

Introduction

Health equity refers to the ability of all individuals to fully realize their potential for health and well-being [1]. This goal has always been a key pursuit in global public health and healthcare systems [2]. According to projections, by 2030, one in every six people worldwide will be aged 60 or older [3]. In the face of the global trend of population aging, Russia is also facing significant challenges. As of 2023, the proportion of the population aged 65 and older in Russia is 18.5%, and it is projected that by 2050, this proportion will rise to approximately 28.2% [4]. Action is needed to improve health equity among older adults. Sleep health is a key indicator of overall health and improving sleep health is a necessary step towards achieving health equity [5].

Sleep disturbances in aging societies represent a major public health issue [6]. According to a survey by the World Health Organization, 27% of the world's population suffers from sleep disturbances [7]. It is estimated that about 30–50% of people aged 65 and older report having sleep problems [8]. According to a 2020 survey by the All-Russian Public Opinion Research Center, 42% of Russians aged 60 and older reported difficulty falling asleep, while 43% experienced waking up during the night. Sleep disturbances are one of the most common health issues among the elderly [9]. The prevalence of sleep disturbances among the elderly varies across different regions [10]. There is substantial evidence that sleep disturbances have adverse effects on the health of older adults. For example, insufficient sleep increases the risk of cardiovascular disease [11, 12], mental illness [13, 14], and other chronic diseases in older adults [15, 16]. In addition, sleep disturbances impose a heavy economic burden on older adults [17].

Given the numerous negative effects of sleep disturbances on the physical and mental health of the elderly, improving sleep quality has become an increasing focus [18]. Sleep disturbances in the elderly have been receiving growing attention from researchers [9]. Current research on the factors influencing sleep disturbances in the elderly can be categorized into the following areas: Demographic factors (such as sex, age, self-rated health status [19], educational level [20], and place of residence [21], economic status [22], marital status [23]); Behavioral and health outcome factors (such as diet [24], physical and mental health conditions [25], bodily pain [26], hearing issues [27], physical activity [28]) and Environmental factors (such as air pollution [29], noise pollution, light discomfort, temperature [30–32]). Marriage is an important source of social and emotional support during periods of prolonged stress [33]. The loss of a spouse

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elderly care plays a crucial role in Russian society [51]. Research indicates that widowhood and divorce can lead to adverse economic consequences [52]. Social loss can disrupt the family support system, further increasing the challenges of elderly care, which in turn exerts additional

18 items that are scored form seven dimensions: sleep

Table 1 Demographic characteristics of older adults in Russian

Variables	Good sleep quality N= 163(49.2%)	poor sleep quality n= 168(50.8%)	p-value
Sex			
male	60 (36.8%)	36 (21.4%)	0.002
female	103 (63.2%)	132 (78.6%)	
Age group			
60–70	96 (58.9%)	85 (50.6%)	0.052
71–80	42 (25.8%)	64 (38.1%)	
80<	25 (15.3%)	19 (11.3%)	
BMI			
< 18.5	0 (0.0%)	2 (1.2%)	0.69
18.5–23.99	44 (27.0%)	41 (24.4%)	
24.0–27.99	63 (38.7%)	66 (39.3%)	
≥ 28.0	56 (34.4%)	59 (35.1%)	
Education			
General education and below	20 (12.6%)	19 (11.6%)	0.008
Primary vocational education (Vocational school)	10 (6.3%)	19 (11.6%)	
Secondary vocational education (College, technical school)	48 (30.2%)	70 (42.7%)	
Higher or higher professional education	80 (50.3%)	53 (32.3%)	
Other	1 (0.6%)	3 (1.8%)	
Income			
Less than 15,000 rubles	33 (20.8%)	51 (31.3%)	0.004
15,000–24,500 rubles	94 (59.1%)	69 (42.3%)	
24,500–50,000 rubles	28 (17.6%)	29 (17.8%)	
Over 50,000 rubles	4 (2.5%)	14 (8.6%)	
Social loss			
No	111 (68.1%)	91 (54.2%)	0.01
Yes	52 (31.9%)	77 (45.8%)	
Children number			

group (IQR 40, 40) compared to the poor sleep quality group (IQR 20, 40). The median physical functioning (PF) score was 60 (IQR 40, 80) in the good sleep quality group, compared to 40 (IQR 40, 60) in the poor sleep

quality group, indicating lower physical functioning in the poor sleep quality group. The role physical (RP) median score was 50 (IQR 25, 75) in the good sleep quality group and 25 (IQR 25, 50) in the poor sleep quality

group, suggesting differences in role physical functioning between the groups. The mean bodily pain (BP) score

3, after adding behavioral variables and demographic variables (drinking status, social interaction, education level, income level, number of children), the risk of social loss on sleep disturbances in male was further increased (OR=8.77, 95%CI: 2.19–35.09, $p<0.05$), while the risk in female was slightly reduced (OR=1.78, 95%CI: 0.93–2.20), and the significance dropped to the marginal level ($p<0.1$). This may indicate that the moderating effect of behavioral factors on male is more prominent. In Model 4, after adding health-related variables, behavioral variables, and demographic variables (RP, BP, VT, drinking status, social interaction, education level, income level, and number of children), the risk of sleep disturbances due to social loss in male was reduced (OR=5.92, 95%CI: 1.29–27.07, $p<0.05$), but it was still significant, while the risk in female was significantly increased (OR=2.44, 95%CI: 1.12–5.30, $p<0.05$). In Model 5, after adding

physical activity level, health-related variables, behavioral variables and demographic variables (PASE, RP, BP, VT, drinking status, social interaction, education level, income level, number of children), the risk of sleep disturbances in male who experienced social

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structure of social relationships in older Russian adults, and the most important way to express emotions is disrupted, which may lead to the accumulation of stress and become a risk factor for sleep disturbance. In addition,

impact of external factors such as the Russian-Ukrainian war, we believe that future research should explore how similar social upheavals and conflicts (such as the Russian-Ukrainian war) may exacerbate social loss and affect sleep disturbances among older adults. Therefore, future studies could build upon our research to investigate how these external factors influence sleep disturbances in the context of social loss, and further elucidate the interaction between the two.

Conclusions

Our study provides the first empirical evidence on the effects of social loss on sleep disturbance among older adults in the Russian Far East. Our study focuses on a relatively under-researched group and expands the current understanding of the effects of social loss on sleep disturbance among older adults. Our results show that older Russian females who experience social loss are at higher risk for sleep disturbance. Social interaction has a buffering effect on sleep disturbance among older Russian females who experience social loss, but not among older males. Our results suggest that more attention should be

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