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Early predictors of Alpha and Beta Personality factors in adulthood

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Abstract

This study examined the predictors of two higher factors of personality (Alpha and Beta) using a large nationally representative sample. In total, we had 5476 participants data on family social status measured at birth, childhood intelligence ability assessed at age 11 years, behavioural problems and leisure activities (sports and parties) at age 16 years, psychological distress at age 23 years, optimism and educational qualifications at age 33 years, occupational prestige at age 42 years, and Big Five personality measured at 50 years. We combined Big Five scores into Alpha and Beta Factors. Correlational analysis showed that childhood intelligence, teenager behavioural problems and leisure activities, psychological distress, optimism, and occupational prestige were all significant correlates of the Alpha Factor. Structural equational modelling (SEM) showed that education and occupation, childhood intelligence, teenage behavioural problems and leisure activities, as well as optimism were all direct predictors of the latent Alpha Factor; and childhood intelligence, education and occupation, psychological distress and optimism were the direct predictors of the latent Beta Factor. Gender was significantly associated with both Alpha and Beta Factors. Implications and limitations are acknowledged.

Word Count: 4934

Key Words: Alpha and Beta Personality Factors; Parental Social Status; Childhood Intelligence; Behavioural Problems; Leisure Activities; Psychological Distress; Optimism; Education and Occupation

Introduction

This study examined the correlates of Alpha and Beta personality factors respectively. There has long been a debate about the structure of personality, though the Five Factor Model (FFM) has dominated research in this area for many years (Cooper, 2010; Goldberg, 1993). Whilst there was a flurry of interest in the single factor of personality (Rushton & Irwing, 2008) there is better evidence for the two-factor model proposed by Digman (1997).

Over twenty years ago, Digman (1997) in an analysis of the Big Five came up with two superordinate factors referred to these factors as "Alpha" and "Beta". Alpha was the combination of Agreeableness, Conscientiousness and Neuroticism while Beta was a combination of Extraversion and Openness. He suggested that Alpha may represent a *social desirability factor* while Beta was interpreted as *desire for personal growth.* He also called them "Communion" and "Agency" where agency refers to as strivings for mastery, power, self-assertion, and self-expansion while communion referred to the drive toward community and the relinquishing of individuality.

Later, DeYoung et. al. (2002) suggested that the Alpha and Beta factors might be better interpreted as "Stability" and "Plasticity": Stability is, in essence, a person's general ability to maintain stable relationships, motivation and emotional states. Beta was more an index of "cognitive flexibility" or plasticity. Hirsh et al. (2009) noted *"variability in human personality appears to reflect restraint and engagement. Stability appears to be associated with refraining from a variety of behaviors associated with disruptive impulses (such as drug use and reactive aggression), whereas Plasticity appears to be associated with engaging in a variety of behaviors associated with approach behavior and exploration (such as creative expression and attending social events). These results are consistent with the theory that the meta-traits reflect*

serotonergically mediated self-regulation and constraint on the one hand and dopaminergically mediated exploration and engagement on the other" (p. 1096).

The two factor model has attracted a great deal of research. Digman's paper has been cited over 1750 times and there have been careful and positive reviews of the Two Factor Model (TFM). Cieciuch and Strus, (2017) in their comprehensive review, noted that there is now a considerable body of evidence that only two broad factors appear to be fully ubiquitous across languages and cultures. They also noted important characteristics of this model namely: *Biological foundations* – Alpha/Stability and Beta/Plasticity have been found to be genetically determined and are thought to have neurobiological substrates in the serotonergic and dopaminergic systems, respectively; *Theoretical explanatory mechanisms* – Alpha/Stability and Beta/Plasticity are considered to describe the broadest psychological properties (parameters) of the human cybernetic system; and the possibility of integration with many other constructs developed within various models and theories of personality, emotion, and motivation

In this study we shall use the two factors as the criterion variables.

Correlates of personality

In most studies on personality, traits are the independent variable. Most personality researchers are interested in exploring which and how personality traits are related to/explain/predict behaviours in many areas such as education, health, relationships and work (Furnham & Heaven, 1999). That is, traits are always the independent variables, rarely the dependent variables. However, more recent studies have seen documented bi-directional and transactional relations between personality and environmental factors where there are treated as both dependent *and* independent variables

Others have a adopted a cybernetic or cumulative continuity variable or maturity principle which focuses on the development of personality over time (De Young, 2015)

There are however a number of studies on the stability of personality traits over time. Personality traits are both stable over time (Roberts, Wood, & Caspi, 2008) but also subject to change (Caspi, Roberts, & Shiner, 2005; Furnham & Cheng, 2019; Roberts, Walton & Viechtbauer, 2006). In a recent study of the stability over a six year period Furnham and Cheng (2019) showed that, as expected, Agreeableness, Conscientiousness, and Extroversion significantly increased, whereas Neuroticism significantly decreased, and Openness remained essentially the same over the time period.

There are far fewer studies like this one, which look at early indicators of personality traits. Inevitable this involves collecting longitudinal data. However, using the same longitudinal cohort data, Furnham and Cheng (2014, 2015, 2016, 2017, 2018) conducted studies on attitudinal, biographical, demographic, and intelligence correlates of each of the Big Five traits with a large representative sample. In each study they selected and tested a number of possible early indicators of the trait measures many years before. The extensive data set allows for the choice of a number of variables that may be considered relevant to the development of the trait from a theoretical perspective For instance, Furnham and Cheng (2015) found that childhood intelligence, education, occupation, and gender had the direct effects on trait Agreeableness, whilst family social status had indirect effects on adult trait Agreeableness. Gender was the strongest predictor of trait Agreeableness. Later, Furnham and Cheng (2018) found that six factors: childhood social life, childhood speech ability, attending parties and sports, optimism, and occupational levels were significant and independent predictors of trait Extraversion in adulthood for both men and women. This was based on Wilt and Revelle's (2008) analysis of extraversion

This study

In this study we used a less explored approach examining the correlates of Alpha and Beta personality factors, using a large and nationally representative longitudinal dataset in the UK. Based on the literature on Alpha and Beta Factors we explored various variables like parental social status, childhood intelligence, teenage behavioural problems, teenager leisure activities, psychological distress, optimism, and education and occupation which were all available in this valuable data set. Based on our understanding of the Alpha and Beta factors we assumed each would be related to those higher-order traits based on our, and other, studies on the correlates of individual traits (Furnham & Cheng, 2019). We chose to examine some variables which had not previously been examined. We then set out to explore the relationship between the variables (distal to proximal) by SEM. The two higher order factors Alpha and Beta were our criterion variables.

Based on the literature on Alpha and Beta Factors we had hypothesized: (H1) Parental social status would be significantly and positively correlated with both Alpha and Beta Factors; (H2) Childhood intelligence would be significantly and positively correlated with both Alpha and Beta Factors; (H3) Teenage behavioural problems would be significantly and negatively correlated with both Alpha and Beta Factors; (H4) Teenage leisure activities would be significantly and positively correlated with both Alpha and Beta Factors; (H5) Psychological distress would be significantly and negatively correlated with both Alpha and Beta Factors; (H6) Optimism would be significantly and positively correlated with both Alpha and Beta Factors; (H7) Education and occupation would be significantly and positively correlated with both Alpha and Beta Factors; (H8) All nine independent variable listed in (H1) to (H8) would be independently associated with both Alpha and Beta Factors.

Method

Participants

The National Child Development Study 1958 is a large-scale longitudinal study of the 17,415 individuals who were born in Great Britain in a week in March 1958 (Ferri, Bynner, & Wadsworth, 2003). There were 9 follow-ups. The dependent variable in this study was measured at age 50 years in 2008. At age 50 years, 9,790 (response = 79%) participants completed a questionnaire on the Big-Five personality factors: Extraversion (A), Emotional Stability/Neuroticism (N), Agreeableness (A), Conscientiousness (C), Openness/Intellect (O). These five personality factors were combined into the "Alpha Factor" (A+C+N) and "Beta Factor" (E+O). The analytic sample comprises 5476 cohort members (49 per cent females) for whom complete relevant data were collected at birth, at ages 11 years, 16 years, 23 years, 33 years, 42 years and the outcome measure at 50 years. Bias due to attrition of the sample during childhood has been shown to be minimal (Davie, Butler, & Goldstein, 1972; Fogelman, 1976).

Measures

1. *Family social status* includes information on parental social class and parental education. Parental social class at birth was measured by the Registrar General's measure of social class (RGSC). RGSC was coded on a 6-point scale, ranging from unskilled occupations to professional (Leete, 1977). Parental education is measured by the age parents had left their full-time education.
2. *Childhood intelligence* was assessed at age 11 in school using a general ability test (Douglas, 1964) consisting of 40 verbal and 40 non-verbal items.

3. *The Behaviour Adjustment Scale* It consists of 14 items. It was answered by mothers when participants were 16 years old (Rutter, Tizard, & Whitmore, 1970). The Cronbach's alpha coefficient was 0.66 in the study.
4. *Leisure Activities* were two self-report measures when cohort members were at age 16 years. Going to friends' parties was a 2-item measure and Sports was a 3-item measure with the same response (No chance=0, Hardly ever=1, Sometimes=2, Often=3). Cronbach's alpha coefficient was .61 for Sports, and 0.62 for Parties.
5. *Psychological distress* was assessed at age 23 using Rutter Malaise Inventory (Rutter, Tizard, & Whitmore, 1970). It comprises of 24 items with Yes/No. Cronbach's alpha coefficient was 0.81 in the study.
6. *Optimism* was a measure at aged 33yrs with three indicators. Never get what I want of life/Usually do (1=Never get what I want, 2=Usually get what I want); Usually have control over life/Usually don't (1=have no real effect, 2=Usually have control); Satisfaction with way life has turned out so far (1=Life's just too much, 2=I can run my life).
7. *Education* was measured at age 33 years. Responses are coded to the six-point scale of National Vocational Qualifications levels (NVQ) ranging from 'none' to 'university degree or equivalent'.
8. *Occupation* was measured at age 42 years. Responses are coded according to the RGSC described above, using a 6-point classification mentioned above.
9. *Alpha and Beta Personality factors* were assessed at age 50 years, from the International Personality Item Pool (IPIP) (Goldberg, 1999). Responses (5-point, from "Strongly Agree" to "Strongly Disagree"). It is comprised of 10 items for each of the Big-five personality factors. After combining these five personality factors into the Alpha Factor (A+C+N, in

which N was reversed as Emotional Stability) and Beta Factor (E+O), Cronbach's alpha coefficient was 0.83 for Alpha Factor and .87 for Beta Factor.

Statistical Analysis

First, correlation analysis was conducted examining the bivariate associations between the measures used in the study. Second, two Structural equational models were designed and tested using latent Alpha and Beta Factors as the outcome variables respectively, using IBM SPSS Statistic 26 and IBM Amos version 26.

Results

Correlational Analysis

Table 1 shows the correlation matrix of means and SDs of all variables examined in the study. The two Alpha and Beta personality factors were modestly but significantly associated with all psychological and socio-demographic factors examined in the study in the expected direction ($p<.05$ to $p<.001$). All of the correlations were significant, partly a function of the size of the N. In all, four of the 30 correlations were r>.20, and of the remainder 13 $r>.10$. For 10 of the 15 comparisons the correlations were higher for the Beta compared to the Alpha factor, particularly parental and cohort members' own education. The biggest difference was for Psychological Distress which was much more negatively correlated with Alpha ($r=-.23$) compared to Beta ($r=-.06$). Overall, the Alpha factor was much more closely associated with stability and adjustment, probably because Neuroticism (reversed as Emotional Stability) was a component of Alpha Factor.

Gender was significantly and positively associated with both Alpha and Beta Factors. Interestingly both intelligence scores were positively associated with both Alpha and Beta.

Insert Table 1 about here

Structural Equation Modelling

Structural Equation Modelling (SEM) was used to assess the links between a set of variables in the study. To keep the models neat, all indirect paths which were not statistically significant in both models were removed from the final models. The SEM model testing was carried out using the structural equation modelling program AMOS 26. FIML is preferable to maximum likelihood estimation based on complete data (the listwise deletion (LD) approach) since FIML estimates tend to show less bias and are more reliable than LD estimates even when the data deviate from missing at random and are non-ignorable (Arbuckle, 1996).

Insert Tables 2 and 3 about here

Figures 1 and 2 show the standardised path coefficients of the SEM for Alpha and Beta Factors respectively. The solid lines indicate that the corresponding path coefficients were statistically significant and dashed line indicate that the path coefficients were non-significant. Measurement errors for each observable variable were included in the model (not shown in the diagram).

The χ^2 statistic is overly sensitive when sample sizes are large or the observed variables are non-normally distributed. The root mean square error of approximation (RMSEA) gives a measure of the discrepancy in fit per degrees of freedom (<.05 indicates a good fit). The indices of choices are

the Comparative Fit Index (CFI), and the Tucker Lewis Index (or Non-normed Fit Index) where values above .95 indicate a very good fit, and values >.90 are interpreted as "good" (Bentler, 1990).

The model in Figure 1 for Alpha Factor showed a reasonably good fit. Chi-square was 1580.1 (df = 98, p <.001), the CFI was .913, the TLI was .850, and the RMSEA was .053. The model explains 22 per cent of the total variance of Alpha Factor in adulthood.

Figure 1 shows that childhood intelligence, teenager behavioural problems and leisure activities, optimism, education and occupation were the significant and direct predictors of Alpha Factor. Thus hypotheses (H2) to (H7) were further confirmed. Hypothesis (H8) was partially supported, for parental social status and psychological distress were not the significant predictors of Alpha Factor. Gender was significantly and positively associated with the outcome variable.

Insert Figures 1 and 2 about here

The model in Figure 2 for Beta Factor showed a good fit. Chi-square was 710.9 (df = 81, p < .001), the CFI was .962, the TLI was .929, and the RMSEA was .038. The model explains 9 per cent of the total variance of Beta Factor in adulthood.

Figure 2 shows that parental social status, childhood intelligence, education and occupation, and optimism were the significant and direct predictors of Beta Factor. Thus hypotheses (H2), (H4), (H5), (H6) and (H7) were further confirmed. Gender was significantly and positively associated with Beta Factor.

Figures 1 and 2 also show that parental social status and childhood intelligence had significant and positive effects on education and occupation, and females scored significantly lower than males on sports and higher on psychological distress. Further, more frequent sports had

significant and negative effect on psychological distress, but significant and positive effect on education.

Discussion

The correlation matrix (Table 1) shows the extent to which the early indicators were related to the two factors. For the Alpha Factor the three highest correlates were psychological distress (negative) and the first and third optimism factors whereas for the Beta Factor it was education and occupation (social class). All the correlations were in the same direction (and significant) for both factors the biggest differences being for psychological distress, education and behaviour problems. The findings of the study also show that in all ten variables: parental social status indicators, childhood intelligence, teenager behavioural problems, sports and parties, psychological distress, optimism, education and occupation, and gender were all significantly associated with both Alpha and Beta Factors.

SEM in Figure 1 shows that eight factors had the direct effects on Alpha Factor. Children who had higher scores on cognitive ability tests, who more often had leisure activities such as sports and parties and lower scores on behavioural problem in teenage years, who had lower scores on psychological distress and higher optimism in early adulthood, and obtained a higher educational qualification, a higher level on occupation tended to score higher on Alpha Factor. The strongest predictors were gender, optimism and occupation. This may reflect the significant and negative associations between neuroticism and optimism (Cheng & Furnham, 2001), between neuroticism and psychological distress (Furnham & Cheng, 1999; Cheng & Furnham, 2003), and between gender and agreeableness (Furnham, 2008) (in this study r=.43, p<.001).

These results confirm the theoretical understanding of Alpha as being associated with communion and stability (behavioural problems, psychological distress, optimism) and less with social interaction (parties, sport). It was interesting that lack of behavioural problems at 16 and optimism at 33 predicted Alpha at aged 50.

Structural Equation Modelling in Figure 2 shows that eight factors had the direct effects on Beta Factor. Cohort members who had higher scores on cognitive ability tests in childhood, who had higher scores on optimism, and higher scores on education and occupation tended to score higher on Beta Factor. The strongest predictor was childhood intelligence, followed by education and occupation. This may reflect the significant and positive associations between openness and education and occupation (Furnham, 2008) (r=.31 between openness and education and r=.26 between openness and occupation, p<.001 in this study). Further, the findings show that sports significantly reduced the scores on psychological distress 7 years later and significantly enhanced educational qualifications 17 years later, indicating the importance in physical exercise in one's life.

Again, the results provide some support for the overall conception of the Beta factor as associated with approach behaviours, exploration and flexibility/plasticity. Beta scorers tend to be brighter and better educated and higher socio-economic status all of which are associated with personal growth, agency and plasticity by which this trait is also known

In general, the variables predicting Alpha Factor and variables predicting Beta Factor are very similar, except that optimism was more important variable for Alpha Factor and childhood intelligence was more important variable for Beta factor. This makes sense in terms of the way the factors are conceived namely that Alpha is more associated with social desirability and stability and Beta with agency.

What was particularly interesting was the role of optimism measures at age 33 years. This concept has been linked to many individual difference variables like Extraversion, Emotional Stability, Locus of Control and self-esteem. Indeed, it could be seen at the centre of the CORE concept of Judge et al. (2002) which also combines various traits into a single concept. Whilst we had just three single item measures with was interesting to note that assessed at aged 33, they were among the highest correlates of the Alpha factor at age 50 years.

Like all studies this one had limitations. It would have been very desirable to have data on personality many years earlier *as well,* so that we could see both the stability over time but also whether the correlates were stable. It would also have been particularly interesting to have data on the parents' personality. Also, some of the measures consisted of just two or three items combined which from a psychometric point of view is suboptimal. Ideally also we could have had a measure of the Big Five which had facet scores so making for a more granular analysis.

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Table 1. Pearson correlations among variables used in the study.

	Variables	Mean SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1.	Alpha factor	99.66 (11.8)	_																
2.	Beta factor	62.06 (9.88)	**.38***	_															
3.	Gender	.49 (.50)	**.04***	**.03***	_														
4.	Parental social class	3.31 (1.23)	**.05***	**.10***	-.01	_													
5.	Paternal education	15.53 (1.98)	**.04***	**.12***	.02	.47*	_												
6.	Maternal education	15.50 (1.54)	**.04***	**.10***	.04*	.34*	.51*	_											
7.	Verbal scores	24.42 (8.58)	**.13***	**.20***	.12*	.25*	.23*	.20*	_										
8.	Non-verbal scores	22.86 (7.06)	**.11***	**.15***	.02	.26*	.23*	.19*	.78*	_									
9.	Behavioural problems	21.71 (3.22)	**-.15***	**-.06***	.02	-.10*	-.07*	-.07*	-.15*	-.15*	_								
10.	Sports	5.57 (1.88)	**.06***	**.08***	-.23*	.03*	.05*	.03*	-.07*	-.04*	-.07*	_							
11.	Parties	3.81 (1.46)	**.06***	**.12***	.20*	-.09*	-.05*	-.08*	-.08*	-.11*	-.01	.05*	_						
12.	Psychological distress	2.34 (2.59)	**-.23***	**-.07***	.23*	-.11*	-.08*	-.04*	-.14*	-.16*	.20*	-.16*	.07*	_					
13.	Optimism indicator 1 get what one wants of life	1.80 (.40)	**.20***	**.12***	.02	.06*	.06*	.06*	.11*	.11*	-.13*	.02	.04*	-.14*	_				
14.	Optimism indicator 2 have control over life	1.10 (.30)	**.13***	**.09***	.01	.06*	.07*	.06*	.10*	.10*	-.10*	.04*	.01	-.14*	.40*	_			
15.	Optimism indicator 3 way life has turned out	1.05 (.22)	**.15***	**.06***	-.06*	.02	.01	.03*	.04*	.04*	-.07*	.04*	.02	-.18*	.34*	.34*	_		
16.	Education	2.72 (1.44)	**.11***	**.22***	-.08*	.31*	.30*	.26*	.46*	.44*	-.15*	.05*	-.17*	-.21*	.15*	.15*	.06*	_	
17.	Occupation	4.05 (1.21)	**.13***	**.22***	-.04*	.22*	.20*	.18*	.34*	.32*	-.10*	.02	-.06*	-.15*	.14*	.14*	.07*	.49*	_

Note: Variables were scored such that a higher score indicated being female, higher scores on Alpha and Beta factors, a more professional occupation for the parent and higher age parents left school, higher childhood verbal and non-verbal cognitive ability scores, more behavioural problems, more sports and parties, being more optimistic in life, highest educational qualification, and more professional occupation for cohort members. The outcome measures were in bold.
*p<.05.

Table 2. Measurement of the latent variables and SEM of Alpha factor.

Variables	**Unstandardized estimate**	**Standard error**	**Standardised estimate**
Parental social status loadings			
RGSC	1.000		.609
Father's education	1.522	.071***	.651
Mather's education	1.037	.058***	.533
Childhood intelligence loadings			
Verbal	1.000		.820
Non-verbal	.772	.014***	.784
Optimism loadings			
Get what one wants of life	1.000		.682
Have control over life	.393	.029***	.501
Way life has turned out	.634	.044***	.585
Alpha Factor loadings			
Agreeableness	1.000		.910
Conscientiousness	.325	.30***	.302
Emotional stability/Neuroticism	.134	.23***	.132
Predicting Alpha Factor			
Gender	4.823	.157***	.421
Parental social status (latent)	.025	.161	.015
Childhood intelligence (latent)	.037	.020***	.053
Behavioural problems	-.093	,026***	-.056
Sports	.127	.047**	.045
Parties	.197	.059***	.054
Psychological distress	-.005	.007	-.008
Optimism (latent)	.900	.387***	.107
Education	.157	.079***	.039
Occupation	.270	.076***	.083

Note: *p<.05; **p<.01; ***p<.001.

Table 3. Measurement of the latent variables and SEM of Beta Factor.

Variables	**Unstandardized estimate**	**Standard error**	**Standardised estimate**
Parental social status loadings			
RGSC	1.000		.647
Father's education	1.539	.071***	.613
Mather's education	1.045	.058***	.535
Childhood intelligence loadings			
Verbal	1.000		.826
Non-verbal	.756	.014***	.773
Optimism loadings			
Get what one wants of life	1.000		.664
Have control over life	.412	.036***	.512
Way life has turned out	.624	.049***	.562
Beta Factor loadings			
Extraversion	1.000		.283
Intellect/Openness	5.303	1.161***	.636
Predicting Beta factor			
Gender	-.111	.038**	-.031
Parental social status (latent)	.055	.043	.023
Childhood intelligence (latent)	.085	.028***	.261
Behavioural problems	-.015	.006	-.021
Sports	.015	.011	.016
Parties	.004	.011	.004
Psychological distress	-.027	.009**	-.043
Optimism (latent)	.032	.075*	.036
Education	.118	.039***	.096
Occupation	.057	.022**	.052

Note: *p<.05; **p<.01; ***p<.001.

Figure 1. Predicting Alpha Factor path model.

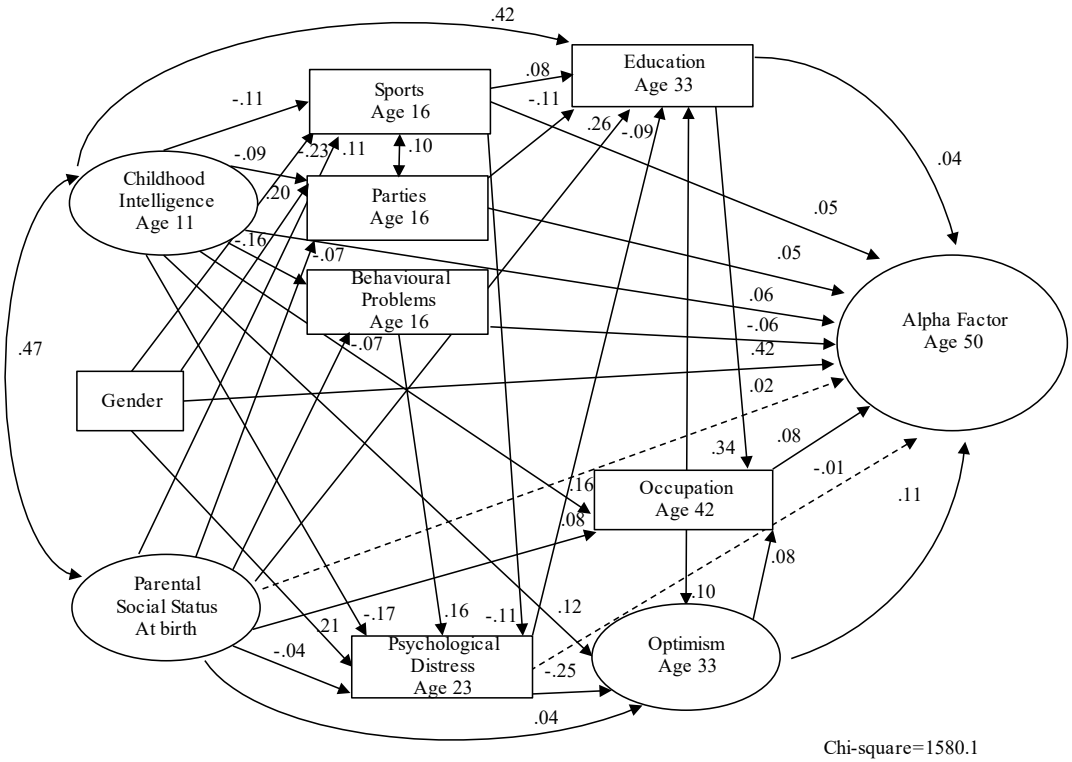

Figure 2. Predicting Beta Factor path model.