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The Big-Five personality factors, mental health, and social-demographic indicators as independent predictors of gratification delay.

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Abstract

This paper reports on a study testing over 12,000 adults.. We were interested in the correlates of gratification delay (GD) (as criterion variable) with gender, age, education and occupation, the Big-Five personality factors, and mental health (as predictor variables). Correlations and regressions showed that all the Big-Five personality factors, mental health, and a set of socio-demographic variables were significant and independent predictors of GD, accounting for 19% of the total variance of the outcome variable. As predicted, Conscientiousness was the strongest correlate. The implications of these findings are discussed along with the limitations of this research.

Word Count: 4957

Key Words: Gratification Delay; Big-Five Personality Factors; Mental Health; Education and Occupation;

Introduction

Being able to postpone immediate reward and satisfaction, especially on the physical level, for the benefit of a longer/later goal, is defined as gratification delay (GD). It is seen as the opposite of impulsivity and instant gratification, and similar to the concept of patience. The idea is essentially that GD is the process that occurs when a person is faced with the decision to resist the temptation of an immediate reward in preference for a later bigger or better reward. Several factors have been shown to correlate with GD, which is seen to be a relatively stable condition with important social consequences. Hence it forms an important part of the socialization agenda of primary and secondary socializers, both parents and teachers.

A central theoretical and practical question refers to the major correlates and causes of GD because that can inform what type of intervention is best to encourage it, as everyone accepts its benefits. Hence, the importance of multivariate studies, such as this one, which can explore the relative contribution of various demographic (sex, age), intrapersonal (Big Five personality) and social factors (education, social class) to GD.

The literature on GD, sometimes called postponement of gratification, has a long history (Freud, 1911; Mischel, 1958, 1961). The literature was re-energised by the popular book *The Marshmallow Test* written by Mischel (2014) who dominated the psychometric research in the area. For instance, Watts et al., (2018), replicated and reanalysed an early study, and concluded that GD as measured by classic tests should be seen in terms of broader cognitive and behavioural abilities. Barrangan-Jason et al. (2019) concurred, arguing that patience (GD) needs a broader definition and a focus on mechanisms that lead to successful outcomes.

Inevitably there are now physiological studies on GD which have implicated such things as prenatal testosterone exposure as possible part explanations for observed sex differences (Korner et al., 2019). Indeed, nearly all studies suggest a sex difference which has been confirmed by meta-analyses of the extant literature (Silverman, 2003). There is also a large literature in animal behaviour comparing GD in different species and offering various possible explanations for the findings (Anderson et al., 2010)

Whatever the conceptualisation and measurement, GD has been found to be adaptive, healthy and beneficial. Thus, it has been associated with many positive outcomes such as academic and career success, quality of life and social competence, and psychological health (Hoerger, Quirk, & Weed, 2011). Deficits in GD are in turn associated with a broad range of public health problems, such as obesity, risky sexual behaviour, and substance abuse (Hoerger, et al., 2011).

There is a scattered literature in clinical, educational, health and work psychology that conceptualises the concept somewhat differently but have central features of the fundamental GD concept. The area is confused because there are a number of concepts closely related to GD which leads to the famous *jingle-jangle* issue. This refers to the erroneous assumptions that two different things are the same because they bear the same name (jingle fallacy) or that two identical or almost identical things are different because they are labelled differently (jangle fallacy). Thus, we have concepts like ego-resilience, externalising, grit, (low) impulsivity, procrastination, self-control, self-discipline, self-regulation and the work ethic, which are similar to, and overlapping with, the GD concept (Meriac, Slifka & LaBat, 2015; Steel, 2007; Shu & Gneezy, 2010).

Similarly, there is an overlap with ambition, hardiness, need for achievement, perseverance, and resilience which every deviser of a new concept seeks to point out is different (though possibly related to) their specific concept (Duckworth et al., 2013; Duckworth & Gross, 2014). There are also many empirical studies which measure a number of these variables trying to determine the incremental validity of one dimension over another to predict an outcome measure (Dumfart & Neubauer, 2016). The same issue applies to dimensions which may be considered to be the opposite of GD like impulsivity, hyperactivity, inattention, and venturesomeness (Evenden, 1999). This study uses in part an incremental analysis to explore the predictive power of one set of variables over another.

There is also a not-inconsiderable literature on the measurement of GD usually by self-report measures which may be uni- or multi-dimensional and designed to be used in particular settings like health or education (Hoerger et al., 2011; Liu, Wang & Jiang, 2013). Moreover, there is a longstanding, as well as renewed, interest in longitudinal studies which shows the predictive validity of GD over long periods of time (Funder, Block & Block, 1983; Mischel, 2014). There are also a large number of usually cross-sectional studies with modest sized populations that have examined individual and situational correlates of GD (Trommsdorf, & Schmidt-Rinke, 1980).

There have been relatively few Big Five studies of GD. An exception is Mahalingam et al (2014) who in a large sample ($N = 5,888$), we found that greater DD (delay discounting) was predicted by low Openness and Conscientiousness and higher Extraversion and Neuroticism. We intend to replicate this result in a much bigger sample and with a different measure of GD. They noted that Openness predicted less delay discounting, while Neuroticism predicted more; however, and further that effects became even stronger when the delayed amount at stake was

larger. They argued that the relationship between Openness and Neuroticism to delay discounting is highly dependent on the specific size of the reward one will receive in the future.

In a recent review, Dawd (2017) noted that GD has been seen as both a measure of cognitive and affective control which is traditionally measured by both self-report and experimental methods. He noted that there has also been the development of Computer based programmes to measure impulsivity which measures motor action. He concluded that correlates of GD can be divided into intra-individual factors (age, gender, personality, intelligence) as well as contextual and external factors like social class and parenting style. As a result, he suggests that we will only get a better understanding of GD if we use both types of variables.

This Study

This study set out to investigate the correlates of gratification delay based on a large dataset in Britain, the UK Household Longitudinal Study (UKHLS). This is a publically available data set. We were particularly interested as to whether the Big-Five personality factors relate to GD as well as whether mental health, and a set of socio-demographic variables were independently associated with the outcome variable. This unique data base allows us to explore the relative contribution of different factors related to GD to examine their incremental validity. Inevitably we were also constrained by what variables were available and how they were measured.

Many of these variables have been explored in previous research but very few at the same time allowing an investigation in the relative contribution of one set of variables over another in such analyses as step-wise regressions.

Based on the past literature we developed a number of hypotheses:

H1) Conscientiousness (C) would be significantly and positively associated with GD. There is an extensive literature in personality and work psychology which suggests that C is associated with forward planning, being organized, prepared, achievement-oriented and dependable. Indeed, there are many studies which show a correlation between C and many of the overlapping concepts like Grit and the Work Ethic (Furnham, 2008).

H2) Of the other personality factors we predicted that Neuroticism (N) and Extraversion (E) would be significantly and negatively, and Agreeableness (A) positively associated with GD (Mahalingam et al., 2014). That is, Agreeable, Stable, Introverts would be better at GD. Whilst some early studies looked at E and N there are few studies looking at the Big Five correlates of GD, particularly their relative power to predict it.

H3) Mental health would be significantly and positively associated with gratification delay. There are numerous studies which suggest that GD is in itself a measure of maturity, well-being and mental health at any age (Krueger et al., 1996). There are many measures of mental health and in this study we used one of the most celebrated and used tests of minor psychiatric morbidity.

H4) Education and occupation would be significantly and positively associated with GD. Intelligence, education and occupation tend to be moderately inter-correlated as brighter and more hard-working people attain higher and better educational qualifications and occupational levels. Further, education encourages GD. Again, the study enabled us to examine the incremental validity of these measures above demographic, social and mental health factors.

H5) Personality traits Conscientiousness and Neuroticism, mental health, education and occupation would be significant and independent predictors of the outcome variable.

Method

The UK Household Longitudinal Study (UKHLS) named *Understanding Society* is an innovative world-leading study following the lives of 40,000 UK households to provide valuable evidence about 21st century UK life and how it is changing (Knies, G. et al., 2014). It captures (every year since it started in 2009 with the latest Wave 5 data available in November 2015) important information about people's social and economic circumstances, attitudes, behaviours and health. Data Wave 3 (2011) and Wave 5 (2013) were used in the study to examine, where possible, the predictive validity of this data over a two year period. Also, not all factors were repeatedly measured at each Wave. We have permission to use this data set.

Participants

The study was based on a sample of 12,522 participants (males=5,623 and females=6,899) with age range from 17 through 84 (mean=40.2, SD=12.6) who had information on the complete data for all variables examined in the study. The age ranged from 16 to 82 (<20=4.6%, 20-29=16.1%, 30-39=25.5%, 40-49=29.6%, 50-59=19.4%, >=60=4.9%)..

Measures

1. *Personality factors.* Personality traits are classified according to the 'Big Five' taxonomy: Agreeableness (A), Conscientiousness (C), Extraversion (E), Neuroticism (N), and Openness (O). The Big Five personality traits were assessed in Wave 3 (in 2011) using a 15-item version of the BFI (John, Naumann, & Soto, 2008). Three items were used to assess each of the five dimensions. Appropriate items were reverse coded and scores were averaged within each 3-item subscale to create a composite score for each dimension. This measure is a 7-point Likert scale (1=does not apply to me at all 2 3 4 5 6 to 7=applies to me perfectly). The Cronbach's alpha was 0.57 for A, 0.55 for C, 0.60 for E, 0.71 for N, and 0.66 for O. Although reliability coefficients for these five

factors may appear modest by traditional standards (but standard for three item tests) past research suggests that these alpha coefficients underestimate the actual reliability of these scales due to their brevity (Donnellan & Lucas, 2008; Lucas & Donnellan, 2011).

2. *GHQ*. Mental health was measured by GHQ in Wave 3 (in 2011). It is a 12-item self-completion instrument, measuring depression, anxiety and psychosomatic illness (Goldberg & Williams, 1988) and it correlates significantly with previously diagnosed and currently treated depression. The alpha for the total score was .83.
3. *Education*. Educational qualifications were ranged from 0=no qualification to 5=university degree in Wave 3 (in 2011);
4. *Occupation*. Current occupation in Wave 5 (in 2013) was measured by the Registrar General's measure of social class (RGSC). RGSC is defined according to occupational status and lifestyle (Marsh, 1986). It was coded on a 6-point scale: I unskilled (3.0%), II partly skilled (13.4%), IIIM skilled manual (17.9%), IIIN skilled non-manual (20.9%), V managerial /technical (38.1%), VI professional (6.7%) (Leete, 1977).
5. *Gratification delay*. In Wave 5 (in 2013), the adult self-completion included new sets of questions including delayed self-gratification. This is a 10-item scale (0= Strongly disagree to 10=Strongly agree). Item examples are "hard to stick to diet" (R); "try to spend money wisely"; "given up comfort to reach goals"; and "hard work pay off in the end". Items were taken from the longer scale developed by Hoerger, Quirk, & Weed, (2011). The alpha for the total scale was .66. We factor analysed the scale but found only one factor.

Results

Correlational Analysis

Correlation analysis was conducted to examine the associations between gratification delay and a set of psychological and socio-demographic variables in the study. Results are shown in Table 1.

Insert Table 1 about here

Table 1 shows that among the variables examined in the study, gender and age, all five personality factors, education and occupation, and mental health were all significantly ($p < .001$) associated with GD. As in many other studies the strongest correlation was between GD and C, despite the fact they were measured two years apart. It showed older, females with better mental health, higher education and socio-economic status had higher GD. The personality factors suggested Stable, Agreeable, Open, Extraverts who were Conscientious had higher GD. This confirmed all hypotheses except that for Extraversion, as it was assumed that Introverts would have higher GD scores.

Regression analysis

Following this, a hierarchical regression analysis was carried out using log GD as the dependent variable. This allowed us to test the various incremental validity hypotheses mentioned above.

We chose the order in the step-wise regression for the following reasons and based on various other similar studies (Furnham & Cheng, 2013, 2014, 2017ab). Most studies enter the variables in order of their stability over time. Hence it is common to enter demographic (i.e. sex and age) first, followed by stable socio-demographic variables like education and occupation. In a sense these became “control” variables for those we were most interested in namely mental health and personality.

Table 2 shows the results.

Insert Table 2 about here

Table 2 shows that in step 1 (Model 1), both gender and age were significant predictors of income, accounting for only 1% of variance. In step 2 (Model 2), after entering the two sociological variables, it showed that education and occupation both were significant predictors of gratification delay, accounting for further 3.6% variance. In step 3 (Model 3), mental health/illness measure, the GHQ, was entered into the equation, it was a negative predictor of the outcome variable, adding another 4.6% of the variance. In step 4 (Model 4), five personality factors were entered into the equation and it shows that all five personality factors (C, A, and O positively; and N and E negatively) which in addition accounted for 10.2% variance. In total, the variables examined accounted for 19.4% of the variance for gratification delay.

We did another analysis this time changing the order of variables entered into the regression. In step 1, both gender and age were significant predictors of income, accounting for 1% of variance. In step 2 the five personality factors were entered into the equation and it shows that all five personality factors (C, A, and O positively; and N and E negatively) which in addition accounted for 13% variance. Gender and age remained the significant predictor of the outcome variable. In step 3 mental health measure, the GHQ, was entered into the equation, it was a negative predictor of the outcome variable, adding another 2% of the variance. In step 4, after entering the two sociological variables, it shows that education and occupation both were significant predictors of gratification delay, accounting for further 3% variance.

Discussion

This study set out to investigate the correlates of GD based on a large dataset in Britain, the UK Household Longitudinal Study (UKHLS). It confirms and extends previous findings in the area. For instance, we replicated sex and age difference: older females had the highest GD score. The data suggest that as people get older they are better at GD. Further, females who are less impulsive than males have higher scores. These two variables accounted for a significant but very modest amount of the variance. There are various physiological, evolutionary and social theories which all mention age and sex differences, but what is surprising is how little of the total variance they account for.

All five hypotheses were supported. In addition, this study shows that traits Conscientiousness, Agreeableness, and Openness are positive predictors of gratification delay, whereas traits Neuroticism and Extraversion are negatively predictors of the outcome variable. These results are largely in line with Mahalingam et al. (2014) though they used different measures of both variables especially GD.

Conscientiousness was significantly and positively associated with GD ($r=.33$), as found in previous studies. The latter might be viewed as the manifestation of the former: these two constructs share some common ground, such as prudence and self-discipline. Further, many studies have shown they are both related to desirable educational and health outcomes (Cheng et al., 2017; Furnham & Cheng, 2014). The very definition of Conscientiousness is being careful, or diligent, and Conscientious people are efficient, planful and organized as opposed to easy-going, disorderly and impulsive. They display planned rather than spontaneous behavior; being neat, and systematic; and known for their carefulness, thoroughness, and

deliberation (Roberts et al., 2005; Furnham, 2017). However, it is inevitable more than simple GD.

Neuroticism was significantly and negatively associated with gratification delay. Neuroticism is associated with poor emotional regulation, mood fluctuations and poor coping skills which are the very opposite of GD. Individuals scoring high on the Neuroticism scale can be overwhelmed by emotions, unable to control outbursts and particular needs.

Agreeableness and Openness, measured two years before GD were also significant positive correlates, more so than either Extraversion and Neuroticism. The results for Openness disconfirm the results of Mahalingam et al (2014) This was unanticipated and requires some speculation. Clearly people who are good at GD are more dependable and pleasant to be around. It is possible that some manifestations of GD are social in nature to the extent that they benefit others. It is probably more easy to befriend and rely on those with high rather than a low GD. Hence, GD is associated with impulse control and predictability which would be part of Agreeableness.

Why should Openness be associated with GD, though correlations were not particularly high? Openness is an index of imagination, creativity, and intellectual curiosity. It relates to ability and interest in attending to and processing complex stimuli. This often requires effort, and dedication and cannot be achieved quickly or impulsively. It is possible that open people are more aware of how to acquire knowledge and understand the world which is best done by GD.

Although Extraversion was significantly and positively associated with GD, it became the negative predictor of the outcome variable in the regression models. One of the explanation

could be that this reflects the different facets of extraversion such as sociability and impulsivity, the former is associated with mental health and well-being, and the latter is associated with quick gratification and risky behaviors.

Mental health, measured two years before, was significant predictor of GD. Indeed, it was the second highest correlate ($r=-.21$) and had the second highest beta (beta $=-.17$) in the regression. The ability to plan and regulate behaviour has always been seen fundamental to mental health. It has often been observed that mentally healthier individuals are more careful and considered with their daily functioning and behaviors, and tend to be more persistent in their endeavors towards goals (Cheng et al., 2017). Impulsive desire for immediate gratification is thought of as childlike and very immature in an adult often leading to psychological and physical poor habits. Both anxiety and depression are associated with poor emotional regulation and an unhealthy life-style (Hampson, 2019; Huang et al., 2017)

Education and occupation, themselves highly correlated ($r=.44$) were both positive associated with GD; education more so than occupation in both correlations and regressions. Indeed, a large part of primary and secondary socialization and education is about GD especially with regard to finances. Thus, parents encourage their children to budget and save which is at the heart of GD (Dawd, 2017). This, in part, might be through training programs in school and requirements at work place, such as delayed lunch over a time-bound task. It is believed that GD can be taught and learned, especially in the early stage of life as part of self-discipline training, which has many benefits as Mischel's (2014) work has demonstrated.

However, it is clear that intelligence and personality are powerful determinants of educational success and then occupational attainment and mental health (Furnham & Cheng, 2013;

2017ab). Education would serve to reward and increase GD from an early age. This suggests that GD may be an interesting possible mediator variable between personality and intelligence and economic and financial success (Furnham, 2018).

Limitations

The sample with complete data had a slight under-representation of lower/manual occupational classes, which may provide a small bias in these results (i.e. the findings were more conservative). Studies such as this are always handicapped by common method variance with often both independent and dependent variable being self-report. Personality, mental health and GD were based on questionnaires though the latter two were completed two years before GD. It is always preferable to have observer and behavioural data to compliment self-report data and it could be a percentage of the shared variance was due to the methodology. This inevitably effects the generalisability of the data. Equally, it would be desirable to have a longer multi-dimensional measure of GD which allowed the possibility of exploring how different types of GD in difference contexts operated

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Table 1. Pearson correlations matrix between gratification delay, personality factors, mental health, education and occupation.

Variables	Mean SD	Correlation												
		1	2	3	4	5	6	7	8	9	10	11		
1. Gratification delay	66.63 (11.76)	–												
2. Gender	.48 (.50)	.07***	–											
3. Age	40.21 (12.64)	.08***	-.01	–										
4. Extraversion	4.64 (1.26)	.08***	.11	-.04***	–									
5. Neuroticism	3.54 (1.37)	-.15***	.23***	-.11***	-.19***	–								
6. Agreeableness	5.57 (1.02)	.21***	.16***	.06***	.15***	-.06***	–							
7. Conscientiousness	5.53 (1.03)	.33***	.13***	.18***	.19***	-.16***	.31***	–						
8. Openness	4.68 (1.24)	.17***	-.08***	-.05***	.23***	-.11***	.19***	.17***	–					
9. Mental Illness	22.72 (5.07)	-.21***	.11***	.00	-.10***	.32***	-.05***	-.10***	-.04***	–				
10. Educational Qual	3.30 (1.47)	.17***	.03**	-.13***	-.02*	.02	-.02*	-.03*	.19***	.01	–			
11. Current occupation	3.93 (1.28)	.14***	.01	.03**	-.01	-.01	-.02*	.01	.12***	-.01	.44***	–		

Note. Standard deviations (SD) are given in parentheses. Variables were scored such that a higher score indicated being female, a higher score on gratification delay scale, higher cores on personality factors, higher scores on mental illness, highest educational qualification, and a more professional occupation for participants. Correlations between the outcome variables and other variables measured are in bold. Correlation analysis was weighted with UK sampling weight.

* $p < .05$; ** $p < .01$; *** $p < .001$.

Gratification delay new Table 2 with text:

Table 2. Predicting adult gratification delay from gender and age, education and occupation, mental health, and personality factors.

<i>Measures</i>	Model 1		Model 2		Model 3		Model 4		<i>p #</i>
	Beta	<i>t</i>	Beta	<i>t</i>	Beta	<i>t</i>	Beta	<i>t</i>	
Gender	.07***	7.32	.06***	6.97	.09***	9.75	.05***	5.85	<.001
Age	.08***	8.52	.09***	10.33	.09***	10.62	.04***	4.61	<.001
Educational qualifications			.14***	14.21	.14***	14.59	.14***	14.34	<.001
Current occupation			.08***	7.73	.08***	7.78	.07***	7.66	<.001
Mental Illness					-.22***	24.26	-.17***	18.85	<.001
Extraversion							-.02*	2.34	.019
Neuroticism							-.05***	5.23	<.001
Agreeableness							.11***	11.67	<.001
Conscientiousness							.25***	27.07	<.001
Openness							.08***	8.66	<.001
<i>Variance explained</i>	<i>R</i> ² adjusted = .010		<i>R</i> ² adjusted = .046		<i>R</i> ² adjusted = .092		<i>R</i> ² adjusted = .194		
	<i>F</i> (2,12518)=62.58***		<i>F</i> (7,12516)=143.86***		<i>F</i> (8,12515)=238.57***		<i>F</i> (10,12510)=283.61***		

Note. # Significance in the final model. The Ns were un-weighted. Regression analyses were weighted with UK sampling weight.

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