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Longer, more optimistic, lives: Historic optimism and life expectancy in the United States

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Abstract

How was optimism related to mortality before the rise in "deaths of despair" that began in the late 1990s? We show that as early as 1968 more optimistic people lived longer (using the Panel Study of Income Dynamics). The relationship depends on many factors including gender, race, health, and education. We then evaluate these and other variables as determinants of individual optimism over the period 1968-1975. We find women and African Americans were less optimistic at the time than men and whites (although this has changed in recent years). Greater education is associated with greater optimism and so is having wealthy parents. We then predict optimism for the same individuals in subsequent years, thus generating our best guess as to how optimism changed for various demographic groups from 1976-1995. We find people with less than a high school degree show the greatest declines in optimism, which along with their long-run links to premature mortality and deaths of despair, highlights the importance of better understanding optimism's causes and consequences.

1. Introduction

A little understood question is the extent to which optimism and aspirations actually matter to future outcomes. It seems intuitive that hope and optimism for the future provide incentives for individuals to invest in those futures. Yet it is also plausible that optimists could mis-predict, and therefore fail to invest in insurance against negative shocks, and then suffer worse future outcomes.

There are several studies in the literature on the economics of well-being that support the first hypothesis. In some very early work on this topic, one of us (Graham, Eggers, and Sukhtankar 2004) found that higher levels of residual happiness – e.g. the happiness of each individual that was not explained by observable socioeconomic and demographic traits – in an initial period was correlated with higher levels of income and better health in future periods.[1] Since then, several studies using a range of metrics, from twin and sibling comparisons to lab experiments, have confirmed such a channel, finding again that happy people have better outcomes in a range of areas from the health to the labor market to the social arena.[2]

Some more recent experimental studies, which are based on simple interventions that evoke optimism, find significant changes in behavior. One such study is based on the provision of simple assets – such as a cow or other livestock – to poor people in developing countries, and find it results in increased labor and other investments. Another asked respondents in U.S. soup kitchens to recall a time they felt positive about themselves, and that in turn resulted in more effort in playing simple games compared to those who did not receive the optimism prompt.[3] The

[1] The study was based on based on panel data for Russia. We regressed happiness on the usual control variables in t-0 and then calculated a residual or unexplained happiness for each respondent, which was then used as an independent variable in t-1. See Graham et al., (2004).
[2] See, De Neve et al., (2013), De Neve and Oswald, (2012), and O'Connor, (2017), and for an overview, Graham (2017).
[3] See Haushofer and Fehr (2014) and Hall et al., (2014)

driving channel in both these cases – as well as in other experiments – seems to be the provision of new hope. While these studies cannot reveal how long the behavioral changes last, they are, at the very least suggestive of a virtuous circle.

On the other hand, there is some evidence that individuals mis-predict what will make them better off in the future.[4] A recent study based on panel data for Germany finds that most individuals mis-predict the positive effects of life events such as marriage and the negative effects of others such as divorce, unemployment, and disability (Odermatt and Stutzer, n.d.). Another study based on the same German panel finds that younger people over-predict their future life satisfaction, while older people under-predict it but have higher levels of current reported life satisfaction (Schwandt 2016). The direction of these findings complements the wider body of work that has been done on the U-curve relationship between age and happiness, which finds a consistent cross-country relationship, with the low point in happiness being in the middle-aged years (in part as individuals adjust their aspirations as they age), and then current life satisfaction increasing as people age, as long as they are healthy for their age (Blanchflower and Oswald 2016; Graham and Ruiz Pozuelo 2017). [5]

In some recent work on the U.S., meanwhile, one of us (Graham with Sergio Pinto 2018) finds that lack of hope and high levels of stress and worry among less than high school educated whites are linked to the higher rates of premature mortality, deaths of despair as identified by

[4] See Kahneman and Thaler (2006) and Frey and Stutzer (2014)

[5] These studies control for the primary confounding factors such as income and health and therefore the "pure" effect of aging, with everything else held constant. Other studies alternatively look at aging without these controls, evaluating so-called "experienced" well-being, in which case the U holds in fewer countries and usually in richer rather than poorer ones. Moreover, in a study critiquing aspects of the U-shape, one of us still finds similar evidence. Average experienced life satisfaction (over 17 countries) declines from approximately age 30, until about age 50, then increases again until about age 75 (Morgan and O'Connor 2017). For an excellent review of the psychological as well as economic studies, see (Rauch 2018).

(Case and Deaton 2015, 2017).[6] In contrast, poor African Americans and Hispanics have much higher levels of optimism, and have not displayed the same increase in mortality that afflicted non-white Hispanics beginning in the late 1990s; indeed the life expectancies of African Americans and Hispanics have continued to increase during this period and are catching up with those of whites in general. While older whites display the typical decrease in optimism that is shared by older respondents in many European countries, African Americans depart from that trend and maintain higher levels of optimism as they age (Graham and Pinto, 2018).

One explanation, among many, for the increase in the despair of less than college educated whites is the decline of their primary identity – as productive blue collar workers – on the one hand, and the associated loss of ties to society and community that accompanied the decline of manufacturing and other blue collar jobs. The starkest manifestation of this is the rise in the increase of prime age workers, and particularly males, out of the labor force. Time use studies of this group show large increases in time spent on video games which, in turn, is an additional disconnect from society (Krueger 2017). The loss of close ties to society, meanwhile, as in the case of the long-term unemployed, is associated with deep unhappiness and even despair (Clark and Oswald 1994; Pecchenino 2015).

In this paper, we explore the proposition that more optimistic people live longer and first explore that by looking at the differential optimism of household heads in the period 1968-1975 and their probability of being alive in 2015. We posit that in addition to innate character traits, optimism depends on demographic and socio-economic characteristics, as well as parental traits. It is important to note that we use optimism and hope as inter-changeable concepts, with each of these combining a positive belief that good rather than bad things will happen, as well as the

[6] Case and Deaton's second paper (2017), meanwhile, suggests that the trends underlying this despair may have have started as early as the 1970's, something that our findings (below), corroborate.

ability to plan for and work towards goals, the latter requiring a certain level of agency. Psychologists make finer distinctions between these concepts; in terms of our objectives and data, the two go hand in hand.[7]

We also predict long-term trends in optimism using a model estimated using historical optimism. The trends reveal forces affecting the country before increasing mortality was identified in the late 1990s. Moreover the trends affecting people with less than a high school level of education are present whether or not we follow the same people over time. This finding illustrates one of the strengths of our study. Most studies are unable to follow the same people over time and recognize this as a limitation. For example, the underlying characteristics of high school dropouts in 1972 are unlike those in 2016 (as an increasing percentage of students completed high school over the time period).[8]

2. Data and Methods

2.1 Data

Optimism and mortality data are from the Panel Study of Income Dynamics (PSID) from the years 1968 - 2015. The PSID is a longitudinal, household survey, which when weighted is nationally representative of U.S. families. Our sample is based on all family heads that personally responded to the survey. This restriction is important because while the survey is for family units, subjective questions, especially the one relating to optimism, only reflect the

[7] See, for example, Bailey et al. (2007). In some related new survey work, one of us (Graham), with Ruiz-Pozuelo, we also test whether the agency component of these two concepts is associated with surmounting negative events, which in turn builds resilience (Graham and Ruiz Pozuelo 2018).
[8] See Blanchflower and Oswald (2018, 15) as an example study that recognizes this limitation in part of their analysis.

respondent's views. The sample also excludes people for which mortality data is unavailable and for which variables were missing.[9] The sample limitations are listed in Table 1.

The sample is largely comprised of men because the PSID considered men to be the household heads in married couples. That means that only unmarried women are included and they are on average older than the national average because they are more likely to be divorced or widowed. The unrestricted and weighted sample should be representative of household heads, not men or women generally. Table 2 lists the sample composition in detail.

Table 1. PSID Sample 1968-1975

Families in 1968	4,802
Heads and Spouses	11,813
Household Heads	7,912
Matched Heads	7,582
Mortality Data Available	4,840
Non-Missing Variables	4,442

Table 2. Sample Composition

	Unweighted		Weighted	
	N	%	N	%
White	2,820	63.48	66,051	86.73
Black	1,506	33.90	8,236	10.81
Hispanic	80	1.80	1,322	1.74
Other	36	0.81	545	0.72
Total	4,442		76,153	
Men	2,835	63.82	52,738	69.25
Women	1,607	36.18	23,415	30.75
Total	4,442		76,153	

[9] The year of death is unknown for people that attrite for reasons other than mortality and the PSID was unable to ascertain if or when they died. This attrition does not depend on our variable of interest (at five percent significance) when the additional controls are included (results available upon request).

Optimism is operationalized using the responses to a question related to whether the respondent believed life would work out (see the Appendix for the exact question phrasing). The variable "Life Work Out" (LWO) is created from the five potential responses such that higher values correspond to greater optimism. In general, LWO is treated as a continuous variable;[10] however, in descriptive settings, individuals were deemed to be optimists if they reported one of the top two LWO categories (4 or 5).[11] Mortality is observed if it occurred before the survey was fielded in 2015. Approximately 71 percent of the sample died during the sample period. Table 3 illustrates sample shares that deceased by 2015 for different population groups.[12] Also displayed is the maximum age, which corresponds to the age at death or if alive, the respondent's age in 2015. Notice that optimistic people have a greater maximum age and fewer of them died before 2015.

Table 3. Mortality by 2015

	Weighted Sample	Average Maximum Age	Deceased in 2015
	N	(years)	%
White	66051	74.3	70.9
Black	8236	70.3	79.0
Hispanic	1322	73.1	60.4
Other	545	72.5	46.0
Men	52738	72.7	72.6
Women	23415	76.4	68.6
Pessimistic	31825	73.3	74.8
Optimistic	44327	74.2	68.9

[10] While LWO is ordinal in nature, regressions of similar subjective ordinal variables exhibit similar results whether they are treated as ordered choices or continuously (Ferrer-i-Carbonell and Frijters 2004).
[11] In our view, the LWO question captures both of the traits that psychologists describe in the relationship between hope and optimism, which is the tendency to believe that good rather than bad things will happen, and belief in the ability to plan and reach goals. See (Bailey et al. 2007).
[12] A relatively smaller number of people from the "Other" racial groups have deceased by 2015 because they are relatively younger, on average 39 years old when initially observed, compared to 45 for the full sample.

2.2 Methods to Examine the Relationship Between Life Expectancy and Optimism

To determine the relationship between life expectancy and LWO, an ordinary least squares (OLS) model would simply regress the maximum age in which a person is observed on initial LWO and demographic and socio-economic characteristics, especially a measure of health. However, OLS estimates are biased because OLS is unable to appropriately condition on age when LWO is observed but the age of death is not always observed. To address these issues, two approaches are used. First, duration analysis is performed using Cox Proportional Hazard Models. In the present case, hazard models use the duration alive, or time elapsed between initial age and age at death, to estimate the probability of death given the respondent is alive. This probability is referred to as the hazard rate. Cox Proportional Hazard Models allow for the estimation of different hazard rates conditioning on a set of covariates. The hazard models also allow for the fact that not everyone dies during the sample period; in duration modeling terminology, the data are right-censored. Cox Proportional Hazard Models are standard for duration analysis. The second method uses probit models that estimate the probability of death by the year 2015 as the dependent variable.

In each model controls include demographic and socio-economic characteristics. Specifically, age, gender, race, education status, a measure of health status, income, employment status, and location controls are included. A dummy variable for the presence of a mental or physical work limitation was the only health variable that was available in 1968 and consistently throughout the sample. Location controls for current residence and where the respondent grew up are measured at the census division level.[13]

[13] Location is available at the state level too, but sample sizes were severely reduced within particular states.

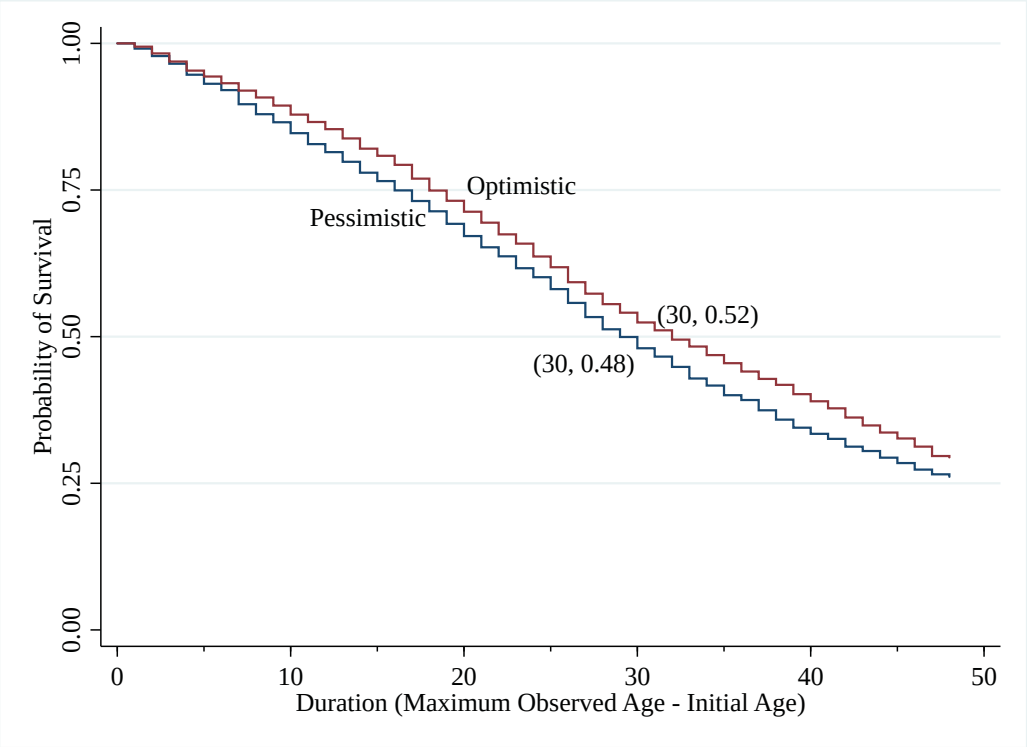
The samples differ slightly for the Cox models compared to the probit models. In the Cox models, repeated observations for the same person are used (with a duration based on the next observation and if observed again, the mortality is censored). For the probit models, only one observation per person is used because the outcome variable is constant. The probit models also have fewer people because everyone aged 65 and above (at initial observation) dies by the year 2015 and are therefore excluded.

3. Results

3.1 Longer, More Optimistic, Lives

To illustrate the importance of LWO, Figure 1 presents the survival function (Kaplan Meier) for optimists compared to pessimists. Without additional controls, optimists are statistically significantly less likely to die (at one percent). Thirty years after LWO was measured, conditional on being alive, those that were optimists have a 52 percent probability of surviving another year, while those that were pessimists have only a 48 percent probability. The average initial age is 45. Nearly 50 years later, at the maximum duration observable, approximately 29 percent of the sample remains.

Figure 1. Survival Function by Initial Optimism



Kaplan-Meier non-parametric functions. Duration is the maximum observed age less the initial age. The average initial age is 45. At a duration of 30, the average age would be 75 (if there were equal mortality rates across the age distribution). Optimism is measured in the years 1968-1972 and 1975 and mortality is observed up until 2015.
Source: PSID and author estimates.

The statistical analysis confirms LWO is statistically positively related to greater life expectancy. Presented in Table 4, the estimated LWO-mortality relations are consistent in terms of direction and significance. A negative coefficient for the Cox model means a lower hazard rate and therefore greater life expectancy. The coefficient in column 1, from an OLS model presented for comparison, also shows that greater LWO is associated with an older age of death. Table 5 presents the probit results, which are generally consistent with those of Table 4. Death by 2015 is less likely for people reporting greater LWO.

Table 4. Life expectancy regressions, Ordinary Least Squares and Cox Proportional Hazard

	(1) OLS	(2) Cox	(3) Cox	(4) Cox	(5) Cox	(6) Cox	(7) Cox
Life Work Out	0.347***	-0.060***	-0.059***	-0.048***	-0.044***	-0.048***	-0.033***
	(0.062)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Female	2.129***	-0.354***	-0.373***	-0.370***	-0.414***	-0.500***	-0.479***
	(0.216)	(0.040)	(0.040)	(0.041)	(0.041)	(0.042)	(0.043)
Black	-0.476**	0.152***	0.125**	0.059	0.102**	0.048	0.024
	(0.234)	(0.042)	(0.050)	(0.051)	(0.051)	(0.052)	(0.053)
Hispanic & Other	1.057*	-0.339**	-0.210	-0.268*	-0.269	-0.318*	-0.375**
	(0.616)	(0.150)	(0.161)	(0.161)	(0.165)	(0.167)	(0.171)
Ages 35-49	-1.983***	0.714***	0.716***	0.668***	0.670***	0.727***	0.653***
	(0.390)	(0.063)	(0.063)	(0.064)	(0.063)	(0.064)	(0.065)
Ages 50-64	-3.993***	1.657***	1.669***	1.586***	1.580***	1.623***	1.503***
	(0.331)	(0.061)	(0.062)	(0.063)	(0.062)	(0.063)	(0.065)
Ages 65+	-6.084***	2.709***	2.734***	2.624***	2.572***	2.409***	2.305***
	(0.314)	(0.067)	(0.067)	(0.070)	(0.069)	(0.078)	(0.082)
In School				0.015			-0.169
				(0.185)			(0.189)
Edu < High School				0.199***			0.132***
				(0.046)			(0.046)
Edu > High School				-0.202***			-0.161***
				(0.053)			(0.053)
Work Limitation					0.448***		0.301***
					(0.044)		(0.048)
ln(Real Inc. FU pc)						-0.026***	-0.007
						(0.009)	(0.009)
Unemployed						0.382***	0.348***
						(0.103)	(0.105)
Out of Labor Force						0.429***	0.353***
						(0.064)	(0.068)
Location Controls	-	-	yes	yes	yes	yes	yes
Constant	11.450***						
	(0.361)						
Observations	16489	16489	16489	16489	16489	16489	16489
# of People	4442	4442	4442	4442	4442	4442	4442
R-Squared	0.025						
Adj. R-Sq.	0.024						
Pseudo R-Sq.		0.046	0.046	0.048	0.049	0.049	0.051
Division Grew Up F			24.059	22.104	26.073	27.685	27.629
Current Division F			6.170	5.193	4.970	5.076	3.932

Notes: The OLS dependent variable is the same duration (maximum observed age less the initial age) as used in the Cox Proportional Hazard model. Excluded categories include: male, white, ages 16-34, high school, and working.
Standard errors in parentheses (clustered by individual); * p<0.10 ** p<0.05 *** p<0.01

Table 5. Probability of death by the year 2015, Probit Regressions

	(1)	(2)	(3)	(4)	(5)	(6)
Life Work Out	-0.073***	-0.076***	-0.061***	-0.069***	-0.072***	-0.055***
	(0.016)	(0.016)	(0.017)	(0.016)	(0.017)	(0.017)
Female	-0.575***	-0.596***	-0.598***	-0.604***	-0.656***	-0.624***
	(0.069)	(0.070)	(0.070)	(0.069)	(0.075)	(0.076)
Black	0.519***	0.415***	0.360***	0.420***	0.391***	0.373***
	(0.083)	(0.090)	(0.093)	(0.090)	(0.093)	(0.094)
Hispanic & Other	-0.357**	-0.210	-0.280	-0.230	-0.240	-0.296
	(0.177)	(0.191)	(0.191)	(0.191)	(0.193)	(0.194)
Ages 35-49	1.121***	1.140***	1.078***	1.127***	1.158***	1.084***
	(0.062)	(0.063)	(0.066)	(0.063)	(0.064)	(0.066)
Ages 50-64	2.670***	2.691***	2.582***	2.647***	2.694***	2.536***
	(0.099)	(0.100)	(0.103)	(0.101)	(0.101)	(0.105)
In School			-0.171			-0.272**
			(0.118)			(0.132)
Edu < High School			0.302***			0.290***
			(0.075)			(0.076)
Edu > High School			-0.163**			-0.154*
			(0.078)			(0.079)
Work Limitation				0.315***		0.238**
				(0.093)		(0.096)
ln(Real Inc. FU pc)					-0.011	0.030
					(0.020)	(0.022)
Unemployed					0.327**	0.302*
					(0.153)	(0.157)
Out of Labor Force					0.166	0.280**
					(0.112)	(0.130)
Constant	-0.097	-0.192*	-0.222**	-0.235**	-0.144	-0.507**
	(0.076)	(0.103)	(0.108)	(0.103)	(0.185)	(0.200)
Location Controls	-	yes	yes	yes	yes	yes
Observations	3899	3899	3899	3899	3899	3899
Pseudo R-Sq.	0.326	0.333	0.342	0.336	0.335	0.347
Division Grew Up Chi2		18.684	15.413	18.676	17.981	15.172
Current Division Chi2		8.500	7.280	8.629	7.233	6.461

Notes: Excluded categories include: male, white, ages 16-34, high school, and working.
Robust standard errors in parentheses; * p<0.10 ** p<0.05 *** p<0.01

The LWO-mortality relation is affected by education, health, and economic factors. This finding is illustrated in Tables 4 and 5 by the reduced coefficient magnitudes that are observed as additional controls are added. Moderation is expected, as optimism is interrelated with many variables, for example: better education, income, and health, as shown in the next section.

Some scholars posit that personality traits, such as optimism, are "set like plaster" (Costa and McCrae 1994), implying that the relationship between characteristics such as education and optimism is not caused by education.[14] We do not take this point of view, but believe education can influence optimism and optimism can influence education. In short, the way to understand our results is, optimistic people live longer, in part because they are better educated, earn greater incomes, and are free from mental or physical work limitations. This likely reflects the virtuous circle highlighted in the studies cited above, with optimists more likely to invest in their education, and then education leading to better outcomes along many different aspects of life. These same studies, though, highlight the independent role of optimism, particularly for the poor, who have less assets and have to sacrifice more (at least as a percentage of their assets) to make such investments in the future than do the rich.[15]

Across Tables 4 and 5, women live longer than men and African Americans shorter than whites, but the relationship for blacks becomes insignificant once employment and income controls are included in Table 4. The magnitude also declines when location controls are added. Because racial groups are not equally dispersed throughout the nation, the variable "Black" may have initially proxied for higher mortality conditions in certain regions with a higher concentration of black respondents – such as the southeastern cluster of states – due to the gap in black-white life expectancy, which was much higher in the earlier years of this study. In later years location dummies are likely also picking up the concentration of premature mortality among less than college educated whites in certain regions in the heartland.[16]

[14] If optimism was set at birth, then all behaviorally chosen variables would be dependent on it.
[15] See (Graham, Eggers, and Sukhtankar 2004) and (Haushofer and Fehr 2014).
[16] Along the same lines, in our later work on minority optimism versus poor white pessimism (Graham and Pinto 2018), we also find that regions with a higher concentration of minorities – such as the Southern cluster of states – are, controlling for a host of mediating factors, more optimistic and less

The other controls are related to life expectancy in the expected directions and are generally statistically significant. The categorical age coefficients are monotonically increasing in size. Compared to being in high school, those with less education have higher hazard rates, and those with more, lower. People with work limitations, mental or physical, have higher hazard rates, and so do people that are out of the labor force or unemployed. Having greater family income per capita does not translate into greater life expectancy once education, work limitations, and employment status are also accounted for. And once income is controlled, students live longer, but only based on the probit estimation. Lastly, where a person grew up and currently resides statistically significantly affects life expectancy. The location controls, dummies by census division, are tested jointly and their significance is illustrated by the Chi-squared statistics.

3.1.1 Relationship Heterogeneity by Gender, Race, and Age

To test for heterogeneity in the LWO-mortality relation gender, race, and age groups are interacted with LWO. As shown in Table 6, the LWO-mortality relation does not vary significantly with race, but it does by gender and age. In the Cox model the interaction term between female and LWO is statistically significant and positive. The interaction magnitude is substantial too, completely offsetting the main effect. That suggests that more optimistic women do not live longer than less optimistic women. Also, relative to men, women live longer on average, but the gap shrinks with increasing LWO, because optimism is still important for men's longevity (as shown by the main effect of LWO). However, the relation for women should be

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stressed, even though they have poor indicators on the health (not suicide though) and poverty fronts. See also: https://www.brookings.edu/research/the-geography-of-desperation-in-america/ .

read with caution because the sample of women is constrained to household heads, much smaller than the sample of men, and not nationally representative.

Table 6. Life Expectancy regressions with added interactions, Cox Proportional Hazard Models

	(1)	(2)	(3)
Life Work Out	-0.053***	-0.036***	-0.081***
	(0.012)	(0.013)	(0.027)
Female X Life Work Out	0.060***		
	(0.020)		
Black X Life Work Out		0.007	
		(0.022)	
Hisp & X Life Work Out		0.045	
		(0.081)	
Ages 35-49 X Life Work Out			0.009
			(0.032)
Ages 50-64 X Life Work Out			0.067**
			(0.031)
Ages 65+ X Life Work Out			0.080**
			(0.032)
Female	-0.658***	-0.480***	-0.482***
	(0.078)	(0.043)	(0.043)
Black	0.020	0.002	0.014
	(0.053)	(0.080)	(0.053)
Hispanic & Other	-0.391**	-0.510	-0.369**
	(0.173)	(0.319)	(0.171)
Ages 35-49	0.657***	0.653***	0.634***
	(0.065)	(0.065)	(0.118)
Ages 50-64	1.503***	1.504***	1.297***
	(0.065)	(0.065)	(0.117)
Ages 65+	2.299***	2.304***	2.058***
	(0.082)	(0.082)	(0.127)
Socio-Economic Controls	yes	yes	yes
Observations	16489	16489	16489
# of People	4442	4442	4442
Pseudo R-Sq.	0.051	0.051	0.051
Division Grew Up F	26.858	27.427	27.535
Current Division F	3.864	3.906	3.926

Notes: Excluded categories include: male, white, and ages 16-34. Socio-Economic Controls include the same education, work limitations, income, and employment status variables as in Table 1.
Standard errors in parentheses (clustered by individual); * p<0.10 ** p<0.05 *** p<0.01

What is perhaps more interesting is that the LWO interaction term for older age groups is positive, significant, and large. One might think that optimism is more important in older ages, but for people of ages 50 years and older, increasing LWO has no significant relationship with the probability of dying. Perhaps optimistic people invest in their lives more, for example by exercising more (in addition to education and the other moderators already mentioned), which has a cumulative positive compounding effect that cannot be made up for later? Related to that, higher levels of optimism may play an important role in protecting psychological well-being in the mid-life years, when life satisfaction is at the bottom of the U-curve, than in the later years when life satisfaction is on the increase. The different relations by age may also explain the reduced LWO-mortality relation for women, who are on average older than men in the present sample.

3.2 Who Are the Optimists?

Optimism varies over time for the population as whole and varies systematically across groups of people. LWO also varies over time for a given individual. Indeed the within-person standard deviation of LWO is similar to the between-person standard deviation (1.3 compared to 1.6 on a scale of 1-5). It is important to highlight that optimism can change. If individuals can positively change their outlook, they could live longer. However, the purpose of this paper is not to suggest causes of mortality or optimism. The present aim is two-fold: learn about the determinants of optimism (in the form of LWO) and obtain a model for predicting historical trends.

The determinants of LWO are presented in Table 8, based primarily on OLS regressions of LWO on various demographic and socio-economic characteristics (fixed effects and ordered

probit models are also considered). Observations from each year that LWO was observed (1968-1972 and 1975) are used. Column 1 presents relations for strictly exogenous variables. Columns 2 and 3 each add sets of individual characteristics, including location controls (only measures of their joint significance are presented for brevity). Column 4 adds in lagged LWO. Column 5 forms the basis of the prediction model by dropping year effects and insignificant variables that limit the sample.

The variables associated with higher socio-economic status are positively associated with LWO, i.e., high education, good health (lacking a work limitation), income, being employed, and owning your home (the omitted category). Getting divorced or separated and becoming widowed is negatively associated with LWO relative to being single (though the association of being widowed or separated is accounted for with lagged LWO). Men have greater LWO than women, and whites more than blacks but not Hispanics.[17] LWO is greater for people over 65, which is reminiscent of the latter part of the U-shaped life satisfaction relation with age (when other controls are also included). The various explanations for U-shape range from aspirations aligning with reality in the middle aged years, to increased emotional wisdom as individuals age, to selection bias as happier (and more optimistic) people live longer, which is relevant issue in this case.[18]

[17] The relation for blacks has likely changed since then, as in later data from the Gallup Healthways poll for 2008 onwards, we find that blacks in general and poor blacks in particular have the highest levels of optimism (defined here as how they predict their life satisfaction will be in the future) of all racial groups, even though their current life satisfaction is lower than that of both whites and Hispanics (Graham and Pinto 2018; see also Witters 2017). It may have also changed for women, as they are both more optimistic and satisfied with their lives than are men in this period (Graham and Pinto 2018). For over time trends in happiness and the narrowing gap between women and African Americans and men/whites, see (Stevenson and Wolfers 2008; O'Connor 2017b).

[18] For a review of the explanations for the age curve, see (Graham and Ruiz Pozuelo 2017); for an excellent review of all the bodies of research that seek to explain the age curve, see Rauch (2018).

Table 8. OLS Life Work Out Regressions

	(1)	(2)	(3)	(4)	(5)
Lag Life Work Out				0.374***	0.368***
				(0.015)	(0.015)
Ages 35-49	0.014	0.140**	0.140**	0.084	0.084
	(0.062)	(0.060)	(0.063)	(0.058)	(0.058)
Ages 50-64	-0.096	0.132**	0.121*	0.012	-0.016
	(0.066)	(0.066)	(0.070)	(0.064)	(0.063)
Ages 65+	0.050	0.532***	0.482***	0.295***	0.253***
	(0.074)	(0.088)	(0.095)	(0.089)	(0.086)
Female	-0.874***	-0.737***	-0.346***	-0.263***	-0.297***
	(0.060)	(0.059)	(0.088)	(0.087)	(0.085)
Black	-0.845***	-0.561***	-0.397***	-0.251***	-0.228***
	(0.073)	(0.072)	(0.080)	(0.078)	(0.074)
Hispanic	-0.581***	-0.366**	-0.252	-0.132	-0.186
	(0.166)	(0.169)	(0.182)	(0.166)	(0.169)
Other	-0.339	-0.485	-0.401	-0.277	-0.237
	(0.320)	(0.312)	(0.345)	(0.306)	(0.299)
In School		0.266**	0.272**	0.032	0.017
		(0.109)	(0.124)	(0.133)	(0.118)
Edu < High School		-0.274***	-0.166**	-0.187***	-0.189***
		(0.060)	(0.078)	(0.070)	(0.053)
Edu > High School		0.376***	0.262***	0.140**	0.164***
		(0.060)	(0.071)	(0.064)	(0.056)
Work Limitation		-0.468***	-0.420***	-0.247***	-0.249***
		(0.059)	(0.059)	(0.058)	(0.056)
ln(Real Inc. FU pc)		0.075***	0.067***	0.037***	0.040***
		(0.012)	(0.012)	(0.013)	(0.012)
Unemployed		-0.450***	-0.762**	-0.811**	-0.466**
		(0.132)	(0.316)	(0.398)	(0.205)
Out of Labor Force		0.084	-0.318	-0.345	-0.065
		(0.076)	(0.292)	(0.350)	(0.079)
Rents Home			-0.233***	-0.116**	-0.108**
			(0.055)	(0.053)	(0.052)
Neither Own or Rent			-0.214**	-0.044	-0.036
			(0.104)	(0.105)	(0.105)
N/A No Job			0.376	0.279	
			(0.287)	(0.343)	
Works Two Jobs			0.084	0.071	
			(0.055)	(0.054)	
Married			0.077	0.044	0.057
			(0.100)	(0.099)	(0.098)
Widowed			-0.236**	-0.088	-0.020
			(0.113)	(0.108)	(0.107)
Divorced			-0.812***	-0.563***	-0.528***
			(0.117)	(0.112)	(0.111)
Separated			-0.514***	-0.131	-0.110
			(0.128)	(0.141)	(0.137)
Max Parent's Educ.			0.108***	0.062*	0.044**
			(0.038)	(0.035)	(0.018)
Relative Educ.			0.045	-0.004	
			(0.057)	(0.051)	
Avg. Inc. Pars.			0.167***	0.147***	0.169***
			(0.053)	(0.047)	(0.046)
Well to do Pars.			0.231***	0.145**	0.184***
			(0.074)	(0.066)	(0.065)
DK/NA Pars.			-0.135	-0.097	-0.088
			(0.266)	(0.259)	(0.263)
Year Controls	-	yes	yes	yes	-
Constant	3.906***	2.819***	2.489***	1.686***	1.795***
	(0.051)	(0.126)	(0.204)	(0.201)	(0.170)
Observations	16489	16489	15666	8634	9079
R-Squared	0.069	0.131	0.153	0.270	0.266
Adj. R-Sq.	0.068	0.130	0.150	0.266	0.263
# of People	4442	4442	4156	3235	3426
Division Grew Up F			0.797	1.614	4.117
Current Division F		6.438	1.654	0.662	

Notes: omitted categories include: men, white, ages 16-34, working, owns home, works one job, married, poor parents. Standard errors in parentheses (clustered by individual); * p<0.10 ** p<0.05 *** p<0.01

Parents' status is also important. LWO is positively associated with parents' educational achievement and whether the individual perceived their parents to be well off (in terms of income). We also expected education attainment relative to one's parents to be an important determinant, because we believed one's parents' social status partially determined their expectations for their own. However in the present case, only absolute parental status is important.

Lagged LWO is highly significant and together with the other variables explains more than 25 percent of the variation in individual LWO, which is high for individual subjective variables like SWB.[19] When dropping the year controls and insignificant controls, the sample expands and the adjusted R-squared decreases only slightly. We dropped the year controls because they are not helpful for prediction. We also considered fixed effects and ordered probit specifications but omitted them for brevity. The determinants in the fixed effects specification are generally insignificant and do not explain the variation very well. In this instance, we are interested in the characteristics associated with individuals that report high LWO. While some fixed and unobservable characteristics relate to both LWO *and* educational achievement, for example, a fixed effect controls for those characteristics but does not help us to explicitly identify them.[20] We found the ordered probit to be inferior based on both the Akaike and Bayesian information criteria, which were each substantially higher for the same sample and variables. For these reasons we chose the autoregressive specification for prediction (column 5).

[19] The World Happiness Report reports among the highest R-squareds we have observed, explaining individual SWB data, ranging from 0.09 to 0.28 (Layard, Clark, and Senik 2012).
[20] The separate issue of how optimism changes over time for a given person (i.e., using fixed effects) would be interesting for future research.

4. Prediction of Life Work Out

The predicted trends are informative in part because they summarize the influence of multiple characteristics. While it is possible to observe declining well-being across multiple dimensions, a priori it is unclear what factors are most important. Table 9 presents many of these characteristics for people with less than high school education in the years 1970 and 1995, and contrasts that with the full sample ("Expanded" sample, as defined below).

Declining or deteriorating conditions are observable, but not for every variable, and it is unclear how those with less than high school fared relative to the full population. Perhaps the most obvious change is the decline in real taxable income per household member (Real Inc. (FU pc)) from 1,745 to 1,085. During a period of sustained economic growth, this decline or stagnation, repeated in many other studies, is striking. The married population share also declined by more than half! The unemployment rate increased as well. Many of the characteristics also worsened for the full sample, but to a lesser degree. The predicted optimism trends illustrate the collective influence of each dimension across several subsamples.

Table 9. Sample Average Characteristics, Two Samples in 1970 and 1995
Full Sample corresponds to the "Expanded" Sample

		Less Than High School		Full Sample	
	Unit	1970	1995	1970	1995
Age	years	55.30	57.56	49.08	49.88
Female	Share	0.29	0.59	0.24	0.43
White	Share	0.82	0.72	0.87	0.82
Black	Share	0.16	0.26	0.10	0.16
LessthanHS	Share	1.00	1.00	0.44	0.15
Work Limitation	Share	0.39	0.39	0.27	0.23
Real Inc. (FU pc)	1968 $s	1745	1085	2760	3677
Unemployed	Share	0.01	0.06	0.01	0.04
Homeowner	Share	0.65	0.51	0.67	0.62
PoorParents	Share	0.64	0.68	0.52	0.53
Married	Share	0.61	0.27	0.67	0.40

4.1 Methods for Prediction

We predicted LWO using the autoregressive model from the previous section with an additional adjustment to predict LWO for different subgroups. Each time-varying variable is allowed to take different values by population subgroup using interactions with an indicator of subgroup (time-invariant controls are not interacted in order to limit the total number of variables). This process is used to predict LWO by gender, race, education, and birth cohort. Once the models are estimated, prediction is performed for one subsequent year at a time. This process is used because the model uses lagged LWO as a determinant and LWO is not observed in the years 1973, 1974, and following 1975. For the years 1974, 1975, and 1977-1995, the prediction model uses lagged predicted LWO. In particular the following steps are undertaken: (1) the model is estimated using the years 1969-1972; (2) LWO is predicted for 1973; (3) LWO is predicted for 1974; and (4) LWO is predicted for the years 1976 to 1995. The final year is 1995 because the PSID starts interviewing every two years in 1997 and there is no individual weighting variable in 1996.

Sample selection is also important for predicting LWO. We chose to estimate the model and present predicted LWO for two different samples, a balanced sample of the individuals that were observed in every year from 1972-1995 (labeled as "Balanced")[21]. No additional individuals were added for replenishment and attriters for any reason were excluded. Eight hundred and twenty two people met these restrictions. The second sample ("Expanded") is comprised of all household heads, including attriters and those that were added to the PSID as long as the important characteristics (e.g. education) were observed. Predictions of LWO for the Expanded sample are out of sample, both in terms of time and individual, whereas predictions

[21] Individuals were added after 1968 up until 1972 because 1972 is necessary to complete step two of the prediction process.

for the Balanced sample are based on the same people and only out of sample in time. Note that the mean level of LWO is higher in the Balanced sample than in the Expanded sample because attriters due to mortality were excluded from the former sample and, optimistic people live longer.

To maintain subsample composition over time (in the Balanced sample), the subgroups are based on characteristics that are not behaviorally chosen, with the exception of the groups by education. It is also for this reason that birth cohorts are used instead of age. In particular the group born during the years 1906-25 is contrasted with those born during 1926-45. Later cohorts were excluded due to sample size.[22] To maintain consistent samples over time based on education, the groups were determined based on educational achievement in 1975 and then held constant in subsequent years (in the Balanced sample).[23] Also, similar to birth-cohorts, the education groups were limited to two to increase sample size. In particular, LWO was predicted for those with a high school or more education and those with less than a high school education.

4.2 Predicted Historical Trends in Optimism

The predicted LWO trends, presented in Figure 2 as dashed lines, reveal two groups with consistent trends. For most subgroups, the trends are inconsistent across samples. The clearest pattern is how poorly the Less than High School group fared since 1975, in general and relative to other groups. They show declining LWO over the period (within both samples), which suggests that the trends affecting despair and leading to substance abuse and suicide started long before the 1990s. This decline is supported by the characteristics presented in Table 9. What was

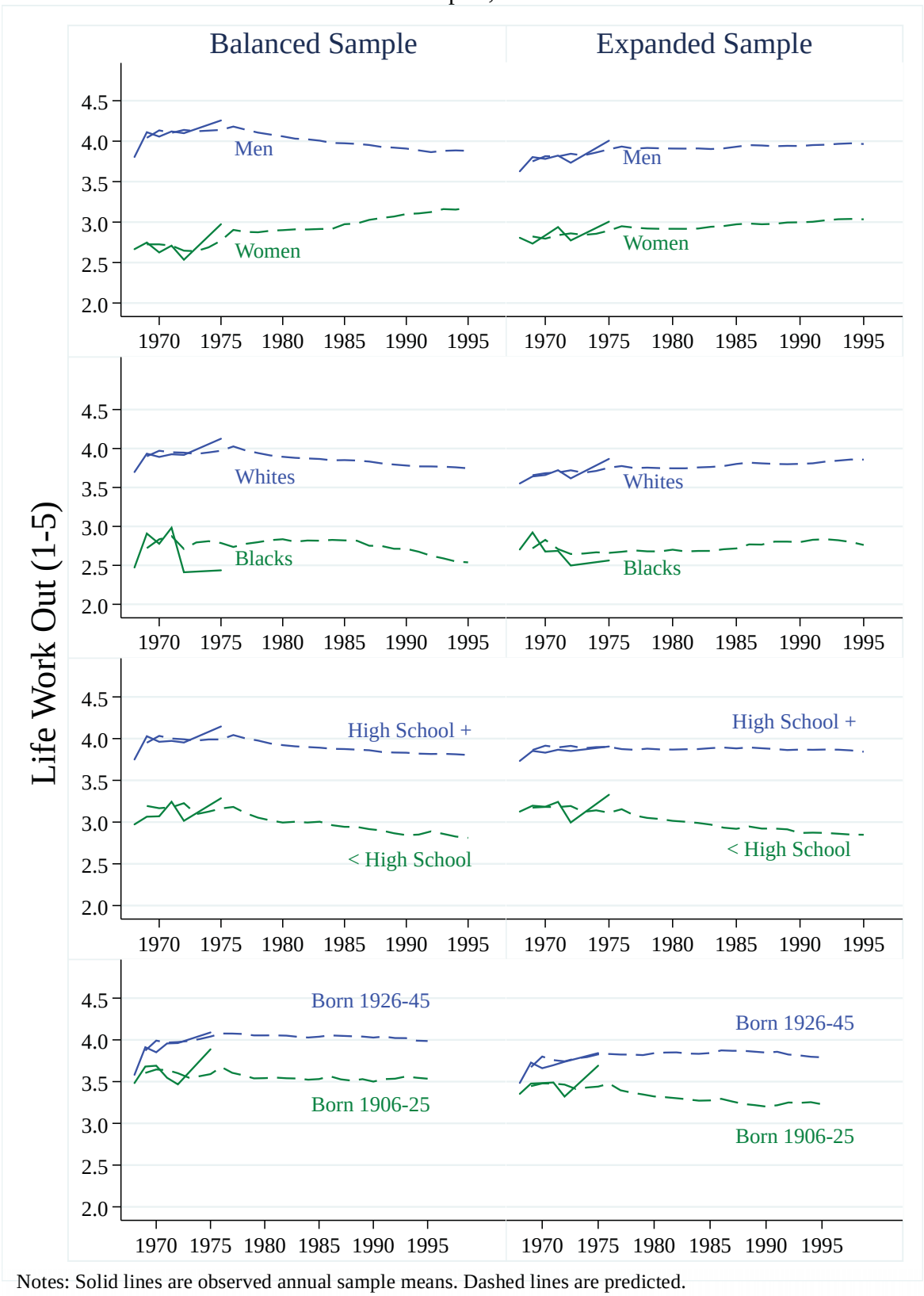
[22] Remember that the sample is constrained to household heads. In 1968 the oldest of the Baby Boomers (1946-1964) are 22.
[23] In the Expanded sample, education was allowed to vary because education was not observed in 1975 for those people added afterwards.

unclear before was that no other group would exhibit such a consistent decline because many characteristics of the full sample also worsened.

The success story appears to be female household heads (who are unmarried in the PSID) because they are the only group that show increasing LWO over the period within both samples. This finding seems consistent with improvement in women's rights; however, mean happiness for nationally representative samples of women tell a different story. It generally fell in the U.S. from the 1970's (Stevenson and Wolfers 2009; O'Connor 2017b), although there are some exceptions. Largely consistent with our findings, single mothers reported increasing happiness starting in the late 1980s, in part due to new employment opportunities (Ifcher 2011). Also, based on the most recent data (2008-2016), women are consistently happier (and more optimistic) than men (see Graham and Pinto 2018).[24] Additional research is necessary to understand the trend for women in a broader context.

[24] In addition, the general gap between men and women may have also changed with increasing equality in gender rights over the period. Later studies find that women are on average happier than men in countries with relatively good gender rights and certainly in rich countries (Graham and Chattopadhyay 2013).

Figure 2. Predicted "Life Work Out" by Gender, Race, Education, and Birth Cohort
Two samples, 1968-1995



Notes: Solid lines are observed annual sample means. Dashed lines are predicted.
Source: PSID and author estimates.

In general the LWO trends do not exhibit a singular pattern. The most consistent pattern is largely flat, with a greater downward tendency in the Balanced sample.[25] More specifically, in the Balanced sample, three groups experienced declines, one increased, and for the remaining four, the trends are either flat or unclear. In the Expanded sample, LWO is predicted to be fairly flat or increasing for most groups. Beyond the less than high school group, the only other group to show a decline is the birth cohort 1906-25, which is not hard to understand. They are 70-89 years old in 1995, and while studies of subjective well-being over the life-cycle show an increase in later life happiness, the increase occurs only up to approximately the age of 70 (depending on the study). Concerning group rankings, in contrast, there is consistency over time and across samples.

The average predicted values visually correspond fairly well with the observed values (solid lines) with two exceptions. First, the predictions for 1975 are not matched as well, perhaps because it was an unusual year. The entirety of 1974 was recorded as a recession and there was a recession in 1970 as well (NBER 2014). Second, the predictions for Blacks in the Balanced Sample do not correspond as well. The solid lines are consistent with the statistical analysis; men, whites, and better-educated people report higher LWO than their counterparts. The 1926-45 birth-cohort also reports higher LWO than the 1906-25 cohort.

[25] Aging may affect the LWO trends in the Balanced sample, however the effects are likely to depend on what point the individuals are in the life cycle. Figure A1 plots lowess smoothed LWO by age for the two birth cohorts for which we predicted LWO. The cohort trends contrast each other, declining in the younger group and increasing in the older, but across cohorts, life-cycle LWO resembles the oft-cited U-shape. The less than high school group is more predominantly of the older birth cohort than better educated group, suggesting any effects of aging should more positively effect the lower educated group.

5. Conclusion

Taking the nascent body of research that finds that respondents with higher levels of happiness and hope tend to have better future outcomes, both within and outside the U.S., we test the proposition that more optimistic people live longer, based on data from the U.S. Panel Study on Income Dynamics. We find, indeed, that to be the case, with household heads who reported higher levels of optimism during the period 1968-1975 are more likely to be alive in 2015 than those with low levels of optimism. However, there is significant relationship heterogeneity; it only holds for men and household heads less than 50 years old.

We also find that optimism can change over time, and its relationship with longevity is moderated by health, education, and income. This reflects the findings of the earlier studies suggesting that more optimistic people are more likely to invest in their futures (as in the case of education) because they are more confident in those futures. And while people with more income and education can more easily make such investments, optimism plays an additional and independent role.

We find that the greatest predicted decline in optimism over the period 1975-1995 occurred for those respondents with less than a high school education, the same cohorts (especially whites) who are driving premature mortality trends today. It was clear before that this group suffered relative to the population at large (especially in terms of wages), but not the degree to which they suffered especially when including the contribution of other factors (e.g., marriage rates). Of any group, female household heads (unmarried women in the PSID) fared the best over this period. African Americans and whites fared similar to each other. These trends are largely consistent with evidence from recent years. At the time that optimism was measured in the PSID, women and blacks were less optimistic than men and whites, but in recent years,

women are on average happier and more optimistic, and blacks are also more optimistic, though still not as happy.

The study of optimism is a fairly new and uncharted territory, at least for economists. Yet our results, as well as those of some previous studies, suggest that it plays an identifiable role in more positive future outcomes and, in this case, longer lives. Our finding on the early declines in optimism among the less than high school educated population, and their long-run links to premature mortality and deaths of despair in the U.S., meanwhile highlight the importance of better understanding its causes and consequences.

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Appendix

Age of death
"YEAR OF DEATH" ER32050
More Precise Year of Death from the 1968-2013 PSID Death File
When available, the exact year of death is recorded. When a range of years was reported, this variable contains a four-digit code in which the first two digits represent the first possible year of death, and the last two digits represent the last possible year.
For now only using the exact year. Range data is ignored for time being.

"WHY NONRESPONSE" (1969 example) ER30041
41: This individual died between the 1968 and 1969 interviews.

Life Work Out (V295)
Have you usually felt pretty sure your life would work out the way you want it to, or have there been more times when you haven't been very sure about it?

5 Usually been pretty sure
4 Pretty sure, qualified
3 Pro-con, sure sometimes, not sure other
2 More times when haven't been sure, qualified
1 More times when not very sure about it

Work limitation (V216)
Do you have a physical or nervous condition that limits the type of work or the amount of work you can do? If Yes - How much does it limit your work?

No Work Limit.:	No
Work Limitation:	Yes, but no limitation on work
	Yes, some limitation on work (must rest, mentions parttime work, occasional limit on work, can't lift heavy objects, reports periods of pain, sickness, etc.)
	Yes, severe limitation on work
	Yes, complete limitation; can't work at all

Variable compressed to two categories to maintain consistency across years with less information.

ln(Real Inc. FU pc) (V76 and V115)
Natural log of real taxable income (1968 $s). Income is the sum of family head and spouse's income adjusted for family size. Inflation is adjusted using a deflator based on **Urban Cons. Infl**. The deflator is adjusted so that 1968 serves as the base year. V76: This variable is the sum of Head's labor income, Wife's labor income, asset part of income from farm, business, roomers, etc., rental, interest and dividend income, and Wife's income from assets.

Own Home (V103)
Do you (FU) own this home or pay rent or what?

Owns home (or trailer, fully or jointly); Rents (or shares rent); Neither (owns nor rents)

Works Two Jobs (previous year) (V660)
Did you have any extra jobs or other ways of making money in addition to your main job in 1968? (1969 Question)

Max Parent's Educ.
Maximum of mother and father's education. Categories: (1) 0 - 5 grades; (2) 6-11 grades; (3) 12 grades; (4) 12 plus but no degree; (5) College BA and no advanced; (6) College and advanced; (7) NA or DK

Relative Educ.
Subject education relative to maximum of parents' education category. (-1) subject has less the max of their parents; (0) subject has the same; (1) subject has more education.

Head's Parents' wealth (V317)
Were your parents poor when you were growing up, pretty well off, or what?
(1) Poor; (3) Average, it varied; (5) Pretty well off; (9) DK, didn't live with parents

Urban Cons. Infl.
Disaggregated by U.S. regions: Northwest, Midwest, South, and West. CPI-All Urban Consumers (1982-84=100). From the Bureau of Labor Statistics.

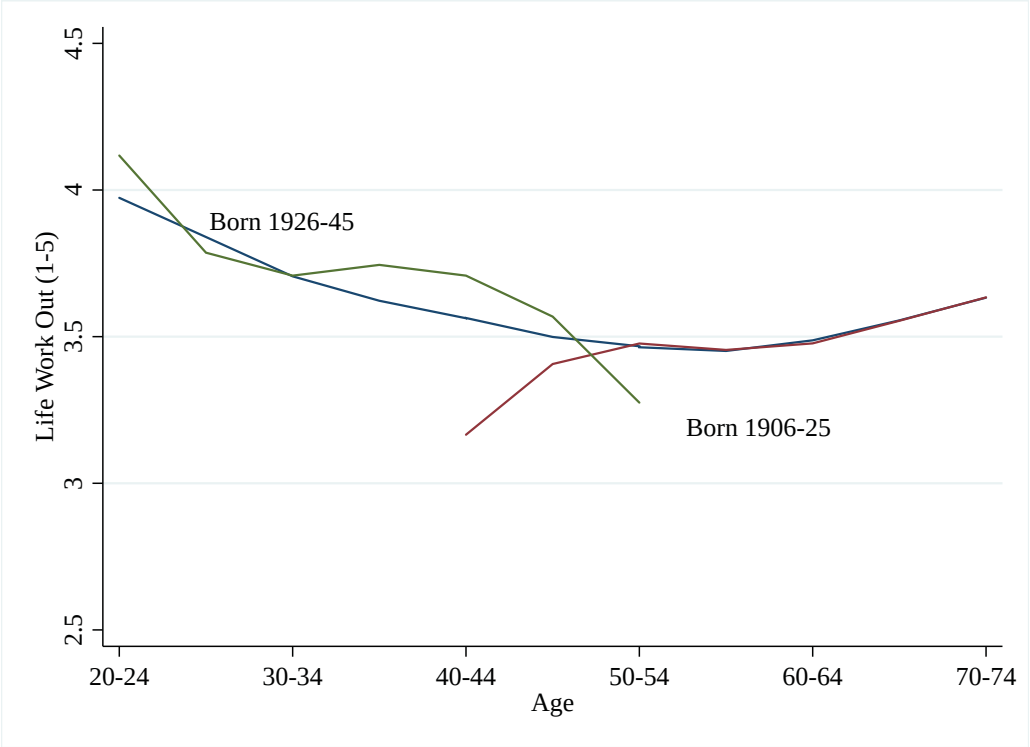
State Inc. pc
Real Personal Income per capita (1968 $s), disaggregated by state. From the Bureau of Economic Analysis.

State Unem. Rate
Unemployment rate, by state (%). From the Local Area Unemployment Statistics (LAUS), available from the BLS. Predicted backwards from 1976 (the first year of the LAUS) using a one-step dynamic regression with state-varying coefficients, of state income, state population, state non-farm employment, and **Urban Cons. Infl.**

Census division grew up (V311)
Where did you grow up? Recorded by state, but collapsed to census division.

Interview Information
"From 1968 to 1972, over 95% of the interviews were conducted face-to-face; since then, nearly all of interviews have been conducted via telephone. A single primary adult has typically served as the sole respondent and provides information about himself/herself and about all other family members (exceptions were reports of retrospective information in 1976 and 1985 when separate interviews were completed with both the Head and Spouses/Partners.) The most detailed information is collected about the Heads and Spouses/Partners of FUs." (User Guide 2015, pg. 21)
Field dates listed on page 23. Approximately, 1968-1980 March-July; 1981-1988 March-October; 1989-2015 March-December.

Figure A1. Life-Cycle Life Work Out for Two Birth Cohorts, Lowess Smoothed



Notes: Average (over cohort) values of predicted LWO for each age group are used for the Lowess plots. LWO predictions are based on regressions of LWO on five-year age dummies, year effects, and individual fixed effects. The data are from the main sample that is used in the analysis for Tables 4-8 and restricted to the two birth cohorts.
Source: PSID and author estimates.