THE RELATIONSHIP BETWEEN FINANCIAL BEHAVIOURS AND PERSONALITY

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INTRODUCTION

Within the scientific community, we have now established ways in which to define and measure personality. We can think of personality traits as tendencies to act, think, and feel in certain ways that remain the same over time and across different situations. Extensive research has investigated how best to quantify and summarise our personalities within a useful and manageable framework, and typical solutions usually involve either five (e.g., John & Srivastava, 1999) or six traits (e.g., Ashton & Lee, 2008; Lee & Ashton, 2004). In the latter case (utilised in the current work), we can think of personalities being composed of the following domains:

- Honesty-humility: high scorers avoid manipulating others for personal gain, feel little temptation to break rules, and are uninterested in lavish wealth and luxuries
- Emotionality (also Neuroticism): high scorers experience fear of physical dangers, experience anxiety in response to life's stresses, and feel a need for emotional support from others
- Extraversion: high scorers feel positively about themselves, feel confident when leading or addressing groups of people, and enjoy social gatherings and interactions
- Agreeableness: high scorers forgive the wrongs that they suffered, are lenient in judging others, and are willing to compromise and cooperate with others

- Conscientiousness: high scorers organize their time and their physical surroundings, work in a disciplined way toward their goals, strive for accuracy and perfection in their tasks
- Openness to experience: high scorers become absorbed in the beauty of art and nature, are inquisitive about various domains of knowledge, and use their imagination freely in everyday life

Known as the HEXACO personality inventory, these six domains/traits provide a important method of quantify who we are and how we differ from each other. Given that these traits are both stable and predictive of behaviour, it logically follows that we might use these in order to investigate financial decision-making. Like any other behaviours, our approach to our own finances *should* be associated with our underlying personalities. After all, financial behaviours are no different from any other day-to-day choices we make, all of which are driven to some extent by our personalities.

The relationship between personality and financial behaviour is a growing area of research, and some interesting results have already been established. For example, Turkish investors scoring higher on the traits of Conscientiousness, Agreeableness, and Openness tended to demonstrate more successful financial behaviours (Ozer & Mutlu, 2019). In another study, this time involving Europeans, Conscientiousness and Neuroticism were associated with a tendency to participate in the stock market, while Agreeableness and Neuroticism (in women) or Openness and Conscientiousness (in men) predicted the likelihood of being in financial debt (Bertoni et al., 2019). The tendency to take financial risks has also been studied, with one experiment involving a large Dutch sample revealing that those more tolerant of risk tended to score higher on Extraversion, Neuroticism and Openness, while scoring lower on Conscientiousness and Agreeableness (Pinjisakikool, 2018; for similar results in a US sample, see also Wong & Carducci, 2013). Further, these personality scores – through the influence of risk tolerance – predicted actual financial behaviours in terms of the amount of bonds, mutual

funds, and equity that participants held. These findings aligned with another Dutch study, in which neurotic and extraverted participants showed decreased saving and increased borrowing (Nyhus & Webley, 2001). Another study involving a large US sample of pre-retirees showed that Conscientiousness and Extraversion were associated with increased saving behaviour, while Openness and Neuroticism showed the inverse relationship (Asebedo et al., 2019).

Of greater relevance, a British sample with a wide age range demonstrated that conscientious and agreeable participants, with lower Openness, showed more positive financial attitudes. In addition, agreeable and conscientious people, and those lower on Neuroticism, scored higher on account management. Perhaps unsurprisingly given the existing evidence already discussed, extraverts and those scoring lower on Agreeableness typically saved a lower proportion of their income, while extraverts were also far less likely to pay off their credit card balance in time (Davey & George, 2010). In another British sample, this time much larger and using interviews regarding their financial behaviours, researchers demonstrated that those who were more Extraverted had fewer assets and higher levels of debt (Brown & Taylor, 2014).

Taking the literature together as a whole, the emerging picture is one in which - on average - certain personality traits are more associated with positive financial behaviours while others are related to more negative ones. While not always the case, the majority of findings suggest that those scoring higher on Conscientiousness and Agreeableness often fare better financially, while more neurotic, open, and extraverted people make poorer financial decisions. This general pattern aligns neatly, for the most part, with the more broad relationships between personality and general risk propensity – risk takers are often individuals with higher Extraversion and Openness, with lower levels of Neuroticism, Agreeableness, and Conscientiousness (Nicholson et al., 2005). This makes intuitive sense, given that many financial choices often involve an element of risk – we should not be surprised that personality shows strong relationships with such behaviours.

In the current investigation, we collect information regarding both financial behaviours (spanning several categories) and personality traits in a large, representative sample of UK adults. Using several stages of statistical analysis, our aim is to identify the driving factors of financial behaviours, group individuals into particular financial behavioural profiles, and determine which personality traits are associated with these behavioural profiles.

SURVEY METHODOLOGY

Survey components

The survey comprised six main sections, which are briefly summarised here to lend structure to the report.

Demographics. Participants were asked about their gender, age, marital status, and living situation (paying back mortgage, renting, etc.).

Credit Behaviour. Participants were asked about the number of financial products they use (credit card, loans, student loans), whether they knew their credit score and what it was (both numerically and categorically), how often they check it, and what prompts them to check it, as well as the steps they might take to improve it. They were also asked how many times they had applied for a credit card, why they had, and what actions they would take if they did not have a credit card. They were also asked to rate their financial confidence on a 1 (low) to 7 (high) scale.

Financial attitudes and approaches statements. Participants were asked the extent to which they agreed with several statements that described attitudes and approaches to finances. Each statement was scored on a bipolar scale of 1-100, with two statements as anchors/poles. The statements included were about *spending* ("I am impulsive" to "I am strict"), *credit reliance* ("I rely on credit more than I should" to "I only spend credit when needed"), *money management* ("I often find myself short at the end of the month" to "I manage my money

well"), *saving* ("Saving money isn't a priority" to "Saving money is a priority"), *budgeting* ("I budget at the start of each month" to "I do not budget"), *budgeting difficulty* ("I find it hard to stick to one" to "I find it easy"), *credit wariness* ("I am wary about using credit" to "Using credit is a normal part of my spending"), and *credit limits* ("I find it hard to keep track" to "I find it easy to keep track").

Income, Savings, and Debt. Participants were asked to indicate, in GBP, their annual income, amount of debt, and the amount they save each month.

COVID-related Financial Impacts. Participants were asked the extent to which they agreed with a series of seven statements that described the impact of COVID on their attitudes and approaches to finances. Participants responded on a scale from 'strongly disagree' through to 'strongly agree'. Participants were asked whether the pandemic *made them realise they were previously careless with money, they saved more now as the pandemic made them feel a lack of security, they spend more now as they feel life is too short, they had managed to pay off debt during the pandemic, they frequently purchased things online they did not need, they struggled financially due to being on furlough*, and *they struggled financially due to the cut in Universal Credit.*

HEXACO personality inventory (de Vries, 2013). This validated questionnaire measures human personality according to six traits, shown in the table below. High scorers on each trait correspond to having "more" of the traits on the left.

HEXACO Trait	Characteristics
Agreeableness	Patient, tolerant, gentle *vs* stubborn, argumentative, unkind
Conscientiousness	Organised, careful, thorough *vs* negligent, reckless, impulsive
Emotionality	Sensitive, anxious, vulnerable *vs* tough, independent, stable
Extraversion	Outgoing, sociable, talkative *vs* shy, quiet, reserved
Honesty-Humility	Honest, faithful, loyal *vs* greedy, boastful, pretentious
Openness	Creative, innovative, artistic *vs* unimaginative, shallow, conventional

Demographics – who completed the survey?

Using the participant pool from Prolific (www.prolific.ac), we obtained a representative sample (with regard to the general UK population) of 1,632 individuals who completed the survey. Fifty-two percent of the sample were female, and the sample had a diverse range of ages (18-88, with an average of 45.19 and standard deviation of 15.50). Of those who responded, 46% of the sample were married, 33% were single, and 6% were divorced. Housing situations varied across the sample – 32% were paying back a mortgage, while 26% had paid theirs off. Twenty-nine percent were renting, and 8% were living with their parents.

Survey Scoring

The scores for the survey were generally used in their raw form – for example, the financial attitudes, COVID impacts, and savings, income, and debt were all taken as the participants gave them. The HEXACO questionnaire was scored according to questionnaire instructions (including reverse coding items where necessary), giving six personality scores per participant. For questions such as the number of financial products, the reasons for checking credit score, and steps taken to improve score, a sum of the number of products/actions was taken. This resulted in a total of 23 variables entered into the analyses.

ANALYSIS AND RESULTS

The aim of the analysis is to link personality variables to financial behaviours. With a dataset with as many variables as was recorded here, simple associations – for example, the link between Conscientiousness and the number of financial products – rapidly become unwieldy and uninterpretable. As such, our analysis involved a number of steps to arrive at a simple and interpretable outcome without losing much of the rich detail provided in the survey.

Step 1 – Uncovering the latent factors driving the survey responses

We first used a technique called factor analysis which allowed us to reduce the number of variables in the survey without losing much information. The idea behind factor analysis is that the responses in a survey are generated by a few "hidden", underlying factors that drive the variety of responses that are observed. For example, perhaps there is a single factor that would cause a pattern of responses such as having high income and savings, an avoidance of credit, and success in paying off debt during the pandemic. Another factor may explain frivolous spending during COVID and not having saving as a priority, and finding oneself short on money at the end of the month.

Our factor analysis revealed four factors that explained the variation in all 23 survey variables well. We were then able to examine the relationships between the 23 survey variables and the factors themselves, which gives an indication of the nature of the factors. Based on our analyses, we labelled the four factors as follows:

1. Financial Confidence. High scorers on this factor had a distinct pattern of responses on the survey – specifically, they did *not* struggle financially during COVID and were unaffected by changes in Universal Credit, and reported managing money well. They rated themselves as having high financial confidence, and rated having credit as a normal part of

their day to day spending. They took more actions to improve their credit, found it easy to stick to credit limits, and had a higher income.

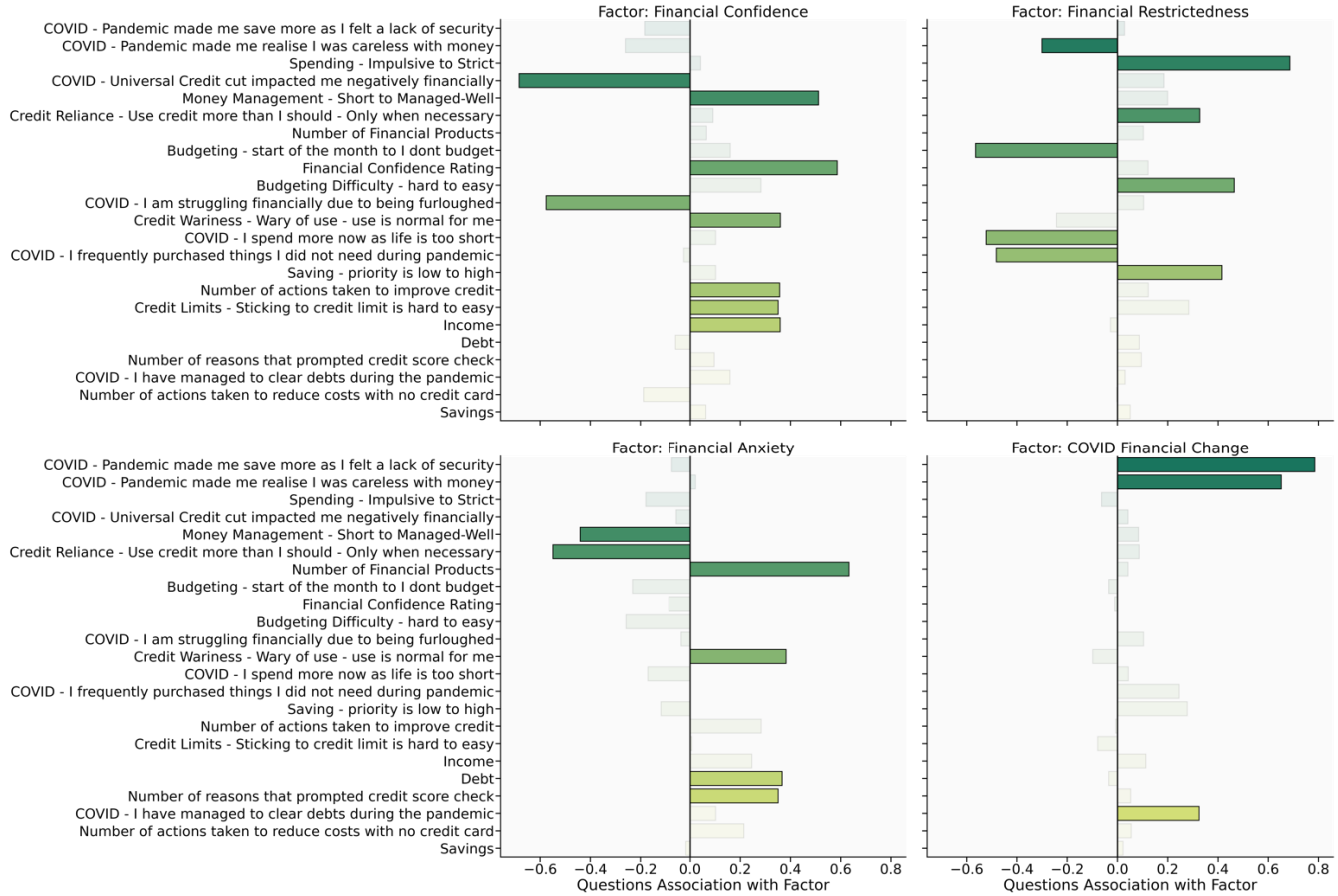
2. Financial Restrictedness. High scorers on this factor reported being strict with spending, and disagreed with the pandemic causing them to be careless with money. They reported using credit only when necessary, and said they budgeted at the start of the month. Saving is a high priority for high scorers; and they disagreed with COVID making them spend more and purchase more during the pandemic.

3. Financial Anxiety. High scorers here admitted to being short on money at the end of the month and feeling they used credit more than they should. They also had a higher number of financial products (loans, credit cards, etc.), and found using credit was normal for them. However, they had higher levels of debt, and more reasons for checking their credit score.

4. COVID Financial Change. The last factor was related to only a few original variables – high scorers indicated that the pandemic made them save more, and that they realised they were previously careless with money. They also responded they had managed to clear debts during the pandemic.

The factors were also themselves related to each other – for example, financial confidence was positively associated with financial restrictedness, and negatively associated with financial anxiety. Financial restrictedness was negatively related to financial anxiety, and COVID financial change was positively associated with financial anxiety but unrelated to confidence and restrictedness.

The factors and their association with the original survey questions are illustrated in the below figure.



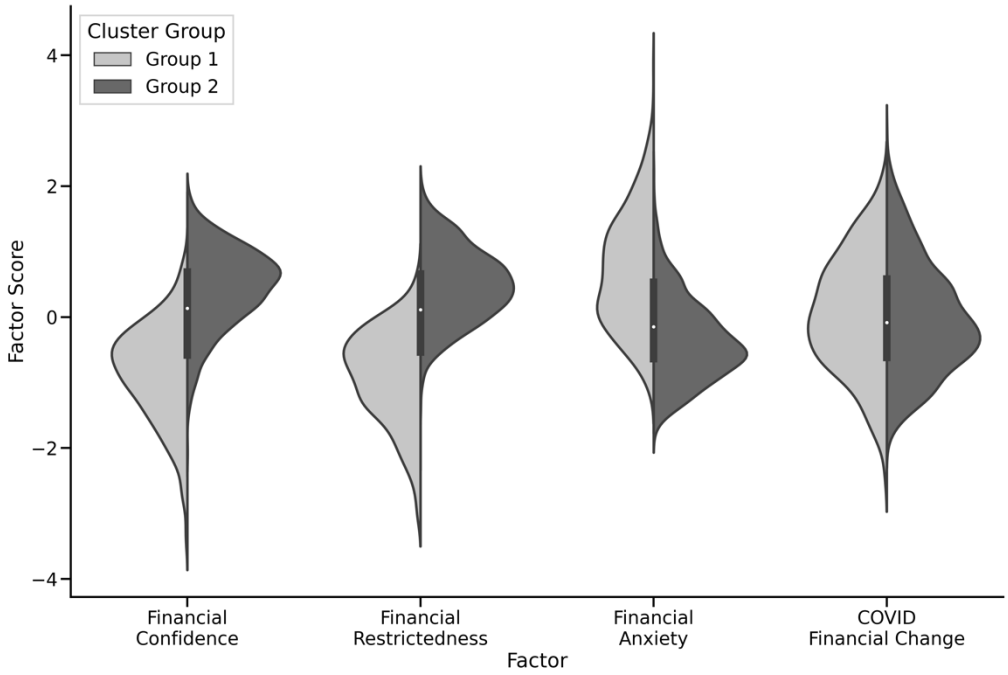
Results of the factor analysis are shown here. Each of the four factors is associated to some extent with all survey variables, but each factor shows strong relationships only with certain variables (highlighted bars). These variables were used to define the factors in terms of their name. Bars to the left indicate lower scores on the original variable being more associated with the factor.

Step 2 – Grouping (clustering) respondents on their factor scores

With the four factors defined, we next sought to put people into groups based on their scores on these new factors. For example, there may be patterns of responses within these factors – a given participant may experience high levels of financial anxiety and restrictedness, but low levels of confidence. Similarly, individuals who have experienced COVID financial changes may have high confidence but low anxiety and restrictedness. These patterns are hinted at in the relationships between factors, but we wish to seek out groups of survey respondents with distinct patterns of scores.

To do this, we used a technique called k-means clustering, which searches for groups of responses that are close to one another in terms of their scores. Using this technique to find groups of respondents on the four factors, we found the strongest evidence for just two clusters of individuals – that is, the scores on the factors seem to pool together into two distinct groups. One smaller group contained 35% of the sample (575 out of 1,632), while the other contained the remaining 64% (1,057 individuals). Examining the scores on each of the two cluster groups revealed a distinct pattern of scores – the smaller "Group One" respondents had lower scores on financial confidence and financial restriction, but higher levels of financial anxiety. Conversely, the larger "Group Two" were more financially confident, restricted, and less anxious. There appeared to be no difference between the groups on COVID financial change. These differences are shown in the below figure.

This analysis suggests that, in addition to there being a select few factors which gave rise to the responses in the survey, participants fall into two groups that have distinct patterns on these factors – they are either confident, restricted, and less anxious, or the reverse.



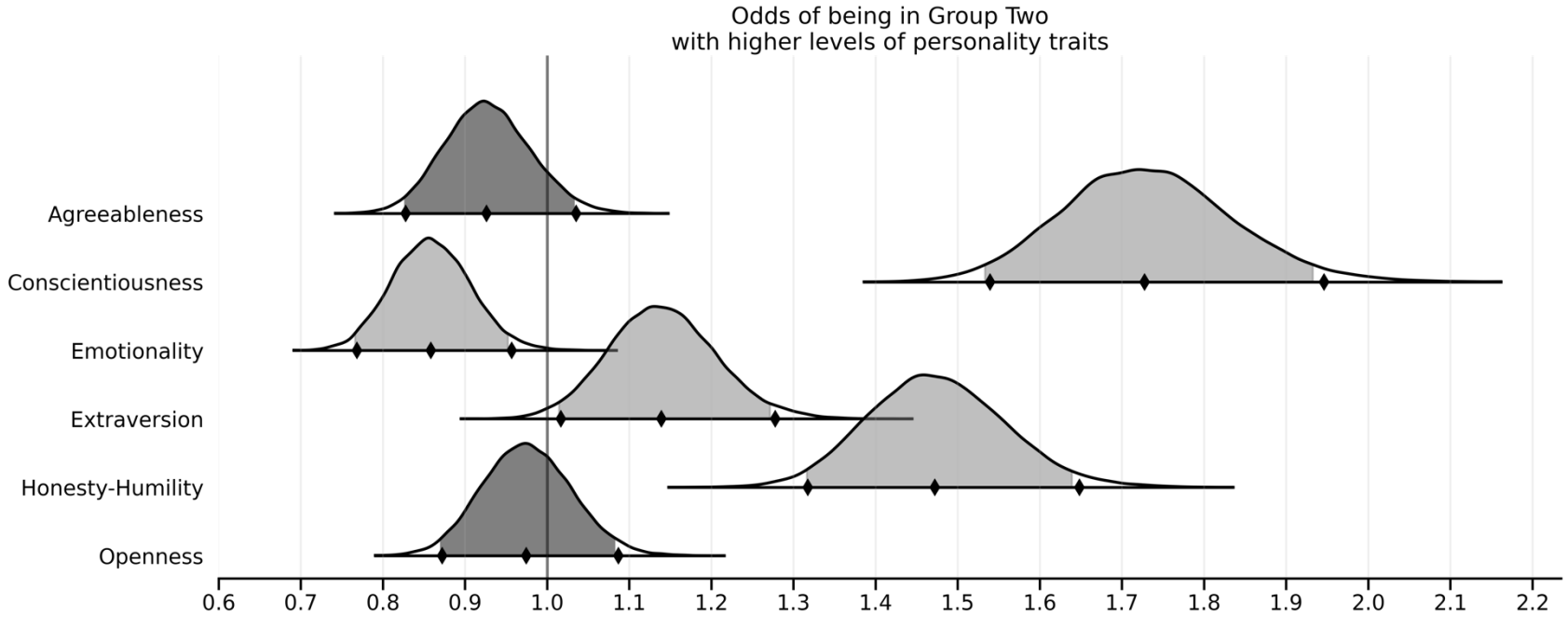
How the four factors differ between the cluster groups. The curves illustrate the overall distribution of the factor within a group.

Step 3 – Identifying the links with personality

With the two groups (clusters) of individuals, we can examine links between personality factors and the group which the respondents belong to. Specifically, we were able to build a statistical model that gave us the odds that a respondent would be in Group Two (confident, restricted, less anxious) as compared to Group One, based solely on their six personality scores. We report these odds below, along with some uncertainty in their estimation.

The model was clear – individuals with higher Conscientiousness (organised, careful, and thorough people) were 72% more likely to be in Group Two (odds = 1.72, and we are 95% certain this value falls between 1.53 and 1.94). Similarly, individuals high on Honesty-Humility (honest, faithful, and loyal people) were 47% more likely to be in Group Two (odds = 1.47, between 1.31 and 1.64). Finally, more extraverted individuals (outgoing, sociable, and

talkative) were 14% more likely to be in Group Two (odds = 1.13, between 1.02 and 1.27). Our model indicates that these effects are almost certain (i.e., likely to be robust and reproducible). For being in Group One, we saw that those with higher Emotionality (sensitive, anxious, vulnerable) were about 15% more likely to be included (odds = 0.85, between 0.76 and 0.95). This was the only clear association – we did however see that those with lower Agreeableness (stubborn, argumentative, unkind people; odds = 0.92, between 0.83 and 1.04) and low Openness (unimaginative, shallow, conventional people; odds = 0.97, between 0.87 and 1.09) were more likely to be in Group One, but we can conclude with only 91% (for Agreeableness) and 67% (for Openness) certainty that this is the case. The below figure illustrates these overall findings graphically.



Results of the statistical model. The distributions show the possible effects, in odds, of being in Group Two (confident, restricted, less anxious). The diamond in the centre of each distribution is the most likely effect, the ones at either side represent the lowest and highest most probable effects. The four light grey distributions show definite effects; while the darker grey are not as certain. The vertical line shows even odds of being in either group, given that personality trait, and the amount that a distribution crosses it indicates how uncertain its effect is.

SURVEY DATA SUMMARY AND CONCLUSIONS

The analysis of these survey data indicate several interesting findings – first, responses on a wide range of questions were well-defined in terms of four underlying factors, that seemed to indicate financial confidence, restriction, anxiety, and changes brought on by COVID. The scores on these factors themselves followed a pattern, with respondents being grouped into higher confidence, restriction, and less anxiety (Group Two), or the reverse (Group One). More importantly, the HEXACO description of personality was able to predict the odds of belonging to one group or another with certain probabilities. Higher Conscientiousness (probability = 72%), Honesty-Humility (47%), and Extraversion (13%) were all associated with belonging to Group Two, while only higher Emotionality was definitely associated with belonging to Group One (15%). Both lower Agreeableness (8%) and Openness (3%) were associated with belonging to Group One, but this was less certain.

Taken together, we find clear evidence that aspects of personality impact on financial and credit related behaviours in predictable ways, and that COVID has influenced changes in financial behaviour.

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