


The Association Between Personality and Loneliness: Findings From a Community-Dwelling Chinese Aging Population

Gerontology & Geriatric Medicine
Volume 4: 1–9
© The Author(s) 2018
Reprints and permissions:
sagepub.com/journalsPermissions.nav
DOI: 10.1177/2333721418778181
journals.sagepub.com/home/ggm


Bei Wang, MPH¹  and Xinqi Dong, MD, MPH¹

Abstract

The experience of loneliness is prevalent and detrimental. Personality may influence individual perceptions of loneliness, but the relationship has not been adequately examined among minority aging populations. In a representative sample of 3,157 Chinese older adults in Chicago, we examined the associations between two personality traits and loneliness. Independent variables were neuroticism and conscientiousness, and dependent variable was perceived loneliness. Logistic regressions were used to adjust for confounding factors. Both traits were significantly associated with loneliness. One unit increase in neuroticism was associated with a 1.15 times higher likelihood of feeling lonely (odds ratio [OR]: 1.15, 1.12-1.18), whereas a unit increase in conscientiousness was associated with 3% decrease in risk of loneliness (OR: 0.97, 0.96-0.99). Compared with a low level of neuroticism, individuals with middle and high levels were 1.51 and 3.59 times more likely to feel lonely (OR: 1.51, 1.17-1.95; OR: 3.59, 2.84-4.54). Participants with high conscientiousness had a 24% decreased risk of loneliness relative to those with a low level (OR: 0.76, 0.60-0.96). This study provides evidence supporting the close relationships between personality and loneliness among U.S. Chinese older adults. Rigorously designed longitudinal studies are needed to clarify different trajectories of loneliness over time and its associated factors.

Keywords

loneliness, personality, neuroticism, conscientiousness, Chinese older adults

Manuscript received: January 2, 2018; **final revision received:** February 13, 2018; **accepted:** March 26, 2018.

Introduction

Loneliness is a feeling that occurs when a person's intimate and social needs are inadequately met (Cacioppo et al., 2006). It is a pervasive condition that has been associated with increased morbidity and mortality (Hawkey, Thisted, Masi, & Cacioppo, 2010; Luo, Hawkey, Waite, & Cacioppo, 2012; Paul, Ayis, & Ebrahim, 2006). Peplau and Perlman (1982) estimated the U.S. national prevalence of loneliness is 20%. Wilson and Moulton (2010) suggested it is even more prevalent among older populations (60-69 years: 32%; ≥70 years: 25%).

As a subjective feeling, loneliness reflects people's different patterns in thinking, behaving, and reacting to situational factors. This, in turn, is influenced by personality, described as one's dispositional traits and adaptations to the environments (Watson & Hubbard, 1996). Hence, personality might have an essential influence on the perceptions and coping of lonely feelings.

The NEO Five-Factor Model is a robust inventory measuring personality traits including openness, conscientiousness, extraversion, agreeableness, and

neuroticism (Costa & McCrae, 1992). Among them, neuroticism (emotional instability and distress) and conscientiousness (dependability and orderliness) have close relationships with mortality and morbidity (Chang & Dong, 2014). They have also been linked to loneliness. For instance, in a study of 137 centenarians of the Georgia Centenarian Study, neuroticism was associated with higher level of loneliness (Hensley et al., 2012). Another study of 197 older adults found that higher level of loneliness was associated with high neuroticism and low conscientiousness (Cacioppo et al., 2006). However, there is a dearth of large population studies that further examine the interplays between personality traits and loneliness.

¹Rush University Medical Center, Chicago, IL, USA

Corresponding Author:

Xinqi Dong, Institute for Health, Health Care Policy, and Aging Research, Rutgers, The State University of New Jersey, 112 Paterson Street, New Brunswick, NJ, 08901, USA.
Email: xinqi.dong@rutgers.edu



There is an urgent need to understanding mental health disparities and cultural differences in minority aging populations (Dong, Chang, Wong, & Simon, 2011). In the United States, 29.8% of the 4 million Chinese immigrants are more than 55 years of age (Terrazas & Batalova, 2010), among which an estimate of 26.2% have felt lonely (Simon, Chang, Zhang, Ruan, & Dong, 2014). Loneliness may be culturally situated in many aspects. Previous qualitative investigations found that distinguished from the emphasis of friend-oriented social relationships in Western societies, intergenerational relationships are more important for the Chinese older people (Dong, Chang, Wong, & Simon, 2012). Perceived inadequate intergenerational support and shrank social network are key indicators for depressive symptoms and cognitive impairment for the Chinese older adults (Dong, Li, & Hua, 2017; Li & Dong, 2018). Moreover, the role of personality on loneliness might vary across populations. Given as such, this study is to examine the associations between personality traits and the lonely feelings within Chinese older adults.

Method

Population and Settings

Data were drawn from the Population Study of Chinese Elderly in Chicago (PINE) project, an epidemiology study aimed to examine the key cultural determinants of health and well-being of U.S. Chinese older adults in the Greater Chicago area. To enhance the research's relevance to the well-being of the Chinese community, the research team implemented extensive culturally and linguistically appropriate community recruitment strategies guided by a community-based participatory research (CBPR) approach, and details about the PINE study has been published somewhere else (Dong, Wong, & Simon, 2014).

In the present article, we used the baseline data collected from 2011 to 2013, during which 3,157 eligible people participated. The eligibility criteria were (a) community-dwelling older adults aged 60 years and more and (b) older adults who were self-identified as Chinese. Multilingual research assistants (e.g., Cantonese, Taishanese, Mandarin, and Teochew), recruited through community partners, conducted face-to-face interviews with the participants. The study was approved by the Institutional Review Board of the Rush University Medical Center.

Measurements

Covariates: Sociodemographics, social economics, medical comorbidities, and social support. We collected basic information including age, sex, education (completed years of school), annual personal income (US\$), marital status, living arrangement (number of people they live with), number of children, number of grandchildren, years of residence in the United States, and language preference. In addition, we assessed the presence of nine

common conditions (medical comorbidities) such as heart disease, stroke, and cancers. Frequencies of social support from spouse, family members, and friends were each measured by four questions (Smith et al., 2009).

Dependent variable: Loneliness. Presence of loneliness was assessed by a validated shortened (3-item) version of the Revised University of California at Los Angeles (R-UCLA) Loneliness Scale asking subjective feelings of (a) lack companionship, (b) being left out of life, and (c) being isolated. Participants were given a 3-point scale from 1 = "hardly ever" to 3 = "often," and any response other than "hardly ever" to any items was regarded as experiencing loneliness. The measurement has been demonstrated to be of favorable internal consistency, with the alpha coefficient of reliability of .71 in two large population studies (Hughes, Waite, Hawkey, & Cacioppo, 2004) and .78 in the PINE study (Chang, Beck, Simon, & Dong, 2014).

Independent variables: Neuroticism and Conscientiousness. We inquired into neuroticism and conscientiousness using measurements derived from the NEO Five-Factor Inventory (Costa & McCrae, 1992). Participants were asked to rate 6 ("neuroticism") and 12 ("conscientiousness") agreements, respectively, regarding the tendency to characteristics described by each trait, and the detailed items have been published in another article (Chang & Dong, 2014). Each item was given a 5-point scale response ranging from 1 = "strongly disagree" to 5 = "strongly agree," and higher sums of scores indicate greater proneness to the personality traits. Neuroticism and conscientiousness were first treated as continuous variables. Then, considering the importance of making diagnostic decisions about personality, we used the sum scores to calculate tertiles of low (6-12), medium (13-15), and high levels (16-30) of neuroticism and low (12-45), medium (46-49), and high (50-60) levels of conscientiousness. The alpha coefficient of reliability was .65 for the neuroticism measure and .82 for the conscientiousness in the PINE study (Chang & Dong, 2014).

Data Analysis

t tests, Wilcoxon tests, and chi-square tests were used to compare personality traits (including tertiles) among older adults with or without loneliness. Pearson correlation coefficients were used to examine the relationships among all variables. To further determine the associations between the personality traits and loneliness, we computed logistic regression models to adjust for the potential confounding variables. Six models were used with an increasing number of covariates. We included age and gender in Model A. In Model B, we added education and income. In Model C, we included marital status, living arrangement, and numbers of children and grandchildren. In Model D, we added length of residence in the United States and language

Table 1. Personality Traits of Neuroticism, Conscientiousness, and Tertiles by Loneliness in Chinese Older Adults.

	Perceived loneliness		t/χ^2 , df (p value)
	Any ($N = 819$) M (SD)/numbers (%)	None ($N = 2306$) M (SD)/numbers (%)	
Personality traits			
Neuroticism	16.22 (4.37)	13.36 (3.61)	-16.64, 1211.9 (<.0001)
Conscientiousness	45.58 (6.70)	47.53 (5.93)	7.28, 1265.5 (<.0001)
Tertiles of neuroticism			
Low	161 (20.00)	964 (42.23)	243.66, 2 (<.0001)
Medium	206 (25.59)	742 (32.50)	
High	438 (54.41)	577 (25.27)	
Tertiles of conscientiousness			
Low	364 (45.61)	741 (32.76)	43.01, 2 (<.0001)
Medium	222 (27.82)	740 (32.71)	
High	212 (26.57)	781 (34.53)	

preference. We further added medical comorbidities in Model E and social support in Model F. All statistical analyses were conducted using SAS, Version 9.2 (SAS Institute Inc., Cary, NC).

Results

Table 1 presents the descriptive results on the personality traits for the 819 Chinese older people who felt lonely and the 2,306 who did not. Comparing the two groups, participants with loneliness scored higher in neuroticism (16.22 vs. 13.36, $p < .0001$) and lower in conscientiousness (45.58 vs. 47.53, $p < .0001$). Among participants with loneliness, 54.41% have a high tertile of neuroticism and 26.57% the high conscientiousness, whereas 25.27% of those without loneliness have a high level of neuroticism in comparison with 34.53% in the high conscientiousness tertile.

Loneliness endorsement was positively correlated with neuroticism ($r = .28$) and negatively correlated with conscientiousness ($r = -.08$; Table 2). Having higher levels of educational attainment ($r = .05$), having lower income ($r = -.05$), being unmarried ($r = -.17$), preferring to speak Mandarin/English ($r = -.12$), having fewer children ($r = -.05$), having more medical comorbidities ($r = .06$), and having less social support ($r = -.16$) were more likely to report feeling lonely. No significant correlations found between loneliness with age, sex, years in the United States, living arrangement, and number of grandchildren (Table 2).

Table 3 shows the associations between the personality traits (as continuous variables) and perceived loneliness. After adjusting for all covariates in Model F, neuroticism positively associated with loneliness (odds ratio [OR]: 1.15, 1.12-1.18), whereas conscientiousness negatively associated with loneliness (OR: 0.97, 0.96-0.99). In Table 4, the personality traits were then modeled as categorical independent variables (tertiles). Using similar regression models, compared with low neuroticism tertile, medium (OR: 1.51, 1.17-1.95) and

high neuroticism (OR: 3.59, 2.84-4.54) associated with higher risks of feeling lonely. Highly conscientious people were less likely to feel lonely (OR: 0.76, 0.60-0.96) compared with those low in conscientiousness. However, after adding marital status as a covariate since Model C, people with medium conscientiousness were no longer associated with decreased odds of feeling lonely relative to the low conscientiousness.

Discussion

In the first study to examine relations between personality and loneliness in a representative sample of U.S. Chinese older population (M. Simon, Chang, Rajan, Welch, & Dong, 2014), we found that people higher in neuroticism and/or lower in conscientiousness are more likely to feel lonely. The associations remained significant regardless of sociodemographic characteristics, immigration and acculturation variables, medical comorbidities, and social support. The study expands our knowledge about personality and loneliness by clarifying the independent relationships between them among U.S. Chinese and sheds light on directions for future research and practice of loneliness in immigrant and older populations.

Reflecting and extending previous findings of the U.S. White, Black, and Hispanic populations (Cacioppo et al., 2006; Hensley et al., 2012), we found that among our participants, being more neurotic was significantly associated with greater likelihood of loneliness, whereas higher conscientiousness was negatively associated with loneliness. Existing literature has suggested a variety of factors strongly linked to loneliness, which include gender (Dong & Chen, 2017), social support (Cacioppo et al., 2006), marital status (Page & Cole, 1991), chronic diseases (Burholt & Scharf, 2014), and immigration-related factors (Wu & Penning, 2015). But after adjusting these potential confounders, the associations between neuroticism and conscientiousness with loneliness remained statistically significant.

Table 2. Correlations Between the Personality Traits, Loneliness, and Covariates.

	Age	Sex	Edu	Income	MS	LP	Yrs in U.S.	LA	Child	Grandchild	MC	SS	Loneliness	N	C
Age	1.0														
Sex	-0.01	1.0													
Edu	-0.10***	-0.17***	1.0												
Income	0.01***	0.021	0.04	1.0											
MS	-0.15***	-0.27***	0.17***	-0.01	1.0										
LP	-0.01***	-0.03	-0.57***	0.09***	-0.05*	1.0									
Yrs in U.S.	0.35***	0.02	-0.07***	0.33***	-0.06**	0.23***	1.0								
LA	-0.23***	0.05*	-0.13***	-0.11***	-0.18***	0.10***	-0.24***	1.0							
Child	0.30***	0.06**	-0.38**	-0.02	-0.10***	0.29**	0.15**	0.01	1.0						
Grandchild	-0.05**	0.11***	-0.14***	-0.14***	-0.25***	0.05*	-0.20***	0.80***	0.08***	1.0					
MC	0.25***	0.10***	0.06**	0.03	-0.07***	-0.09***	0.17***	-0.08***	0.03	-0.04	1.0				
SS	-0.05**	0.09***	0.01	-0.01	-0.01	-0.01	-0.07**	0.02	0.01	0.05*	-0.02	1.0			
Loneliness	0.03	0.03	0.05*	-0.05*	-0.17***	-0.12***	-0.021	0.01	-0.05*	-0.00	0.06**	-0.16***	1.0		
N	-0.05**	0.13***	-0.04*	-0.04*	-0.08***	-0.03	0.00	0.03	-0.06**	0.01	0.06**	-0.10***	0.28***	1.0	
C	-0.16***	-0.03	0.17***	0.04	0.09***	-0.07***	-0.11***	0.00	-0.06**	-0.00	-0.04	0.07***	-0.08***	-0.36***	1.0

Note. Edu = education; MS = marital status; LP = language preference; Yrs in U.S. = years of residence in the United States; LA = living arrangement; Child = children alive; Grandchild = grandchildren alive;

MC = medical comorbidities; SS = social support; N = neuroticism; C = conscientiousness.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3. Logistic Regressions of Personality Traits (Neuroticism and Conscientiousness) and Loneliness.

	Model A	Model B	Model C	Model D	Model E	Model F
Odds ratio [95% CI]						
Neuroticism and loneliness						
Age	1.03 [1.02, 1.04] ^{***}	1.03 [1.02, 1.04] ^{***}	1.01 [0.99, 1.02]	1.00 [0.99, 1.01]	1.00 [0.98, 1.01]	1.00 [0.98, 1.01]
Female	0.97 [0.83, 1.14]	1.02 [0.87, 1.20]	0.82 [0.67, 1.00]	0.75 [0.62, 0.94]	0.73 [0.60, 0.90] ^{**}	0.76 [0.62, 0.94] ^{**}
Education		1.02 [1.01, 1.04] ^{**}	1.03 [1.01, 1.06] ^{**}	1.00 [0.99, 1.01]	0.99 [0.97, 1.02]	0.99 [0.97, 1.02]
Income		0.96 [0.89, 1.03]	0.89 [0.82, 0.97] ^{**}	0.90 [0.82, 0.98] [*]	0.90 [0.82, 0.99] [*]	0.91 [0.83, 0.99] [*]
Married			0.37 [0.28, 0.48] ^{***}	0.36 [0.27, 0.47] ^{***}	0.36 [0.27, 0.47] ^{***}	0.35 [0.26, 0.46] ^{***}
Living arrangement (N)			1.01 [0.92, 1.12]	1.06 [0.95, 1.17]	1.06 [0.95, 1.17]	1.05 [0.95, 1.17]
Children (N)			0.97 [0.90, 1.04]	0.99 [0.92, 1.07]	0.99 [0.92, 1.07]	0.99 [0.92, 1.06]
Grandchildren (N)			0.89 [0.74, 1.07]	0.84 [0.70, 1.01]	0.84 [0.70, 1.01]	0.86 [0.71, 1.03]
Years in United States				1.01 [1.00, 1.01]	1.01 [1.00, 1.01]	1.00 [1.00, 1.01]
Cantonese/Taihanese				0.47 [0.36, 0.61] ^{***}	0.47 [0.36, 0.61] ^{***}	0.46 [0.36, 0.60] ^{***}
Medical comorbidities				1.06 [0.99, 1.13] ^{***}	1.06 [0.99, 1.13] ^{***}	1.05 [0.98, 1.12]
Social support						0.93 [0.91, 0.96] ^{***}
Neuroticism	1.16 [1.14, 1.18] ^{***}	1.16 [1.14, 1.18] ^{***}	1.16 [1.14, 1.19] ^{***}	1.16 [1.14, 1.19] ^{***}	1.16 [1.13, 1.19] ^{***}	1.15 [1.12, 1.18] ^{***}
Conscientiousness and loneliness						
Age	1.01 [1.00, 1.02] [*]	1.01 [1.00, 1.02] ^{**}	1.00 [0.99, 1.02]	0.99 [0.98, 1.01]	0.99 [0.98, 1.01]	0.99 [0.98, 1.01]
Female	1.13 [0.95, 1.33]	1.20 [1.01, 1.42] [*]	1.01 [0.82, 1.24]	0.91 [0.73, 1.12]	0.88 [0.71, 1.09]	0.91 [0.74, 1.13]
Education		1.03 [1.01, 1.05] [*]	1.04 [1.01, 1.06] ^{**}	1.00 [0.97, 1.03]	1.00 [0.97, 1.02]	0.99 [0.97, 1.02]
Income		0.92 [0.65, 0.99] [*]	0.86 [0.79, 0.94] ^{**}	0.85 [0.77, 0.94] ^{**}	0.86 [0.78, 0.95] ^{**}	0.87 [0.79, 0.96] ^{**}
Married			0.38 [0.28, 0.51] ^{***}	0.36 [0.27, 0.49] ^{***}	0.37 [0.27, 0.49] ^{***}	0.35 [0.26, 0.47] ^{***}
Living arrangement (N)			1.00 [0.90, 1.11]	1.05 [0.94, 1.17]	1.05 [0.94, 1.17]	1.05 [0.94, 1.17]
Children alive (N)			0.93 [0.86, 1.00]	0.96 [0.88, 1.03]	0.96 [0.88, 1.03]	0.95 [0.88, 1.02]
Grandchildren alive (N)			0.88 [0.72, 1.07]	0.83 [0.69, 1.01]	0.83 [0.68, 1.01]	0.84 [0.70, 1.02]
Years in United States				1.01 [1.00, 1.02]	1.01 [1.00, 1.02]	1.01 [1.00, 1.01]
Cantonese/Taihanese				0.48 [0.36, 0.63] ^{***}	0.47 [0.36, 0.63] ^{***}	0.46 [0.35, 0.61] ^{***}
Medical comorbidities					1.08 [1.01, 1.16] [*]	1.07 [1.00, 1.15] [*]
Social support						0.91 [0.89, 0.94] ^{***}
Conscientiousness	0.96 [0.94, 0.97] ^{***}	0.95 [0.94, 0.97] ^{***}	0.97 [0.95, 0.98] ^{***}	0.97 [0.95, 0.98] ^{***}	0.97 [0.95, 0.99] ^{***}	0.97 [0.96, 0.99] ^{***}

Note. CI = confidence interval; N = number.
^{*}p < .05. ^{**}p < .01. ^{***}p < .001.

Table 4. Logistic Regressions of Neuroticism and Conscientiousness Tertiles and Loneliness.

	Model A	Model B	Model C	Model D	Model E	Model F
Odds ratio [95% CI]						
Neuroticism and Loneliness						
Age	1.02 [1.01, 1.03] ^{***}	1.03 [1.02, 1.03] ^{***}	1.00 [0.99, 1.02]	1.00 [0.98, 1.01]	0.99 [0.98, 1.01]	0.99 [0.98, 1.01]
Female	1.02 [0.87, 1.20]	1.07 [0.91, 1.26]	0.85 [0.69, 1.04]	0.77 [0.62, 0.94]	0.75 [0.61, 0.92] ^{**}	0.79 [0.64, 0.96] [*]
Education		1.02 [1.00, 1.04] [*]	1.03 [1.01, 1.05] ^{**}	0.99 [0.97, 1.02]	0.99 [0.97, 1.02]	0.99 [0.96, 1.01]
Income		0.95 [0.89, 1.02]	0.87 [0.80, 0.95] ^{**}	0.87 [0.79, 0.96] [*]	0.88 [0.80, 0.96] ^{**}	0.89 [0.81, 0.97] [*]
Married			0.35 [0.27, 0.47] ^{***}	0.34 [0.26, 0.45] ^{***}	0.34 [0.26, 0.45] ^{***}	0.33 [0.25, 0.44] ^{***}
Living arrangement (N)			1.01 [0.91, 1.12]	1.06 [0.95, 1.17]	1.06 [0.95, 1.17]	1.05 [0.95, 1.17]
Children alive (N)			0.95 [0.89, 1.03]	0.98 [0.91, 1.06]	0.98 [0.91, 1.06]	0.97 [0.91, 1.05]
Grandchildren alive (N)			0.90 [0.74, 1.08]	0.85 [0.70, 1.02]	0.84 [0.70, 1.02]	0.86 [0.71, 1.03]
Years in United States			1.01 [1.00, 1.02]	1.01 [1.00, 1.02]	1.01 [1.00, 1.02]	1.01 [1.00, 1.01]
Cantonese/Taishanese			0.45 [0.35, 0.59] ^{***}	0.45 [0.35, 0.59] ^{***}	0.45 [0.35, 0.59] ^{***}	0.45 [0.34, 0.58] ^{***}
Medical comorbidities					1.07 [1.00, 1.14]	1.05 [0.99, 1.13]
Social support						0.93 [0.91, 0.95] ^{***}
Neuroticism low						
Neuroticism mid	1.55 [1.26, 1.90] ^{***}	1.53 [1.24, 1.89] ^{***}	1.57 [1.21, 2.03] ^{***}	1.54 [1.19, 1.99] ^{***}	1.52 [1.18, 1.97] ^{**}	1.51 [1.17, 1.95] ^{**}
Neuroticism high	3.80 [3.14, 4.59] ^{***}	3.82 [3.15, 4.62] ^{***}	3.98 [3.15, 5.04] ^{***}	3.97 [3.14, 5.02] ^{***}	3.92 [3.10, 4.96] ^{***}	3.59 [2.84, 4.54] ^{***}
Conscientiousness and Loneliness						
Age	1.01 [1.00, 1.03] [*]	1.02 [1.01, 1.03] ^{**}	1.00 [0.99, 1.02]	1.00 [0.98, 1.01]	0.99 [0.98, 1.01]	0.99 [0.98, 1.01]
Female	1.14 [0.97, 1.35]	1.20 [1.01, 1.43] [*]	1.00 [0.81, 1.23]	0.90 [0.73, 1.11]	0.87 [0.71, 1.08]	0.91 [0.73, 1.12]
Education		1.02 [1.01, 1.04] ^{**}	1.03 [1.01, 1.06] ^{**}	1.00 [0.97, 1.02]	0.99 [0.97, 1.02]	0.99 [0.96, 1.02]
Income		0.92 [0.86, 1.00] [*]	0.86 [0.79, 0.94] ^{**}	0.85 [0.77, 0.94] ^{**}	0.86 [0.78, 0.94] ^{**}	0.87 [0.79, 0.96] ^{**}
Married			0.37 [0.27, 0.49] ^{***}	0.36 [0.26, 0.48] ^{***}	0.36 [0.27, 0.48] ^{***}	0.34 [0.26, 0.46] ^{***}
Living arrangement (N)			1.00 [0.90, 1.11]	1.05 [0.94, 1.17]	1.05 [0.94, 1.17]	1.05 [0.94, 1.17]
Children alive (N)			0.93 [0.86, 1.00]	0.95 [0.88, 1.03]	0.95 [0.88, 1.03]	0.95 [0.88, 1.02]
Grandchildren alive (N)			0.88 [0.73, 1.07]	0.83 [0.69, 1.01]	0.83 [0.69, 1.01]	0.85 [0.70, 1.02]
Years in United States			1.01 [1.00, 1.02]	1.01 [1.00, 1.02]	1.01 [1.00, 1.02]	1.01 [1.00, 1.02]
Cantonese/Taishanese			0.48 [0.36, 0.64] ^{***}	0.48 [0.36, 0.64] ^{***}	0.48 [0.36, 0.63] ^{***}	0.46 [0.35, 0.61] ^{***}
Medical comorbidities					1.09 [1.01, 1.16] [*]	1.07 [1.00, 1.15] [*]
Social support						0.91 [0.89, 0.94] ^{***}
Conscientiousness low						
Conscientiousness mid	0.71 [0.58, 0.86] ^{***}	0.70 [0.57, 0.85] ^{***}	0.82 [0.64, 1.05]	0.84 [0.66, 1.07]	0.85 [0.66, 1.08]	0.85 [0.67, 1.08]
Conscientiousness high	0.60 [0.49, 0.73] ^{***}	0.58 [0.47, 0.71] ^{***}	0.67 [0.53, 0.86] ^{**}	0.71 [0.56, 0.90] ^{**}	0.71 [0.56, 0.90] ^{**}	0.76 [0.60, 0.96] [*]

Note. CI = confidence interval; N = number.

* $p < .05$. ** $p < .01$. *** $p < .001$.

There are a few pathways to elucidate these results. First, it is possible that the lonely feelings result from strained social relationships, which are highly related to one's tendency to be neurotic such as to feel anxious, fearful, worried, hostile, impulsive, and jealous. Based on the previous investigations in the PINE cohort, 16.7% of the Chinese older adults often get angry with the way people treat them (Chang & Dong, 2014), and anxiety and depressive symptoms were associated with declined physical function (Dong & Li, 2016; Li & Dong, 2017). These indicate that the more neurotic older individuals might have lower independency because of physical impairment, and therefore make it harder to achieve satisfying relationships. However, people who are more conscientious are known to have more satisfying relationships (Connor-Smith & Flachsbart, 2007), and conscientiousness weakened the positive association between stress and depressive symptoms (Peng, Dong, Ma, & Chen, 2017). Second, this might also be explained by the relative nature of individuals' judgments regarding objective facts. Costa and McCrae (1980) suggested that neurotic individuals tend to report more negative perceptions of the circumstances, whereas greater conscientiousness has been linked to more positive subjective well-being (Malouff, Thorsteinsson, & Schutte, 2005). Hence, it might be a universal fact that individuals who are more neurotic and/or less conscientious might be more likely to indicate the unpleasant feelings of loneliness. Importantly, the independent associations underscore the significance of considering personality as a highly relevant factor for understanding loneliness, in addition to other personal and environmental factors. Standardized measurements and research methods should be adopted in diverse populations, which would thereby enable cross-population comparisons and deepen our systematic understanding of this issue.

Interestingly, when conscientiousness was later entered as categorical tertiles in the fully adjusted model, the medium level of conscientiousness showed no significant association with loneliness, whereas the high level of conscientiousness was associated with 24% and decreased the risk of loneliness. This indicates that the observed negative association between being conscientious and feeling lonely might be conditional; only when reaching to higher levels of conscientiousness that people would be less likely to feel lonely. Determining cut-off points of conscientiousness could be essential for future intervention strategies and diagnostic decision-making, but agreements have not been reached upon this. We believe that our findings contribute to the literature as our knowledge about conscientiousness remains little relative to other traits such as openness, extraversion, and neuroticism.

Furthermore, after adding marital status as a covariate, the associations between the medium conscientiousness and loneliness became insignificant. More surprisingly, loneliness was negatively correlated with having more children. This seems to challenge our earlier assumption

about the cultural importance of intergenerational relationships among the Chinese. Moreover, a prior quantitative study has demonstrated that the lower the perceived receipt of filial piety (from adult children), the lonelier the older parents feel (Dong, Zhang, & Chang, 2015). This paradox may be because the number of children does not necessarily equate the quality of child–parent relationships. In addition, the immigration experience is likely to alter and strain intergenerational relationships because of acculturation disparities (Dong, Chen, Fulmer, & Simon, 2014; Jung, 2013). It is highly possible that for the immigrant aging Chinese population, lack of satisfying child–parent relationships might cause lonely feelings, making intimate partnerships (spouse) essential. Building on the existing literature, this finding sheds light on the mechanism of perceived loneliness among the population and has the potential to improve cultural sensitivity for future interventions.

Challenging the stereotypes of age-related declines in social connections and aforementioned higher prevalence of loneliness in older populations, we found no significant correlation between age and loneliness. The theory of socioemotional selectivity might provide some insights; when time is perceived as limited as people age, they tend to prioritize emotional and social goals and try to achieve optimal results (Carstensen, Isaacowitz, & Charles, 1999). From a neuroscience perspective, this could be attributed to age-related decreased activation of the amygdala in brains, which is associated with less emotional response (e.g., loneliness; Cacioppo, Berntson, Bechara, Tranel, & Hawkey, 2011). The complexity of loneliness requires leveraged multidisciplinary efforts to test hypotheses as such for untangling it through the social and biological lens.

Our findings need to be interpreted cautiously because they might not be generalizable to other populations and have limitations. First, individual personality might vary depending on contextual and age-related factors (Baltes, Staudinger, & Lindenberger, 1999). With the cross-sectional design of the research, we were unable to assess the longitudinal patterns that might better reflect one's enduring disposition. Second, the NEO Five-Factor Model developed based on Western cultures might be inadequate for psychology research within non-Western populations. More culture-specific measures, for instance, the Chinese constructs of harmony, face, and Ren Qing, deserve further investigations (Cheung et al., 2001). Third, loneliness has been conceptualized into chronic and situational types based on duration, each subjected to variations in their impact (Shiovitz-Ezra & Ayalon, 2010). Longitudinal data can better address this limitation in the future.

Despite the limitations, our findings contribute to the understanding of personality traits and loneliness in a large number of older people, whereas prior related conclusions were majorly drawn from younger and/or smaller cohorts. More importantly, as feelings of loneliness are multifaceted and culturally constructed, this study

expands our knowledge of loneliness among a representative immigrant older population in the United States. This continues to require research investigations of the older minority individuals who have received limited attention but are highly susceptible to the associated health consequences.

In practice, given different individual and cultural needs for relational satisfaction and coping methods, it is critical to enhance the psychological and cultural profiles of people who experience loneliness for appropriate design and implementation of intervention strategies. Furthermore, since the 1980s, loneliness has been treated as a unique clinical problem, and a number of strategies (e.g., cognitive-behavior therapy, social skill training, and social support) have been adopted for counseling treatments to alleviate the issue. A key of these counseling interventions is matching counselors and techniques with clients (McWhirter, 1990), which cannot be achieved without a comprehensive understanding of personal level characteristics and their relationships to loneliness.

As the largest population-based study about personality and loneliness of U.S. Chinese older adults, this study demonstrates the independent associations between neuroticism and conscientiousness with perceived loneliness, regardless of some important factors. Additional longitudinal research examining the differences in trajectories of loneliness over time will substantially enhance researchers' understanding of antecedents and consequences of loneliness pertaining to older adults.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

ORCID iD

Bei Wang  <https://orcid.org/0000-0002-3125-5140>

References

- Baltes, P. B., Staudinger, U. M., & Lindenberger, U. (1999). Lifespan psychology: Theory and application to intellectual functioning. *Annual Review of Psychology, 50*, 471-507. doi:10.1146/annurev.psych.50.1.471
- Burholt, V., & Scharf, T. (2014). Poor health and loneliness in later life: The role of depressive symptoms, social resources, and rural environments. *The Journals of Gerontology, Series B: Psychological Sciences & Social Sciences, 69*, 311-324. doi:10.1093/geronb/gbt121
- Cacioppo, J. T., Berntson, G. G., Bechara, A., Tranel, D., & Hawkley, L. C. (2011). Could an aging brain contribute to subjective well-being? The value added by a social neuroscience perspective. In A. Todorov, S. T. Fiske, & D. A. Prentice (Eds.), *Oxford series in social cognition and social neuroscience. Social neuroscience: Toward understanding the underpinnings of the social mind* (pp. 249-262). New York, NY, US: Oxford University Press.
- Cacioppo, J. T., Hawkley, L. C., Ernst, J. M., Burleson, M., Berntson, G. G., Nouriani, B., & Spiegel, D. (2006). Loneliness within a nomological net: An evolutionary perspective. *Journal of Research in Personality, 40*, 1054-1085. doi:10.1016/j.jrp.2005.11.007
- Carstensen, L. L., Isaacowitz, D. M., & Charles, S. T. (1999). Taking time seriously: A theory of socioemotional selectivity. *American Psychologist, 54*, 165-181.
- Chang, E.-S., Beck, T., Simon, M. A., & Dong, X. (2014). A psychometric assessment of the psychological and social well-being indicators in the PINE study. *Journal of Aging and Health, 26*, 1116-1136. doi:10.1177/0898264314543471
- Chang, E.-S., & Dong, X. (2014). Personality traits among community-dwelling Chinese older adults in the Greater Chicago area. *AIMS Medical Science, 1*, 73-86. doi:10.3934/Medsci.2014.2.73
- Cheung, F. M., Leung, K., Zhang, J.-X., Sun, H.-F., Gan, Y.-Q., Song, W.-Z., & Xie, D. (2001). Indigenous Chinese personality constructs: Is the five-factor model complete? *Journal of Cross-Cultural Psychology, 32*, 407-433. doi:10.1177/0022022101032004003
- Connor-Smith, J. K., & Flachsbart, C. (2007). Relations between personality and coping: A meta-analysis. *Journal of Personality and Social Psychology, 93*, 1080-1107. doi:10.1037/0022-3514.93.6.1080
- Costa, P. T., & McCrae, R. R. (1980). Influence of extraversion and neuroticism on subjective well-being: Happy and unhappy people. *Journal of Personality and Social Psychology, 38*, 668-678. doi:10.1037/0022-3514.38.4.668
- Costa, P. T., & McCrae, R. R. (1992). *Revised NEO Personality Inventory (NEO PI-R) and NEO Five-Factor Inventory (NEO-FFI): Professional manual*. Odessa, FL: Psychological Assessment Resources.
- Dong, X. Q., Chang, E.-S., Wong, E., & Simon, M. (2011). The perceptions, social determinants, and negative health outcomes associated with depressive symptoms among U.S. Chinese older adults. *The Gerontologist, 52*, 650-663. doi:10.1093/geront/gnr126
- Dong, X. Q., Chang, E.-S., Wong, E., & Simon, M. A. (2012). Perception and negative effect of loneliness in a Chicago Chinese population of older adults. *Archives of Gerontology and Geriatrics, 54*, 151-159. doi:10.1016/j.archger.2011.04.022
- Dong, X. Q., & Chen, R. (2017). Gender differences in the experience of loneliness in U.S. Chinese older adults. *Journal of Women & Aging, 29*, 115-125. doi:10.1080/08952841.2015.1080534
- Dong, X. Q., Chen, R., Fulmer, T., & Simon, M. A. (2014). Prevalence and correlates of elder mistreatment in a community-dwelling population of U.S. Chinese older adults. *Journal of Aging and Health, 26*, 1209-1224. doi:10.1177/0898264314531617
- Dong, X. Q., & Li, M. T. (2016). Self-reported and directly observed physical function and anxiety symptoms in community-dwelling US Chinese older adults: Findings from the PINE study. *Journal of Psychology and Cognition, 1*, 29-36.
- Dong, X. Q., Li, M. T., & Hua, Y. X. (2017). The association between filial discrepancy and depressive symptoms: Findings from a community-dwelling Chinese aging population. *The Journals of Gerontology, Series A: Biological Sciences & Medical Sciences, 72*(Suppl. 1), S63-S68. doi:10.1093/gerona/glx040

- Dong, X. Q., Wong, E., & Simon, M. A. (2014). Study design and implementation of the PINE study. *Journal of Aging and Health, 26*, 1085-1099. doi:10.1177/0898264314526620
- Dong, X. Q., Zhang, M., & Chang, E.-S. (2015). The association between filial piety and loneliness among Chinese older adults in the Greater Chicago area. *Journal of Epidemiological Research, 2*, 62-70. doi:10.5430/jer.v2n1p62
- Hawkley, L. C., Thisted, R. A., Masi, C. M., & Cacioppo, J. T. (2010). Loneliness predicts increased blood pressure: 5-year cross-lagged analyses in middle-aged and older adults. *Psychology and Aging, 25*, 132-141. doi:10.1037/a0017805
- Hensley, B., Martin, P., Margrett, J. A., MacDonald, M., Siegler, I. C., & Leonard Poon, W. (2012). Life events and personality predicting loneliness among Centenarians: Findings from the Georgia Centenarian study. *The Journal of Psychology: Interdisciplinary and Applied, 146*, 173-188. doi:10.1080/00223980.2011.613874
- Hughes, M. E., Waite, L. J., Hawkley, L. C., & Cacioppo, J. T. (2004). A short scale for measuring loneliness in large surveys: Results from two population-based studies. *Research on Aging, 26*, 655-672. doi:10.1177/0164027504268574
- Jung, M.-J. (2013). *The role of an intergenerational acculturation gap in the adjustment of immigrant youth: A meta-analysis* (Doctoral dissertation). Knoxville: University of Tennessee.
- Li, M. T., & Dong, X. Q. (2017). Association between both self-reported and directly observed physical function and depressive symptoms in a US Chinese population: Findings from the PINE study. *SOJ Psychology, 3*(1), 1-8.
- Li, M. T., & Dong, X. Q. (2018). Is social network a protective factor for cognitive impairment in US Chinese older adults? Findings from the PINE study. *Gerontology, 64*, 246-256. doi:10.1159/000485616
- Luo, Y., Hawkley, L. C., Waite, L. J., & Cacioppo, J. T. (2012). Loneliness, health, and mortality in old age: A national longitudinal study. *Social Science & Medicine, 74*, 907-914. doi:10.1016/j.socscimed.2011.11.028
- Malouff, J. M., Thorsteinsson, E. B., & Schutte, N. S. (2005). The relationship between the five-factor model of personality and symptoms of clinical disorders: A meta-analysis. *Journal of Psychopathology and Behavioral Assessment, 27*, 101-114. doi:10.1007/s10862-005-5384-y
- McWhirter, B. T. (1990). Loneliness: A review of current literature, with implications for counseling and research. *Journal of Counseling & Development, 68*, 417-422. doi:10.1002/j.1556-6676.1990.tb02521.x
- Page, R. M., & Cole, G. E. (1991). Demographic predictors of self-reported loneliness in adults. *Psychological Reports, 68*(3 Pt 1), 939-945. doi:10.2466/PR0.68.3.939-945
- Paul, C., Ayis, S., & Ebrahim, S. (2006). Psychological distress, loneliness and disability in old age. *Psychology, Health & Medicine, 11*, 221-232. doi:10.1080/13548500500262945
- Peng, Y., Dong, X., Ma, X., & Chen, Y. (2017). Conscientiousness moderates the relationship between perceived stress and depressive symptoms among U.S. Chinese older adults. *The Journals of Gerontology, Series A: Biological Sciences & Medical Sciences, 72*(7), S108-S112. doi:10.1093/geron/ glw172
- Peplau, L. A., & Perlman, D. (1982). *Loneliness: A source-book of current theory, research, and therapy*. New York, NY: John Wiley.
- Shiovitz-Ezra, S., & Ayalon, L. (2010). Situational versus chronic loneliness as risk factors for all-cause mortality. *International Psychogeriatrics, 22*, 455-462. doi:10.1017/S1041610209991426
- Simon, M. A., Chang, E.-S., Rajan, K. B., Welch, M. J., & Dong, X. (2014). Demographic characteristics of U.S. Chinese older adults in the Greater Chicago area: Assessing the representativeness of the PINE study. *Journal of Aging and Health, 26*, 1100-1115. doi:10.1177/0898264314543472
- Simon, M. A., Chang, E.-S., Zhang, M., Ruan, J., & Dong, X. (2014). The prevalence of loneliness among U.S. Chinese older adults. *Journal of Aging and Health, 26*, 1172-1188. doi:10.1177/0898264314533722
- Smith, S., Jaszczak, A., Graber, J., Lundeen, K., Leitsch, S., Wargo, E., & O'Muirheartaigh, C. (2009). Instrument development, study design implementation, and survey conduct for the national social life, health, and aging project. *The Journals of Gerontology, Series B: Psychological Sciences & Social Sciences, 64*(Suppl. 1), i20-i29. doi:10.1093/geronb/gbn013
- Terrazas, A., & Batalova, J. (2010). *Chinese immigrants in the United States*. Migration Information Source. Retrieved from <https://www.migrationpolicy.org/article/chinese-immigrants-united-states-0>
- Watson, D., & Hubbard, B. (1996). Adaptational style and dispositional structure: Coping in the context of the five-factor model. *Journal of Personality, 64*, 737-774. doi:10.1111/j.1467-6494.1996.tb00943.x
- Wilson, C., & Moulton, B. (2010). *Loneliness among older adults: A national survey of adults 45+*. Retrieved from https://assets.aarp.org/rgcenter/general/loneliness_2010.pdf
- Wu, Z., & Penning, M. (2015). Immigration and loneliness in later life. *Ageing & Society, 35*, 64-95. doi:10.1017/S0144686X13000470