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Loneliness and happiness in the face of the COVID-19 lockdown: Examining the pathways through somatic symptoms and psychological distress

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Abstract
Studies show that loneliness was higher during the pandemic than in the pre-pandemic periods, with negative consequences on individual happiness. This study extends current knowledge by investigating the indirect effects of somatic symptoms and psychological distress in the loneliness-happiness relationship during the COVID-19 lockdown. The cross-sectional sample comprises 538 Nigerian adults (Mean age = 36.48 ± 12.03) with 43% females. Data were collected using structured self-report instruments and subjected to path analyses in SPSS AMOS. Results showed that loneliness and happiness were negatively related. Loneliness and happiness were indirectly related through the successive association between somatic symptoms and psychological distress. Specifically, greater loneliness was associated with increased somatic symptoms, which in turn were associated with greater psychological distress and reduced happiness levels. Clinicians can manage the decline in happiness from loneliness during the pandemic lockdown by administering treatments that mitigate somatic symptoms and psychological distress in concerned clients.

Introduction

The world has never been the same since the Corona Virus Disease (COVID-19) outbreak in Wuhan, China, in December 2019. Although COVID-19 is no longer a global health emergency (United Nations, 2023), the disease caused the death of almost seven million people worldwide, with close to three million in America, almost two million in Europe and less than 300,000 recorded in Africa (Worldometers, 2023). During the first wave of the pandemic spanning between March and June 2020, many countries of the world adopted preventive strategies to curtail the virus, which included social distancing, increasing personal hygiene, quarantine measures and total or partial lockdown of social, economic, and religious activities (Kavoor et al., 2020). By mid-March of 2020, countries in Europe and America had advocated both personal (e.g. cough etiquette, wearing of face masks or respirators, hand hygiene) and environmental protective measures such as regular cleaning of frequently used clothes, objects and surfaces, ensuring proper ventilation and reducing object sharing (Alemanno, 2020; Schuchat, 2020).

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Data Availability Statement included at the end of the article

In Africa, many countries locked down major public life sectors, including schools, religious centres, offices, government functions, international and local travels, community shopping centres and markets by the end of March 2020 (Kuehn, 2021). Specifically in Nigeria, the total lockdown was enforced on March 30, 2020, and lasted 35 days, with another 8 months of partial lockdown (Ajimotokan and Ezigbo, 2021; Onuh, 2021). During these periods, citizens were restricted to the perimeter of their houses and expected to procure groceries on days designated by the government. Switching to remote work became necessary, and individuals must adapt to a new life condition characterised by reduced social contacts and increased social isolation.

As most African cultures are majorly collectivists, where communal relationships, interdependence and the "we" consciousness are prioritised over individualistic, privacy and "I" consciousness common in most Western cultures (Kim et al., 1994), the disruption in social relationships brought about by the COVID-19 lockdown measures heightened impact on the mental health of the people (Oginni et al., 2021). The pandemic social restriction limits the ability of many Africans, and especially Nigerians, to meet their psychological, social and economic needs as daily living and survival are largely dependent on social relations and inter-connectedness (Chukwuorji and Iorfa, 2020; Olawa et al., 2022). Social isolation and loneliness during the pandemic lockdown were partly associated with the high occurrence of suicidal attempts and suicide recorded in Nigeria during the initial phase of the pandemic lockdown (Chukwuorji and Iorfa, 2020). Although it is established that loneliness has adverse effects on the mental health and wellbeing of vulnerable individuals during "normal" times (Kearns et al., 2015; Mann et al., 2017), however, given that the pandemic lockdown is an unusual occurrence shutting down public life across the general population at the exact moment in time, it provides a unique context for researchers to examine the mechanism by which loneliness associate with individuals' subjective wellbeing.

Loneliness, which is defined as "the cognitive awareness of a deficiency in one's social and personal relationships, and ensuring affective reactions of sadness, emptiness, or longing" (Asher and Paquette, 2003), is usually one of the consequences of social isolation (Taylor, 2020). It is an adverse emotional condition emanating from perceived deficiencies in one's social and interpersonal relationships (Russell et al., 1984). According to the Evolutionary Theory of Loneliness (Cacioppo and Cacioppo, 2018), loneliness and social isolation are associated and may perpetuate and strengthen each other over time. However, not every socially isolated individual is lonely, and not every lonely individual is socially isolated (Ernst et al., 2022). This is because social isolation tends to specifically refer more to an objective decline in the *quantity* of contacts available for social interaction, while loneliness emphasises a subjective decrease in the *quality* of people around needed for intimacy, affection or conflict (Cacioppo et al., 2014). In a very recent systematic review of 27 longitudinal studies on loneliness, research showed that loneliness was higher among people during the pandemic times than in the pre-pandemic periods (Ernst et al., 2022).

Happiness - which refers to a hedonic experience and the affective component of subjective wellbeing (Gamble and Gärling, 2012) - is shown to be directly associated with loneliness at the turn of the COVID-19 lockdown. For instance, (Stieger et al., 2021) documented that increased levels of loneliness were associated with lower levels of happiness among Australian adults during the first phase of the lockdown. Also, (Datu and Fincham, 2022) provided similar results where loneliness and happiness were negatively correlated among American and Filipino university students. Other studies carried out during the pandemic lockdown have also reported similar findings in large surveys among adult samples from German (Lepinteur et al., 2022), American (Hamermesh, 2020) and Dutch populations (Sprekelmeyer, 2022) and tertiary education students in the Philippines (Tus et al., 2021). Among school teachers in Turkey, however, (Karakose et al., 2022) reported that an increase in loneliness was associated with increased happiness in post-lockdown and quarantine, and this relationship was mediated by internet addiction. The study adduced the positive relationship between loneliness and happiness to spending more quality time with immediate family members during the pandemic (Karakose et al., 2022).

The self-determination theory supports the association between loneliness and happiness (Ryan and Deci, 2000). SDT posits that the three basic needs of relatedness, autonomy and competency are fundamental for attaining emotional wellness, which includes happiness and life satisfaction. More importantly, the need for relatedness, which refers to having close and meaningful bonds with others, is shown to be essential for happiness (Callea et al., 2019). Given the restrictive social interaction and the limits to meeting relatedness needs during the lockdown, it is expected that many individuals would have suffered from low happiness due to feelings of loneliness (Bucher et al., 2019). However, the relationship between loneliness and happiness may go beyond the inability to meet relatedness or social needs as proposed in the evolutionary theory of loneliness (ETL), the bottom-up theory of subjective wellbeing (Diener, 1984) and the psychoanalytic perspective (presented in the succeeding paragraphs). Based on these theories and the empirical evidence in the research literature, the present study proposes that the negative influence of loneliness on happiness during the pandemic lockdown may occur via somatic symptoms and psychological distress. In other words, feeling lonely during the

pandemic may not in itself make one vulnerable to low happiness, but that loneliness can predispose to increased psychological distress and somatic symptoms and, in turn, reduced happiness.

Association of loneliness with somatic symptoms and psychological distress

Somatic symptoms may refer to "medically unexplained" physical symptoms or complaints which are not limited to headaches, stomach pain, back pain, constipation and dizziness (Kroenke et al., 2002), while psychological distress usually means the presence of both anxiety and depressive symptoms (Kessler et al., 2002). The ETL explains the associations of loneliness with somatic symptoms and psychological distress (Cacioppo and Cacioppo, 2018). The ETL posits that loneliness has enduring consequences on physical (that is, somatic symptoms) and mental health outcomes (that is, psychological distress). Loneliness deprives the individual of the primary behavioural adaptation needed for protection from scarcity of resources and the threat of predation (Silk, 2021). In other words, loneliness denies the individual the security and comfort sociality brings (Hutten et al., 2021) and afterwards perpetuates emotional stress. In order to compensate for this denial, the individual becomes hyper-vigilant (Meng et al., 2020) and then ruminates over negative social expectations, which further perpetuates vulnerability to mental and physical health risks in the long run (Cacioppo and Cacioppo, 2018). The assumptions of the ETL imply that loneliness makes individuals vulnerable to increased psychological distress and somatic health problems. There is substantial empirical evidence associating high loneliness with high psychological distress and somatic symptoms before (Hutten et al., 2021) and during the lockdown (Werner et al., 2021).

Association of somatisation and psychological distress with happiness

The links of somatisation and psychological distress with happiness can be understood using the bottom-up theory of subjective wellbeing proposed by Diener, 1984. The theory opines that unpleasant objective life conditions such as job loss, health stressors, pandemic lockdown, war, family discord and general stressful life circumstances can negatively affect subjective wellbeing (for example, happiness). Given that unpleasant life conditions are associated with psychological distress (Hassanzadeh et al., 2017) and somatic symptoms (Shahini et al., 2021), happiness is expected to be theoretically related to somatic symptoms and psychological distress. Hence, the more individuals are distressed and somaticised from negative life circumstances, the less they would feel happy. Empirical evidence shows that higher levels of somatic symptoms (Garaigordobil, 2015) and psychological distress (Olawa and Idemudia, 2023) relate to lower happiness.

Association between somatic symptoms and psychological distress

From the psychoanalytic perspective, somatisation is "a conversion of emotional stress into somatic stress" (Clarke et al., 2008). From this perspective, psychological distress mediates somatic symptoms (Mostafaei et al., 2019). This is confirmed in a study where 66% of participants attributed psychological distress or a combination of psychological and physical problems as the source of their somatic complaints (Hoedeman et al., 2010). Also, (Clarke et al., 2008) showed that almost 60% of patients with anxiety or depression reported greater somatisation than 29.6% of those with somatisation reporting increased anxiety or depression. These imply that somatisation and psychological distress may have a reciprocal influence on each other, with the latter having a greater influence on the former. Moreover, (Davern and O'Donnell, 2018) showed that the two variables are more than moderately correlated.

The Present Study

Based on the theoretical and empirical accounts showing that (1) loneliness and happiness are associated, (2) loneliness is linked with somatisation and psychological distress, (3) somatisation and psychological distress are associated with happiness, and (4) somatic symptoms and psychological distress are related, the present study proposes that loneliness and happiness may be indirectly related through somatic symptoms and psychological distress. While it is known that loneliness and happiness are related outside and during pandemic conditions (Akdoğan and Çimşir, 2019; Lepinteur et al., 2022; Satici et al., 2016; Sprekelmeyer, 2022; Stieger et al., 2021), the research literature is yet to demonstrate the mechanism by which these two variables are associated before, during and after the pandemic. To our knowledge, only (Karakose et al., 2022) provided evidence that internet addition significantly mediated the positive relationship between loneliness and happiness. Increased loneliness was shown to be positively associated with increased internet addiction, leading to increased happiness. However, given that the study found a positive relationship between loneliness and happiness (which is generally inconsistent with past findings), it does not contribute to our understanding of the pathways by which loneliness adversely impacts happiness. Hence, there is a need for further research to explicate the intervening factors in the detrimental impact of loneliness on happiness, especially during the pandemic lockdown.

Study objectives and hypotheses

Based on this gap, the present study examines the indirect roles of somatisation and psychological distress in the relationship between loneliness and happiness. It is hypothesised that:

(1) Loneliness and happiness will be indirectly associated through psychological distress,
(2) Loneliness and happiness will be indirectly related through somatic symptoms,
(3) Loneliness and happiness will be indirectly associated serially through psychological distress and somatic symptoms.

The outcomes of this study will significantly contribute to the research literature by demonstrating the indirect roles of psychological distress and somatic symptoms in the loneliness-happiness relationship during the pandemic.

Method

Sample and procedure

Cross-sectional data were collected from 538 participants (consisting of 42.8% females) residing in Nigeria with an average age of 36.48 (SD = 12.03). Using the bias-corrected method, a sample size of 500 is adequate for bootstrap tests for indirect effects (Creedon and Hayes, 2015; Tofighi and MacKinnon, 2016). Table 1 presents the complete socio-demographic data. Data consist mainly of 63.4% of adults between 18 and 39; 54.8% were married, 39.6% studied up to a degree level, 41.4% were employed in public organisations, and 48.3% were of perceived middle socioeconomic status. Only three participants (0.6%) reported being diagnosed with COVID-19, while 3.2% reported that friends and/or family members were diagnosed with the virus. Only about 10% of the sample received relief materials from the government during the lockdown.

Participants responded to an anonymous online survey created using Google Forms. Data collection spanned from April 30 to May 17 2020. About 73% (*n* = 392) responded to the survey before the end of the total lockdown on May 4 2020 (Ibrahim et al., 2020). The remaining 27% responded between 4th -17th May 2020, 2 weeks into the partial lockdown's first phase, which lasted till June 1 2020 (Ibrahim et al., 2020). At the first phase of the partial lockdown, only small-scale businesses were principally allowed to operate while maintaining bans on religious activities, social gatherings, international travel, non-essential local travel, and closures of schools, banks, most government parastatals, and imposition of curfews between 20:00 and 06:00 (BBC News, 2020). Hence, social isolation and loneliness could still be a problem during the

Table 1. Complete sample characteristics.

Variables N = 538	n (%)
Sex	
Female	230 (42.8)
Male	308 (57.2)
Age (years)	
18-28	173 (32.2)
29-39	168 (31.2)
40-50	109 (20.3)
>50	88 (16.4)
Marital status	
Unmarried	243 (45.2)
Married	295 (54.8)
Education	
First degree/Higher Diploma	237 (44.1)
Masters	140 (26)
PhD	95 (17.7)
Others	66 (12.3)
Employment	
Public employment	223 (41.4)
Private employment	99 (18.4)
Self-employed	73 (13.6)
Student	89 (16.5)
Unemployed	54 (10)
Perceived SES	
Very low	19 (3.5)
Low	68 (12.6)
Low middle	102 (19)
Middle	260 (48.3)
High middle	70 (13)
High	19 (3.4)
Household size	
Living alone	23 (4.3)
2-4	162 (30.1)
5-7	288 (53.5)
>7	65 (12.1)

first phase of the partial lockdown. The Institutional Review Board of Authors' institutional affiliation provided ethical clearance for the study. All participants provided written informed consent.

Measures

Independent variable. The UCLA 3-Item Loneliness Scale developed by Hughes et al. (2004) was used in assessing loneliness. The 3-item loneliness measure is a short version of the R-UCLA Loneliness Scale with 20 items (Russell et al., 1980). The UCLA 3-Item Loneliness Scale is easier to administer in large surveys, given its brevity and as valid and reliable as the R-UCLA Loneliness Scale (Hughes et al., 2004). Participants were asked to rate their feelings in response to the items using a 3-point scale ranging from

hardly ever (1) to *often* (3). The items are: "*First, how often do you feel that you lack companionship time?*", "*How often do you feel left out?*" and "*How often do you feel isolated from others?*" The UCLA 3-Item Loneliness Scale is a valid measure of loneliness within the Nigerian context (Olawa and Idemudia, 2020). An internal consistency coefficient of 0.78 was obtained for the scale in the current study. High scores indicate high feelings of loneliness.

Intervening variables. Somatic symptoms were measured using the 15-item Patient Health Questionnaire (PHQ-15). The PHQ-15 is one of the five subscales of the Primary Care Evaluation of Mental Disorders used in measuring the risk of developing somatoform disorders (Kroenke et al., 2002). The scale asks participants whether they are bothered about experiencing somatic problems such as headaches, stomach pain, back pain, constipation and dizziness within the last 7 days. The PHQ-15 is a valid measure of somatic symptoms within the Nigerian context (Ogunsemi et al., 2020). An internal consistency coefficient of 0.91 was obtained for the PHQ-15 in the current study.

Psychological distress was evaluated using the Kessler Psychological Distress Scale (Kessler et al., 2002). K10 is a 10-item measure of non-specific psychological distress on a 5-point scale, with *none of the time* scored as *1* and *all of the time* scored as *5*. The items ask participants about negative feelings such as nervousness, depression, hopelessness, and restlessness during the past 30 days. (Igwe et al., 2016) demonstrated the usefulness of the scale within the Nigerian setting. An internal consistency coefficient of 0.86 was obtained for the K10 in the current study. High PHQ-15 and K-10 scores reflect greater somatic symptoms and psychological distress, respectively.

Dependent variable. Happiness was assessed using the Happiness Measures (HM) developed by (Fordyce, 1988). The HM assesses the affective component of subjective wellbeing, often called happiness (Arthaud-day et al., 2005). The HM was utilised in this study because it is a general measure of happiness (Fordyce, 1988), very brief to administer, is free of race bias, and contains a negative and a positive pole of happiness, unlike other happiness measures (Slezackova et al., 2018). The scale has two parts or two questions: the first part measures general happiness and asks participants to rate how happy they are on an 11-point scale ranging from *extremely unhappy* (0) to *extremely happy* (10). The second part examines the percentage of time individuals felt unhappy, neutral, and happy. The current study only utilised Part 1 of the HM because it is less common to report the addition of the scores from the second part (Jarden, 2011). After reviewing 20 wellbeing and happiness measures, (Diener, 1984) concluded that the HM is a valid and reliable measure of happiness that "should receive more widespread use" (p. 549). A single-item

measure of happiness is as cross-culturally valid and reliable as a multiple-item measure of happiness and life satisfaction (Abdel-Khalek, 2006).

Socio-demographics. Besides the structured psychological instruments, participants also answered socio-demographic questions, which include sex, age, marital status, educational attainment, employment status, perceived socioeconomic status and COVID-19 diagnosis.

Statistical analyses

Analyses of socio-demographic data and bivariate associations were computed using IBM SPSS software (20.0). The analysis of indirect effect was carried out in IBM SPSS AMOS 28. Model estimation was done using the maximum likelihood (ML) method. As shown in Table 1, data distribution does not deviate from moderate univariate and multivariate normality. Skewness and kurtosis scores do not exceed the thresholds of 3 and 5, respectively (Byrne, 2010; Kline, 2011). Three models were tested: the *parallel model* (Figure 1), the *serial model A* (Figure 2) and the *serial model B* (Figure 3). The parallel model evaluated the indirect effect of loneliness on happiness through psychological distress and somatic symptoms. The indirect effect of loneliness on happiness through the successive paths from psychological distress to somatic symptoms was estimated in serial model A, while the successive path from somatic symptoms to psychological distress was estimated in serial model B. All significant socio-demographic variables in bivariate analyses were treated as control variables in the models. Statistical significance was determined at $p < .05$.

Results

Bivariate relationships among continuous variables

The results of bivariate relationships among study variables with socio-demographics are presented in Table 2. Loneliness was positively associated with psychological distress [$r = 0.42$, $p < 0.001$] and somatic symptoms [$r = 0.23$, $p < 0.001$], and negatively associated with happiness [$r = -0.29$, $p < 0.001$]. Somatic symptoms [$r = -0.22$, $p < .001$] and psychological distress [$r = 0.41$, $p < 0.001$] were negatively related to happiness. There was a positive association between somatic symptoms and psychological distress [$r = 0.42$, $p < 0.001$].

Bivariate relationships between socio-Demographic and continuous variables

In addition, results indicated that most of the socio-demographic variables were related to the study's focal
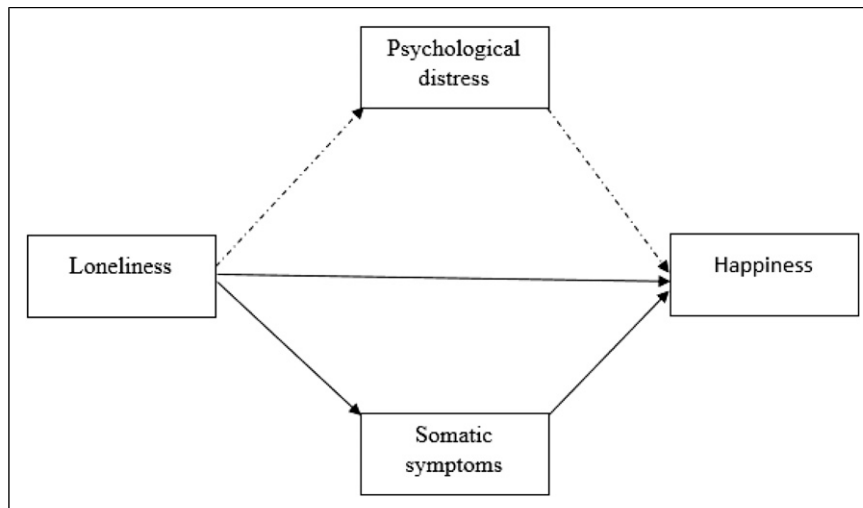
Figure 1. Parallel model. Note: the indirect effect through psychological distress is shown in broken lines, while the indirect effect through somatic symptoms are indicated in unbroken lines.
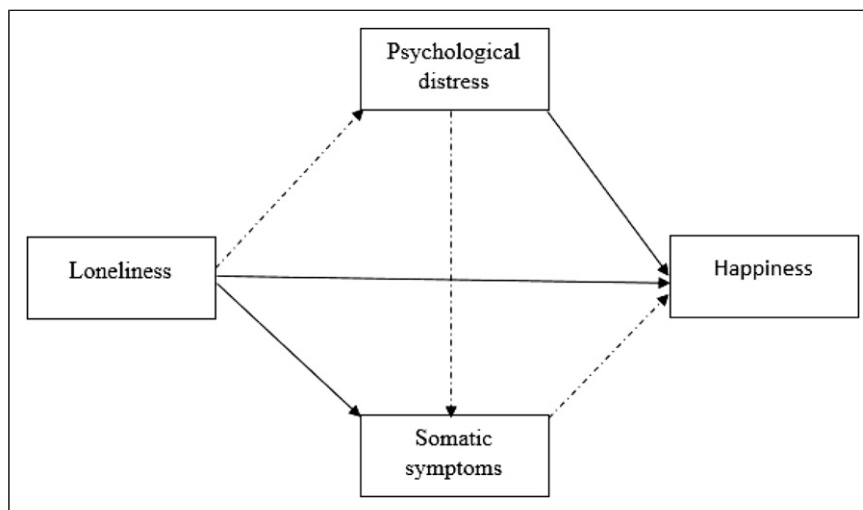

Figure 2. Serial model A. Note: the indirect effect through the successive paths from psychological distress to somatic symptoms are indicated in broken lines.

variables. Being female was associated with somatic symptoms (r_{pb} = -0.20, p < 0.001) and psychological distress (r_{pb} = –0.13, p = 0.002). Being unmarried was related to loneliness (r_{pb} = –0.23, p < 0.001), somatic symptoms (r_{pb} = -0.09, p = 0.04) and psychological distress (r_{pb} = -0.23, p < 0.001) while being married was associated with happiness (r_{pb} = .13, p = 0.002). Having less than a PhD degree was associated with loneliness (r_{pb} = .14, p = 0.002) and psychological distress (r_{pb} = .14, p = 0.001) while having a PhD degree was related with happiness (r_{pb} = .11, p = 0.01), albeit all at weak levels. Not being a government employee was associated with loneliness (rpb = -0.18, p < .001), somatic symptoms (rpb = –0.12, p = 0.008) and psychological distress (rpb = -0.19, p < 0.001) while being a government employee was related with happiness (rpb = .10, p = 0.01), though at a very weak level. Younger age was found to associate with psychological distress [r = –0.30, p < 0.001] and loneliness [r = -0.22, p < 0.001]. Perceived socio-economic status correlated positively with happiness [r = 0.13, p = 0.003] and negatively with loneliness [r = –0.19, p < 0.001] and psychological distress [r = -0.11, p = 0.009]. However, household size and the time of data collection were not associated with focal variables, thus showing that data collection at both total and partial lockdown periods did not vary with participants' responses.
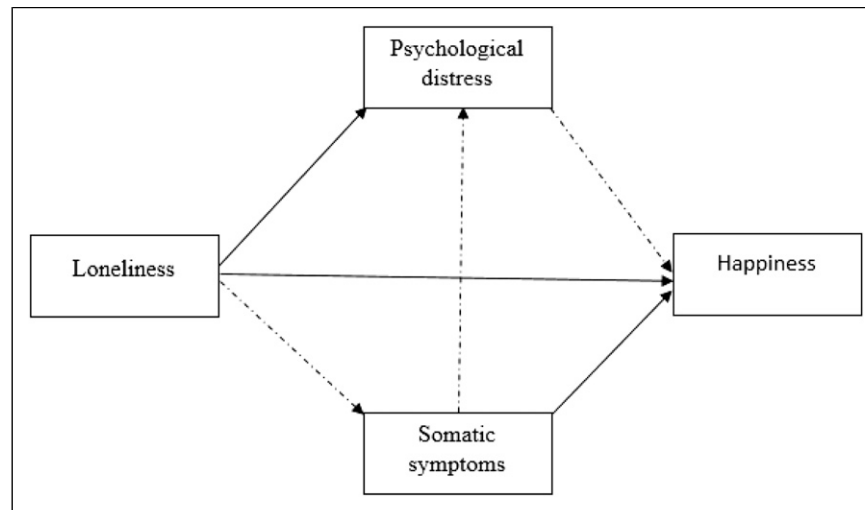
Figure 3. Serial model B. Note: the indirect effect through the successive paths from somatic symptoms to psychological distress are indicated in broken lines.

Table 2. Bivariate correlations and descriptive statistics.

N = 538	1	2	3	4	5	6	7	8	9	10	11
Sex (1)											
Time (2)	−0.10*										
Marital status (3)	0.08	−0.13**									
Education (4)	0.08	−0.01	0.30**								
Employment (5)	−0.03	0.004	0.47**	0.43**							
Age (6)	0.13	−0.09*	0.69**	0.42**	0.43**						
Number in household (7)	−0.08	0.03	−0.13**	0.001	−0.06	−0.08					
Perceived SES (8)	0.01	0.03	0.27**	0.24**	0.21**	0.28**	−0.10*				
Loneliness (9)	−0.02	−0.03	−0.23**	−0.14**	−0.18**	−0.22**	0.02	−0.19**			
Happiness (10)	0.02	−0.02	0.13**	0.11*	0.10*	0.10*	−0.003	0.13**	−0.29**		
Somatic symptoms (11)	−0.20**	−0.03	−0.09*	−0.04	−0.12**	−0.06	0.07	−0.05	0.23**	−0.22**	
Psychological distress (12)	−0.13**	−0.03	−0.23**	−0.14*	−0.19**	−0.30**	0.10*	−0.11**	0.42**	−0.41**	0.42**
Mean						36.48	5	3.65	4.75	7.05	19.17	14.89
SD						12.03	3	1.08	1.57	1.9	5.54	5.31
Range						18-80	1-15	1–6	3-9	0–10	14–41	9–35
Skewness						0.55	1.7	−0.39	0.45	−0.78	1.47	1.16
Kurtosis (multivariate Kurt = 4.81)						−0.47	7.14	0.14	−0.65	0.88	1.80	1.01

**Correlation is significant at the 0.01 level (2-tailed); *Correlation is significant at the 0.05 level (2-tailed).
Gender (0 = male, 1 = female); Time (0 = total lockdown, 1 = partial lockdown); Marital status (0 = unmarried, 1 = married); Education (0 = others, 1 = Ph.D. degree); Employment (0 = others, 1 = Public employment).

Structural model

Figure 4 indicates the serial and parallel indirect roles of psychological distress and somatic symptoms in the relationship between loneliness and happiness. As shown in Table 3, the model met the acceptable cut-offs for model fit. The paths from loneliness to psychological distress ($\beta = 0.29$, $p < 0.001$) and somatic symptoms ($\beta = 0.23$, $p < 0.001$) were all significant with the same beta weights for the parallel model

and the serial model B. The beta weights for paths from loneliness to psychological distress and somatic symptoms in the serial model A were ($\beta = 0.37$, $p < 0.001$) and ($\beta = 0.08$, $p = 0.08$), respectively. The path from loneliness to happiness was also significant ($\beta = 0.13$, $p = 0.004$). While psychological distress ($\beta = -0.35$, $p < 0.001$) was significant on happiness, somatic symptoms ($\beta = -0.05$, $p = 0.24$) was not. The bi-directional paths between psychological distress and somatic symptoms were also significant [($\beta = 0.39$, $p < 0.001$) versus
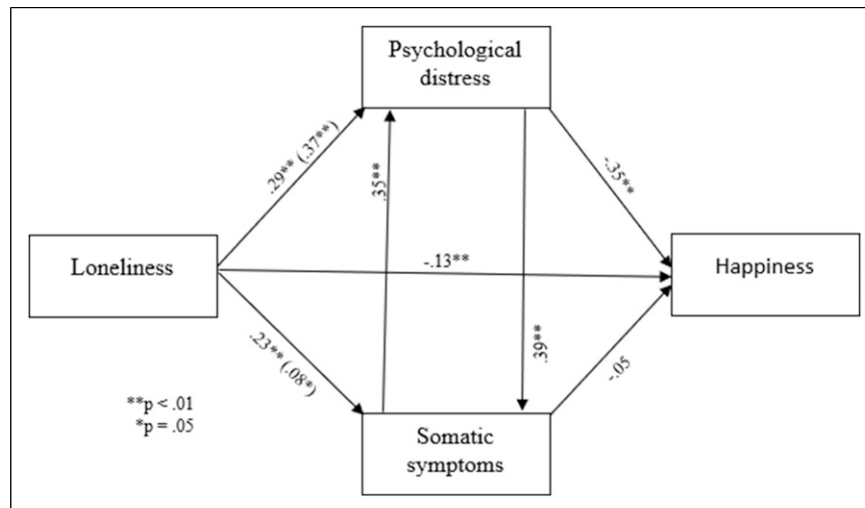
Figure 4. Parallel and serial indirect effects by psychological distress and somatic symptoms. Note: Beta weights in parenthesis indicate the only changes in estimates for the serial inidre from psychological distress to somatic symptoms. Beta weights for demographic variables were not included in the model for better clarity.

Table 3. Standardised indirect effects.

	5000-Sample Bootstrapping
Parallel indirect effect	
Loneliness → PD → happiness	−0.16 (−0.23, −0.10)
Loneliness → SS → happiness	−0.02 (−0.04, 0.01)
Serial indirect effect	
Loneliness → PD → SS → happiness	−0.01 (−0.03, 0.01)
Loneliness → SS → PD → happiness	−0.04 (−0.06, −0.02)

($\beta = 0.35$, $p < .001$)]. Sex and age were found to be significant in the structural model. Sex was significant on somatic symptoms ($\beta = –0.20$, $p < 0.001$) while age was significant on psychological distress ($\beta = –0.22$, $p < 0.001$) and happiness ($\beta = –0.12$, $p = 0.04$). Marital status was not significant on somatic symptoms ($\beta = -0.03$, $p = 0.54$), psychological distress ($\beta = –0.03$, $p = .61$) and happiness ($\beta = 0.01$, $p = 0.92$). Other socio-demographic variables (type of employment type, education and perceived socioeconomic status) significant in the bivariate analyses were not significant in the structural model.

Indirect roles analyses. Establishing an indirect effect involves observing significant effects for both indirect and total effects in a SEM model (Preacher and Hayes, 2004). The standardised total effects in the three models were significant ($\beta = 0.27$, $p < 0.001$). Table 3 presents the 95% bias-corrected confidence intervals for unstandardised indirect effects with 5000 bootstrap samples. For the *parallel indirect model*, results showed that psychological distress partially and significantly accounted for the association between loneliness and happiness ($B = –.16$ [–0.23, –0.10]), given that the confidence interval (CI) did not pass through

zero. Conversely, somatic symptoms did not account for the association between loneliness and happiness ($B = –0.02$ [–0.04, 0.01]) because the CI passed through zero.

In *serial model A*, the successive paths from psychological distress to somatic symptoms ($B = -0.01$ [–0.03, 0.01]) did not significantly account for the association between loneliness and happiness. In *serial model B*, on the other hand, the successive paths from somatic symptoms to psychological distress ($B = –0.04$ [-0.06, –0.02]) significantly and partially accounted for the association between loneliness and happiness since the CI did not pass through zero.

Discussion

Literature suggests that loneliness is associated with lower happiness levels during the COVID-19 pandemic (Hesse et al., 2021; Stieger et al., 2021). However, little is known about the mechanisms underlying this association. Based on the existing theoretical postulations and the empirical evidence in the literature, the present study assumed that loneliness and happiness can be indirectly associated

through psychological distress and somatic symptoms. Hence, this study investigated the parallel and the serial indirect effects of psychological distress and somatic symptoms on the relationship between loneliness and happiness.

Outcomes of bivariate analyses showed that all focal variables are linked in the anticipated directions. High loneliness was related to low happiness levels, greater distress and somatic symptoms. Loneliness appears to be more associated with psychological distress than somatic symptoms and happiness. Also, high psychological distress and somatic symptoms were related to low happiness. Happiness tends to be more connected with psychological distress than somatic symptoms.

Further, greater levels of psychological distress were related to high levels of somatic symptoms at a moderate level. These results corroborate previous works that showed that loneliness significantly influences happiness (Hesse et al., 2021), psychological distress and somatic symptoms during the lockdown (Werner et al., 2021). It also provides credence to studies that showed that somatic symptoms and distress levels impact low happiness (Garaigordobil, 2015; Olawa and Idemudia, 2023). The positive association between somatic symptoms and psychological distress supports previous findings (Davern and O'Donnell, 2018; Mostafaei et al., 2019).

The results of parallel indirect relationships were mixed. First, they suggest that loneliness and happiness are associated partly via psychological distress. This finding implies that an increase in loneliness relates to an increase in psychological distress, which in turn associates with low happiness. In other words, one of the ways loneliness may reduce the feelings of happiness in individuals is to increase the levels of psychological distress. This notable finding helps fill the gap in the SDT (Ryan and Deci, 2000), which needs to explicitly explain the pathway by which low levels of social interaction with others can lead to low happiness and life satisfaction. According to the current finding, loneliness is not just directly associated with happiness, but it can do so by making the individual vulnerable to feelings of distress. Second, the results did not confirm the indirect role of somatic symptoms. Although it is established that loneliness impacts somatic symptoms (Cacioppo and Cacioppo, 2018; Hutten et al., 2021) and that somatic symptoms influence happiness (Garaigordobil, 2015), the current study data do not support the proposition that loneliness affects happiness by predisposing to somatisation.

Third, the outcomes of the serial indirect relationships were varied. Contrary to expectation, we did not confirm the proposition that the association between loneliness and happiness will flow from psychological distress to somatic symptoms. Although in the indirect serial chain, loneliness was found to be significantly related to psychological distress, and psychological distress was significantly associated with somatic symptoms, it is realised that in the final chain, somatic symptoms did not form a significant association with happiness. This implies that somatic symptoms may not be a good predictor of happiness from psychological distress. Instead, results showed that loneliness and happiness might be associated via the successive paths from somatic symptoms to psychological distress. These suggest that greater levels of loneliness are associated with higher somatic symptoms and then high psychological distress, which relates to low happiness levels. The novelty in this finding is that loneliness may predispose individuals to somatic problems during the pandemic, which may further increase levels of psychological distress and low happiness. This outcome knits previous findings that documented that loneliness impacts somatic symptoms (Hutten et al., 2021; Werner et al., 2021), that somatic symptoms can predict a high level of distress (Clarke et al., 2008), and that increased psychological distress can lower happiness levels (Olawa and Idemudia, 2023).

Study limitations and future research direction

Despite the significant contributions of this study to understanding the mechanism through which loneliness relates to happiness, it is essential to point out its three major limitations. As the study utilised a cross-sectional approach in its framework, there is a limit to which cause-effect relationships can be demonstrated among study variables. Hence, the relationships among variables are primarily correlational. Notably, other personal and economic factors may interact with loneliness during the pandemic lockdown to predispose to low happiness, which was not examined in this study. These may include COVID-19 diagnosis, fear of COVID-19, personality traits, coping skills, job loss and income reduction caused by the pandemic. Also, findings should be interpreted within the context of the pandemic lockdown, given that no available data suggests that the results regarding the indirect relationships among variables would apply during regular times. This is because loneliness at "normal" times is usually onset by individuals' specific life conditions which is in contrast to the pandemic context where there was an entire lockdown of public life in the general population.

Further, data was collected online, with 88% of participants having a formal education. Extending the applicability of findings to individuals with no formal education and no internet access may be limited, given that this population segment constitutes a significant part of the Nigerian populace (Erunke, 2021). Future studies can utilise the longitudinal approach and target a more diverse sample to demonstrate results over time.

Conclusion

This study demonstrates that loneliness and happiness during the pandemic lockdown may be indirectly associated

via psychological distress and the successive link between somatic symptoms and psychological distress. High loneliness is associated with high psychological distress and, in turn, low happiness. Also, greater loneliness is associated with increased somatic symptoms, which relates to greater psychological distress and then low happiness levels. These findings have important implications for clinicians in managing the decline in happiness due to feelings of loneliness during the pandemic lockdown. One way to do this is by administering treatments that mitigate somatic symptoms and psychological distress in concerned clients, such as cognitive-behavioural therapy (Nakao, 2017). Individuals can also utilise self-guided cognitive behavioural therapy and mindfulness-based therapy to manage somatic symptoms and psychological distress during pandemic times (Kurlansik and Maffei, 2016; Young et al., 2022).

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