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Prevalence and correlates of loneliness among Chinese service industry migrant workers

A cross-sectional survey

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Abstract

Chinese rural-to-urban migrant workers (MWs) who are employed in service industry are a rapidly growing population in urban China. Like other MWs, service industry MWs (SIMWs) are generally excluded from the mainstream of city societies, but unlike other MWs, they are more marginalized in cities. Social isolation increases the feelings of loneliness; however, there are little empirical data on the epidemiology of loneliness of SIMWs. The present study aimed to investigate the prevalence and associated factors of loneliness among SIMWs in Shenzhen, China. By using respondent-driven sampling, 1979 SIMWs were recruited and administered with standardized questionnaires to collect data on sociodemographics, physical health, and migration-related characteristics. Loneliness and social support were measured with a single-item self-report question "Do you feel lonely often?" and Multidimensional Scale of Perceived Social Support (MSPSS), respectively. 18.3% of SIMWs reported feeling lonely often. Being aged 60 years or older (odds ratio [OR] = 2.30), marital status of "others" (OR = 2.77), being physically ill in the last 2 weeks (OR = 1.46), migrating alone (OR = 1.97), working >8 hours/day (OR = 1.06), MSPSS inside family subscale score ≤18 (OR = 1.80), and MSPSS outside family subscale score ≤38 (OR = 1.50) were significantly associated with increased risk of loneliness in SIMWs. Loneliness is prevalent in Chinese SIMWs and should be seen as a major public health issue. The high prevalence and many negative health consequences of loneliness highlight the importance of routine screening, evaluation, and treatment of loneliness in this vulnerable population.

Abbreviations: CI = confidence interval, IFS = inside family support, MSPSS = multidimensional scale of perceived social support, MWs = migrant workers, OFS = outside family support, OR = odds ratio, RDS = respondent-driven sampling, SIMWs = service industry migrant workers.

Keywords: epidemiology, loneliness, rural-to-urban migrant worker, service industry

1. Introduction

China has experienced a remarkable demographic transition during the past 3 decades from 1980 to 2014, with the proportion of the population residing in rural areas decreasing from 80.6% to 45.2%.[1] Each year, hundreds of thousands of Chinese farmers leave their lands and move to the cities for jobs. In addition to those who have permanently dwelled in cities, the majority of these internal migrants have to move back and forth between their hometowns where they belong permanently, and cities where they temporarily work and dwell. At present, the number of rural-to-urban migrant workers (MWs) has reached 274 million, accounting for nearly one-fifth of China's total population.[2]

Although MWs represent the backbone of China's rapid industrialization and urbanization, they are treated unfairly and do not get the same social benefits as the city-born population because of China's household registration system—hukou. The hukou divides Chinese people at birth into 2 distinct categories of the agricultural and nonagricultural hukou by the residential locations of their parents, serving as a measure to control rural-to-urban migration and determine residents' access to high-level occupations, housing, medical care, and pension benefits.[3,4] Therefore, MWs are often regarded as a vulnerable population that are economically and socially inferior to urban residents. In contemporary urban China, MWs not only experience institutional discrimination, but are also stigmatized in various ways and generally excluded from the mainstream of city societies.[5,6]

Loneliness is an unpleasant, subjective experience that results from the lack of social relationship satisfying in either quantity or quality.[7] Although there is a clear distinction between loneliness and social isolation, for example, the former is more closely related to the quality than quantity of social interactions, loneliness often occurs in conjunction with social isolation.[8] Owing to MWs' socially isolated status, separation from distant families and friends, and reduced social network sizes,[9,10] they

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might be at increased risk of feeling lonely. However, to our knowledge, only 4 studies, 3 published in local journals[11–13] and 1 in international journal,[14] have assessed the epidemiology of loneliness in MWs. Wang et al (2009)[11] investigated the loneliness experience of a convenient sample of 130 returned MWs who were waiting for the train home in a train station using the UCLA Loneliness Scale and found that MWs were more lonelier than police, college students, and older adults. Wen et al (2009)[14] interviewed 905 MWs from corporations and labor markets with a single question "Do you feel lonely?" and found that "often felt lonely" and "occasionally felt lonely" were reported by 12% and 67% of the MWs. By contrast, Yang et al (2013) and Li et al (2011)[12,13] employed UCLA Loneliness Scale to examine feelings of loneliness among 204 factory MWs and 397 community-dwelling MWs, respectively, and both studies found that the overall levels of loneliness of MWs were not so high compared with those of college students and nurses. Because of the small and unrepresentative MW samples used in previous studies, their findings were potentially biased. Furthermore, owing to the heterogeneity in measures of loneliness and samples of MWs used in previous studies, it is very difficult to get a conclusive answer to whether or not MWs have a higher risk of loneliness. Therefore, it is very important to further survey the epidemiology of loneliness in a large, representative, and relatively homogenous sample of MWs using a widely accepted assessment of loneliness.

In recent years, service sectors are playing an increasingly important role in China's rapid economic development, whereas service industry MWs (SIMWs) accounted for the proportion of the total MW population increasing from 25.5% in 2009[15] to 43.0% in 2014.[2] Nevertheless, people are more reluctant to work in service sectors because workers who provide services to others are often regarded as the riff raff of the society in traditional Chinese culture.[16] Under this circumstance, low-skilled MWs, who are not able to find a decent job, are often employed in service-providing industries, such as babysitting, housekeeping, and the handling of garbage, sewage, and chemical wastes. On average, relative to the general MWs, SIMWs are more likely to be female, older, less educated, engaged in "dirty work," be paid the minimum wage, and look-down upon by urban residents,[17] indicating that SIMWs are a particularly marginalized population in urban China. As a result, it is reasonable to hypothesize that SIMWs have a higher risk of feeling lonely; however, to date, no studies have been conducted to investigate loneliness of MWs who are employed in service industry.

Studies have demonstrated that feelings of loneliness are significantly associated with increased mortality,[18] reduced physical activity,[19] daytime dysfunction,[20] health risk behaviors,[21] poor physical health,[22] sleep fragmentation,[23] depression,[24] and suicidal behaviors.[25] Understanding the epidemiology of loneliness in MWs is vitally important for healthcare providers and policymakers in the implementation of appropriate strategies and execution of effective measures to reduce the harmful consequences of loneliness. Therefore, the current study was carried out to provide the prevalence of loneliness among Chinese SIMWs and to identify the socio-demographic and migration-related correlates of loneliness.

2. Methods

2.1. Subjects and sampling

This cross-sectional survey was conducted between June 2014 and August 2014. Respondents who fulfilled the following inclusion criteria were considered eligible for this study: aged 16 years or older; held a rural hukou and were living in Shenzhen at the time of the survey; were working in service industries, including wholesale and retail, accommodation and catering, leasing and business services, and resident service, as defined in China's national Standard Industrial Classification Codes (GB/T 4754—2011)[26]; and volunteered to participate in this study. Subjects were excluded if they repeatedly participated in the survey and moved to cities for purposes other than jobs such as travel and visiting relatives. Written informed consent was obtained from all participants following a protocol that was approved by the Ethics Committee of Shenzhen Kangning Hospital.

Because MWs change their places of residence and jobs frequently, it is very difficult to develop a definitive sampling frame for probability sampling in this population. Respondent-driven sampling (RDS),[27] a quasiprobability sampling method, was used in an attempt to obtain a representative sample of SIMWs. RDS employed a long chain-referral sampling technique with a mathematical model that allowed for calculating unbiased population estimates.[28] Two primary care clinics (Shuikuxinxun and Shahe community health centers) were selected as our subject recruitment sites, which were located in centers of the 2 most populous districts (Nanshan and Luohu) of Shenzhen and were easily accessible using public transport facilities. RDS begins the recruitment chains with several seeds, individuals who were then asked to recruit their peers, who in turn further referred their peers to our study, and so on. A total of 14 initial seeds were selected after taking sex, age, occupation, and place of residence into consideration. We gave each seed 3 uniquely coded coupons to recruit peers. Each MW who presented one of these valid coupons and satisfied the inclusion criteria was enrolled. In turn, each new completer was given up to 3 coded coupons to extend the recruitment chain. We used a dual incentive system for an expanding chain of referrals, in which respondents were compensated for both participating and recruiting new participants. RMB30 (US$4.7) was given to each respondent who completed the survey (primary incentive). RMB15 (US$2.4), RMB30 (US$4.7), or RMB50 (US$7.8) was paid to each recruiter who successfully assisted in recruiting 1, 2, or 3 eligible peers (secondary incentive), respectively. To control the sample growth, the number of recruitment coupons was decreased from 3 to 2 for the fifth wave, and from 2 to 1 for the sixth wave of recruitment. Coupon distribution continued until the sample size exceeded 1800. RDS has been proved to be a robust and effective way to recruit Chinese MW samples.[29]

Of the initial 14 seeds, 1 seed referred only 2 participants into the study, 1 seed produced only 2 waves of recruitment with 3 participants, and the remaining seeds produced at least 4 waves of recruitment. Finally, a total of 1982 participants were recruited based upon 14 seeds, of which 1979 completed the survey. As the referral chain grew over the time of the sampling, the sample composition for sex and age groups gradually stabilized after wave 5 (difference between 2 adjacent waves $\leq$1%) (Table 1).

2.2. Measures

The survey instrument used in this study consists of 5 parts: a questionnaire developed for the study that collects basic demographic information (age, sex, education, ethnic group [Han Chinese versus Ethnic Minorities], marital status, place of residence [urban vs rural], and average monthly income); physical health; migration-related factors (age at first migration,

Table 1

Sample size and sex and age compositions of each recruitment wave of the respondent-driven sampling.

Wave	N	Sex, n (%)		Age, n (%)			
		Male	Female	16~30 y	31~40 y	41~50 y	>50 y
0	14	7 (50.0)	7 (50.0)	5 (35.7)	3 (21.4)	3 (21.4)	3 (21.4)
1	41	19 (46.3)	22 (53.7)	13 (31.7)	6 (14.6)	13 (31.7)	9 (22.0)
2	123	49 (39.8)	74 (60.2)	34 (27.6)	17 (13.8)	43 (35.0)	29 (23.6)
3	327	123 (37.6)	204 (62.4)	89 (27.2)	52 (15.9)	104 (31.8)	82 (25.1)
4	630	228 (36.2)	402 (63.8)	170 (27.0)	116 (18.4)	200 (31.7)	144 (22.9)
5	1226	433 (35.3)	793 (64.7)	330 (26.9)	240 (19.6)	401 (32.7)	255 (20.8)
6	1979	691 (34.9)	1288 (65.1)	546 (27.6)	395 (20.0)	634 (32.0)	404 (20.4)

frequency of hometown visit, migration pattern [migrate alone, with some family members, or with all family members], average working hours per day, and average working days per month); loneliness; and the Multidimensional Scale of Perceived Social Support (MSPSS).[30]

The 2-week morbidity was used to measure the physical health status of respondents. This health indicator was directly adapted from the National Health Services Survey in China,[31] in which all participants were asked whether they had experienced any physical health problems, including infectious diseases and chronic noncommunicable diseases, in the recent 2 weeks. Loneliness was assessed with a single question asking whether the respondent often feels lonely with dichotomized answers: "yes" and "no." Respondents answering "yes" were classified as having the experience of loneliness. Although there is a limitation that the use of a single-item measure of an undesirable emotional state may result in an underestimation of the true prevalence of loneliness,[32] this single-question measure has been widely employed in previous studies.[33,34] Furthermore, as noted by Victor et al,[35] the single-item and multi-item instruments of loneliness can provide similar estimates of the prevalence of severe level of loneliness (i.e., "often feel lonely"), but these 2 approaches were inconsistent in estimating the prevalence of intermediate level of loneliness (i.e., "sometimes feel lonely"). Because our study focused on severe loneliness, the use of this single-item scale would have little effect on the prevalence estimation of loneliness.

The MSPSS is a 12-item self-report scale used to assess an individual's perception of how much he/she receives 3 sources of social support, namely, family, friends, and significant others.[30] Each item was rated on a 7-point Likert-type scale with scores ranging from "1=very strongly disagree" to "7=very strongly agree." The Chinese version of MSPSS has good reliability and validity; however, results from factor analysis based on MSPSS data from Chinese adults showed that the 2-factor structure provided a much better fit than the original 3-factor structure when the friends and significant others subscales were merged into one.[36] Hence, the Chinese MSPSS contains 2 subscales: inside family support (IFS) and outside family support (OFS), with higher subscale scores indicating higher level of social support in domain indicated.

2.3. Procedures

The study investigators were 5 trained mater students in applied psychology. Before starting the survey, all eligible participants were given a detailed explanation on the aims, the confidentiality principles and procedures of the study. Subjects who signed informed consent forms were then arranged to independently and anonymously complete self-administered questionnaires and scales. For the respondents who had difficulty in completing questionnaires, these psychologists read all the items one by one to them and recorded their answers. Our investigators were also required to check the completeness and coherence of responses to questions before the collection of questionnaires.

2.4. Data analysis

Crude prevalence of loneliness in different population cohorts and the whole sample were calculated. Because MWs who knew more potential participants had greater likelihood to be recruited than those with small network sizes and subjects recruited by shared recruiters were not mutually independent, we used RDS Analysis Tool (RDSAT, version7.1) to calculate individualized weights to adjust for unequal probability of being sampled and nonindependence because of shared recruiters.[37] An overall adjusted prevalence rate of loneliness was also computed by RDSAT.

Weights generated by RDSAT were then exported to Stata (version 13.0) for logistic regression analysis. Univariate weighted logistic regression was performed to assess the association between loneliness and sociodemographic and other variables. Multivariate weighted logistic regression with a backward stepwise entry of all significant variables in univariate analysis was used to identify factors associated with loneliness. Odds ratios (ORs) and 95% confidence intervals (95% CIs) were generated for each variable. All tests employed were 2-tailed and the significance level used was $P < 0.05$.

3. Results

3.1. Characteristics of survey participants

Among the 1979 respondents, 691 (34.9%) were male and 1288 (65.1%) were female. The mean (standard deviation) age was 40.0 (12.0) years, ranging from 16 to 76. Our sample included MWs from various types of service industry, the top 10 most common workers were: security guard (15.2%), cleaner (12.7%), housekeeper (10.0%), restaurant waiter (9.1%), shop assistant (8.3%), porter (7.2%), repairman (7.0%), foot-bath massagist (6.3%), nursing worker (5.4%), and hotel waiter (1.8%). Detailed sociodemographic and other characteristics of the subjects are shown in Table 2.[38]

3.2. Crude and adjusted prevalence of loneliness

A total of 327 participants reported feeling lonely often; the crude and adjusted prevalence of loneliness among SIMWs were 16.5% and 18.3%, respectively. The crude rates of loneliness stratified according to various characteristics are shown in Table 2.

Table 2

Characteristics of participants, crude prevalence rates of loneliness by variables and adjusted ORs (95% CIs) for loneliness.

Variables	No. of subjects	No. of lonely subjects	Crude prevalence (%)	Adjusted OR (95% CI)[II]
Sex				
Male	691	128	18.5	1
Female	1288	199	15.5	0.81 (0.64–1.13)
Age, y[*]				
26∼59	1638	254	15.5	1
16∼25	290	59	20.3	1.39 (1.02–1.91)
≥60	51	14	27.5	2.16 (1.20–4.0)
Ethnic group				
Han Chinese	1939	322	16.6	1
Minorities	40	5	12.5	0.72 (0.28–1.85)
Education level				
Primary school and below	704	119	16.9	1
Junior high school	856	133	15.5	0.90 (0.69–1.19)
Senior high school and above	419	75	17.9	1.07 (0.78–1.47)
Marital status				
Married	1658	256	15.4	1
Never married	292	60	20.5	1.42 (1.04–1.94)
Others[†]	29	11	37.9	3.35 (1.56–7.17)
Average monthly income[‡]				
≤1999 RMB	751	120	16	1
2000⊠2999 RMB	801	143	17.9	1.14 (0.88–1.49)
≥3000 RMB	427	64	15	0.93 (0.67–1.29)
Recent 2-week morbidity				
No	1632	253	15.5	1
Yes	347	74	21.3	1.48 (1.11–1.98)
Age at first migration				
<18 years	279	43	15.4	1
≥18 years	1700	284	16.7	1.10 (0.78–1.56)
Frequency of hometown visit				
≥ once per year	1649	261	15.8	1
< once per year	330	66	20	1.35 (0.98–1.81)
Migration pattern				
With all family members	599	80	13.4	1
With some family members	1132	184	16.3	1.26 (0.95–1.67)
Alone	248	63	25.4	2.21 (1.53–3.20)
Average working hours per day				
≤8 hours	1335	196	14.7	1
>8 hours	644	131	20.3	1.49 (1.17–1.91)
Average working days per month				
≤20 days	155	18	11.6	1
>20 days	1824	309	16.9	1.56 (0.95–2.58)
MSPSS—Inside family support score[§]				
>18	1172	138	11.8	1
≤18	807	189	23.4	2.29 (1.80–2.92)
MSPSS—Outside family support score[§]				
>38	888	97	10.9	1
≤38	1091	230	21.1	2.18 (1.69–2.81)

CI = confidence interval, OR = odds ratio.

[*] Because it has been found that the prevalence of loneliness shows a nonlinear U-shaped distribution, with those younger than 25 years and those who are older adults demonstrating the highest levels of loneliness,[38] our study divided age into 3 groups: 16∼25, 26∼59, and ≥60 years, with those aged 26∼59 years as the reference group.

[†] Others included remarried, separated, cohabitating, divorced, and widowed.

[‡] One RMB equals 0.1566 US$.

[§] The 2 subscale scores of Multidimensional Scale of Perceived Social Support (MSPSS) were dichotomized at the median value.

[II] Adjusted ORs and 95% CIs were calculated based on univariate weighted logistic regression, with loneliness as the dichotomous outcome variable and one grouping variable as the predictor.

3.3. Factors associated with loneliness of SIMWs

Results of the univariate weighted logistic regression analysis are also depicted in Table 2. Some variables were significantly associated with loneliness in SIMWs: being aged 16∼25 years, being aged 60 years and over, being unmarried, marital status of "others" (remarried, separated, cohabitating, divorced, and widowed), physical illness in previous 2 weeks, migrating alone, working >8 hours a day, low IFS, and low OFS.

Results of the stepwise multivariate weighted logistic regression are shown in Table 3. After entering all statistically significant variables from the univariate analysis (Table 1), factors that were independently associated with loneliness were identified using backward selection. The factors that remained in

Table 3

Multivariate weighted logistic regression results of factors significantly associated with loneliness in service industry migrant workers.

Factor	Risk level	Reference level	Coefficient	Standard error	Wald χ^2	*P*	Adjusted OR (95% CI)
Age, y	≥60	26∼59	0.833	0.330	6.370	0.012	2.30 (1.21–4.39)
Marital status	Others*	Married	1.020	0.449	5.156	0.023	2.77 (1.15–6.69)
Recent two-week morbidity	Yes	No	0.381	0.154	6.091	0.014	1.46 (1.08–1.98)
Migration pattern	Alone	With all family members	0.676	0.201	11.342	0.001	1.97 (1.33–2.92)
Average working hours per day	>8	≤8	0.058	0.023	6.684	0.01	1.06 (1.01–1.11)
MSPSS—Inside family support score†	≤18	>18	0.586	0.151	15.082	<0.001	1.80 (1.34–2.42)
MSPSS—Outside family support score†	≤38	>38	0.408	0.160	6.497	0.011	1.50 (1.10–2.06)

CI = confidence interval, OR = odds ratio.

* Others included remarried, separated, cohabitating, divorced, and widowed.

† The 2 subscale scores of Multidimensional Scale of Perceived Social Support (MSPSS) were dichotomized at the median value.

the final model included: being aged 60 years or older, marital status of "others," being physically ill in recent 2 weeks, migrating alone, working >8 hours a day, low IFS, and low OFS.

4. Discussion

As far as we know, this is the first large-scale cross-sectional survey in China that investigated the epidemiology of loneliness in SIMWs. By using RDS approach, we were able to recruit a sample of SIMWs with a wider range of service jobs and make unbiased estimates of the prevalence and epidemiological characteristics of loneliness. Previous studies have indicated that, relative to situational loneliness, persistent loneliness is significantly associated with a greater risk for all-cause mortality and greater health service utilization.[39,40] The present study focused on an almost persistent type of loneliness, feeling lonely often; the advantage of this measure of loneliness is that the accuracy of clinical relevance of our findings is increased. This study demonstrated that 18.3% of SIMWs suffered from loneliness often. Compared with studies using a similar single-item questions about loneliness, this prevalence is much higher than those reported in other cohorts worldwide, including the 2.7% prevalence of "often feel lonely" demonstrated in Norwegian adults,[41] the 7.0% prevalence of "feel lonely often or always" found among Chinese older adults,[32] the 9.7% prevalence of "often feel lonely" revealed in Russian adults,[42] 9.3% prevalence of "often feel lonely" found among Finnish elderly,[43] 12% prevalence of "feel lonely often or always" reported in Portuguese middle- and older-age adults,[44] and 12% prevalence of "often feel lonely" shown in MWs of Shanghai, China.[14] Considering the enhanced representativeness of our sample and high prevalence of loneliness in SIMWs, our hypothesis that loneliness is a common mental health problem of SIMWs is supported.

The high prevalence of loneliness in SIMWs found in this study is similar to findings reported in transnational immigrant studies. For example, in Canada, De Jong et al[44] (2015) found that older immigrants were significantly lonelier than native-born older adults and Ng et al (2015)[46] reported that 18% South Asian immigrant seniors felt lonely frequently or all of the time, and, in the Netherlands, van Tilburg et al (2015)[47] revealed that the average level of loneliness of older migrants from Turkey and Morocco was much higher than that of indigenous older people. In the context of international migration, migration is viewed as a significant life course transition that may negatively influence immigrants' connectedness to family, friends, and communities.[48] Making friends with host country residents is also challenging for immigrants. Cultural differences in norms and values between sending and receiving countries and poor indigenous language proficiency further hinder their social integration process, thereby resulting in feelings of loneliness.[45] China is a multiethnic country with regional linguistic and cultural diversity. As outsiders, who left their familiar farmlands for nonagricultural activities in completely strange cities, MWs have to face many challenges from crosscultural changes, including, the loss of close friendship, reduced religious activities, language barriers, and market-oriented norms and values. Although MWs are different in many aspects from international immigrants, we consider MWs are similarly affected by these factors and thus present elevated level of loneliness. In addition, there might be other reasons specific to China. As noted by van Tilburg et al (2015),[47] an uncertainty in identity also significantly contributed to the high level of loneliness in immigrants. In today's China, owing to the rural–urban dual hukou system, MWs are still in the transition state of "farmers in terms of identity, and industrial workers in terms of occupation."[49] Because of their uncertain identity in cities, MWs feel isolated from or unaccepted by the "majority culture" and, in turn, feel a consequent sense of rejection, alienation, lack of belonging, and loneliness inevitably occurs.[50,51]

Regression analysis found that loneliness among SIMWs is related to age, marital status, physical illness, migration pattern, average working hours a day, and perceived social support. On the whole, these findings are similar to those reported in previous studies about loneliness in the general and older adult populations, which identify female sex,[32,41] advanced age,[32,44] unhappy marriage,[41,42,44] poor physical health,[41,42,44] living alone,[32,42,52] and lack of social support[42,52] as the primary risk factors for loneliness. However, there are several differences. The vast majority of studies in other cohorts report substantially higher rates of loneliness in women than in men, but we found no significant sex difference in the prevalence of loneliness. Previous literature suggested that loneliness is common among older adults and young adults, but not common among middle-age people.[38] In this study, although only old age remained in the final regression model, our univariate analysis still confirmed the nonlinear U-shaped relationship between age and loneliness in SIMWs.

In this study, SIMWs who were previously married, perceived lower level of IFS and OFS, and migrated alone were more likely to be lonely. This finding is consistent with the protective effect of

social support, especially family support, in alleviating loneliness.[52] Importantly, the finding that both objective measure (marital status and migration pattern) and subjective measure of social support (perceived social support) were independently and significantly associated with loneliness may suggest that both objective and subjective social support are important in the pathogenesis and intervention of loneliness.

It is not surprising that loneliness was more prevalent among SIMWs who worked >8 hours per day than among those worked <8 hours per day. A similar association between long working hours and depression is also seen in MWs of the United Arab Emirates.[53] One reasonable explanation for the high loneliness prevalence among long-hour working MWs is that the busy SIMWs have too limited spare time to interact with friends, build new friendship with others, and keep in touch with acquaintances.

The main limitation of this study is that the sampling was based on peer-driven chain referrals, a method that has a potential prerequisite that each subject knows at least 1 SIMW in Shenzhen. SIMWs who were not included in our study sample tend to have smaller social network size, so our reported prevalence of loneliness in SIMWs may be an underestimate of the rate that exists among all SIMWs. A second limitation is that this is a cross-sectional study so the factors we found associated with loneliness are not, strictly speaking, risk factors. Whether or not the identified factors result in loneliness needs to be examined by prospective follow-up studies. A third limitation is that the current study only assessed the epidemiology of loneliness in SIMWs, not all MWs, so our findings may not be generalizable to MWs who are employed in manufacturing and construction industries. A fourth limitation is the lack of detailed information on medical comorbidities and no assessment of mental disorders, which hinders detailed analyses on the relationship between a specific physical/mental illness. A final limitation is that some other risk factors of loneliness in migrants, such as discrimination, cultural identity, and negative acculturation strategies, were not assessed in the study, so it is uncertain whether or not these factors would also be associated with increased risk of loneliness in SIMWs.

In summary, the present study has demonstrated a high prevalence of loneliness among SIMWs, indicating that SIMWs have psychological needs that are not being met. Given the negative effect of loneliness on the well-being of MWs, many health conditions associated with loneliness, and the large number of SIMWs, loneliness has been a major public health problem for SIMWs. Many of the risk factors for loneliness in the general population are also associated with loneliness in SIMWs, but the negative psychological effect of these factors may be magnified by their marginalized status, particularly in individuals who lack of social support. Mental health services for the SIMWs (and for MWs employed in other industries) need to include periodic evaluation of loneliness, expanded social supports that specifically focus on improving psychological wellbeing, and, when necessary, psychosocial assessment and treatment.

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