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Early-life correlates of later-life well-being: Evidence from the Wisconsin Longitudinal Study*

Andrew E. Clark[†] Tom Lee[‡]

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Abstract

We use data from the Wisconsin Longitudinal Study (WLS) to consider the distal and proximal correlates of happiness and eudaimonia in later life. Even after controlling for proximal covariates, outcomes at age 18 (IQ score, parental income and parental education) remain good predictors of well-being over 50 years later. In terms of the proximal covariates, mental health and social participation are the strongest predictors of well-being. Although some factors are important in explaining both happiness and eudaimonia, there are notable differences between the two measures: well-being policy will thus depend to an extent on which measure is preferred.

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1 Introduction

The improvement of individuals' lives should arguably be the fundamental task of policy-makers. There are actually two distinct parts of this task - how to measure the quality of life, and how policy can best affect it. In recent years, there has been a great deal of work that has appealed to subjective well-being to reflect overall life quality. Although this work has led to fascinating insights about what is important for well-being, there is still no consensus about which well-being measure is the most appropriate.

There are loosely-speaking three types of well-being measures - eudaimonic,¹ hedonic and cognitive. Although these are undoubtedly different in their focus, if those who fare well according to one measure also do so across all the others, then it may not greatly matter which measure is retained. By comparing the results from different measures for the same individuals, we can ascertain just how inter-related these different measures are. Clark & Senik (2011) compare a number of different measures in the well-being module of Wave 3 of the European Social Survey (ESS), and find a mostly similar covariate pattern for happiness, life satisfaction and eudaimonia (in that the explanatory variables seem to be correlated in the same way with all the well-being measures). A similar approach is taken in Clark (2016a) for a number of different well-being measures found in the British Household Panel Survey (BHPS), ESS and the Office of National Statistics' National Well-Being Programme. Again, fairly high correlations are found across a variety of measures, especially within country.

Most work in subjective well-being has used cross-section or panel data on adults (such as the BHPS or the German Socio-Economic Panel, SOEP). This has allowed the calculation of correlations between adult well-being and current outcomes and/or events that occurred to the individual in the relatively recent past. We can broadly call these proximal variables.² A more recent area of study has relied on long-run

¹Eudaimonia refers to the idea of flourishing or developing human potential, as opposed to pleasure, and is designed to capture elements such as mastery, relations with others, self-acceptance and purpose. Practically, eudaimonic well-being is measured by questions on autonomy, determination, interest and engagement, aspirations and motivation, and a sense of meaning, direction or purpose in life.

²See Frey & Stutzer (2001) and Clark (2016b) for overviews of the range of insights provided by the economics of well-being literature.

cohort studies to examine the effect of covariates in the distant past (called distal variables) on current outcomes. We do of course here require data in which the distal outcomes are measured at the time when they occurred, not as the adult recalls them many years later. A number of contributions have emphasised the importance of early childhood for adult outcomes.³ The analysis of well-being in this context is much scarcer. Layard et al. (2014) combine distal and proximal factors in a life-course model of adult outcomes, including well-being: see also Clark et al. (2017). We here contribute to this literature by considering well-being at a much later age (72) than in the existing literature, and comparing the distal and proximal correlates of both happiness and eudaimonia at that age.

2 Data

We use data from the WLS, a cohort study that has been run from 1957 to the present day in Wisconsin, USA (see Herd et al., 2014). The initial data collection was carried out before high-school graduation in 1957 (so that the majority of the cohort were born in 1938/1939). This cohort has been periodically re-surveyed over time. Of particular interest are the last three waves (1993, 2004 and 2011), which contain multiple well-being measures for the respondent at ages of roughly 54, 65 and 72. This is an attractive feature of the WLS. The majority of cohort datasets used to analyse well-being are more recent. Some exceptions are the Douglas Cohort Study, which started in 1946, the The Lothian Birth Cohorts of 1921 and 1936 (<http://www.lothianbirthcohort.ed.ac.uk/>) and the Aberdeen Birth Cohorts of the same two years (<https://www.abdn.ac.uk/birth-cohorts/>). Representative panel studies such as the BHPS (started in 1991) and the SOEP (started in 1984) provide invaluable data on contemporaneous outcomes but suffer from the relatively late starting years.⁴ Of course individuals born in 1938 may be very different to those born post-World War Two - this issue can be examined as other cohorts reach comparable ages in the future.

One drawback with the WLS is that it is not a birth cohort, as data collection started only on high-school graduation at age 18. This means that there is not rich childhood data. Although the covariates at age 18 may be good proxies for childhood measures, they are not the same as those available in the UK British Cohort Study

³See for example Sacerdote (2007), Cunha & Heckman (2008) and Heckman & Mosso (2014).

⁴There is no data on individuals born in 1938 before the ages of 52 and 45 in the BHPS and SOEP respectively.)

(BCS) or National Child Development Study (NCDS). There nonetheless remains more than sufficient adult data for analysis. The fact that the cohort is restricted to high-school graduates again implies that we should be careful about making generalisations to the whole population.

A second issue is that only the three most-recent waves (1993, 2004 and 2011) contain well-being information. It is therefore not possible to see how well-being evolves over all of adult life (the earliest well-being observation is at age 54). In addition, the same well-being/covariate questions are not asked across the three years. Happiness (and health covariates) only appear in the 2004 and 2011 waves, whereas measures of eudaimonia are only available in 1993 and 2011. As a result, we focus on 2011 well-being (aged 72) and will use the 2004 happiness information to check for continuity over time.

We now turn to the key variables used in the analysis, starting with well-being before moving on to the distal and proximal covariates.

2.1 Well-being

We focus on two well-being measures: happiness and eudaimonia.⁵

Happiness

The happiness variable comes from the emotion component of the Health Utilities Index (HUI). Individuals were first asked if they felt happy/unhappy with their life over the past 4 weeks. If the individual replied “happy” they were asked if they were *somewhat happy* or *happy and interested in life*. If unhappy, they were asked if they were *somewhat unhappy*, *very unhappy* or *so unhappy that life is not worthwhile*. The resulting happiness variable is measured on a 1 to 5 scale ranging from *"So unhappy that life is not worthwhile"* to *"Happy and interested in life"*. One drawback of the measure is that, due to the negative wording, a majority of respondents in every wave chose the top category *"happy and interested in life"*, limiting the variation in the outcome.

⁵The full description of these well-being measures appears in Appendix A.

Eudaimonia

The eudaimonia scale comes from a psychological well-being model devised by Carol Ryff (1989). Questions are asked about six different aspects of life - autonomy, environmental mastery, personal growth, positive relations with others, purpose in life and self-acceptance, with the answers being combined to form a composite eudaimonic measure. Although the theoretical justification for the particular aspects chosen is debated in the literature, eudaimonia will prove a useful complement to the hedonic/cognitive happiness measure.⁶

2.2 Covariates

Table 1 presents the summary statistics of the distal covariates for different attrition sub-groups.⁷ Sample attrition is a concern, as the number of every-question respondents (3320) is considerably lower than the initial number of individuals surveyed (10317) and every-question respondents have different characteristics to dropouts. Across all covariates, the *Every-question Respondent* sub-group is different to both of the others, meaning that an uncorrected statistical analysis that only focuses on 2011 respondents will lead to biased estimates. Probability weighting (Wooldridge, 2002) and multiple imputation (Rubin 2004) will be used to address this problem.⁸

Regarding the last panel of Table 1, there is a substantial literature looking at the predictors of premature mortality in the WLS. Of particular interest, is the importance of adolescent IQ in predicting early death. In a well-known contribution, Gottfredson (2004) argued that early-life intelligence in itself was an important determinant of later-life health outcomes. More recent work using the WLS, by Hauser & Palloni (2012) and Maener et al. (2015), has instead suggested that educational attainment is a stronger predictor of longevity than raw intelligence. Although longevity is not the focus of this paper, we also find that the best early-life predictor of premature mortality is education. A number of contributions have looked at other determinants of mortality: Pudrovska & Anikputa (2013) found that although breast-cancer incidence is higher for more-educated women, the mortality rate is lower; Yonker et al. (2013) show that later onset of the menopause is associated with lower mortality; and Reither et al. (2009) find that overweight adolescents

⁶See Springer & Hauser (2006) for an assessment of the scale, using in part data from the WLS.

⁷See Appendix B for the detailed description of all of the variables.

⁸The results in the main text use inverse-probability weighting; the multiple-imputation results (with inverse-probability weighting) can be found in Appendix D. There are only small differences between these two sets of results.

Table 1: Distal Covariate Summary Statistics by Attrition Sub-group

Variable	Mean	Std. Dev.	Min.	Max.	N
<i>Every-question Respondent</i>					
IQ Score	103.7	14.4	61	145	3320
Log Parental Income	10.6	0.7	6.6	13.6	3320
Single-Parent Household	0.06	0.24	0	1	3320
Number of Siblings	3.1	2.4	0	26	3320
Parental Education	10.2	2.7	0	21	3320
Female	0.52	0.5	0	1	3320
<i>Alive - Missed 1+ 2011 Question</i>					
IQ Score	98.9	14.9	61	145	4734
Log Parental Income	10.5	0.7	6.7	13.6	3708
Single-Parent Household	0.12	0.33	0	1	4365
Number of Siblings	3.3	2.6	0	18	4341
Parental Education	10.1	2.8	1.5	21	4439
Female	0.56	0.5	0	1	4734
<i>Dead pre-2011</i>					
IQ Score	99.1	15.1	61	145	2346
Log Parental Income	10.5	0.7	6.653	13.559	2025
Single-Parent Household	0.12	0.32	0	1	1997
Number of Siblings	3.3	2.6	0	22	1985
Parental Education	10.1	2.6	2	21.5	2215
Female	0.43	0.5	0	1	2346

Note: *Every-question Respondent* refers to the sub-group of respondents who provided information on all of the distal (1957) and proximal (2011) covariates.

are twice as likely to suffer premature death than their non-overweight counterparts.

Table 2: Proximal Covariate Summary Statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
Years of Schooling	13.7	2.3	12	20	3320
Log Household Income	10.0	1.0	1.1	13.3	3320
Separated	0.1	0.3	0	1	3320
Widowed	0.12	0.33	0	1	3320
Never Married	0.04	0.185	0	1	3320
Unemployed	0.06	0.24	0	1	3320
Retired	0.64	0.48	0	1	3320
Social Participation	22.6	7.3	0	58	3320
Mental Health	125.6	14.7	8	140	3320
Physical Health	0.98	0.02	0.78	1	3320
Female	0.52	0.5	0	1	3320

Note: The statistics are calculated from the *Every-question Respondent* sub-group.

Table 2 presents the proximal covariate summary statistics from the *Every-question respondent* sub-group. Most of the variables are fairly self-explanatory, although mental and physical health probably require greater illumination. The summary statistics provide a useful snapshot of the life circumstances of WLS respondents at age 72. A sizeable number of individuals are widowed (12%), the majority have retired (64%) and most are in fairly good health.

Our mental-health variable comes from the CES-D depression scale.⁹ This scale is calculated from 20 questions about how many days over the past week the individual has felt certain emotions (16 negative, 4 positive) e.g. "*On how many days during the past week did you feel lonely?*". The test was designed in 1977 by Lenore Radloff, not as a test for clinical depression *per se*, but rather as an indicator of psychological distress. Physical Health is a composite score calculated from six of the eight Health Utilities Index Mark 3 (HUI) measures - vision, hearing, speech, ambulation, dexterity and pain.¹⁰

⁹Reverse coded so that a high *Mental Health* score indicates a low CES-D score.

¹⁰Emotion (where the happiness well-being measure comes from) and cognition (not directly related to physical health) are the two excluded measures.

3 Results

We now ask how much of the variation in later-life well-being across individuals can be explained by their distal and proximal variables. To do so we consider three different specifications: (1) distal-only, (2) proximal-only and (3) both together. All variables (except for gender) are standardised to represent their relative importance in explaining well-being at age 72.

Figure 1 depicts the relationships between different covariates and happiness, evaluated at age 72 in 2011.¹¹ Looking at the distal-only specification, we can see that the biggest single happiness effect comes from being female. This gender difference in well-being is well-known in the literature: women often report higher values on cognitive-evaluate measures of well-being than do men, but also higher stress scores (Nolen-Hoeksema and Rusting, 1999: see also Kahneman and Deaton, 2010). There is also a moderate positive effect from parental education and the childhood IQ score. The fact that variables from 50+ years ago have predictive power over current happiness is in itself an interesting result, showing that reduced form early-life outcomes are correlated with later-life well-being over 50 years later.

The introduction of the proximal variables produces substantial changes in the distal coefficients (as would be expected if these latter predict the proximal outcomes). The coefficient on *Female* becomes small and insignificant, indicating that the proximal channels almost entirely mediate the effect of gender. Moreover, the IQ score flips sign from positive to negative. Although intelligence in the reduced form appears beneficial for happiness, once we control for the later-life outcomes that are correlated with intelligence, the effect of IQ score becomes negative. This “residual” effect of IQ on well-being perhaps reflects greater expectations. Education was shown to be negatively correlated with the GHQ measure of well-being in the first wave of the BHPS in Clark and Oswald (1994). In Clark et al. (2015), education was explicitly shown to be positively correlated with how happy the individuals thought that they should be. Oreopoulos and Salvanes (2011) find a rise in the school-leaving age increased the well-being of those affected by the change, although Clark and Jung (2016) cannot replicate the UK results in BHPS data, with a life-satisfaction effect that is either zero or negative.

Regarding the proximal covariates, by far the strongest predictor of age-72 hap-

¹¹The analogous happiness results at age 65 in 2004 can be found in Appendix E. There are no great differences between the two sets of results.

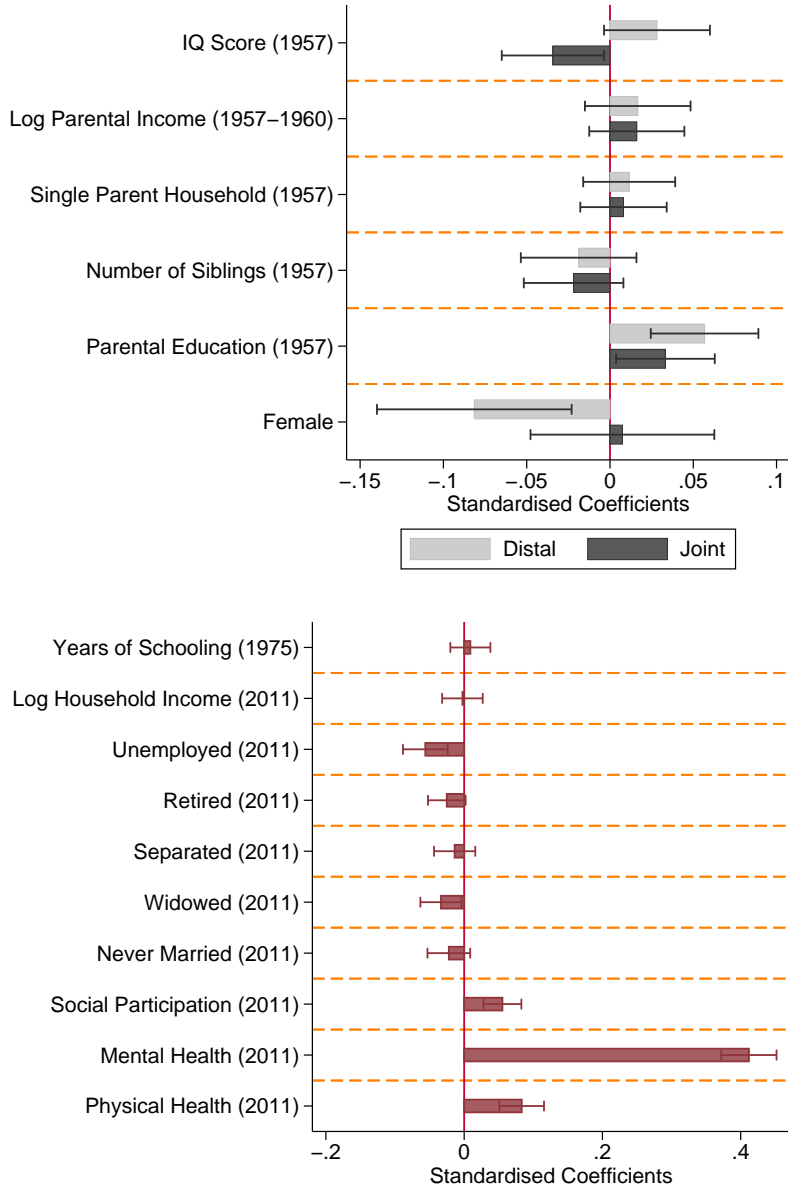
piness is mental health. This is in line with the results in the UK BCS and NCDS in Flèche et al. (2017). A one standard deviation rise in mental health is associated with 41% of a standard deviation higher happiness. On the contrary, physical health is nowhere near as important. Although there is a positive relationship with happiness, the coefficient is only one-fifth of the size of that on mental health. Other notable proximal factors at the bottom of Figure 1 are unemployment and widowhood, with negative estimated coefficients, and social participation, for which the estimated coefficient is positive.

Figure 2 shows the corresponding coefficients for eudaimonia. The distal-only specification indicates that a variety of early-life covariates are positively correlated with eudaimonia. The inclusion of the proximal variables leaves only gender and parental income as independent predictors of later-life eudaimonia. It is unclear quite why parental income is a good predictor of eudaimonia 50+ years later: it may be the case that higher parental income at a young age is associated with more choice over life-decisions such as education and career path. The fact that women have higher eudaimonia scores goes against the ESS findings of Clark & Senik (2011), although it should be underlined that the WLS and ESS eudaimonia measures are not the same in the two surveys, and of course the age ranges are very different.

Looking at the proximal covariates, we again see that mental health is a strong predictor of well-being, as is social participation. This latter may however reflect one of the six components of the eudaimonia score being *Positive Relationships*. It is worth noting here that social participation is also positively correlated with happiness, where there is of course no mechanical relationship. There is no relationship between physical health and eudaimonia, indicating that a sense of flourishing is much more closely linked to mental/social processes.

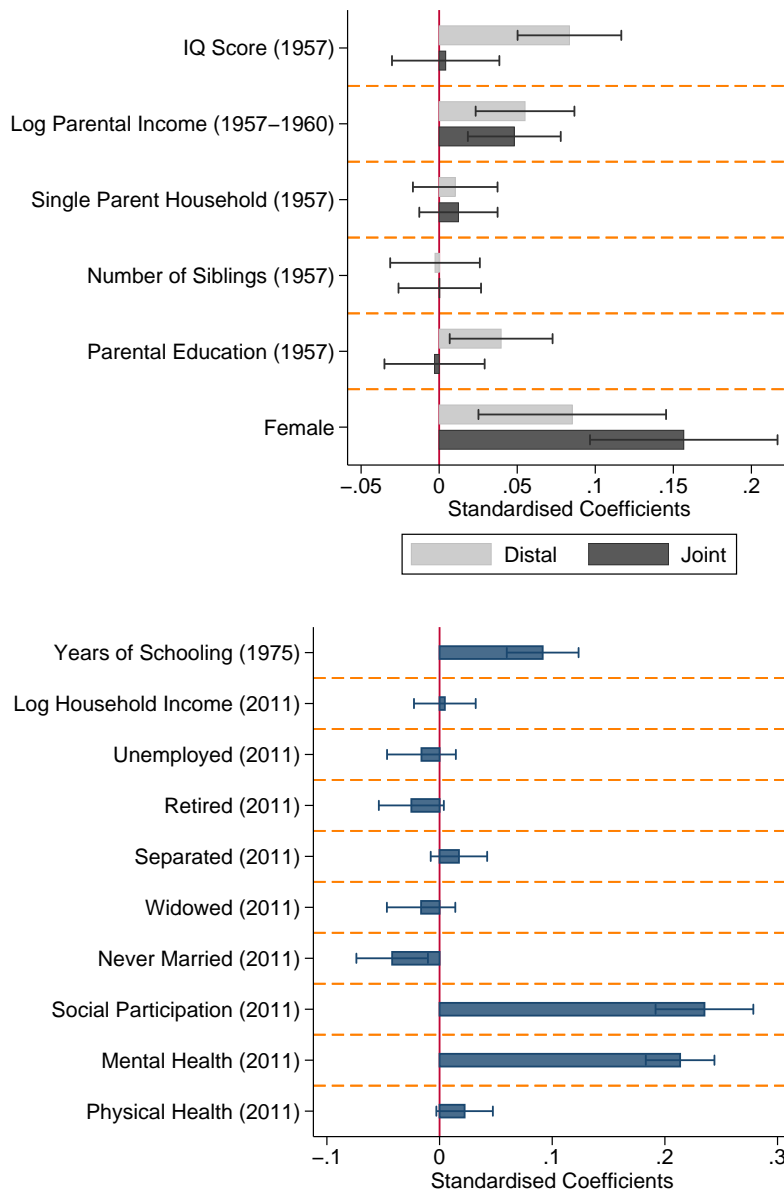
Unemployment is associated with lower happiness scores, but not significantly with lower eudaimonia. The latter may reflect that labour-force status is less relevant at age 72 than at younger ages. Clark & Senik (2011) consistently find that the unemployed report lower levels of eudaimonia.

Figure 1: The Distal and Proximal Correlates of Happiness at age 72



Note: Lines around the bar represent a 90% confidence interval. The full regression table appears in Appendix C. The proximal-only specification is not shown as the results there are very similar to those in the joint specification.

Figure 2: The Distal and Proximal Correlates of Eudaimonia at age 72



Note: Lines around the bar represent a 90% confidence interval. The full regression table appears in Appendix C. The proximal-only specification is not shown as the results there are very similar to those in the joint specification.

Two of the most “economic” variables here - income and years of schooling - have only a mixed effect on well-being. Years of schooling does turn out to be a good predictor of eudaimonia (as in Clark & Senik, 2011) but not of happiness. This may show that education is linked to the ability to make good life decisions. Household income has no independent effect on either happiness or eudaimonia. This is contrary to the ESS results in Clark & Senik (2011), where income is positively correlated with life satisfaction, happiness and four measures of eudaimonia. It is important to note here that this may reflect income not being a good measure of financial resources in later-life (wealth may be more important at this age). Alternatively, financial concerns in later life may have become of secondary importance compared to factors such as health and social participation. If this is the case, then some government spending on pensions may be usefully diverted to provide a more comprehensive health and social-care system.¹²

3.1 Channels

The fact that the distal coefficients changed with the introduction of proximal variables to the regression reveals mechanically that the distal and contemporaneous variables are correlated. Figure 3 considers the size of the different distal-proximal channels.

Of particular interest is the large change in the estimated coefficient on the childhood IQ score with the addition of the proximal variables: from positive to negative for happiness and from positive to zero for eudaimonia. Figure 3 shows that the early-life IQ score is positively correlated with a number of age-72 outcomes, including mental health (as in Flèche et al., 2017). Later-life mental health is one of the main correlates of adult life satisfaction, as can be seen in Figures 1 and 2, which explains why the estimated coefficient on *IQ Score* falls with the introduction of the proximal variables. A similar story can be told for years of schooling and eudaimonia: a higher childhood IQ score predicts adult years of schooling, which in turn is associated with higher levels of later-life eudaimonia.

The effect of any policy interventions that take place in early life should be predicted using the the distal-only (reduced-form) specification. A policy aimed at childhood cognitive performance will thus be predicted to improve later-life well-

¹²The correlation coefficient between the joint determinants of happiness and eudaimonia is 0.65, which is somewhat lower than most of the analogous figures in the ESS, BHPS and ONS in Clark, 2016a.

Figure 3: Distal-Proximal Channel Coefficients



Note: These coefficients come from separate regressions of each proximal variable on the set of distal variables. The five proximal variables that appear in each panel of the figure above are those with the greatest channel effect (the highest partial R^2). Lines around the bar represent a 90% confidence interval. The full regression results appear in Appendix C.

being (as well, of course, as higher well-being throughout life) through a variety of channels. This is not of course to say that childhood interventions are the only ones that matter. As the bottom panels of Figures 1 and 2 show, conditional on childhood, policies aimed at education success and later-life mental health are also predicted to increase well-being, to some extent in the same way as would policies aimed at childhood cognitive performance.

4 Conclusion

This analysis has shown a clear reduced-form impact of IQ scores, parental income and parental education on well-being 50+ years later. Family and early-life outcomes are thus associated with higher levels of well-being well into old age. This arguably underlines the large returns (as they last for so long) of interventions in these domains at young ages. Adding proximal variables to the analysis allows us to estimate the indirect and direct effect of the distal factors and the corresponding channels of influence. We find strong channel effects (in particular through mental health and years of schooling), with some early-life outcomes remaining significant predictors of well-being at age 72 even when the proximal variables are controlled for. This is of course not to say that we should neglect proximal variables in determining policy for well-being. In particular, interventions that target later-life social participation and mental health could have a substantial impact on later-life well-being.

One important caveat to any these results is that we do not control for fixed effects. It may be that individuals with better distal outcomes also had some genetic predisposition to being content with life. In that case, early-life interventions may not affect well-being. The same argument applies to social participation: extroverted/optimistic individuals may enjoy more social participation and report greater subjective well-being, and it may be that making unsociable people socialise more will actually reduce their well-being. Controlling for fixed effects using panel data would defeat the purpose of our analysis here: we only have one childhood, which remains constant through our adult lives. We can however imagine identification strategies for some adult outcomes, and perhaps greater analysis of the role of both personality variables (although these might be thought to be partly endogenous: see Boyce et al., 2013) and genetic factors (Pluess, 2015) in determining adult well-being.

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Appendix A: Well-being Measures

A.1 Happiness

The happiness measure comes directly from the emotion component of the Health Utilities Index, the score taken being the level achieved (reverse coded)

Level	Description
1	The respondent has been happy and interested in life.
2	The respondent has been somewhat happy.
3	The respondent has been somewhat unhappy.
4	The respondent has been very unhappy.
5	The respondent has been unhappy that life is not worthwhile

A.2 Eudaimonia

Eudaimonia is ascertained by asking individuals two questions about six aspects that are deemed to be important eudaimonically. All questions are answered on a seven-point scale:

1. Agree Strongly
2. Agree Moderately
3. Agree Slightly
4. Neither Agree or Disagree
5. Disagree Slightly
6. Disagree Moderately
7. Disagree Strongly

The score across the questions is then summed (reverse coded for positive questions) to calculate the eudaimonia score.

Self Acceptance:

- *To what extent do you agree that when you look at the story of your life, you are pleased with how things have turned out? (Reverse coded)*

- *To what extent do you agree that you like most aspects of your personality? (Reverse coded)*

Purpose in Life:

- *To what extent do you agree that some people wander aimlessly through life but you are not one of them? (Reverse Coded)*
- *To what extent do you agree that you live life one day at a time and don't really think about the future?*

Positive Relationships:

- *To what extent do you agree that maintaining close relationships has been difficult and frustrating for you?*
- *To what extent do you agree that you have not experienced many warm and trusting relationships with others?*

Environmental Mastery:

- *To what extent do you agree that, in general, you feel you are in charge of the situation in which you live? (Reverse coded)*
- *To what extent do you agree that the demands of everyday life often get you down?*

Personal Growth:

- *To what extent do you agree that for you, life has been a continuous process of learning, changing, and growing?(Reverse coded)*
- *To what extent do you agree that you gave up trying to make big improvements or changes in your life a long time ago?*

Autonomy:

- *To what extent do you agree that you tend to be influenced by people with strong opinions?*
- *To what extent do you agree that you judge yourself by what you think is important, not by what others think is important?(Reverse coded)*

Appendix B: Covariates

Distal Variables

<i>IQ Score (1957)</i>	IQ score mapped from raw Henmon-Nelson test score
<i>Log Parental Income (1957-60)</i>	Average Annual Parental Income (1957-1960) - from tax data (Corrected for inflation using the CPI index from the Bureau of Labor Statistics)
<i>Parental Education (1957)</i>	Average number of years of schooling of parents
<i>Single Parent Household (1975)</i>	<i>Did you live with both parents most of time up until 1957?</i>
<i>Number of Siblings (1975)</i>	Total number of siblings

Proximal Variables

<i>Years of Schooling (1975)</i>	Total years of schooling
<i>Log Household Income (1993, 2004, 2011)</i>	Household income per OECD adult equivalent (extra adults 0.7; children 0.5) For respondent and spouse: Reported income from wages, farm, interest, social security, pensions, public assistance, other government programs, child support, alimony, and other sources of income - child support and alimony expenditure For other household members: Total reported income (Corrected for inflation using the CPI index from the Bureau of Labor Statistics)
<i>Social Participation (1993, 2004, 2011)</i>	Sum of replies to participation question across 17 types of groups* <i>What is your level of involvement with...?</i> Great Deal = 4 Quite a Bit = 3 Some = 2 Very little = 1 Not involved = 0
<i>Marital Status (1993, 2004, 2011)</i>	<i>What is your current marital status?</i> Married (omitted dummy variable category) Separated Divorced (Included under separated dummy variable) Widowed Never married
<i>Employment Status (1993, 2004, 2011)</i>	Constructed from variables: 1993: <i>Current employment status</i> 1993: <i>Ever work in paid labor force from 1975 to 1992/93</i> 2004/2011: <i>Flag for current employment and retirement status</i>
<i>Mental Health</i>	CES-D Scale (See Section A1 for more details)
<i>Physical Health</i>	Physical health components of the Health Utilities Index (See Section A2 for more details)

* (1) Church-connected groups, but not the church itself (2) church, temple or other place of worship (3) Labour unions

(4) Veterans' Organizations (5) Fraternal organizations or lodges (6) Business or civic groups (7) Parent-teachers' associations
(8) Community centres (9) Organisations of people of the same nationality (10) Sport teams (11) Country clubs
(12) Youth groups, for example as a Scout leader (13) Professional groups (14) Political clubs or organizations
(15) Neighbourhood improvement organisations (16) Charity of welfare organizations (17) Hobby groups

B1: Mental Health

The mental health covariates come from the CES-D scale - based on 20 questions (16 negative + 4 positive) about how many days over the past week respondents felt a certain way in this past week. The CES-D scale is the total number of days across the 20 questions (negative questions reverse coded). The questions are as follows:

Negative Questions (reverse coded):

1. *On how many days during the past week did you feel you could not shake off the blues even with help from your family and friends?*
2. *On how many days during the past week did you feel bothered by things that usually don't bother you?*
3. *On how many days during the past week did you think your life had been a failure?*
4. *On how many days during the past week did you feel that people were unfriendly?*
5. *On how many days during the past week did you feel lonely?*
6. *On how many days during the past week did you have crying spells?*
7. *On how many days during the past week did you feel that people disliked you?*
8. *On how many days during the past week did you feel sad?*
9. *On how many days during the past week did you feel depressed?*
10. *On how many days during the past week did you have trouble keeping your mind on what you were doing?*
11. *On how many days during the past week did you not feel like eating, your appetite was poor?*
12. *On how many days during the past week did you feel you were just as good as other people?*
13. *On how many days during the past week did you feel fearful?*
14. *On how many days during the past week did you sleep restlessly?*

15. *On how many days during the past week did you talk less than usual?*
16. *On how many days during the past week did you feel you could not get going?*

Positive questions:

1. *On how many days during the past week did you feel happy?*
2. *On how many days during the past week did you enjoy life?*
3. *On how many days during the past week did you feel hopeful about the future?*
4. *On how many days during the past week did you feel you were just as good as other people?*

B2: Physical Health

Physical health is calculated from six of the eight components of the Health Utilities Index - vision, hearing, speech, ambulation, dexterity and pain. Emotion (where happiness well-being measure comes from) and cognition (not directly related to physical health) are the two excluded measures. Health over each of these components is ascertained by asking how the respondent has fared over the past four weeks. The six different domains and their associated questions are listed below - possible responses are Yes or No, unless otherwise stated¹³

¹³It is important to note that not all questions are asked to every respondent, rather the responses given affect the number of questions asked. For instance replying Yes to *During the past 4 weeks, have you been able to see well enough to read ordinary newsprint without glasses or contact lenses?* stops all further Vision questions and the highest vision level is assigned.

Vision

- *During the past 4 weeks, have you been able to see well enough to read ordinary newsprint without glasses or contact lenses?*
- *During the past 4 weeks, have you been able to see well enough to read ordinary newsprint with glasses or contact lenses?*
- *During the past 4 weeks, have you been able to see at all?*
- *During the past 4 weeks, have you been able to see well enough to recognize a friend on the other side of the street without glasses or contact lenses?*
- *During the past 4 weeks, have you been able to see well enough to recognize a friend on the other side of the street with glasses or contact lenses?*

Level Description

1	The respondent has been able to see well enough to read ordinary newsprint and recognize a friend on the other side of the street, without glasses or contact lenses
2	The respondent has been able to see well enough to read ordinary newsprint and recognize a friend on the other side of the street, but with glasses.
3	The respondent has been able to read ordinary newsprint with or without glasses but unable to recognize a friend on the other side of the street, even with glasses.
4	The respondent has been able to recognize a friend on the other side of the street with or without glasses but unable to read ordinary newsprint, even with glasses.
5	The respondent has been unable to read ordinary newsprint and unable to recognize a friend on the other side of the street, even with glasses.
6	The respondent has been unable to see at all.

Hearing

- *During the past 4 weeks, have you been able to hear what is said while in a group conversation with at least three other people without a hearing aid?*
- *During the past 4 weeks, have you been able to hear what is said in a group conversation with at least three other people with a hearing aid?*
- *During the past 4 weeks, have you been able to hear what is said in a conversation with one other person in a quiet room without a hearing aid?*
- *During the past 4 weeks, have you been able to hear what is said in a conversation with one other person in a quiet room with a hearing aid?*

Level Description

- | | |
|---|--|
| 1 | The respondent has been able to hear what is said in a group conversation with at least three other people, without a hearing aid. |
| 2 | The respondent has been able to hear what is said in a conversation with one other person in a quiet room without a hearing aid, but requires a hearing aid to hear what is said in a group conversation with at least three other people. |
| 3 | The respondent has been able to hear what is said in a conversation with one other person in a quiet room with a hearing aid, and able to hear what is said in a group conversation with at least three other people, with a hearing aid. |
| 4 | The respondent has been able to hear what is said in a conversation with one other person in a quiet room without a hearing aid, but unable to hear what is said in a group conversation with at least three other people even with a hearing aid. |
| 5 | The respondent has been able to hear what is said in a conversation with one other person in a quiet room without a hearing aid, but unable to hear what is said in a group conversation with at least three other people even with a hearing aid. |
| 6 | The respondent has been unable to hear at all. |

Speech

- *During the past 4 weeks, have people who do not know you understood you completely when you speak?*
- *During the past 4 weeks, have people who do not know you understood you partially when you speak?*
- *During the past 4 weeks, have people who know you well understood you completely when you speak?*
- *During the past 4 weeks, have people who know you well understood you partially when you speak?*
- *During the past 4 weeks, have you been able to speak at all?*

Level Description

- | | |
|---|---|
| 1 | The respondent has been able to be understood completely when speaking with strangers or friends. |
| 2 | The respondent has been able to be understood partially when speaking with strangers but able to be understood completely when speaking with people who know me well. |
| 3 | The respondent has been able to be understood partially when speaking with strangers or people who know me well. . |
| 4 | The respondent has been unable to be understood when speaking with strangers but able to be understood partially by people who know me well. |
| 5 | The respondent has been unable to be understood when speaking to other people (or unable to speak at all). |

Ambulation

- *During the past 4 weeks, have you been able to bend, lift, jump and run without difficulty and without help or equipment of any kind?*
- *During the past 4 weeks, have you been able to walk around the neighborhood without difficulty and without help or equipment of any kind?*
- *During the past 4 weeks, have you been able to walk around the neighborhood with difficulty but without help or equipment of any kind?*
- *During the past 4 weeks, have you been able to walk at all?*
- *During the past 4 weeks, have you needed mechanical support, such as braces or a cane or crutches, to be able to walk around the neighborhood?*
- *During the past 4 weeks, have you needed the help of another person to walk?*
- *During the past 4 weeks, have you needed a wheelchair to get around the neighborhood?*
- *During the past 4 weeks, have you needed the help of another person to get around in the wheelchair?*

Level Description

- | | |
|---|---|
| 1 | The respondent has been able to walk around the neighborhood without difficulty, and without walking equipment. |
| 2 | The respondent has been able to walk around the neighborhood with difficulty; but does not require walking equipment or the help of another person. |
| 3 | The respondent has been able to walk around the neighborhood with walking equipment, but without the help of another person. |
| 4 | The respondent has been able to walk only short distances with walking equipment, and requires a wheelchair to get around the neighborhood. |
| 5 | The respondent has been unable to walk alone, even with walking equipment. |
| 6 | The respondent could not walk at all. |

Dexterity

- *During the past 4 weeks, have you had full use of both hands and 10 fingers?*
- *During the past 4 weeks, have you needed the help of another person because of limitations in the use of your hands or fingers?*
- *During the past 4 weeks, due to limitations in the use of your hands or fingers, have you needed the help of another person with some tasks, most tasks, or all tasks?*
- *During the past 4 weeks, have you needed special equipment, for example, special tools to help with dressing or eating, because of limitations in the use of your hands or fingers?*
- *During the past 4 weeks, have you been able to eat, bathe, dress and use the toilet without difficulty?*
- *During the past 4 weeks, have you needed the help of another person to eat, bathe, dress or use the toilet?*
- *During the past 4 weeks, have you needed special equipment or tools to eat, bathe, dress or use the toilet?*

Level Description

- | | |
|---|---|
| 1 | The respondent has had full use of two hands and ten fingers. |
| 2 | The respondent has had limitations in the use of hands or fingers, but does not require special tools or help of another person. |
| 3 | The respondent has had limitations in the use of hands or fingers; s/he is independent with use of special tools and does not require the help of another person. |
| 4 | The respondent has had limitations in the use of hands or fingers; s/he requires the help of another person for some tasks and is not independent even with use of special tools. |
| 5 | The respondent has had limitations in the use of hands or fingers; s/he requires the help of another person for most tasks and is not independent even with use of special tools. |
| 6 | The respondent has had limitations in use of hands or fingers; s/he requires the help of another person for all tasks and is not independent even with use of special tools. |

Pain

- *During the past 4 weeks, have you had any trouble with pain or discomfort?*
- *During the past 4 weeks, how many of your activities were limited by pain or discomfort? [Possible responses: None, A few, Some, Most, All]*

Level Description

- | | |
|---|---|
| 1 | The respondent has been free of pain and discomfort |
| 2 | The respondent has been in mild to moderate pain that prevents no activities. |
| 3 | The respondent has been in moderate pain that prevents a few activities. |
| 4 | The respondent has been in moderate to severe pain that prevents some activities. |
| 5 | The respondent has been in severe pain that prevents most activities. |

Calculation

In order to obtain a single overall measure of health the different domains must be combined. Each level is assigned a domain-specific score between 0 and 1, as shown in Table B.1, and the average score is taken.

Table B.1: Domain Level Score

Level	Vision	Hearing	Speech	Ambulation	Dexterity	Pain
1	1.00	1.00	1.00	1.00	1.00	1.00
2	0.98	0.95	0.94	0.93	0.95	0.96
3	0.89	0.89	0.89	0.86	0.88	0.90
4	0.84	0.80	0.81	0.73	0.76	0.77
5	0.75	0.74	0.68	0.65	0.65	0.55
6	0.61	0.61		0.58	0.56	

Appendix C: Regression Tables

Table C1: The Relationship between Distal/Proximal Covariates and 2011 Well-being

	(1)	(2)	(3)	(4)	(5)	(6)
	Happiness	Happiness	Happiness	Eudaimonia	Eudaimonia	Eudaimonia
<i>Distal Covariates</i>						
IQ Score	0.0282 (0.0193)		-0.0343* (0.0186)	0.0835*** (0.0202)		0.00417 (0.0209)
Log Parental Income	0.0167 (0.0193)		0.0161 (0.0174)	0.0550*** (0.0192)		0.0481*** (0.0181)
Parental Education	0.0568*** (0.0196)		0.0333* (0.0180)	0.0397** (0.0200)		-0.0030 (0.0195)
Number of Siblings	-0.0188 (0.0211)		-0.0218 (0.0182)	-0.0027 (0.0175)		0.0004 (0.0161)
Single Parent Household	0.0115 (0.0168)		0.0081 (0.0158)	0.0103 (0.0165)		0.0123 (0.0152)
<i>Proximal Covariates</i>						
Years of Schooling		0.0130 (0.0158)	0.0090 (0.0176)		0.103*** (0.0179)	0.0915*** (0.0194)
Log Household Income		-0.0032 (0.0177)	-0.0025 (0.0178)		0.00771 (0.0166)	0.0047 (0.0166)
Social Participation		0.0551*** (0.0168)	0.0553*** (0.0167)		0.235*** (0.0265)	0.235*** (0.0264)
Separated		-0.0125 (0.0182)	-0.0138 (0.0181)		0.0178 (0.0152)	0.0172 (0.0152)
Widowed		-0.0330* (0.0181)	-0.0335* (0.0181)		-0.0160 (0.0185)	-0.0164 (0.0184)
Never Married		-0.0215 (0.0187)	-0.0222 (0.0188)		-0.0421** (0.0193)	-0.0421** (0.0193)
Unemployed		-0.0532*** (0.0197)	-0.0562*** (0.0197)		-0.0138 (0.0185)	-0.0161 (0.0186)
Retired		-0.0230 (0.0166)	-0.0251 (0.0166)		-0.0239 (0.0175)	-0.0250 (0.0175)
Mental Health		0.410*** (0.0242)	0.412*** (0.0243)		0.214*** (0.0180)	0.214*** (0.0185)
Physical Health		0.0851*** (0.0195)	0.0832*** (0.0196)		0.0224 (0.0152)	0.0222 (0.0152)
Female	-0.0815** (0.0355)	0.0021 (0.0331)	0.0075 (0.0335)	0.0853** (0.0365)	0.160*** (0.0375)	0.157*** (0.0365)
Observations	3320	3320	3320	3320	3320	3320
Adjusted R^2	0.007	0.209	0.211	0.016	0.134	0.135

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table C2: 2011 Channels

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Years of Schooling	Log Household Income	Social Participation	Separated	Widowed	Never Married	Unemployed	Retired	Mental Health	Physical Health
IQ Score	0.333*** (0.0139)	0.145*** (0.0170)	0.0867*** (0.0186)	-0.00802 (0.0181)	-0.0486** (0.0194)	0.0131 (0.0202)	-0.0231 (0.0188)	-0.0290 (0.0185)	0.123*** (0.0213)	0.0108 (0.0197)
Parental Education	0.213*** (0.0163)	0.0327* (0.0185)	0.0637*** (0.0206)	0.0295 (0.0201)	-0.0394** (0.0199)	0.0163 (0.0204)	-0.0166 (0.0207)	0.00979 (0.0194)	0.0288 (0.0195)	0.0605*** (0.0193)
Number of Siblings	-0.0504*** (0.0128)	-0.00352 (0.0156)	-0.0000648 (0.0202)	0.00345 (0.0172)	0.00118 (0.0210)	-0.0139 (0.0170)	-0.0447** (0.0174)	-0.00141 (0.0180)	0.000401 (0.0211)	0.00638 (0.0197)
Single Parent Household	-0.000115 (0.0135)	0.0390*** (0.0123)	-0.0252 (0.0183)	0.00163 (0.0179)	0.0317 (0.0202)	-0.00193 (0.0172)	0.0201 (0.0201)	0.0127 (0.0174)	0.0270 (0.0181)	-0.0446* (0.0241)
Female	-0.369*** (0.0282)	-0.351*** (0.0335)	0.0185 (0.0354)	0.197*** (0.0351)	0.376*** (0.0350)	0.0242 (0.0350)	0.0559 (0.0357)	0.159*** (0.0352)	-0.140*** (0.0364)	-0.0830** (0.0358)
Log Parental Income	0.0721*** (0.0154)	0.0580*** (0.0173)	-0.00122 (0.0196)	0.00124 (0.0205)	0.0148 (0.0189)	0.00443 (0.0166)	0.0302 (0.0189)	-0.00404 (0.0194)	0.00452 (0.0197)	0.00572 (0.0198)
Observations	3320	3320	3320	3320	3320	3320	3320	3320	3320	3320
Adjusted R^2	0.285	0.063	0.013	0.008	0.037	-0.001	0.002	0.005	0.021	0.006

Standard errors in parentheses
 * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Appendix D: Multiple Imputation

Table D1: The Relationship between Distal/Proximal Covariates and 2011 Well-being (Multiple Imputation)

	(1)	(2)	(3)	(4)	(5)	(6)
	Happiness	Happiness	Happiness	Eudaimonia	Eudaimonia	Eudaimonia
<i>Distal Covariates</i>						
IQ Score	0.0197 (0.0150)		-0.0465*** (0.0147)	0.0890*** (0.0202)		0.0133 (0.0165)
Log Parental Income	0.0084 (0.0159)		0.0083 (0.0142)	0.0649*** (0.0192)		0.0548*** (0.0150)
Parental Education	0.0605*** (0.0154)		0.0333* (0.0194)	0.0528** (0.0200)		0.0157 (0.0156)
Number of Siblings	-0.0123 (0.0156)		-0.0174 (0.0139)	0.0010 (0.0175)		0.0001 (0.0133)
Single Parent Household	0.0257* (0.0138)		0.0360*** (0.0125)	0.0360 *** (0.0135)		0.0361*** (0.0127)
<i>Proximal Covariates</i>						
Years of Schooling		0.0142 (0.0127)	0.0165 (0.0145)		0.945*** (0.0135)	0.0706*** (0.0194)
Log Household Income		-0.0153 (0.0138)	-0.0133 (0.0137)		0.0320** (0.0162)	0.0271** (0.0159)
Social Participation		0.0445*** (0.0137)	0.0456*** (0.0131)		0.225*** (0.0216)	0.224*** (0.0214)
Separated		-0.0251* (0.0122)	-0.0259* (0.0137)		0.0228* (0.0152)	0.0231* (0.0123)
Widowed		-0.0411*** (0.0181)	-0.0430*** (0.0151)		-0.0252* (0.0153)	-0.0248 (0.0152)
Never Married		-0.0104 (0.0133)	-0.0101 (0.0134)		-0.0208 (0.0134)	-0.0202 (0.0135)
Unemployed		-0.0450*** (0.0160)	-0.0470*** (0.0159)		-0.0036 (0.0149)	-0.0068 (0.0148)
Retired		-0.0051 (0.0138)	-0.0063 (0.0137)		-0.0070 (0.0161)	-0.0086 (0.0159)
Mental Health		0.415*** (0.0196)	0.418*** (0.0196)		0.180*** (0.0144)	0.178*** (0.0150)
Physical Health		0.0582*** (0.0155)	0.0562*** (0.0155)		0.0139 (0.0144)	0.0142 (0.0152)
Female	-0.0815** (0.0355)	0.0153 (0.260)	0.207 (0.0335)	0.0853** (0.0365)	0.172*** (0.0375)	0.160*** (0.0290)
Observations	5190	5190	5190	5190	5190	5190

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Appendix E: 2004 Happiness Regressions

Table E1: The Relationship between Distal/Proximal Covariates and 2004 Happiness

	(1)	(2)	(3)
	Happiness	Happiness	Happiness
<i>Distal Covariates</i>			
IQ Score	0.0202 (0.0185)		-0.0478*** (0.0182)
Log Parental Income	-0.00554 (0.0197)		-0.0164 (0.0182)
Parental Education	0.0323* (0.0196)		0.0118 (0.0181)
Number of Siblings	-0.00503 (0.0216)		0.000192 (0.0190)
Single Parent Household	-0.0331 (0.0218)		-0.0303 (0.0195)
<i>Proximal Covariates</i>			
Years of Schooling		0.00214 (0.0168)	0.0206 (0.0185)
Log Household Income		0.0230 (0.0171)	0.0308* (0.0173)
Unemployed		-0.0672*** (0.0255)	-0.0669*** (0.0254)
Retired		-0.00184 (0.0168)	-0.00155 (0.0168)
Separated		-0.0198 (0.0172)	-0.0195 (0.0171)
Never Married		-0.0277 (0.0195)	-0.0271 (0.0194)
Widowed		-0.0603*** (0.0229)	-0.0604*** (0.0231)
Social Participation		0.0279 (0.0171)	0.0259 (0.0170)
Mental Health		0.370*** (0.0304)	0.374*** (0.0300)
Physical Health		0.0587** (0.0244)	0.0582** (0.0243)
Female	-0.0302 (0.0367)	0.0678* (0.0353)	0.0789** (0.0353)
Observations	3073	3073	3073
Adjusted R^2	0.001	0.176	0.178

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$