Individualism and Collectivism as predictors of compliance with COVID-19 public health safety expectations

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Abstract

The 2019 coronavirus (COVID-19) pandemic has presented a complex problem to policymakers and researchers. To slow the rate of infection, governments across the world have implemented similar lockdown procedures and recommended behavioural changes, yet the rates of compliance with these measures have varied significantly across communities. This directly impacts the level of severity of measures required to fight the pandemic and the degree to which these measures impact economic activity. Previous studies have highlighted how culture plays a role in determining values, which impact decision making and therefore influence responses to social and collective coordination. Our study builds on this literature by developing a survey that explores how cultural dispositions impact public health safety behaviours in NSW. We refer to the Individualism index from Hofstede's model of culture as our predictor of COVID-19 behaviours. We also present recommendations to improve compliance and reduce the impact of the pandemic. We find that Horizontal Collectivism (HC) is positively associated with social distancing and face mask behaviours, and Vertical Collectivism (VC) is positively linked to increased hand hygiene behaviours. We also find that Horizontal Individualism (HI) is negatively related to social distancing in general. Interestingly, both Vertical Individualism (VI) and Collectivism relate positively to worries about health, whilst high scores of HI indicate lower probabilities of being worried about personal health and the well-being of friends and family. From these findings, we recommend that policymakers spread unifying messages and emphasise the pandemic as a group problem to promote compliance and minimise uncertainty.

JEL codes: H12; D91; I18; D80

Keywords: COVID-19; Health-protective behaviour; IND-COL scale; Online survey.

1. Introduction

The first case of the novel coronavirus (SARS-CoV-2, COVID-19) was detected in Australia on 25 January 2020 and, by early March, escalated national action was introduced with Stage 1, 2 and 3 shutdowns occurring across the country (Grattan Institute, 2020). In the absence of vaccines or antiviral medications, non-pharmaceutical solutions such as social distancing, hygiene standards, cough and interaction etiquettes have since been enforced to reduce viral transmission. However, as transmission rates dropped, so too did the willingness of the population to continue to comply with physical distancing and hygiene practices (Briggs 2020). In combination with other social factors, Melbourne experienced a spike in local transmission cases in June 2020 as a result (Briggs 2020), which led to a 111-day lockdown that included home confinement, travel restrictions and closures of stores and restaurants (BBC News 2020). These extended shutdown measures directly and substantially impacted Australia's economy.

The two waves of COVID-19 cases in Australia have revealed: 1) a low compliance with recommended public health safety behaviours creates perfect conditions for viral transmission and 2) the economic consequences of implementing severe management plans in response to viral transmission can jeopardise public and economic health. Therefore, to prevent a surge in cases, policymakers should aim to promote high levels of compliance with their respective COVID-19 response plans.

Behavioural and cultural theories argue that the opposing beliefs shared across individuals within a population can account for the variation in the level of voluntary compliance behaviours (Baskozos et al., 2020). The framework referred to in this paper is derived from the Cultural Dimensions Framework developed by Geert Hofstede (Hofstede 2011). He quantifies the degrees of cultural difference across countries, and illustrates how country values are rooted in culture and explains how behaviours are motivated within a population. This framework has been regarded in empirical studies as one of the most appropriate and valid measures to explain behaviours during national crises (Jain 2020). Some previous papers have already used this theory to explain variation in pathogen prevalence, the effectiveness of vaccination policies and the implementation of infection control plans across countries (Webster et al 2020). We refer specifically to the Individualism index (IND-COL) of this framework.

This paper contributes to the growing literature that analyses the psychological and cultural variance amongst individuals and its impact on decision-making behaviour during a pandemic. The main limitation of these

findings is their applicability to the Australian context, specifically that of New South Wales (NSW). Considering the historical differences between Australia and the reference paper (Germani et al 2020) it is important to reconceptualise this investigation so that it is appropriate for our problem question and population. Therefore, our study will make considerations to income levels, household demographics and expected behaviours that are specific to the NSW context. This study will also be the first of its kind to be conducted in Australia and present a unique dataset for analysis. Further, we validate the use of Triandis' (2001) model of Vertical and Horizontal Individualism and Collectivism as an appropriate method to predict individual's behaviour around collective action and demonstrate an analytical technique to apply the study to the COVID-19 context. In doing so, we have developed a unique and specific survey that can be manipulated or replicated for new contexts.

We find that promoting a collectivist mindset can increase intentions of a population to engage in protective behaviours, whereas an endorsement of individualist perspectives can inadvertently impact physical distancing intentions. These findings contribute to the growing literature that argues for the use of cultural theory in the development of management plans that rely on influencing individual behaviour. This study is also the first of its kind in Australia and contributes a survey template and new dataset that can be replicated or incorporated into existing studies.

The remainder of the paper is structured as follows. Section 2 summarises the relevant literature on both the individualism-collectivism dichotomy and Covid-19. Section 3 discusses the survey, while section 4 presents summary statistics of the data sample. The methodology of the analysis is introduced in section 5. Section 6 illustrates empirical results, which are then discussed in section 7. Finally, section 8 provides some concluding remarks.

2. Related literature

2.1 Individualism and collectivism

The Individualism index within the model measures the degree to which a society feels an interpersonal connection with those within their core groups (i.e. friends and family), and the wider community. Within Individualist societies, people are more likely to have multiple tight groups, but these groups are inherently unstable. This is because Individualists are willing to drop groups in favour of new groups when demands

become inconvenient or values shift away from the individual's personal belief (Cozma 2011). This weaker interpersonal connection with others allows members to freely pursue their personal goals without internalising the different challenges presented by their groups (Markus & Kitayama 1991). Whereas, Collectivist societies have a smaller but wider number of groups, and often extend their circles to include those of the broader community. Unlike Individualists, their groups are more stable as they promote loyalty and conformity. Often Collectivists are also willing to prioritise the goals of the group to maintain harmony, even if they shift away from the individual's personal beliefs (Hui & Triandis 1986).

Since social distancing and hygiene practices are collective actions, their effectiveness relies on the willingness of individuals to adopt strict behaviours and consider how their actions affect the wider community. Those within a Collectivist society will be better able to undertake collective action since the society itself values unity and stronger interpersonal connections with the wider community. They are also more receptive to actions that involve a level of personal sacrifice if it improves the well-being of the greater society (Dheer et al 2020). However, attempting to co-ordinate collective actions within an Individualist society is comparatively more difficult given the nature of Individualists to regard such health mandates as threats to personal freedom and liberty. This theory was referenced by behavioural scientists working with the Scientific Advisory Group for Emergencies (SAGE) in the United Kingdom (UK) who recommended that the UK government promote a sense of collectivism to avoid public disorder and promote social norms around COVID-19 public health behaviours (Gov.UK 2020).

This relationship between IND-COL alignments and the COVID-19 pandemic has been since heavily researched in recent studies. Using an inquiry of 49 countries, Medeiros and Erman (2020) conducted a comparison of COVID-19 fatalities conditional on a country's socio-economic demographics and their level of Individualism, finding a positive correlation between Individualism and fatalities among infected individuals. They argue this may be due to associations between Individualist societies and neo-liberal socio-economic policies. They claim that governments of Individualist nations tend to reward individual well-being and undercut social welfare which develops weak collective protections. In another cross-country examination, Jiang, Wei and Zhang (2020) find that similar cultural differences explain the variation in government responses to COVID-19 and the levels of viral transmission across countries. They suggest that since public health orders cannot be entirely enforced without force, the success of a policy relies heavily on the will of a population. When

comparing Individualist countries such as the US with Collectivist countries such as South Korea, they find that Individualist societies have lower willingness to engage in collective action and significantly higher transmission rates than those of the collectivist countries. This is reinforced not only by the actions of the individuals but by the decisions of their governments who reflect the society's attitudes and wills. They conclude that the nature of low compliance is therefore reinforcing given the US would also prefer a government that desires a low level of intervention across all areas. This is supported by another survey that found 52% of US adults went out in public despite public health authorities recommending staying home and social distancing behaviours (Canning et al 2020).

IND-COL model has been reconceptualised for individual analysis multiple times in literature. Researchers have debated on the bipolarity of the dimensions and the accuracy of its components to explain cultural patterns (Cozma 2011). For this study, we will be referring to the model developed by Hui and Triandis (1986). The 16-item scale is considered one of the most useful and easily applicable psychometric tests that reliably measures IND-COL at the individual level (Germani et al 2019). His work suggests that there are multiple types of IND-COL and that the addition of a Vertical and Horizontal attribute can best account for these variations, a view supported by Shavitt et al (2011). Thus, the delineation of different IND-COL measures provides a more nuanced understanding of culture and behavioural decisions. Specifically, the Horizontal attribute emphasises equality whereas the Vertical attribute recognises the existence of hierarchy (Triandis, H.C. & Gelfand M.J. 1998). This in turn impacts how societies respond to groups in power, the level of social cohesion within a community and how efficiently decisions are made (Cozma, I. 2011). Since our study will focus on within-culture comparisons, these extra dimensions provide necessary and valuable information.

Individuals scoring high on the Vertical Individualist scale (VI) view themselves in competition with others, seek achievement and wish to improve on their status in society. Horizontal Individualists (HI) similarly acknowledge the existence of hierarchy and status in society, but they are not particularly interested in becoming distinguished individuals themselves. They prefer to maintain modesty in their achievements and place less value on competing with others. On the other hand, individuals scoring high on the Horizontal Collectivist scale (HC) see themselves at equal status with others in their community and emphasise social appropriateness, cooperation and working towards a common goal. Vertical Collectivists (VC) similarly emphasise the

importance of supporting the core-group and working towards group goals but acknowledge that are required to respect those who benefit from higher status to maintain harmony within the groups.

2.2 Literature on Covid-19

This paper is loosely inspired by an Italian study conducted by Germani et al (2020). They use Triandis' measure of culture to evaluate the role of cultural dimensions on psychological maladjustment of young adults in Italy during the COVID-19 pandemic. They claim that emotional and behavioural reactions to the infectious disease can be explained by the degree to which an individual aligns to the four IND-COL dimensions. The survey included demographic indicators, behavioural and belief-based questions about the pandemic as well as a modified version of Triandis' IND-COL measure. They find that Collectivist orientations are positively related to perceived knowledge, worries and concerns about the virus. Given Collectivists value the relationships with their core groups, these higher levels of concern could be translated into greater concerns about infecting others within these circles. Further, the higher risk perception and sense of responsibility to prioritise community goals may also explain the increased intentions to participate in public health behaviours that reduce the spread of the virus. They also highlight that the emphasis Collectivists place on interdependence and sense of community seems to explain why those aligning to HC or VC were better able to mentally manage the isolation and uncertainty that social distancing measures exacerbated.

Other studies have suggested that given the nature of Collectivists to abide by social norms in a society, they are also more likely to engage in collective actions such as social distancing and hygiene practices in comparison to Individualists. According to Biddlestone et al (2020), those who align with the HC dimension are more likely to comply with public health orders and accept government intervention due to lower levels of powerlessness. That is, Collectivists tend to show higher beliefs that their actions can contribute and are necessary for a positive outcome to the crisis. Similarly, Travaglino (2020) finds that individuals with a high horizontal collectivist orientation are more likely to report higher levels of compliance with social distancing norms due to their stronger trust in the government and higher willingness to collaborate with authorities. This trust in the government can be partly attributed to previous performance but is also a reflection of *"social and civic engagement within a society"* (Putnam, 2000), which tends to be correlated with collectivist attributes. This is supported by Dheer et al (2020) who have also suggested that societies of Collectivist individuals are best

equipped to implement management policies that rely on collective action because adherence to social norms is central to their belief systems.

Conversely, Biddlestone et al find that individuals in the VI category are more likely to believe conspiracy theories and misinformation, as well as indicate more pronounced feelings of powerlessness, due to their perception that personal actions are insignificant in collective crises and that malicious intents exist behind government recommendations. These findings are extended by Freeman et al (2020), who find that individuals with high levels of COVID-19 conspiracy thinking report less adherence to government recommendations, showing lower willingness to be vaccinated, partly due to higher levels of mistrust of authority, heightened levels of perceived danger and an unwillingness to conform to group ideals.

Along the same lines, Ahuja et al (2020) measure fear of Coronavirus, mental well-being and IND-COL alignment in India, finding that the values of belonging, improving the well-being of one's family and strong social circles act as natural defences against the uncertainty and fear that accompanies the threat of infectious diseases. Their findings confirm the results Schaller and Murray (2011), in which Collectivists emerge to be better equipped to manage the risks of foreign pathogens as they value conformity, have higher levels of distrust of strangers and have generally more experience adhering to food preparation and hygiene rituals.

Studies of previous pandemics have revealed similar findings about the influence of different levels of IND-COL on community behaviour (see, for example, Heejung et al, 2016).

Finally, further indirect evidence about the role of the IND-COL dimension on predicting pro-social and harmonious behaviour is discussed in papers that have investigated environmental beliefs, such as Xiang et al (2019) and Kim and Choi (2005).

3. Survey Design

The survey is comprised of three sections: 1) the demographic questions, 2) a COVID-19 behavioural questionnaire and 3) Triandis' IND-COL survey. In this section we will give a broad overview of the survey. The exact wording of the questions with response options are presented in the Appendix.

3.1 Demographic questions

The demographic information include respondents' gender, age, education, employment status and income, ethnicity, location of residence, and household characteristics. The household demographic questions include 1) *'Which dwelling type best applies to you?'* with the responses *'Free-standing home', 'Apartment', 'Townhouse'* or *'Other'*, and 2) *'Number of people living in your household (including you)'* and 3) *'Age(s) of people in your home (check all that apply)'*. Response to these questions were included as control variables in our regression analysis because household type and demographics are likely to be associated with the collectivist or individualistic mindset and have in independent effect on health behaviours during the coronavirus pandemic. For example, individuals living in a free-standing home may be less likely to interact with objects that have been touched by others in comparison to individuals living in apartment complexes with shared doors and buttons (Biasco 2020). This can affect the frequency of handwashing and use of hand sanitiser. Individuals in apartments may also feel more inclined to leave their homes due to the small living space in comparison to those in free-standing houses. Finally, individuals living with people above the age of 65 may act more cautiously and have higher levels of risk perception given that this category represents those at the highest risk of COVID-19 infection (O'Donnell 2020).

Following Hughes et al (2016), we allow open-ended responses such as: *'Other: please specify'* or '*I prefer not to answer'* to the questions '*Which of the following describes your sex?'*, '*What is your postcode?*, and '*Which of the following describes your personal income last year?'*.

Finally, the response options for the demographic questions were specifically designed to increase the completion rate and comparability of our survey with the Australian Bureau of Statistics survey instruments.[1]

3.2 COVID-19 behaviour questions

The COVID-19 behaviour questions are divided into the following 8 sections:

i. Social distancing – avoiding crowded public places,

ii. Protective behaviours – face masks,

[1] The following were used to inform the responses to our demographic questions: the ABS Standard for Sex and Gender Variables, the Australian Statistical Standard for Classifying Cultural and Ethnic Groups (ASCCEG), the Australian Standard Classification of Education (ASCED), the ABS Labour Force Survey (LFS) and Statistics: Concepts, Sources and Methods and the ABS Household Impacts of COVID-19 Survey.

iii. Avoidance behaviours – avoiding places of study or work,

iv. Avoidance behaviours – preventing children from going to places of study or work,

v. Improving personal hygiene,

vi. Beliefs about public health safety behaviours,

vii. Personal impact and,

viii. Fears.

These questions are adapted from the datasets available on the COVID-19 Public Monitor created by YouGov and the Imperial College London (YouGov 2020). In particular, our survey adopts questions from 'COVID-19 fears' and 'Personal measures taken to avoid COVID-19' modules of the Monitor. Questions relevant to our study are extracted from the YouGov dataset codebook (Ellison 2020) and organised into appropriate categories. Only questions that we deemed appropriate for our study were included in our final survey.[2] We will now describe the eight categories of COVID-19 behavioural questions in detail. Tables 3a-3g present distribution of the responses to all COVID-19 behavioural among our survey respondents.

Social distancing – Avoiding crowded public places

This section includes the five questions which measure different forms of social distancing behaviour. Four questions relate to avoidance behaviours in the past month, with responses ranging on a Likert Scale of 1 = *'All of the time'* to 5 = '*Not at all'*. Since no formal lockdowns were in place during the survey period, these responses measure risk perception to the virus and level of voluntary compliance with government recommendations. Individuals who responded with '*All of the time'* or *'Most of the time'* are assumed to show the highest levels of these attitudes.

Protective behaviours – Face masks

Similar to the social distancing questions, four of the five face mask questions are related to behaviours adopted in the past month, with responses in a Likert Scale of 1 = *'All of the time'* and 5 = *'Not at all'*. A conditional

[2] For example, we excluded the question '% of people in each market who say they are: Avoiding physical contact with tourists' as interaction was presumed to be minimal or nil since the survey was circulated when international border closures were still in place (Grattan Institute 2020).

question is first presented to filter out individuals who would not be able to wear face masks for medical or professional reasons. This ensures that only individuals who had a voluntary choice about wearing a face mask responded. Considering face masks were never formally required during the survey period, the questions measure levels of risk perception, self-protection, and adherence with government recommendations. Those that responded with *'All of the time'* or *'Most of the time'* are assumed to demonstrate the highest levels of these attitudes.

Avoidance behaviours – avoiding places of work or study

To develop a clear understanding of how the sample adjusted their work or study behaviours during the survey period, we ask our respondents to indicate if they avoided working at their place of work or study and if they had prevented any of their children from attending places of work or study. Conditional questions are first asked to validate that places of work or study did not shut down during the period. If the individual stated that their workplace did close, they would skip these questions. This ensures that we were only capturing voluntary intentions.

Improving personal hygiene

The five questions in this section measure changes in personal hygiene behaviours in the past month. The responses are collected in a Likert Scale format where 1 = *'More'*, 2 = *'About the same'* and 3 = *'Less'*. The five questions are chosen according to their relevance to our study. Like the other measures, hand hygiene behaviours were never enforced but widely encouraged. Therefore, those who respond with *'More'* are considered to have higher levels of compliance and greater intentions to self-protect.

Beliefs about public health safety behaviours

The four questions in this section are adapted from the 'Fears' category of the YouGov dataset. The questions were designed to determine levels of perceived susceptibility and severity of the pandemic. The question *'I feel it is important to carry out activities which will improve my health'* was added to help us gauge the degree to which the respondents perceive health and healthy behaviours to be important in their lives.

Impact on well-being

The question *'My life has been greatly affected by coronavirus (COVID-19)*' was adapted directly from the YouGov codebook. This question allows us to develop an understanding of how respondents experienced the pandemic, and how these perceptions impacted fears and behaviours. For example, those who feel less impacted than others may have lower levels of worry and feel better able to manage the uncertainty of the pandemic in comparison to those who indicate that they feel more impacted.

Fears

The Fears section presents the final set of questions for the COVID-19 behaviours questionnaire. The three questions focus on measuring perceptions about the health of the society, concerns about personal health and the health of family and friends. Similar to the other sections, the questions are asked in a Likert Scale format where 1 = *'Very worried'* and *4 = 'Not at all worried'*.

3.3 IND-COL Survey

The 16-item scale is designed to understand the degrees to which individuals aligned with four of the IND-COL cultural dimensions; vertical collectivism (VC), horizontal collectivism (HC), vertical individualism (VI) and vertical collectivism (VC). Within the survey, each dimension is described by a combination of four specific questions. Some examples are *'I'd rather depend on myself than others'* (HI), '*Competition is the law of nature'* (VI), *'The well-being of my co-workers is important to me'* (HC) and *'It is my duty to take care of my family, even when I have to sacrifice what I want'* (VC). The participants were asked to respond to the statements using a 9-point Likert Scale that ranges from *'Strongly disagree'* (1) to *'Strongly agree'* (9). The total score for each dimension was calculated by summing each item score and possible scores ranged from 4 to 36. The higher the cumulative score, the more the respondent aligned with the values and beliefs characteristic to the cultural dimension.

4. Descriptive Statistics

The survey was published on Qualtrics and shared across our social media platforms and email contact groups. The survey was live for approximately one month and received responses between 17 September and 19 October

2020. After validating the responses and clearing unfinished surveys, the final sample size comprises of 120 participants. **Table 1** summarises the key demographic characteristics from the survey. Of the group, 72.50% are under the age of 36 and approximately 91.67% of respondents have attained a Bachelor degree or higher education.

Most of the respondents are located in the inner city of Sydney (19.51%), followed closely by residents in North Sydney (17.07%), Western Sydney (18.29%), the Inner West (12.20%) and South West Sydney (9%). Less frequent representations include the Blue Mountains (2.44%), Eastern Suburbs (4.88%), Hills District (3.66%), Northern Beaches (2.44%), South Sydney (4.88%) and Wollongong. Although the survey has a relatively small sample size, the range of individuals is large across the Sydney region (see **Map 1** and **Map 2** in the Appendix).

From the household statistics, 55% of the sample indicated that they are currently living in a free-standing home, with 36% living in apartments. The remaining indicated they are residing in home types such as duplexes or townhouses. Approximately 37% indicated that there are less than 3 people in the home and 45% of people indicated that there are 4 or more people in the home.

Descriptive statistics for the IND-COL variables are given in Table 2. Each of the four IND-COL scores are calculated by summing responses to four respective questions included in the psychological questionnaire presented at the end of the survey. With the maximum score of 36, the high means for HC (26.8) and HI (25.63) suggest that the respondents have a generally horizontal alignment[3]. However, there is still a substantial variability of the Individualist and Collectivist attributes in the sample as is evident from the sample standard deviations of these variables.

We investigate if our approach to constructing the IND-COL scales is appropriate. Because the four questions used to construct each of the four IND-COL scales intend to measure one general concept, we use the CFA technique and Cronbach's alpha to determine if each factor within the scale was coherent with others within the same factor. First, factor correlations across the respective HC, HI, VC and VI questions are computed. Then internal consistency is checked using Cronbach's alpha. Given the small sample size of the study, item-rest

[3] As previously mentioned, the horizontal and vertical attributes describe how the individual understands the world to be either equal or hierarchical. Those with a horizontal alignment emphasise equality and do not generally perceive others to be less or more deserving than themselves.

correlations above 0.30 and alpha levels above 0.50 are considered acceptable. P-values smaller than 0.10 were also set as the appropriate threshold. Any variables that failed to meet item-test, item-rest correlation and alpha values are removed from the summation scores. Only one variables from the set of four variables measuring Vertical Collectivism does not pass these tests and is not included in the construction of the VC measure used it the estimation of our econometric models. The details of this analysis are presented in the Appendix.

Tables 3a-3g present frequency distributions of the COVID-19 behavioural variables. These data suggest heterogeneity in the responses with a substantial proportion of the sample reporting incomplete compliance with social distancing, facemask wearing and personal hygiene recommendations (Tables 3a-3c), despite the beliefs of the large majority of the sample that these and similar activities are protective against coronavirus (Table 3e). Interestingly, a large majority of the sample reveals strong fears that their friends or family may become unwell or die from coronavirus, but the respondents do not seem overly concerned about the effects of coronavirus on their own health (Table 3g). This may be explained by the age composition of our sample where close to 90% of the respondents are younger than 45 years old. Finally, about 80% of the respondents expect a long-lasting negative impact of coronavirus on society.

5. Empirical Methodology

The research questions of the study are investigated by testing the direction and strength of the empirical relationship between the COVID-19 behavioural variables and the Individualist and Collectivist attributes, conditional on socio-demographic characteristics. Our preferred empirical models for COVID-19 behavioural variables (our dependent variables of interest) are ordered probit and ordered logit. However, these models rely on the asymptotically consistent Maximum Likelihood estimator, which requires large sample sizes to produce reliable estimates. Furthermore, these models suffer from separation problems when applied to our data, with some observations perfectly predicting the outcomes in several specifications. To remedy these problems, we implement two solutions: 1) dichotomising all dependent variables into binary format, and 2) using Penalized Maximum Likelihood Estimation (PMLE).

To implement the first solution we set to one responses that indicate positive alignment with the question (e.g. 'Strongly Agree' and 'Agree', or 'All of the time" and 'Most of the time') and we set to 0 responses that indicate negative alignment (e.g. 'Strongly Disagree', 'Disagree' and 'Neutral', or 'Some of the time', 'Rarely', 'Not at

all'). Neutral responses were given value of zero because our goal is to understand the determinants of changes towards positive behaviours from the behavioural status quo.

We also explore the possibility of aggregation of the discrete responses within the eight sections of the COVID-19 behavioural questionnaire by summation, so that the resulting summative score could be analysed by OLS. In order for this approach to have internal consistency, the questions within the section must measure the same underlying behavioural tendency. We test this by computing Cronbach's alpha for responses within each of the eight sections. For three sections (Social distancing – avoiding crowded public places, Protective behaviours – face masks, Beliefs about public health safety behaviours) where the results suggest it is appropriate to sum the responses we have generated the summative behavioural scores to be used as dependent variables in the empirical analysis alongside the binary variables described above.[4]

In particular, the summative scores for social distancing (sociald) and mask wearing (facemask) are constructed by summing the responses to the four questions in the respective sections of the behavioural questionnaire where 1 was coded for 'All of the time' and 5 for 'Not at all'. To make the indexes increasing in the direction of the positive behavioural change the resulting scores are subtracted from their maximum of 20. The resulting summative scores vary from 16 ('All of the time') to 0 ('Not at all'). The summative score for beliefs about public health safety behaviour (beliefs) is coded using the responses from the respective section of the behavioural questionnaire where 1 is coded for 'Strongly agree' and 7 for 'Strongly disagree'. To make the index increasing in the direction of a positive behavioural change the resulting score is subtracted from its maximum of 14. The resulting index varies from 12 ('Strongly agree') to 0 ('Strongly disagree'). We analyse these summative scores using OLS regression models.

The second solution involves Penalized Maximum Likelihood Estimation (PMLE). This method introduces a penalty that cancels out the biases of MLE when applied to small samples. David Firth (1993) developed firthlogit, a user written STATA program, that capitalises on this technique for estimation of the logit model.[5] Studies suggest that firthlogit is appropriate for situations in which a separated dataset suffers from the biases of a conventional MLE model (Coveney, J. 2008). The method produces results that are almost identical to

[4] The results for the CFA analysis of the responses in the social distancing, face masks wearing and beliefs sections are presented in the Appendix.

[5] For further information on how firthlogit builds upon logistic regression, see Canario 2020.

those of the ordinary logistic regression in large samples, and is superior in small samples. In particular, the firthlogit model produces correct coverage probability in applications with small sample sizes and large number of covariates (Devika & Sebastian 2016).

To improve precision of our estimates we re-code demographic explanatory variables to remove cells with very small number of observations. In particular, gender and house type are re-coded into binary variables. This was appropriate since the responses to '*Other*' options are aligned with one of two available close ended responses. Education is also coded as a binary variable as over 90% of the respondents indicated they have achieved an education level of at least an undergraduate degree. Hence, we collapse educational categories available in the survey into two groups: a Bachelor degree or lower qualification (44.17%) and Postgraduate levels of education (55.84%). We also collapse income into 5 categories: 'Less than $20,000', 'More than $20,000 but less than $49,999', 'More than $50,000 but less than $99,000', 'More than $100,000' and 'Prefer not to answer'. Finally, we collapse the household type into two categories: less than 4 people in the home and more than 4 people in the home.

After these changes, each of the 16 binary indicators measuring COVID-19 behavioural changes and three behavioural summative scores are regressed on the Individualist and Collectivist attributes and re-coded demographic characteristics using firthlogit or OLS. The full set of the explanatory variables in our models includes Individualist and Collectivist attribute variables HI, VI, HC, VC, gender (male or female), education (post-grad or bachelors and less), age (linear), employment status (employed and working paid hours, employed and not working paid hours, not employed), house type (free-standing home, apartment), number of occupants in the home (less than 4 or 4 or more) and income.

6. Results

In this section, we present estimation results for models where binary or summative measures of COVID-19 behavioural changes are regressed on Collectivist and Individualist attributes and demographic control variables. For the firthlogit models we present the results in the form of marginal effects of covariates on the probability that binary outcome is equal to one (e.g. the behaviour is performed 'All of the time' or 'Most of

the time', or the respondent 'Agrees' or 'Strongly agrees' with the statement).[6] For the binary independent variables, such as gender and house type, the marginal effects measure how the probability of the outcomes changes when the variable changes from 0 to 1. For continuous independent variables, such as IND-COL measures and age, the marginal effects measure the change in this probability when the independent variable increases by one unit. For the three summative scores (sociald, facemask, beliefs) we present coefficients from the OLS regressions. Statistically significant estimates are indicated in the tables of results by asterisks. In the six subjections that follow, we describe the effects of IND-COL variables and demographic characteristics on the respective COVID-19 behaviours. For the sake of brevity, we do not present the effects of demographic characteristics other than gender in the body of the paper, but we provide full regression results in the Appendix. A comprehensive discussion of the empirical results is provided in section 7.

6.1 Social distancing – Avoiding crowded public places

Table 4 presents marginal effects of covariates on social distancing behaviour. For question APP_5: '*Would you avoid contact with people who have the coronavirus symptoms, or you think may have been exposed to the coronavirus?'* we find that a one unit increase of a HC score, on average, leads to an increase of 1.3 percentage points (at $p<0.10$) in the probability of an individual responding *'Yes'*. This implies that a one standard deviation increase in HC (5.39) increases this probability by 7 percentage points. Last column of the table shows the results for the summative score *social*. One unit increase in HI decreases this summative score by 0.162 points (at $p<0.10$). This translates to the decrease of 0.91 for a one standard deviation increase in HI (5.64).

We also find that social distancing behaviours are affected by demographic characteristics. In particular, males are 20.1 percentage points less likely to avoid potentially infected persons, compared to females. Residing in a free-standing house or townhouse in comparison to living in an apartment reduces the probability of several social distancing behaviours, in comparison to living in an apartment.

[6] The results of firthlogit models in the form of odds ratios are available from the authors upon request.

6.2 Protective behaviours – Face masks

Table 5 presents marginal effects of covariates on responses to face mask questions. Our survey reveals that 91.67% of the sample (110 respondents) were able to use face masks in public. For this group, a one unit increase of HC, on average, leads to an increase of 2.1 percentage points in the probability of an individual responding *'All the time'* or *'Most of the time'* to the question FM_5 *'In the past month, how often did you wear a face mask on public transport?'* The magnitude of this effect implies that a one standard deviation increase in HC (5.39) increases the probability of using face masks by 0.11.

We find that males are less likely than females to engage in the following face mask behaviours:

1) FM_2: wearing a face mask in outdoor public spaces (20.4 percentage points less likely at $p<0.10$)
2) FM_4: wearing a face mask at a place of work (17.6 percentage points less likely at $p<0.10$)
3) FM_5: wearing a face mask on public transportation (20.5 percentage points less likely at $p<0.10$).

This gender effect is also statistically significant for the summative score for face mask behaviour.

6.3 Avoidance behaviours – avoiding going to places of study or work and preventing children from going to places of study or work

The number of observations for the models in Table 6 was filtered by the following questions respectively: *'Did your place of work or study close during this period?'* (for variable AGW_2) and '*Did your child's place of study close during this period?'* (for variable ASCS_2). We find that 109 respondents stated that their place of work or study remained open. Of the respondents who have children, 31 indicated that their child's place of study or work did close.

From these observations, we find that a one unit increase in VI, on average, increases the probability of an individual responding *'Always'* or *'Frequently'* to ASCS_2 *'How often did you avoid letting your child/children go to school or university?'* by 3.9 percentage points. This translates into the 23 percentage points increase in this probability from a one standard deviation increase in VI (5.99).

Our results also show that males and residents of free-standing houses or townhouses have a lower probability of responding *'Always'* or *'Frequently'* to question AGW_2: *'How often did you avoid working or studying outside of your home?'*.

6.4 Improving personal hygiene

Table 7 presents the marginal effects of covariates on the personal hygiene behaviours. Our results suggest that a one unit increase of VC, on average, leads to a 2.1 percentage point increase of the probability of an individual responding *'More'* to question PH_1: '*In the past month, how often did you wash your hands?'*. This translates to the increase of 11 percentage points in this probability from a one standard deviation increase in VC (5.45). Similarly, a one unit increase of VC on average, leads to the 1.6 percentage points increase of the probability of responding *'More'* to question PH_2: '*In the past month, how often did you use hand sanitiser?'* Consequently, a one standard deviation increase of VC (5.45) implies an 8.72 percentage points increase in this probability. Finally, a one unit increase of VI, on average, leads to an increase of 0.7 percentage points (at $p<0.10$) in the probability of an individual responding 'Less' to the question PH_5 *'In the past month, how often did you avoid touching objects in public'*. A one standard deviation increase in VI (5.97) increases this probability by 4.1 percentage points.

Consistently with previous results, we also find that males are 22.6 percentage points less likely than females to respond *'More*' to question PH_4: '*In the past month, how often did you clean frequently touched surfaces*'.

6.5 Beliefs about public health safety behaviours

Table 8 presents marginal effects of the covariates on beliefs about public health safety behaviours. Our results reveal that a unit increase of HC, on average, leads to a decrease of 0.9 percentage points in the probability of a respondent strongly agreeing or agreeing with the statement in PIMP_3: *'Wearing a mask will protect others against coronavirus (COVID-19)'*. This implies a decrease of 4.9 percentage points from a one standard deviation increase in HC (5.39). Similarly, a one unit increase in HC, on average, leads to a decrease of 1.1 percentage points in the probability of an individual strongly agreeing or agreeing with the statement in PIMP_4: *'I feel it is important to carry out activities which will improve my health'*. This implies a decrease of 5.8 percentage points from a one standard deviation increase in HC (5.39)

Finally, the probability of a respondent strongly agreeing or agreeing with the statement in PIMP_1: *'It is likely that I will get coronavirus (COVID-19) in the future'* is negatively related to age, residing in a home with fewer than 4 residents and is positively related to high income. The summative scale for beliefs reveals no statistically significant results.

6.6 Impact on Well-being and Fears

Table 9 presents the marginal effects of covariates on the responses to questions about the Impact on well-being and Fears. The results suggest that all four IND-COL variables impact at least one outcome in this section. In particular, the HI variable negatively affects three types of fears: FEARS_1: '*There will be a long-lasting negative impact on society',* FEARS_2: *'How worried are you that friends or family might become seriously unwell or die'* and FEARS_3: '*How worried are you that I might become seriously unwell or die'*. The magnitudes of the effects of HI on these fears are quite similar, i.e. one unit increase of HI decreases the likelihood of being '*Very worried'* or *'Fairly worried'* by about 2.2-2.4 percentage points, which translates to the decrease of about 12-13 percentage points from one standard deviation increase in HI (5.64). The HC and VI variables positively affects FEARS_2, while VC variable positively affects FEARS_3, with the absolute values of the magnitudes of the effects being similar across the models.

Demographic characteristics such as Postgraduate education, Employed status and income in the highest category reduce fears and negative believes in some specifications.

7. Discussion

We test the following hypotheses on the relationship between Triandis' IND-COL measures and public health safety behaviours:

Hypothesis 1: HC and VC are positively related to higher intentions to comply with government recommendations and public health advice.

Hypothesis 2: HI and VI will predict lower intentions to engage in behaviours that reduce the spread of coronavirus.

Hypothesis 3: HC is positively associated with face mask behaviours and improved hygiene practices.

Hypothesis 4: HC and VC promote belonging and community support which helps them manage the psychological stress of lockdown measures.

Hypothesis 5: HI and VI feel more vulnerable to the pandemic and lack psychological protection against the threat of the coronavirus

Through the construction of a detailed survey and new dataset, we present an Australian context on the problem of compliance and contribute new findings to these established hypotheses. According to Hofstede's classification, Australia is considered the second most individualistic country behind the United States (Hofstede 2011). From the perspective of the current literature, this would suggest that most of the individuals within Australia prioritise their personal goals and freedoms over the needs of the majority, with consequent low level of compliance with public health recommendations. However, with globalisation, migration, and access to the internet, it is more likely to find individuals within a country that disagree with the shared norms and values of a nation. We see this variation in the strong appearance of both Collectivism and Individualism within our study. This may be due to Australia's rich history of immigration and current migration composition that has influenced multiculturalism (ABS, 2019a). This aligns with Triandis' initial argument that the IND-COL measure ascribed at the country-level is not representative of individuals within a nation, nor is it applicable for analysis at the individual level.

Hypothesis 1: HC and VC are positively related to higher intentions to comply with government recommendations and public health advice.

We find a positive relationship between increasing levels of collectivism and intentions to engage in public health safety behaviours that supports Hypothesis 1. As HC increases, we find that an individual is more likely to state that they would avoid persons who have been exposed to the coronavirus or who may be showing symptoms of the disease (see Table 4 and section 6.1). A similar positive relationship is revealed between HC and wearing face masks on public transport (see Table 5 and section 6.2). This finding supports existing evidence that argues higher levels of risk perception and vulnerability are positively related to the Collectivist dimension. Coupled with the interdependent and cooperative characteristics they uphold (Triandis 2001), Collectivists are more aware of the risks of viral transmission and are more willing to inform themselves about

the pandemic (Germani et al 2020). As we see in our findings, this will therefore translate into a higher intention to implement the most effective public health safety measures. Consideration of the context in which the respondent practised these avoidance behaviours defends these findings. During the survey period, there were no enforced lockdowns in NSW that prevented individuals from visiting public places. Rather, the call to physical distance was recommended as part of the coronavirus response plan that the Australian government broadcasted in official media statements and reports (Department of Health, 2020). Thus, those who stated that they avoided public places *'All of the time'* or '*Most of the time'* are generally demonstrating higher degrees of compliance with government recommendations and public health advice.

H2: HI and VI will predict lower intentions to engage in behaviours that reduce the spread of coronavirus.
Hypothesis 5: HI and VI feel more vulnerable to the pandemic and lack psychological protection against the threat of the coronavirus

Hypothesis 2 is partially supported by the statistically significant negative relationship between the intentions to engage in social distancing behaviours and HI scores (see Table 4 and section 6.1). Given these social distancing behaviours involve a level of personal sacrifice; those with high HI scores may perceive such mandates as restrictive on their personal freedom. This finding supports the existing literature that suggests that it is more difficult to implement COVID-19 management plans in societies of Individualists because of their inclination to value individual well-being and personal freedom (Jiang et al 2020). These two attributes directly oppose the required characteristics of conformity and obedience that are relied upon in collective action policies. This also supports studies that find Collectivists to be unwilling to adopt actions that require a degree of personal sacrifice (Kim and Choi 2005).

Hypothesis 5 is also partially supported by our survey which finds a positive relationship between VI and the probability to worry that *'Friends or family might become seriously unwell or die'* (see Table 9 and section 6.6). This result indicates that the VI characteristic may play an important role in determining the degree to which individuals manage the psychological stress of the pandemic. Since Individualists emphasise solidarity and self-reliance, they may feel isolated and vulnerable during such crises. Heejung et al (2016) emphasise that a feeling of competition is detrimental during a pandemic when societies of Individualists view others making decisions

that are characteristically selfish. For example, the mass stockpiling of essential goods from supermarkets or news broadcasts that report individuals hosting large events despite restrictions can further promote feelings of alienation and increase levels of worry (Lufkin, 2020). We also find that HI also influences levels of worry about the coronavirus pandemic, but in the opposite direction of our hypothesis (see Table 9 ad section 6.6). We find that HI scores decrease probability the individual states that they are worried about their health or the health of their friends and family. The result is surprising given this dimension shares the same Individualist characteristics as VI. One way of explaining this variation is with the conspiracy theory argument from Biddlestone et al (2020). They find that individuals with high levels of VI appear to be directly affected by conspiracy theories about the coronavirus. Freeman et al (2020) also finds that those with high levels of conspiracy thinking are more likely to be distrustful and suspicious of government intervention. With some current conspiracy theories questioning the legitimacy of the pandemic and the potentially malicious intents of coronavirus response plans, this may explain why increasing VI scores results in increasing worry and fear (Freeman et al. 2020). However, we can also argue that from a contextual perspective the participants from the survey with high HI may feel more confident about the future because cases were relatively low in NSW during the survey period when restrictions had started easing (ABC, 2020). This can be translated into lower concerns about personal health of the health of loved ones. Redistributing the survey and collecting information about conspiracy theories may assist in clearing up this unexplained variation. Despite this, given the strength of the relationship for VI holds at $p<0.01$, we conclude with confidence that increasing VI has a more significant relationship with fears about the pandemic.

Hypothesis 3: HC is positively associated with face mask behaviours and improved hygiene practices.

Hypothesis 3 is supported by the positive relationship between HC alignment and likelihood to wear mask in public transportation (see Table 5 and section 6.2). This also contributes to the argument for Hypothesis 1. As HC and VC share a Collectivist dimension, we can generalise the previous argument and claim that both are characteristically more likely to comply with government recommendations and public health advice. This outcome can be explained by the nature of Collectivists to respond positively to public health initiatives due to lower feelings of powerlessness. Existing research states that Collectivists tend to believe that their personal

action has a meaningful effect on collective outcomes (Biddlestone et al, 2020). This attribute, coupled with the emphasis they place on supporting group goals, also increases their likelihood of displaying adaptive responses during times of national crisis (Schaller & Murray 2011). Our results provide support for this reasoning, as we find a positive significant relationship between VC and the likelihood of compliance with personal hygiene recommendations (see Table 7 and section 6.4).

However, it is important to note that we did not find any significant relationships between HC and the summative face mask score, nor did HC influence face mask-wearing behaviours in other situations, such as in supermarkets or in public places. This impacts the degree to which we can state that HC has an overall positive impact on higher regularity of wearing face masks in general. Similarly, VC did not significantly influence social distancing behaviours or face mask-wearing behaviours. We recognise that although the marginal effects of VC on FM_2 and APP_2 are not statistically significant, the directions of the coefficients suggest that increased levels of these dimensions would decrease the probability of the individual adopting the recommended behaviour, the inverse of our hypothesis. According to the study by Heejung et al (2016), this unexpected behaviour could the result of an over-effective sense of psychological protection that Collectivist are susceptible to. Given their nature to assume others of the community are acting in the best interests of the group, this mental defence may convince Collectivists to be less compliant to public health behaviours because they feel higher levels of security within their community. To determine the validity of this argument, a replication of the study on a large sample group is recommended, with the inclusion of specific questions that test this measure.

H4: HC and VC promote belonging and community support which helps them manage the psychological stress of lockdown measures.

In contrast to the expectations of Hypothesis 4, we identify a positive relationship between HC, VC, and experiencing fears about COVID-19 (see Table 9 and section 6.6). This result is surprising given the interdependent attributes of collectivists have been previously found to reduce fear and improve capacity to manage concerns about the pandemic (Germani et al 2020) (Heejung et al 2016). However, we can argue that this relationship could be capturing the higher levels of risk perception that Biddlestone et al (2020) attributes to HC and VC. They claim that due to their high sense of responsibility towards the community, those with a

high collectivist alignment may feel more worried about infecting others and thus have higher concerns about the health of friends and family. Further, as a result of the mix of Individualists within the sample, we can argue that those of a collectivist alignment who witness the same characteristically selfish behaviours referenced previously, may feel less confident about the level of unity within their society. This argument extends on the findings of Heejung et al (2016) who find that group protection efficacy is built when a community trust that others are behaving in ways that improve the well-being of the community. We conclude that if Collectivists perceive selfish behaviours in their societies, this may have the inverse effect on their sense of security and generate fear, which increases levels of worry about their well-being.

Beyond the IND-COL measures, we also find interesting relationships between gender and COVID-19 behaviours. We find that males are less likely than females to avoid persons who may have been exposed to the coronavirus, and generally are less likely to engage in face mask-wearing behaviours than females. This finding is consistent with results from a US survey that found men to be approximately 15 percentage points less likely than women to engage in mask wearing behaviour (Haischer et al 2020). It is also consistent with other studies that point to gender differences in health behaviours and risk attitudes, e.g. a Finnish study that found women to be more actively engaged with health information and education (Ek, S. 2015), a risk assessment study that found women to have lower levels of risk tolerance (Harris, C.R. & Jenkins, M. 2006), and an international survey that found women to be more compliant with sheltering-in-place measures (Clark et al 2020).

8. Conclusion

The study of the impact of the COVID-19 pandemic on the society requires sophisticated policy development and multidisciplinary design. Entire populations have had their familiar social interactions interrupted and are experiencing heightened levels of uncertainty over their finances, relationships, physical and mental health. Despite these concerns and government recommendations, Australia has seen wavering levels of compliance with COVID-19 safe behaviours. To understand the behavioural roots of this phenomenon, we develop a study that analyses behavioural decision making from a psychological perspective. We conclude that individuals with Horizontally or Vertically Collectivist characteristics are more inclined to voluntarily participate in COVID-19 guidelines and follow government recommendations. However, the evidence is mixed. We find that HC and VC are equally susceptible to heightened levels of worries and fear as VI, which contradicts the expectations of

Hypothesis 4 (HC and VC promote belonging and community support which helps them manage the psychological stress of lockdown measures). We also find that increasing levels of HI improves the ability of an individual to manage the uncertainty of the pandemic. Finally, we also find that males appear less likely to adopt face mask-wearing behaviours confirming previous empirical studies suggest that this may be due to gender differences in risk perceptions and willingness to self-educate about the pandemic.

Overall, these findings, in conjunction with existing studies, suggest that policymakers should aim to promote a Collectivist mindset to improve the individual compliance with COVID-19 safe behaviours. Individualists messages, such as blame individuals or groups for COVID-19, divide the society and promotes a sense of competition, possibly dissuading individuals from adopting public health safety behaviours. Further, given that our findings suggest that 1) building these collective thoughts may inadvertently create a false sense of safety and 2): Collectivists are susceptible to increased levels of worry and fear, policymakers should act conservatively when forming these messages, focusing on positive stories that emphasise the relationship between increased hygiene and lower transmission rate as opposed to stories of low compliance, which can generate fear and uncertainty in the population.

The small sample size and the high concentration of tertiary-educated participants were the main limitations of our study. The results are therefore localised to the Sydney city region and educated population, which prevents us from generalising our findings to the wider population. We also distributed the survey through private social media accounts and email contacts, which favours the study towards individuals that have similar values and beliefs. Additionally, despite the amount of literature that supports the appropriateness of Triandis' IND-COL measure, we acknowledge that a single numeric measure is unable to accurately and comprehensively describe the complex cultural values that shape an individual's beliefs about the pandemic. However, we believe that the findings from this study can help contribute to the growing research that investigates both cultural categorisation and its implications on behavioural analysis by clarifying and demonstrating its application. Finally, although the firthmodel generated stable results for our dataset, some argue against its suitability.

Tables

Table 1: Summary of demographic variables

Variables		Freq.	Percent
Gender	Male	59	49.17
	Female	58	48.33
	Prefer not to answer	3	2.50
Age	16-25	56	46.67
	26-35	31	25.84
	36-45	21	17.50
	46-55	7	5.83
	56-65	3	1.67
	66+	2	1.67
Ethnicity	Oceanian – e.g. Australian Peoples, New Zealand Peoples, Melanesian and Papuan, Micronesian, Polynesian	34	28.33
	North-West European – e.g. British, Irish, Western European, Northern European	43	35.83
	Southern and Eastern European – e.g. Southern European, South-Eastern European, Eastern European	19	15.8
	North African and Middle Eastern – e.g. Arab, Jewish, Peoples of the Sudan, Other North African and Middle Eastern	10	8.33
	South-East Asian – e.g. Mainland South-East Asian, Maritime South-East Asian	17	14.17
	North-East Asian – e.g. Chinese Asian, Other North-East Asian	7	5.83
	Southern and Central Asian	5	4.17
	Peoples of the Americas – e.g. North American, South American, Central American, Caribbean Islander	4	3.33
	Sub-Saharan African – e.g. Central and West African, Southern and East African	4	3.33
Education	Postgraduate Degree level	46	38.33
	Graduate Diploma and Graduate Certification level	7	5.83
	Bachelor Degree level	57	47.50
	Advanced Diploma and Diploma Level	3	2.50
	Certificate Level	3	2.50
	Secondary Education (High school) or less	4	3.33
Employment	Have a job, currently working paid hours	85	70.83
	Have a job, but not currently working any paid hours	9	7.50
	Do not have a paid job	26	21.67
Income	Less than $20,000	26	21.67
	$20,000 to $34,999	15	12.5
	$35,000 to $49,999	20	16.67
	$50,000 to $74,999	10	8.33
	$75,000 to $99,999	8	6.67
	$100,000 to $149,999	13	10.83
	$150,000 and greater	16	13.33
	Prefer not to answer	12	10
NSW Districts	Blue Mountains	2	2.44
	Eastern Suburbs	4	4.88
	Hills District	3	3.66
	Inner City	16	19.51
	Inner West	10	12.2
	North Sydney	14	17.07
	Northern Beaches	2	2.44

	South Sydney	4	4.88
	South West Sydney	10	12.2
	Western Sydney	15	18.29
	Wollongong	2	2.44
Household Statistics			
Dwelling Type	Free-standing home or townhouse	77	64.16
	Apartment	43	35.83
Number of people in the home	1	7	5.83
	2	34	28.33
	3	23	19.17
	4	30	25
	5 or more	26	21.67
Ages of people in the home	Living with 65+	29	24.17
Total number of observations		120	

Table 2: Descriptive statistics of cultural orientation variables (IND-COL)

Cultural Orientation (IND-COL)	M ± SD
Horizontal Individualism (HI)	25.63 ± 5.64
Vertical Individualism (VI)	20.56 ± 5.97
Horizontal Collectivism (HC)	26.8 ± 5.39
Vertical Collectivism (VC)	18.98 ± 4.74

Table 3a: Frequency table of responses to 'Social distancing – Avoiding crowded public places'

In the past month, how often did you…	All of the time	Most of the time	Some of the time	Rarely	Not at all
APP_1: Avoid going to hospital or other healthcare settings	17.50%	19.17%	21.67%	9.17%	32.50%
APP_2: Avoid leaving the house for walks/exercise	5%	12.50%	15%	30.83%	36.67$
APP_ 3: Avoid taking public transport	32.50%	21.67%	22.50%	8.33%	15%
APP_4: Avoid visiting or hosting family or friends	12.50%	24.17%	25.83%	23.33%	14.17%
	Yes	No	Maybe		
APP_5:Would you avoid contact with people who have the coronavirus symptoms, or you think may have been exposed to the coronavirus?	81.67%	9.17%	9.17%		

Table 3b: Frequency table of responses to 'Protective behaviours – Face masks'

In the past month, how often did you…	All of the time	Most of the time	Some of the time	Rarely	Not at all
FM_2: Wear a face mask in outdoor public spaces (e.g. main roads, outdoor shopping districts, parks)	19.09%	13.64%	25.45%	18.18%	23.63%
FM_3: Wear a face mask inside a grocery store / supermarket	38.18%	10.91%	21.82%	10.91%	18.18%
FM_4: Wear a face mask at your place of work	26.36%	6.36%	10.91%	5.45%	50.91%
FM_5: Wear a face mask on public transportation	50%	9.09%	8.18%	4.55%	28.18%

Note: The responses in Table 3b were computed from 110 observations (91.7% of the sample) where the respondents answered "No" to the question FM_1: '*Is wearing a mask to protect against the coronavirus (COVID-19) impossible for you? (e.g. due to medical or professional reasons)'*

Table 3c: Frequency table of responses to 'Avoidance behaviours – avoiding places of study or work'

In the past month, how often did you…	Always	Frequently	Sometimes	Rarely	Not at all
AGW_2: How often did you avoid working or studying outside of your home?	24.77%	31.19%	20.18%	5.50%	18.35%
ASCS_2: How often did you avoid letting your child/children go to school or university?	9.68%	16.13%	19.35%	25.81%	29.03%

Note: In Table 3c the responses to question AGW_2 were computed from 109 observations where respondent's place of work/study did not close during the survey period. The responses to question ASCS_2 were computed from 31 observations where respondent had a child and the child's place of study did not close during the survey period.

Table 3d: Frequency table of responses to 'Improving personal hygiene'

In the past month, how often did you…	More	About the same	Less
PH_1: Washed your hands	73.33%	26.67%	0%
PH_2: Used hand sanitiser	80%	15.83%	4.17%
PH_3: Touched your face	6%	61%	53%
PH_4: Cleaned frequently touched surfaces in the home (e.g. doorknobs, toilets, taps)	35%	63.50%	2.50%
PH_5: Avoided touching objects in public (e.g. elevator buttons or doors)	7.50%	20%	72.50%

Table 3e: Frequency table of responses to 'Beliefs about public health safety behaviours'

	Strongly Disagree 1	2	3	4	5	6	Strongly Agree 7
PIMP_1: It is likely that I will get coronavirus (COVID-19) in the future	15%	30.83%	0%	33.33%	18.33%	2.50%	0%
PIMP_2: Wearing a mask will protect me against coronavirus (COVID-19)	5.83%	9.17%	0%	17.50%	60.00%	2.50%	5%
PIMP_3: Wearing a mask will protect others against coronavirus (COVID-19)	3.30%	5.83%	5%	5%	73.33%	3.33%	4.17%
PIMP_4: I feel it is important to carry out activities which will improve my health	3.33%	3.33%	8.33%	0%	75.83%	5.83%	3.33%

Table 3f: Frequency table of responses to 'Impact on well-being'

	Strongly Disagree 1	2	3	4	5	6	Strongly Agree 7
PIMP_5: My life has been greatly affected by coronavirus (COVID-19)	2.50%	14.17%	20%	5%	55.83%	0%	2.50%

Table 3g: Frequency table of responses to 'Fears'

How worried are you that…	Very worried	Fairly worried	Not too worried	Not at all worried
FEARS_1 There will be a long-lasting negative impact on society	23.30%	50.83%	21.67%	4.17%
FEARS_2: Friends or family might become seriously unwell or die	16.67%	41.67%	34.17%	7.50%
FEARS_3: I might become seriously unwell or die	7.50%	16.67%	50%	25.83%

Table 4: Marginal effects of IND-COL scores and gender on Social distancing – Avoiding crowded public places

	APP_1	APP_2	APP_3	APP_4	APP_5	Sociald
HI	-0.005	-0.005	-0.006	-0.005	-0.009	**-0.162***
	(0.011)	(0.008)	(0.011)	(0.011)	(0.008)	(0.097)
HC	0.004	-0.001	0.005	0.004	**0.013***	0.040
	(0.010)	(0.008)	(0.010)	(0.010)	(0.007)	(0.092)
VI	0.002	-0.004	0.001	0.002	-0.010	0.009
	(0.010)	(0.008)	(0.010)	(0.010)	(0.006)	(0.076)
VC	0.016	-0.007	0.016	0.016	0.010	0.134
	(0.012)	(0.009)	(0.012)	(0.012)	(0.008)	(0.094)
Male	-0.133	0.056	-0.093	-0.133	**-0.201*****	-0.954
	(0.105)	(0.078)	(0.101)	(0.105)	(0.071)	(0.817)
Constant						**9.410****
						(3.591)
Observations	120	120	120	120	120	120
Adjusted R-squared						0.045

Note: All regressions include controls for gender, age, education, labour force status, income, type of dwelling ad household type. Robust standard errors in parentheses, *p<0.10 **p<0.05 ***p<0.01

Table 5: Marginal effects of IND-COL scores and gender on Protective behaviours – Face masks

	FM_1	FM_2	FM_3	FM_4	FM_5	Facemask
HI	0.001	-0.014	-0.013	-0.013	-0.019	-0.190
	(0.007)	(0.010)	(0.012)	(0.011)	(0.012)	(0.116)
HC	-0.001	0.009	0.003	0.006	**0.021***	0.132
	(0.007)	(0.010)	(0.011)	(0.011)	(0.012)	(0.102)
VI	-0.001	0.010	0.006	0.010	0.007	0.059
	(0.006)	(0.010)	(0.010)	(0.010)	(0.010)	(0.111)
VC	0.002	-0.002	0.008	0.009	0.007	0.050
	(0.007)	(0.011)	(0.013)	(0.012)	(0.013)	(0.137)
Male	0.007	**-0.204***	-0.178	**-0.176***	**-0.205***	**-2.040***
	(0.067)	(0.106)	(0.112)	(0.104)	(0.119)	(1.044)
Constant						**9.217****
						(4.535)
Observations	110	110	110	110	110	110
Adjusted R-squared						0.119

Note: The models in Table 5 were estimated from 110 observations (91.7% of the sample) where the respondents answered "No" to the question FM_1: 'Is wearing a mask to protect against the coronavirus (COVID-19) impossible for you? (e.g. due to medical or professional reasons)'. All regressions include controls for gender, age, education, labour force status, income, type of dwelling ad household type. Robust standard errors in parentheses, *p<0.10 **p<0.05 ***p<0.01

Table 6: Marginal effects of IND-COL scores and gender on Avoidance behaviours – preventing children from going to places of study or work

	AGW_2	ASCS_2
HI	-0.045	-0.025
	(0.046)	(0.032)
HC	0.006	0.015
	(0.046)	(0.025)
VI	-0.003	**0.039****
	(0.044)	(0.019)
VC	0.053	-0.023
	(0.050)	(0.035)
Male	**-0.926****	-0.384
	(0.456)	(0.235)
Constant	0.750	
	(2.090)	
Observations	109	31

Note: The models in Table 6 for AGW_2 was estimated from 109 observations where respondent's place of work/study did not close during the survey period. The model for ASCS_2 was estimated from 31 observations where respondent had a child and the child's place of study did not close during the survey period. All regressions include controls for gender, age, education, labour force status, income, type of dwelling ad household type. Robust standard errors in parentheses, *p<0.10 **p<0.05 ***p<0.01

Table 7: Marginal effects of IND-COL scores and gender on Improving personal hygiene

	PH_1	PH_2	PH_3	PH_4	PH_5
HI	-0.007	-0.005	-0.005	-0.010	-0.003
	(0.010)	(0.009)	(0.004)	(0.011)	(0.003)
HC	0.002	0.009	-0.000	0.012	0.001
	(0.009)	(0.008)	(0.003)	(0.010)	(0.003)
VI	-0.004	-0.006	0.002	0.006	**0.007***
	(0.009)	(0.008)	(0.003)	(0.010)	(0.004)
VC	**0.021****	**0.016***	0.004	0.007	0.001
	(0.010)	(0.009)	(0.005)	(0.012)	(0.003)
Male	-0.036	-0.046	-0.055	**-0.226****	-0.041
	(0.089)	(0.085)	(0.040)	(0.102)	(0.041)
Constant					
Observations	120	120	120	120	120

Note: All regressions include controls for gender, age, education, labour force status, income, type of dwelling ad household type. Robust standard errors in parentheses, *p<0.10 **p<0.05 ***p<0.01

Table 8: Marginal effects of IND-COL scores and gender on Beliefs about public health safety behaviours

	PIMP_1	PIMP_2	PIMP_3	PIMP_4	Beliefs
HI	0.010	-0.006	-0.003	-0.003	-0.052
	(0.011)	(0.008)	(0.006)	(0.006)	(0.047)
HC	-0.010	-0.010	**-0.009***	**-0.011****	-0.086
	(0.010)	(0.007)	(0.006)	(0.005)	(0.052)
VI	0.003	0.002	-0.000	-0.007	0.005
	(0.010)	(0.007)	(0.005)	(0.005)	(0.049)
VC	-0.003	-0.004	-0.007	0.007	-0.066
	(0.012)	(0.008)	(0.007)	(0.006)	(0.052)
Male	-0.071	0.099	0.045	0.029	0.484
	(0.104)	(0.074)	(0.061)	(0.049)	(0.397)
Constant					**9.584*****
					(2.301)
Observations	120	120	120	120	120
Adjusted R-squared					0.044

Note: All regressions include controls for gender, age, education, labour force status, income, type of dwelling ad household type.
Robust standard errors in parentheses, *p<0.10 **p<0.05 ***p<0.01

Table 9: Marginal effects of IND-COL scores and gender on Impact on well-being and Fears

	PIMP_5	Fears_1	Fears_2	Fears_3
HI	-0.007	**-0.022****	**-0.023****	**-0.024****
	(0.008)	(0.010)	(0.011)	(0.010)
HC	-0.001	0.009	**0.021***	0.013
	(0.006)	(0.009)	(0.011)	(0.009)
VI	0.004	-0.000	**0.031*****	0.013
	(0.006)	(0.008)	(0.011)	(0.009)
VC	-0.007	0.016	0.009	**0.018***
	(0.008)	(0.010)	(0.012)	(0.011)
Male	-0.075	0.019	-0.108	-0.027
	(0.067)	(0.090)	(0.105)	(0.087)
Constant				
Observations	120	120	120	120

Note: All regressions include controls for gender, age, education, labour force status, income, type of dwelling ad household type.
Robust standard errors in parentheses, *p<0.10 **p<0.05 ***p<0.01

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Appendix

Map 1: Map of Sydney region with points showing the suburbs of the respondents from the survey.

Map 2: Map of Sydney region with postcode suburbs highlighted.

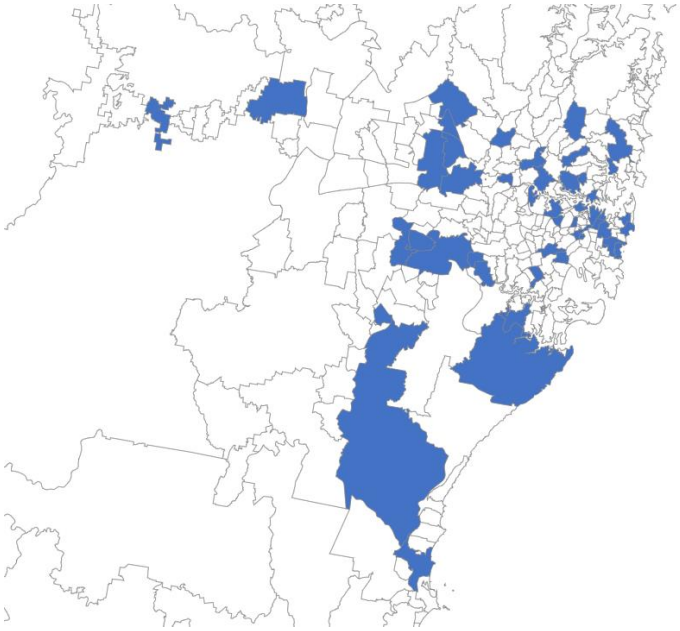

Table A1: CFA Analysis of Social Distancing responses – Avoiding crowded public places

Item	Obs	Sign	Item-test correlation	Item-rest correlation	Avg interitem covariance	Alpha
APP_1	109	+	0.79	0.5775	0.8283214	0.7402
APP_2	109	+	0.723	0.5304	1.000028	0.7589
APP_3	109	+	0.759	0.5453	0.9023106	0.7538
APP_4	109	+	0.8522	0.7273	0.7655454	0.6638
Test scale					0.8740514	0.7831

APP_1: 'Would you avoid contact with people who have symptoms, or you think may have been exposed to the coronavirus?'
APP_2: 'In the past month how often did you avoid going to hospital or other healthcare settings?'
APP_3: 'In the past month how often did you avoid leaving the house for walks/exercise?'
APP_4: 'In the past month how often did you avoid visiting or hosting family or friends?'

Table A2: CFA Analysis of Protective behaviour responses – Face masks

Item	Obs	Sign	Item-test correlation	Item-rest correlation	Avg interitem covariance	Alpha
FM_2	109	+	0.878	0.7875	1.593761	0.8079
FM_3	109	+	0.8807	0.7864	1.549784	0.8057
FM_4	109	+	0.8149	0.6556	1.65337	0.8581
FM_5	109	+	0.8295	0.672	1.588092	0.8535
Test scale					1.596252	0.8676

FM_2: 'In the past month how often did you wear a face mask in outdoor public spaces (e.g. main roads, outdoor shopping districts, parks)'
FM_3: 'In the past month how often did you wear a face mask inside a grocery store / supermarket?'
FM_4: 'In the past month how often did you wear a face mask at your place of work?'
FM_5: 'In the past month how often did you wear a face mask on public transportation?'

Table A3: CFA analysis of Beliefs about public health safety behaviours

Average interitem covariance	1.009314
Number of items in the scale	2
Scale reliability coefficient	0.7640

Items:
PIMP_2: 'Wearing a mask will protect me against coronavirus (COVID-19)'
PIMP_3: 'Wearing a mask will protect others against coronavirus (COVID-19)'

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Table A4. CFA analysis of HI, HC, VI, VC variables

Item	Obs	Sign	Item-test correlation	Item-rest correlation	Avg interitem covariance	Alpha
HI_1	109	+	0.6878	0.411	1.510845	0.6447
HI_2	109	+	0.7403	0.5139	1.311643	0.5778
HI_3	109	+	0.7114	0.4546	1.41661	0.6155
HI_4	109	+	0.7157	0.463	1.399932	0.6099
Test scale					1.409758	0.678

Item	Obs	Sign	Item-test correlation	Item-rest correlation	Avg interitem covariance	Alpha
HC_1	109	+	0.69	0.5067	1.646194	0.7198
HC_2	109	+	0.6881	0.4566	1.597803	0.7402
HC_3	109	+	0.8451	0.645	1.011864	0.6373
HC_4	109	+	0.7994	0.6122	1.228395	0.6558
Test scale					1.371064	0.7512

Item	Obs	Sign	Item-test correlation	Item-rest correlation	Avg interitem covariance	Alpha
VI_1	109	+	0.8233	0.6112	1.068892	0.5352
VI_2	109	+	0.6447	0.4077	1.828491	0.6719
VI_3	109	+	0.7517	0.5147	1.394042	0.6066
VI_4	109	+	0.6569	0.3928	1.778571	0.6813
Test scale					1.517499	0.6947

Item	Obs	Sign	Item-test correlation	Item-rest correlation	Avg interitem covariance	Alpha
VC_1	109	+	0.7639	0.5505	1.170008	0.5563
VC_2	109	+	0.5725	0.2808	1.847633	0.7193
VC_3	109	+	0.7686	0.523	1.131527	0.5707
VC_4	109	+	0.7446	0.5068	1.230774	0.5833
Test scale					1.344985	0.6794

Table A5: Updated CFA analysis of VC variables

Item	Obs	Sign	Item-test correlation	Item-rest correlation	Avg interitem covariance	Alpha
VC_1	109	+	0.8049	0.5674	1.799949	0.5997
VC_3	109	+	0.8209	0.5547	1.66896	0.6130
VC_4	109	+	0.7763	0.5	2.073989	0.6772
Test scale					1.847633	0.7193

Note: The outcomes of the confirmatory factor analysis for the IND-COL variables are outlined in Table A4. We find that for HI, HC and VI, the correlation and alpha levels suggest that the variables included measure the appropriate concept. VC_2 is the only variable that does not seem to fit the Vertically Collectivist model. Item-rest correlation is significantly lower than VC_1, 3 and 4. The average interitem covariance also increases substantially when it is removed. The increase in Cronbach's alpha from 0.6794 to 0.7193 also indicates that the variable is ill-fitting to the model. We find that removing the variable from the set improves the correlation levels and Cronbach's alpha as seen in the current Table A5.

Table A6: Marginal effects of covariates on Social distancing – Avoiding crowded public places

	APP_1	APP_2	APP_3	APP_4	APP_5	Sociald
HI	-0.005	-0.005	-0.006	-0.005	-0.009	**-0.162***
	(0.011)	(0.008)	(0.011)	(0.011)	(0.008)	(0.097)
HC	0.004	-0.001	0.005	0.004	**0.013***	0.040
	(0.010)	(0.008)	(0.010)	(0.010)	(0.007)	(0.092)
VI	0.002	-0.004	0.001	0.002	-0.010	0.009
	(0.010)	(0.008)	(0.010)	(0.010)	(0.006)	(0.076)
VC	0.016	-0.007	0.016	0.016	0.010	0.134
	(0.012)	(0.009)	(0.012)	(0.012)	(0.008)	(0.094)
Male	-0.133	0.056	-0.093	-0.133	**-0.201*****	-0.954
	(0.105)	(0.078)	(0.101)	(0.105)	(0.071)	(0.817)
Postgrad	0.141	-0.117	0.119	0.141	-0.088	-0.262
	(0.113)	(0.085)	(0.108)	(0.113)	(0.078)	(0.942)
House or Townhouse	**-0.235***	0.043	0.095	**-0.235***	0.077	-0.854
	(0.122)	(0.086)	(0.112)	(0.122)	(0.073)	(0.984)
Age	-0.007	-0.002	-0.000	-0.007	0.002	-0.041
	(0.006)	(0.004)	(0.006)	(0.006)	(0.004)	(0.041)
Employed and unpaid	-0.174	0.210	0.175	-0.174	-0.252	1.761
	(0.156)	(0.173)	(0.161)	(0.156)	(0.180)	(1.577)
Unemployed	0.125	0.207	-0.016	0.125	-0.155	1.001
	(0.139)	(0.128)	(0.132)	(0.139)	(0.126)	(1.058)
Less than 4 in the home	-0.097	0.092	-0.012	-0.097	0.104	0.296
	(0.122)	(0.085)	(0.110)	(0.122)	(0.078)	(0.922)
Income (nil response)	**0.543*****	0.008	0.214	**0.543*****	-0.019	**3.016***
	(0.158)	(0.120)	(0.174)	(0.158)	(0.128)	(1.636)
Income ($20k - $49k)	-0.018	0.012	0.198	-0.018	-0.119	0.184
	(0.125)	(0.096)	(0.134)	(0.125)	(0.103)	(1.079)
Income ($50k - $99k)	0.093	0.105	0.143	0.093	0.003	-0.384
	(0.174)	(0.165)	(0.181)	(0.174)	(0.136)	(1.563)
Income (>$100k)	0.033	0.019	0.029	0.033	0.064	-0.219
	(0.179)	(0.144)	(0.186)	(0.179)	(0.100)	(1.613)
Constant						**9.410****
						(3.591)
Observations	120	120	120	120	120	120
Adjusted R-squared						0.045

Note: Robust standard errors in parentheses, *p<0.10 **p<0.05 ***p<0.01

Table A7: Marginal effects of covariates on Protective behaviours – Face masks

	FM_1	FM_2	FM_3	FM_4	FM_5	Facemask
HI	0.001	-0.014	-0.013	-0.013	-0.019	-0.190
	(0.007)	(0.010)	(0.012)	(0.011)	(0.012)	(0.116)
HC	-0.001	0.009	0.003	0.006	**0.021***	0.132
	(0.007)	(0.010)	(0.011)	(0.011)	(0.012)	(0.102)
VI	-0.001	0.010	0.006	0.010	0.007	0.059
	(0.006)	(0.010)	(0.010)	(0.010)	(0.010)	(0.111)
VC	0.002	-0.002	0.008	0.009	0.007	0.050
	(0.007)	(0.011)	(0.013)	(0.012)	(0.013)	(0.137)
Male	0.007	**-0.204***	-0.178	**-0.176***	**-0.205***	**-2.040***
	(0.067)	(0.106)	(0.112)	(0.104)	(0.119)	(1.044)
Postgrad	0.002	0.026	0.082	0.104	-0.039	-0.445
	(0.066)	(0.105)	(0.118)	(0.109)	(0.117)	(1.251)
House or Townhouse	0.007	-0.040	-0.129	0.048	-0.141	-1.122
	(0.073)	(0.111)	(0.125)	(0.112)	(0.125)	(1.241)
Age	-0.001	-0.001	0.001	-0.006	0.006	-0.005
	(0.003)	(0.006)	(0.006)	(0.006)	(0.006)	(0.051)
Employed and unpaid	-0.067	0.068	-0.098	0.031	0.111	1.664
	(0.148)	(0.192)	(0.199)	(0.184)	(0.185)	(2.579)
Unemployed	-0.031	0.014	0.001	0.079	**-0.314****	0.182
	(0.101)	(0.138)	(0.154)	(0.139)	(0.152)	(1.316)
Less than 4 in the home	0.005	**0.198***	0.183	**0.223****	0.167	**2.178***
	(0.074)	(0.109)	(0.121)	(0.112)	(0.119)	(1.185)
Income (nil response)	-0.025	0.225	0.192	0.259	0.043	2.776
	(0.110)	(0.177)	(0.166)	(0.182)	(0.131)	(1.703)
Income ($20k - $49k)	-0.000	-0.024	-0.212	-0.041	**-0.342****	-2.430
	(0.080)	(0.132)	(0.150)	(0.137)	(0.138)	(1.521)
Income ($50k - $99k)	-0.022	0.045	-0.091	0.029	**-0.304***	-0.623
	(0.126)	(0.176)	(0.195)	(0.183)	(0.185)	(1.957)
Income (>$100k)	0.009	0.079	-0.204	-0.098	**-0.291***	-1.646
	(0.100)	(0.179)	(0.192)	(0.169)	(0.174)	(1.971)
Constant						**9.217****
						(4.535)
Observations	110	110	110	110	110	110
Adjusted R-squared						0.119

Note: The models in Table 5 were estimated from 110 observations (91.7% of the sample) where the respondents answered "No" to the question FM_1: 'Is wearing a mask to protect against the coronavirus (COVID-19) impossible for you? (e.g. due to medical or professional reasons)'

Robust standard errors in parentheses, *p<0.10 **p<0.05 ***p<0.01

Table A8: Marginal effects of covariates on Avoidance behaviours – preventing children from going to places of study or work

	AGW_2	ASCS_2
HI	-0.045	-0.025
	(0.046)	(0.032)
HC	0.006	0.015
	(0.046)	(0.025)
VI	-0.003	**0.039****
	(0.044)	(0.019)
VC	0.053	-0.023
	(0.050)	(0.035)
Male	**-0.926****	-0.384
	(0.456)	(0.235)
Postgrad	-0.213	0.451
	(0.494)	(0.277)
House or Townhouse	**-1.158****	0.043
	(0.537)	(0.344)
Age	0.026	0.003
	(0.029)	(0.011)
Employed and unpaid	0.877	0.092
	(0.915)	(0.304)
Unemployed	0.934	0.010
	(0.661)	(0.258)
Less than 4 in the home	-0.205	0.115
	(0.499)	(0.373)
Income (nil response)	0.890	-0.284
	(0.926)	(0.563)
Income ($20k - $49k)	0.135	-0.062
	(0.635)	(0.543)
Income ($50k - $99k)	-1.149	-0.314
	(0.843)	(0.505)
Income (>$100k)	0.099	-0.406
	(0.875)	(0.508)
Constant	0.750	
	(2.090)	
Observations	109	31

Note: The models in Table 6 for AGW_2 was estimated from 109 observations where respondent's place of work/study did not close during the survey period. The model for ASCS_2 was estimated from 31 observations where respondent had a child and the child's place of study did not close during the survey period. Robust standard errors in parentheses, *p<0.10 **p<0.05 ***p<0.01

Table A9: Marginal effects of covariates on Improving personal hygiene

	PH_1	PH_2	PH_3	PH_4	PH_5
HI	-0.007	-0.005	-0.005	-0.010	-0.003
	(0.010)	(0.009)	(0.004)	(0.011)	(0.003)
HC	0.002	0.009	-0.000	0.012	0.001
	(0.009)	(0.008)	(0.003)	(0.010)	(0.003)
VI	-0.004	-0.006	0.002	0.006	**0.007***
	(0.009)	(0.008)	(0.003)	(0.010)	(0.004)
VC	**0.021****	**0.016***	0.004	0.007	0.001
	(0.010)	(0.009)	(0.005)	(0.012)	(0.003)
Male	-0.036	-0.046	-0.055	**-0.226****	-0.041
	(0.089)	(0.085)	(0.040)	(0.102)	(0.041)
Postgrad	-0.095	**-0.145***	0.020	-0.114	-0.050
	(0.098)	(0.086)	(0.036)	(0.106)	(0.042)
House or Townhouse	0.014	0.054	-0.053	-0.096	-0.024
	(0.102)	(0.091)	(0.036)	(0.108)	(0.028)
Age	-0.001	-0.002	0.001	0.000	-0.002
	(0.005)	(0.005)	(0.001)	(0.005)	(0.002)
Employed and unpaid	**-0.307***	0.012	0.158	-0.009	-0.018
	(0.179)	(0.152)	(0.186)	(0.176)	(0.020)
Unemployed	0.005	-0.033	0.038	-0.095	0.126
	(0.117)	(0.120)	(0.055)	(0.118)	(0.107)
Less than 4 in the home	0.071	-0.005	0.034	**0.175***	0.068
	(0.102)	(0.094)	(0.039)	(0.106)	(0.044)
Income (nil response)	0.227	0.102	0.031	0.205	0.006
	(0.147)	(0.142)	(0.077)	(0.175)	(0.016)
Income ($20k - $49k)	0.037	0.015	0.007	-0.056	0.036
	(0.134)	(0.121)	(0.036)	(0.123)	(0.033)
Income ($50k - $99k)	0.057	-0.123	0.059	0.176	0.172
	(0.185)	(0.183)	(0.083)	(0.177)	(0.129)
Income (>$100k)	0.119	0.072	-0.008	0.103	0.146
	(0.173)	(0.144)	(0.040)	(0.180)	(0.120)
Constant					
Observations	120	120	120	120	120

Note: Robust standard errors in parentheses, *p<0.10 **p<0.05 ***p<0.01

Table A10: Marginal effects of covariates on Beliefs about public health safety behaviours

	PIMP_1	PIMP_2	PIMP_3	PIMP_4	Beliefs
HI	0.010	-0.006	-0.003	-0.003	-0.052
	(0.011)	(0.008)	(0.006)	(0.006)	(0.047)
HC	-0.010	-0.010	**-0.009***	**-0.011****	-0.086
	(0.010)	(0.007)	(0.006)	(0.005)	(0.052)
VI	0.003	0.002	-0.000	-0.007	0.005
	(0.010)	(0.007)	(0.005)	(0.005)	(0.049)
VC	-0.003	-0.004	-0.007	0.007	-0.066
	(0.012)	(0.008)	(0.007)	(0.006)	(0.052)
Male	-0.071	0.099	0.045	0.029	0.484
	(0.104)	(0.074)	(0.061)	(0.049)	(0.397)
Postgrad	-0.057	-0.049	-0.014	0.070	0.329
	(0.111)	(0.081)	(0.068)	(0.055)	(0.509)
House or Townhouse	-0.022	0.033	0.008	-0.022	0.029
	(0.116)	(0.083)	(0.069)	(0.057)	(0.558)
Age	**-0.012****	-0.001	-0.004	-0.005	-0.035
	(0.006)	(0.004)	(0.003)	(0.003)	(0.023)
Employed and unpaid	0.152	0.047	0.031	0.097	0.952
	(0.183)	(0.146)	(0.102)	(0.135)	(0.824)
Unemployed	0.134	-0.017	0.075	0.137	0.287
	(0.131)	(0.104)	(0.104)	(0.136)	(0.533)
Less than 4 in the home	**-0.222***	0.045	-0.032	0.017	-0.003
	(0.114)	(0.081)	(0.066)	(0.059)	(0.550)
Income (nil response)	-0.008	-0.089	0.050	0.025	0.985
	(0.168)	(0.090)	(0.098)	(0.058)	(0.690)
Income ($20k - $49k)	0.088	0.083	-0.006	0.069	0.879
	(0.127)	(0.103)	(0.063)	(0.063)	(0.606)
Income ($50k - $99k)	0.055	0.075	-0.003	0.045	0.744
	(0.177)	(0.153)	(0.109)	(0.097)	(0.697)
Income (>$100k)	**0.402****	0.053	0.100	0.065	0.695
	(0.165)	(0.140)	(0.135)	(0.087)	(0.811)
Constant					**9.584*****
					(2.301)
Observations	120	120	120	120	120
Adjusted R-squared					0.044

Note: Robust standard errors in parentheses, *p<0.10 **p<0.05 ***p<0.01

Table A11: Marginal effects of covariates on Impact on well-being and Fears

	PIMP_5	Fears_1	Fears_2	Fears_3
HI	-0.007	**-0.022****	**-0.023****	**-0.024****
	(0.008)	(0.010)	(0.011)	(0.010)
HC	-0.001	0.009	**0.021***	0.013
	(0.006)	(0.009)	(0.011)	(0.009)
VI	0.004	-0.000	**0.031*****	0.013
	(0.006)	(0.008)	(0.011)	(0.009)
VC	-0.007	0.016	0.009	**0.018***
	(0.008)	(0.010)	(0.012)	(0.011)
Male	-0.075	0.019	-0.108	-0.027
	(0.067)	(0.090)	(0.105)	(0.087)
Postgrad	-0.031	-0.033	**-0.188***	-0.084
	(0.073)	(0.094)	(0.111)	(0.096)
House or Townhouse	-0.083	-0.094	0.119	0.067
	(0.078)	(0.103)	(0.117)	(0.092)
Age	0.002	0.006	0.007	0.005
	(0.004)	(0.005)	(0.006)	(0.005)
Employed and unpaid	**-0.138****	0.101	0.136	0.266
	(0.054)	(0.134)	(0.169)	(0.183)
Unemployed	-0.009	-0.046	-0.019	0.213
	(0.092)	(0.125)	(0.144)	(0.135)
Less than 4 in the home	-0.070	0.092	0.181	**0.255*****
	(0.078)	(0.095)	(0.114)	(0.092)
Income (nil response)	-0.083	**-0.277***	0.136	-0.035
	(0.092)	(0.163)	(0.181)	(0.121)
Income ($20k - $49k)	**0.278****	-0.079	-0.023	0.121
	(0.119)	(0.096)	(0.152)	(0.113)
Income ($50k - $99k)	-0.094	-0.089	0.062	0.150
	(0.090)	(0.139)	(0.198)	(0.165)
Income (>$100k)	0.030	**-0.277***	0.035	0.019
	(0.134)	(0.156)	(0.198)	(0.144)
Constant				
Observations	120	120	120	120

Note: Robust standard errors in parentheses, *p<0.10 **p<0.05 ***p<0.01

Individualism and Collectivism as predictors of compliance with COVID-19 public health safety expectations - Survey

1. **Which of the following describes your sex?**
    a. Male
    b. Female
    c. Other
        i. Please specify: _____
    d. I prefer not to answer.

2. **What is your current age in years?**
    a. Please specify: _____

3. **Which categories describe you? Select all that apply**
    a. Oceanian – e.g. Australian Peoples, New Zealand Peoples, Melanesian and Papuan, Micronesian, Polynesian
    b. North-West European – e.g. British, Irish, Western European, Northern European
    c. Southern and Eastern European – e.g. Southern European, South-Eastern European, Eastern European
    d. North African and Middle Eastern – e.g. Arab, Jewish, Peoples of the Sudan, Other North African and Middle Eastern
    e. South-East Asian – e.g. Mainland South-East Asian, Maritime South-East Asian
    f. North-East Asian – e.g. Chinese Asian, Other North-East Asian
    g. Southern and Central Asian
    h. Peoples of the Americas – e.g. North American, South American, Central American, Caribbean Islander
    i. Sub-Saharan African – e.g. Central and West African, Southern and East African
    j. Some other race, ethnicity, or origin, please specify: _____

4. **Which level of education applies to you?**
    a. Postgraduate Degree level
    b. Graduate Diploma and Graduate Certification level
    c. Bachelor Degree level
    d. Advanced Diploma and Diploma Level
    e. Certificate Level
    f. Secondary Education (High school)
    g. Primary Education
    h. Pre-primary Education
    i. Other Education
        i. Please specify: _____

5. **What is your postcode?**
    a. Postcode, please specify: _____
    b. I prefer not to answer

6. **Which employment category best applies to you?**
    a. Have a job, currently working paid hours
    b. Have a job, but not currently working any paid hours

c. Do not have a paid job

7. **Which dwelling type best applies to you?**
    a. Free-standing home
    b. Apartment
    c. Townhouse
    d. Other: please specify
    e. _____

8. **Number of people living in your household (including you)**
    a. 1
    b. 2
    c. 3
    d. 4
    e. 5 or more

9. **Age(s) of people in your home (check all that apply)**
    a. 10 or younger
    b. 11-20
    c. 21-29
    d. 30-39
    e. 40-49
    f. 50-59
    g. 60-69
    h. 70-79
    i. 80 or older

10. **Which of the following describes your personal income last year?**
    a. Less than $20,000
    b. $20,000 to $34,999
    c. $35,000 to $49,999
    d. $50,000 to $74,999
    e. $75,000 to $99,999
    f. $100,000 to $149,999
    g. $150,000 and greater
    h. Prefer not to answer

COVID-19 behaviour questions

Social distancing – avoiding crowded public places

APP_5:

1. Would you avoid contact with people who have symptoms, or you think may have been exposed to the coronavirus?
    a. Yes
    b. No
    c. Maybe

2. In the past month how often did you…

		All of the time	Most of the time	Some of the time	Rarely	Not at all
APP_1	Avoid going to hospital or other healthcare settings					
APP_2	Avoid leaving the house for walks/exercise					
APP_3	Avoid taking public transport					
APP_4	Avoid visiting or hosting family or friends					

Protective behaviours – face masks

FM_1

3. Is wearing a mask to protect against coronavirus (COVID-19) impossible for you? (e.g. due to medical or professional reasons)
    a. Yes
    b. No

4. If no, in the past month how often did you…

		All of the time	Most of the time	Some of the time	Rarely	Not at all
FM_2	Wear a face mask in outdoor public spaces (e.g. main roads, outdoor shopping districts, parks)					
FM_3	Wear a face mask inside a grocery store / supermarket					
FM_4	Wear a face mask at your place of work					
FM_5	Wear a face mask on public transportation					

Avoidance behaviours – avoiding places of study or work

AGW_1:

5. Did your place of work/study close during this period?
   a. Yes
   b. No
   c. Does not apply (skip to question 7.)

		All of the time	Most of the time	Some of the time	Rarely	Not at all
AGW_2	If no, how often did you avoid working/studying outside your home					

Avoidance behaviours – preventing children from going to places of study or work

ASCS_1:

6. Did your child's place of study/university close during this period?
   a. Yes
   b. No
   c. Does not apply (skip to question 7.)

		Always	Frequently	Sometimes	Rarely	Not at all
ASCS_2	If no, how often did you avoid letting your children go to school/university					

Improving personal hygiene

7. In the past month, how have you following behaviours changed?

		More	About the same	Less
PH_1	Washed your hands			
PH_2	Used hand sanitiser			
PH_3	Touched your face			
PH_4	Cleaned frequently touched surfaces in the home (e.g. doorknobs, toilets, taps)			
PH_5	Avoided touching objects in public (e.g. elevator buttons or doors) – flip question			

Beliefs about public health safety behaviours

		1 – Strongly Disagree	2	3	4	5	6	7 – Strongly Agree
PIMP_1	It is likely that I will get coronavirus (COVID-19) in the future							
PIMP_2	Wearing a mask will protect me against coronavirus (COVID-19)							
PIMP_3	Wearing a mask will protect others against coronavirus (COVID-19)							
PIMP_4	I feel it is important to carry out activities which will improve my health							

Personal Impact

		1 – Strongly Disagree	2	3	4	5	6	7 – Strongly Agree
PIMP_5	My life has been greatly affected by coronavirus (COVID-19)							

Fears

8. How worried are you that…

		Very worried	Fairly worried	Not too worried	Not at all worried
FEARS_1	There will be a long-lasting negative impact on society				
FEARS_2	Friends or family might become seriously unwell or die				
FEARS_3	I might become seriously unwell or die				

IND-COL

Please read each statement and indicate your agreement by **CIRCLING** the appropriate number on the right scale. Do not spend too much time on any statement. Answer quickly and honestly. Use the following key.

1----------2----------3----------4----------5----------6----------7----------8----------9
Strongly Disagree — Neutral — Strongly Agree

1. I'd rather depend on myself than others.	1	2	3	4	5	6	7	8	9
2. It is important that I do my job better than others.	1	2	3	4	5	6	7	8	9
3. If a co-worker gets a prize, I would feel proud.	1	2	3	4	5	6	7	8	9
4. Parents and children must stay together as much as possible.	1	2	3	4	5	6	7	8	9
5. I rely on myself most of the time; I rarely rely on others.	1	2	3	4	5	6	7	8	9
6. Winning is everything.	1	2	3	4	5	6	7	8	9
7. The well-being of my co-workers is important to me.	1	2	3	4	5	6	7	8	9
8. It is my duty to take care of my family, even when I have to sacrifice what I want.	1	2	3	4	5	6	7	8	9
9. I often "do my own thing".	1	2	3	4	5	6	7	8	9
10. Competition is the law of nature.	1	2	3	4	5	6	7	8	9
11. To me, pleasure is spending time with others.	1	2	3	4	5	6	7	8	9
12. Family members should stick together, no matter what sacrifices are required.	1	2	3	4	5	6	7	8	9
13. My personal identity, independent of others, is very important to me.	1	2	3	4	5	6	7	8	9
14. When another person does better than I do, I get tense and aroused.	1	2	3	4	5	6	7	8	9
15. I feel good when I cooperate with others.	1	2	3	4	5	6	7	8	9
16. It is important to me that I respect the decisions made by my groups.	1	2	3	4	5	6	7	8	9