business entry. Second, we do not have a good measure of an individual's outside employment opportunities, although in townships, such opportunities are very limited. Third, although our area fixed effects control for factors that could affect both business entry and health at the area level (such as local infrastructure), there may also be uncontrolled for individual-specific factors such as crime and credit access. Further research is needed to better understand how health contributes to decisions about business entry.

7. Conclusion

Small businesses are the backbone of economic activity in South African townships. Many of these businesses are owned and operated by a single person and provide various necessary or useful products and services. Given that the South African government is interested in promoting the growth of the small business sector as an engine for economic growth, it is important to realize that these small businesses are often started and operated by a key individual, and that this individual's health may be important for both entry and survival of the business. Unlike bigger firms, where replacement workers are easier to find and where daily business operations are routine and mechanized, the planning, execution, and daily operation of small businesses are often the sole responsibility of the owner-entrepreneur. Poor owner health, including morbidity from HIV, not only would lead to business closure but could also deter potential entry. Policy makers that seek to promote the health of the small business sector should not be blind to the potential importance of policies that promote the health of current and potential small business owners.

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References

- Burger, D., editor. South Africa Yearbook 2000/2001. 7th ed Pretoria, South Africa: Government Communication and Information System; 2000.
- Chao LW, Pauly MV, Szrek H, Pereira N, Sousa B, Bundred F, Cross C, Gow J. Poor health kills small business: Illness and microenterprises in South Africa. *Health Affairs*. 2007; 26(2):474–482. [PubMed: 17339676]
- Connelly P, Rosen S. Will small and medium enterprises provide HIV/AIDS services to employees? An analysis of market demand. *South African Journal of Economics (Special Edition on HIV/AIDS)*. 2005; 73:613–625.
- Delate T, Coons TJ. The discriminative ability of the 12-item short form health survey (SF-12) in a sample of persons infected with HIV. *Clinical Therapeutics*. 2000; 22:1112–1120. [PubMed: 11048908]

- Dow, W.; Gertler, P.; Schoeni, RF.; Strauss, J.; Thomas, D. Health care prices, health and labor outcomes: Experimental evidence. 1997. RAND Labor and Population Program Working Paper Series 97-01
- Fraser FK, Grant WJ, Mwanza P, Naidoo V. The Impact of HIV/AIDS on Small and Medium Enterprises in South Africa. *The South African Journal of Economics*. 2002; 70(7):1216–1234.
- Grossman M. On the concept of health capital and the demand for health. *Journal of Political Economy*. 1972; 80(2):223–255.
- Holtz-Eakin D, Penrod JR, Rosen HS. Health insurance and the supply of entrepreneurs. *Journal of Public Economics*. 1996; 62:209–235.
- Kingdon GG, Knight J. Unemployment in South Africa: The nature of the beast. *World Development*. 2004; 32(3):391–408.
- Liedholm, C.; Mead, DC. *Small Enterprises and Economic Development: The Dynamics of Micro and Small Enterprises*. Routledge; London: 1999.
- McClellan MB, Wise DA. Health events, health insurance, and labor supply: Evidence from the Health and Retirement Survey. *Frontiers in the Economics of Aging*. 1998:301–350.
- O’Keefe EA, Wood R. The impact of human immunodeficiency virus (HIV) infection on quality of life in a multiracial South African population. *Quality of Life Research*. 1996; 5(2):275–280. [PubMed: 8998496]
- Perry CW, Rosen HS, Holtz-Eakin D, Rosen HS. The self-employed are less likely to have health insurance than wage earners. So what? *Public Policy and the Economics of Entrepreneurship*. 2004:23–57.
- Polity.org.za. Small Business Act of 1996. [5 January 2006]. 1996
<http://www.polity.org.za/html/govdocs/legislation/1996/act96-102.html?rebookmark=1>
- Rogerson, CM. SMMes and poverty in South Africa. Input Report for the National Project on Poverty and Inequality. 1997.
- Parliament of the Republic of South Africa. *National Strategy for the Development and Promotion of Small Business in South Africa*. Department of Trade and Industry; Cape Town: 1995.
- Shisana, O.; Rehle, T.; Simbayi, LC.; Parker, W.; Zuma, K.; Bhana, A.; Connolly, C.; Jooste, S.; Pillay, V., et al. *South African National HIV Prevalence, HIV Incidence, Behaviour and Communication Survey, 2005*. South African Human Sciences Research Council; 2005.
- South Africa Business Guidebook. 10th Edition. WriteStuff Publishing; 2005/2006. p. 216-218.
- Statistics South Africa. Labour force survey: September 2000 to March 2005 historical series of revised estimates. 2005a. Statistical release P0210
- Statistics South Africa. Survey of employers and the self-employed: September 2005. 2005b. Statistical release P0276
- Ware, JE.; Kosinski, M.; Keller, SD. *How to Score the SF-12 Physical and Mental Health Summary Scale*. 2d ed. Health Institute, New England Medical Center; Boston: 1995.
- Ware JE Jr, Kosinski M, Keller SD. A 12-item short-form health survey: construction of scales and preliminary tests of reliability and validity. *Medical Care*. 1996; 34(3):220–233. [PubMed: 8628042]

Table 1

Summary of Entries by Year

Respondent's Entrant Type	Year		
	2002	2003	2004
Respondents who are potential entrants:			
New entrant	21	5	8
Non entrant	56	68	80
Respondents who are not potential entrants:			
Owner of existing or newly closed business	166	127	96
Respondents lost to follow-up	0	43	59
Total number of respondents in each year	243	243	243

Table 2

Mean, percentage, and standard deviation of variables used in regressions

	Full Sample (N = 114)		New Entrants (N = 24)		Non-Entrants (N = 90)	
	Mean or %	SD	Mean or %	SD	Mean or %	SD
PCS12 score in baseline year (2002)	48.19	11.62	54.41	7.14	46.54	12.04
Age of respondent (in years)	45.09	15.24	35.42	9.50	47.67	15.48
Gender (female=1; male=0)	0.72	0.45	0.83	0.38	0.69	0.47
Marital status (married=1; not married=0)	0.47	0.50	0.17	0.38	0.56	0.50
Education dummy:						
No education or some primary	0.19	0.40	0.17	0.39	0.20	0.40
Finished primary or some secondary	0.44	0.50	0.50	0.51	0.42	0.50
Finished secondary or higher	0.37	0.48	0.33	0.48	0.38	0.49

Table 3

Logistic regression for probability of entry for entries in 2002, 2003, and 2004

Explanatory Variables	Odds Ratios	Robust SE	z	p > z	95% Conf. Interval
Physical health (PCS12)	1.087	0.037	2.45	0.014	1.017 1.162
Age of respondent (in years)	0.977	0.023	-0.99	0.323	0.933 1.023
Gender (female=1; male=0)	1.911	0.937	1.32	0.186	0.731 4.995
Marital status (married=1; unmarried=0)	0.307	0.160	-2.27	0.023	0.111 0.851
Education dummy (less than primary=0)					
Finished primary school or some secondary	1.883	0.977	1.22	0.222	0.681 5.206
Finished secondary or higher	1.095	0.904	0.11	0.913	0.217 5.524
Year fixed effect dummy (year 2002=0)					
Dummy variable for 2003	0.217	0.112	-2.95	0.003	0.078 0.599
Dummy variable for 2004	0.307	0.157	-2.31	0.021	1.112 0.837
Income strata dummy (high income strata=0)					
Middle income strata	1.080	0.623	0.13	0.894	0.349 3.345
Low income strata	2.071	1.286	1.17	0.241	0.613 6.994
Dependent variable (entrant=1; non-entrant=0)					
Number of observations	238				
Wald χ^2	40.07				
p > χ^2	<0.0001				
Pseudo R ²	0.260				
Log pseudo-likelihood	-72.203				

Table 4

Logistic regression for probability of entry for entries in 2003 and 2004 only

Explanatory Variables	Odds Ratios	Robust SE	z	p > z	95% Conf. Interval
Physical health (PCS12)	1.078	0.036	2.28	0.023	1.011 1.151
Age of respondent (in years)	0.992	0.032	-0.26	0.795	0.931 1.056
Gender (female=1; male=0)	2.578	1.994	1.22	0.221	0.566 11.741
Marital status (married=1; unmarried=0)	0.549	0.406	-0.81	0.417	0.129 2.337
Education dummy (less than primary=0)					
Finished primary school or some secondary	0.929	0.642	-0.11	0.915	0.240 3.601
Finished secondary or higher	1.110	1.174	0.10	0.921	0.140 8.817
Year fixed effect dummy (year 2003=0)					
Dummy variable for 2004	1.531	0.907	0.72	0.473	0.479 4.891
Income strata dummy (high income strata=0)					
Middle income strata	4.617	6.425	1.10	0.272	0.302 70.60
Low income strata	13.735	17.684	2.03	0.042	1.101 171.32
Dependent variable (entrant=1; non-entrant=0)					
Number of observations	161				
Wald χ^2	16.87				
p > χ^2	0.051				
Pseudo R ²	0.197				
Log pseudo-likelihood	-36.260				