

Social Support and Mental Health Status of Older People: A Population-Based Study in Iran- Tehran

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Abstract

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Objectives: To investigate direct and stress-buffering associations between social support from family and the mental health of older people in Iran, a country which has recently undergone an exceptionally fast fertility transition and is consequently experiencing rapid population ageing.

Method: A cross-sectional stratified random survey of 800 people aged 60+ years resident in Tehran was conducted. In total, 644 people responded. The SPS and the GHQ were used to measure perceived social support and mental health respectively. Multilevel mixed-effects models were used to examine the hypotheses.

Results: The findings supported the hypothesis of a direct association between perceived and received social support and mental health. However, we did not find strong evidence to suggest that social support buffered the effects of stress arising from limitations of physical functioning. Lack of help doing paperwork was associated with worse mental health for women but not men. Source of support did not seem to be important.

Conclusion: Our results indicated that in Tehran, as in Western settings, social support is important for the mental well-being of older people. Recommendations for policy and further research priorities based on the study findings were provided.

Keywords: Social Support, Mental Health, Older People, Iran, Tehran

Introduction

Iran has experienced a faster fertility transition than yet observed in any other country (Abbasi-Shavazi & McDonald, 2006). The Total Fertility Rate decreased from 7 children per women of reproductive age in 1980 to 1.6 in 2010 [Statistical Centre of Iran (SCI)]. Iran has also experienced a rapid mortality transition. Life expectancy at birth increased from 37 for men and 40 for women in 1956 to 72 for men and 76 for women in 2012 (WHO, 2013). This rapid demographic transition has made Iran one of the fastest-ageing countries in the world (Abbasi-Shavazi & McDonald, 2006). These demographic changes have occurred in the context of – and are intertwined with– very major changes in the governance, economy, and cultural and socio-economic context. Such changes, coupled with future decreases in the number of children available to support older people due to the fertility decline discussed above, make it timely to consider how important children currently are as a source of social support for older people and to what extent this support is associated with mental health (Chang, 1992; Rambod & Rafii, 2010; Azadarmaki & Bahar, 2006).

Previous research, predominantly from Western populations, indicates that social support is associated with physical and mental health (Kendler et al., 2005; Wilkinson & Marmot, 2003; Cooper et al., 1999; Cohen, 1988) and mortality (Blazer, 1982; Berkman & Syme, 1979) and a lack of social support may have negative effects on health among general populations (Lakey & Cronin, 2008; Cooper et al., 1999) and older populations (Adams et al., 2000; Grundy et al., 1996). Social support is of particular importance for older people, as later life is associated with an increased risk of exposure to various stressors such as the onset of chronic conditions and functional limitations, loss of sources of income, and loss of spouse and confidants (Nemeroff et al., 2010). Social support may be particularly important for mental health because as well as having a direct influence, social support may buffer the deleterious effects of stress (Hatfield et al., 2013; Hsu & Tung, 2010; Lakey & Cronin, 2008; Cooper et al., 1999; Cohen et al., 1997). Consequently, there is a concern that the well-being of older people, particularly their mental health, may be adversely affected if smaller family sizes lead to a reduction in the support available to them.

Previous studies of the association between social support and mental health have largely focused on Western societies and until recently there was little research on the topic in non-Western countries (Tajvar et al., 2013). It is likely that differences in culture, societal conditions and settings make it difficult to generalise study findings from Western countries to other countries and populations. For example, it has been suggested that a lack of support has a more serious negative effect on the mental health of older people in Asian countries than in Western societies because interdependence, exchanges of support and family togetherness are more highly valued, and autonomy and independence less valued, in Asia (Eyetsemitan, 2002; Lim & Kua, 2011). The aim of the research reported here was to explore for the first time in the contemporary older population of Tehran main (or direct) and stress-buffering associations between social support and mental health. Additional questions focussed on gender differences in the association between social support and mental health, and whether the source of support is itself associated with mental health.

The ‘main effect’ and the ‘stress-buffering effect’ models are the two most influential models of the action of social support on health. The ‘main effect model’ implies that social support has a positive effect on health and operates at all the times, irrespective of the individual’s exposure to a stress (House et al., 1988). The ‘stress-buffering effect model’ proposes that social support acts as a buffer against the deleterious effects of stressors on health, and in the absence of stress, social support is not linked to health (Taylor, 1995). According to Kawachi and Berkman (2001) social support may act on at least two points in the pathway between the stressor and depression. First, the perceived availability of social support in the face of a stressful event may promote less threatening interpretations of adverse events, thereby making them more manageable (Stansfeld, 2006; Lakey & Cohen, 2000; Thoits, 1986). Second, after occurrence of a stressful event, social support may reduce the negative emotional reaction and/or ameliorate the physiological and behavioural responses to stress.

It has been suggested that functional health decline is the most important predictor of depression in older adults (Brilman & Ormel, 2001; Chong et al., 2001) and that social support is an important factor that may moderate the relationship between functional limitations and depression (Cruza-Guet et al., 2008; Hay et al., 2001). We therefore selected limitations of

physical functioning as the stressor in our investigation of the stress buffering role of social support.

The main research question, drawn from the literature (e.g. Wilkinson & Marmot, 2003; Berkman & Syme, 1979; SCI, 2010; Koosheshi, 2007), examined in this study was whether there were main and/or stress buffering associations between social support and the mental health of older people in Tehran. We hypothesised that associations between social support and mental health would be moderated by gender and that, as Iranian older women are exposed to higher levels of stressors (Tajvar et al., 2008; Vahdaninia et al., 2005; Goshtasbi et al., 2003), the mental health of older women would be more seriously affected, in comparison with men, by a lack of social support. Additionally we hypothesised that the association between received social support and the mental health of men and women would vary by source of support. We expected that lack of support from a spouse and from children would have a more deleterious effect on the mental health of older men and older women respectively (Koosheshi, 2007).

Methods

We undertook a cross sectional survey of a representative sample of older people in Tehran in order to address study questions. The study population was community-resident older people aged 60+ years. The required sample size was calculated at 800 based on an alpha level of 0.05 and power of 80% using an expected OR of 2 and a design effect of 1.5 based on results from earlier studies (Hashemi et al., 2003; Noorbala et al., 2004; Grundy & Sloggett, 2003). A multistage stratified cluster sampling strategy was adopted in order to ensure representation of people from neighbourhoods of different socio-economic status. For the first stage of the sampling, three municipal districts of Tehran were chosen from areas of different socioeconomic status. For the second stage, one neighbourhood from each district was randomly selected. As there was no suitable sampling frame from which to draw the sample, preparatory work included enumeration of all households in the study neighbourhoods, undertaken to identify all those aged 60 and over in the selected neighbourhoods. Study individuals were then randomly selected from this sampling frame using probability proportionate to size allocation method within study clusters. In total, 644 people responded (response rate 76%). There was no systematic difference

between characteristics (age and gender) of non-respondents compared with respondents. The data were collected using a structured multi-sectional questionnaire administered to respondents through face-to-face interviews conducted in their own homes. Fieldwork was undertaken over a seven month period in 2010. Ethical approval for the study was given by the ethical committee of the London School of Hygiene and Tropical Medicine and the ethical committee of the Tehran University of Medical Sciences.

Conceptualisation and Measurement of Variables

Mental Health: ‘Mental health’ has been conceptualised by researchers as a positive emotion, such as feelings of happiness, or negatively, indicated and evaluated by mental disorders, symptoms, and problems. In this research, since one hypothesis considered social support as a buffer to stress, associations may apply more to negative than positive aspects. Thus, we chose a measure of negative mental health, the Farsi 15-item version of the General Health Questionnaire (GHQ) derived from the Iranian version of the 28-item GHQ (using a loading factor of 0.6 or greater ($\alpha = 0.9$ and $r = 0.97$), specifically tested and validated on older people living in Tehran by Malakouti et al. (2007). Cronbach’s α with the GHQ-15 was 0.9. The values of the 15 GHQ items were summed with scores ranging from 0 to 45 with higher scores indicating worse mental health status. Due to the absence of a validated cut off point for the GHQ-15 in Iran or other countries, we used the strategy of taking a cut point based on quartiles of the score distribution, comparing those with scores in the worst quartile of the GHQ with those with scores in the other three quartiles. This approach is commonly used in studies where a scale does not have a defined cut point (e.g. Prady et al. 2013; Iheanacho et al. 2014). In this study, the cut off point for being in the worst fourth of the GHQ score distribution was 22 out of 45.

Social Support: Social support is an exchange of resources between at least two individuals which is perceived by the provider or the recipient to be intended to enhance the well-being of the recipient (Shumaker & Brownell, 1984). Much of the literature distinguishes between two important dimensions of social support: ‘perceived’ and ‘received’ social support. ‘Perceived social support’ refers to one’s perception of potential access to social support, whereas ‘received social support’ refers to the reported receipt of support resources during a specific time period

(Dunkel- Schetter & Bennett, 1990). The Farsi version of the Social Provisions Scale (SPS), translated and validated in Iran by Zaki (2009), was used to measure perceived social support. Goldberg's Well-being Questionnaire was used by Zaki (2009) to assess the validity of the SPS. Cronbach's alpha for all participants, males and females were 0.85, 0.87 and 0.82 respectively. The SPS measures 6 functions of social support (provision for attachment, social integration, opportunity for nurturing behaviour, reassurance of worth, reliable alliance and obtaining of guidance) and includes 24 items with a four-point Likert scale. Thus, the total SPS scores ranged from 24-96, with higher scores indicating a higher degree of perception of social support. The SPS scores were dichotomised into the lowest score quartile versus the rest, as we were interested to investigate whether low SPS scores were associated with low GHQ scores.

To measure received social support, we included a number of questions derived from a review of the literature, previous scales, and testing during a pilot study. The final questionnaire included questions about help received with various activities and in various circumstances including 'being looked after when confined to bed', 'help with transport', 'help with housework', 'help with paperwork', and 'financial support'. Respondents were asked who provided support with these activities and answers were grouped into help from children, spouse and anyone. The levels of five types of received social support were measured using questions with 4 response categories as "not at all", "to some extent", "all/most of the time" and "haven't needed/asked". In order to simplify the multivariable analyses, the received social support variables were re-categorised into binary variables comparing those who received support "not at all" with the other participants.

Physical Functioning Limitations: Physical function is a person's ability to perform normal activities of daily living and disability occurs when a person has restriction with his or her physical functions (Verbrugge & Jette, 1994). The physical functioning status of participants was measured using the 'Nagi scale' (Nagi, 1965). The Nagi scale comprises a series of questions measuring 10 types of physical functions that might be limited due to physical health conditions. The Nagi measures have been included in the "Physical Functioning" dimension of the SF-36 scale. The SF-36 has been translated into Farsi and found to be a reliable and valid measure of health related quality of life among the general population in Iran (Montazeri et al., 2005). For scoring, a variable was created to calculate the total Nagi score combining the scores

on the 10 items ranging from 10 to 30 with lower scores indicating poorer functional status. A binary variable was created and used in multivariable models allowing comparisons between participants in the worst quartile and those in other quartiles of the Nagi scores.

Apart from the main study variables, we included a range of covariates, selected based on literature mainly from Iran (e.g. Alizadeh et al., 2012; Ghaderi et al., 2012; Manzouri et al., 2009; Malakouti et al. 2006; Couture et al. 2005; Mohammadi et al., 2005; Noorbala et al., 2004). These included age, gender, educational level (the highest degree of education achieved), economic status (self-evaluated economic status of participants relative to the average for people in Tehran) and marital status (married /never married/divorced/widowed).

Data Analyses

After collecting the data, the information from the 644 completed questionnaires was coded and entered into STATA for analyses (STATA Statistical Software: Release 14. College Station, TX: StataCorp LP). After preliminary exploratory analysis, multivariable logistic regression was used to analyse associations between indicators of support and the outcome measure (worst quartile of GHQ). The data collected were clustered and had a hierarchical structure. Individuals in the study were nested within households within neighbourhoods within districts of Tehran. Thus, single-level multivariable analyses were inappropriate and multilevel models (also called hierarchical analysis) were used instead. Of the common methods for analysing clustered data, multivariable ‘mixed-effects modelling’ was selected as the most appropriate. As the outcome measure was binary, multilevel mixed-effects logistic regression model using ‘xtmelogit’ command in STATA was used.

Modelling Strategy- We fitted two main sets of models, the first to analyse associations between perceived social support and mental health and the second to examine associations between different types of received social support and mental health. For each set of these analyses, the following multilevel mixed-effects logistic regression models were run in sequential manner: 1) *Crude analysis*: firstly crude analysis was conducted to examine individual association between each independent variable including covariates and dependent variable. 2) *Main effect model*: The main effect model of social support was tested by examining the association between social support measures and mental health adjusted for the effects of covariates. 3) *Stress-buffering*

effect model: To examine the moderating or stress-buffering function of social support an interaction term between the proposed stressor (Nagi score) and the measure of social support was created and added to the second model, statistically controlling for the main effects. A significant relationship between the interaction term and the mental health measure was taken to indicate support for the buffering effect of social support. 4) *Gender interaction*: In order to test the hypothesis that gender moderates associations between social support and mental health, an interaction term between gender and the measure of social support was created and added to the second model. A significant relationship between the interaction term and the mental health measure was taken to indicate support for the hypothesis.

Results

Descriptive information on sample members is shown in Table 1. Sample characteristics were similar to census data for a similar age group for the city of Tehran.

[Table 1 near here]

The mean GHQ (SD) score of participants was 16.8 (8.1) with a range of 0-45 with higher scores among women (mean=19.3, SD=7.8) indicating poorer mental health. The Mean (SD) Nagi score was 19.2 (6.2) ranging from 10-30 with lower scores among women (mean=17.0, SD=5.2) indicating poorer physical functioning status. 33% of women versus 15% of men had GHQ scores in the worst quartile and 39% of women versus 19% of men were in the worst quartile of the Nagi score distribution.

The mean (SD) score for perceived social support of the participants as measured by the SPS was 71.8 (9.7) with a range of 24-96. A higher proportion of women than men (58% vs. 42%) had scores in the worst quartile of the SPS. Table 2 describes the levels of various types of instrumental support received by participants from different sources by gender. For being looked after when confined to bed, looking after, transportation, housework, paperwork and financial support, 72%, 67%, 73%, 63% and 29% of participants respectively reported receiving support 'all or most of the time' from others. In general women primarily relied on their children, while men primarily relied on their wives for most types of support. For all the types of support, more

women needed or asked for support and women also received more support from their parental and marital relationship compared to men. Generally couples were most helpful to each other and looked after one another when confined to bed and least helpful to each other in providing financial support. Financial support was the need for which help was least often asked for or met in both men and women.

[Table 2 near here]

Associations between perceived social support and mental health: The results of the analysis of associations between perceived social support (based on SPS score) and poor mental health (worst quartile of GHQ score) are shown in Table 3. The covariates included in the models (age, gender, economic status, literacy, marital status, and physical functioning status) were selected based on the previous literature and all showed strong crude associations with GHQ score in the expected direction. Those in older age groups, women, illiterate people, those not currently married, those perceiving a poor economic status and those with poor physical functioning status were more likely to have poor GHQ scores.

[Table 3 near here]

As shown in Table 3, in the crude analysis, people with poor SPS score (those in the worst quartile) were more than 5 times more likely to have a GHQ score in the worst quartile than people with higher SPS scores. Inclusion of the covariates in Model 2 attenuated the magnitude of the OR to 3.8, but there was still a strong main association with the GHQ score. Model 3 shows the ORs stratified by SPS and Nagi scores. The result of analyses showed that the p value for the interaction was 0.63, thus, there was no strong evidence that perceived social support moderated the association between Nagi score (the hypothesized stressor) and mental health. The analysis for Model 4 indicated that poor SPS was associated with poor GHQ among both women and men, with a larger effect for women. However, the p value for the interaction was 0.74, thus there was no evidence for a significant difference between men and women in terms of the effect of perceived social support on their mental health.

Associations between received social support and mental health: Of the five types of received social support measured in this study, 'being looked after' was omitted from multivariable

analyses, because there was too little variation in the responses to the question to allow analysis of this. As shown in Table 4, the results of the crude analysis (Model 1) showed a significant association between poor GHQ score and help with transport and housework provided by any source or by a spouse and financial support provided by anyone. There was no association with support of any type provided by children. In Model 2, for all forms of received social support, absence of support from anyone was associated with poor mental health, while there seemed to be no particular association with lack of support from a spouse or children. In the case of financial support, however, there was an association with support from children. According to the findings, there is little evidence from this study for the interaction of sources of support in the associations between received social support and mental health.

[Table 4 near here]

Possible buffering effects of types of received social support were also examined (Model 3). However, help with transport provided by anyone was the only type of support which moderated the association between functional limitation and mental health (p interaction=0.05). Participants with poor physical functioning who were helped with transport were nearly 6 times more likely to have poor mental health ($p=0.01$). In contrast, there was no association with poor mental health for participants with good or fair physical functioning who did not received transport help from anyone (OR=0.38, $p=0.39$).

Moreover, although results for men and women in all types of received support appeared slightly different, the only significant interaction with gender was found only for paperwork support received from anyone (p interaction=0.03). Thus, the finding from this study was consistent with the hypothesis that an absence of help with paperwork has a more deleterious effect on the mental health of older women than older men. (Model 4)

Discussion

The main question addressed in this study was whether there are associations (main or stress-buffering) between social support and mental health in the older population of Tehran. The

findings indicated that social support was associated with mental health and that there were variations by type of social support:

We found a strong direct association between perceived social support and mental health (OR=3.8, $p=0.006$), a finding that is consistent with most of the literature from other regions of the world (Nemeroff et al., 2010; Bozo et al., 2009; Cruza-Guet et al., 2008; Han et al., 2007; Kara & Mirici, 2004) and in Iran (Shakerinia, 2012; Pasha et al., 2007). A perception of strong social support may promote self-esteem (Uchino et al., 2012; Thoits, 2011), which, in turn, is associated with lower symptoms of anxiety and depression (Taylor, 2007; Baumeister et al., 2003). However, it should be noted that this study was cross-sectional and temporal associations between the two variables cannot be identified. Perceived social support is likely to be influenced by general psychological well-being, as well as by actual network functions (Gore, 1981). Results from longitudinal studies have provided inconsistent results (Bierman & Statland, 2010; Kendler et al., 2005; Wade & Kendler, 2000). Therefore, the real interrelationship and direction of associations between perceived support and mental health in this setting still remains uncertain.

Our analyses did not provide support for the hypothesis that perceived social support buffers the effect of stress (indicated here by functional limitation) on mental health. Evidence for the stress-buffering effect of social support on mental health in the literature is less consistent and weaker than for main effect of social support. Yet, most previous studies which have examined the issue suggest such a stress-buffering effect (e.g. Schwarzer & Leppin, 1989; Cohen & Wills; 1985; Kaplan et al., 1977; Cassel, 1976). It is possible that our study lacked power to test the interaction of SPS in the Nagi-GHQ association, as the sample size calculation in this study was based on detecting main effects rather than interaction effects, which need a much larger sample size (Smith & Day, 1984). Additionally, consistent with 'contingent theory', it is possible that psychological disorder was so high among participants of this study that their current perception of social support was not sufficient and did little to ameliorate the effects of stressors (Cruza-Guet et al. 2008). Cruza-Guet et al. (2008) suggested that the benefit of receiving social support, particularly in elders who are severely distressed, may only be evident when congruency between needs and amount of social support received is achieved. Furthermore, discrepancies between the results of this study with those of others which have reported a stress buffering

effect, may also reflect differences in the cultural background and context, differences between characteristics of study populations (Bierman & Statland, 2010), and differences in operational definition and measurement of social support (Cruza-Guet et al., 2008).

The results of this study showed strong main associations between all the types of instrumental support received from anyone, but not support received from a specific source (except in the case of financial support received from children). The results of the wider literature on the main associations between received instrumental support and mental health are inconsistent. While some studies (e.g. Lee & Dunkle, 2010; Cruza-Guet et al., 2008) have found a significant negative association between receipt of instrumental support and mental disorders, others (e.g. Bolger & Amarel, 2007; Bolger et al., 2000), including Iranian studies (Koosheshi, 2007; Motamedi-Shalamzari et al., 2002) have found no link or positive associations between receipt of instrumental support and mental health. The later studies argued that receiving support may have some negative effects (in addition to positive effects) such as lowered self-esteem, demoralization and feelings of weakness on older people's mental health (Umberson & Montez, 2010; Brown et al., 2003). Positive relationships between received support and mental disorders may also be confounded by the elder's health status (Maher et al., 2006), i.e., those who receive more support are more likely to be the ones who experience more serious illness, and thus seek help from others and vice versa (Ibarra-Rovillard & Kuiper, 2011; Larzelere et al., 2004). On the other hand, studies suggesting an important positive role of received instrumental support on the mental health of older persons have emphasized that the provision of tangible or enacted support may be especially important for older people, due to the increased risk of physical limitations in old age (Bisschop et al., 2004; Chi & Chou, 2001). Older people with physical limitations may not be too concerned with the negative side of visible help, as discussed above, in favour of the advantages of receiving help to fulfil their essential daily activities including transportation and housework.

The evidence from this study suggests that lack of instrumental support from a spouse or children was not associated with poor mental health. Looking closely at the statistical outcomes revealed that the numbers not receiving any help from anyone were much lower than the numbers not receiving any support from spouse or children. Thus, it is inferred that those who lacked support from a spouse had support from children or other sources and their needs for

support were fulfilled anyway, whereas, those not receiving help from anyone are the least supported and, as seen, are at the highest risk of poor mental health. Therefore, it is concluded that in this context – in which needs for support were very high- the receipt of support is more important than source of support. With regard to financial support, as children were the main source of financial support of both men and women, lack of financial support from children essentially meant lack of support from anyone for most participants, and this absence, rather than source of support, may be the important factor.

With regard to the stress-buffering effect, only for transportation support was the p-value for effect modification less than 0.05. This finding is compatible with the “Optimal Matching theory”, which differentiates between controllable and uncontrollable stressors, proposing that uncontrollable stressors require emotional support, while controllable stressors require instrumental support to buffer the psychological impacts of the stressor most effectively (Cutrona & Russell, 1990). Poor physical functioning seems to be a controllable stressor that is optimally matched with transportation support against the demands of the stressor and subsequently a significant buffering effect was observed; whereas, other types of received support studied were less directly and sufficiently matched with the demands of poor physical functioning to create a significant buffering effect for mental health.

The descriptive analyses, in line with most of earlier studies in Iran (e.g. Tajvar et al., 2008; Koosheshi, 2007; Vahdaninia et al., 2005) indicated that there are considerable gender inequalities in socioeconomic and health status among older people in Tehran and older women are exposed to higher levels of stressors. According to the earlier literature, we hypothesised that due to higher needs of older women for social support; their mental health would be more seriously affected compared to older men, if their social support needs are not met. The analyses showed that the ORs of men and women in comparison were all in the hypothesised direction, except in the case of poor financial support, which had a worse effect on mental health of older men. However, it was only in the case of help with paperwork that we found a significant gender difference in the association with mental health. This result might again be attributed to some extent to statistical limitations in this study to detect the real differences between the ORs. With regard to the significant gender interaction of paperwork support, we argue that this finding is not actually surprising, because a very high proportion of older women (89%) were illiterate or

had only primary education. Therefore, provision of paperwork support, compatibly with the matching theory (Cohen & McKay, 1984), seems to be absolutely essential for these women and the absence of this type of support might be very stressful and threatening for their psychological wellbeing.

The descriptive results from this study indicated that in general, women primarily relied on their children, while men primarily relied on their wives for most types of instrumental social support. This is consistent with earlier literature from Iran (Koosheshi, 2007), Thailand (Knodel & Chayovan, 2009), Turkey (Kara & Mirici, 2004), Brazil (Alexandrino-Silva et al., 2011) and other countries (Stolar, et al. 1993). Our hypothesis was that lack of spouse support has a more serious effect on mental health of men and lack of children support is worse for women's mental health. However, although in multivariable analyses there were noticeable differences in the magnitude of the ORs in all the types of support in the hypothesised direction, the p-values suggested little evidence to support the hypothesis. In addition to the possible statistical limitations of this study for detecting the real differences, it is possible that although men preferred support from their spouse and women preferred support from children, there could be a substitute source of support in the absence of support from the desired source which may have attenuated the negative effects of lack of support from the preferred sources.

There are very few previous studies of the association between social support and mental health in Iran or culturally similar countries. Thus, the findings from this research make an important contribution toward the scarce research evidence on this topic among older people in this region. The strengths of this study include a randomly selected population-based sample of older people, a relatively large survey with a high response rate (ensuring that the sample was representative of the older population of Tehran), the collection of comprehensive and detailed information on perceived and received social support and a high internal and external validity of the study. The approach to the statistical analysis was guided by a conceptual model and used appropriate statistical methods to take account of the multi-level sampling method.

The main weakness of this study is that it was cross sectional and the temporal relationships between social support and mental health cannot be ascertained. Undertaking a longitudinal study would help to address this concern. Another limitation was that this study was underpowered to examine interaction effects. Future research should employ larger samples to

allow for analysis of the stress-buffering effect theory, gender interaction, and the role of different sources of support in mental health of men and women. Additionally, the results of the study are not generalisable to older people living in institutions, those hospitalised at the time of the survey or those living in other parts of Iran. Future studies should try to include these groups for whom associations may differ and have a wider geographical scope. Importantly further research is needed to elucidate the possible pathways and mechanisms whereby social support influences the mental health of older people in Iran.

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Table 1: Distribution of participants by selected demographic and socio-economic characteristics, by gender

Characteristics N (%)	All (n=644)	Men (n=322)	Women (n=322)
Age			
Mean (SD)	69.8 (7.2)	70.6 (7.5)	68.9 (6.8)
60-69	329 (51.2)	152 (47.2)	177 (54.9)
70-79	243 (37.8)	128 (39.7)	115 (35.7)
80+	70 (11.0)	42 (13.0)	28 (8.6)
Marital status			
Married	459 (71.2)	290 (90.0)	169 (52.4)
Widowed	177 (27.4)	30 (9.3)	147 (45.6)
Other (never married, divorced)	8 (1.2)	2 (0.6)	6 (1.8)
Educational level (years of education)			
Illiterate	307 (47.7)	104 (32.2)	203 (63.0)
Primary (1-5)	215 (33.4)	130 (40.3)	85 (26.3)
Second level (9)	35 (5.4)	26 (8.0)	9 (2.7)
Diploma (12)	41 (6.3)	25 (7.7)	16 (4.9)
University qualification	41 (6.3)	33 (10.2)	8 (2.4)
Religious degree	4 (0.6)	4 (1.2)	0 (0.0)
SES of area of residence			
High	122 (18.9)	64 (19.8)	58 (18.0)
Middle	172 (26.7)	85 (26.3)	87 (27.0)
Low	350 (54.3)	173 (53.7)	177 (54.9)
Perceived economic status compared to average in Tehran			
Poorer than average	274 (42.8)	118 (36.6)	156 (49.1)
Same as average	362 (56.5)	200 (62.1)	162 (50.9)
Higher than average	4 (0.7)	4 (1.2)	0 (0.0)

Note: Because of item non-response, the total N for different variables differed slightly

Table 2: Distribution of participants by type and source of social support received by gender

To what extent do you receive support with the following activities and from whom...? n (%)	Anyone**			Spouse			Children **		
	All n=644	Men n=322	Women n=322	All n=644	Men n=322	Women n=322	All n=644	Men n=322	Women n=322
Being looked after when confined to bed									
Haven't needed/asked	124 (19.2)	61 (18.9)	63 (19.6)	27 (6.0)	17 (5.8)	10 (5.9)	71 (11.3)	36 (11.3)	35 (11.2)
All/Most of the time	464 (72.0)	246 (76.4)	218 (67.7)	341(75.9)	243 (83.7)	98 (57.9)	353 (56.3)	155 (48.8)	198 (63.8)
To some extent	36 (5.5)	9 (2.8)	27 (8.4)	47 (10.5)	15 (5.1)	32 (18.9)	119 (19.0)	71 (22.3)	48 (15.4)
Not at all	20 (3.1)	6 (1.8)	14 (4.3)	34 (7.6)	10 (3.4)	24 (14.2)	84 (13.4)	55 (17.3)	29 (9.3)
Not applicable *	0	0	0	185	32	153	17	5	12
Transportation									
Haven't needed/asked	89 (13.8)	49 (15.2)	40 (12.4)	13 (2.9)	13 (4.4)	1 (0.5)	40 (6.4)	30 (9.4)	10 (3.2)
All/Most of the time	429 (66.6)	199 (61.8)	230 (71.4)	247 (54.9)	138 (47.5)	109 (64.4)	334 (53.3)	144 (45.4)	190 (61.2)
To some extent	62 (9.6)	44 (13.7)	18 (5.6)	93 (20.6)	68 (23.4)	25 (14.7)	105 (16.7)	62 (19.5)	43 (13.8)
Not at all	64 (9.9)	30 (9.3)	34 (10.5)	97 (21.5)	67 (23.1)	30 (17.7)	148 (23.6)	81 (25.5)	67 (21.6)
Not applicable*	0	0	0	185	32	153	17	5	12
Housework									
Haven't needed/asked	75 (11.6)	42 (13.0)	33 (10.2)	8 (1.7)	4 (1.3)	4 (2.3)	22 (3.5)	12 (3.7)	10 (3.2)
All/Most of the time	470 (73.0)	246 (76.4)	224 (69.6)	286 (62.7)	220 (75.8)	62 (36.6)	327 (52.1)	146 (46.0)	181 (58.3)
To some extent	62 (9.6)	22 (6.8)	40 (12.4)	73 (16.0)	32 (10.0)	41 (24.2)	121 (19.3)	73 (23.0)	48 (15.4)
Not at all	37 (5.7)	12 (3.7)	25 (7.7)	89 (19.5)	30 (11.0)	59 (34.9)	157 (25.0)	86 (27.1)	71 (22.9)
Not applicable *	0	0	0	185	32	153	17	5	12
Paperwork									
Haven't needed/asked	93 (14.4)	51 (15.8)	42 (13.0)	18 (4.0)	14 (4.8)	4 (2.3)	51 (8.1)	32 (10.0)	19 (6.1)
All/Most of the time	406 (63.0)	175 (54.3)	231 (71.7)	203 (44.8)	93 (32.0)	110 (64.8)	299 (47.7)	132 (41.6)	167 (53.8)
To some extent	53 (8.2)	32 (9.9)	21 (6.5)	45 (9.9)	26 (8.9)	19 (11.2)	84 (13.4)	42 (13.2)	42 (13.5)
Not at all	92 (14.3)	64 (19.9)	28 (8.6)	187 (41.2)	153 (52.7)	34 (20.1)	193 (30.8)	111 (35.0)	82 (26.4)
Not applicable *	0	0	0	185	32	153	17	5	12
Financial help									
Haven't needed/asked	284 (44.0)	157 (48.8)	127 (39.4)	124 (27.8)	89 (30.6)	35 (20.7)	202 (32.2)	116 (36.5)	86 (27.7)
All/Most of the time	186 (28.9)	72 (22.4)	114 (35.4)	74 (16.6)	24 (8.2)	50 (29.5)	185 (29.5)	66 (20.8)	119 (38.3)
To some extent	53 (8.2)	28 (8.7)	25 (7.8)	24 (5.4)	6 (2.0)	18 (10.6)	48 (7.6)	29 (9.1)	19 (6.1)
Not at all	121 (18.8)	65 (20.2)	56 (17.4)	224 (50.2)	163 (56.2)	61 (36.0)	192 (30.6)	106 (33.4)	86 (27.7)
Not applicable *	0	0	0	185	32	153	17	5	12

**Not applicable* are participants for whom the information was not applicable (e.g. had no child or spouse). This group is not included in the calculation of % for that question although included in 'n'.

***Children* include receiving support from at least 1 child, 'Anyone' includes receiving support from at least 1 person regardless of relationship.

Note: the classification in this table is hierarchical in that inclusion in a higher category in the list removes the eligibility of participants for lower categories.

Table 3: Associations between perceived social support (SPS) and poor mental health (GHQ) in older people of Tehran

Variables	Model 1	Model 2	Model 3	Model 4
	Crude Analysis	Main Effect	Stress- Buffering Effect	Gender Interaction
	OR (95% CI) P	OR (95% CI) P	OR (95% CI) P	OR (95% CI) P
SPS				
Good or fair	Ref.	Ref.		
Poor	5.62 (2.39 - 13.23), <0.001	3.80 (1.48 - 9.79), 0.01		
SPS-Nagi interaction				
			P=0.63	
SPS in people with poor Nagi score				
Good or fair			Ref.	
Poor			4.25 (1.50-12.30), 0.01	
SPS in people with good or fair Nagi score				
Good or fair			Ref.	
Poor			3.11 (0.96- 10.05), 0.1	
SPS-Gender interaction				
				p=0.74
SPS in women				
Good or fair			Ref.	
Poor			4.20 (1.33-13.27), 0.01	
SPS in men				
Good or fair			Ref.	
Poor			3.37 (1.05-10.77), 0.04	

Except in Model 1, other models of the associations between SPS and GHQ included age, gender, literacy, economic status, marital status and Nagi score

'Poor SPS' indicates those in the worst quartile of the SPS scores and 'Good or fair SPS' indicates those in other quartiles of the SPS distribution

'Poor Nagi' indicates those in the worst quartile of the Nagi scores and 'Good or fair Nagi' indicates those in other quartiles of the Nagi distribution

Table 4: Associations between different types of instrumental support received by source and poor mental health (GHQ) in older people of Tehran

Support types: Sources*:	Transportation Support			Housework Support			Paperwork Support			Financial Support		
	Anyone OR (p)	Spouse OR (p)	Children OR (p)	Anyone OR (p)	Spouse OR (p)	Children OR (p)	Anyone OR (p)	Spouse OR (p)	Children OR (p)	Anyone OR (p)	Spouse OR (p)	Children OR (p)
Model 1:												
Crude Analysis												
Some or good support	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
No support	2.13(0.06)	2.14(0.05)	1.08(0.79)	4.67(0.002)	2.42(0.02)	0.86(0.61)	1.15(0.69)	0.54(0.10)	0.81(0.48)	2.63(0.05)	0.80(0.58)	1.63(0.21)
Model 2: Main Effect												
Some or good support	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
No support	3.30(0.04)	2.36(0.11)	1.48(0.28)	5.54(0.009)	1.57(0.35)	1.00(0.98)	2.99(0.03)	0.87(0.76)	1.26(0.50)	4.49(0.04)	1.37(0.58)	3.60(0.05)
Model 3:												
Stress-Buffering effect												
Sup. in people with poor Nagi score	p=0.05	p=0.42	p=0.89	p=0.23	p=0.91	p=0.28	p=0.21	p=0.24	p=0.49	p=0.22	p=0.46	p=0.55
Some or good support	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
No support	5.69(0.01)	1.73(0.38)	1.43(0.41)	7.36(0.006)	1.50(0.51)	1.34(0.50)	3.76(0.01)	0.57(0.33)	1.49(0.34)	7.15(0.02)	1.05(0.94)	4.51(0.06)
Sup. in people with good or fair Nagi score												
Some or good support	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
No support	0.38(0.39)	3.89(0.12)	1.58(0.45)	1.25(0.86)	1.66(0.50)	0.60(0.40)	0.80(0.84)	1.64(0.48)	0.92(0.88)	1.86(0.47)	2.22 (0.37)	2.52(0.27)
Model 4:												
Gender Interaction												
Support in women	p=0.08	p=0.72	p=0.07	p=0.10	p=0.52	p=0.15	p=0.03	p=0.88	p=0.11	p=0.71	p=0.36	p=0.07
Some or good support	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
No support	7.58(0.02)	1.92(0.39)	2.96(0.06)	11.29(0.005)	1.24(0.72)	1.63(0.31)	14.77(0.01)	0.79(0.76)	2.35(0.12)	3.81 (0.10)	0.95(0.95)	8.86(0.02)
Support in men												
Some or good support	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
No support	0.98(0.98)	2.70(0.13)	0.63(0.43)	1.11(0.92)	2.30(0.27)	0.51(0.28)	0.94(0.92)	0.91(0.87)	0.57(0.35)	5.57 (0.07)	3.18(0.31)	1.26 (0.76)

Except in Model 1, models included age, gender, literacy, economic status, marital status and Nagi score.

Models excluded those people without a spouse/ child. Also people who stated they “haven't needed/asked” for a particular type of support were excluded from the analysis.

‘Some or good support’ indicates reporting receiving support ‘to some extent’/‘most of the time’/‘all the time’.

Poor Nagi’ indicates those in the worst quartile of the Nagi distribution and ‘good or fair Nagi’ indicates those in the other quartiles of the Nagi score distribution.

