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# The role of cognitive flexibility and hope in the relationship between loneliness and psychological adjustment: a moderated mediation model

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## ABSTRACT

**Objectives:** The COVID-19 pandemic caused people to suffer from secondary problems such as social isolation and loneliness as well as experiencing anxiety about catching and spreading the virus. Existing research emphasizes the roles of cognitive flexibility and hope for psychological adjustment but the mediating and moderating mechanisms have not yet been researched widely. Therefore, this study examined whether hope mediated the relationship between loneliness and psychological adjustment problems and whether cognitive flexibility moderated this mediation effect of hope in the relationship between loneliness and psychological adjustment problems during the COVID-19 pandemic curfew in Turkey.

**Methods:** A total of 512 Turkish students and young adults completed UCLA Loneliness Scale, Brief Psychological Adjustment Scale, Dispositional Hope Scale, and Cognitive Flexibility Inventory for this cross-sectional study.

**Results:** The results indicated that loneliness had a significant and positive predictive effect on the psychological adjustment problems and that this relationship was partially mediated by hope. Further, psychological flexibility moderated the relationship between loneliness and hope.

**Conclusions:** The current study contributes a better understanding of the influence of loneliness on psychological adjustment, especially during the COVID-19 curfew period.

## KEY POINTS

### What is already known about this topic:

- (1) Loneliness is positively associated with psychological adjustment problems.
- (2) Hope proved to play an important role in psychological adjustment during the COVID-19 pandemic.
- (3) Cognitive flexibility is positively related to hope.

### What this topic adds:

- (1) Hope mediates the relationship between loneliness and psychological adjustment problems during the COVID-19 curfew.
- (2) The association between loneliness and hope is moderated by cognitive flexibility, such that the association becomes weaker for those who report higher levels of cognitive flexibility.
- (3) The indirect effect of loneliness on psychological adjustment problems via hope is conditional on the levels of cognitive flexibility.

## ARTICLE HISTORY

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## KEYWORDS

Loneliness; hope; cognitive flexibility; psychological adjustment; COVID-19

The Covid-19 process and the accompanying social isolation have raised concerns about the prevalence of loneliness, hopelessness, and accompanying psychological problems (Horigian et al., 2021; Levere et al., 2021) all over the world. In the Republic of Turkey, a high number of people have been infected and died due to Covid-19. When this study started on 10 May 2021, the Ministry of Health reported that there were 5.044.936 cases and 43.311 deaths in Turkey (Presidency of the Republic of Turkey, 2021). To control the spread of the virus, the Turkish government took several measures to promote social distancing, as well

as imposing a comprehensive curfew on citizens with the exemption of certain groups working in fields such as health, production, sanitation from April 29 to May 1 (Republic of Turkey Ministry of Health, 2021). Although its effects may change depending on some sociodemographic variables, the pandemic and related restrictions and preventive measures had serious impacts on public mental health both in Turkey (Altındag et al., 2020; Ozdin & Bayrak Ozdin, 2020) and other countries (Elmer et al., 2020). A study carried out by Varga et al. (2021) using a large international sample of more than 200,000 participants, showed that in four Western and

Northern European countries, individuals responded psychologically in similar ways to the pandemic and related preventive measures despite differences in government approaches. The main outcomes of the study were loneliness, anxiety, and COVID-19-related worries and precautionary behaviours. Arslan (2021) reported that loneliness negatively affect the psychological adjustment of university students in Turkey during the pandemic, though there were protective factors such as subjective vitality and college belongingness. This also indicates that not everyone who is experiencing the same social conditions in the pandemic will respond to loneliness in the same way. Previous research has shown that protective factors such as individual resilience and social support helped people to maintain mental health in pandemic-related situations (Grey et al., 2020; Vos et al., 2021). It is critical to understand protective emotional and cognitive factors that may prevent feelings of loneliness from developing into psychological adjustment problems. The purpose of the current study is to investigate whether hope mediates the association of loneliness with psychological adjustment problems, whether the influence of loneliness on hope is moderated by psychological adjustment problems, and whether cognitive flexibility moderates the mediating effect of hope in the relationship between loneliness and psychological adjustment problems during curfew in Turkey.

### Loneliness and psychological adjustment problems

Loneliness describes one's negative emotional experiences related to inadequacy both quantitatively, such as not having enough friends in social networks, and qualitatively, such as lack of closeness in relationships (Russell et al., 1984). According to Hawkley and Cacioppo (2010), loneliness is a distressing emotion since feelings of unsafety accompany it. For humans, social bonding has a survival value, and the need for the social bond has evolutionary origins. In case of social isolation, feelings of unhappiness, stress, insecurity, and increased vigilance to threats are triggered which activate several physiological and behavioural mechanisms that are detrimental to mental and physical health (Cacioppo et al., 2006). Indeed, loneliness is associated with physical health, life expectancy, and mortality (Hawkley et al., 2003; Holt-Lunstad et al., 2010; Stokes et al., 2021) as well as many psychological problems such as depression, anxiety, stress, hopelessness, suicidal thoughts, and low quality of life (Klein et al., 2021; McClelland et al., 2020; Rumas et al., 2021;

Salgado et al., 2021). Research conducted during this period revealed an increase in loneliness and psychological problems related to the pandemic (Baarck et al., 2021; Groarke et al., 2021; Killgore et al., 2020; Lee et al., 2020). Besides several variables including increased social media use (Rumas et al., 2021), social demographic characteristics (ie, age, gender, financial state, household type, health status) (Baarck et al., 2021), and perceived social support (Bareket-Bojmel et al., 2021) seem to contribute to loneliness during the pandemic. Therefore, in the study, it was expected that loneliness was related to increased psychological adjustment problems.

### The mediating effect of hope

Snyder et al. (2002) described hope as a "positive motivational state" which requires two thinking processes: 1) the perceived ability to plan alternative ways to attain desired goals or pathways thinking and 2) the perceived ability to use pathways thinking to achieve goals or agentic thinking. They further indicated that hope was related to the belief in self, positive thoughts, better coping strategies, actions, and as a result successful goal attainment. Therefore, hope is an important contributor to psychological adjustment and plays a protective role for psychological difficulties in various risk groups. Hope predicted life satisfaction in adults (Bailey et al., 2007), greater emotional well-being in adolescents in 6 years (Ciarrochi et al., 2015). Hope, with perceived support, was negatively associated with suicidal thoughts in prisoners (Pratt & Foster, 2020). On the other hand, hopelessness is an important predictor of depression, anxiety, and suicidal thoughts and behaviour (Mullarkey & Schleider, 2020) and increases the risk of suicide in patients with psychiatric symptoms (Gooding et al., 2015).

Hope also proved to play an important role in psychological adjustment during the COVID-19 pandemic. For example, Demirtas (2021) found that increased hope and cognitive flexibility were protective factors from state anxiety in the pandemic while Genc and Aslan (2021) reported that hope, with optimism, buffered the effects of coronavirus stress on the subjective well-being of university students in Turkey. In a longitudinal study, hope predicted greater emotional well-being, emotional control, lower levels of anxiety, and COVID-19 stress in American adults in one month (Gallagher et al., 2021).

Besides, hope develops through interactions with others, and that establishing and maintaining relationships with other people is vital for one's efforts to achieve his or her goals since an individual's goals are

almost always realized in a social context (Snyder et al., 2002). Therefore, loneliness can be an obstacle for goal pursuit and influence hope negatively, as a result. Indeed, loneliness seems to be associated with hopelessness and is considered a significant predictor of it (Bonner & Rich, 1991; Chang et al., 2010; Page, 1991). It can also be said that there is a mutual interaction in the relationship between loneliness and hope. For example, in a longitudinal study, it was found that perceived social support predicted the levels of hope in university students in China throughout the year, and that perceived social support and hope interacted with each other (Xiang et al., 2020). Bareket-Bojmel et al. (2021) reported that perceived social support decreased loneliness which in turn increased loneliness in the UK, USA and Israel during the COVID-19 pandemic.

On the other hand, hope as a state of mind and motivation may exist even when one experiences loneliness. As Snyder et al. (2002) stated that high-hope people prospect on their future goals and feel decisive, certain and confident as opposed to low-hope people. Therefore, high-hope people can protect themselves psychologically by keeping their motivational state even if they feel lonely. In that respect, hope is a resilience factor and there are some supportive results. For example, Muyan et al. (2016) reported that hope levels moderated the relationship between loneliness and anxiety symptoms. Chang et al. (2019) found that the pathways aspect of hope, but no agency, diminished the effects of loneliness on anxiety and depressive symptoms, and suicidal ideation. It was also reported that hope had buffering effects in the relationship between loneliness and psychological distress during the COVID –19 pandemic (Loslo-Roth et al., Yu et al., 2019).

Based on the literature review above, loneliness was expected to be negatively related to hope, which in turn would be negatively related to psychological adjustment problems during the COVID-19 pandemic. That is, hope would mediate the relationship between loneliness and psychological adjustment problems. However, to our knowledge, little research has examined the mediating effect of hope in the relationship between loneliness and psychological adjustment problems during the pandemic and another aim of the study was to test this mediation effect of hope.

### **The moderating role of cognitive flexibility**

Cognitive flexibility is one of the variables that may explain individual differences in terms of the relationships among loneliness, hope, and psychological

adjustment. Cognitive flexibility is accepted as one of the main executive processes and characterizes the ability to adapt to varying situations, to change one's perspective on problems, events, and solutions under changing conditions and goals of the person (Diamond & Ling, 2019; Morris & Mansell, 2018). Being cognitively flexible requires "sensitivity, capacity, and inclination to detect, deliberately select and execute optimal strategy" even in uncertain situations (Yu et al., 2019). In this way, adaptive goals, thoughts, and behaviours can be adopted in stressful conditions. Diamond (2016) stated that cognitive flexibility influenced psychological problems such as depression and anxiety by affecting psychological well-being. Research has revealed supportive results. Low cognitive flexibility is associated with many problems such as stress, anxiety, and depression (Yu et al., 2020), eating disorders (Goddard et al., 2014; Roberts et al., 2007), suicide risk (Hausman et al., 2020; Miranda et al., 2012). It is also important in terms of the psychological adjustment of people experiencing different health problems (Maor et al., 2021). On the other hand, high cognitive flexibility is a protective factor. For example, a high level of cognitive flexibility is crucial for psychological well-being in adolescents who have survived earthquakes (Fu & Chow, 2017). Similarly, high cognitive flexibility protected trauma-exposed children from the long-term effects of trauma, and that these children have a higher psychological adjustment (Qouta et al., 2001). A study with pilots also revealed the stress-buffering effects of cognitive flexibility on psychological symptoms (Sung et al., 2019). The COVID-19 pandemic and related processes have created uncertainty in people's lives in many ways. This uncertainty requires adaptive thought and behaviour patterns to cope with stress and psychological adjustment problems.

Besides, cognitive flexibility is closely related to hope since both are conceptualized as goal-related processes. Cognitive flexibility is a general cognitive capacity to successfully change and select goals and strategies with the demands of the situation, whereas hope defines self-referential thoughts about goal pursuing capacity, emotions related to self and the situation, and the motivation to pursue the goal (Snyder et al., 2002). Indeed cognitive flexibility seems to play a role in the development and maintenance of hope. Studies have shown that people with low cognitive flexibility feel more hopeless (Miranda et al., 2013) and cognitive flexibility is a determining factor for a change in hopelessness in the future (Yu & Lee, 2017). Beck and Freeman (1990) argued that individuals with high hopelessness tendency continued to

be so since they were closed to counter-evidences that did not match their non-adaptive beliefs and attitudes.

Based on the above discussion, the moderator role of cognitive flexibility was tested in the study. Cognitive flexibility, as a major adjustment process, was expected to shape the effect of loneliness on hope and psychological adjustment problems. Loneliness and related psychological problems stand out as serious concerns in the COVID-19 pandemic. Developing effective intervention strategies requires detecting protective factors. Therefore, it was aimed to determine the effects of cognitive flexibility in the mediational relationship of hope between loneliness and psychological adjustment problems during the pandemic.

In the present study, we present a model testing whether loneliness would be positively related to psychological adjustment problems, whether hope would mediate the relationship between loneliness and psychological adjustment problems, whether the influence of loneliness on hope would be moderated by psychological adjustment problems and whether cognitive flexibility would moderate the mediating effect of hope on the relationship between loneliness and psychological adjustment problems during curfew in pandemy process in Turkey.

Figure 1 shows the proposed model of the study.

Based on the previous revised literature, we hypothesized that (H1) For Turkish university students and adults, loneliness is positively correlated with psychological adjustment problems during the COVID-19 curfew; (H2) Hope mediates the relationship between loneliness and psychological adjustment problems during the COVID-19 curfew; (H3) The association between loneliness and hope is moderated by cognitive flexibility, such that the association becomes weaker for those who report higher levels of cognitive flexibility; and

(H4) The indirect effect of loneliness on psychological adjustment problems via hope is conditional on the levels of cognitive flexibility.

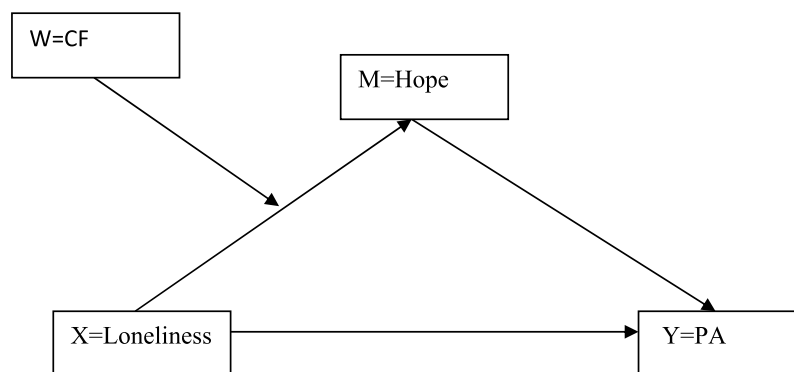
## Method

### Participants

A convenience sample of 512 Turkish young adults (73.8% women, 26.2% men) participated in the study. The mean age of participants was 23.8 ( $SD = 5.27$ ; ranging from 18 to 60). In terms of education level, 2.1% of the participants were primary 19.1% were secondary school and 29.9% were high school graduates. The rest of them reported that they were either university students (41.8%) or university graduates (7%). Of the participants, 7% defined their economic status as low, 81.6% medium, and 11.3% as high. Most of the participants reported that they were single 86.1%. Others reported that they were married (12.75%) or widowed/divorced (1.2%).

### Procedure

This is a cross-sectional study of which data were collected from a web-based survey in Turkey between 10 May and 15 May 2021 when there was a full closure (between 1–17 May) and curfew across the country. The inclusion criterion was that the participants had to be 18–60 years of age. The survey was completed on the Google Forms application and a relevant smartphone link pushed to WhatsApp student groups and other social media platforms. The members were asked to disseminate the link for participation. The participants were informed about the study aims and procedure and data confidentiality, were defined that participation was voluntary, and that consent could



**Figure 1.** The proposed model indicating the association between the variables of the study. CF= cognitive flexibility, PA=psychological adjustment problems, X =independent variable, M =mediator variable, W= moderator variable, Y = dependent variable.

be withdrawn at any time. Participants provided informed consent by clicking on the “I accept to participate in the study” button. This research was approved by the Ethics Committee of the authors’ university. This research was approved by the Ethics Committee of the authors’ university (No:E-46,409,256-300-9288).

## Measures

### UCLA loneliness scale

The UCLA Loneliness Scale (ULS-8) is an eight-item scale for measuring feelings of loneliness, which was derived from the 20-item ULS (Russell et al., 1980) by Hays and DiMatteo (1987). All items of the measure are scored based on a 4-point Likert scale from never to often. The higher scores mean a higher level of loneliness. Dogan et al. (2011) adapted the scale into Turkish culture on university students and reported that Cronbach’s alpha value of the scale was .72. Further, the scale had an adequate internal reliability estimate in the present study (.80).

### Brief psychological adjustment scale

The BASE-6 was developed by Cruz et al. (2020) and it is a self-report instrument with 6 items. Each item assesses how a participant has been feeling in the past week. A sample item is “To what extent have you felt irritable, angry, and/or resentful this week?” Higher scores mean a greater level of psychological adjustment problems. Yildirim and Solmaz (2020) investigated the psychometric properties of the BASE for the Turkish sample. They reported good internal consistency ( $\alpha = .87-.93$ ) and test-retest reliability. In the study, an instruction “Answer the following questions considering the full closure period due to the COVID-19 process” was added to the introduction part of the scale. The fit indices of the scale were re-examined with confirmatory factor analysis. Confirmatory Factor Analysis served adjustable fit indexes ( $\chi^2/df=4.45$ ,  $RMSEA=.082$ ,  $RMR=.095$ ,  $NFI=.99$ ,  $CFI=.99$ ,  $GFI=.98$ ). In the present study, Cronbach’s alpha value was .90 for the total scale.

### Dispositional hope scale

Dispositional Hope Scale was developed by Snyder et al. (1996) and adapted into Turkish by Tarhan and Bacanlı (2015). Twelve items were gathered under two factors. The scale also gives a total dispositional hope point. Higher scores mean higher dispositional hope. Internal consistency coefficient was found .84 with good re-test reliability. In the present study Cronbach’s alpha value was .88.

### Cognitive Flexibility Inventory (CFI)

Cognitive Flexibility Inventory was developed by Dennis and Vander Wal (2010) to assess a person’s ability to generate multiple solutions to difficult situations and to perceive difficult situations as controllable with 20 items. Each statement was rated on a scale ranging from 1 (strongly disagree) to 5 (strongly agree) Higher scores indicate greater cognitive flexibility. The inventory had a reliable two-factor structure named alternatives and control. Dennis and Vander Wal (2010) reported Chronbach’s alpha value, for the Alternatives subscale (Time 1 = .91 ; Time 2 = .91), Control subscale (Time 1 = .86; Time 2 = .84), and total CFI (Time 1 = .90 ; Time 2 = .91) based on a 7-week longitudinal study. Gulum and Dag (2012) adapted the scale into Turkish. In Turkish version of CFI, the original two-factor structure was validated. The internal consistency coefficient was reported at .90 for the total score. In the present study, Cronbach’s alpha value was .89 for the total score.

### Statistical analysis

Statistical analyses were performed using SPSS 22.0. The PROCESS Macro for SPSS (Hayes, 2018, Model 4) was used to test the mediating role of hope between loneliness and psychological adjustment problems, and the moderated mediation analysis was conducted using Model 7. Preacher et al. (2007) procedure was referred to examine the moderated mediation. All sociodemographic variables (gender, age, socio-economic status, and educational background) were controlled within the analyses. The bias-corrected 95% confidence interval (CI) was calculated with 10,000 bootstrapping re-samples. Confidence intervals that do not include zero indicate significant effects (Hayes, 2018). Power analysis were conducted using G\*Power 3.1. Software (Faul et al., 2009), which indicated that our sample size is above the required sample (moderate effect size  $f^2 = .25$ , power = .95,  $\alpha = .05$ )

**Table 1.** Summary statistics and intercorrelations for all variables (N = 512).

Variable	1	2	3	4
Loneliness	-	-.395**	-.390**	.655**
Hope		-	.373**	-.314**
CF			-	-.372**
PA				-
M	1.66	5.31	3.78	3.88
SD	(.57)	(1.02)	(.58)	(1.58)
Skewness(Curtosis)	931(1.161)	-.622(.528)	-.070(-.331)	074(-.913)

CF=cognitive flexibility, PA=psychological adjustment problems, 1=loneliness, 2=Hope, 3=cognitive flexibility, 4=psychological adjustment problems, \*\* $p < .01$

**Table 2.** Testing the mediating effect.

Predictors	Model 1		Model 2	
	Hope		PA	
	$\beta$	$t$	$\beta$	$t$
Loneliness	-.682***	-9.439	.619***	6.884
Hope			-.185***	-3.623
$R^2$	.433***		.463***	
$F$	19.407		19.613	

CF=cognitive flexibility, PA=psychological adjustment \*\*\* $p < .001$ .

There were no observed missing data or outliers. The data were tested for normality, linearity, homoscedasticity, multicollinearity, independence of subjects and singularity among the variables, which were assumptions of regression analyses (Tabachnick & Fidell, 2014) and they met those criteria without applying a transformation process.

## Results

### Preliminary analyses

Means, standard deviations (SD), Skewness, Kurtosis values for scores of all the questionnaires, and Pearson correlations between the variables are presented in Table 1.

Based on Table 1 all variables presented acceptable values of skewness and kurtosis (Tabachnick & Fidell, 2014) which means no severe violation of normality. Loneliness was positively correlated with psychological adjustment problems during the COVID-19 curfew, whereas hope and cognitive flexibility were negatively correlated with psychological adjustment problems. Hope and cognitive flexibility were positively

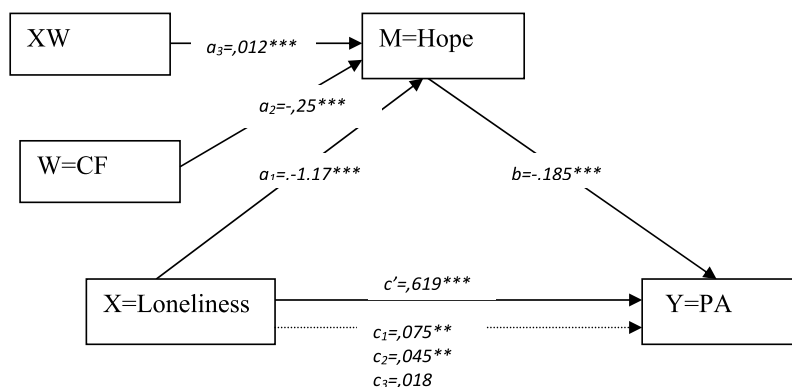
correlated with each other while negatively correlated with loneliness.

### Testing for mediation effect

According to Hypothesis 2, hope would be a mediator between loneliness and psychological adjustment problems. We conducted a bootstrap analysis to estimate the mediation with 10,000 samples (SPSS PROCESS Macro, Model 4), using loneliness as the independent variable, hope as the mediator, and psychological adjustment problems as the dependent variable.

First, we controlled the demographic variables (i.e. gender, age, socio-economic status, and educational background) in all mediation and moderated mediation analyses. Our results from Model 4 showed that (see Table 2) loneliness positively influenced psychological adjustment problems ( $\beta = .619$ ,  $t = 6.88$ ,  $p < .001$ ), and negatively influenced hope ( $\beta = -.683$ ,  $t = -9.44$ ,  $p < .001$ ). Hope in turn negatively influenced psychological adjustment problems ( $\beta = -.185$ ,  $t = -3.62$ ,  $p < .001$ ). Loneliness and hope accounted for a 21 % variance in psychological adjustment problems. The

*A statistical diagram of the conditional process model*



**Figure 2.** A statistical diagram of the conditional process model.

**Note:** CF= cognitive flexibility, PA=psychological adjustment problems, X =independent variable, M =mediator variable, W= moderator variable, Y = dependent variable,  $c'$  = direct effect of X on Y,  $c_1$ =conditional indirect effect of X on Y for Low W,  $c_2$ = conditional indirect effect of X on Y for Moderate W,  $c_3$ = conditional indirect effect of X on Y for High W.

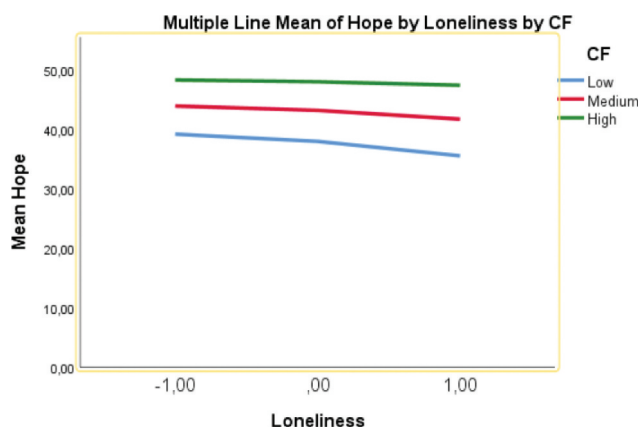


Figure 3. Moderating affect of cognitive flexibility.

Table 3. Ordinary least squares regression coefficients from moderated mediation model.

Predictors	Model 1		Model 2	
	$\beta$	<i>t</i>	$\beta$	<i>t</i>
Loneliness	-1.173	-3.082**	.619	6.885***
Hope			-.185	-3.623***
CF	.255	3.583***		
Loneliness*CF	.012	2.357*		
R2	.475***		.214***	
F	56.902		19.613	

CF=cognitive flexibility; PA=psychological adjustment \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

Table 4. Conditional indirect effects of cognitive flexibility= Mean $\pm$ 1SD.

Hope	Coeff.	BootSE	BootLLCI	BootULCI
<i>M</i> -1SD(-13)	.075	.027	.029	.136
<i>M</i> (.00)	.045	.018	.015	.086
<i>M</i> +1SD(13)	.018	.021	-.021	.064
Index of moderated mediation				
CF	-.002	.0013	-.0052	-.0002

CF=cognitive flexibility.

indirect effect of hope in this relationship was significant in a positive way ( $\beta = .126$ , 95%CI=.058-.208). Besides, the direct effect was significant, too ( $\beta = .619$ , 95% CI =.443-.796). The results, thus, indicate that hope accounts for some, but not all, of the variance in the relationship between loneliness and psychological adjustment problems. Therefore, Hypothesis 1 was supported.

### Testing for moderated mediation

To test Hypothesis 3 and Hypothesis 4, moderated mediation was examined (see Figure 1) in which loneliness was treated as an independent variable, psychological adjustment problems during the COVID-19

curfew as a dependent variable, hope as a mediator, cognitive flexibility as a moderator, and demographic variables (i.e. gender, age, socio-economic status, and educational background) as covariates. The results are shown in Figure 2, Tables 3 and 4. According to the findings (see Table 3) loneliness had a positive predictive effect on psychological adjustment problems ( $\beta = .619$ ,  $p < .001$ ); the product (interaction term) of loneliness and psychological flexibility had a significant predictive effect on hope ( $\beta = .012$ ,  $p < .05$ ); and hope had a negative predictive effect on psychological adjustment problems ( $\beta = -.185$ ,  $p < .001$ ). As Figure 3 illustrates, loneliness predicted hope in a negative way when there was a low and moderate level of cognitive flexibility. But the predictive function of loneliness wasn't significant when there was a high level of cognitive flexibility. As a result, Hypothesis 3 was supported.

In order to test Hypothesis 4, we calculated the conditional indirect effects as seen in Table 4. For lower cognitive flexibility, loneliness had a positive influence on psychological adjustment problems during the COVID-19 curfew through hope (effect = .074,  $SE = .027$ , 95%CI = [.028, .136]). In contrast, the indirect effect became nonsignificant as the level of cognitive flexibility higher (effect = .018,  $SE = .021$ , 95%CI = [-.019, .066]). Cognitive flexibility moderated the indirect effect of loneliness on psychological adjustment problems, showing a significant index of moderated mediation (index = -.002, 95%CI = [-.0052, -.0002]). Therefore, the Hypothesis 4 was supported.

### Discussion

The COVID-19 pandemic has brought many unexpected changes in daily life. Many governments have taken restrictive measures such as quarantines



and long-term curfews to prevent the spread of COVID-19 and this has changed people's daily activities and routines, especially in social contexts, loneliness and associated psychological problems have become a mental health issue during the pandemic. The present study aimed to explore the dynamics in the relationship between loneliness and psychological adjustment problems during the pandemic and contribute to the existing knowledge of the relationship. Therefore, the study examined a moderated mediation model to investigate the mediation effect of hope in the relationship between loneliness and psychological adjustment and the moderating role of psychological flexibility in the association between loneliness and hope during curfew in Turkey.

Firstly it was predicted that there would be a positive relationship between loneliness and psychological adjustment problems during the COVID-19 curfew in Turkey, and the result was as expected. Loneliness significantly and positively predicted psychological adjustment problems in the curfew and is in line with the latest COVID-19 pandemic related research both in Turkey (Kilincel et al., 2020; Oksuz et al., 2021) and in other countries (De Pedraza et al., 2020; Killgore et al., 2020). This result confirms that loneliness is a major concern for mental health. Especially social restrictions and accompanying coping behaviours such as increased social media use (Geirdal et al., 2021; Yu et al., 2019) make loneliness a critical public health issue in the pandemic.

In line with the second hypothesis, higher loneliness was associated with lower hope and lower hope was related to higher psychological adjustment problems. Overall, findings regarding the second hypothesis were compatible with the literature which revealed that hope and hopelessness mediated the relationship between loneliness and anxiety, and depression (Chang et al., 2019; Muyan et al., 2016; Padmanabhanunni & Pretorius, 2021). In this case, it can be argued that negative perceptions regarding the social context in the curfew may affect an individual's expectations, motivation and goals negatively, since goals are mostly embedded in the social context (Snyder et al., 2002). Lowered hope, in turn, may lead to psychological adjustment problems through less than adaptive emotional, cognitive and behavioural patterns.

In addition to the mediation path, it was expected that cognitive flexibility moderated this mediation. The results were as expected and indicated that cognitive flexibility had a protective role in the relationship between loneliness and hope. Accordingly, lonely people with high cognitive flexibility had high levels of

hope, and loneliness was not a predictor of psychological adjustment problems. On the other hand, loneliness affected hope negatively in people with low and moderate levels of cognitive flexibility which resulted in elevated psychological adjustment problems. These results supported our third and fourth hypotheses. Research on loneliness, hope, and cognitive flexibility interactions revealed that hope and cognitive flexibility are both important to better psychological adjustment and have a protective role against several psychological symptoms such as anxiety and depression both before (Chang et al., 2019; Sung et al., 2019) and during the pandemic (Demirtas, 2021; Wu et al., 2021) which are congruent with the findings of the present study. It can be said that people with low and moderate cognitive flexibility exhibit rigidity or insist on certain cognitive and behavioural patterns that have been developed, even when they are not functional anymore (Morris & Mansell, 2018) during the pandemic which affects hope and psychological adjustment negatively.

This study contributes to the existing literature in some respects. First, the results indicate that interventions for people suffering loneliness and psychological adjustment problems in the COVID-19 pandemic may focus on cognitive flexibility and hope. For example, a goal-oriented intervention may help increase cognitive flexibility and hope (Hodson et al., 2021). Secondly, hope was identified as an important mechanism in the dynamics between loneliness and psychological adjustment problems during the pandemic. Thirdly, it extends knowledge about the nature of the relationship between cognitive flexibility and hope in the context of loneliness and psychological adjustment problems.

### **Limitations**

Our findings should be interpreted considering some limitations of the study. First, this was a cross-sectional study which does not allow any causal interpretation. Future longitudinal or experimental studies can help to determine the direction of the effects. Data for this cross-sectional study were collected from a web-based survey. This may limit the generalizability of the research findings. Besides these, it provides strong predictions for professionals who provide psychological help to plan cognitive flexibility and hope-oriented

therapeutic interventions when working with individuals with psychological adjustment problems in the case of loneliness.

## Conclusion

In the pandemic, social distancing and restrictions have posed a major threat to public mental health and one of the most important concerns is the increase of loneliness since it accompanies several mental health issues. The study showed that hope and cognitive flexibility had an important contribution to protecting psychological health. Interventions that promote cognitive flexibility and hope may decrease the effects of negative social conditions and loneliness in the pandemic.

## Data availability

Data is available from <https://mfr.osf.io/render?url=https%3A%2F%2Fosf.io%2Fvn2zr%2Fdownload>

## Disclosure statement

No potential conflict of interest was reported by the author(s).

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## Ethical standards

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation.

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