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# Relationships of leisure social support and flow with loneliness among nursing home residents during the COVID-19 pandemic: An age-based moderating model

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## ABSTRACT

Identifying predictors of loneliness is important to develop interventions that help older adults residing in nursing homes reduce their loneliness, particularly during the COVID-19 pandemic. Therefore, we examined whether leisure social support and flow (also identified as optimal experience) were predictive of loneliness, and whether age moderated the relationship between flow and loneliness. In total, 235 nursing home residents, aged 65 years or older, participated in our study. We conducted in-person surveys to measure their age, leisure social support, flow, and loneliness as well as used multiple linear regression analysis to analyze data. Results indicated that high levels of leisure social support and flow predicted low levels of loneliness. However, age decreased the negative relationship between flow and loneliness. We discuss implications of these results in terms of reducing loneliness, without depending highly on the presence of others, during times of social isolation associated with responses to the COVID-19 pandemic.

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Loneliness is prevalent among older adults,<sup>1</sup> particularly those residing in nursing homes.<sup>2</sup> Loneliness refers to negative feelings of social isolation that accompany perceived deficiencies in the quantity and quality of social relationships.<sup>3</sup> Research indicates that the problem of loneliness was exacerbated during the COVID-19 pandemic in 2020.<sup>4</sup> Older adults who already experience high rates of social isolation become more susceptible to adverse effects as a result of the social distancing protocols enacted to slow the spread of the coronavirus.<sup>5</sup> To prevent nursing home residents from contracting the coronavirus, in many cases, visitations were also discontinued.<sup>6</sup> Mo and Shi identified loneliness as a primary mental consequence caused by the coronavirus for nursing home residents.<sup>7</sup> Because high levels of loneliness are strongly associated with high levels of depression<sup>8</sup> and suicide<sup>9</sup> and low levels of life satisfaction among nursing home residents,<sup>10</sup> addressing their loneliness should be helpful when practitioners attempt to improve their mental health and well-being, particularly during the COVID-19 pandemic.

## Value of social support and leisure social support

Effects of social support on loneliness among older adults has attracted considerable attention in numerous studies.<sup>1,3,11</sup> Social support refers to the care and assistance from family members and friends.<sup>12</sup> Empirical studies demonstrate that high levels of social support predict low levels of loneliness among older adults.<sup>1,3</sup> In a 20-year national aging study, Dahlberg et al. consistently reported that social support was negatively associated with loneliness.<sup>13</sup> To support the causal relationship between social support and loneliness, Lai et al. recruited 60 older adults and assigned them to an experimental group involving an 8-week peer support intervention and a control group in a randomized control parallel trial design.<sup>14</sup> Twenty-four volunteers engaged in this peer support intervention through home visits and telephone calls to provide experimental group participants with social support. After the experiment ended, experimental results indicated that participants receiving the intervention significantly reduced their loneliness. In brief, social support helps older adults reduce their loneliness.

Although social support also helps nursing home residents address their loneliness,<sup>15</sup> older adults who reside in nursing homes receive social support less than those who live in communities do.<sup>16</sup> Thus, identifying an accessible particular type of support would be valuable to assist nursing home residents in increasing their social support.

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Contexts conducive to leisure can provide nursing home residents with enjoyable experiences and opportunities to develop positive social interactions with family members and friends and may increase social support.<sup>17</sup> Encouraging nursing home residents to participate in leisure appears to be a feasible means of increasing their social support. Chang identified leisure social support as receiving social support from family members and friends who experience leisure together with the participant.<sup>18</sup> Although no research has directly examined a possible relationship between leisure social support and loneliness among nursing home residents, some evidence indirectly supports this relationship. For example, Coleman and Iso-Ahola reported that leisure social support could mitigate negative effects of stress on health.<sup>19</sup> Older adults who receive leisure social support can reduce negative effects of stress as they receive comfort or aid to solve problems from leisure companions.<sup>20</sup> Several studies demonstrate that high levels of loneliness predict high levels of stress<sup>21</sup> and vice versa.<sup>22</sup> Many nursing home residents also report loneliness as a stressor.<sup>23</sup> According to these findings, leisure social support may correlate negatively with loneliness among nursing home residents, as inferred from the close relationship between loneliness and stress.

In addition to stress reduction, leisure social support is positively associated with life satisfaction<sup>24</sup> and subjective vitality among older adults,<sup>18</sup> which commonly occur with loneliness reduction.<sup>25,26</sup> Leisure social support appears to correlate negatively with loneliness. However, there is a dearth of research examining a possible correlation between leisure social support and loneliness among nursing home residents. Consequently, further research of this correlation is warranted to identify the potential value of leisure social support.

#### *Necessity of flow*

Empirical studies indicate that the loneliness construct comprises both emotional and social dimensions,<sup>27,28</sup> with the emotional dimension accounting for variance in loneliness more than the social dimension.<sup>29,30</sup> However, most published studies focus on the social dimension to examine the relationship between social support and loneliness among older adults.<sup>1,3,15</sup> Because little research has adequately explored the role of an emotion-related predictor of loneliness, identifying such predictor is necessary to explain more variance in loneliness.

Flow, also identified as optimal experience,<sup>31</sup> is an emotion-related variable for geriatric research.<sup>18</sup> Csikszentmihalyi is the first to use the word *flow* to describe this optimal experience,<sup>31</sup> and defines it as an enjoyable experiential state that occurs during full-capacity engagement in which a participant is performing at a high level that is matched with the demands of the activity.<sup>31,32</sup> Activities producing flow are essential to achieve satisfaction with life.<sup>33</sup> Some studies also indicate that older adults who have adequate skills to meet challenges they encounter experience flow, and these flow experiences enable them to develop positive emotions and improve their quality of life,<sup>34,35</sup> which is commonly associated with loneliness reduction.<sup>25,26</sup> According to these findings, flow may relate negatively to loneliness among nursing home residents.

Another perspective to explain a possible relationship between flow and loneliness is that positive emotions can help older adults buffer detrimental effects of loneliness.<sup>36</sup> For example, the positive emotion of interest increases an urge to explore and become involved in the world.<sup>37</sup> Interest also enables people to develop lifelong leisure pursuits as a way to achieve meaningful happiness,<sup>38</sup> which correlates negatively with loneliness.<sup>39</sup> Because experiencing flow can generate the positive emotion of interest,<sup>37</sup> high levels of flow likely predict low levels of loneliness among nursing home residents.

Addressing loneliness among nursing home residents is particularly important during the COVID-19 pandemic because they terminate direct personal contact with family members and friends to

reduce risk of infection.<sup>6</sup> There appears a need to identify a means of reducing loneliness for nursing home residents, without depending highly on the presence of others, during the COVID-19 crisis. Facilitating flow may be a solution, as people can experience flow *alone* when they have high skills to meet challenges in activities.<sup>40</sup> However, little research has adequately explored whether flow correlates negatively with loneliness. Therefore, we examined whether flow is predictive of loneliness to obtain practical information for interventions designed to help nursing home residents reduce their loneliness.

#### *Age as a moderator*

As older adults age, they experience senescence involving a decline in their physical functioning,<sup>41</sup> such decline particularly increases feelings of reduced autonomy and competence among older adults when the range of their practically attainable goals and achievements becomes limited in leisure contexts.<sup>12</sup> Autonomy in leisure contexts refers to beliefs by older adults that they express leisure behaviors within a context of freedom, and competence corresponds to beliefs that they perceive themselves as having capacities to manage their leisure and they have control over their behaviors. In examining whether age moderated benefits of autonomy and competence, Chang and Yu observed that age decreased the negative relationships of autonomy and competence with stress reduction among older adults.<sup>12</sup> Some studies indicate that flow formation is highly dependent on skills,<sup>31,40</sup> and correlates positively with autonomy and competence among older adults.<sup>18</sup> Given a strong connection of flow with autonomy and competence, age may also moderate a negative relationship between flow and loneliness among nursing home residents.

#### *Relationships of demographic variables and self-rated health with loneliness*

Geriatric studies demonstrate that demographic variables, such as age and duration of nursing home residence, correlate positively with loneliness. For example, when age of older adults increases, their feelings of loneliness also increase.<sup>3</sup> In addition, older adults who stay in nursing homes longer more often report loneliness than those who stay for shorter durations do.<sup>42</sup> Because practitioners can easily judge demographic characteristics of nursing home residents through direct observation, compared with leisure social support and flow assessed using scales indirectly to measure them, reexamining the relationships between demographic variables and loneliness may identify practical information to help practitioners focus their efforts on sub-populations likely to have higher levels of loneliness.

In addition to demographic variables, self-rated health is negatively associated with loneliness among older adults.<sup>1</sup> Typically, researchers use the following single-item to measure self-rated health: How do you rate your general health condition?<sup>43</sup> Since self-rated health also can be easily measured, compared with leisure social support and flow, we reexamined the relationship between self-rated health and loneliness to identify information that helps practitioners focus their efforts on nursing home residents with low levels of self-rated health.

In summary, demographic variables, self-rated health, leisure social support, and flow likely relate to loneliness. However, no research has explored possible relationships of leisure social support and flow with loneliness among nursing home residents. It is not clear how leisure social support and flow relate to loneliness. It is particularly unclear whether age moderates the relationship between flow and loneliness. Therefore, we re-identified the relationships of demographic variables and self-rated health with loneliness as well as examined a loneliness model with age as a moderator to understand benefits of leisure social support and flow more

comprehensively. Study results should provide useful information for developing interventions that help nursing home residents reduce their loneliness.

## Hypotheses

After examining the related literature, we proposed five hypotheses associated with nursing home residents. First, demographic variables correlate positively with loneliness. Second, self-rated health correlates negatively with loneliness. Third, leisure social support correlates negatively with loneliness. Fourth, flow correlates negatively with loneliness. Fifth, age decreases the negative correlation between flow and loneliness.

## Methods

We used a cross-sectional design to collect data from nursing home residents and examine the five hypotheses.

### Participants

We used convenience sampling to recruit participants. After the Research Ethics Committee [IRB-2019-047] approved our study, we selected four rural nursing homes whose directors we knew as survey settings in Dajia District of Taichung City (a rural area of Taichung County), Jian Township of Hualien County, Shuishang Township of Chiayi County, and Tianzhong Township of Changhua County in Taiwan. We requested that the directors encourage their residents to participate in our study. The survey was conducted between September 1 and October 1, 2020. During the survey, we invited all residents to join the study if they met three eligibility criteria. First, they were aged 65 years or older. Second, they had no cold symptoms (e.g., fever, cough, and nasal drainage). Third, they were able to participate in physically, psychologically, or socially active recreation activities (e.g., socializing with friends and walking in small parks nearby), rather than only passive recreation activities (e.g., listening to radio and watching television). To achieve a flow state, participants were required to engage in an activity that matched their skills set with the level of challenges. Therefore, we selected nursing home residents who were able to participate in active recreation activities, as such type of activities was more likely to support the occurrence of flow experiences.<sup>31,40</sup> Each participant volunteered to participate in our study and completed an informed consent form prior to study initiation. We recruited 235 participants (response rate: 92.9%). These participants were aged from 65 to 93 years, with an average of 77.72 years (SD = 7.80), and were predominately female (57.4%). [Table 1](#) contains additional participant characteristics.

### Procedures

Although more than three-quarters of participants could independently read a questionnaire, many expressed that they disliked reading it. For consistency, a research assistant conducted in-person surveys reading questionnaire items aloud to all participants. After the assistant read each item aloud, she used a 5-point interval scale related to the answer of the item and coded their responses. Each survey lasted approximately 35 minutes. Before beginning each survey, the assistant explained study purposes, rights of participants, anonymity of their identity, and confidentiality of all responses. Participants who were able to read signed an informed consent form to affirm their participation was voluntary. If participants were unable to read, the assistant helped them explain our study. After agreeing to enroll in the study, the participants stamped their name on the form. The assistant conducted each survey in a conference room or living room.

**Table 1**  
Participant characteristics.

Characteristic	n	%
Gender		
Female	135	57.4
Male	100	42.6
Education		
Illiterate	58	24.7
Primary School Graduates	153	65.1
High School Graduates	17	7.2
University Degree and Above	7	3.0
Marital Status		
Single	202	86.0
With a Spouse	33	14.0
Duration of Residence		
1–5 Years	127	54.1
5–10 Years	83	35.3
> 10 Years	25	10.6
Self-Rated Health		
Poor	14	5.9
Fair	37	15.7
Good	61	26.0
Very Good	73	31.1
Excellent	50	21.3

### Measures

Participants identified demographic variables including their age, gender (0 = *female*; 1 = *male*), education levels (0 = *illiterate*; 1 = *primary school*; 2 = *high school*; 3 = *university or above*), marital status (0 = *single*; 1 = *with a spouse*), and duration of nursing home residence (calculation using years). We also measured self-rated health using the item: How do you rate your general health condition? Participants were asked to rate their overall health on a 5-point scale, from 1 (*poor*) to 5 (*excellent*).

Leisure social support was measured using the scale developed by Iwasaki and Mannell.<sup>44</sup> The scale is reliable for research on older adults and able to evaluate the degree to which they feel adequately and emotionally supported by their leisure companions.<sup>12</sup> Examples of items include: (a) I feel emotionally supported by my leisure companions, and (b) my leisure companions will lend me things when I need to borrow them. Participants were asked to rate the degree to which they agreed with each item on a 5-point scale from 1 (*not at all*) to 5 (*completely*). The scale has 16 items, and total scores ranged from 16 to 80. High scores represented high levels of leisure emotional support.

Flow was measured using the scale developed by Jackson et al.<sup>45</sup> The scale is reliable for research on older adults and able to evaluate the following nine dimensions: challenge-skill balance, action awareness, clear goals, unambiguous feedback, concentration on task, sense of control, loss self-consciousness, transformation of time, and autotelic experience.<sup>18</sup> Example of items include: (a) My abilities match high challenges faced in the situation, and (b) I really enjoy the experience. To focus on individual-based leisure, we used crafting, drawing, singing, walking, etc. as item examples. However, we excluded listening to radio and watching television because they were not an activity typically facilitating flow.<sup>40</sup> Participants were asked to rate the degree to which they agreed with each of the items on a 5-point scale from 1 (*not at all*) to 5 (*completely*). The scale has nine items, and total scale scores ranged from 9 to 45. High scores represented high levels of flow.

Loneliness was measured using the scale developed by De Jong Gierveld and Van Tilburg.<sup>27</sup> The scale is reliable for research on older adults and able to evaluate their perceptions of loneliness.<sup>46</sup> Examples of items include: (a) I experience a general sense of emptiness, and (b) there are enough people I feel close to. Participants were asked to rate the degree to which they agreed with each item on a 5-

point scale from 1 (*not at all*) to 5 (*completely*). The scale has six items, and total scores ranged from 6 to 30. High scores represented high levels of loneliness.

### Data analysis

Analyses were performed using IBM SPSS (version 23.0) for Windows. We used descriptive statistics to profile data and Cronbach's  $\alpha$  coefficients to assess scale reliability. We also employed Pearson correlation analysis to examine correlations among variables. We then conducted multiple linear regression analysis to examine whether demographic variables, self-rated health, leisure social support, and flow were predictive of loneliness as well as whether age moderated the relationship between flow and loneliness. Among Pearson correlation and multiple linear regression analyses, the level of the statistical significance was set at .05.

### Results

Average scores were 3.46 (SD = 1.16) for self-rated health, 56.76 (SD = 12.66) for leisure social support, 34.49 (SD = 7.63) for flow, and 16.83 (SD = 3.47) for loneliness, respectively. Results of scale reliability assessment indicated positive results with the leisure social support scale achieving an alpha reliability coefficient of .92, the flow scale .91, and the loneliness scale .76.

Results of Pearson correlation analyses demonstrated that age ( $r = .20$ ;  $p < .05$ ), education ( $r = -.18$ ;  $p < .05$ ), duration of nursing home residence ( $r = .20$ ;  $p < .05$ ), self-rated health ( $r = -.31$ ;  $p < .05$ ), leisure social support ( $r = -.43$ ;  $p < .05$ ), and flow ( $r = -.50$ ;  $p < .05$ ) correlated with loneliness (Table 2).

The multiple linear regression analysis produced the following results (Table 3). First, long duration of nursing home residence predicted high levels of loneliness ( $\beta = .15$ ;  $p < .05$ ), partly supporting the first hypothesis. The longer the residents stayed in a nursing home, the lonelier they felt. Second, high levels of self-rated health predicted low levels of loneliness ( $\beta = -.13$ ;  $p < .05$ ), supporting the second hypothesis. Specifically, nursing home residents who perceived good health often reported lower levels of loneliness than those who did not. Third, high levels of leisure social support predicted low levels of loneliness ( $\beta = -.18$ ;  $p < .05$ ), supporting the third hypothesis. Specifically, levels of loneliness among nursing home residents changed with their levels of leisure social support. Fourth, high levels of flow predicted low levels of loneliness ( $\beta = -.33$ ;  $p < .05$ ), supporting the fourth hypothesis. Specifically, when flow increased among nursing home residents, their loneliness decreased. Fifth, the interaction between age and flow was significant ( $\beta = .13$ ;  $p < .05$ ), and entering the interaction into the model had an increment in variance ( $R^2$ ), supporting the fifth hypothesis. In addition, a plot of the multiple linear regression analysis revealed that levels of loneliness significantly decreased when levels of flow increased for younger ages. However, levels of loneliness did not significantly

**Table 2**

Results of Pearson correlation analysis.

Variable	1	2	3	4	5	6	7	8	9
1. Age	-								
2. Gender	.03	-							
3. Education	-.14*	.22*	-						
4. Marital Status	-.08	.07	.17*	-					
5. Duration of Residence	.11	.05	-.08	-.02	-				
6. Self-Rated Health	-.14*	-.03	.06	-.04	-.13*	-			
7. Leisure Social Support	-.18*	-.11	.07	.13*	-.04	.31*	-		
8. Flow	-.20*	-.07	.09	-.02	-.01	.33*	.57*	-	
9. Loneliness	.20*	-.03	-.18*	.02	.20*	-.31*	-.43*	-.50*	-

\* $p < .05$ .

**Table 3**

Multiple linear regression analysis with loneliness as a dependent variable.

Variable	Model 1			Model 2		
	B	SE	$\beta$	B	SE	$\beta$
Age	.03	.03	.06	.03	.03	.07
Gender	-.42	.41	-.06	-.41	.40	-.06
Education	-.27	.21	-.08	-.20	.21	-.06
Marital Status	.59	.56	.06	.46	.56	.05
Duration of Residence	.13	.05	.14*	.13	.05	.15*
Self-Rated Health	-.36	.18	-.12*	-.37	.18	-.13*
Leisure Social Support	-.05	.02	-.20*	-.05	.02	-.18*
Flow	-.14	.03	-.33*	-.15	.03	-.33*
Interaction (Age $\times$ Flow)				.01	.01	.13*
F		12.62*			12.07*	
R <sup>2</sup>		.32			.34	

\* $p < .05$ .

change when levels of flow increased for older ages (Fig. 1). Specifically, age moderated the negative relationship between flow and loneliness among nursing home residents.

### Discussion

As expected, our study supported that duration of nursing home residence correlated positively with loneliness, and that self-rated health, leisure social support, and flow correlated negatively with loneliness. In addition, age moderated the correlation between flow and loneliness. We discuss these results in the subsequent sections.

#### Relationships of residence and self-rated health with loneliness

Similar to previous findings,<sup>42</sup> duration of nursing home residence related positively to loneliness in our study. There is a possible explanation for this result. Because living in a nursing home is a lonely experience,<sup>47</sup> the residents who live in a nursing home longer commonly feel lonelier than those who live more shortly.

Again, similar to previous findings,<sup>1</sup> self-rated health related negatively to loneliness in our study. A possible explanation exists for this result. Since nursing home residents who are healthier often participate in physical and social activities more than those who are less healthy, they likely feel less lonely.

#### Leisure social support and flow as predictors of loneliness

Consistent with previous findings,<sup>18,24</sup> our study demonstrated that leisure social support correlated negatively with loneliness. As Wang et al. mentioned,<sup>3</sup> loneliness involves negative feelings of social isolation resulting from perceived deficiencies in social relationships. When older adults receive social support that satisfies their needs for expected social relationships, their loneliness decreases.<sup>14</sup> Leisure social support plays a similar role in leisure contexts.<sup>12</sup> Such

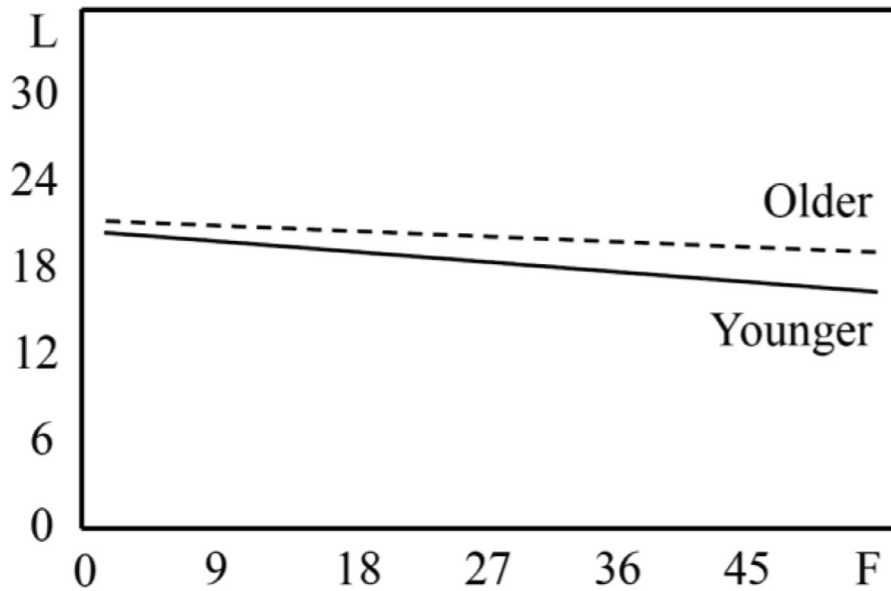


Fig. 1. Effects of flow (F) on loneliness (L) at different ages.

results were supported by our study that an increase in leisure social support is associated with a decrease in loneliness among nursing home residents.

Again, consistent with previous findings,<sup>34,35</sup> our study indicated that flow correlated negatively with loneliness. There are two reasonable explanations for this result. First, because flow positively relates to positive emotions and quality of life,<sup>34,35</sup> which generally occur with loneliness reduction,<sup>25,26</sup> flow is negatively associated with loneliness. Second, since experiencing flow, as strong interest,<sup>37</sup> helps people develop lifelong leisure pursuits to gain happiness,<sup>40</sup> high levels of flow predict low levels of loneliness among nursing home residents.

In addition, similar to previous findings that the emotional dimension could explain variance in loneliness more than the social dimension could,<sup>29,30</sup> we observed that the standardized regression coefficient between flow and loneliness was larger than that between leisure social support and loneliness was. Chang also found that flow, compared with leisure social support, was more predictive of subjective vitality among community-dwelling older adults,<sup>18</sup> which correlated negatively with loneliness.<sup>26</sup> Therefore, we conclude that flow is a more effective predictor of loneliness among nursing home residents than leisure social support is.

#### Moderating effect of age

Consistent with previous findings,<sup>12</sup> our study demonstrated that flow interacted with age when it predicted loneliness. Geriatric research indicates that aging leads to a decline in physical functioning<sup>41</sup> and decreases in autonomy and competence; for example, in a statistical model, age reduces power of autonomy and competence when they predict stress among older adults.<sup>12</sup> Given that flow correlates strongly with autonomy and competence,<sup>18</sup> as age increases, the negative relationship between flow and loneliness decreases among nursing home residents.

#### Contributions and implications

Although the causal relationship between social support and loneliness among community-dwelling older adults is well established,<sup>14</sup> nursing home residents typically have lower levels of social support than community-dwelling older adults do<sup>16</sup> and appear to have limited social support to reduce their loneliness.<sup>15</sup> Therefore, there is a

need to identify an accessible particular type of support that is also negatively associated with loneliness among nursing home residents.

We observed that high levels of leisure social support, feasible support among nursing home residents,<sup>17</sup> correlated with low levels of loneliness. Our study thereby contributes to development of feasible interventions that may help nursing home residents reduce their loneliness.

We also found that high levels of flow predicted low levels of loneliness better than high levels of leisure social support did. Because there is inadequate research examining relationships of leisure social support and flow with loneliness, our findings provide information for developing interventions designed to reduce loneliness. Our study further demonstrated that as age increased, the negative relationship between flow and loneliness decreased among participants. Since to date, no research has directly explored the moderating effect of age on such relationship, our study contributes to the literature.

There are some implications associated with our findings. First, increasing levels of leisure social support may be a feasible way of helping nursing home residents reduce their levels of loneliness. Therefore, it may be beneficial for practitioners to guide nursing home residents to seek sources of leisure social support. For example, practitioners and staff may invite family, friends, volunteers, and members of the community to attend events with the residents such as musical performances designed to encourage dancing and singing followed by refreshments and facilitated social interactions. The intention of such social interactions are to increase leisure social support among nursing home residents and, ultimately, reduce their feelings of loneliness.

Second, although nursing home residents experiencing loneliness may benefit from leisure social support, experiencing flow may more effectively mitigate their negative feelings of loneliness. These findings are especially valuable to consider in times of restricted human interactions created by the COVID-19 pandemic. Specifically, receiving leisure social support depends highly on the presence of others, but experiencing flow does not. Participants can experience flow when they are alone.<sup>40</sup> For example, we used individual-based leisure such as making crafts, drawing, singing, and walking as item examples to measure flow. Scores of flow appeared to reflect a state in which participants were alone. Therefore, to help nursing home residents reduce their loneliness during times of increased isolation, it

may be helpful for practitioners to encourage them to engage in activities in which they have skills to successfully manage challenging experiences and actively participate so that they may increase their chance of experiencing flow. As older adults demonstrate their skills to participate actively in recreation activities such as painting with watercolors that requires them to be creative, or using a computer to facilitate social interactions, or learning about historical events to challenge their memory, they stretch themselves to meet the challenges of stimulating tasks and experience flow. These periods of flow then appear to influence their perceptions of loneliness.

Third, given that aging may decrease rigorous leisure participation and the negative relationship between flow and loneliness, we encourage practitioners to facilitate flow carefully for the eldest adults. Although aging limits various skills<sup>12</sup> and the COVID-19 pandemic further decreases access to social recreation activities among nursing home residents,<sup>6</sup> they still can participate in stimulating recreation activities such as singing and engaging in online games to experience flow. Consequently, to help the eldest adults address their loneliness, practitioners may need to help them select, optimize, and adapt recreation activities so that leisure contexts do not overwhelm them, yet challenge and stimulate them.<sup>48,49</sup>

In addition, duration of nursing home residence related positively to loneliness, and self-rated health related negatively to it. Therefore, we encourage practitioners to focus their efforts on nursing home residents who stay longer and perceive less health, helping these residents experience flow.

Various scholars provide similar recommendations for encouraging flow within a leisure context. For example, Tan and Sin identified the following ways to facilitate flow when engaging participants in music: (a) consider challenge-skill balance, (b) set clear goals, (c) cultivate grit, (d) nurture reflection, (f) empower participants, (g) promote mastery approach goals, (h) stay positive, (i) connect emotionally, (j) flow together, and (k) play from time to time.<sup>50</sup> More specifically, Freer suggested that practitioners consider the following ways to promote flow among singers in a chorus: (a) be aware of individual needs of singers and (b) attend to differences in singers' skill levels particularly with regard to pitch and rhythm.<sup>51</sup> Moreover, to facilitate flow in older adults, Belchior et al. recommended using video games that: (a) contain clear goals and rules, (b) provide immediate feedback on their performance, and (c) increase challenge level immediately following level mastery.<sup>52</sup> More generally, Myllykangas et al. found that supporting older adults to set a goal and participate more in recreation and other activities of their choice increased their flow state.<sup>53</sup> In conclusion, we suggest practitioners considering how older adults, particularly those residing in nursing homes for a considerable length of time, can match the level of challenge and skills needed for the activity to help them experience flow when they feel lonely.

#### Limitations and recommendations

Our study has several limitations. First, since we used a correlational design, we could not identify cause-effect conclusions directly from the study results. To address this concern, we recommend that researchers use experimental designs to examine effects of leisure social support and flow on loneliness and interaction effects of flow and age on loneliness among nursing home residents.

Second, because participants were from purposively selected nursing homes, we advise caution when attempting to generalize our results to other nursing home residents. Based on this concern, we recommend that researchers explore relationships of leisure social support and flow with loneliness and a moderating role of age using a random sample.

Third, risk perceptions that influence social interactions during the COVID-19 crisis may also correlate with loneliness. However, to streamline our survey, a scale for risk perceptions was not included.

Therefore, our model did not comprehensively include causes of reduced loneliness. There is value in conducting studies examining risk perceptions when developing models of loneliness to achieve a more comprehensive understanding of studied variables among nursing home residents.

#### Conclusion

Our study identified that leisure social support and flow negatively related to loneliness and that age moderated the relationship between flow and loneliness in the regression model. Thus, to help nursing home residents reduce loneliness, it may be advantageous for practitioners to guide them in seeking sources of leisure social support.

We further observed that experiencing flow was associated with a more significant decrease in loneliness than receiving leisure social support was. Consequently, it may be more helpful for practitioners to support nursing home residents in pursuing leisure experiences that promote flow, compared with leisure social support, in an attempt to reduce their loneliness more effectively, especially during times of social isolation resulting from the COVID-19 pandemic.

Although flow is predictive of loneliness among nursing home residents, aging decreases its role. Therefore, we encourage researchers to examine effects of various ways to facilitate flow for the eldest adults so that practitioners improve their ability to cultivate skills and talents of these adults when they need to meet demands of challenging recreation activities.

#### Description of authors' roles

Liang-Chih Chang designed the study, performed some of the statistical analyses, and wrote the final manuscript. John Dattilo gave critical comments, assisted in the writing process, and edited the final manuscript. Pei-Chun Hsieh gave critical comments and assisted in the writing process. Fei-Hsin Huang constructed the analytical sample and performed the statistical analyses.

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#### Declaration of Competing Interest

None.

#### References

- Hawkey LC, Kocherginsky M. Transitions in loneliness among older adults: a 5-year follow-up in the National Social Life, Health, and Aging Project. *Res Aging*. 2018;40(4):365–387.
- Gardiner C, Laud P, Heaton T, Gott M. What is the prevalence of loneliness amongst older people living in residential and nursing care homes? a systematic review and meta-analysis. *Age Ageing*. 2020;49(5):748–757.
- Wang G, Zhang X, Wang K, et al. Loneliness among the rural older people in Anhui, China: prevalence and associated factors. *Int J Geriatr Psychiatry*. 2011;26(11):1162–1168.
- Roy J, Jain R, Golamari R, Vunnam R, Sahu N. COVID-19 in the geriatric population. *Int J Geriatr Psychiatry*. 2020;35(12):1437–1441.
- Kasar KS, Karaman E. Life in lockdown: Social isolation, loneliness and quality of life in the elderly during the COVID-19 pandemic: a scoping review. *Geriatr Nurs*. 2021.
- Simard J, Volicer L. Loneliness and isolation in long-term care and the Covid-19 pandemic. *J Am Med Dir Assoc*. 2020;21(7):966–967.
- Mo S, Shi J. The psychological consequences of the COVID-19 on residents and staff in nursing homes. *Work Aging Retire*. 2020;6(4):254–259.
- Li Y, Jia J, Zhao X, Zhang D. Preparation for future care moderates the relationship between loneliness and depression among Chinese rural older adults: a cross-sectional study. *Geriatr Nurs*. 2020;41(5):641–647.
- Zhang D, Wang R, Zhao X, et al. Role of resilience and social support in the relationship between loneliness and suicidal ideation among Chinese nursing home residents. *Aging Ment Health*. 2021;25(7):1262–1272.
- Trybusińska D, Saracen A. Loneliness in the context of quality of life of nursing home residents. *Open Med*. 2019;14(1):354–361.

11. Chen L, Alston M, Guo W. The influence of social support on loneliness and depression among older elderly people in China: coping styles as mediators. *J Commun Psychol*. 2019;47(5):1235–1245.
12. Chang LC, Yu P. Relationships between leisure factors and health-related stress among older adults. *Psychol Health Med*. 2013;18(1):79–88.
13. Dahlberg L, Andersson L, Lennartsson C. Long-term predictors of loneliness in old age: results of a 20-year national study. *Aging Ment Health*. 2018;22(2):190–196.
14. Lai DW, Li J, Ou X, Li CY. Effectiveness of a peer-based intervention on loneliness and social isolation of older Chinese immigrants in Canada: a randomized controlled trial. *BMC Geriatr*. 2020;20(1):1–12.
15. Eskimez Z, Demirci PY, TosunOz IK, Oztunc G, Kumas G. Loneliness and social support level of elderly people living in nursing homes. *Int J Caring Sci*. 2019;12(1):465–474.
16. Rashedi V, Rezaei M, Gharib M, Nabavi SH. Social support for the elderly: comparison between home and nursing home. *J North Khorasan Univ Med Sci*. 2013;5(2):351–356.
17. Chang L. Is social support always related to stress reduction in nursing home residents? A study in leisure contexts. *Res Gerontol Nurs*. 2018;11(4):174–180.
18. Chang L. Relationship between flow experience and subjective vitality among older adults attending senior centres. *Leis Stud*. 2020;39(3):433–443.
19. Coleman D, Iso-Ahola SE. Leisure and health: the role of social support and self-determination. *J Leis Res*. 1993;25(2):111–128.
20. Chang L. Reexamining the relationship between leisure and stress among older adults. *J Leis Res*. 2015;47(3):358–372.
21. DeBerard MS, Kleinknecht RA. Loneliness, duration of loneliness, and reported stress symptomatology. *Psychol Rep*. 1995;76(3):1363–1369.
22. Satici SA. Hope and loneliness mediate the association between stress and subjective vitality. *J Coll Stud Dev*. 2020;61(2):225–239.
23. Hunter IR, Gillen MC. Stress coping mechanisms in elderly adults: an initial study of recreational and other coping behaviors in nursing home patients. *Adultspan J*. 2009;8(1):43–53.
24. Sasidharan V, Payne L, Orsega-Smith E, Godbey G. Older adults' physical activity participation and perceptions of wellbeing: examining the role of social support for leisure. *Manag Leis*. 2006;11(3):164–185.
25. Andrew N, Meeks S. Fulfilled preferences, perceived control, life satisfaction, and loneliness in elderly long-term care residents. *Aging Ment Health*. 2018;22(2):183–189.
26. Arslan G. Loneliness, college belongingness, subjective vitality, and psychological adjustment during coronavirus pandemic: development of the College Belongingness Questionnaire. *J Posit Sch Psychol*. 2020;5(1):17–31.
27. De Jong Gierveld J, Van Tilburg T. A 6-item scale for overall, emotional, and social loneliness: confirmatory tests on survey data. *Res Aging*. 2006;28(5):582–598.
28. Diehl K, Jansen C, Ishchanova K, Hilger-Kolb J. Loneliness at universities: determinants of emotional and social loneliness among students. *Int J Environ Res Public Health*. 2018;15(9):1865.
29. Dykstra PA, Fokkema T. Social and emotional loneliness among divorced and married men and women: comparing the deficit and cognitive perspectives. *Basic Appl Soc Psych*. 2007;29(1):1–12.
30. Salimi A. Social-emotional loneliness and life satisfaction. *Soc Behav Sci*. 2011;29:292–295.
31. Csikszentmihalyi M. *Beyond Boredom and Anxiety*. San Francisco, CA: Jossey-Bass; 1975.
32. Payne BR, Jackson JJ, Noh SR, Stine-Morrow EAL. In the zone: flow state and cognition in older adults. *Psychol Aging*. 2011;26(3):738–743.
33. Csikszentmihalyi M, Larson R. *Being Adolescent*. New York, NY: Basic Books; 1984.
34. Lee S, Heo J. Life experience of older women with chronic conditions: flow and balance as a coping resource. *Educ Gerontol*. 2019;45(4):259–268.
35. Standridge SH, Dunlap R, Hamilton G. Retirement and flow: can the casual leisure pursuits of older adults in retirement create the experience of flow? *Act Adapt Aging*. 2020;44(3):192–209.
36. Newall NE, Chipperfield JG, Bailis DS, Stewart TL. Consequences of loneliness on physical activity and mortality in older adults and the power of positive emotions. *Health Psychol*. 2013;32(8):921–924.
37. Fredrickson BL. What good are positive emotions? *Rev Gen Psychol*. 1998;2(3):300–319.
38. Ekeland CB. High as a kite: exploring the positive emotion of interest through extreme sporting in the arctic. *Int J Tour Anthropol*. 2016;5(3–4):276–298.
39. Satici SA, Uysal R, Deniz ME. Linking social connectedness to loneliness: the mediating role of subjective happiness. *Pers Individ Dif*. 2016;97:306–310.
40. Csikszentmihalyi M. *Finding Flow: The Psychology of Engagement with Everyday Life*. New York, NY: Basic Books; 1997.
41. Chalise HN. Aging: basic concept. *Am J Biomed Sci Res*. 2019;1(1):8–10.
42. Kim IS, Kim MS, Kang HY. Factors influencing loneliness in elderly living in nursing homes. *J Korean Acad Fundam Nurs*. 2010;17(3):391–399.
43. Wu S, Wang R, Zhao Y, et al. The relationship between self-rated health and objective health status: a population-based study. *BMC Public Health*. 2013;13(1):1–9.
44. Iwasaki Y, Mannell RC. Hierarchical dimensions of leisure stress coping. *Leis Sci*. 2000;22(3):163–181.
45. Jackson SA, Martin AJ, Eklund RC. Long and short measures of flow: the construct validity of the FSS-2, DFS-2, and new brief counterparts. *J Sport Exerc Psychol*. 2008;30(5):561–587.
46. De Jong Gierveld J, Keating N, Fast JE. Determinants of loneliness among older adults in Canada. *Can J Aging*. 2015;34(2):125–136.
47. Slettebø A. Safe, but lonely: living in a nursing home. *Nord J Nurs Res*. 2008;28(1):22–25.
48. Burnett-Wolle S, Godbey G. Refining research on older adults' leisure: implications of selection, optimization, and compensation and socioemotional selectivity theories. *J Leis Res*. 2007;39(3):498–513.
49. Hutchinson SL, Warner G. Older adults' use of SOC strategies for leisure participation following an acute health event: implications for recreation service delivery. *J Park Recreat Admi*. 2014;32(1):80–95.
50. Tan L, Sin HX. Optimizing optimal experiences: Practical strategies to facilitate flow for 21st-Century music educators. *Music Ed J*. 2020;107(2):35–41.
51. Freer PK. Boys' descriptions of their experiences in choral music. *Re. Stud. Music Ed*. 2009;31(2):142–160.
52. Belchior P, Marsiske M, Sisco S, Yam A, Mann W. Older adults' engagement with a video game training program. *Act Adapt Aging*. 2012;36(4):269–279.
53. Myllykangas SA, Gosselink CA, Foose AK, Gaede DB. Meaningful activity in older adults: being in flow. *World Leisure J*. 2002;44(3):24–34.