The perceived relationship quality with migrant domestic workers is correlated with a lower level of loneliness among community-dwelling older adults: A cross-sectional study☆

Ken H.M. Ho [a],[*], Maria S.Y. Hung [b],[1], Youjuan Zhang [a],[2], Xue Bai [c],[3], Daphne S.K. Cheung [d],[4], Meyrick C.M. Chow [b],[5], Paul H. Lee [e],[6], Wai Tong Chien [a],[7]

[a] The Nethersole School of Nursing, Faculty of Medicine, The Chinese University of Hong Kong, Shatin, New Territories, Hong Kong
[b] School of Health Sciences, Caritas Institute of Higher Education, Tseung Kwan O, New Territories, Hong Kong
[c] Department of Applied Social Sciences, Faculty of Health and Social Sciences, Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong
[d] School of Nursing, Faculty of Health and Social Sciences, Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong
[e] Southampton Clinical Trials Unit, University of Southampton, United Kingdoms

ARTICLE INFO

ABSTRACT

Purpose: To explore older adults' perceived relationship quality with migrant domestic workers (MDWs) and examine the correlation between older adult/MDW (O-M) relationship quality and loneliness of community-dwelling older adults.

Materials and methods: In this cross-sectional study, older adults living with MDWs were conveniently recruited from neighbourhood elderly centers in Hong Kong. Loneliness and O-M relationship quality were assessed by the 6-item De Jong Gierveld Loneliness Scale and the mutuality scale, respectively. Older adults' demographic and functional characteristics, and MDW's nationality, spoken language and years of service in the dyad were also collected. Hierarchical multiple regression analyses were conducted to examine the contributions of 1) demographic variables and functional status, 2) MDW characteristics, 3) perceived social network and 4) perceived O-M relationship quality on loneliness.

Results: The 178 participants [mean age 83.44 (SD 7.05 years); 155 (87.1%) women and 23 men (22.9%)] were socially lonely (1.07 ± 1.15) and close to being lonely overall (1.90 ± 1.68), and emotionally (0.84 ± 0.97). The mean O-M relationship quality was poor (1.42 ± 0.79), which was significantly correlated with overall (β = -0.33, 95% CI: -0.65 to -0.01, P value = 0.045), and social (β= -0.24, 95% CI: -0.46 to -0.01, P value = 0.04) loneliness, but not significantly correlated to emotional loneliness.

Conclusion: Better perceived O-M relationship quality is correlated with a lower level of loneliness among older adults. Strategies to improve O-M relationship quality may alleviate loneliness among older adults.

* Corresponding author at: The Nethersole School of Nursing, The Chinese University of Hong Kong, Shatin, New Territories ELB 731, Hong Kong.
E-mail address: kenho@cuhk.edu.hk (K.H.M. Ho).
[1] 0000-0001-9989-9498.
[2] 0000-0002-9399-1848.
[3] 0000-0002-0502-7291.
[4] 0000-0001-5651-9352.
[5] 0000-0001-6826-1539.
[6] 0000-0002-5729-6450.
[7] 0000-0001-5321-5791.

1. Introduction

Loneliness is a neglected social determinant of health (World Health Organization, 2021) and describes the feeling of a deficit between actual and desired social contact (Fokkema et al., 2012; Gierveld et al., 2018). The deficit pertains to a highly subjective experience of intimacy absence (emotional loneliness) or a limited social network (social loneliness) (Gierveld et al., 2018; Weiss, 1973). Loneliness is associated with a number of adverse health outcomes in both physical (Hodgson et al., 2020; Leigh-Hunt et al., 2017; Lim et al., 2020; Valtorta et al., 2016) and mental aspects (Griffin et al., 2020; Lara et al., 2019). The detrimental effects of loneliness affect older adults more with their degraded physiological resilience (Cacioppo & Cacioppo, 2018). Older adults face an elevated risk of loneliness as they age, increasing from 6 to 15% among those aged 65 years and above to 50% among those aged 80 years and above (Penning et al., 2014). Increased age, sex, living arrangement, being widowed or divorced, poor self-rated health, and social support are consistently associated with loneliness (Chan et al., 2017; Chen et al., 2014; De Jong Gierveld et al., 2018).

Due to decreased fertility, shortage of family caregivers and the increase in life expectancy, there has been an emerging worldwide trend that older adults are cared by migrant domestic workers (MDWs) (Ho et al., 2019; Iecovich, 2014; Kay, 2017). MDWs are full-time live-in migrant workers hired underground or regulated by law, and each MDW is tied to an employer in a single household to perform domestic work and family care (Basnyat & Chang, 2017). There were 11.5 million MDWs globally (Gallotti, 2015). MDWs made up almost one in five domestic workforce across the world (International Labour Organization, 2016), and for instance, the percentage of MDWs in domestic workforce was 54.6% in the regions of Northern, Southern and Western Europe and 70.8% in North America (International Labour Organization, 2016; Rao et al., 2021). Specific to Asian regions, there is also a great demand for MDWs for older adults care. In Hong Kong, approximately 183,000 older adults were under the care of live-in MDWs in 2018 (Mission for Migrant Workers, 2018). The percentage of older singleton households employing MDWs increased four-folds from 1995 to 9.7% in 2016 (Legislative Council Commission, 2017). It was estimated that around 300,000 MDWs would be needed in Singapore by 2030 (The National Population & Talent Division, 2012).

According to the convoy model of social relations, people surrounding an individual constitute a dynamic network denoted as a convoy, which includes people providing and receiving support from the individual and having influences on the individual's well-being (Fuller et al., 2020). Traditionally, family support is a major protector against loneliness in older adults (Yang & Gu, 2020). However, the contemporary small household size decreases the capacity of family members to support the wellbeing of older adults. MDWs function as a consistent source of social contact for older adults because they provide round-the-clock services for older adults (Mission for Migrant Workers, 2018), compensating the shrinking support by family members.

Meanwhile, people closest to the individual are the most crucial support providers because of the solid emotional exchange making these people irreplaceable (Fuller et al., 2020). Grounded in the convoy model, the quality of the interpersonal relationship is of particular importance for the wellbeing of older adults (Ho, Mak et al., 2022; Rippon et al., 2020). Qualitative studies showed that older adults and MDWs could develop a substantially intimate relationship through the kinning process (Ho et al., 2019, 2018). However, researchers also argued that introducing MDWs into a family setting would predispose older adults to loneliness (Ayalon et al., 2012). It was suggested that the large age gap, different cultural backgrounds and linguistic structures prevented satisfactory communication, thus impeding the development of good older adult/MDW (O-M) relationships (Ayalon et al., 2012). In comparison to traditional family caregivers, MDWs caring involved both instrumental and emotional aspects (Baldassar et al., 2017), alongside being paid care (Ho et al., 2019). As such, a moderate level of

ambivalence between MDWs and older adults is found in an Israel study (Iecovich, 2014). However, information about the influence of O-M relationship quality on loneliness among community-dwelling older adults were scant (Ayalon et al., 2012; Iecovich, 2014).

Given the increasing MDWs supporting older adults and high prevalence and negative health consequences of loneliness, this study thereby aimed to explore the O-M relationship quality and examine its correlation with the perceived loneliness of community-dwelling older adults being supported by MDWs.

2. Methods

2.1. Study design

We report this cross-sectional study in the format recommended by the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement (Elm et al., 2007).

2.2. Setting

Participants were recruited from elderly community centers, referred as neighbourhood elderly centers (NECs), in Hong Kong. These centers provide community support services at neighbourhood level including a range of comprehensive services to enable older adults to remain in the community, such as health education, counselling services, and social activities.

2.3. Participants

Community-dwelling older adults who were supported by MDWs were recruited for this study. There is no sampling frame for randomly recruiting older adults with MDWs and such participants can only be found from NECs. NECs provide comprehensive social care services to healthy and vulnerable older adults, including older adults with MDWs, which make them the best available sites with minimal systematic bias for recruiting sample. There were 171 NECs covering all districts in Hong Kong. Project promotion posters (both e-copy and hardcopy) were sent to all the NECs. Interested participants will contact the research team through the center-in-charge of NECs. A research assistant then double confirmed the eligibility of the participants.

2.4. Inclusion criteria

Community-dwelling older adults aged 60 years or above, supported by MDWs were eligible for participation. Community-dwelling was defined as living at home for the past six months without being institutionalized.

2.5. Exclusion criteria

To minimize recall bias, we excluded adults with cognitive impairment (scored <6 on the Abbreviated Mental Test, AMT, Chu et al., 1995) from participating in this study. Those diagnosed with serious psychiatric illness were also excluded from participating in this study.

2.6. Sample size

Using G-Power 3.1.9.7, a priori power analysis was conducted using multiple linear regression (fixed model, R^2 increase). While little information was found about the association between perceived O-M relationship quality and loneliness, previous studies indicated that living with MDWs was associated with loneliness at small ($d = 0.46$) (O'Súilleabháin et al., 2019) to medium (R^2=0.298) (Ho, Cheung et al., 2022) strengths. To be conservative, a small effect size and an error probability of 0.05 and the power of 0.8 was assumed, with one tested predictor and a total of 11 predictors. The estimated sample size was at least 151.

2.7. Data collection

Guided by questionnaires, a trained research assistant conducted individual face-to-face interview with each participant in Cantonese in a quiet room of the referring NECs from January to September 2021. Each interview took 35 to 45 min. Upon completion, a beverage coupon of HK $100 (approximately US$12.8) was given to each participant as compensation for their time.

2.8. Outcome

The perceived loneliness of older adults was measured using the 6-item Chinese version of the De Jong Gierveld Loneliness Scale (DJGLS) (Leung et al., 2008). The DJGLS has two subscales measuring emotional and social loneliness, with three items in each subscale. With an overall score ranging from 0 to 6, a score of ≥ 2 was considered lonely, and a higher score indicates a greater level of loneliness (Van Tilburg & De Jong Gierveld, 2019). Scoring 1 or higher on subscales suggests being lonely emotionally or socially (Van Tilburg & De Jong Gierveld, 2019). This scale has been validated among Hong Kong Chinese population, exhibiting good internal consistency (Cronbach's α = 0.76) and excellent inter-rater reliability (Intraclass correlation coefficient = 0.98–1.00) (Leung et al., 2008).

2.9. Correlate

The 15-item Chinese version of the Mutuality Scale (Shyu et al., 2010) was used to assess the older adult's perceived O-M relationship quality as the correlate. The Mutuality Scale showed excellent internal consistency among Chinese, presenting a Cronbach's α of 0.94 (Shyu et al., 2010). The total score, calculated as the average of the summed item scores, ranged from 0 to 4, with a score less than 2.5 suggesting poor mutuality (Kneeshaw et al., 1999; Zhou et al., 2022).

2.10. Potential confounders

Potential confounders, which can distort the true relationship between the exposure and outcome without proper adjustment (Devick et al., 2022), were categorized into socio-demographic, characteristics of MDWs, functional status, and social network in our study. These variables were known to be consistently associated with loneliness (Chen et al., 2014; Pinquart & Sörensen, 2003) and potentially related to the O-M relationship quality (Cohen-Mansfield & Golander, 2022; Walsh & Shutes, 2013).

Socio-demographic variables of older adults, including age (years), sex, marital status (married or not), education attainment (nil/pre-primary, primary, or secondary and above), and living arrangement (living with family or not), were collected using a self-developed questionnaire. MDW-related information on nationality, spoken language and years of service in the dyad were also collected, as these factors have been argued to be related to loneliness among older adults and the O-M relationship quality (Ayalon et al., 2012; Baldassar et al., 2017; Ho et al., 2018).

Functional status was evaluated by the 9-item Chinese version of the Lawton Instrumental Activities of Daily Living Scale (Tong & Man, 2002). Nine dimensions of instrumental activities of daily living were measured by the nine items on a 3-point scale (0= "unable to do", 1= "with help", 2= "independent"). Within the range of 0 to 18, a higher total score shows higher level of independency in performing daily instrumental activities. The scale showed good internal consistency, as well as excellent test-retest (ICC= 0.90) and inter-rater (ICC= 0.99) reliabilities among Hong Kong Chinese (Tong & Man, 2002).

Social network was examined using the 10-item Chinese version of the Lubben Social Network Scale (Chou & Chi, 1999). Social networks from family, friends and interdependent relations was measured. Individual items were rated on a 6-point scale by frequency (from 0= never to 5= always). In total, the score ranged from 0 to 50, with a higher score

Table 1
Socio-demographic, health status, and co-living profile of the participants ($N = 178$).

Characteristics	Mean (SD)/frequency (%)
Older adults	
Age, years	83.44 (7.05)
Sex	
Male	23 (12.9)
Female	155 (87.1)
Marital status	
Single/divorced/separated/widowed	121 (68.0)
Married	57 (32.0)
Education level	
Nil/pre-primary	47 (26.4)
Primary	80 (44.9)
Secondary and above	51 (28.7)
Social network, LSNS	19.29 (8.74)
LSNS <20	98 (55.1)
Functional capacity, IADL	12.34 (4.07)
Loneliness, DJGLS score	
Overall score	1.90 (1.68)
Overall score ≥2	95 (53.4)
Emotional subscale score	0.84 (0.97)
Emotional subscale score ≥1	90 (50.6)
Social subscale score	1.07 (1.15)
Social subscale score ≥1	100 (56.2)
Living with family	
No	86 (48.3)
Yes	92 (51.7)
Dyadic relationship quality, MS total score	1.42 (0.79)
MS total score <2.5	166 (93.3)
Migrant worker	
Nationality	
Filipinos	32 (18.0)
Indonesians	142 (79.8)
Others (including Thais, Malaysians, and Bengalese)	4 (1.1)
Spoken language	
Cantonese	141 (79.2)
Non-Cantonese	37 (20.8)
Serving years	3.02 (2.66)

suggesting a better social network. Those who scored below 20 were deemed at greater risk of social isolation (Lubben, 1988). Among Hong Kong Chinese older adults, this scale has demonstrated satisfactory internal consistency with a Cronbach's α of 0.72 (Chou & Chi, 1999).

2.11. Bias

A minimum of 90% inter-rater reliability was achieved between the responsible research assistant and the aging research expert in our team by training. An adequate sample size was achieved to infer firm findings from the data analysis.

2.12. Statistical analysis

All statistical analyses were performed using SPSS (Version 26.0, IBM Corp., Armonk, NY). Participants' demographic, functional status, MDW characteristics and perceived social network were summarized using descriptive statistics. Means and standard deviations (SDs), and frequencies and percentages were used to present continuous and categorical variables, respectively. Hierarchical multiple regression analyses were conducted on loneliness to examine the separate contributions with four models: 1) demographic variables and functional status, 2) MDW characteristics, 3) perceived social network and 4) perceived O-M relationship quality. Using loneliness as the dependent variable in the hierarchical regression analysis, model 1 involved older adults' demographic variables, including age, marital status, educational attainment, and living arrangements, and functional status. In model 2, characteristics of MDWs, including nationality, spoken

Table 2

Summary of hierarchical regression analysis for variables predicting overall loneliness in older adults ($N = 178$).

Variable	β	95% CI for β	SE	P value	R^2	Adjusted R^2	R^2 Change	P value
Model 1					0.05	0.01	0.05	0.23
Demographic characteristics of the older adults								
Age	−0.02	−0.06 to 0.02	0.02	0.42				
Marital status								
Single (ref)	0	0						
With a partner	0.25	−0.39 to 0.89	0.32	0.44				
Educational attainment								
No formal education (ref)	0	0						
Primary education	0.05	−0.57 to 0.67	0.31	0.87				
Secondary education and above	−0.58	−1.30 to 0.15	0.37	0.12				
Living with family								
No (ref)	0	0						
Yes	−0.13	−0.73 to 0.46	0.30	0.66				
Functional capacity	−0.06	−0.12 to 0.01	0.03	0.08				
Model 2					0.13	0.08	0.09	0.003
Demographic characteristics of the older adults								
Age	−0.01	−0.05 to 0.03	0.02	0.48				
Marital status								
Single (ref)	0	0						
With a partner	0.19	−0.44 to 0.81	0.32	0.56				
Educational attainment								
No formal education (ref)	0	0						
Primary education	−0.04	−0.65 to 0.56	0.31	0.89				
Secondary education and above	−0.67	−1.39 to 0.05	0.36	0.07				
Living with family								
No (ref)	0	0						
Yes	−0.16	−0.74 to 0.42	0.29	0.58				
Functional capacity	−0.05	−0.12 to 0.01	0.03	0.08				
Migrant workers' characteristics								
Nationality								
Philippines (ref)	0	0						
Indonesia	1.34	0.65 to 2.03	0.35	**<0.001**				
Others (including Thailand, Malaysia, and Bengalese)	0.95	−0.82 to 2.71	0.89	0.29				
Spoken language								
Cantonese (ref)	0	0						
Non-Cantonese	0.95	0.28 to 1.62	0.34	**0.006**				
Serving years	0.002	−0.09 to 0.10	0.05	0.97				
Model 3					0.17	0.12	0.04	0.007
Demographic characteristics of the older adults								
Age	−0.03	−0.06 to 0.01	0.02	0.20				
Marital status								
Single (ref)	0	0						
With a partner	0.29	−0.33 to 0.91	0.31	0.36				
Educational attainment								
No formal education (ref)	0	0						
Primary education	−0.09	−0.68 to 0.51	0.30	0.77				
Secondary education and above	−0.65	−1.36 to 0.06	0.36	0.07				
Living with family								
No (ref)	0	0						
Yes	−0.04	−0.62 to 0.54	0.29	0.89				
Functional capacity	−0.04	−0.10 to 0.03	0.03	0.26				
Migrant workers' characteristics								
Nationality								
Philippines (ref)	0	0						
Indonesia	1.30	0.62 to 1.97	0.34	**<0.001**				
Others (including Thailand, Malaysia, and Bengalese)	0.84	−0.90 to 2.57	0.8	0.34				
Spoken language								
Cantonese (ref)	0	0						
Non-Cantonese	1.03	0.37 to 1.69	0.33	**0.002**				
Serving years	−0.02	−0.11 to 0.08	0.05	0.70				
Perceived social network	−0.04	−0.08 to −0.01	0.02	**0.007**				
Model 4					0.19	0.13	0.02	0.045
Demographic characteristics of the older adults								
Age	−0.03	−0.07 to 0.01	0.02	0.19				
Marital status								
Single (ref)	0	0						
With a partner	0.27	−0.34 to 0.88	0.31	0.39				
Educational attainment								
No formal education (ref)	0	0						
Primary education	−0.11	−0.70 to 0.48	0.30	0.70				
Secondary education and above	−0.74	−1.44 to −0.04	0.36	0.04				
Living with family								
No (ref)	0	0						
Yes	−0.06	−0.63 to 0.51	0.29	0.84				

Table 2 (*continued*)

Variable	β	95% CI for β	SE	*P* value	R²	Adjusted R²	R² Change	*P* value
Functional capacity	−0.03	−0.09 to 0.03	0.03	0.36				
Migrant workers' characteristics								
Nationality								
Philippines (ref)	0	0						
Indonesia	1.37	0.69 to 2.04	0.34	**<0.001**				
Others (including Thailand, Malaysia, and Bengalese)	0.77	−0.95 to 2.49	0.87	0.38				
Spoken language								
Cantonese (ref)	0	0						
Non-Cantonese	1.11	0.45 to 1.77	0.33	**0.001**				
Serving years	−0.01	−0.10 to 0.08	0.05	0.84				
Perceived social network	−0.03	−0.07 to −0.001	0.02	**0.045**				
Perceived dyadic relationship quality	−0.33	−0.65 to −0.01	0.16	**0.045**				

language, and years of service, were included. Model 3 and 4 further included perceived social network and perceived O-M relationship quality, respectively. The statistical significance level was set at 0.05.

2.13. Ethical considerations

Ethical approval was obtained from the School Research Committee of a tertiary education institution in Hong Kong. Written informed consent was sought from each participant after a detailed explanation of the study purpose, the confidentiality and anonymity of the study, and their right to withdraw from the study at any time. Upon screening, any older adult presented with AMT< 6 without prior medical attention, our team provided information for a voluntary follow-up check from geriatric clinics. This is a general practice in Hong Kong (Ho, Cheung et al., 2022).

3. Results

3.1. Study sample

A total of 187 participants recruiting from 23 NECs completed the survey, and nine participants (4.81%) had missing data on marital status, education level, MDWs' nationality or spoken language. Eventually, 178 participants were included in the analysis. As shown in Table 1, the majority of the participants were female ($n = 155$, 87.1%), with less than one-third being married ($n = 57$, 32.0%) and having attained secondary education or above ($n = 51$, 28.7%). Participants living with family ($n = 92$, 51.7%) were slightly more than those who were not. For social network, 55.1% of the participants were at risk of social isolation, presenting a mean score of 19.29 (SD 8.74).

Participants were close to being lonely (mean 1.90, SD 1.68) overall and emotionally (mean 0.84, SD 0.97), while their mean value of social loneliness reached the level of being lonely (mean 1.07, SD 1.15). In particular, more than half of the participants perceived loneliness overall ($n = 95$, 53.4%), emotionally ($n = 90$, 50.6%) and socially ($n = 100$, 56.2%). On average, they had poor quality in the relationship with MDWs (mean 1.42, SD 0.79), and a large proportion (93.3%) reported a mutuality score of below 2.5, meaning poor quality of relationship. Participants had a mean score of 12.34 (SD 4.07) for functional status, showing medium level of physical functioning. Most MDWs were Indonesians ($n = 142$, 79.8%) and Filipinos ($n = 32$, 18.0%), and 79.2% spoke Cantonese. The mean length of service was 3.02 (SD 2.66) years.

3.2. Correlation between O-M relationship quality and loneliness

Table 2 summarizes the variables predicting overall loneliness in older adults. As shown in the hierarchical regression analysis, with older adults' sociodemographic variables included only, model 1 showed insignificant contributions to the model with a weak effect size (R² = 0.05). Model 2, F (10, 167) = 2.57, *p* value = 0.006, R² = 0.13, which includes MDW's variables, showed significant improvement from model

1, ΔF (4, 167) = 4.22, *P* value = 0.003, ΔR² = 0.09. Both MDW's Indonesian nationality ($\beta = 1.34$, 95% CI: 0.65 to 2.03, *P* value < 0.001) and spoken language ($\beta = 0.95$, 95% CI: 0.28 to 1.62, *P* value = 0.006) contributed significantly to the overall loneliness. In model 3, F (11, 166) = 3.11, *P* value = 0.001, R² = 0.17, social network ($\beta = -0.04$, 95% CI: −0.08 to −0.01, *P* value = 0.007) significantly improved the regression model, ΔF (1, 166) = 7.54, *P* value = 0.007, ΔR² = 0.04. Introducing the variable of O-M relationship quality ($\beta = -0.33$, 95% CI: −0.65 to −0.01, *P* value = 0.045) to model 4, F (12, 165) = 3.25, *P* value < 0.001, R² = 0.19, led to further improvement of the regression model, ΔF (1, 165) = 4.08, *P* value = 0.045, ΔR² = 0.02, explaining 2% of the total variance. In model 4, having attained secondary education and above ($\beta = -0.74$, 95% CI: −1.44 to −0.04, *P* value = 0.04) was also correlated with a lower level of loneliness. The final model accounted for 19.1% of the variance, representing a moderate effect size (Cohen, 1988). With a sample size of 178, one tested correlate and a total of 11 correlates, assuming an error probability of 0.05, our estimated effect size achieved a power of above 99.99%.

In predicting social loneliness, both model 3, F (11, 166) = 1.97, *P* value = 0.04, R² = 0.12, and model 4, F (12, 165) = 2.20, *P* value = 0.01, R² = 0.14, demonstrated significant results (Table 3). In model 3, social network ($\beta = -0.03$, 95% CI: −0.05 to −0.01, *P* value = 0.007) was correlated with social loneliness, ΔF (1, 166) = 7.40, *P* value = 0.007, ΔR² = 0.04. Model 4 showed that the O-M relationship quality ($\beta = -0.24$, 95% CI: −0.46 to −0.01, *P* value = 0.04) explained 2.3% of the variance, and this change in R² was significant, ΔF (1, 165) = 4.33, *P* value = 0.04, ΔR² = 0.02. A higher education level was correlated with a lower level of social loneliness ($\beta = -0.73$, 95% CI: −1.23 to −0.24, *P* value = 0.004 for secondary education and above and $\beta = -0.51$, 95% CI: −0.92 to −0.09, *P* value = 0.02 for primary education). With all variables included in the model 4, the final model explained 13.8% of the variance, demonstrating a moderate effect size.

As shown in Table 4, regarding emotional loneliness, only model 1, F (6, 171) = 3.080, *P* value = 0.007, R² = 0.10, and model 2, F (10, 167) = 3.913, *P* value = 0.001, R² = 0.19, contributed significantly to predict emotional loneliness. Having primary education ($\beta = 0.44$, 95% CI: 0.10 to 0.79, *P* value = 0.01), and the functional capacity ($\beta = -0.05$, 95% CI: −0.09 to −0.02, *P* value = 0.005) were correlated with emotional loneliness in model 1. In model 2, additional significant factors include MDW's Indonesian nationality ($\beta = 0.81$, 95% CI: 0.43 to 1.20, *P* value < 0.001) and spoken language ($\beta = 0.48$, 95% CI: 0.10 to 0.85, *P* value = 0.01). The social network and O-M relationship quality failed to show significant contributions to emotional loneliness in model 3 and model 4.

4. Discussion

In our study, approximately half of the older adults indicated loneliness, close to the recent estimates among these adults in high-income countries that used the DJGLS for loneliness assessment (Chawla et al., 2021; Dahlberg & McKee, 2014; La Grow et al., 2012). Our study also found that the older adults' perceived quality of O-M relationship

Table 3

Summary of hierarchical regression analysis for variables predicting social loneliness in older adults ($N = 178$).

Variable	β	95% CI for β	SE	P value	R^2	Adjusted R^2	R^2 Change	P value
Model 1					0.04	0.008	0.04	0.29
Demographic characteristics of the older adults								
Age	−0.02	−0.05 to 0.01	0.01	0.12				
Marital status								
Single (ref)	0	0						
With a partner	0.08	−0.36 to 0.52	0.22	0.72				
Educational attainment								
No formal education (ref)	0	0						
Primary education	−0.42	−0.84 to 0.01	0.22	0.06				
Secondary education and above	−0.62	−1.12 to −0.12	0.25	0.02				
Living with family								
No (ref)	0	0						
Yes	−0.03	−0.44 to 0.38	0.21	0.89				
Functional capacity	−0.01	−0.05 to 0.04	0.02	0.82				
Model 2					0.08	0.02	0.03	0.19
Demographic characteristics of the older adults								
Age	−0.02	−0.05 to 0.01	0.01	0.15				
Marital status								
Single (ref)	0	0						
With a partner	0.06	−0.39 to 0.50	0.22	0.80				
Educational attainment								
No formal education (ref)	0	0						
Primary education	−0.46	−0.88 to −0.03	0.22	0.04				
Secondary education and above	−0.68	−1.19 to −0.18	0.26	0.009				
Living with family								
No (ref)	0	0						
Yes	−0.05	−0.45 to 0.36	0.21	0.83				
Functional capacity	−0.003	−0.05 to 0.04	0.02	0.89				
Migrant workers' characteristics								
Nationality								
Philippines (ref)	0	0						
Indonesia	0.53	0.04 to 1.02	0.25	**0.03**				
Others (including Thailand, Malaysia, and Bengalese)	0.38	−0.87 to 1.62	0.63	0.55				
Spoken language								
Cantonese (ref)	0	0						
Non-Cantonese	0.47	0.001 to 0.95	0.24	**0.049**				
Serving years	0.01	−0.06 to 0.08	0.03	0.80				
Model 3					0.12	0.06	0.04	0.007
Demographic characteristics of the older adults								
Age	−0.03	−0.06 to −0.001	0.01	0.045				
Marital status								
Single (ref)	0	0						
With a partner	0.13	−0.31 to 0.56	0.22	0.56				
Educational attainment								
No formal education (ref)	0	0						
Primary education	−0.49	−0.91 to −0.07	0.21	0.02				
Secondary education and above	−0.67	−1.16 to −0.17	0.25	0.009				
Living with family								
No (ref)	0	0						
Yes	0.04	−0.37 to 0.45	0.21	0.84				
Functional capacity	0.01	−0.03 to 0.05	0.02	0.63				
Migrant workers' characteristics								
Nationality								
Philippines (ref)	0	0						
Indonesia	0.50	0.02 to 0.98	0.24	**0.04**				
Others (including Thailand, Malaysia, and Bengalese)	0.30	−0.92 to 1.52	0.62	0.63				
Spoken language								
Cantonese (ref)	0	0						
Non-Cantonese	0.53	0.06 to 1.00	0.24	**0.03**				
Serving years	−0.01	−0.07 to 0.06	0.03	0.87				
Perceived social network	−0.03	−0.05 to −0.01	0.01	0.007				
Model 4					0.14	0.08	0.02	0.04
Demographic characteristics of the older adults								
Age	−0.03	−0.06 to −0.001	0.01	0.04				
Marital status								
Single (ref)	0	0						
With a partner	0.11	−0.32 to 0.55	0.22	0.60				
Educational attainment								
No formal education (ref)	0	0						
Primary education	−0.51	−0.92 to −0.09	0.21	0.02				
Secondary education and above	−0.73	−1.23 to −0.24	0.25	0.004				
Living with family								
No (ref)	0	0						
Yes	0.03	−0.38 to 0.43	0.20	0.89				

Table 3 (*continued*)

Variable	β	95% CI for β	SE	P value	R²	Adjusted R²	R² Change	P value
Functional capacity	0.02	−0.03 to 0.06	0.02	0.48				
Migrant workers' characteristics								
Nationality								
Philippines (ref)	0	0						
Indonesia	0.56	0.08 to 1.03	0.24	**0.02**				
Others (including Thailand, Malaysia, and Bengalese)	0.25	−0.96 to 1.47	0.61	0.68				
Spoken language								
Cantonese (ref)	0	0						
Non-Cantonese	0.59	0.12 to 1.05	0.24	**0.01**				
Serving years	0.001	−0.07 to 0.07	0.03	0.98				
Perceived social network	−0.02	−0.05 to 0.000	0.01	0.05				
Perceived dyadic relationship quality	−0.24	−0.46 to −0.01	0.11	**0.04**				

was poor in general, which was substantially lower than that reported in traditional care dyads involving family caregivers and community-dwelling older adults (Karlstedt et al., 2020; Pan et al., 2017; Shim et al., 2011). In contrast, qualitative studies on MDWs caring for older adults (Ho et al., 2019, 2018) showed that MDWs could develop intimate relationships with older adults. The discrepancies of perceived relationship quality between older adults' and MDW's perspectives might suggest a gap between their expectations. This might be due to the cultural and language barriers between MDWs and older adults (Ayalon et al., 2012). While the perceived O-M relationship quality with MDWs was significantly correlated with overall loneliness and social loneliness among community-dwelling older adults, there is a strong need to conduct qualitative studies [e.g., Q-methodology (Cheung et al., 2022)] to understand the reasons for the poor perceived O-M relationship from the perspective of older adults and the expectations on relationship from both caregivers and care-recipients.

After adjusting potential covariates, the current study suggested that older adults with a better perceived O-M relationship quality had a lower level of loneliness. Such correlation was in accordance with another research report that older adults having a positive relationship with the MDW were significantly less lonely ($r = 0.18$, P value < 0.001) (Iecovich, 2014) and is concordant with other studies that the perceived relationship quality with their caregivers was significantly correlated with the older adults' quality of life (Ho, Mak et al., 2022; Mortazavizadeh et al., 2020). Grounded in the convoy model, the shortage of family caregivers in modern society posits a great potential of the MDWs to be an important support providers and, thereby, the closest individual to the older adults in the convoy model of social relations (Fuller et al., 2020). Therefore, our findings supported that the O-M relationship quality shall be taken into account in health and social services for the wellbeing of older adults being cared for by MDWs. A potential area to strengthen O-M relationship quality can be strategies to engage both older adults and their MDWs in dyadic intervention (Cheung et al., 2021). Our study also found that compared to those with no formal education, a higher education level was correlated with a lower level of loneliness, suggesting future dyadic intervention for loneliness alleviation to put extra attention on older adults with no formal education.

This study showed that the perceived quality of the relationship with MDWs was correlated with social loneliness but not emotional loneliness. While emotional loneliness describes an absence of a close emotional attachment, social loneliness refers to the absence of an engaging social network. There was evidence that MDWs could be an attachment figure for older adults (Ho, Cheung et al., 2022). However, it is noteworthy that, on average, our participants experienced social loneliness (mean 1.07, SD 1.15) but not emotional loneliness (mean 0.84, SD 0.97). Also, they had a poor relationship quality with the MDWs. The insignificant correlation may suggest a potential floor effect for the quality of the O-M relationship to exert significance in affecting emotional loneliness. Moreover, in practice, for a non-kin to be a significant one in older adults' life requires special ties such as friendship and motivations with great compassion (Conkova & King, 2019;

Pleschberger & Wosko, 2017). In comparison, social care might be more direct, readily available, and easier to supply (International Organization for Migration, 2022), leading to more significant results.

Our current findings showed that MDWs' Indonesian nationality and the spoken language account for considerable variances in explaining older adults' loneliness, especially in the emotional aspect. While the underlying mechanism remains to be further explored for the correlation between MDWs' nationality and older adults' loneliness, generally, Indonesian MDWs have the dominant faith of Islam and distinct clothing and dietary restrictions (Liao & Gan, 2020). The substantial differences in religious beliefs and lifestyle behaviors with older adults may reduce the connectedness and intimacy in the dyad, raising the loneliness of the older adults (Rokach, 2018). Although MDWs could have emotional labor employment for stewardship demonstration, conflict avoidance, or connection establishment, employer-employee power hierarchy is still a dominant feature with O-M relationship (Ho et al., 2019). Such nature might partly explain the low mutuality between the older adults and the MDWs, and further limit the influence of the relationship and its quality on alleviating emotional loneliness. In contrast, substantial and high-quality support from MDWs could considerably help the older adults to achieve social integration, thereby alleviating social loneliness.

The current study provides pioneering empirical quantitative evidence to illustrate the correlation between the perceived quality of O-M relationship and loneliness in community-dwelling older adults. Our findings have significant implications for older adults care that the perceived O-M relationship quality may influence the social integration of older adults who are cared by MDWs, recognizing a neglected area to improve their well-being. However, the interpretation of the study results should be cautious as our study is limited by its convenience sampling. In particular, our participants exhibited a high female-male sex ratio. From the gerontological point of view, women tend to be more active in social participation than men at an old age (Huang & Yang, 2013; Naud et al., 2019). While our sample was recruited from the NECs, it might reflect the specific sex composition of participants that utilizing local social care services, causing selection bias. The NECs also provide community support services, such as health education, counseling services, and social activities, those services may buffer the loneliness at the individual level, underestimating the correlation between O-M relationship quality and loneliness. Majority of the MDWs were Indonesians, with only 18% of the MDWs being Filipinos. However, in Hong Kong, Filipinos account for approximately 56% of the MDWs, followed by Indonesians (41%) (Census & Statistics Department, 2022). Such phenomenon matches with the local culture that Indonesian MDWs are more popular among older adults than English-speaking Filipinos, mainly due to their Cantonese-speaking language capacity, submissive and innocent personalities (Ho, 2013). In explaining the potential influence of their sex and the MDW's nationality on older adults' loneliness, future studies may consider using cluster/stratified sampling methods to recruit more contextually appropriate samples. Also, because the cut-off value of mutuality was suggested based on data from the western population, it might

Table 4

Summary of hierarchical regression analysis for variables predicting emotional loneliness in older adults (N = 178).

Variable	β	95% CI for β	SE	P value	R^2	Adjusted R^2	R^2 Change	P value
Model 1					0.10	0.07	0.10	0.007
Demographic characteristics of the older adults								
Age	0.005	−0.02 to 0.03	0.01	0.65				
Marital status								
Single (ref)	0	0						
With a partner	0.17	−0.19 to 0.53	0.18	0.35				
Educational attainment								
No formal education (ref)	0	0						
Primary education	0.44	0.10 to 0.79	0.18	0.01				
Secondary education and above	0.02	−0.39 to 0.43	0.21	0.92				
Living with family								
No (ref)	0	0						
Yes	−0.11	−0.45 to 0.22	0.17	0.50				
Functional capacity	−0.05	−0.09 to −0.02	0.02	0.005				
Model 2					0.19	0.14	0.09	0.001
Demographic characteristics of the older adults								
Age	0.006	−0.02 to 0.03	0.01	0.58				
Marital status								
Single (ref)	0	0						
With a partner	0.13	−0.22 to 0.48	0.18	0.47				
Educational attainment								
No formal education (ref)	0	0						
Primary education	0.39	0.06 to 0.73	0.17	0.02				
Secondary education and above	−0.01	−0.41 to 0.39	0.20	0.95				
Living with family								
No (ref)	0	0						
Yes	−0.13	−0.45 to 0.19	0.16	0.43				
Functional capacity	−0.05	−0.08 to −0.02	0.02	0.004				
Migrant workers' characteristics								
Nationality								
Philippines (ref)	0	0						
Indonesia	0.81	0.43 to 1.20	0.20	**<0.001**				
Others (including Thailand, Malaysia, and Bengalese)	0.57	−0.41 to 1.55	0.50	0.25				
Spoken language								
Cantonese (ref)	0	0						
Non-Cantonese	0.48	0.10 to 0.85	0.19	**0.01**				
Serving years	−0.004	−0.06 to 0.05	0.03	0.88				
Model 3					0.20	0.15	0.01	0.16
Demographic characteristics of the older adults								
Age	0.003	−0.02 to 0.03	0.01	0.80				
Marital status								
Single (ref)	0	0						
With a partner	0.16	−0.19 to 0.51	0.18	0.37				
Educational attainment								
No formal education (ref)	0	0						
Primary education	0.38	0.04 to 0.72	0.17	0.03				
Secondary education and above	−0.006	−0.41 to 0.39	0.20	0.98				
Living with family								
No (ref)	0	0						
Yes	−0.09	−0.42 to 0.23	0.17	0.57				
Functional capacity	−0.04	−0.08 to −0.01	0.02	0.01				
Migrant workers' characteristics								
Nationality								
Philippines (ref)	0	0						
Indonesia	0.80	0.42 to 1.19	0.19	**<0.001**				
Others (including Thailand, Malaysia, and Bengalese)	0.54	−0.44 to 1.52	0.50	0.28				
Spoken language								
Cantonese (ref)	0	0						
Non-Cantonese	0.50	0.13 to 0.87	0.19	**0.009**				
Serving years	−0.01	−0.06 to 0.04	0.03	0.71				
Perceived social network	−0.01	−0.03 to 0.01	0.009	0.16				
Model 4					0.20	0.15	0.005	0.32
Demographic characteristics of the older adults								
Age	0.003	−0.02 to 0.03	0.01	0.82				
Marital status								
Single (ref)	0	0						
With a partner	0.15	−0.20 to 0.50	0.18	0.39				
Educational attainment								
No formal education (ref)	0	0						
Primary education	0.37	0.04 to 0.71	0.17	0.03				
Secondary education and above	−0.03	−0.43 to 0.37	0.20	0.88				
Living with family								
No (ref)	0	0						
Yes	−0.10	−0.42 to 0.23	0.17	0.55				

Table 4 (*continued*)

Variable	β	95% CI for β	SE	*P* value	R^2	Adjusted R^2	R^2 Change	*P* value
Functional capacity	−0.04	−0.08 to −0.01	0.02	0.02				
Migrant workers' characteristics								
Nationality								
Philippines (ref)	0	0						
Indonesia	0.82	0.44 to 1.21	0.20	**<0.001**				
Others (including Thailand, Malaysia, and Bengalese)	0.52	−0.46 to 1.50	0.50	0.30				
Spoken language								
Cantonese (ref)	0	0						
Non-Cantonese	0.52	0.15 to 0.90	0.19	**0.007**				
Serving years	−0.008	−0.06 to 0.05	0.03	0.78				
Perceived social network	−0.01	−0.03 to 0.01	0.009	0.30				
Perceived dyadic relationship quality	−0.09	−0.28 to 0.09	0.09	0.32				

overestimate/underestimate the quality level in the Hong Kong population. As the data was collected by face-to-face interviews, there might be a social desirability effect, leading to self-reporting bias. Liden et al. (2016) suggested that the relationship between older adult and MDWs can be influenced by the relationships that they hold with family members (particularly primary family caregivers), and vice versa. Our study was unable to capture the triadic dynamic into account, which shall be investigated in future study. While our study only suggested the correlation between O-M relationship quality and loneliness among older adults, further studies can compare loneliness levels before and after hiring a MDW, to establish a causative relationship.

5. Conclusion

Among community-dwelling older adults, the perceived O-M relationship quality is correlated with a lower level of loneliness, particularly social but not emotional. The study findings imply that improving the perceived O-M relationship quality in older adults care may facilitate the social integration of older adults and address a potential area for supporting older adults being cared for by MDWs.

Author agreement

All authors have seen and approved the final version of the manuscript being submitted. The article is the authors' original work, it hasn't received prior publication and isn't under consideration for publication elsewhere.

CRediT authorship contribution statement

Ken H.M. Ho: Conceptualization, Methodology, Formal analysis, Investigation, Supervision, Project administration, Writing – original draft, Funding acquisition. **Maria S.Y. Hung:** Supervision, Writing – review & editing, Project administration, Investigation. **Youjuan Zhang:** Formal analysis, Writing – original draft. **Xue Bai:** Supervision, Writing – review & editing. **Daphne S.K. Cheung:** Supervision, Writing – review & editing, Conceptualization. **Meyrick C.M. Chow:** Supervision, Writing – review & editing. **Paul H. Lee:** Supervision, Writing – review & editing. **Wai Tong Chien:** Supervision, Writing – review & editing.

Declaration of Competing Interest

None.

Acknowledgements

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