



HAPPINESS AND HEALTH IN CHINA: THE PARADOX OF PROGRESS

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CONTENTS

Abstract	1
I. Introduction	2
II. The New “Science” and Metrics of Well-being.	3
III. Happiness in China	4
IV. Data and Methods	5
IV.1. Data.	5
IV.2. Methods	8
V. Results	9
V.1. Determinants of Mental Health.	10
V.2. Determinants of Life Satisfaction	14
VI. Concluding Remarks	18
Endnotes	19
Resources	19

LIST OF TABLES

Table 1: Variables and descriptions	6
Table 2: Sample distribution for physical and mental health (%)	8
Table 3: Mental health determinants: all sample, ordered Probit model	11
Table 4: Mental health determinants: rural sample, ordered Probit model	12
Table 5: Mental health determinants: urban sample, ordered Probit model	13
Table 6: Life satisfaction: all sample, OLS model	15
Table 7: Life satisfaction: rural and urban sample, OLS model	16
Table 8: Equivalent income growth effects (%)	18

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ABSTRACT

Well-being metrics often highlight discrepancies between income trends and well-being reports. In recent decades in China, life satisfaction declined dramatically at precisely the time of its unprecedented economic growth, and only began to recover circa 2003. Mental illness also increased: Hospital admissions, for example, increased by 183.21 percent from 2002 to 2012, reaching 1.2 million people in 2012. We posit that these trends can, in part, be explained by the rapid nature of China's transition and associated "progress paradoxes." We use data from a nationally representative survey to explore the determinants of life satisfaction and the specific role of health. We confirm the standard correlates of life satisfaction—such as age, income, gender, and health—but also find important differences. More educated respondents, those in urban areas, and those

with insufficient rest and leisure are less satisfied with their lives and more likely to report depression and anxiety. In contrast, respondents in rural areas, those with more stable jobs in the public sector, and those with less education are more satisfied and less likely to report poor mental health. The lack of security associated with China's rapid progress is a critical factor, as are long working hours and high workforce stress. A related and novel finding is that reports of mental health problems are the highest in the same age range that life satisfaction is the lowest, and then decrease as life satisfaction increases. The standard U curve in age and happiness is an inverse U in age and reported depression and anxiety. China's rapid economic progress has not been cost-free. Given the rapid gains in growth and poverty reduction, it is time to consider policies that focus on quality of life and mental illness among the working population and their families.

I. INTRODUCTION

The past two decades in China brought unprecedented rates of economic growth, development, and poverty reduction. Indeed, much of the reduction in the world's extreme poverty rates during that time can be explained by the millions of people in China who exited poverty. GDP per capita and household consumption increased fourfold between the years 1990 and 2005.¹ China jumped 10 places forward on the Human Development Index from 2008 until 2013, moving up to 93 of 187 countries, and life expectancy climbed to 75.3 years, compared to 67 years in 1980.²

Yet during the same period, life satisfaction levels in China demonstrated very different trends—in particular dropping precipitously in the initial stages of rapid growth and then recovering somewhat thereafter. The drops in life satisfaction were accompanied by increases in the suicide rate and in incidence of mental illness.³ China had one of the highest suicide rates in the world in 1990s: approximately 23.2 suicides per 100,000 people per year from 1995 to 1999 (with the rate gradually falling to 7.8 per 100,000 by 2012). Mental health disorders, on the other hand, increased as suicide rates fell (perhaps because more individuals sought treatment). The annual growth rate of inpatients admitted into mental health hospitals was 13.4 percent from 2007 to 2012 (reaching 1.2 million people). Outpatient visits increased at a similar rate—12.4 percent (reaching a magnitude of 27 million outpatient visits in 2011).⁴

Is this an anomaly? Is there something unique about China's life satisfaction and well-being more generally? Or is it China's growth trajectory? While income metrics provide us with one story of China's progress, well-being metrics—including measures of mental health—are telling us a very different story. What explains the discrepancy?

Surely each country has a unique trajectory, and China's economic boom occurred as centrally planned macroeconomic management was being replaced by free market principles and accompanying changes in social welfare and other institutions (although not political ones). Yet China's unhappy growth story also fits into a broader set of progress paradoxes related to rapid change and development in countries around the world. While change associated with economic progress usually brings increases in well-being levels over time, in the short term it is often associated with drops in life satisfaction and other dimensions of well-being. Changes in the pace and nature of economic growth tend to bring increases in insecurity (as rewards to different skill sets change) and in inequality (as there are winners and losers in the process).⁵

These latter trends were particularly stark in the case of China due to the dismantling of traditional safety nets as millions migrated from rural to urban areas in search of new opportunities. In addition, although not the focus of this paper, many other transition economies made concurrent transitions to political democracy, but China did not. In general, political freedom is positively associated with well-being in countries around the world.⁶ What clearly stands out in China's case, though, is the rapid nature of economic growth and poverty reduction on the one hand, and trends in life satisfaction going in the opposite direction (at least in the initial growth years) on the other (Easterlin et al., 2012; Li and Raine, 2014).

Indeed, one of the early findings—and paradoxes—in the well-being literature, which is particularly relevant to China, is that of “happy peasants and frustrated achievers.” Years ago we found that upwardly mobile respondents in growing developing economies reported lower levels of satisfaction with their lives than very poor respondents with no change in their income levels.⁷ Part

of the trend is explained by the raised expectations and access to new information that come with upward mobility. We found that our frustrated respondents were more concerned about income inequality than were their non-frustrated counterparts at equivalent income levels. Part of the explanation could be reverse causality, as more frustrated, unhappy respondents may be more likely to seek change and to better their situation. Our more recent work on the well-being of migrants is suggestive along these lines. We find potential migrants from Latin America (and in some transition economies) are wealthier and more educated than the average, but also less happy and more critical of their economic situations prior to migrating. They then tend to make modest gains in well-being once they actually migrate.⁸

In this paper we take advantage of a new national-level well-being survey for China that has detailed information about health (reports of chronic and acute health problems, as well as anxiety and depression), sufficiency in rest, frequency of leisure activities, education, income, marital status, formal household registration (*hukou*), and housing status in addition to life satisfaction to explore channels that might be driving China's progress paradox. Our work is distinct from previous studies of life satisfaction in China in its exploration of the relationships between mental health/life satisfaction and physical health (chronic disease) and also time use (sufficiency in rest or frequency of leisure activities). We build on detailed work by one of the authors—Graham—on life satisfaction trends around the world, progress paradoxes, the links between happiness and health, and the detailed knowledge of and work on China's economy and public institutions by the others—Zhou and Zhang.⁹

We find that the standard determinants of well-being are the same for China as they are for most countries around the world. At the same time, China stands out

in that unhappiness and reported mental health problems are highest among the cohorts who either have or are positioned to benefit from the transition and related growth—a clear progress paradox. These are urban residents, the more educated, those who work in the private sector, and those who report to have insufficient leisure time and rest. We hope that our findings contribute new insights to the extensive work that has already been done on life satisfaction in China, from the perspective of the linkages between well-being and mental health in particular.¹⁰

II. THE NEW “SCIENCE” AND METRICS OF WELL-BEING

There is a burgeoning literature on well-being, much of which finds consistent patterns in its determinants in countries and cultures around the world. Many of these patterns are predictable: Income matters to individual well-being, but after a certain point other things such as the incomes of others also start to matter. Health is essential to well-being (more so than income, although the two tend to be correlated), and stable partnerships, stable marriages, and social relationships also play a role. Women are typically happier than men, except in contexts where their rights are severely compromised. And because these patterns are so consistent across diverse countries and cultures, scholars in the field can control for these factors and explore the well-being effects of phenomena that vary more, such as inflation and unemployment rates; crime and corruption; smoking, drinking, and exercising; and the nature of public goods, among others. Not surprisingly, the approach is well-suited for exploring the relationship between well-being and economic change.¹¹

Well-being has two distinct and measurable dimensions, each of which captures different aspects of human lives.¹² The first is hedonic well-being, which captures

the manner in which individuals experience their daily lives, the quality of those lives, and their moods (both positive and negative) during those experiences. The second is evaluative well-being, which captures how people think about and assess their lives as a whole. The latter dimension implicitly includes eudemonic well-being—how much purpose or meaning people have in their lives—although there are also aspects of daily experiences that can be purposeful but not pleasurable (such as reading the same story over and over again to a child) and others that are pleasurable but not purposeful (such as watching television).

Hedonic well-being is typically measured with questions that gauge positive affect on the one hand (smiling yesterday or happy yesterday, for example) and negative affect (anger or stress yesterday) on the other. Psychologists emphasize that there is not a simple continuum running from the positive to negative dimensions, as people can experience both at the same time (such as happiness and stress).¹³ Evaluative well-being, meanwhile, is typically measured with questions that ask respondents about their satisfaction with their lives as a whole or compare their lives to the best possible life they can imagine. Given our data set, we focus on self-reported mental health and on evaluative well-being (in this instance, life satisfaction).

Evaluative well-being typically correlates more closely with individual income than hedonic well-being, not least as life course evaluations extend well beyond momentary experiences and encompass the opportunities and choices that people have in their lives. Graham and Nikolova, for example, find that individuals emphasize one well-being dimension over the other, depending on their agency and capabilities. Respondents with more means and agency (i.e., the capacity to make choices over the courses that their lives take) tend to emphasize evaluative well-being more, while those with limited

means and opportunities tend to emphasize daily experience more. They also find that income and agency are less important to the well-being of respondents who are at highest levels of the well-being distribution.¹⁴

All of these patterns are relevant to China—and to our findings there. As in the context of very rapid economic change, many individuals are not only making economic progress, but are having expectations raised at the same time, and may indeed be emphasizing the more complex evaluative dimension of well-being more, precisely because they are gaining more control over their lives and also receiving more information against which they can make comparisons. And, as noted above, the process of making progress and acquiring agency is not necessarily a happy one (and the causality can go in both directions), as demonstrated by the happy peasant and frustrated achiever paradox.

III. HAPPINESS IN CHINA

As noted above, past decades have brought the Chinese population major improvements in not only standards of living but also sweeping changes in social welfare and other social structures. It is clear that these changes were associated with major dips in life satisfaction, at least in the short term, and that there was some recovery thereafter. Yet, due to data limitations in prior periods among other factors, there is no consensus in the existing literature on how current levels of life satisfaction compare to those before the economic transition. For example, Liu et al. (2012) use the Chinese General Social Survey (CGSS) data to calculate trends in happiness levels from 2003 to 2010 and found a general improvement. However, Easterlin and co-authors, using a number of data sources, including the World Value Survey (WVS), the Gallup Poll, the Asia-barometer (AB), the China Horizon survey, and the Pew Global Attitudes surveys (Pew), did not find robust evidence of

an increase in life satisfaction that (theoretically) should have accompanied a fourfold improvement in the level of per capita consumption (Easterlin et al., 2012). In particular, they found that life satisfaction declined markedly in the lowest-income and least-educated segments of the population, while rising somewhat in the upper socioeconomic strata. Li and Raine (2013) conducted a similar exercise and concluded that, despite great success in increasing levels of material wealth, the trend in happiness was negatively related to (log) GDP per capita.

As noted above, life satisfaction trends in China reflect the profound changes of the time: rising aspirations, increasing income inequality, and the risk and uncertainty associated with rapid economic growth on the one hand and tremendous social transformations linked with rapid urbanization and evolving labor markets on the other. For example, Knight and Gunatilaka (2011) found that current income has a positive and significant effect on happiness for rural Chinese, but less so for urban residents and migrants. Their findings are very much driven by the incomes of the relevant reference groups; as such the same gains in income can have very different effects in terms of relative income and differential effects on happiness.

Relative income differences can also generate other adverse outcomes. Sun and Unger (2012) explored the association of self-perceived relative income inequality compared to individuals' own past to that of their peers with general health status, depression, stress, and cigarette smoking. The youth in the "lower" self-perceived groups (e.g., self and peers) reported the worst general health and the highest levels of depression and stress, while the youth in the "higher" groups reported the best general health (of course there is a direction of causality problems as less happy individuals are more likely to be concerned about income differentials and to have worse health; Graham, 2015b). In addition, Yu (2015)

found that, not surprisingly, those individuals whose personal conditions expose them more to the risks and uncertainty during the Chinese transition, such as self-employed workers, were more likely to suffer from psychological distress.

Given significant rural-urban divisions and massive rural-urban migration, several studies have examined disparities in happiness among rural residents, urban residents with urban *hukou*, and rural-urban migrants. Knight and Gunatilaka (2010, 2009) found that Chinese rural households reported higher subjective well-being than did their richer urban counterparts, and that migrant households in urban China have average happiness scores that are lower than rural households. There are a number of features of migrant conditions that make for unhappiness, such as high aspirations related to new reference groups and the experiences of discrimination and social inequity, which are, in turn, associated with mental health problems for urban migrants.

Health significantly affects subjective well-being; China is no exception. Poor health is a particularly important detrimental factor to subjective wellbeing in China. Mental health—a focus of this study—is an important part of this story. A micro experiment on female migrant workers' mental health in four cities, conducted by He, Fu, and Wong (2011), found that 24 percent of female migrant workers were classified as having poor mental health. The percentage in Shenzhen (35 percent), meanwhile, was far greater than in the three other cities in China. "Financial and employment-related difficulties," "cultural differences," gender-specific stressors, and "better future for self and children" significantly accounted for the mental health outcomes of female migrant workers. Yip et al. (2007), meanwhile, found that social capital, measured in various ways, is associated with self-reported health, and migrants often lose important networks of social capital when they move to the cities.

Historically, mental health has not been a priority in China. The largest psychiatric epidemiological study in China, conducted from 2001-2005, found that 92 percent of individuals with mental disorders had not sought any type of professional help, in part because of the shortage of specialized services, especially in rural areas, and the limited training of general physicians in mental health care.¹⁵ A National Mental Health Law finally came into effect in 2013, after 27-year-long drafting process.¹⁶

Research has also shed light on other transition-related factors. For example, working in the public sector is significantly negatively correlated with the odds of experiencing economic relative deprivation, which is surprising as there is likely less of a differential in wage rates across public sector workers.¹⁷ Appleton and Song (2008) also found that Communist Party membership and political participation have positive and significant associations with life satisfaction. Homeownership status—which has obviously changed with the transition—has a strong positive effect on individual housing satisfaction and overall happiness in urban China. Women seem to value owning a house more than do men, and the subjective benefits of home-ownership in large cities seems to be smaller than in small cities.¹⁸ In addition, individuals with more education have more extensive social networks and greater awareness of the world outside China; they also tend to have higher levels of happiness.¹⁹

IV. DATA AND METHODS

IV.1 Data

In this paper we take advantage of a new, large-scale, nationally representative survey of well-being in China, carried out in 2011-2012. The survey was primarily conducted via telephone by the China National Development Research Center. It covered 31 provinces and

targeted respondents aging from 18 to 75 years who had lived in their locales for more than two years, with a total number of 45,188 observations. The survey includes four categories of questions: residents' lives, public services, public safety, and living environment. As such, it yields detailed data on household income, socio-demographics, employment status, *hukou*, leisure time and rest, car and home ownership, rural-versus-urban location, regional location, and reports of various health conditions and mental health. For a detailed description of the variables, see Table 1. For the purposes of this study, we also benchmark our results against those from studies conducted by other scholars, as well as from our own analysis based on the Gallup World Poll data.²⁰

Table 2 shows the sample distribution for physical and mental health for our sample over different groups. Our analysis focuses on the distribution of rural-versus-urban respondents, education groups, and income quintiles, and how they relate to chronic diseases, minor ailments, and mental health.

Objective health conditions are significantly worse in rural areas. There is a significant gap in life expectancy, for example, across rural and urban areas. Although life expectancy has increased significantly since 1982 for both urban and rural residents, there is still a significant gap between them. While life expectancy of urban residents increased from 71.1 to 77.3 years from 1982 to 1999, life expectancy for rural residents increased from 67.1 to 72.3 years during the same time. In 2009, life expectancy of rural residents was still five years lower than that of urban ones. Deaths from cerebrovascular and coronary heart disease also were higher in rural areas than in urban areas in the same time period.²¹

Yet there is no obvious urban-rural difference in reports of having or frequently having physical health and mental health problems. The one exception is minor ailments, with rural respondents 4.3 percent more likely to

Table 1: Variables and descriptions

Variables	Question description
Chronic diseases	Do you have any chronic diseases, such as diabetes and heart disease? Options: 1 = none; 2= yes
Minor ailment	Do you get any minor ailments frequently, such as catching a cold? Options: 1= nearly none; 2= sometimes; 3= frequently
Mental health	Do you often feel tired, depressed, fractious, or nervous? Options: 1= nearly none; 2= sometimes; 3= frequently
Life satisfaction	Besides work and housework, can you have rest sufficiently? Options: 1= sufficient rest; 2= moderate rest; 3= lack of rest;
Sufficiency in rest	Do you have any chronic diseases, such as diabetes and heart disease? Options: 1 = none; 2= yes
Frequency of leisure activities	Do you often participate in any entertainments? Options: 1= frequently; 2= sometimes; 3= nearly none;
Urban	1 if the respondent lives in the urban area
Female	1 if female
Educational background	primary school or below, junior high, senior high, associate bachelor, bachelor, and post-graduate
Marital status	married, never married, divorced and widowed
Living alone	1 if the respondent lives alone
Having children at study	1 if the family has children at study, who are generally economically dependent
Need to support the elderly	1 if the family needs to support the elderly.
Household registration (<i>hukou</i>)	local and non-agricultural, local and agricultural, non-local and non-agricultural, and non-local and agricultural
Log(per capita income)	Logarithm of per capita income
Log(per capita income)_square	Square of logarithm of per capita income
Housing status	For urban individuals, housing status is categorized into homeownership, renting private housing, renting public housing and others; for rural individuals, is categorized into homeownership, renting private housing, and others
Ownership of motor vehicle	No motor vehicle and having motor vehicle, including family car or production-used vehicles

report having minor ailments than their urban counterparts. Poor rural residents (beyond China) tend to underreport health problems in general. They have lower expectations about what a good health status should be and have different norms of what is “good” health. Deaton (2008), for example, finds that respondents in Kenya are as satisfied with their health as those in the U.S., while Graham and Lora (2009) find that respondents in Guatemala are more satisfied with their health than those in Chile, even though objective standards are significantly worse in the case of Kenya and Guatemala than in their respective counterparts.²²

Physical health and mental health reports vary across education groups. The trends of the distributions of physical problems are descending: People with more education are less likely to report both serious diseases and minor ailments. In contrast, the trend in mental health reports displays a U-shape, with the highest percentages of reports being among the highest educated groups (see Table 2).

Overall, people with higher incomes report less physical and mental health problems in both rural and urban settings. However, there are larger gaps across income

Table 2: Sample distribution for physical and mental health (%)

Urban or rural	Chronic diseases		Minor ailment			Mental health		
	none	yes	nearly none	sometimes	frequently	nearly none	sometimes	frequently
Rural	84.6	15.4	27.6	55.8	16.6	40.4	41.2	18.4
Urban	85.9	14.1	27.6	60.1	12.3	34.7	46.6	18.7
Education group								
Primary or below	73.1	26.9	26.0	47.9	26.1	42.7	31.0	26.4
Junior high	83.8	16.2	27.8	57.2	15.1	40.1	42.4	17.5
Senior high	86.8	13.2	28.1	59.8	12.1	37.5	46.3	16.1
Associate bachelor	89.7	10.3	27.4	62.4	10.2	32.4	50.3	17.4
Bachelor	90.9	9.1	27.5	63.3	9.2	30.5	50.0	19.5
Postgraduate	92.2	7.8	30.6	60.1	9.4	23.5	53.8	22.7
Rural income group								
First quintile	91.5	8.5	30.8	59.0	10.2	41.6	45.3	13.0
Second quintile	87.7	12.3	26.6	59.3	14.2	38.5	45.0	16.5
Third quintile	85.5	14.5	26.4	58.1	15.4	40.5	42.6	17.0
Fourth quintile	82.4	17.6	26.1	54.3	19.5	39.2	39.6	21.1
Fifth quintile	76.2	23.8	27.2	49.2	23.6	41.5	34.3	24.3
Urban income group								
First quintile	89.5	10.5	30.3	60.9	8.8	34.4	48.1	17.6
Second quintile	87.6	12.4	27.4	62.9	9.7	34.4	48.9	16.7
Third quintile	86.3	13.7	27.1	61.3	11.6	34.5	48.0	17.5
Fourth quintile	85.0	15.0	27.2	58.7	14.1	34.6	45.8	19.6
Fifth quintile	81.0	19.0	25.8	56.2	18.0	35.8	41.6	22.6

groups for rural respondents than urban ones. And, in general, regardless of where they live, more people in China report mental health problems than they do physical problems. Rather interestingly, while the distribution of mental health reports is quite similar across the first three urban income quintiles, there are more urban respondents who report having frequent mental health problems in the top two quintiles.

IV.2 Methods

Our basic econometric model is based on the standard well-being equation:

$$W_i = \alpha + \beta x_i + \varepsilon_i \quad (1)$$

where W is the reported well-being of individual i , and X is a vector of demographic and socio-economic characteristics (which have stable patterns). Unobserved

traits are captured in the error term. The primary additional variables that we include in our regressions are: reported health status, education background, marital status, *hukou* status, home and car ownership, and rest and leisure time.

Our well-being variables are, respectively, reported anxiety/depression (a measure of mental health) and life satisfaction (a measure of evaluative well-being). Exact phrasing of the questions is in Table 1. While typically life satisfaction and depression are inversely correlated with each other, they are not direct analogues of each other and must be measured and analyzed separately. Measures of positive affect (experience) correlate quite closely (and positively) with evaluative measures such as life satisfaction, even though they are measuring different well-being dimensions. Yet measures of negative

affect, such as stress and anger, correlate much less predictably.²³

Answers to well-being questions are ordinal rather than cardinal in nature. Respondents place themselves on an ordinal scale that runs from 0 to either 7 or 10, but there is no cardinal value attached to the categories. Thus we cannot assume that 10 is twice the value of 5, for example. The theoretically appropriate specification is an ordered logit or ordered probit equation, which captures the probability of respondents being in one category or the other. Yet with increasing usage of well-being data and equations, scholars have found that the coefficients from OLS equations are virtually identical. Thus, if the same equations are run with both specifications and get virtually identical coefficients, it is possible to compare the relative weights of coefficients on well-being in the OLS equations.²⁴ That is precisely what we have done in this instance, and we report, respectively, the findings of the ordered probit specification, the marginal effects from those, and then the results of the OLS equations. Our discussion, below, is based on the OLS results.

V. RESULTS

V.1 Determinants of Mental Health

Our results confirm that China fits the usual patterns in terms of the basic determinants of life satisfaction around the world, which is unsurprising.²⁵ Yet the findings are interesting and novel in their own right, both in terms of shedding light on China's progress paradoxes and in terms of the relationship between well-being and mental health in a context of rapid change. First of all, we use mental health as the dependent variable and conduct the regressions with the full sample, and then the urban and rural samples separately. Mental health reports demonstrate China's progress paradoxes. The results are presented in Tables 3, 4, and 5, respectively.

We began by exploring how the control variables of education, marital status, age, and economic status correlate with mental health problems in Table 2, equation (1). In the same table we next included physical health: chronic diseases and minor ailment in equation (2), and then self-reported rest and leisure activities are added to equation (3).

In general, people living in urban areas have a higher probability of reporting mental health problems. This finding is robust to the addition of physical health status and time use. Women consistently report more mental health problems than men. This may be because women have more emotional swings than men, or it may be that men are less likely to report anxiety and depression due to a "strongman" norm. In our work on the Gallup World Poll, for example, we found that men are less likely to report depression but more likely to report anger (as do Helliwell et al., 2013).²⁶

People with higher education levels tend to report more mental health problems, and this result is consistent in all specifications. The estimated marginal effects of education-related variables in Table 4 show that rural individuals with higher educational background tend to report "frequently" more, and "nearly none" less. This phenomenon is more obvious and concentrated among those respondents with an education degree greater than high school in urban settings (Table 5).

The age profile of mental health shows an inverted U-shape—i.e., individuals' mental health tends to deteriorate up until the late 30s and then tends to improve after that. This mirrors Blanchflower and Oswald's 2011 findings on anti-depressant use by U.S. and British respondents and confirms that there is some biological regularity in the relation between age and life satisfaction/unhappiness.²⁷ The highest point in the age curve is 33 years when controlling for physical health and time use (Table 1). This climax in age is 36 years old for

rural individuals and 30 years old for urban individuals, indicating that the significant disparity in mental health between rural and urban individuals (Tables 4 and 5). In general, the patterns conform to an old Chinese proverb, which is that a man will have to be independent and face all the difficulties that life brings to him at the age of 30.

Having children at home and needing to support the elderly are positively correlated with mental health problems, and the findings are robust to the addition of physical health and time use. Part of this may be due to the one-child policy of the late 1970s. Most couples in our sample are from the one-child era, and each typically has the burden of taking care of up to four senior citizens at the same time. In addition, as the one-child policy has not been lifted completely, most families still have an only child; there may be some mental health pressures related to either taking care of or being the only child.

Lower income levels also correspond with worse mental health. However, the coefficients drop gradually and become insignificant after adding all the independent variables. This might be because earning more income might be the result of sacrificing more spare time, which is captured by the variable of time usage. In addition, the ownership of houses and cars is negatively related to mental health problems and may be a proxy for better quality of life for those lower-income respondents who attain such ownership.

We also focus on the effects of physical health and time use (Tables 3, 4, and 5), as physical health can significantly affect mental health. The coefficients on reporting a minor ailment on mental health are relatively robust, and their estimated coefficients change little when adding self-reported rest situation and leisure activities. Compared to those without chronic diseases

(the reference group) in Table 4 and 5, those with chronic diseases have a 19 percentage point higher probability of reporting serious mental health problems for rural individuals, and about 14 percentage points for urban individuals, which is not surprising. Likewise, compared to those without any minor ailments (the reference group), those who frequently have minor ailments have a 41 percentage point higher probability of reporting serious mental health problems for both urban and rural individuals, suggesting that frequent minor ailments more than chronic disease hurt mental health (or perhaps more depressed people are more likely to report and be concerned about minor ailments).

Lack of rest and insufficient leisure time are also associated with higher levels of anxiety and depression. While the causality could go in either direction (less-rested people may be more prone to depression, but depressed or anxious people are also more likely to report lower scores on a host of measures of well-being), this is yet another marker of the extent to which China's rapid growth, long working hours, and high pressure to succeed (particularly for the educated and their children), is also associated with stress and lower levels of well-being. Sufficient rest and more leisure activities are associated with better mental health. While adding variables of time use, the estimated coefficients of physical health only change a little between equations (2) and (3). This suggests that rest and leisure affect mental health directly rather than through affecting individuals' physical health. Specifically, lack of rest significantly increases the risk of frequently having a mental health problem by 16 percent for the rural sample and 30 percent for the urban one. Lack of rest seems to be more detrimental to mental health for urban individuals (which may be due to norms of working hours or the nature of work). In contrast, we do not observe much of a difference in the impact of leisure activities between rural and urban participants.

Table 3: Mental health determinants: all sample, ordered Probit model

Dependent variable: reported mental health	(1)		(2)		(3)	
	Coef	z	Coef	z	Coef	z
Chronic diseases (none for reference)			0.607***	0.607	0.600	29.67
Minor ailment (nearly none as reference)						
1 if sometimes			0.470***	34.97	0.463***	34.3
1 if frequently			1.334***	64.26	1.282***	62.41
Life satisfaction						
Self-reported rest situation (sufficient rest as reference)						
1 if moderate rest					0.341***	27.11
1 if lack of rest					0.810***	35.17
Leisure activities (frequently for reference)						
1 if sometimes					0.168***	8.28
1 if nearly none					0.253***	12.59
1 if urban	0.087***	3.81	0.090***	3.8	0.096***	4.06
1 if female	0.169***	14.04	0.088***	7.05	0.124***	9.89
Educational background (primary school or below as reference)						
1 if junior high	-0.073***	-3.47	-0.031	-1.49	0.011	0.52
1 if senior high	-0.045*	-1.83	0.009	0.35	0.059**	2.37
1 if associate bachelor	0.061**	2.21	0.108***	3.85	0.157***	5.63
1 if bachelor	0.136***	4.75	0.180***	5.99	0.211***	6.99
1 if postgraduate	0.294***	6.24	0.328***	7.26	0.339***	7.85
Marital status (married as reference)						
1 if never married	0.046**	2.21	0.034	1.61	0.038*	1.82
1 if divorced	0.216***	5.46	0.162***	4.06	0.171***	4.24
1 if widowed	0.156***	3.19	0.137***	2.6	0.161***	3.12
Age/10	0.170***	4.67	0.226***	6.17	0.171***	4.68
Age^2/100	-0.017***	-4.04	-0.033***	-8	-0.026***	-6.31
Living alone (not living alone as reference)	0.054	1.32	0.069*	1.71	0.051	1.3
Having children at study	0.030**	2.56	0.033***	2.64	0.030**	2.44
Need to support the elderly	0.178***	13.75	0.155***	12.4	0.121***	9.71
Log(per capita income)	-0.184***	-5.52	-0.078**	-2.32	-0.046	-1.3
Log(per capita income)_square	0.010***	4.15	0.004*	1.7	0.003	1.31
Housing status (homeownership as reference)						
1 if renting private housing	0.091***	5.29	0.090***	5.16	0.046**	2.49
1 if renting public housing	0.079***	2.9	0.056**	2.02	0.022	0.79
1 if other	0.171***	3.69	0.179***	4	0.149***	3.27
Ownership of motor vehicle (none as reference)	-0.052***	-3.81	-0.031**	-2.15	-0.005	-0.35
/Cut1	-0.580		0.258		0.813	
/Cut2	0.685		1.665		2.273	
Number of obs	45188		45188		45188	
Pseudo R2	0.019		0.098		0.125	

Robust z statistics in parentheses: * significant at 10%; ** significant at 5%; *** significant at 1%; employment status and regional dummies are controlled.

Table 4: Mental health determinants: rural sample, ordered probit model

Dependent variable: reported mental health	Coef	z	Marginal effects					
			nearly none		sometimes		frequently	
			dy/dx	z	dy/dx	z	dy/dx	z
Chronic diseases (none for reference)	0.689***	23.41	-0.233***	-27.90	0.036***	12.34	0.196***	20.23
Minor ailment (nearly none as reference)								
1 if sometimes	0.449***	19.51	-0.170***	-19.53	0.070***	16.72	0.100***	19.78
1 if frequently	1.291***	39.20	-0.377***	-57.45	-0.030***	-4.27	0.407***	34.52
Self-reported rest situation (sufficient rest as reference)								
1 if moderate rest	0.277***	13.00	-0.104***	-13.10	0.040***	12.19	0.064***	13.03
1 if lack of rest	0.590***	17.45	-0.203***	-19.61	0.038***	16.04	0.164***	14.71
Leisure activities								
1 if sometimes	0.235***	5.14	-0.087***	-5.28	0.030***	6.13	0.057***	4.88
1 if nearly none	0.270***	5.67	-0.104***	-5.64	0.045***	5.15	0.059***	6.03
1 if female	0.135***	6.85	-0.051***	-6.85	0.020***	6.59	0.031***	6.95
Educational background (primary school or below as reference)								
1 if junior high	0.013	0.47	-0.005	-0.47	0.002	0.47	0.003	0.47
1 if senior high	0.065**	2.15	-0.024**	-2.16	0.009**	2.25	0.015**	2.11
1 if associate bachelor	0.136***	2.99	-0.050***	-3.06	0.017***	3.64	0.033***	2.82
1 if bachelor	0.137**	2.37	-0.051**	-2.44	0.017***	2.95	0.034**	2.23
1 if postgraduate	0.261	1.22	-0.094	-1.30	0.026***	2.64	0.068	1.09
Marital status (married as reference)								
1 if never married	0.078**	2.21	-0.029**	-2.23	0.002**	0.47	0.003**	0.47
1 if divorced	0.087	1.22	-0.032	-1.24	0.012	1.38	0.021	1.17
1 if widowed	0.251***	2.74	-0.091***	-2.91	0.026***	5.23	0.065**	2.46
Log(per capita income)	-0.043	-0.74	0.016	0.74	-0.006	-0.74	-0.010	-0.74
Log(per capita income)_square	0.002	0.51	-0.001	-0.51	0.000	0.51	0.001	0.51
Age/10	0.146**	2.42	-0.056**	-2.42	0.022**	2.40	0.034**	2.43
Age^2/100	-0.022***	-3.21	0.008***	3.22	-0.003***	-3.18	-0.005***	-3.23
Living alone (not living alone as reference)	-0.037	-0.43	0.014	0.43	-0.006	-0.42	-0.008	-0.44
Having children at study	0.021	1.02	-0.008	-1.02	0.003	1.01	0.005	1.02
Need to support the elderly	0.118***	5.48	-0.045***	-5.48	0.018***	5.39	0.027**	5.51
Hukou status (local and non-agricultural as reference)								
1 if local and agricultural	0.016	0.56	-0.006	-0.56	0.002	0.55	0.004	0.56
1 if non-local and non-agricultural	0.170**	2.20	-0.062**	-2.28	0.020***	2.98	0.042**	2.05
1 if non-local and agricultural	0.106**	2.14	-0.040**	-2.18	0.014**	2.47	0.026**	2.04
Housing status (homeownership as reference)								
1 if renting private housing	0.053	1.50	-0.020	-1.52	0.007	1.59	0.012	1.47
1 if other	0.092	1.34	-0.034	-1.36	0.012	1.54	0.022	1.28
Ownership of motor vehicle (none as reference)	0.005	0.19	-0.002	-0.19	0.001	0.19	0.001	0.19
/Cut1	0.891							
/Cut2	2.259							
Number of obs	15962							
Pseudo R2	0.1271							

Robust z statistics in parentheses: * significant at 10%; ** significant at 5%; *** significant at 1%; employment status and regional dummies are controlled.

Table 5: Mental health determinants: urban sample, ordered probit model

Dependent variable: reported mental health	Coef	z	Marginal effects					
			nearly none		sometimes		frequently	
			dy/dx	z	dy/dx	z	dy/dx	z
Chronic diseases (none for reference)	0.542***	22.12	-0.171***	-25.67	0.021***	9.83	0.151***	18.98
Minor ailment (nearly none as reference)								
1 if sometimes	0.469***	29.09	-0.169***	-28.51	0.066***	22.81	0.104***	28.62
1 if frequently	1.266***	44.09	-0.318***	-65.49	-0.094***	-12.77	0.412***	37.86
Self-reported rest situation (sufficient rest as reference)								
1 if moderate rest	0.383***	25.46	-0.135***	-25.69	0.045***	21.43	0.090***	24.77
1 if lack of rest	0.962***	35.73	-0.265***	-51.55	-0.035***	-6.03	0.300***	29.62
Leisure activities								
1 if sometimes	0.145***	6.54	-0.051***	-6.56	0.017***	6.49	0.034***	6.55
1 if nearly none	0.248***	11.74	-0.087***	-11.94	0.029***	11.85	0.059***	11.59
1 if female								
Educational background (primary school or below as reference)	0.122***	8.21	-0.043***	-8.21	0.015***	7.97	0.028***	8.19
1 if junior high	0.026	0.72	-0.009	-0.72	0.003	0.74	0.006	0.72
1 if senior high	0.066	1.63	-0.023	-1.64	0.008*	1.71	0.016	1.61
1 if associate bachelor	0.171***	4.07	-0.059***	-4.17	0.018***	4.94	0.042	3.90
1 if bachelor	0.226***	4.95	-0.078***	-5.13	0.022***	6.86	0.056	4.65
1 if postgraduate	0.349***	6.40	-0.113***	-7.17	0.018***	10.85	0.095	5.65
Marital status (married as reference)								
1 if never married	0.022	0.82	-0.008	-0.82	0.003	0.84	0.005	0.81
1 if divorced	0.204***	4.44	-0.069***	-4.70	0.017***	8.11	0.052***	4.10
1 if widowed	0.107*	1.79	-0.037*	-1.84	0.011***	2.27	0.026*	1.70
Log(per capita income)	0.018	0.31	-0.007	-0.31	0.002	0.31	0.004	0.31
Log(per capita income)_square	-0.001	-0.22	0.000	0.22	0.000	-0.22	0.000	-0.22
Age/10	0.201***	4.65	-0.072***	-4.65	0.025***	4.56	0.047***	4.67
Age^2/100	-0.031***	-6.17	0.011***	6.17	-0.004***	-5.99	-0.007***	-6.21
Living alone (not living alone as reference)	0.076	1.48	-0.026	-1.51	0.008	1.73	0.018	1.43
Having children at study	0.038***	2.64	-0.014***	-2.64	0.005***	2.60	0.009***	2.66
Need to support the elderly	0.123***	8.11	-0.044***	0.015	0.015***	7.80	0.028***	8.15
Hukou status (local and non-agricultural as reference)								
1 if local and agricultural	-0.010	-0.48	0.004	0.48	-0.001	-0.47	-0.002	-0.48
1 if non-local and non-agricultural	0.008	0.37	-0.003	-0.37	0.001	0.37	0.002	0.36
1 if non-local and agricultural	0.031	0.95	-0.011	-0.96	0.004	0.99	0.007	0.94
Housing status (homeownership as reference)								
1 if renting private housing	0.024	1.08	-0.009	-1.08	0.003	1.11	0.006	1.07
1 if renting public housing	0.008	0.27	-0.003	-0.27	0.001	0.27	0.002	0.27
1 if other	0.183***	3.04	-0.062***	-3.20	0.016***	5.50	0.046***	2.80
Ownership of motor vehicle (none as reference)	-0.014	-0.75	0.005	0.75	-0.002	-0.74	-0.003	-0.75
/Cut1	1.015							
/Cut2	2.532							
Number of obs	29226							
Pseudo R2	0.1255							

Robust z statistics in parentheses: * significant at 10%; ** significant at 5%; *** significant at 1%; employment status and regional dummies are controlled.

V.2 Determinants of Life Satisfaction

Tables 6 and 7 present the life satisfaction results. As noted above, we focus on the OLS results. The life satisfaction variable, which runs from 1 to 5, is thus regarded as a cardinal variable. The empirical results based on the full sample are in Table 6. Equation (2) adds the mental health variable based on equation (1), and equation (3) includes all the covariates except for life improvement. Table 7 shows the results when the sample is divided into rural and urban respondents.

Our empirical results are in accordance with the general results of other happiness studies. For example, those who are male, divorced, living alone, and need to support the elderly tend to have lower life satisfaction levels. Age also demonstrates the classic U-shape pattern. Material well-being, including income, homeownership, and owning a family car, are all positively associated with life satisfaction, and the effects of income diminish as income levels increase.

We also have some findings that reflect the context of China's rapid development. For example, despite that the fact rural areas have many disadvantages compared with urban ones, the life satisfaction of rural individuals is higher than urban ones in all of our specifications. One explanation could be that rural individuals generally have lower life aspirations than their urban counterparts. Another finding, which reflects China's progress paradoxes, is education. As shown in Tables 6 and 7, individuals with higher levels of education (above high school) tend to report lower life satisfaction than their counterparts with high school or below, which likely reflects higher life aspiration for those with more education.

Health and time use are also related to life satisfaction. Table 6 shows that both physical and mental health conditions (self-reported) are associated with lower levels

of life satisfaction, and those with acute conditions report the lowest life satisfaction (not surprisingly). The effects of physical health on life satisfaction are significantly mitigated after the inclusion of mental health in the independent variables, which is largely due to the correlation between mental health and physical health.

Rest and leisure activities are also important to life satisfaction, and there is no significant difference between rural and urban samples, as shown in Table 7. Furthermore, comparing equations (2) and (3), we find that the estimated coefficients of physical health change little after controlling for individuals' rest status and leisure activities, but those of mental health decrease moderately. This implies that the time use is more correlated with mental health than with physical health. Additionally, the effect of mental health on life satisfaction only decreases moderately here, indicating that rest and leisure affect life satisfaction directly, above and beyond their negative effects on mental health.

We compare the quantitative importance of physical health, mental health, and time use in equivalent income terms. Income is positively related to life satisfaction, but with a diminishing effect at higher levels, as shown by the negative coefficient on the square term (Table 6). Given the disparity of these factors between rural and urban individuals, we conduct the regressions separately for the two samples (Table 7).

Table 7 shows that a 10 percent increase in income causes a 0.0083 percent increase on the 5 point life satisfaction scale for urban individuals and a 0.009 percent increase for rural individuals. Therefore, a 10 percent increase in income only corresponds to about 0.02 percent of the gap between the lowest and highest life satisfaction (which is 1 for the lowest ladder and 5 for the highest ladder), implying that the effect of income increases on life satisfaction are limited.

Table 6: Life satisfaction: all sample, OLS model

Dependent variable: life satisfaction	(1)		(2)		(3)	
	Coef	z	Coef	z	Coef	z
independent variables						
Chronic diseases (none for reference)	-0.145***	-9.51	-0.049***	-3.24	-0.050***	-3.37
Minor ailment (nearly none as reference)						
1 if sometimes	-0.104***	-12.07	0.066***	-4.64	-0.042***	-5.09
1 if frequently	-0.347***	-19.49	-0.133***	-7.62	-0.121***	-7.23
Mental health (nearly none for reference)						
1 if sometimes			-0.224***	-23.74	-0.193***	-19.87
1 if frequently			-0.565***	-39.34	-0.469***	-32.11
Rest situation (sufficient rest as reference)						
1 if moderate rest					-0.137***	-14.78
1 if lack of rest					-0.316***	-19.00
Leisure activities (frequently for reference)						
1 if sometimes					-0.099***	-6.94
1 if nearly none					-0.232***	-15.04
1 if urban	-0.127***	-5.61	-0.113***	-5.12	-0.125***	-5.73
1 if female	0.133***	14.80	0.144***	16.24	0.130***	14.23
Educational background (primary school or below as reference)						
1 if junior high	-0.086***	-4.52	-0.094***	-5.11	-0.114***	-6.34
1 if senior high	-0.148***	-6.93	-0.151***	-7.46	-0.184***	-9.17
1 if associate bachelor	-0.168***	-7.70	-0.155***	-7.47	-0.199***	-9.60
1 if bachelor	-0.155***	-6.70	-0.130***	-5.85	-0.171***	-7.70
1 if postgraduate	-0.197***	-4.26	-0.150***	-3.35	-0.185***	-4.37
Marital status (married as reference)						
1 if never married	-0.062***	-4.21	-0.057***	-3.95	-0.065***	-4.57
1 if divorced	-0.232***	-7.02	-0.205***	-6.10	-0.211***	-6.20
1 if widowed	-0.070**	-1.99	-0.049	-1.41	-0.059*	-1.74
Age/10	-0.301***	-11.42	-0.266***	-10.21	-0.242***	-9.50
Age^2/100	0.044***	15.25	0.039***	13.75	0.036***	13.01
Log(per capita income)	0.161***	6.48	0.144***	5.83	0.132***	5.32
Log(per capita income)_square	-0.005***	-2.63	-0.004**	-2.11	-0.004**	-2.16
Living alone (not living alone as reference)	-0.125***	-3.98	-0.111***	-3.45	-0.100***	-3.09
Having children at study	0.005	0.52	0.011	1.12	0.011	1.14
Need to support the elderly	-0.088***	-9.42	-0.064***	-7.06	-0.051***	-5.67
Housing status (homeownership as reference)						
1 if renting private housing	-0.200***	-14.38	-0.184***	-13.65	-0.159***	-11.87
1 if renting public housing	-0.186***	-8.67	-0.177***	-8.41	-0.157***	-7.84
1 if other	-0.211***	-5.36	-0.181***	-4.76	-0.163***	-4.28
Ownership of motor vehicle (none as reference)	0.175***	16.81	0.170***	16.13	0.150***	14.51
_cons	3.285***	30.30	3.404***	32.05	3.713***	33.99
Number of obs	45188		45188		45188	
Pseudo R2	0.101		0.1396		0.16	

Robust z statistics in parentheses: * significant at 10%; ** significant at 5%; *** significant at 1%; employment status and regional dummies are controlled.

Table 7: Life satisfaction: rural and urban sample, OLS model

Dependent variable: life satisfaction	(1) Urban		(2) Rural	
	Coef	z	Coef	z
Chronic diseases (none for reference)	-0.044***	-2.67	-0.053**	-2.13
Minor ailment (nearly none as reference)				
1 if sometimes	-0.038***	-3.93	-0.043**	-2.50
1 if frequently	-0.117***	-6.40	-0.141***	-4.71
Mental health (nearly none for reference)				
1 if sometimes	-0.194***	-16.87	-0.196***	-12.74
1 if frequently	-0.508***	-29.77	-0.401***	-16.17
Self-reported rest situation (sufficient rest as reference)				
1 if moderate rest	-0.136***	-13.80	-0.144***	-8.24
1 if lack of rest	-0.325***	-17.01	-0.314***	-12.11
Leisure activities (1=frequently; 2=sometimes; 3=nearly none)				
1 if sometimes	-0.100***	-6.23	-0.103***	-3.17
1 if nearly none	-0.242***	-14.72	-0.215***	-7.05
1 if female	0.143***	13.46	0.108***	7.06
Educational background (primary school or below as reference)				
1 if junior high	-0.118***	-4.38	-0.075***	-3.17
1 if senior high	-0.191***	-7.26	-0.133***	-4.86
1 if associate bachelor	-0.196***	-7.00	-0.175***	-5.17
1 if bachelor	-0.170***	-5.87	-0.168***	-3.68
1 if postgraduate	-0.184***	-4.09	-0.403**	-2.38
Marital status (married as reference)				
1 if never married	-0.085***	-4.76	-0.056**	-1.98
1 if divorced	-0.234***	-6.21	-0.103	-1.62
1 if widowed	-0.061	-1.45	-0.048	-0.80
Age/10	-0.241***	-7.21	-0.211***	-5.14
Age ² /100	0.032***	8.75	0.037***	8.18
Log(per capita income)	0.083***	13.59	0.090***	10.88
Living alone (not living alone as reference)	-0.098***	-2.88	-0.103	-1.37
Having children at study	0.028***	2.61	-0.013	-0.76
Need to support the elderly	-0.032***	-3.15	-0.069***	-4.15
Hukou status (local and non-agricultural as reference)				
1 if local and agricultural	0.031	1.75	0.062***	2.75
1 if non-local and non-agricultural	-0.024	-1.26	0.048	0.87
1 if non-local and agricultural	0.089***	4.15	0.076**	2.09
Housing status (homeownership as reference)				
1 if renting private housing	-0.167***	-11.41	-0.174***	-6.12
1 if renting public housing	-0.160***	-7.62		
1 if other	-0.180***	-4.16	-0.132**	-2.07
Ownership of motor vehicle (none as reference)	0.152***	12.01	0.138***	7.87
_cons	3.809***	38.95	3.381***	31.31
Number of obs	29226		15962	
Pseudo R2	0.183		0.136	

Robust z statistics in parentheses: * significant at 10%; ** significant at 5%; *** significant at 1%; employment status and regional dummies are controlled.

We then evaluate the effects of physical health, mental health, and time use on life satisfaction by comparing the equivalent change in income, which (theoretically) generates the same level of increase in life satisfaction. The estimation process as follows. Equation (2) shows the change in life satisfaction score caused by the changes in the logarithm of income; and equation (3) is the difference of life satisfaction score between a certain status for health or time use and its reference status. Therefore, we can estimate the effect of a certain status for health or time use by comparing its equivalent income growth effect as shown in Equation (4).

$$\Delta(\text{life satisfaction score}) = \lambda * \Delta(\text{income}) / \text{income} \quad (2)$$

$$\Delta(\text{life satisfaction score}) = Y * \text{Status} \quad (3)$$

$$\Delta(\text{income}) / \text{income} = -Y / \lambda * \text{Status} \quad (4)$$

For example, chronic diseases cause a reduction of 0.044 on life satisfaction for urban individuals, and this reduction can be compensated by income growth of 53 percent ($0.044 / 0.083 * 100$ percent). We summarize the estimated equivalent income estimations in Table 8. We can observe that the effects of physical health, mental health, and time use on life satisfaction are substantial relative to those of income. It is important to note that these estimations are intended to gauge of orders of magnitude of the effects rather than to provide exact outcomes in terms of amounts of income.

Using the same equivalent income terms, we find that frequently reporting a minor ailment (compared with the reference status of nearly none) has a negative coefficient of 0.117, which, in income equivalence terms, would require a 141 percent increase in income for urban individuals and 157 percent for rural individuals.

The equivalent income effects are even larger for mental health. Compared to having no mental health problems, frequently suffering from mental disorders has a negative coefficient in the regression equation on life satisfaction of 0.508 for urban respondents and 0.401 for rural ones. If we translate this in terms of the compensating income increase necessary to account for this differential in life satisfaction, it would be a 612 percent increase for urban individuals and a 483 percent increase for their rural counterparts (Table 8). Thus, mental health is quantitatively more important to life satisfaction than physical health in China, which accords with what Graham, Lora, and Higuera (2011) find in Latin America. Given that there at least 18 percent of respondents report having serious mental health issues, and the proportion of reporting “nearly none” is 35 percent urban areas and 40 percent in the rural areas (Table 2), mental health has clearly become one of the dominant causes of unhappiness in China.

The same method demonstrates that the quantitative effects of time use on life satisfaction are also large compared to those of physical health (Table 8). Compared with the status of “sufficient rest,” for example, the equivalent income effect of “lack of rest” is 391 percent for urban individuals and 349 percent for rural individuals. For leisure activities, compared with the status of “frequent leisure activities,” the equivalent income effect of the status of “nearly none” is 292 percent for urban individuals and 239 percent for rural individuals. In this sense, time use makes a substantial and independent contribution to individuals’ overall life satisfaction, and it also significantly affects mental health.

Table 8: Equivalent income growth effects (%)

Items	Urban	Rural
Chronic diseases (none for reference)	-0.044	-2.67
Minor ailment (nearly none as reference)		
1 if sometimes	45.8	47.8
1 if frequently	141.0	156.7
Mental health (nearly none for reference)		
1 if sometimes	233.7	217.8
1 if frequently	612.0	445.6
Self-reported rest situation (sufficient rest as reference)		
1 if moderate rest	163.9	160.0
1 if lack of rest	391.6	348.9
Leisure activities (1=frequently; 2=sometimes; 3=nearly none)		
1 if sometimes	120.5	114
1 if nearly none	114	238.9

Finally, the differences across rural and urban respondents are notable. Urban individuals are more likely to be affected by mental health and time use, and rural individuals are more affected by physical health.

VI. CONCLUDING REMARKS

In this paper we took advantage of a detailed, nationally representative survey to further explore the determinants of mental health and life satisfaction in China on the one hand, and then the relationship between these two variables and respondents' health status and time use on the other.

We find that physical health directly and significantly affects mental health, with people reporting suffering from minor ailments having more severe mental health problems in both rural and urban areas. When it comes to life satisfaction, mental health has a more obvious impact than physical health. Under both circumstances, the variables of time use are statistically and quantitatively significant.

The patterns that we find in mental health reports reflect progress paradoxes. Urban and more educated respondents were more likely to report depression and anxiety than were those living in rural areas and less educated. Another related and novel finding in our paper is that reports of mental health problems in China are the highest at the same age range that life satisfaction is the lowest, and then decrease as life satisfaction increases. The standard U curve in age and happiness is an inverse U in age and depression and anxiety.

We find that the usual standard patterns in the correlates of life satisfaction—such as age, income, gender, and health—hold for the most part, which is not surprising. However, we also find some differences which, we believe, reflect the very rapid nature of China's transition and growth patterns, and associated "progress paradoxes." More educated respondents, those in urban areas, and those with insufficient rest and leisure, for example, are much less satisfied with their lives than the average. In contrast, respondents in rural areas, workers in more stable jobs in the public sector, and respondents with less education are more satisfied than the average. The lack of security that seems to be associated with China's rapid progress is an important factor in life satisfaction, as are a number of quality of life issues associated with long working hours and high workforce stress.

China's rapid economic progress has not been free of costs in terms of life satisfaction and mental health. Historically, mental health services have been a low priority in China. Our results suggest that China should regard mental health as a distinct health domain and seriously prioritize mental health policy and mental health systems in the future. In particular, in addition to economic growth, an increased supply of mental health professionals could be critical to helping people overcome challenges and hardships, and live better, happier lives.

ENDNOTES

1. Easterlin et al. 2012.
2. Data source: United Nations Development Program, Human Development Reports <http://hdr.undp.org/en/data>;
3. Helliwell and Huang, 2008; Layard, 2005.
4. Suicide data is from the Lancet and WHO, cited in Qian, 2012.
5. Graham and Pettinato, 2002a; Graham and Lora, 2009; Graham, 2009.
6. See Helliwell et al in the World Happiness Report, 2012 and Graham, 2009.
7. Graham and Pettinato, 2002.
8. Graham and Markowitz, 2011; Nikolova and Graham, 2015.
9. See Graham, 2008a, 2009, and Graham, Higuera, and Lora, 2011.
10. Easterlin et al. 2012; Knight and Gunitalaka, 2015; Clark and Senik, 2015; and above-cited references on health
11. See, among others, Frey and Stutzer, 2002; Blanchflower and Oswald, 2004; Graham (2009); and Graham (2008b).
12. For a detailed discussion among many scholars in the field and their report for the National Academy of Sciences on Well-Being Metrics and their dimensions, see Stone and Mackie, 2013.
13. Stone and Mackie, 2013.
14. Graham and Nikolova, 2015.
15. Phillips, Michael R., 2013.
16. Xiang, Yu-Tao, Yu, Xin, Sartorius, Norman, Ungvari, Gabor S., Chiu, Helen F. K., 2012.
17. Hu, 2012.
18. Hu, 2011.
19. Chen, 2011.
20. Easterlin, 2012; Knight and Gunitalaka, 2015; Clark and Senik (2015); Graham and Nikolova, 2014.
21. He, Gu, Chen, Wu, Kelly, Huang, Chen, Chen, Bazzano, Reynolds, Whelton, Klag, 2009.
22. Deaton, 2008; Graham and Lora (2009); Graham, 2008a.
23. Stone and Mackie, 2013.
24. Ferrer-i-Carbonell and Frijters, 2004.
25. For a summary, see Graham, 2009.
26. Graham and Nikolova, 2015; Helliwell et al., 2013.
27. Blanchflower and Oswald, 2011; Blanchflower and Oswald, 2004; Weiss et al., 2012; Rauch , 2013.

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