COVID-19 social distancing compliance mechanisms: UK evidence

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Abstract

Non-compliance with social distancing (SD) measures clearly has negative effects on both public health and post-pandemic economic recovery. However, little is as yet known about people's views on and factors influencing their behavioral intentions toward SD measures. This study draws on moral disengagement theory and the norm-activation model to investigate mechanisms that promote or hinder compliance with SD measures. A longitudinal research approach was adopted to compare changes in the main factors over three periods of the COVID-19 pandemic in England (UK). The results reveal significant differences between the three periods regarding intentions to comply with SD measures, altruistic value, moral obligation and moral disengagement, with no significant change in ascription of responsibility. Residents showed had the strongest intentions to comply with SD measures during the first national lockdown, with the highest moral obligation and lowest moral disengagement levels, compared with the lowest intention to comply during the first re-opening period. Altruistic value is important in promoting moral obligation and compliance with SD measures, whereas the predictive powers of ascription of responsibility and moral disengagement were weaker than expected. These findings offer guidance to policymakers and researchers in developing more effective policies and public communication strategies. The results suggest that communication is key to normalizing SD compliance, which can be achieved most effectively by fostering residents' altruistic value and moral considerations. Particular attention must be paid to re-opening periods between lockdowns, with clear messages to remind residents of prosocial aspects of SD compliance and public health. In addition to appropriate communication and education, technologies such as apps, QR codes and contactless shopping settings may also be used to facilitate compliance with SD measures.

Keywords: altruistic value, COVID-19, moral obligation, moral disengagement, norm-activation model, social distancing measures

Highlights

- Three rounds of data reveal changes in intentions to comply with SD measures and related factors

- SD compliance intentions were highest in the first lockdown and decreased thereafter

- Moral obligation decreased and moral disengagement increased over the three pandemic periods

- Altruistic value is a stronger predictor of moral obligation than ascription of responsibility

- Moral disengagement had a negative effect on SD compliance intentions, but this effect became limited

1. Introduction

Between April 2020 and July 2021, the UK government's social distancing (SD) measures for England sought to minimize social interactions and reduce the spread of COVID-19. SD comprised a package of measures that varied over time, including staying at home, taking only one form of exercise per day, maintaining a two-meter distance from other people, avoiding social gatherings with friends and family, and shopping for only essential items as infrequently as possible (UK Gov, 2020, Brown and Kirk-Wade, 2021). However, it appears that only 50% of residents adhered strictly and 25% loosely to the SD advice, with 25% ignoring it (Ferguson et al., 2020). Understanding SD compliance is essential to reduce the likelihood of further pandemic waves following lockdowns, which is crucial for global health recovery and sustainability. According to Domingo et al. (2020), prevention of future pandemics should be based on sustainability considerations, and on social and environmental science. Better understanding of individuals' behavioral intentions toward SD compliance and its antecedents will help public health policymakers and industry practitioners to design more effective communication methods for residents, enabling a progressive return to normality.

The environmental literature documents many investigations of potential paths and factors that may reduce COVID-19 transmission (Domingo et al., 2020). These include environmental factors such as air pollution, wind speeds and atmospheric stability, as well as social and public health-related elements such as SD and social contact. Several studies of SD seek to measure perception-based factors influencing individuals' willingness to adopt COVID-19 prevention measures (Ahmad et al., 2020; Aschwanden et al., 2021; Farias and Pilati, 2020; Yu et al., 2021). Ahmad et al. (2020) find that moral norms do not influence willingness to adhere to such measures, whereas government guidelines and personal attitudes are influential. However,

as their cross-sectional study was conducted during the initial stages of the pandemic, it does not reveal whether such behaviors and antecedents have changed over time. As complying with SD measures requires people to make self-sacrifices to reduce the risk of spreading the virus, such as not gathering socially with large groups of friends, this behavior can be studied through the lens of prosocial behavior theory, which explains the circumstances under which individuals will engage in behavior that is costly to themselves to achieve collective benefits (Caprara et al., 2001). Various studies explain prosocial behaviors, including both promoting (Steg and De Groot, 2010) and hindering mechanisms (Menesini and Camodeca, 2008). However, these do not appear to link the prosocial behavior literature with understanding of compliance with SD measures, which might allow identification of effective social psychological mechanisms to nudge residents to comply with SD. Much remains unknown about this problem, including why people do or do not comply with SD measures, and whether people's behavioral intention to comply with SD measures and its influential factors change over different periods of pandemic.

We examine behavioral intentions toward SD measures from a social psychology perspective by combining the norm-activation-model (NAM) and moral disengagement (MD) theory. As the theoretical basis for this study, the NAM is a critical framework for understanding how normative influences such as altruistic value, ascription of responsibility and moral obligation shape prosocial behaviors (Schwartz, 1977), while MD explains how individuals morally disengage from prosocial behavior apparently without suffering self-censure (Bandura et al., 1996). This study takes a discrete emotions perspective, studying moral obligation and moral disengagement as two separate constructs rather than as opposite ends of a spectrum. Furthermore, unlike most studies of individuals' protective behavior, which are primarily cross-sectional (e.g., Aschwanden et al., 2021; Ahmad et al., 2020; Farias and Pilati, 2020), data for this study were collected during three significantly different periods to explain how behaviors change over time. Its three main objectives were: (1) to uncover mechanisms driving or hindering compliance with SD measures; (2) to develop and empirically validate a research framework based on both the NAM and MD in the context of compliance with SD measures in response to COVID-19; and (3) to propose behavioral science-informed nudging mechanisms for use by policymakers and industry practitioners to promote SD to reduce the possibility of another pandemic wave.

2. Literature review

2.1 Social distancing

The environmental literature has documented numerous sources of transmission dynamics of COVID-19 (Coccia, 2021 b; Domingo et al., 2020), such as environmental and climate factors (Coccia, 2020 a, b, c, d; Domingo et al., 2020), socioeconomic factors (Askitas et al., 2021; Coccia, 2021 b, d, e; Zhang et al., 2020), and restriction policies and responses of governments (Backer et al., 2021; Coccia, 2021 a, c, d, f; Sharma et al., 2022). Coccia (2020, a, b, c, d) and Domingo et al. (2020) suggest that the spread of COVID-19 is highly associated with air pollution as well as the speed of wind. Sustainable development strategies should be developed to improve air quality and reduce pollution level, thereby mitigating the negative impact of transmission dynamics of pandemic (Coccia, 2020 c, d). It is also argued by researchers that besides efforts on medicine research (e.g. vaccine), a comprehensive strategy that takes environmental or socioeconomic factors into account is needed for preventing the negative impact of COVID-19 (Coccia, 2021 c).

Among various response policies of governments, social distancing was a key method for reducing spread of the virus at a global level (Mondal et al., 2022). Social distancing measures imposed on people during the covid-19 lockdown have had varying levels of success across various groups of people. The success and acceptability of SD measures are dependent on the impact these measures have on the broader socioeconomic factors, such as age (Zhang et al., 2020; Backer et al., 2020; Sebri et al., 2021), income (McCreesh et al., 2021), household composition (Quaife et al., 2020), profession, educational qualification and awareness of the

pandemic (Singh, 2022). Sebri et al. (2021) highlight how younger, emerging adults are more likely to feel anxiety and worry related to the pandemic, and thus may be more likely to engage in SD behaviours. While some scholars indicate that SD rules may have had implications for social relationships (Pietromonaco & Overall 2022; Feeney & Fitzgerald 2022), which might explain why some people may not that commit to complying with SD measures. Feeny and Fitzgerarld (2022) state that the pandemic has disrupted couples' interaction patterns and engendered major losses, while simultaneously reducing important social connections outside the household; therefore, the impact of SD may negatively impact people's social well-being and consequently the likelihood of compliance of SD measures even though with altruistic motivations (Baxter,1990; Feeney, 1999). Coccia (2021 e) reveal that the effectiveness of SD measures at the second wave of COVID-19 on the control of pandemic was lower than that of the first wave, as citizens showed less commitment to the compliance of the rules of social distancing. As such, it is of great importance to delve into the mechanisms of SD compliance:

what factors drive people to comply with SD measures and what factors may hinder people's commitment?

2.1 Norm-activation model

The NAM, first proposed by Schwartz (1977) in the context of altruistic and prosocial behaviors, is a social psychological model commonly applied in previous literature to explain morality considerations and prosocial behaviors (De Groot and Steg, 2009). Based on the NAM, ascription of responsibility, defined as feeling responsible for the negative outcomes of not performing prosocial actions (Schwartz, 1977), is deemed an important antecedent of personal norms, which refer to individuals' moral obligation to engage in prosocial behaviors (De Groot and Steg, 2009). Previous research in a wide variety of contexts confirms that high ascription of responsibility leads to high levels of moral obligation (or personal norms), thereby promoting more prosocial or pro-environmental behaviors (De Groot and Steg, 2009; Han, 2014; Meng et al., 2020). A recent study in Germany indicates that normative processes such as moral obligation impact positively on compliance behaviors in relation to SD regulations (Rattay et al., 2021). However, relatively little is known about the importance of NAM variables under conditions of risk, particularly in contexts involving public health-related behaviors such as compliance with SD measures. Based on the above discussion, the following hypotheses are proposed:

>   H1: Ascription of responsibility is positively associated with individuals' moral obligation to comply with SD measures.

>   H2: Moral obligation is positively associated with individuals' behavioral intentions to comply with SD measures.

Although many previous NAM studies have examined awareness of the consequences as an antecedent of ascription of responsibility (Han, 2014; Meng et al., 2020), or as a direct determinant of personal norms jointly with ascription of responsibility (Zhang et al., 2013), discrepant conclusions are reached regarding relationships between these factors (O'Connor and Assaker, 2021). This study, which investigates residents' behavioral intentions relating to compliance with SD measures and the factors influencing them, focuses on understanding the role of altruistic value rather than awareness of the consequences in affecting people's feelings of responsibility to engage in prosocial behavior, as well as the morality-related variables of moral obligation and disengagement. There are two reasons for doing so. First, governments around the world have issued public health communications to increase people's awareness of the potentially serious consequences of failing to follow SD measures. Second, previous

research suggests that if individuals' acts (e.g., compliance with SD measures) are motivated by selfish reasons, they may be less likely to act prosocially in other situations (Swap, 1991). Thus, comprehending the influence of altruism is particularly crucial in this study, as residents must follow SD measures in various circumstances to better avoid further spread of the virus.

Altruistic value is defined as the psychological benefit resulting from a feeling of helping others beyond personal interests (De Groot and Steg, 2008). In environmental research, it refers to feelings of concern for other people with regard to the environment or public health (Quoquab et al., 2020; Swami et al., 2010), and has formed a basis for many studies of environmental/prosocial attitudes and behaviors. It is inextricably linked with the NAM (Stern and Dietz, 1994), as a model of altruism for understanding prosocial/pro-environmental actions. Lind et al.'s (2015) study of sustainable travel mode choices reveals that altruistic value positively influences people's ascription of responsibility for the outcomes of travel choices. In other words, people with high altruistic value tend to ascribe more personal responsibility to the consequences of their behaviors. Furthermore, moral obligations (or personal norms) are central to altruistic actions (Schwartz, 1977) and are closely associated with altruistic value (Stern and Dietz, 1994). In an agricultural study, Chua et al. (2016) demonstrate that altruistic value is a significantly positive antecedent of individuals' feelings of moral obligation to engage in pro-environmental behaviors. As altruistic value implies that people are motivated to act prosocially to benefit others (Conte et al., 2021; De Groot and Steg, 2008), those with high altruistic value are more likely to engage in prosocial actions, such as complying with SD measures to protect others. Accordingly, we propose that altruistic value is a direct antecedent of the NAM variables of ascription of responsibility and moral obligation, and of behavioral intentions to comply with SD measures.

Despite substantial information on the effects of NAM factors on prosocial behaviors, little research has applied the NAM to understanding COVID-19-related behaviors. The only study to use the NAM to explore residents' willingness to be vaccinated focuses predominantly on self-interest rather than altruism (Radic et al., 2021). Thus, the following hypothesized relationships in SD compliance behavior during the COVID-19 pandemic are investigated:

H3: Altruistic value is positively associated with individuals' ascription of responsibility for complying with SD measures.

H4: Altruistic value is positively associated with individuals' moral obligation to comply with SD measures.

H5: Altruistic value is positively associated with individuals' behavioral intentions to comply with SD measures.

2.2 Moral disengagement

Bandura (1986) first introduced the concept of moral disengagement as a facet of social cognitive theory to explain how people may disable the cognitive link between their unethical behavior and the self-censure that might prevent it. According to Bandura et al. (1996), individuals tend to refrain from violating their own moral standards, which might cause self-sanctioning. However, their moral self-sanctioning may be selectively disengaged through a range of self-regulatory cognitive processes (Bandura, 1986) referred to as moral disengagement mechanisms.

Eight specific moral disengagement mechanisms explain how people cognitively restructure the consequences of harmful behaviors (Detert et al., 2008): moral justification, euphemistic language, advantageous comparison, displacement and diffusion of responsibility, disregarding the consequences of action, dehumanization and attribution of blame (Bandura et al., 1996). In subsequent literature, moral disengagement theory is commonly regarded as a standalone theory, and has been applied to various phenomena, including antisocial behavior among children (Hyde et al., 2010), violent actions in sports (Boardley and Kavussanu, 2007), unethical behaviors in the workplace (Moore et al., 2012; Newman et al., 2019), pro-environmental actions (Wu et al., 2021) and prosocial behaviors (Paciello et al., 2013; Parlangeli et al., 2019).

Moral disengagement has been shown to have a strengthening influence on unethical behaviors (Boardley and Kavussanu, 2007; Moore et al., 2012; Newman et al., 2019), and a significantly negative impact on prosocial actions such as helping behaviors and conservation actions (Paciello et al., 2013; Wu et al., 2021). High levels of moral disengagement may lead to denial of support for others in need, whereas lowering moral disengagement improves people's engagement in prosocial actions. Previous studies indicate that altruistic value determines people's likelihood of feeling morally obliged to engage in prosocial actions (Chua et al., 2016; De Groot and Steg, 2008), so it can be assumed that altruistic value is negatively associated with moral disengagement (Yang et al., 2020). High altruistic value means strong feelings of concern for others' rather than one's own self-interests, which implies less likelihood of morally disengaging from helping others (Chowdhury and Fernando, 2014). Although the extant literature offer some lessons on how moral disengagement may hinder the formation of prosocial behaviors (Paciello et al., 2013; Parlangeli et al., 2019; Wu et al., 2021),

its mechanisms have not been studied in the context of health-related prosocial behaviors, such as compliance with COVID-19 SD measures.

Moral disengagement may play a pivotal role in the negative moral functioning that results in individuals' denial of responsibility for reducing the spread of COVID-19 by complying with SD measures. People may justify non-compliance through the disengagement mechanism of moral justification (e.g., "it is sometimes acceptable to break social distancing rules to care for my friends and family"). Through the mechanism of euphemistic language, people may use morally neutral language to sanitize behaviors contrary to SD measures (e.g., "it is acceptable to go out for exercise with people outside my household"). With regard to advantageous comparison, people may make their anti-SD behaviors seem less harmful (e.g., "catching up with friends in a park is no big deal when you consider the numbers of people shopping in supermarkets"). Through displacement and diffusion of responsibility, people may pass responsibility onto others (e.g., "people cannot be blamed for breaking social distancing measures if their friends and family ask them to do it") or simply diffuse responsibility amongst a bigger group (e.g., "in contexts where others do not comply with social distancing measures, we cannot be blamed for following their example"). The mechanism of disregarding the consequences of their actions may lead people to distort the harm caused by those actions, thereby reducing their feelings of guilt or distress (e.g., "breaking social distancing measures for a little while does not contribute to the spread of COVID-19"). Through dehumanization, people may minimize their identification with the targets of unethical behaviors (e.g., "teasing someone wearing a mask does not hurt them"). With regard to the mechanism of attribution of blame, individuals may blame contextual issues (e.g., "if I do not strictly comply with social distancing measures, it is probably because the government is not doing its job effectively"). Although people with high altruistic value are less prone to morally disengage from prosocial behaviors, such as compliance with SD measures, we also predict that the more people deactivate their moral reasoning using these moral disengagement mechanisms, the more they will deny their own responsibility for complying with SD measures. Therefore, we propose the following hypotheses:

H6: Altruistic value is negatively associated with individuals' moral disengagement from compliance with SD measures.

H7: Moral disengagement is negatively associated with individuals' behavioral intentions to comply with SD measures.

3. Methodology

3.1 Sample and data

We chose residents in England as our population of interest, as the UK has been one of the worst affected countries in Europe, with approximately 4.5 million confirmed COVID-19 cases by June 2021 (Statista, 2021). Since the start of the pandemic, England has been through three national lockdowns and two waves of infection, with various changes in policy and government guidance, thus affording an opportunity to measure changes at key points in time (for a review of English lockdown laws, see Brown and Kirk-Wade, 2021). England, Scotland, Wales and Northern Ireland have issued different recommendations to their residents, so this study focuses only on England. Furthermore, the UK has led the world in its COVID-19 vaccine rollout beginning in late 2020 (Coccia, 2021), which was also expected to have influenced opinions on the feasibility of relaxing SD measures. Thus, England was deemed an appropriate research context for this study. Unlike most previous research relying on cross-sectional data, this study followed a longitudinal research design, with three periods of data collection from May 2020 to March 2021. Given the changes in government guidance and the ups and downs of England's experience of the COVID-19 pandemic in the space of a year, a particular focus of interest was potential changes in residents' intentions to comply with SD measures and related influencing factors.

Due to the pandemic, only online surveys were feasible. Therefore, we employed Amazon Mechanical Turk, an online survey service that has been widely used for research purposes during the pandemic (e.g., Gursoy et al., 2021). The first survey (*T1*) was conducted during the first national lockdown period, from 1 to 10 May 2020. During this period, residents were not permitted to leave home for outdoor recreation and were advised to stay at home. Residents could leave their homes for essential purposes only, and all non-essential high street businesses were closed. After approximately two months, the second survey (*T2*) was conducted during the first re-opening period, from 10 to 20 July 2020. Under UK government regulations that took effect in England from 4 July 2020, most lockdown restrictions were lifted, and service industries such as hospitality and retail re-opened. Residents were allowed to leave home for outdoor recreation, but recommendations were made to avoid gathering in groups larger than six. The third survey (*T3*) was conducted during the third national lockdown, from 26 February to 7 March 2021. The restrictions during this period were quite similar to those in the first lockdown: people were not allowed to leave home for recreation purposes, and service and non-essential retail businesses were closed (Brown and Kirk-Wade, 2021). During *T3*, around

42% of adult UK residents (aged 18 and over) had had their first vaccination dose and 2% had had their second dose (GOV.UK, 2021). A total of 859 respondents were recruited in the three waves of surveys (320 in *T1*, 241 in *T2* and 298 in *T3*).

3.2 Measures and definitions of variables

SD measures aim to reduce the spread of viruses such as COVID-19 (GOV.UK, 2020). They are not only about protecting oneself, but also about safeguarding others. The dependent variable in this study, behavioural intentions to comply with SD measures, refers to people's intentions to comply with the government's advised SD measures. Based on the UK government's guidance for England in May 2020, five items were included as scale measurements: "I intend to stay at home as much as I can"; "I only go out when I have to (e.g., health reasons)"; "I stay two meters (6ft) away from others when I go out"; "I wash my hands as soon as I return home"; and "I avoid social gatherings with people outside my household." These are consistent with recent research on SD behaviors (Evans et al., 2021), and are the most common SD measures not only in England and the rest of the UK, but also worldwide. Notably, at *T1*, wearing a mask had not been included in the UK government's guidance for England (Brown and Kirk-Wade, 2021). In order to ensure measurement consistency, the same five items (excluding wearing masks) were used for the three waves of data collection. Fig. 1 illustrates the relationships between the measured variables. Ascription of responsibility refers to feelings of responsibility for the negative consequences of not performing prosocially, while moral obligation refers to personal norms of performing or refraining from specific actions (De Groot and Steg, 2009). Godin et al.'s (2005) and Wu et al.'s (2021) scales were adapted to measure ascription of responsibility (three items) and moral obligation (four items) for complying with SD measures. One item used to measure ascription of responsibility was: "I feel jointly responsible for the negative consequences of society not complying with social distancing measures." For moral obligation, one measurement item was: "It would be against my moral principles not to follow social distancing measures." Altruistic value in this study refers to feelings of concern for others in terms of SD and public health. The scale for altruistic value was adapted from Boenigk et al. (2011) and De Groot and Steg (2007). One item was: "I comply with social distancing measures because I want to help others." Moral disengagement refers to a set of cognitive mechanisms that allow people to disengage from moral standards without feeling guilt or distress (Wu et al., 2021), for which the measurement was adapted from Wu et al. (2021), as explained in Section 2.2. The content validity of the survey instrument was assessed in a pre-testing phase, when the appropriateness of the measurements and the wording

of survey questions were discussed and confirmed by seeking experts' opinions. All items of the studied constructs were assessed using seven-point Likert-type scales (1 = strongly disagree, 4 = neutral, 7 = strongly agree). Details of the construct items are given in Appendix 1, and the questionnaire is provided in Appendix 2.
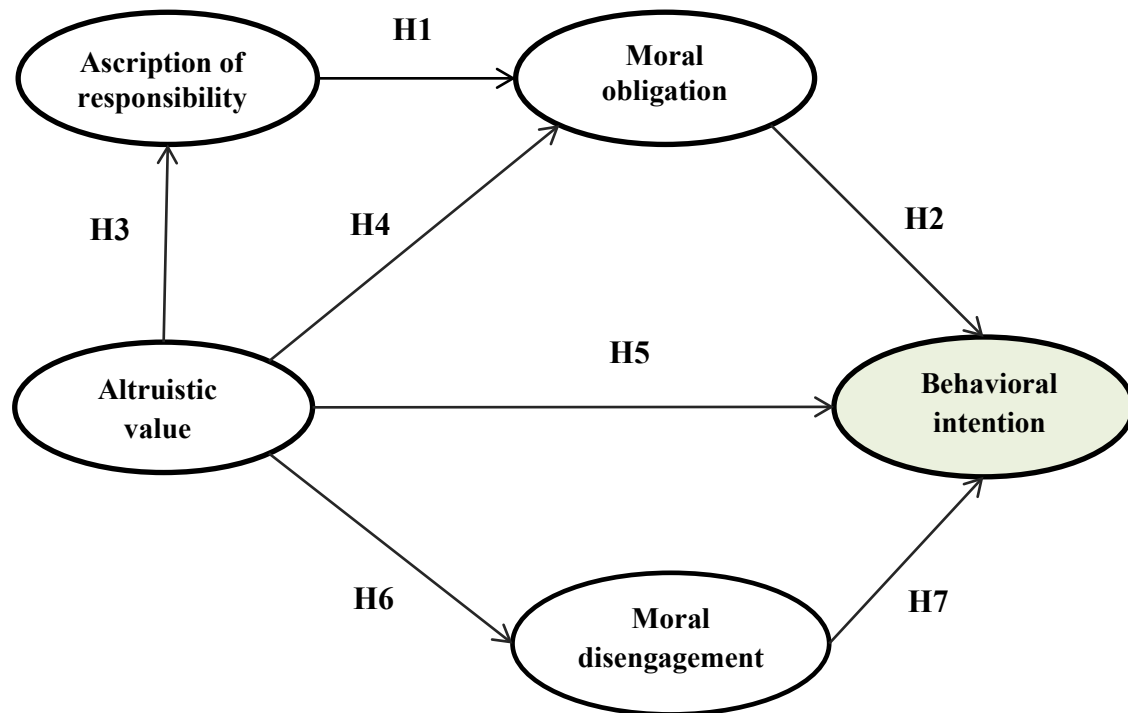
Fig. 1. Research framework

3.3 Data analysis

Data analysis was conducted in several steps, using IBM SPSS 26.0 for descriptive analysis and one-way ANOVA tests, and IBM AMOS 26.0 to assess the measurement and structural models. First, a series of descriptive analyses were deployed to examine respondents' profiles, including the overall respondents (859), and those recruited from *T1* to *T3* (see Table 1). Then, following a longitudinal research approach, one-way ANOVA was performed using IBM SPSS 26.0 to assess changes across three periods of the pandemic (*T1*, *T2* and *T3*) with regard to UK residents' behavioral intentions to comply with SD measures and corresponding influencing factors (see Table 2 and Fig. 2). Tests to examine the hypotheses were conducted using IBM SPSS 26.0 and AMOS 26.0, including reliability and validity tests, confirmatory factor analysis (CFA) and structural equation modeling (SEM).

We assessed the research framework in two steps. First, we examined the overall fit of the measurement and structural models using the overall data (n = 859). Second, we conducted

SEM tests using data from each time period, to compare the SEM between *T1*, *T2* and *T3*, and to identify any differences in the relationships between constructs.

4. Results and discussion

Of the total of 859 participants, 37.8% were female and 62.2% male (see Table 1), with 43.1% aged between 18 and 29, 51.1% between 30 and 49, and 5.8% 50 or above. With regard to ethnicity, 71.7% were white, 13.9% were Asian, including Chinese, and 14.4% were of African, Caribbean or other backgrounds. Regarding education levels, 23.9% had professional or further education qualifications, 39.7% had achieved or were studying for an undergraduate degree, and 28.8% had achieved or were studying for a postgraduate qualification. No significant demographic differences were found between groups in the three time periods except for the age distribution. At *T3*, 58.1% were aged between 30 and 49 and 33.2% between 18 and 29, and the average age in *T1* was slightly higher than in *T2* and *T3*. However, since the demographic profiles did not differ significantly between the three samples, there was no serious concern for attrition in this study, enabling comparison of behavioral changes and their influencing factors between the three periods.

Table 1. Profile of respondents

|		Total (n = 859) %	T1 (n=320) 1st national lockdown: 1–10 May 2020 %	T2 (n=241) 1st re-opening period: 10–20 July 2020 %	T3 (n=298) 3rd national lockdown: 26 Feb–7 March 2021 %
Gender	Male	62.2	62.5	64.3	60.1
	Female	37.8	37.5	35.7	39.9
Age	18–29	43.1	47.8	49.0	33.2
	30–49	51.1	46.9	48.2	58.1
	50+	5.8	5.3	2.9	8.7
Ethnic group	White	71.7	71.9	72.6	70.8
	Asian	13.9	16.0	13.2	12.1
	African/ Caribbean/other	14.4	12.2	14.1	17.2
Education	Secondary school or below	7.7	7.5	7.5	4.7
	College	23.9	18.1	27.8	27.5
	Undergraduate	39.7	41.3	39.0	40.3
	Postgraduate	28.8	33.1	25.7	27.5

Changes in intentions to comply with SD measures and related influencing factors over the three time periods are shown in Table 2 and Fig. 2. The results of one-way ANOVA tests

indicate significant differences between the three periods in terms of behavioral intentions (F = 41.112, p = 0.000), altruistic value (F = 6.145, p = 0.002), moral obligation (F = 7.517, p = 0.001) and moral disengagement (F = 21.622, p = 0.000). This shows that UK residents' intentions to comply with SD measures during national lockdowns (*T1* and *T3*) were significantly higher than when most restrictions were eased and businesses re-opened (*T2*). Similarly, people's altruistic value, moral obligation and moral disengagement changed significantly after the first national lockdown (*T1*). However, the ANOVA results indicate no significant change in ascription of responsibility over the three time periods (p > 0.05), suggesting considerable consistency in UK residents' feelings of responsibility for the negative consequences of not complying with SD measures.

Table 2. Changes in intentions to comply with SD measures and influencing factors over three time periods

Construct	*T1*	*T2*	*T3*	*F*	*p*
Behavioral intention to comply **with SD measures***	6.261[a]	5.437[a]	5.736[a]	41.112	0.000
Altruistic value*	5.859[a]	5.488	5.594	6.145	0.002
Ascription of responsibility	4.282	4.084	4.299	1.273	0.281
Moral obligation*	5.889a	5.510	5.563	7.517	0.001
Moral disengagement*	2.879a	3.462	3.495	21.622	0.000

Notes: * = significant difference between three periods; [a] = significantly different from the other groups; *T1* = 1st national lockdown, 1–10 May 2020, *T2* = 1st re-opening period, 10–20 July 2020, T3 = 3rd national lockdown, 26 February–7 March 2021.
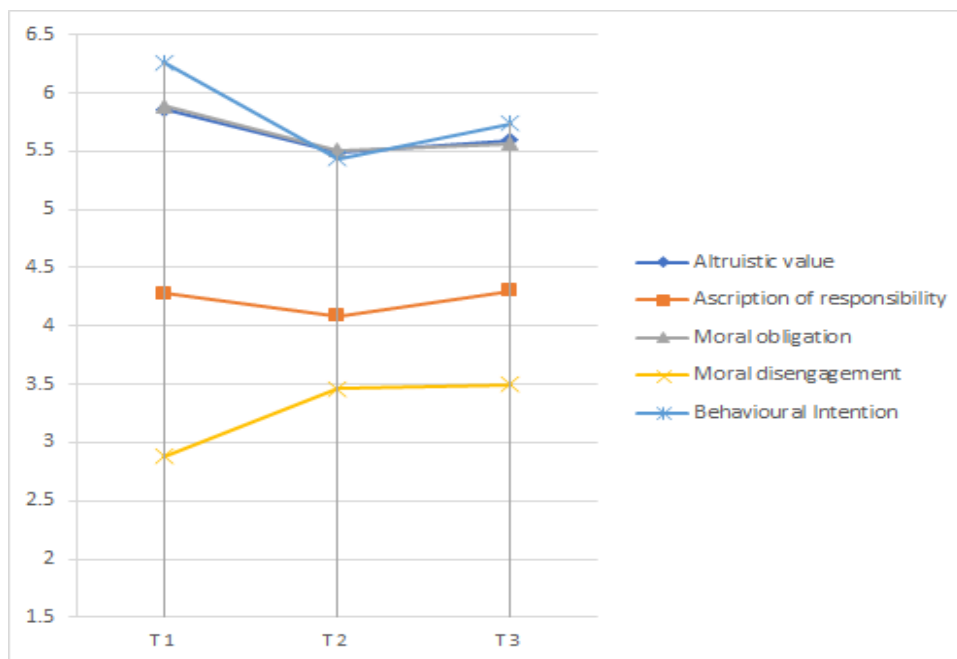
Fig 2. Changes in intentions to comply with SD measures and influencing factors over three periods

A Scheffé post hoc test was employed to identify further sources of differences between the three periods. This is one of the most conservative post hoc tests, recommended for uneven sample sizes (Wurzinger and Johansson, 2006). As depicted in Fig. 2, the results suggest that residents' behavioral intentions to comply with SD measures differed significantly over the three periods, with the highest in *T1* (first lockdown) and the lowest in *T2* (minimal lockdown restrictions). Regarding moral obligation, the mean score for *T1* (mean = 5.889, p < 0.01) is significantly higher than for *T2* (mean = 5.510) and *T3* (mean = 5.563). For moral disengagement, the value in *T1* (mean = 2.879, p < 0.01) is significantly lower than in the other periods (*T2*: mean = 3.462; *T3*: mean = 3.495). These results offer a reasonable explanation for the highest intention to comply with SD measures in *T1*, with high moral obligation and low moral disengagement. Interestingly, although intrinsic value is commonly considered to be a relatively stable construct (Homer and Kahle, 1988; Roos and Hahn, 2017), the results of this study suggest that it may change over time, with the highest level in *T1* (mean = 5.859, p < 0.05) and significantly lower levels in *T2* (mean = 5.488) and *T3* (mean = 5.594).

In summary, the findings suggest that residents in England were more health-conscious and more altruistic during the first national lockdown. However, as time went on, people seemed to get used to the pandemic situation, with an apparent decrease in compliance and in moral concerns about non-compliance with the government's SD recommendations. These findings may help to explain why the UK was among the group of low performers in minimizing

mortality during the COVID-19 pandemic (Coccia, 2021), especially during the second wave. The results of this research reveal that after the first national lockdown, people tended to find more excuses not to morally engage in prosocial behaviors such as compliance with SD measures, with higher levels of moral disengagement and lower orientation toward altruistic moral considerations. Our research also supports the conclusions of recent studies (Baniasad et al., 2021; Coccia, 2021) that the COVID-19 pandemic crisis has required rapid policy responses based on effective public health governance, and that longitudinal empirical research is imperative.According to Hu and Bentler (1999), the comparative fit index (CFI) offers the best approximation of the population value for a single model, with a value greater than 0.90 representing good model fit. The root mean square error of approximation (RMSEA) is a measure of the average standardized residual per degree of freedom, which should be less than 0.08 to indicate good model fit (Byrne, 1998). Based on these rules and the results of CFA, the measurement model suggested reasonable fit with the data ($\chi 2/df$ = 4.271; CFI = 0.948, GFI = 0.905, NFI = 0.933, TLI = 0.939, RMSEA = 0.062). Following the procedure for CFA, results for reliability and validity were obtained (see Appendix 1). All Cronbach's alpha values exceeded 0.80, suggesting excellent internal consistency. In addition, each composite reliability value was greater than 0.80, confirming high reliability of the measures. Good convergent validity was confirmed, with all factor loadings greater than 0.45 and each AVE value larger than the recommended threshold of 0.50. As shown in Table 2, the square root of each AVE was greater than the corresponding correlation coefficients, indicating reasonable discriminant validity (Hair et al., 2010).

Table 3. Descriptive statistics and correlation among factors (N = 859)

Factor	Mean	Standard deviation	1	2	3	4	5
1. Moral obligation	5.67	1.30	(0.84)				
2. Ascription of responsibility	4.23	1.70	0.32**	(0.83)			
3. Altruistic value	5.66	1.32	0.74**	0.41**	(0.90)		
4. Moral disengagement	3.26	1.33	-0.50**	-0.06	-0.39**	(0.71)	
5. Behavioral intention	5.85	1.15	0.71**	0.29**	0.66**	-0.51**	(0.788)

*Notes: * $p < 0.05$, ** $p < 0.01$; numbers in parentheses presented diagonally indicate the square root of the AVEs.*

With an acceptable fit in the measurement model, SEM was conducted using Amos 26.0 for the overall model (combined data from *T1* to *T3*). The overall structural model yielded a similarly reasonable model fit with the data (see Fig. 2): $\chi 2/df$ = 4.490; CFI = 0.944, GFI =

0.895, NFI = 0.929, TLI = 0.935, RMSEA = 0.064. As hypothesized, altruistic value has a significant positive effect on moral obligation (β = 0.801, p < 0.001), ascription of responsibility (β = 0.425, p < 0.001) and behavioral intentions to comply with SD measures (β = 0.213, p < 0.001), thus supporting H3 to H5. Altruistic value is positively related to moral obligation but negatively related to moral disengagement, as predicted in H6. The results show that moral obligation has a significantly positive influence on behavioral intentions (β = 0.521, p < 0.001), whereas moral disengagement negatively affects intentions to comply with SD measures (β = -0.184, p < 0.001), confirming H2 and H7. Amongst all the factors influencing behavioral intentions to comply with SD measures, moral obligation has the highest impact. These results are consistent with comparative analysis over the three periods (from *T1* to *T3*, see Fig. 2), indicating that when levels of moral obligation and altruistic value are high and the level of moral disengagement is low, residents' behavioral intentions are highest (*T1*, first national lockdown).

Surprisingly, the SEM results do not support a positive effect of ascription of responsibility on moral obligation (β = 0.035, p > 0.05), as hypothesized in H1. This result is inconsistent with many previous NAM studies, which identify ascription of responsibility as a significant antecedent of personal norms/moral obligation (De Groot and Steg, 2009; Han, 2014; Meng et al., 2020). Although the correlation analysis reveals a significantly positive correlation between ascription of responsibility and moral obligation (see Table 2), the SEM results suggest that when the effects of the two constructs on moral obligation are tested simultaneously, the effect of ascription of responsibility (β = 0.035) appears quite limited compared with altruistic value (β = 0.801). This result raises interesting questions about the effectiveness of the standard NAM variable of ascription of responsibility as a predictor of individuals' moral obligation in this context. First, although the original NAM suggests that ascription of responsibility plays a role in activating moral obligation, some research shows that it may actually subside or have limited influence on one's personal obligation, especially in the presence of a more influential antecedent (Landon et al., 2017; Linz and Heberlein, 1984). Second, from a conceptual connotation perspective, it is argued that ascription of responsibility shares some similarity with moral obligation regarding individuals' feelings of responsibility for performing or not performing certain prosocial actions (Vaske et al., 2020), and that the role of moral obligation in predicting prosocial behavioral intentions is normally more salient (Han, 2014). These findings and arguments explains the emergence of research seeking to broaden theory on the NAM with the addition of other variables (Han, 2014; Ritchie et al., 2021).

The findings of this study reveal that altruistic value is a more powerful predictor of moral obligation than ascription of responsibility, which suggests that altruistic value may replace the original NAM's role of ascription of responsibility in activating obligation. In our proposed conceptual framework, altruistic value, moral obligation and moral disengagement all impact significantly on people's behavioral intentions toward SD compliance, whereas ascription of responsibility is influenced largely by altruistic value and has little effect on moral obligation. Furthermore, as previously shown in Table 2, the results of longitudinal comparison between the three periods of the pandemic reveal that people's intentions to comply with SD measures changed over time, as did other influential factors such as moral obligation/disengagement and altruistic value, yet levels of ascription of responsibility did not seem to differ significantly. This raises a further concern about the necessity for ascription of responsibility in the conceptual model (Vaske et al., 2020). Thus, the implication is that, rather than raising people's awareness of responsibility, ways of increasing people's altruistic value should be explored, thereby promoting high moral obligation and greater SD compliance.
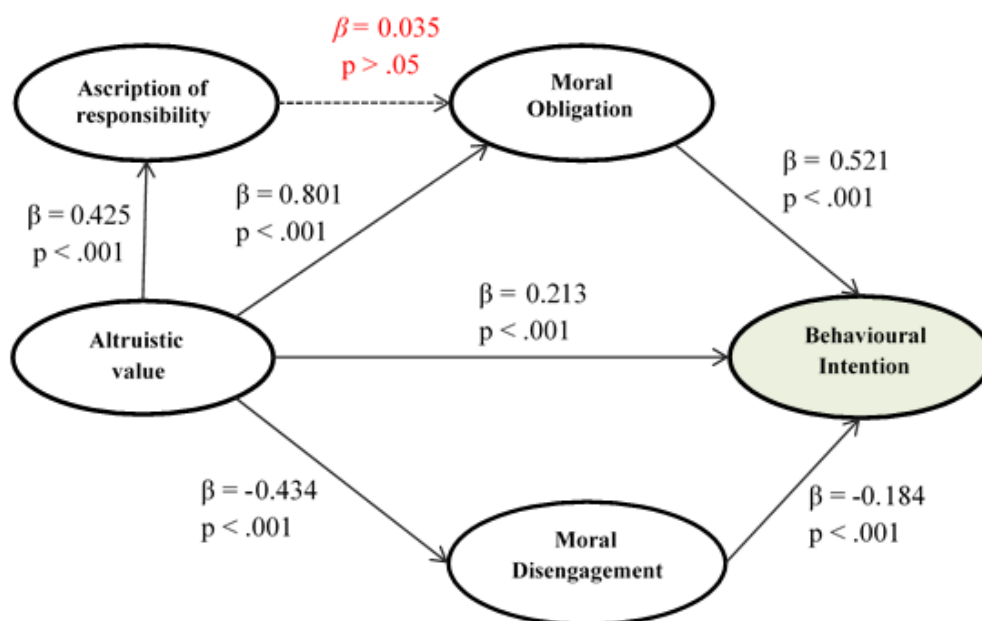

Fig. 3. Results of overall structural model for *T1*, *T2* and *T3* (n = 859)

Based on the results for the overall structural model (*T1*, *T2* and *T3*), we compared the SEM models from *T1* to *T3* to determine any apparent differences between the three periods. As shown in Fig. 4, most of the hypothesized associations are consistent with those proposed in Section 2, and with the results for the overall structural model. From *T1* to *T3*, the direct influence of altruistic value on moral obligation was consistently high, while moral obligation

remained the most influential of the three predictive factors (moral obligation, altruistic value and moral disengagement) on behavioral intentions to comply with SD measures. These results suggest that residents' intentions to comply with SD measures were driven largely by altruistic moral considerations throughout the various stages of the pandemic. Thus, public health policymakers must seek to foster residents' altruistic value and moral obligation regarding compliance with SD measures.

A notable exception to the negative impact of moral disengagement on behavioral intentions occurs in *T3*, when it appears to be insignificant ($\beta = -0.05$, $p > 0.05$). This may be attributable to stronger influences of moral obligation and altruistic value on behavioral intentions in *T3*. By this time, residents in England had been through three national lockdowns, so it is likely that moral disengagement failed to exert a strong impact on people's intentions to comply with SD measures, as their knowledge and awareness of the importance of SD measures had gradually increased and the effects of altruistic considerations (moral obligation and altruistic value) had become stronger. These findings are supported by previous research on moral disengagement (Wu et al., 2021), which indicates that the negative impact of moral disengagement in determining prosocial/pro-environmental behavior varies in different situations. The current research adds further evidence that the effect of moral disengagement changes not only in distinct social contexts, but also over time.
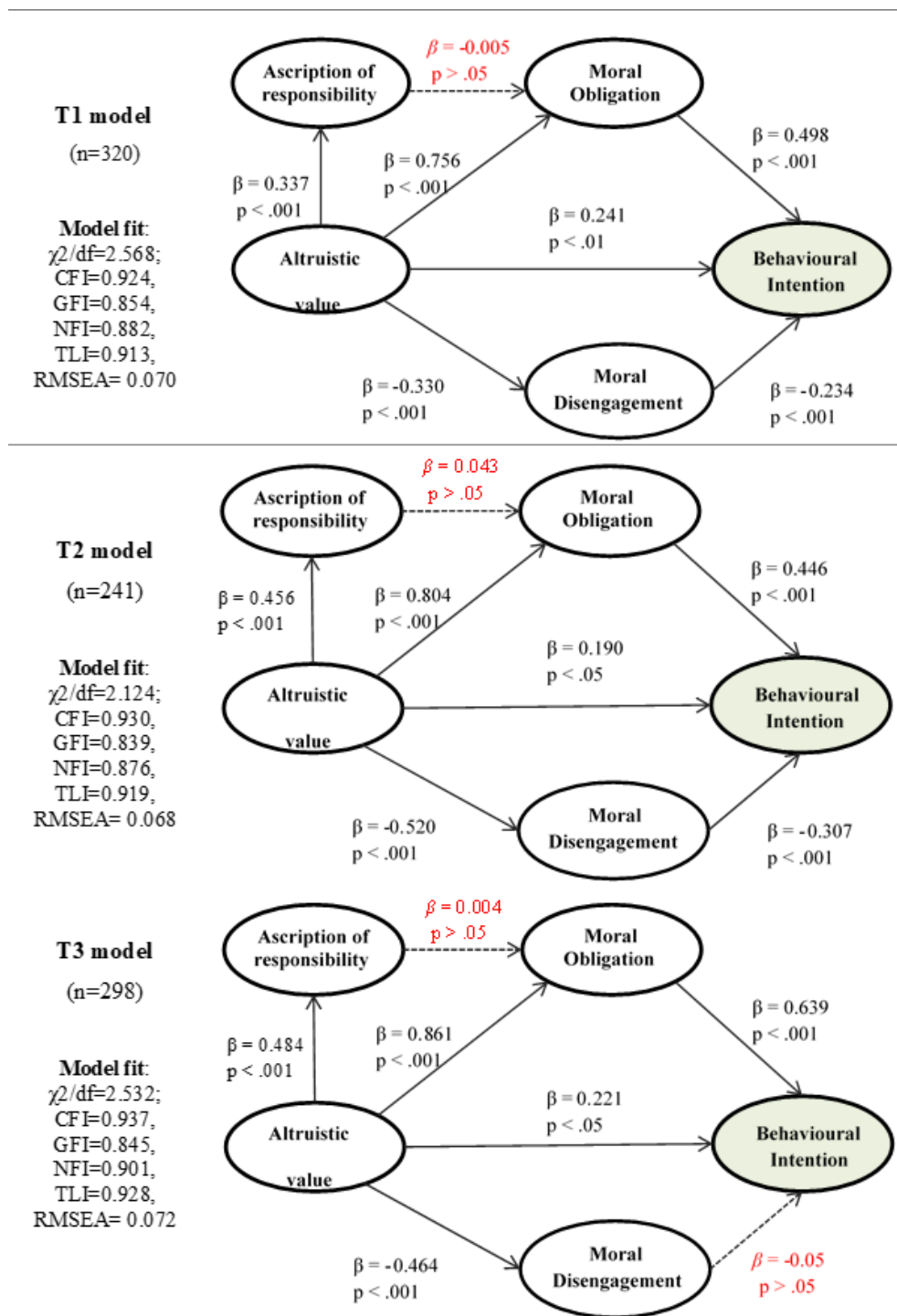
Fig. 4. Results of structural model for three time periods

5. Conclusions, limitations and prospects

This study sought to address critical questions regarding why people have or have not complied with SD measures during the COVID-19 pandemic by providing a better understanding of the social psychological mechanisms that can be employed to nudge

residents' compliance behavior. To this end, we carried out longitudinal data analysis over three periods of the pandemic. Our study not only uncovers driving and hindering factors, with a research framework integrating both theoretical insights from the NAM and moral disengagement theory, but also compares and contrasts behavioral changes and their determinants between two lockdowns and a re-opening period.

5.1 Theoretical implications

This study highlights the importance of nurturing altruistic value among residents. We find altruistic value to be consistently strong in promoting moral considerations and behavioral intentions to comply with SD measures over three periods of COVID-19 lockdowns, whereas the classic NAM variable of ascription of responsibility has more limited impact on moral norms. These findings raise questions about the necessity for ascription of responsibility as an antecedent of personal norms in the original NAM (Landon et al., 2017), and suggest interesting directions for future research to extend or optimize the NAM framework in different situations (Ritchie, et al., 2021), especially in studying prosocial behavior in public health contexts.

Given a dearth of empirical evidence on the effect of moral disengagement on health-related prosocial behaviors, such as compliance with SD measures, this study adds to the literature in revealing that moral disengagement has an impact in hindering SD compliance behaviors, but that this effect is weaker than expected. In addition, we find that the effect of moral disengagement was very limited during the third national lockdown, supporting the scholarly argument that levels of denial of support for others may vary in different contexts (Wu et al., 2021). This study is among the first to explore moral disengagement in a longitudinal setting, thereby deepening understanding of its influence. We find that moral disengagement differed between time periods, with the lowest level during the first national lockdown and apparently higher levels during the re-opening period and the third lockdown. During the first national lockdown, the UK was among many other countries that had engaged in limited national planning (Coccia, 2021), yet the results reveal that people's moral disengagement levels were low and they exhibited the greatest tendency to comply with SD measures. Future investigations should thus consider how to incorporate variables such as personal self-protection concerns (Al-Rasheed, 2020) and other self-interest factors (Ahmad et al., 2020; Feeney and Fitzgerald, 2022) into the research model.

Our longitudinal analysis reveals that people were more morally conscious during the first national lockdown, with greater altruism and lower tendency to morally disengage from

prosocial actions such as complying with SD measures. This study makes an academic contribution by identifying evolving changes in individuals' moral considerations and behavioral intentions towards SD measures, which may be utilized as guidelines for policymakers and scholars in developing more effective policies and public communications (Backer et al., 2021). Residents in England appear to have adapted to the pandemic situation during subsequent lockdowns, with even fewer people following SD measures, which differs from the situation found in Asian contexts (The Straits Times, 2021). Future studies might compare data between different cultural backgrounds with regard to behavioral changes during different periods of a pandemic.

5.2 Policy and industry implications

The findings of this research will be beneficial for planning public health responses and management of future pandemics. We find that during the re-opening period between the first and second national lockdowns in England, people showed the lowest intentions to comply with SD measures. This empirical evidence may explain why the UK in general, and England in particular, was among the countries most affected by the second wave of the pandemic. These findings not only question the efficiency of policy on lockdown plans and the effectiveness of public health communication strategies in England, but also offer guidance to other countries/regions with similar control measures on taking proactive actions (Backer et al., 2021).

From an industry perspective, the impacts of SD are multi-faceted, and a challenge moving forward may be to decide how to encourage and enable compliance with SD measures, while simultaneously achieving commercial and economic growth. Service industries have been most acutely impacted by SD requirements throughout the pandemic, particularly given the need to transition to online offerings, take-away services or complete shutdowns. SD compliance requires industries to rethink how physical space and service environments are used, and how we can communicate with residents and encourage compliance with SD measures. Communications are key to normalizing SD compliance, and this can be achieved most effectively by recognizing that altruistic measures are more likely to be effective in nudging behavior.

The many restrictions imposed during the various lockdowns have resulted in technology and service delivery innovations (Wang et al., 2021), such as the improved and now ubiquitous use of QR codes, integration of apps into service delivery, and accelerated moves toward contactless payments and a cashless society. The findings of this study suggest that industry

should leverage altruistic measures to enhance residents' compliance with SD, for example through communications and education, and take advantage of technological advancements such as apps and QR codes to encourage SD behaviors. For instance, public transport providers might use apps to disseminate clearer messages about how busy their services are, which might encourage SD. Similarly, QR codes might be used to help inform people of appropriate behaviors regarding SD compliance. Public health announcements might potentially be more effective if they were to focus on protection and calm, echoing a return to "normality," rather than fear and lack of autonomy resulting in a view of SD as a burden rather than a solution.

5.3 Limitations and directions for future research

Some limitations of this study must be noted, and the results require cautious interpretation. First, although one strength is the longitudinal analysis of the research methodology, the COVID-19 lockdown restrictions made it highly challenging to make within-subject comparisons over the three time periods. Future longitudinal studies should thus endeavor to track the same group of subjects to compare individual behavioral changes in relation to compliance with SD measures and its determinants. Second, this is the first study to apply the conceptual model and the relationships examined, in this case to a UK context. Other contexts in both Western and Eastern regions should be explored in future research. As previously indicated, our findings are inconsistent with those found in Asian cases. Third, similarly to other studies, this research could only capture certain aspects of the complex relationships (Coccia, 2020) between individuals' moral considerations, altruistic value and behavioral intentions relating to compliance with SD measures. Future research might consider combining prosocial behavioral theories such as the NAM and protection motivation theory to help understand the complicated underlying mechanisms of compliance with SD measures.

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