



# Assessing levels of knowledge, compliance with preventive measures and behavioral adjustments to the ‘new normal’ of COVID-19: Empirical evidence from Ghana

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## ARTICLE INFO

### Keywords:

Knowledge  
Behavioral adjustment  
‘New normal’  
COVID-19, Behavioral fatigue  
Acculturation strategies  
Ghana

## ABSTRACT

Countries have managed COVID-19 infection and mortality differently. Ghana, a resource-constrained country, with a poorer healthcare system, had fewer infections and more recoveries than high-income countries. Although an acculturation framework is commonly discussed in relation to individuals adapting to a new society, we used it to understand how people adapt to rapid changes orchestrated by the COVID-19 pandemic. From pre-pandemic to post-pandemic era, we see a change from the ‘old normal’ to the ‘new normal’. Thus, we sought to understand how people were living their lives under the ‘new normal’. Data was gathered from 416 adults on their attitudes towards obedience to authority, compliance with COVID-19-related activities, and changes in the extent of carrying out these activities three and nine months into the pandemic. COVID-19 acculturation strategies were also assessed. Descriptive and inferential analyses showed that most Ghanaians obeyed authorities and followed the preventive measures. However, after five months of the peak period, compliance dropped, and behavioral fatigue increased significantly. Regarding the acculturation strategies integration, which involves keeping old health care practices and adopting new ones, improved behavioral adjustment the most followed by separation (i.e., rejecting the new health care practices and holding on strongly to the old ones) and assimilation (i.e., rejecting old health care practices and adopting new ones). Marginalization which encompasses rejecting both old and new health care practices was the least. These results suggest that integration strategy had a significant positive impact on behavioral adjustment compared to assimilation and separation strategies.

## 1. Introduction

This study focused on how Ghanaians adjusted to the new normal of life as a result of COVID-19. Four months after the outbreak of coronavirus in China, the World Health Organization (WHO) declared it a global pandemic. COVID-19 infections and fatalities reached about 79 million and 1.7 million, respectively, by December 2020, when this study’s data was obtained (WHO, 2021a, 2021b). Ghana also suffered from the increasing infections and deaths. Ghana had almost 54,000 cases and 335 deaths, ranking second in West and Central Africa and 10<sup>th</sup> in Africa. Worldometer (2020b) ranked Ghana 89<sup>th</sup> in reported cases globally. After the first COVID-19 case was reported in mid-March 2020 and by the end of March, the two most populous cities were

partially locked down. All land borders and international air borders, public gatherings and pre-school to university educational institutions were closed. However, most restrictions were eased between June and October 2020. Churches, funerals, and the main international airport reopened by August.

Ghana, a middle-income nation with a weak healthcare system, had lower infection rates and documented mortality than several high-income countries. With these differences in mind, this study examined how people were living their lives under the ‘new normal’ in Ghana, which could account for the lower infection rates and higher recovery rates. Thus, we examined people’s adjustment levels during the peak period of lockdowns and after they were lifted. We used acculturation framework to understand this phenomenon, arguing that it may be

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<https://doi.org/10.1016/j.cresp.2023.100168>

Received 5 April 2022; Received in revised form 21 October 2023; Accepted 5 November 2023

Available online 17 November 2023

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applied to understanding adjustment to rapid cultural change within a culture or society such as in the case of the COVID-19 pandemic. We conceptualized COVID-19 acculturation as how individuals changed from their original cultural orientation before COVID-19 to the new cultural orientation of COVID-19 preventive practices. Thus, the transition from pre-pandemic to pandemic era was deemed as a migration from a dominating normal cultural orientation to a 'new normal' cultural orientation.

As we delve into the discussion of how Ghanaians were adjusting to life with COVID-19 one year into the pandemic, our focus centers on preventive and protective measures. These measures were pivotal in shaping the 'new normal', a prolonged period characterized by cautious behaviors resembling pre-pandemic life but with adaptations to reduce the spread of COVID-19 (Cahapay, 2020). By examining the factors that predicted changes Ghanaians made to regain a sense of normality, we could derive valuable insights and lessons for dealing with future pandemics. Bish and Michie (2010) looked at protective behaviors to involve preventive behaviors (e.g., hand washing, mask-wearing, and uptake of vaccinations), avoidant behaviors (e.g., avoiding crowds, public places, and obeying quarantine restrictions) and disease management behaviors (e.g., taking medications, seeking professional help and use of helplines). Behavioral adjustment refers to how individuals' actions and daily routines were altered due to COVID-19. It assesses the extent to which people adjusted various aspects of their life, such as social activities, work, and personal habits, in response to the pandemic. Due to social restrictions, we expected increased behavioral adjustments, affecting activities like visiting friends and family, and other outdoor activities. Identifying significant life changes due to COVID-19 and their impact can inform future pandemic prevention strategies.

### 1.1. Predictors of preventive practices and behavioral adjustments

Studies have found several factors that determine adherence to preventive behaviors including demographic, knowledge, attitudinal, psychological and cultural factors (Atchison et al., 2021; Bish and Michie, 2010; Lim et al., 2021; Reynolds et al., 2008; Saunders-Hastings et al., 2017; Wright et al., 2020; Yap et al., 2010).

#### 1.1.1. Demographic variables

Demographic factors such as the female sex, older age, higher education and higher socioeconomic status were revealed to be associated with adherence to preventive behaviors (Abdelhafiz et al., 2020; Bish and Michie, 2010; Erfani et al., 2020; Ferdous et al., 2020; Yap et al., 2010; Zhong et al., 2020). Bish and Michie (2010) assert that women have 'information activation' tendencies which remind them of what they know about the benefits of undertaking protective behaviors. Another explanation is that women perceive risk as higher than men (Atchison et al., 2021; Wright et al., 2020); hence, they are likely to be more compliant than men. In other words, women tend to believe that they are more susceptible to COVID-19 and thus would take the necessary precautionary measures. The evidence for education shows that it influences people's knowledge levels and, consequently, compliance with preventive measures (Erfani et al., 2020; Labban et al., 2020).

#### 1.1.2. Cultural factors

Given the lack of evidence on the impact of demographic factors on preventive practices in the context of COVID-19, it would be worthwhile to examine them in the Ghanaian sociocultural setting. This is because culture is noted to influence how people adapt to threatening situations such as living with COVID-19 (Pierre, 2020; Ryder et al., 2020; Sam and Berry, 2010). Thus, how people understand, and practice COVID-19-related activities may vary across cultures based on whether they are collectivist or individualistic. Studies comparing pandemic related practices, attitudes, and behaviors across countries have reported differences between Western and non-Western countries, which are largely a matter of cultural differences in personal and relational

orientations (Germani et al., 2020; Ibanez and Sisodia, 2020; Pierre, 2020). For example, in typical collectivistic countries, people may tend to prioritize group goals, social harmony, and relational restoration above their own interests and wellbeing (Oyserman et al., 2002). It has been found that people in such collectivist cultures may be less focused on their inner emotions, and hence, less expressive of such emotions (Dzokoto, 2010).

In line with these, Germani et al. (2020) suggest that to fight the COVID-19 pandemic and decrease levels of psychological maladjustment, individuals' collectivist cultural orientation, such as the wish to share common goals with others, interdependence, and sociability, must be emphasized and promoted as protective factors. Nonetheless, a recent study conducted in Ghana on knowledge about and practices against COVID-19 showed that, in spite of the high level of knowledge among participants, about two-thirds of them were unwilling to follow the preventive practices and be vaccinated (Yeboah et al., 2021). We explored how cultural factors, specifically the tendency to obey authority directives, impact Ghanaians' adherence to preventive practices and Behavioral adjustment.

#### 1.1.3. Pandemic fatigue

Another variable of interest is pandemic fatigue, which is defined as the waning of adherence to prevention practices or a lack of motivation to continue adhering to the recommended protective behaviors (Harvey, 2020; Ilesanmi et al., 2020; Lilleholt et al., 2020). The literature acknowledges that adherence to pandemic prevention practices wanes with time, with an increasing number of people no longer adequately complying with the restrictions and gradually reducing efforts to be well-informed about the pandemic (Al-Hasan et al., 2020; WHO, 2020). A consequence of this phenomenon is that it reduces preventive efforts aimed at containing the spread of the virus. Detailed conceptualization, measurement, correlates, and consequences of pandemic fatigue are provided by Lilleholt et al. (2020). The focus of the present paper is thus to examine its level among the current population and its impact on compliance with preventive practices to inform governments and health authorities on how to reinvigorate the fatigued public for improved behavioral adjustment.

#### 1.1.4. Acculturation strategies

Additionally, despite documented evidence of the association between acculturation and health perceptions and behaviors (Krist et al., 2021; Tutu et al., 2017), there is little empirical evidence regarding acculturation as a determinant of adherence to protective behaviors during pandemics in general and COVID-19 in particular. For instance, Lajunen and Wróbel (2022) argued that acculturation to the host country is positively related to trust and acceptance of the COVID-19 vaccine as advised by health authorities because it is a process in which self-identity is modified to accommodate information about the new culture. We link acculturation to COVID-19 adjustment, even though we do not know of a previous study that used it in non-immigration or within-culture contexts.

Acculturation, traditionally applied to minority group adjustment in new cultures, may be relevant to understanding how people adjusted their ways of life during the COVID-19 pandemic. Culture influences pandemic responses, impacting how individuals live with the disease. Societies, as cultural contexts, determine how people react, considering factors like health vulnerabilities and living conditions. The transition from pre-pandemic to pandemic times is akin to shifting from a dominant cultural orientation to a 'new normal.' Acculturation strategies revolve around how much individuals want to preserve their cultural identity and embrace the new one, resulting in four strategies: assimilation, integration, separation, and marginalization (Berry and Hou, 2016).

Assimilation occurs when people no longer care about their original culture and prefer the new one. Integration is when people retain a large part of their original cultural orientation and merge it with the new

cultural reality. Separation occurs when people reject much of the new cultural orientation but cling to their old ones. Marginalization occurs when people reject much of both their old and new cultures. Thus, the COVID-19 assimilation strategy is to fully accept health authorities' disease-control measures. Separation is rejecting the new health measures recommended by authorities and maintaining the status quo, such as social distancing, masking, etc. Marginalization involves rejecting new health care and promotion recommendations and even traditional precautions (Rudmin, 2003). Conspiracy theories may explain this double rejection. One may not trust the government to care about its citizens' health or to provide health care solutions. Integration strategy is to keep some old health care practices and adopt some new ones from health authorities regarding COVID-19.

Health risk behaviors and low acceptance of health prevention directives have been linked to marginalization and separation (Krist et al., 2021; Lajunen and Wróbel, 2022; Tutu et al., 2017). Tutu et al. (2017) found that migrants who marginalized themselves by not practicing their customs or those of the Gas (an ethnic group in Ghana) as host destination had worse health. Lajunen and Wróbel (2022) found that a low adoption of mainstream culture which is typical of separation strategy, led to low acceptance of COVID-19 vaccination and it is typical of people from the heritage culture.

## 2. Objective and hypotheses

The main research objective was to examine the factors that account for individual COVID-19 preventive practices and behavioral adjustment. We hypothesized that COVID-19 preventive practices and behavioral adjustment would be influenced by socio-demographic factors such as age, sex, etc., COVID-19 knowledge, comfort with authority directives, i.e., obedience, COVID-19 fatigue, and acculturation strategies. Specifically, we expected age to be positively related to COVID-19 preventive practices and behavioral adjustment and sex to be negatively related, such that women would more likely undertake the preventive practices and be better adjusted than men. Similarly, COVID-19 knowledge and obedience were expected to be positively associated with COVID-19 preventive practices and behavioral adjustment, whereas COVID-19 fatigue would be negatively correlated with them. Finally, we expected a significant effect of the acculturation strategies on behavioral adjustments.

## 3. Material and method

### 3.1. Setting and participants

A cross-sectional quantitative survey was conducted with 416 adult participants. 274 responses were obtained through hand-delivered questionnaires, while the remaining 142 were collected through an online survey using Google Forms. Both participants' data were compared on demographic characteristics, and no differences were found. Responses from the two groups were therefore merged into a single data file. 422 questionnaires were retrieved, but six were eliminated due to incompleteness. The remaining 416 samples were subjected to post-hoc sensitivity power analysis in order to estimate minimally detectable effect or minimal effect size using the existing sample size (Giner-Sorolla et al., 2019). The sample size of 416 yielded a minimum detectable effect size (MDES) of  $\eta^2 = .04$ , which interprets as a small effect for a one-way ANOVA with an alpha of .05 and a power of 0.80. A MDES of  $\eta^2 = .02$  was obtained using the same sample size for multiple regression (i.e., fixed model, and single regression coefficient). There was also a small effect MDES of  $\eta^2 = .01$  for t-test using the same sample size. A comparative analysis of observed and minimum detectable effect sizes is provided in Section 4.

Demographic information for participants is presented in Table 1. As can be observed in Table 1, most of the participants (i.e.,  $n = 245$ , 58.9 %) were male while 165 (39.7 %) were female. Further, over half of the

**Table 1**  
Demographic characteristics of participants ( $n = 416$ ).

Variable	Frequency	Percentage (%)
Sex		
• Male	245	58.9
• Female	171	41.1
Age		
• 18-25years	212	51.0
• 26-35years	134	32.2
• 36+years	70	16.8
Marital status		
• Single	333	80.0
• Married	74	17.8
• Widowed	2	0.5
• Divorced/separated	7	1.7
Educational level		
• High/secondary	66	15.9
• Undergraduate	219	52.6
• Graduate/Postgraduate	131	31.5
Employment status		
• Employed for wages	182	43.8
• Self-employed	68	16.3
• Student/not employed	166	39.9
Underlying Health condition		
• Health condition	37	8.9
• No health condition	379	91.1

participants (52.5 %) were aged between 18 and 25. Similarly, over half of the participants ( $n = 219$ ; 52.6 %) had undergraduate bachelor's degrees, and a third (22.9 %) had a graduate degree. Eighty percent of participants were single, and less than 1 in 5 (17.8 %) were married. In terms of occupation, 43 % were employed for wages, while 16 % were self-employed. About a third of them (31 %) were students.

Regarding their experiences with COVID-19, most of the participants (85 %) had never been tested for COVID-19. Out of those tested (64), 51 indicated they were tested voluntarily. Only 18 participants indicated having been infected with COVID-19 and recovered, while five indicated they had COVID-19 at the time and were not fully recovered. Some 59 of them indicated they had friends or family members who had been infected and recovered from COVID-19.

### 3.2. Measures and procedure

A questionnaire consisting of a battery of scales was purposely designed for the study. In addition to these scales, there were questions asking for participants' sex, age, level of education, marital status, employment status, health status, etc. The dependent variables measured include Behavioral adjustment. This is a 25-item scale created to assess behavioral adjustment to COVID-19. Participants were asked to indicate the extent to which various aspects of their lives had changed, such as visiting friends and family, on a scale ranging from 1 (hardly any change) to 5 (changed very much). A factor analysis conducted revealed two dimensions that leaned on "outdoor activities" ( $\alpha = .88$ ) and "personal development and family-oriented activities" ( $\alpha = .91$ ). Two items were dropped due to incoherence and cross-loading. Higher scores implied higher behavioral adjustment. The other variable is COVID-19 Preventive Practices. Participants were asked to rate the extent to which they practiced COVID-19-related activities such as "washing/sanitizing your hands as soon as you get home, work, or school", "wearing a face mask in public places," and so on using an 11-item scale developed specifically for this study. Responses were on a 5-point Likert-type scale ranging from 1 (never) to 5 (very regularly).

Independent variables include Obedience to Authority directives – participants reported their level of comfort following directives from established authority with the following anchors: 1 (I am completely uncomfortable obeying established authority) and 5 (I am completely comfortable obeying established authority). For this item, higher scores indicated high obedience to authority. Knowledge about COVID-19 – a 6-item scale was developed where participants had to indicate their level

of knowledge about COVID-19, with response categories ranging from 1 (no knowledge) to 6 (very good knowledge). Two sample items on this scale were “How one gets infected with COVID-19” and “The symptoms of COVID-19”. COVID-19 Fatigue – participants indicated the extent to which they have carried out the COVID-19 preventive practices from March to June 2020 (T1) and now, i.e., November 2020 (T2), on a scale ranging from 1 (not at all) to 10 (always). With a significant difference obtained between T1 and T2, COVID-19 fatigue score was measured by subtracting the T2 score from the T1 score.

Acculturation Strategies – a 15-item Acculturation scale inspired by the Vancouver Index of Acculturation (VAI) was used to measure participants’ acculturation to COVID-19, ranging from 1 (strongly disagree) to 5 (strongly agree). This scale also had high reliability of 0.86. The instrument is made up of two subscales, i.e., Traditional (T) approach (7 items) and New (N) approach (8 items). T and N had high reliabilities of .71 and .76 respectively. Four acculturation strategies were created based on the computation formula from the developers (Ryder et al., 2000). Mean scoring was done to compute totals for the two subscales which were used in determining the acculturation strategies following the computation formula. High means scores above the mean of the scales N and T; and low means scores less or equal to the mean scores on N and T scales. Integration strategy is created when there is a high score on both subscales while Marginalization strategy is created when there are low scores on both subscales. Assimilation strategy is obtained when there is a high score on N and a low score on T while Separation strategy is created when there is a high score on T and a low score on N. Thus, the acculturation variable was used as a categorical variable in the analysis. While it is acknowledged that there may exist certain limitations with this approach, it is important to note that there is currently a lack of consensus regarding the optimal methodology. Notably, scholars have applied this approach to the same dataset in comparison to more recent methodologies, and the resultant conclusions have displayed a substantial degree of similarity (see Abu-Rayya et al. 2023 for a review).

All the reported scales had acceptable internal consistency, and these ranged from .71 to .91. For the specific reliabilities to the scale, see Table 3 in the Appendices. Individuals were recruited across Ghana through convenience sampling. Online questionnaires were widely shared, and those who qualified and were willing responded. Additionally, face-to-face hand-delivered questionnaires were administered across five southern regions of Ghana (i.e., Greater Accra, Ashanti, Eastern, Central, and Volta) through research assistants who were recruited for the purpose. Major inclusion criteria were that respondents could understand, read, and speak English. Thus, there was no need for translation of the data into English. Data was gathered in November 2020. All ethical guidelines for research with humans were adhered to in the conduct of the study. Ethical clearance was obtained from the Departmental Research and Ethics Committee of the Department of Psychology at the University of Ghana.

### 3.3. Data analysis

Means and standard deviations were used to determine levels of comfort following authority directives, COVID-19 knowledge, compliance with COVID-19 preventive practices, and behavioral adjustments associated with COVID-19. To determine the level of difference in compliance between T1 and T2, which measured COVID-19 fatigue, a paired t-test was conducted to determine whether a significant difference existed in COVID-19 preventive practices between T1 and T2.

Principal Component Analysis (PCA) was conducted with the 25-item Behavioral Adjustment to COVID-19 scale. Bartlett’s Test of Sphericity was significant ( $\chi^2 = 4627.02$ ,  $df = 300$ ,  $p < .001$ ), supporting the factorability of the variable. There were four components with eigenvalues exceeding 1, which explained 46.40 %, 8.30 %, 5.27 %, and 4.29 % of the variance, respectively. The scree plot revealed a break after the second component. Parallel analysis showed two components with eigenvalues exceeding the corresponding criterion value for a

randomly generated data matrix of 1000 replicated simulations. Following oblimin rotation, the rotated solution showed the presence of two structures, with 15 items and 10 items showing strong loadings on components 1 and 2 respectively. Items 5 and 7 were dropped due to cross-loading. Thus, 23 items were retained for the final analysis. See Table 2 for details.

To determine what accounted for COVID-19 preventive practices and behavioral adjustments associated with COVID-19, hierarchical regression was conducted. Specifically, both variables were respectively regressed on socio-demographic factors such as sex, age, marital status, educational level, employment status and health condition (Step 1), and obedience, COVID-19 knowledge, and COVID-19 fatigue (Step 2). Acculturation was not included as a predictor because it is a categorical variable, and we did not use them as dummies because we wanted to avoid the complexity of interpretation especially where there are more than two categories. Thus, a one-way ANOVA was conducted to ascertain the effect of acculturation on behavioral adjustments.

## 4. Results

Table 3 gives an overview of the variables of the study including their interpretation and psychometric properties. Results on obedience suggests that most participants were more comfortable following authority directives. For COVID-19 knowledge, majority of participants had good knowledge of COVID-19. For example, about 91 % of participants had average to very good knowledge of how one gets infected with COVID-19. Regarding COVID-19 preventive practices, most participants (i.e., 95 %) indicated regularly performing the pandemic-related activities such as washing or sanitizing hands etc. On the extent of change in day-to-day life, i.e., behavioral adjustments associated with COVID-19, most participants indicated ‘some extent of change’. Comparatively, paired-sample t-test displayed in Table 4 showed that there had been some extent of change with outdoor related activities ( $M = 2.85$ ,  $SD = 1.14$ ) than with personal development and family-oriented activities ( $M =$

**Table 2**

Factor loadings for the Behavioral Adjustment to COVID-19 items from the rotated structure matrix.

No.	Item	Outdoor-related activities	Personal/Family-oriented activities
1.	Visiting friends	.719	
2.	Visiting family	.723	
3.	Going out for dinner	.821	
4.	Going to the bar	.814	
6.	Traveling for pleasure/leisure	.819	
8.	Having a big celebration (e.g., a party, wedding, graduation etc.)	.763	
9.	Attending a place of worship	.500	
10.	Going out for walk	.705	
11.	Going to a café	.803	
12.	Out on sightseeing	.828	
13.	Going to the hairdresser/Barber	.602	
14.	Going to the gym	.684	
15.	Going to the market or out to get groceries	.628	
16.	Work/business		.696
17.	School		.531
18.	Professional development		.725
19.	Group events (e.g., night club, sporting events)	.753	
20.	Childcare		.796
21.	Quality time with spouse or close family members		.826
22.	Quality time with child(ren)		.805
23.	Personal development		.781
24.	Major choices in life		.699
25.	Taking care of a friend/family member with disability		.687

Eigenvalues = 11.60, 2.07, % of Variance = 54.70

**Table 3**  
Level of Comfort with authority obedience, COVID-19 knowledge, prevention practices, behavioral adjustments, COVID fatigue and Acculturation strategies.

Variables	Min	Max	Mean	SD	Interpretation (based on high scores)	$\alpha$
Obedience	1.00	5.00	4.40	0.81	More comfortable with authority orders	NA
COVID-19 knowledge	1.00	6.00	4.82	0.91	Good knowledge	.81
Preventive practices	2.00	5.00	3.59	0.70	Regularly	.83
COVID-19 fatigue	-7.00	9.00	1.64	2.32	High	NA
Behavioral adjustments	0.00	5.00	2.64	1.07	Changed to some extent	
Outdoor-related	0.00	5.00	2.85	1.16	Changed to some extent	.88
Personal/Family-oriented	0.00	5.00	2.31	1.20	Not much change	.91
Acculturation strategies (T)	2.00	5.00	3.30	0.68	Undecided	.71
Acculturation strategies (N)	1.00	5.00	4.03	0.66	Agree	.76

Note: "Obedience"= comfort following directives from authority, "COVID-19 knowledge"= knowledge about COVID-19, "Preventive practices"= practices of COVID-19 prevention activities, "Behavioral adjustments"= COVID-19 behavioral adjustment

**Table 4**  
Results of one-sample t-test and descriptive statistics for behavioral adjustment for outdoor-related and family-oriented activities.

Outcome	M	SD	n	95 % CI for Mean Difference	t	df
Outdoor-related activities	2.85	1.14	408	0.41, 0.58	11.17*	407
Family-related activities	2.36	1.20	408			

\*  $p < 0.05$ ;  $\eta^2 = 0.23$  (large effect)

2.36,  $SD = 1.20$ ), ( $t = 11.17$ ,  $df = 407$ ,  $p < .05$ ). With a large observed effect,  $\eta^2 = 0.23$  which is greater than the MDES ( $\eta^2 = .01$ ), it is thus, affirmed that behavioral adjustments occurred on outdoor related activities during the peak period of COVID-19 in Ghana.

To determine whether there was COVID-19 fatigue, we examined the extent to which participants had complied with the preventive protocols at two points in Time1 (T1=from the beginning of March to June) and at Time 2 (T2= five months later in November). Paired t-test showed that compliance at T1 ( $M = 8.27$ ,  $SD = 1.81$ ) was significantly higher than at T2 ( $M = 6.63$ ,  $SD = 2.35$ ), ( $t = 13.69$ ,  $df = 374$ ,  $p < .05$ ); implying that participants' level of compliance to the protocols has reduced at T2. The observed effect was  $\eta^2 = 0.34$ ; which is greater than the MDES of  $\eta^2 = .01$ ; hence the significant difference supports the claim that a significant COVID-19 fatigue was reported by participants (see Table 5). The most dominant reasons given were forgetfulness (43 %) and being fed up

**Table 5**  
Results of one-sample t-test and descriptive statistics for compliance at T1 and T2.

Outcome	M	SD	n	95 % CI for Mean Difference	t	df
Compliance at T1	8.27	1.81	375	1.41, 1.88	13.69*	374
Compliance at T2	6.63	2.35	375			

\*  $p < 0.05$ ;  $\eta^2 = 0.34$  (large effect)

(19.6 %). Some also blamed it on conflicting messages from authorities (9.6 %) while others just 'didn't care' (6.2 %) or 'didn't know' any reason (16.8 %). Others stated reasons such as complacency, the decreasing infection and increasing recovery rate (at the time of data gathering), fear, uncertainty about the virus and reduction in government control and preventive efforts.

Table 6 is based on the Chi square of goodness of fit analysis [ $\chi^2 (3, n = 412) = 23.85, p < .001$ ;  $w = .06$ ], and revealed that the majority of COVID-19 participants adopted a marginalization strategy ( $n = 135, 32.8 \%$ ), while some adopted assimilation ( $n = 113, 27.4 \%$ ), integration ( $n = 97, 23.5 \%$ ), and separation ( $n = 67, 16.3 \%$ ). In other words, the most prevalent acculturation strategies adopted by Ghanaians were marginalization, assimilation, and integration, while the least prevalent strategy was separation. Sensitivity analysis revealed that the observed effect of  $w = .06$  was smaller than the MDES of  $w = .16$ . Thus, the effect is below what the study would have detected as reliable; hence, this finding was interpreted with caution.

Results of hierarchical multiple regression are shown in Table 7. At Step 1 of the model, results indicated that none of the demographic factors significantly predicted COVID-19 preventive practices ( $R^2 = 0.02$ ,  $F (5,364) = 1.21, p > .05$ ) nor behavioral adjustments associated with COVID-19 ( $R^2 = 0.03$ ,  $F (5,363) = 1.49, p > .05$ ). Thus, the predictive models were not significant. At Step 2 however, obedience, COVID-19 knowledge and COVID-19 fatigue explained an additional 9 % of the variance in COVID-19 preventive practices ( $\Delta R^2 = 0.09$ ,  $F (8, 365) = 5.42, p < 0.05$ ). It was found that knowledge ( $\beta = 0.20, p < 0.05$ ) and fatigue ( $\beta = -0.22, p < 0.05$ ) significantly predicted preventive practices. The observed effect was  $\eta^2 = 0.12$ ; which is greater than the MDES of  $\eta^2 = .02$ ; supported the claim that these factors significantly predicted COVID-19 preventive practices. In other words, while COVID-19 fatigue had a negative influence on preventive practices, the influence of COVID-19 knowledge was positive. Nonetheless, neither of these variables significantly predicted behavioral adjustments. In other words, obedience to authority, COVID-19 knowledge and COVID-19 fatigue did not influence people's behavioral adjustment to the changes warranted by COVID-19.

One-way ANOVA was conducted to determine acculturation strategies' effects on preventive practices and behavioral adjustment. Results shown in Table 8 reveal statistically significant mean differences on preventive practices [ $F_{(3, 408)} = 22.27, \eta^2 = .14, p < .001$ ] and behavioral adjustments [ $F_{(3, 408)} = 22.73, \eta^2 = .15, p < .001$ ]. Given the minimum detectable effect size of  $\eta^2 = .04$ , the observed effect sizes for preventive practices and behavioral adjustments were larger; confirming that the effects were significant. Tukey's Honestly Significant Difference (HSD) comparisons revealed that for behavioral adjustments associated with COVID-19, the integration group scored highest, followed by separation and assimilation. Marginalization group scored the least. These results suggest that integration strategy had a positive impact on behavioral adjustment.

## 5. Discussion

The study found that participants who knew about COVID-19, practiced preventive behaviors, and changed their daily routines accordingly. There was high level of comfort in following authorities' directives. However, participants were fatigued in undertaking

**Table 6**  
Frequency of acculturation strategies adopted by participants.

Integration	Assimilation
97 (23.5 %)	113 (27.4 %)
<b>Separation</b>	<b>Marginalization</b>
67 (16.3 %)	135 (32.8 %)

$\chi^2 (3, N = 412) = 23.85, p < .001$

**Table 7**  
Summary of hierarchical regression analysis for variables predicting COVID-19 prevention practices and COVID-19 behavioral adjustments ( $n = 412$ )

	Variable	Preventive Practices			Behavioral adjustments			
		B	SE B	$\beta$	B	SE B	$\beta$	
Step 1	Gender	.08	.07	.06	-.21	.11	-.10	
	Age	.10	.06	.11	-.001	.09	-.001	
	Education	-.001	.06	-.001	.03	.08	.02	
	Marital status	-.002	.12	-.001	.21	.19	.07	
	Health status	-.10	.13	-.04	-.30	.19	-.08	
	R <sup>2</sup>	.016			.02			
	Adjusted R <sup>2</sup>	.002			.01			
	F	1.152			1.71			
	Step 2	Gender	-.10	.07	.07	-.21	.11	-.10
		Age	.09	.06	.10	-.005	.09	-.004
Education		-.03	.05	-.03	.01	.09	.01	
Marital status		-.02	.12	-.01	.21	.19	.07	
Health status		-.16	.12	-.07	-.32	.20	-.09	
Obedience		.06	.04	.07	.07	.07	.05	
Knowledge		.16	.04	.20*	.06	.07	.05	
Fatigue		-.07	.02	-.22*	-.02	.02	-.04	
$\Delta R^2$		.09			.01			
F for $\Delta R^2$		12.23*			.90			
R <sup>2</sup>		.11			.03			
Adjusted R <sup>2</sup>		.09			.01			
F		5.40*			1.40			

\* =  $p < 0.001$ ;  $\eta^2 = 0.12$  (small effect)

preventive practices. Acculturation strategies such as integration improved behavioral adjustment more than the other strategies such as assimilation separations and marginalization.

Ghana’s contextual issues at the time of data collection may explain the high COVID-19 knowledge and preventive practices. Despite a December 2020 national election, government agencies’ COVID-19 education campaigns seemed unaffected. Political campaign platforms were used to educate the public and some politicians used same to educate their constituents. Masks, social distancing, and handwashing were encouraged. Ghana’s Parliament passed the Imposition of Restrictions Act 2020 (ACT 1012) to embolden the government to implement more restrictive measures to stop the spread. It resulted in public mask-wearing bylaws. According to studies (Al-Hasan et al., 2020; Wright et al., 2021) governmental restrictions are crucial to pandemic prevention protocol compliance. The authorities in Ghana took strong measures including ban on public gatherings, school, church or mosque closures, mandatory quarantine for all travelers, partial lockdown of the two major cities, and requirement to wear face masks in public.

Fear-endemic messages from various sources, despite their negative effects, may have increased people’s protocol adherence (Lim et al., 2021; Temesgan et al., 2022; Urbán et al., 2021). For instance, Ghana has heavily pushed COVID-19 message and built a multi-level risk communication and community engagement strategy for citizens through channels such as radio and TV, social media, text messaging and community outreach.

**Table 8**  
Summary of One-Way ANOVA comparing acculturation strategies’ effects on behavioral adjustments.

Dependent Variables	Assimilation ( $n = 113$ ), A	Separation ( $n = 67$ ), S	Integration ( $n = 97$ ), I	Marginalization ( $n = 135$ ), M	F (3, 408)	$\eta^2$	p	HSD
	M (SD)	M (SD)	M (SD)	M (SD)				
Behavioral adjustments	2.69(1.02)	2.73(1.06)	3.22(1.02)	2.64(1.07)	22.73	.15	.000**	(A<I),(A>M),(S<I),(S>M),(I>M)
Outdoor-related	3.06(1.11)	2.81(1.08)	3.44(1.04)	2.30(1.03)	23.39	.38	.000**	(A<I),(A>M),(S>I),(S>M),(I>M)
Family-related	2.21(1.17)	2.61(1.16)	2.96(1.23)	1.93(1.02)	16.91	.32	.000**	(A<I),(S>I),(S>M),(I>M)

Note:  
\*\* =  $p < .001$

The fact that outdoor-related activities were more affected than personal development and family-oriented activities suggests that participants felt changes in their normal life activities like visiting friends and family and other outdoor activities. However, since people were forced to work or study from home, they could be close to their families and enroll in online personal development programs.

Participants were comfortable following directives. This may be due to Ghana’s collectivist culture. There is no evidence linking cultural orientation to authority obedience. We hypothesized that collectivist cultures’ sense of interdependence and oneness would make them more compliant. According to Germani et al. (2020), collectivism may protect against COVID-19. Our findings confirm that participants obeyed authority. However, it did not affect their preventive practices or behavioral adjustment. This suggests that adherence to preventive practices and behavioral adjustment were not dependent on whether people were comfortable with authority directives. It also emphasizes the importance of preventive measures and the extent of change needed to adapt to the new normal. The bylaws may have prevented noncompliance.

Most participants had pandemic fatigue, which hindered preventive compliance. This is consistent with previous studies (Al-Hasan et al., 2020; Lilleholt et al., 2020; Wang et al., 2020; WHO, 2020). This may be caused by forgetfulness, people being fed up, conflicting messages from authorities, learned helplessness, complacency, reduced infection and recovery rates, uncertainty about COVID-19, and reduced government control measures (Harvey, 2020; Ilesanmi et al., 2020; Papageorge et al., 2021). To prevent disease spread, mutation, and death, public compliance with recommended protocols must be prioritized.

Consistent with previous studies (Erfani et al., 2020; Labban et al., 2020), COVID-19 knowledge significantly influenced people’s compliance with preventive measures. This suggests that more knowledgeable people may be exposed to the disease’s information and become more aware of their vulnerability and compliant than less knowledgeable people.

The outcome that participants mostly used marginalization implies that they rejected both old and new COVID-19 health-protective behaviors. People did not know what to do because COVID-19 was a new pandemic with many changes. Thus, many people rejected most COVID-19 prevention measures. The rise in conspiracy theories about the disease’s etiology at the start of the pandemic made it easy to reject any rational and meaningful behavior (Jovančević and Miličević, 2020). According to Van der Linden (2015) and Jovančević and Miličević (2020), people who believe in such conspiracy theories tend to engage in less socially desirable activities. Some participants cited the virus’s uncertainty and country-to-country variations in infection, recovery, and death rates as reasons for a drop in preventive practices. Studies have linked marginalization strategy to health risk behaviors (Krist et al., 2021; Tutu et al., 2017).

Those who adopted integration and assimilation were better behaviorally adjusted. In line with assimilation, authorities’ new health-preventive directives are mostly followed, making people better adjusted. Total compliance is safer for such people. The increasing

number of infections and deaths at the time and the pandemic's close-to-a-year lifespan may have contributed to this, as studies show that the duration of stay at a destination influences assimilation (Tutu et al., 2017). Thus, COVID-19's prolonged and devastating effects may change attitudes and behaviors.

The third dominant acculturation strategy was integration, where people retained a large part of their original cultural orientation and blended it with the new culture. Behavioral adjustment improved with this strategy. People who use this strategy want to keep their health-protective directives and add more. Integration is the best acculturation strategy and is linked to better health outcomes (Behrens et al., 2015; Krist et al., 2021). In response to COVID-19, people may go above and beyond to find more preventive measures to stay safe and save lives. The least used strategy was separation, suggesting that participants reject much of the new cultural orientation but strongly hold on to their original cultural orientations. These people did not want to change their lifestyle or follow the new preventive guidelines that could infect them. Studies have linked this strategy to poorer health (Behrens et al., 2015; Krist et al., 2021). With the novel virus bringing massive changes to our lives, sticking to old ways of doing things may not be helpful, so such individuals need more education.

## 6. Limitations

The study is limited to some extent. Due to the use of convenience sampling, the generalizability of the findings is limited. Although the sample included diverse adult populations from Ghana, it could not be fully representative of the entire country with regards to the ratio of regions, gender, and other socio-demographic factors which are known to influence individuals' response and adjustment to pandemics (Atchison et al., 2021; Germani et al., 2020). We also acknowledge that Ghana is not ethnically homogenous, thus, the findings may be limited to some extent. As far as the study is cross-sectional, some of the findings are liable to speculative conclusions. In addition, no clear direction of causality could be determined between the selected variables. The study is based on self-reported data; hence, there is the potential for common method variance. For example, perceived knowledge about COVID-19 as expressed by participants cannot be representative of their actual knowledge.

It should also be acknowledged that many of the scales used were developed specifically for the study and have not been validated to ascertain that they were indeed measuring the phenomenon we purport to be measuring. As the name of COVID-19 suggested, it was a novel strain of the virus and as such, existing validated instruments for our purpose were difficult to find. COVID-19 may not be as present today as some years ago, but it may be appropriate to use this time to validate some of the scales through retrospective studies.

## 7. Conclusion

Despite the limitations, the present study showed that during the easing of restrictions three months after the March to June 2020 COVID-19 positivity peak period, most Ghanaian adults were still paying attention to information about COVID-19; were observing the recommended protocols and had experienced some changes in their daily life activities. These outcomes may be attributable to the social, political, and legal contexts at the time. These findings can be used to inform future pandemic preventive and behavioral adjustment efforts. As there could be other unexamined factors, more research is needed to unravel how people's adaptive strategies could enhance future pandemic preventive strategies.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence

the work reported in this paper.

## Data availability

I have added a link to the study data stored under the OSF storage system.

## Acknowledgement

This paper is based on preliminary findings on Ghana data hauled from a three-continent study including Africa (two countries), Europe (16 countries), and the North America (three countries). The project was funded by the University of Bergen (Norway). We are grateful to the rest of the team for allowing us to use the Ghana part of the data for this paper. The first author is a PhD candidate and a beneficiary of the University of Ghana-Carnegie Corporation of New York Scholarship through the BANGA-II Africa Project. He acknowledges the scholarship's support towards his studies.

## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.cresp.2023.100168](https://doi.org/10.1016/j.cresp.2023.100168).

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