Family, Social Support and Health Status of Older People in Tehran

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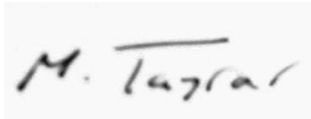
I, Maryam Tajvar, confirm that the work presented in this thesis is my own.

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ABSTRACT

Iran has recently undergone an exceptionally fast fertility transition. The Total Fertility Rate decreased from 7 in 1980 to 1.8 in 2006 along with declines in adult mortality rates. Consequently, Iran is currently experiencing rapid population ageing. As these demographic changes are intertwined with huge social changes, some major challenges may be anticipated in future. One important concern is that the health status of older people, particularly their mental well-being, may be adversely affected if fewer children lead to a reduction in the support available to older people.

The aim of the research described in this thesis was to examine direct and stress-buffering associations between social support and mental health in older age groups. Potential differences between men and women in the associations and the role of different sources of support were also examined. A review of the existing literature indicated that this topic is under-researched in Iran or culturally similar countries.

A quantitative cross-sectional survey of a random sample of 800 people aged 60+ years resident in Tehran was conducted. In total, 644 people responded. Multilevel mixed-effects models were used to examine the hypotheses. The findings supported the hypothesis of a direct association between functional aspects of social support and mental health but not that of an association between structural aspects of social support and mental health. No strong evidence of a stress-buffering effect of social support in the association between physical functioning and mental health was found, except in the case of receipt of social support with transportation. The only type of support that showed a significant interaction with gender was receipt of support with paperwork. The source of support did not seem to matter.

Implications of these findings for older people currently living in Tehran are considered and recommendations for appropriate social support interventions, taking account of the results, are made.

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LIST OF ABBREVATIONS

ADL   Activities of Daily Living
BDI   Beck Depression Inventory
CI   Confidence Intervals
DSM-IV   Diagnostic and Statistical Manual of Mental Disorders-IV
ES   Effect Size
GDS   Geriatric Depression Scale
GHQ   General Health Questionnaire
HRQoL   Health-Related Quality of Life
IADL   Instrumental Activities of daily living
IAGG   International Association of Gerontology and Geriatrics
ICC   Intra-Class Correlation
ID   Individual Identifier
IRANDOC   Iranian Information and Documentation Centre
ISPA   Iranian Student's Polling Agency
LSHTM   London School of Hygiene and Tropical Medicine
ME   Middle Eastern
MH   Mental Health
MOS   Medical Outcomes Study
MSc   Master of Science
MSPSS   Multidimensional Scale of Perceived Social Support
N   Number
NA   Non-Applicable
NGO   Non-Governmental Organization
NOCR   National Organization for Civil Registration
NSSQ   Norbeck Social Support questionnaire
OR   Odds Ratio
P   P-value
PhD   Doctor of Philosophy
PPS   Probability Proportionate to Size
QoL   Quality of Life
Ref   Reference
RR   Response Rate
RS   Retirement and Retirement Plans Survey
SCI   Statistical Centre of Iran
SD   Standard Deviation
SES   Socio-Economic Status
SF-36   Short-Form 36
Sig   Significant
SPS   Social Provisions Scale
SS   Social Support
TFR   Total Fertility Rate
TUMS   Tehran University of Medical Sciences
UCLA   University of California, Los Angeles
UK   United Kingdom

UN	United Nations
UNDP	United Nations Development Program
UNFPA	United Nations Population Fund
USA	United States of America
Vs	Versus
WHO	World Health Organisation
XS	Cross-Sectional

1. INTRODUCTION & BACKGROUND

This chapter presents a brief introduction and summary background to the study and justifies the importance and originality of the thesis in the context of the changing demography of Iran. Building on the existing literature, this chapter also highlights the research objectives and study questions, explains how these objectives are to be investigated and describes the structure of the thesis. This chapter thus sets the scene for the thesis.

Iran has experienced a faster fertility transition than yet observed in any other country (Abbasi-Shavazi & McDonald, 2006). The Total Fertility Rate (TFR) – that is "the number of births women would have if they experienced the age specific fertility rates of a given period throughout their reproductive span" (Demeny & McNicoll, 2003: 73) - decreased from 7 children per women of reproductive age in 1980 to 6.2 in 1986, 2.5 in 1996, and further to 1.8 in 2006, just below the replacement level [Statistical Centre of Iran (SCI)]. The most recent estimated TFR was 1.6 per woman in 2010 (SCI). A more than 70% decline in TFR in only 2 decades is not only unique for a Muslim country but has never been recorded elsewhere in the world (Abbasi-Shavazi & McDonald, 2006). Due to current – and likely future- low levels of fertility, Iran's rapid population growth over the course of the 20th century is also slowing (Abbasi-Shavazi & McDonald, 2006). (see Table 1.1)

Table 1.1: Population size and total fertility rate (TFR) in Iran, 1900-2010

Year	Population (million)	Total Fertility Rate
1900	10.0	-
1927	10.4	-
1935	11.9	-
1941	12.8	-
1956	18.9	-
1966	25.7	7.7
1976	33.7	6.1
1981	38.9	7.0
1986	49.4	6.2
1991	55.8	4.9
1996	59.5	2.5
2000	64.8	2.2
2006	70.4	1.8
2010	75.1	1.6

Sources: Data adopted from SCI; Aghajanian, 1991; Abbasi-Shavazi & McDonald, 2005; Abbasi-Shavazi et al., 2009a; UN Demographic Yearbooks (1976 and 1996); Department of Economic and Social Affairs of the UN Secretariat, World Population Prospects: The 2012 Revision, http://esa.un.org/unpd/wpp/index.htm (UN, 2012b). Data for 1981, 2006 and 2010 are based on United Nations (2011and 2012a)

Proposed explanations for Iran's rapid fertility transition include a well-resourced family planning programme with a successful model of service delivery based on a well-established primary health care delivery infrastructure and full support of religious leaders for family planning, and improvements in Iranian women's education and socio-

economic status (SES) (Vahidnia, 2007; Kaveh-Firouz, 2002). Also, economic hardship after the Iran-Iraq war and the increasing cost of raising children accelerated the fall in fertility in Iran (Abbasi-Shavazi, 2002). There is inconsistency among researchers on whether fertility in Iran will increase again in the near future, level off, or decline further. However, most researchers (e.g. Abbasi-Shavazi, 2002) believe that all of the main influences on the level of fertility appear to be moving in directions that will lower fertility further or at least maintain the current status rather than otherwise.

Iran has also experienced a rapid mortality transition. Life expectancy at birth increased from 37 for men and 40 for women in 1956 to 69 for men and 73 for women in 2008 (SCI). The rapid demographic transition of Iran, characterised by lower fertility and lower mortality, has made it as one of the fastest-ageing countries in the world. As a result of the demographic transition in Iran in the last two decades, a radical transformation in the age structure of the population has happened, with an increase in the population's mean and median age due to a rapid decline in the proportion of children and a considerable rise in the proportion of older people (Mehryar & Ahmad-Nia, 2004) (see Table 1.2).

Table 1.2: Mean age, total dependency ratio and distribution of the population of Iran by broad age groups in 1956-2006 and projections for 2050

Years	1956	1966	1976	1986	1991	1996	2006	2050
Mean age	23.7	22.2	22.4	21.7	21.6	24.0	28.0	40.2
Total dependency ratio	85.7	99.8	92.5	94.2	-	78.1	43.4	-
0-14 (%)	42.2	46.1	44.5	45.5	44.3	39.5	25.1	-
15-64 (%)	53.8	50.0	52.0	51.5	52.2	56.1	67.7	-
65+ (%)	4.0	3.9	3.5	3.0	3.4	4.3	5.2	20-25

Source: All information is based on Iran's censuses data except the data for 2050 which is based on the UN projections (2009). The data for 2050 are projected based on medium and low variants

Although population ageing is a global phenomenon, it is taking place in a much shorter period of time in Iran than in most of other countries. According to United Nations (UN), worldwide the 'old-age support ratio'– that is the number of persons aged 15 to 64 per person aged 65 years or over - was 9 in 2009, this is projected to fall to 4 persons of

working age per person aged 65 or over in 2050. In Iran this indicator was 15 in 2009, and is projected to decline to 3 in 2050.

Dependency ratio, despite its limitations, provides another useful, if crude, indicator of structural changes in age structure of countries. As the demographic transition in Iran is so recent, changes in the 'total dependency ratio' – that is the ratio of children under 15 and people aged 65 and over relative to those aged 15-64- show a fall in 'dependency' due to rapid declines in the relative size of the child population.

As shown in Table 1.2, Iran has had a very young population throughout its recent history, but, since 1991 there has been a considerable decline in the percentage of 0-14 years old, so that 'total dependency ratio' decreased from 78 to 43 in only 10 years, despite an increase in the proportion of older people (SCI). As shown in the table, in 2006 (the year of the most recently available census) the proportion of older people aged 65 and over was still low (5%) in a global context, but it is projected to increase rapidly in coming years and to reach 20% to 25% by 2050. Based on the UN projections (2009), while the current proportion of children under the age of 14 will be halved and the total size of the population of Iran will fail to double during the fifty-year period of 2000-2050, the number of people aged 65+ will experience a six-fold increase. Based on this projection, older people aged 60+ will comprise 28% of the total population of Iran in 2050, almost the same as Japan at the present time, which currently has one of the oldest populations in the world (UN, 2009). These UN projections also indicate that the median age in Iran will increase from 28 now to 40 or more by 2050.

Figure 1.1 illustrates the extent of these changes by comparing the numbers in different age groups in 2005 with those projected for 2050.

Figure 1.1: Iran's population distribution in 2005 and 2050 (projected)
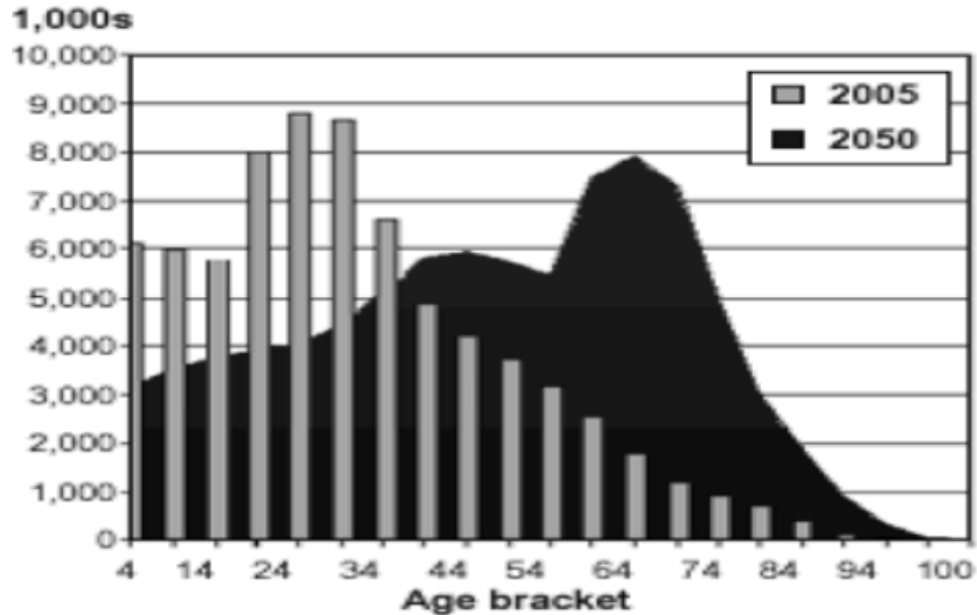
Source: UN (2005a)

Population ageing may present some opportunities for societies. However, it may also present challenges including higher demands for social security, pensions, gerontologists, accommodation and nursing homes and healthcare services including rehabilitation services (Mehryar & Ahmad-nia, 2004). The rapid pace of population ageing in Iran means Iran will have less time to adjust to these challenges compared to countries which have experienced earlier, but slower, population ageing. This is particularly problematic as Iran has currently an under-developed social security system. Majority of working adults -the future older population- have low incomes and are unable to save for their old age (Sheykhi, 2007 and 2004). Providing a pension system for those who lack other resources and maintaining and extending the currently limited social security and pension systems represent a major challenge for a yet unprepared community.

One of the major concerns regarding population ageing is a possible decline in available sources of support for older people as a result of changes in the structure of family, which has traditionally been the main source of care for older people in Iran (Azadarmaki & Bahar, 2006). The decline in fertility rates and family sizes means that older parents in the future will have fewer adult children to depend on for care and

support in old age (Chang, 1992). Moreover, in addition to changes in the structure of family, there is evidence that other dimensions of the Iranian family have also undergone significant changes during recent years as a result of wider social changes such as modernisation, urbanisation and migration (Azadarmaki & Bahar, 2006). Examples are growing preferences for fewer children and nuclear family residence, later age of marriage and increases in proportions never married, higher divorce rates, higher education and labour force participation among women and intergenerational challenges and generation gaps (for more information see Appendix 1). These changes may influence functions of the family.

Social and family changes are almost universally characterised as having a high negative effect on family ties and relationships among family members (Victor, 2005). The recent changes in the structure and functions of Iranian family, traditionally considered as the most basic and frontline institution and the main building block of Iranian society, may also have profound effects on the perception and provision of social support for older people (Rambod & Rafii, 2010; Azadarmaki & Bahar, 2006; Aghajanian, 2001). It has been suggested that particularly for rapidly increasing future older people in Iran, informal sources of support available for them in the future may be significantly different from those available today (Sheykhi, 2006). Family changes may erode the traditional family based systems of care for older people in the future and Iranian elders may no longer be able to rely solely on family support (Sheykhi, 2006).

Social support is of particular importance for older people and is an essential requirement in old age. Later life is associated with an increased risk of exposure to various stressors such as onset of chronic conditions, loss of function, loss of sources of income, role losses, and loss of spouse and confidants (Nemeroff et al., 2010). Older people may also be more vulnerable to certain types of stressors, or may suffer greater ill effects from stress (Oxman et al., 1992; McLeod & Kessler, 1990). Thus, social support in later life is particularly important as a buffer to these stresses, as well as a source of practical help in facing them (Johnson, 1998; Langford et al., 1997).

Nevertheless, despite an increased need for social support in older people, there is evidence that the size of social networks (from which social support is drawn) generally decreases with age as a result of the loss of close friends and family members (Wrzus et

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al., 2013; Nemeroff et al., 2010; Gottlieb, 1983; Broadhead et al., 1983). According to O'Hara (1998), older people may be disadvantaged in obtaining adequate social support because of declining health, lack of awareness of supports available, fear of outsiders, lack of willingness to acknowledge a need, inability to reciprocate, and lack of finance. The issue of inadequate support from family may be especially problematic for older people of countries like Iran, because as a strongly family oriented community Iran has limited non-family sources of support and infrastructure for people.

Available evidence suggests that social support makes an important contribution to health (Kendler et al., 2005; Wilkinson & Marmot, 2003; Cohen, 1988) and a lack of social support may have negative effects on physical and mental health among general populations (Lakey & Cronin, 2008; Cooper et al., 1999) and older populations (Adams et al., 2000; Grundy et al., 1996; Anderson & Dimond, 1995; Sugisawa et al., 1994). In particular, mental health may be affected because social support is believed to play a key role in moderating the effects of stress which is hypothesised to be particularly important for mental health (Lakey & Cronin, 2008; Cooper et al, 1999; Cohen et al., 1997). This is the reason research on social support and health has focussed predominantly on mental health.

Consequently, demographic and social changes in Iran have led to concerns that the well-being of older people, particularly their mental health, may be adversely affected as a result of likely potential decline in family support of older people. Although, the consequences of demographic and family changes would be more relevant to the future population of older people than to current cohorts, understanding more about current associations between support and well-being of older people may provide valuable insights into the implications of these changes in the future and is fundamental to informed planning. Thus, there is a need to develop policies and programmes in advance, which in turn requires a sound evidence basis about the older population of Iran, their social support and health patterns and the links between them, which inspired the choice of topic for this thesis.

What evidence there is has largely focused on western industrialised societies and in non-western countries there has been little research on the topic until recently (Tajvar et al., 2013). A recent search undertaken for the purposes of this thesis for studies referring

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to social support in 'ISI Web of Science' revealed that 65% of the retrieved citations referred to "North America" only and most of the rest were from other Western countries. In Iran or in many of the culturally similar countries such as those in the Middle Eastern (ME)[1] region despite the high prominence of this concern especially for future older people, this topic has not been studied yet. The few published studies on this topic conducted in these countries have various limitations and in general consider only specific aspects of social support (Tajvar et al., 2013). It is likely that differences in cultural attitudes and behaviour, societal conditions and structures or differences in health care systems, and settings make it difficult to generalise study findings from western countries to other (non-western) countries and populations.

The purpose of this PhD research was to expand the knowledge base on social support and mental health among Iranian elderly people by firstly providing descriptive information on the circumstances of a sample of older Iranians, and secondly through analysis of associations between social support and mental health. This includes analysis of the possible role of social support as a buffer of stress arising from functional limitations (see Section 2.4). Therefore, both of the main influential theories about the action of social support on (mental) health, the 'direct effect' and the 'stress-buffering effect' theories, were examined in this study (see Section 2.3.1 for detailed information).

This thesis is focused on mental health, not only because it is theoretically most relevant to social support, but also because mental health surveys suggest that the prevalence of psychological disorders among older people is already a considerable problem in Iran (Mortazavi et al., 2011; Manzouri et al., 2009; Montazeri et al., 2005a; Noorbala et al., 2004) and there is a concern that the potential decline in support of older people in future may make this problem even worse.

I decided to include all the main dimensions and aspects of social support in my study as discussed in Section 2.1.1. Most previous studies have taken a less comprehensive approach. Thus, while there is vast and frequently inconsistent literature on the importance of social support in the lives of older people, less research has been

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[1] The Middle East is a region that spans south-western Asia, western Asia, and north-eastern Africa. It has no clear boundaries, often used as a synonym for Near East, in opposition to Far East. Nineteen countries have been included in this region, namely Armenia, Azerbaijan, Bahrain, Egypt, Georgia, Iran, Iraq, Occupied Palestine (Israel), Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi-Arabia, Syria, Turkey, Turkmenistan, United-Arab-Emirates, and Yemen.

undertaken on the form or aspect of support that is more useful (Olutoyin Oni, 2010). It is unclear whether all aspects of social support are equally beneficial to the health of older people, especially in relation to depression, or if specific aspects or dimensions are more advantageous than the others (Olutoyin Oni, 2010).

There is some evidence from Iran that associations between support from specific sources and mental health may vary be gender. Previous evidence indicated that Iranian women are more reliant on social support from their children whereas older men are more dependent on support from their wives (Koosheshi, 2007). If this is true, it is possible that in future the health of older women is affected more than that of men by reductions in the number of children available. This hypothesis was also examined in this thesis.

Moreover, according to the census data, older women are considerably more disadvantaged than older men in many respects in Tehran and the rest of the country. Compared with older men, a higher proportion of women are illiterate (65% vs. 35%), widowed (53% vs. 10%), and living alone (20% vs. 3%), and women are poorer and more often economically dependent on others, and have poorer health (for example, see the figure in Appendix 2). These inequalities may expose older women to higher levels of stressors, which may contribute to their considerably poorer mental health compared with older men. Women may thus have higher needs and expectations for social support than older men and may suffer more from lack of support. An objective of this study was to see whether there are gender differences in the association between social support and mental health. This is clearly an important topic, relevant both to the understanding of determinants of mental health at older ages and to the planning of appropriate policies on support services for each gender group, but, as shown in the Literature Review chapter (Chapter 3), one that has been considered in only a few previous studies.

The considerations discussed above and the results of the literature review, and identified gaps in the literature, led to the formulation of the five main objectives – one descriptive, four analytical-of the research reported in this thesis, set out below:

1. *To describe the social support, mental health and socio-demographic characteristics of the older population of Tehran*

2. *To examine main (direct) associations between all dimensions and aspects of social support and mental health*

3. *To examine the possible stress-buffering effect of perceived and received social support in associations between physical functioning limitation and mental health*

4. *To examine whether there are gender differences in the association between social support and mental health*

5. *To examine whether associations between received social support and mental health of older men and women vary by sources of support*

These objectives were broken down into specific questions that are addressed in this study are as follows:

1. *What are social support, mental health and socio-demographic characteristics of the older population of Tehran?*

2. *Is there a main association between perceived social support and mental health?*

3. *Has perceived social support a stress-buffering effect in the association between physical functioning limitation and mental health?*

4. *Are there gender differences in the association between perceived social support and mental health?*

5. *Are there main associations between different types of received social support and mental health?*

6. *Do different types of received social support demonstrate a stress-buffering effect in the associations between physical functioning limitation and mental health?*

7. *Are there gender differences in the associations between different types of received social support and mental health?*

8. *Do associations between different types of received social support and mental health among men and women vary by sources of support?*

9. *Are there main associations between structural aspects of social support (including number of children, frequency of meeting with them, and living arrangements) and mental health?*

10. *Are there gender differences in the associations between structural aspects of social support and mental health?*

A quantitative cross-sectional survey of a random sample people aged 60+ years resident in Tehran was conducted to examine the study hypotheses and address the study questions.

This PhD research was conducted with the goal of providing information and evidence for Iranian authorities and policymakers as well as advancing scientific study of a neglected topic in Iran and making an important contribution to the scarce research evidence on the topic.

Following Chapter 1, other six chapters, as described below, are comprised in this thesis:

Chapter 2 - Conceptual and Theoretical Framework- This chapter presents the theoretical and conceptual basis of the thesis. The two key concepts underlying the research undertaken in this thesis, social support and mental health, were defined followed by a critical discussion of the various theories about the action of social support on mental health. This chapter concludes with a presentation of the conceptual framework and hypotheses underlying the research.

Chapter 3 -Literature Review- This chapter reports the results from a systematic review of the literature on associations between social support and mental health in older people. The purposes of this chapter were to summarize the current state of the research on the topic, identify significant gaps in the literature that need to be addressed, and aid in specification of the objectives and hypotheses of my thesis.

Chapter 4 -Methods- This chapter presents the study design and an overview of methods used to meet the objectives outlined in the introductory chapter, and includes information on the results of the fieldwork and sample response. The measurement and operationalisation of study variables, methods used in preparation of the data for analysis and statistical methods used to analyze the data are also described in this chapter.

Chapter 5 -Descriptive Results- This chapter includes descriptive results on the profile of the study participants; their health status and social support.

Chapter 6 -Analytical Results- The results of the main multivariable analyses on the associations between social support and mental health designed to test the study hypotheses are presented in this chapter.

Chapter 7 -Discussion and Conclusion- This chapter provides a summary of findings, followed by a critical discussion of these findings, taking account of various methodological considerations. Recommendations for policy and for future research were also proposed.

2. CONCEPTUAL & THEORETICAL FRAMEWORK

This chapter presents the theoretical and conceptual basis of the thesis and critically assesses the underlying assumptions as well as the justification for, and value of, using these concepts in relation to the social support and mental health of older people in Iran.

In the first section of this chapter, I discuss the two concepts key to the research; social support and mental health. There follows an extensive and critical discussion of the various theories about how social support influences mental health including theoretical justification for the hypothesis that social support may moderate the association between functional limitations and mental health. This is followed by a discussion of the role of gender and sources of support in the association between social support and mental health. The chapter concludes with an overview of the conceptual framework for the study and associated hypotheses to be tested in this study which were developed on the basis of the discussions included in this chapter and the literature on Iran, reviewed here, and the wider literature, reviewed in the next chapter.

2.1 Social Support

2.1.1 Conceptualisation of Social Support

Social support is a complex and multi-faceted concept, which has been conceptualised and operationalised in a range of different ways. This lack of consistency is one of the most common criticisms of social support research (Williams et al., 2004). Nevertheless, there is a consensus among researchers that social support has positive and health promoting effects. According to Shumaker & Brownell (1984), 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. Cohen et al. (2000) also defined it as a process whereby health and well-being is promoted.

Some scholars have considered social support as a basic human need and defined it as a way that a person's basic social needs-for affection, esteem, approval, sense of belonging, identity and security-are satisfied through interaction with others (Thoits, 1982; Cobb, 1976). However, others have suggested that the benefits of social support arise only because it acts as a buffer to stress, and have thus conceptualised it as social interactions that are perceived by the recipient to facilitate coping and assist in responding to stress (Letvak, 2002). A third group views social support as a multiple construct which operates both as a means of meeting basic needs and a means of buffering stress (Kessler & McLeod, 1985; Cohen & Wills, 1985).

Social support includes interrelated dimensions and aspects, as explained below, so measurement issues are complex. This has led to the development of a range of instruments designed to measure all or specific dimensions.

Dimensions of social support: 'perceived' and 'received' social support

Much of the literature distinguishes between two important dimensions of social support: 'perceived' and 'received' social support. 'Perceived social support' refers to one's 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). According to Uchino (2009) perceived support refers to a generalised appraisal that individuals are cared for and valued, significant others are available to them in times

of need and they are satisfied with their relationships. Perceived social support stems from interactions whereas received social support indicates what people obtain from others.

Past research has consistently suggested that subjective measures of social support (perceived social support) are more strongly related to health, particularly mental health, than are objective measures (Hobfoll, 2009; Cohen et al., 2003; Fratiglioni et al., 2000). This notion has been supported by the findings of well-designed longitudinal studies such as the study of Henderson et al. (1981). Thoits (1995) speculated that it may be more beneficial to health to have only one close functional relationship than to have a large social network of unsupportive people. Actions by others not perceived as supportive are unlikely to reduce psychological distress, and conversely, actions not intended to be supportive but that are perceived as such, still might have a buffering effect (Berscheid, 1994). Perceived social support may be very important in later life, when individuals are particularly subject to various stressors (Blazer, 1982). According to the "social support deterioration deterrence model" proposed by Norris and Kaniasty (1996), the effect of received social support on health is mediated by perceived social support. Based on this model, given that perceived social support is a proximal mediator to health in comparison to received social support, it would be expected that the magnitude of the effect of perceived social support on health would be greater than that of received social support (Shrout & Bolger, 2002).

It is important to note that the two dimensions of social support do not appear to be interchangeable (Wills & Shinar, 2000). Received support and perceived support are not highly correlated (Uchino, 2009; Haber et al., 2007; Goldsmith, 2004; Gurung et al., 1994). The beneficial effects of perceived support may be obtained in the absence of any actual support being provided (Cohen, 1988). Indeed, the distinctiveness of perceived and received support is well-documented (Uchino, 2009; Wills & Shinar, 2000). In addition to the weak association between perceived and received support, these two dimensions may show different relations to mental health. Low perceived support is consistently related to poor mental health, whereas received support may be either unrelated or positively related to emotional distress (Bolger & Amarel, 2007; Brummett et al., 2000; Dunkel-Schetter & Bennett, 1990; Sarason et al., 1990; Barrera, 1986). This

is because received support is more likely to be sought and/or provided in response to stress (Larzelere et al., 2004; Barrera, 2000).

Perceived social support is the most frequently assessed construct in the literature (Ibarra-Rovillard & Kuiper, 2011; Winemiller et al., 1993). Although perceived support and received support both usually rely on respondents' self-reports, they are separate constructs. Measures of perceived support assess an individual's cognitive appraisal of the availability of help in times of need, whereas measures of received social support refer to recalling help received from others within a given time period in the past (Schwarzer & Knoll, 2007). Hobfoll (2009) suggested that measures of perceived support summarize perceptions of reality that have accumulated over a long period of time, based upon many events and interactions. In contrast, measures of received support assess much more specific and recent support events that are not necessarily representative of the general pattern of interactions with others. The measurement of both perceived and received social support may present challenges. Responses to questions about perceived social support may be influenced by the perceptions of participants that may distort 'reality' (Henderson, 1981). Also perceptions may be more a reflection of a personality trait, rather than the actual social environment (Paykel, 1994; Sarason et al., 1986). On the other hand, it is possible that reports of social support received, for example, in the last 12 months, may be subject to recall bias.

Aspects of social support: structural and functional aspects

In addition to its different dimensions, social support has also been conceptualised to have 'structural' and 'functional' aspects (Cobb, 1976).

The structural aspect of social support is the actual physicality of the support and includes quantitative elements such as size of social network, frequency of social interaction, whether or not people are married, whether or not people live alone, and how often they take part in social activities. The functional aspect refers to the type or content of support. Social support theory suggests that structural social support is a necessary antecedent of functional support (Queenan et al., 2010). The evidence suggests that the structural features of social support such as the availability of support (Henderson et al., 1981), size of the support network (Jang et al., 2002; Underwood, 2000), and frequency

of social contacts (Jang et al., 2002; Conner et al., l979) are less significant predictors of mental health than the functional aspects.

A wide range of functions have been attributed to social support, of which emotional and instrumental support are most commonly identified (Wills & Shinar, 2000). Emotional support involves the provision of caring, empathy, love and trust (Langford et al., 1997). According to Wills and Shinar (2000), emotional support refers to the availability of people who listen sympathetically and communicate care and acceptance when an individual is undergoing life difficulties. Many studies (e.g. Lee & Dunkle, 2010; House, 1981; Gottlieb, 1978) considered emotional support to be the most important category through which the perception of support is conveyed to others. Instrumental support (also known as tangible support, practical support or enacted support), on the other hand, is defined as the provision of practical help or tangible goods or services (e.g., helping with transportation, household chores, physical assistance or finance) when necessary (Wills & Shinar, 2000; House, 1981). This type of support may be especially important in later life due to the increased risk of physical limitations in old age. There is some evidence that, in older persons, instrumental social support is more important than emotional support in predicting depression (Bisschop et al., 2004a; Chi & Chou, 2001) especially in those with higher levels of functional disability (Prince et al., 1997).

Weiss (1974) outlined six major functions of perceived social support, encompassing most of the functions proposed by other investigators (e.g. Berkman, 1984; Brim, 1974; Caplan, 1974): (a) Provision for attachment (emotional closeness giving one a sense of security); (b) Social integration (a sense of belonging to a group); (c) Opportunity for nurturing behaviour (the sense that others rely on one for their well-being); (d) Reassurance of worth (recognition of one's value, skills, and competence by others); (e) Guidance (the availability of information and advice); and (f) Reliable alliance (the assurance that someone can be depended on for tangible support).

2.1.2 Social Support and Social Networks

Social network approaches, rooted in Durkeim's (1895) classic study, had a strong influence on early research on social support (Berkman & Syme, 1979). However, in the 1980s there was a growing realisation that social networks were not equivalent to social support leading to the derivation of measures specifically designed to capture social

support itself (Rhodes & Lakey, 1999). Network measures are criticized for not providing information about the psychological and interpersonal processes that links social support to psychological health (Barrera, 1986; Cohen & Wills, 1985).

Cunningham and Barbee (2000) defined social networks as the set of people from whom an individual can reasonably expect to receive support in time of need, whereas social support is the interactive process in which aid is obtained from one's social network. Investigators believe that social support is among the primary pathways by which social networks may influence physical and mental health status (Thoits, 2011; Berkman et al., 2000). Social networks, although a potential source of social support, sometimes may have negative influences on health, as they may include ties that not only fail to provide support, but also may be stressful or cause conflict (Auslander & Litwin, 1991; House et al., 1988). For example, some social networks may promote harmful behaviours, such as networks of drug users (Bowling, 1994; Milburn, 1986). Thus, despite similarity and relationships between these two concepts, they are distinct and should be kept separate to avoid definitional, measurement and analytical confusion in studies (Dressler, 1985; Gottlieb, 1981).

Social networks, however, could be considered as a measure of structural aspects of social support which include the following characteristics: size (the number of people in a network); geographic proximity or dispersion (the extent to which network members live near the focal person); density and complexity (the extent to which members of an individual's network know and interact with one another); homogeneity (the extent to which network members are similar, in terms of for example age, social class, religion); symmetry or reciprocity (the extent to which supports and obligations are equal among members); accessibility (the ease with which the focal person can contact other network members); composition and membership (who are the members of the network); and frequency of contact and durability over time and strength of ties (Bowling, 1994; Berkman, 1984).

2.1.3 Determinants of Social Support

Social support is the result of the interplay between individual factors and the social environment. Characteristics such as age, gender, SES, marital status, and family size may be associated with the probability of receiving social support. Various studies have

reported less receipt of social support among unmarried compared with married people (Turner & Marine, 1994; Ross & Mirowsky, 1989), nuclear families versus extended families (Broadhead et al., 1983), older people compared to young people (Choi & Wodarski, 1996), women versus men in some studies (Rambod & Rafaii, 2010) and men versus women in other studies (Turner & Marine, 1994; Ross & Mirowsky, 1989), and people with lower SES compared to those with higher SES (Dalgard et al., 2006 and 2007; Choi & Wodarski, 1996)

Most of this literature is based on studies from the US and Europe but there is also a number of studies from Iran on some of the determinants of social support. Koosheshi (2007) found that Iranian older people living alone perceived less social support than those living with others. Another study (Rambod & Rafii, 2010) found an association between the marital status of older people and their perceived social support with the married perceiving more support.

2.2 Mental Health

2.2.1 Conceptualisation of Mental Health

'Mental health' has also been conceptualised in various ways by researchers. Differences in value systems across countries, cultures, social classes and genders mean that definitions and perceptions of mental health vary [World Health Organization (WHO), 2001a]. However, based on the famous definition of 'health' by the WHO (2001b:1) as "….a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity", it can be concluded that: i) mental health is an integral part of health; ii) mental health is more than the absence of mental illness; and iii) mental health is intimately connected with physical health and behaviour (WHO, 2005).

'Mental health' has specifically been defined by WHO (2007a:1) as "…..a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community". Thus, WHO has looked at mental health positively as a matter of well-being. Positive mental health is a value in itself and may be considered as a health resource (Prati & Pietrantoni, 2010). In the positive perspective, mental health is

conceptualized as a positive emotion such as feelings of happiness, as a personality trait inclusive of the psychological resources of self-esteem and mastery, and as resilience, which is the capacity to cope with adversity (WHO, 2005).

On the other hand, mental health has also been operationalised negatively and negative measures of psychological adjustment (burnout, depression, anxiety, negative mood, etc.) have been a frequent topic of enquiry. Negative mental health is usually indicated and evaluated by mental disorders, symptoms, and problems. Mental disorders are understood as clinically significant conditions with alterations in thinking; mood or behaviour associated with personal distress and/or impaired functioning (WHO, 2001a). Mental disorders are conditions not within the normal range (psychological), but clearly abnormal or pathological phenomena (psychiatric) (WHO, 2001a).

Research has focused more on negative rather than positive measures of mental health (WHO, 2001a). This may be because it is easier to measure mental disorders or symptoms, rather than positive emotions and characteristics of good mental health. Moreover, since one hypothesis about the effect of social support on mental health is as a buffer to stress, associations may apply more to negative than positive aspects. For these reasons, in the research reported here I chose a measure of negative mental health, the General Health Questionnaire (GHQ) (see Section 4.15.1).

2.2.2 Determinants of Mental Health

Based on the literature, it appears that mental distress is a multidimensional construct that emerges as a result of a complex interaction between various socio-demographic, clinical and psychosocial risk factors (Couture et al., 2005).

WHO (2005) highlighted three sets of variables, including 'demographic characteristics of individuals', 'social support' and 'exposures to stressful life events', as essential components of data collection in epidemiological studies of mental health due to their documented associations with mental health. Thus, in addition to measures of social support, I also collected information on the demographic characteristics of individuals and potential stressors in their lives (see Section 4.15).

Couture et al. (2005) suggested that it was essential to consider age, gender, family structure, place of residence, level of education, income, marital status, and employment

as critical demographic variables needed for the planning and targeting of mental health promotion opportunities. This conclusion springs from the wide ranging literature which has shown that all are associated with variations in mental health (Carey, 2004; Jang et al., 2002; Zarit et al., 1999) including among older people (Krause, 2005). The relationship with age, however, is not linear, that is, younger and older people present more psychological distress than middle-aged individuals (e.g. Pre´ville et al., 1995). Older women are more likely to develop psychological distress symptoms (e.g. Alexandrino-Silva et al., 2011). Also, being poorer and less educated may increase the risk of psychological problems (e.g. Krause, 2005; Pre´ville et al., 1995) and widowed older people are more likely to develop mental problems than married older people (e.g. Krause, 2005).

Exposure to stressful life events, as discussed above, is another important potential influence on mental health (Caspi et al., 2003; Stephens et al., 1999). It has been argued that older people compared to younger people may face additional stresses such as onset of chronic conditions, loss of function, decline in energy, loss of sources of income, retirement, children leaving home and loss of spouse and confidants (Oxman et al., 1992; McLeod & Kessler, 1990). These stressors could subject older people to an increased risk of mental disorders (Bozo et al., 2009; WHO, 2001b). It has also suggested that older people may be more vulnerable to certain types of stressors, or may suffer greater negative effects from stress (Oxman et al., 1992; McLeod & Kessler, 1990).

Evidence from Iran

Research from Iran has also shown the salience of the factors explained above. Two large national epidemiological surveys have reported that similar factors are associated with mental health in the general population of Iran. In one of these surveys (Noorbala et al., 2004) the authors found that age, gender, marital status, employment, and education were significantly associated with the mental health (measured by the GHQ) of the population (n=35,014) aged 15 and over. The results of this survey indicated that the likelihood of reporting symptoms of psychological disorder increased with age, was higher among women than men and positively associated with being unmarried, with lower educational level and being unemployed. The second survey (Mohammadi et al., 2005) of a sample of 25,180 individuals aged 18 and over found similar associations

between gender, marital status, education, and employment and psychiatric disorders measured using the Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV) criteria.

In a review of the literature on the determinants of mental health in older people in Iran, I found 11 relevant studies, details of which are summarised in Table 2.1. All of these studies were conducted very recently, possibly because of growing awareness of population ageing in Iran. All the studies, except the study of Malakouti et al. (2006), were published in national Farsi language journals, providing only limited access for international researchers. These studies used a range of different instruments to measure mental health, with the most common being the GHQ (Goldberg & Hillier, 1979) (used by five) followed by the Geriatric Depression Score (GDS) (Yesavage et al., 1982-83), used in three studies. Two studies used the Kessler Psychological Distress Scale (Kessler-K6) (Kessler et al., 2003) and one the Beck Depression Inventory (Beck et al., 1961).

As shown in the table, some of the studies reported associations between all variables included and mental health whereas in others only significant associations were reported. Gender of participants was the only covariate that was used in all the studies and in all showed a significant association with mental health with older women reporting poorer mental health. Education was included in 10 studies, and in 7 of them was found to be significantly associated with mental health. People with lower levels of education were at greater risk. Marital status and age were used in 8 studies and showed significant associations with mental health in most of them (n=5 and 6 respectively) indicating that married and younger older people had better mental health status than the unmarried or older old. The association between income and mental health was examined in 5 studies, of which 4 reported a significant association with those with higher incomes showing lower risk of depression. Other factors were investigated in a limited number of studies: physical health problems and employment showed associations with mental health, but number of children and co-residence with them showed no significant association. However, it should be noted that all of these studies were cross-sectional, thus the temporal direction of associations could not be ascertained. For example, 'unemployment' may be a consequence rather than a predictor of poor mental health.

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Moreover, some of these studies only undertook bivariate analyses and several were based on small samples (Table 2.1).

In summary, the results of these Iranian studies are consistent with the literature from Western countries in indicating associations between gender, age, education, marital status and income with mental health in older age. This accord with the conclusions of other investigators such as Patel (2001) who noted that correlates of mental disorder in less developed countries were similar to those in the more developed world, suggesting common mechanisms operate across cultures.

Table 2.1: Summary of results from studies on the determinants of mental health in Iranian older people

Ref.,	Sample Size	Design and Analysis	Measure of mental health	Findings*
Motamedi-shalamzari et al. (2002)	200	XS Multivariate	GHQ	Sig: gender; age Not Sig: education; marital status; income
Taban et al. (2005)	523	XS Bivariate analysis	GDS	Sig: gender; age; education; marital status; number of chronic medical diseases
Malakouti et al. (2006)	204	XS Bivariate analysis	GHQ	Sig: gender; education Not Sig: age; co-residence with others
Safezadeh (2009)	312	XS Bivariate analysis	GHQ	Sig: gender; age; marital status; education; household income
Manzouri et al. (2009)	248	XS Multivariate	GDS	Sig: education; gender; being married and living with spouse
Alizadeh et al. (2010)	302	XS Multivariate	Kessler-K6	Sig: gender; education, economic status; English spoken ability; duration of living in Australia; diseases; physical activity; social activity; access to information
Kashfi et al. (2010)	120	XS Bivariate analysis	Beck Scale	Sig: gender; age; working or not; married or not; income Not Sig: education; N of children
Mokhtari & Ghasemi (2011)	120	XS Bivariate analysis	GHQ	Sig: gender; age; economic status; occupation Not Sig: N of children; education
Mortazavi et al. (2011)	400	XS Multivariate	GHQ	Sig: gender; education Not Sig: age; marital status; living arrangement; social participation
Ghaderi et al. (2012)	302	XS Bivariate analysis	GDS	Sig: gender; age; living arrangement; education Not Sig: N of children; marital status
Alizadeh et al. (2012)	402	XS Multivariate	Kessler-K6	Sig: gender; housing tenure; working or not

XS: cross-sectional; GDS: Geriatric Depression Scale; GHQ: General Health Questionnaire; Sig: Significant association with mental health; Not Sig: No significant association with mental health

2.3 Theories and Mechanisms Linking Social Support to Mental Health

2.3.1 The 'Main Effect' and the 'Stress-Buffering Effect' Theories

Despite robust findings on the influence of social support on health, at least in Western countries, the exact nature of the association remains elusive, and a model that adequately explains the link between them is lacking (Thoits, 2011). Researchers, as shown in the following examples, have pointed out repeatedly that the mechanisms linking social support to mental health are still unclear.

> *"The mechanisms through which social support is related to mental health outcomes and to serious physical illness outcomes, however, remain to be clarified" (Cohen & Wills, 1985: 311)*

> *"Attention to intervening mechanisms seems a crucial next step if we wish to truly understand how social support influences psychological well-being" (Thoits, 1995:65).*

> *"It is now generally accepted that deficiencies in social support increase the risk for depression. However, processes or mechanisms that may be involved are still not well understood." (Ibarra-Rovillard & Kuiper, 2011: 343)*

However, most of the literature has focused on two influential models of the action of social support on (mental) health: the 'main effect' and the 'stress-buffering effect' models.

The 'main effect model' or the 'direct model' implies that social support has a positive effect on health and operates at all the times, irrespective of the individual's life situation and independent of exposure to a stress (House et al., 1988; Berkman & Syme, 1979). In this model, social support can prevent the occurrence of the stress that may negatively affect health. Social support is regarded as a basic human need, and therefore people will feel better psychologically when that need is fulfilled (House et al., 1988) and people with high social support will have better mental health than those with low social support (Lakey & Orehek, 2011).

Alternatively, the 'stress-buffering model' proposes that social support acts as a buffer against the deleterious influence of stressors on health. Consequently, the buffering effect occurs only when the person is exposed to a stressful situation, 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 at least on two points in the pathway between 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, 2000; Thoits, 1986). Second, after occurrence of stressful event, perceived or received support may reduce the negative emotional reaction to the stressful event or reducing the physiologic/ behavioural responses to stress.

Evidence exists to support both models, but is also contradictory. Three major published reviews (Kaplan et al., 1977; Cassel, 1976; Cobb, 1976) concluded that much of the beneficial health effects of social support were due to its buffering properties in the presence of stress and that social support was likely to be protective of health only in the presence of stress. Thus, much of the subsequent literature focused on the buffering versus the main effects of social support. Nevertheless, the more recent findings reported in the literature on the buffering effect model are less consistent than the literature on the direct effects of social support (Thoits, 2011; Lakey & Orehek, 2011). Although most researchers have considered the main or buffering effects of social support as alternatives, there is also a third group believing that social support as a multiple construct may operate through both pathways (Kessler & McLeod, 1985; Cohen & Wills, 1985).

It has also been argued that the two models are not mutually exclusive; rather, they may help to explain the influence of specific aspects of social relationships on mental health and the direct or buffering effects of social support may be dependent on the type of stress and support (Bisschop et al., 2004b; Cohen & Wills, 1985). It is suggested that structural aspects of social relationships (e.g., social networks) may operate via the main effect mechanism, whereas functional aspects of social relationships (e.g., emotional support) operate through the stress-buffering mechanism by enhancing an individual's coping abilities (Leung et al., 2007; Kawachi & Berkman, 2001; Bowling, 1994). Evidence suggests that perceived social support might be more important than received social support in buffering an individual against stressful life events (Callaghan & Morrissey, 1993). Rhodes & Lakey (1999) believe that social support phenomena are so diverse and complex that a wide range of perspectives are needed. They concluded that

because of this complexity, no single model or perspective would be adequate to explain the range of social support effects.

2.3.2 Pathways of Effect of Social Support on Mental Health

Apart from understanding how social support may be associated with health, it is also crucial to understand intervening pathways through which social support impacts on health outcomes and the relative effect of each of those pathways in order to design effective interventions (Thoits, 2011). Identifying the pathways linking social support to health also helps us to understand why and in what circumstances we can expect or not expect that social support affects health.

According to Thoits (2011) pathways through which social support influences different health outcomes including physical health and mental health outcomes are substantially similar. Most literature (e.g. Berkman & Glass, 2000; House et al., 1988) suggests three main pathways whereby social support affects health in general:

1) Psychological pathway: social support promotes self-esteem (Uchino et al., 2012; Thoits, 2011 and 2006), which, in turn, is associated with lower symptoms of anxiety and depression (Taylor & Stanton, 2007; Baumeister et al., 2003; Turner & Lloyd, 1999; Turner & Roszell, 1994). Also, individuals can be supported by giving them reassurance and feedback about their competence which helps them to maintain a sense of mastery and control over life (Uchino et al., 2012; Thoits, 2011; Bisconti & Bergeman, 1999; Cooper et al., 1999). Perception of control over life is associated with optimism and confidence in one's ability to cope with major stressors and thereby is associated with lower anxiety and depression (Taylor & Stanton, 2007; Mirowsky & Ross, 2003; Turner & Lloyd, 1999; Steptoe et al., 1996; Turner & Roszell, 1994). Additionally, social support may foster a sense of coherence or meaning and purpose in life, which in turn protects against anxiety (Thoits, 2011; Antonovsky, 1987). Moreover, social support is held to enhance a sense of belonging and security, as well as recognition of self-worth in individuals (Thoits, 2011; Cohen et al., 2000). These positive psychological states, in turn, may protect against the emergence of mental disturbances because of increased motivation for self-care as well as the regulation of the neuroendocrine response to stress (Kawachi & Berkman, 2001; Cohen et al., 2000). The current literature suggests that the perception that others will be available to provide any needed assistance may reduce

psychological distress by limiting the time spent worrying about life problems (Peirce et al., 2000) as well as reducing feelings of isolation and mistrust (Bisconti & Bergeman, 1999; Krause, 1993).

2) Biological pathway: this pathway deals with various physiological stress reactions affecting among other things the immune system, metabolic, and autonomic nervous systems and hormonal pathways (Uchino, 2004; Cohen, 2004; Seeman et al., 2001; Marmot & Wilkinson, 1999; Taylor et al., 1997; Cohen & Williamson, 1991,). The study of Thomas et al., (1985), for instance, showed that older people with satisfying relationships had lower serum cholesterol and uric acid levels and higher indices of immune function than those with poorer support. It has been suggested that social support impacts through biological pathways primarily on physical health and the improved physical health in turn is associated with improved psychological wellbeing (Wang et al., 2003).

3) Behavioural pathway: it is suggested that social support influences a person's health behaviours, mainly through two pathways; 'social comparison' and 'social control' (Thoits, 2011). Social comparison is the way that people obtain both normative and behavioural guidance, for example norms about the appropriateness of use of alcohol, cigarette or drugs, exercising and seeking preventive care through comparisons with similar others in their reference groups (Marsden & Friedkin, 1994). On the other hand, social control, a more active and direct pathway, refers to the explicit attempts of social support resources to monitor, guide, remind, or pressure a person to obtain positive behavioural norms and encourage them to adopt healthy behaviours such as giving up smoking (Berkman et al., 2000; Cohen et al., 2000; Lakey & Cohen, 2000). Berkman and Breslow's (1983) prospective study in Alameda County showed that greater overall involvement with formal and informal social ties was associated with more positive health behaviours over a ten-year period. Health behaviours have almost always been mentioned as mechanisms through which social support could primarily influence physical health and then path to mental health through improved physical health, just as biological pathway (Thoits, 2011).

Application in Iran

The above mentioned three pathways are suggested irrespective of the dimensions and aspects of social support, although some of them may be more relevant to a specific dimension or type of social support or the circumstances in which support is provided. Additionally, it is unclear which pathway is more relevant to each of the main effect and stress-buffering effect theories of social support and health. Moreover, I did not find any evidence suggesting that the mechanisms and pathways of effects of social support on mental health vary in different study settings or contexts including Iran. Consequently, although identifying the pathways linking social support to mental health is beyond the focus of my study, yet I have to assume that theories about mechanisms underlying the associations between social support and mental health, as discussed above, apply in the Iranian context too. Exploring these complex issues would be the next step in research, when links between the different dimensions and aspects of social support and mental health were verified among the Iranian older people.

2.4 Physical Functioning Limitations and Mental Health: The Moderating Role of Social Support

Among the most important stresses of later life are poor physical health and limitations in physical functioning [2] (Himes, 2000). Many studies, including longitudinal studies report that declining physical function is associated with, or is a risk factor for depression in the general adult population and in older people (Bierman & Statland, 2010; Schnittker, 2005; Lynch & George, 2002; Jang et al., 2002; Lefrancois, 2002; Penninx et al., 1998; Pre´ville et al., 1995; Kennedy et al., 1990; Reich et al., 1989). In the study of Lee and Dunkle (2010) the more the elder was dependent in both ADL activities and IADL activities, the higher his/her depressive symptoms were.

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[2] "Physical function" is a person's ability to perform normal Activities of Daily Living (ADL) and disability occurs when a person has restriction with his physical functions (Verbrugge & Jette, 1994). The term "Activities of Daily Living" also refers to a set of common, everyday tasks including bathing, dressing, transferring, using the toilet, continence, and eating, performance of which is required for personal self-care and independent living (Katz et al., 1963)

Different mechanisms have been suggested including limiting the ability to participate in social roles (Gayman et al., 2008) or to live safely and independently (Albert, 2004), which increase the risk of depression. Functional limitations require a fundamental reorientation to daily functioning and renegotiation of social participation, thereby changes in professional and leisure roles, as well as changes in how individuals see themselves (Kelley-Moore et al., 2006; Kelley-Moore & Ferraro, 2001). 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). It has also been observed that individuals who recover some of their functional ability experience a reduction in psychological disorders (Lefranc ̧ois, 2002). The evidence from Iran also supports the idea of a relationship between functional limitations and depression (Hadianfard & Hadianfard, 2004).

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; Hashimoto et al., 1999). Perceptions of social support are likely to be particularly important for individuals with functional limitations (Bierman & Statland, 2010). Perceiving the social environment as helpful and responsive to one's needs increases a sense of coherence which leads older people to find functional limitations as less stressful (Antonovsky, 1979). Research and theory therefore suggest that the presence or absence of social support may influence the degree to which older adults are able to manage functional limitations or not (Bierman & Statland, 2010). This is compatible with the stress-buffering theory, in which it is hypothesised that social support may buffer the negative impacts of functional impairment on mental health.

This hypothesis is one that I examine in this study. The selection of functional impairment as the potential stressor in this research is particularly appropriate, as the study subjects are older people, with potentially higher rates of chronic health morbidities limiting their physical functional abilities. The figure in Appendix 2 indicates the prevalence of selected chronic health morbidities among older people in Iran which are high. In particular, 48% of men and 78% of women (total: 63%) reported they have been diagnosed with joint problems and pain that limited their movement. The result of a recent study in Iran (Harouni et al., 2013) also showed that among the eight dimensions of health-related quality of life measured by the 36-item Short Form (SF-36),

'physical functioning' was the poorest dimension of quality of life of older people in Tehran. As already discussed (Section 2.2.1), mental health is intimately connected with physical health (WHO, 2005), thus stresses related to physical health may primarily be linked with mental health.

2.5 Role of Gender and Sources of support

It is suggested that taking a gender-specific approach into account in studies of health of older people is imperative and has important implications in policy making. Nevertheless, taking a gender perspective in elderly health research is limited (Caetano et al., 2013) and the role of gender has not been clarified in this research area in the world and in Iran.

As I briefly discussed in the Introduction Chapter, gender of older people could be a main factor in modifying the associations between social support and mental health. In this study, I hypothesised that poor social support may have a worse effect on mental health of older women than men. This is because based on the comparative data reported in the first chapter (Chapter 1) and also findings of the earlier studies in Iran (Tajvar et al., 2008; Koosheshi, 2007; Vahdaninia et al., 2005; Goshtasbi et al., 2003) older women are more disadvantaged and exposed to more stressors and had poorer health status compared to older men and thus, they may have more social support needs and expectations than men do. In the European context there is also evidence that poor support has the worst effect on the mental health of very old women (Grundy, 2006) and also the risk of death was higher among women with the lack of informal social support (Lyyra & Heikkinen, 2006; Temkin-Greener, 2004; Unger et al., 1999).

Sources of social support such as spouse, children, and friends could also modify associations between social support and mental health of older men and women, as discussed in Introduction Chapter. Available evidence from Iran (Koosheshi, 2007) and also other countries including Brazil (Alexandrino-Silva et al., 2011), Thailand (Knodel & Chayovan, 2009), and Turkey (Kara & Mirici, 2004) indicates that while women tend to have a close confiding relationship with their children and are more reliant on support from them, men are more dependent on support from their wives. This hypothesis was

also examined in my research. Few studies have examined the role of various sources of support in mental wellbeing of older men and women. Understanding the saliency of the source of support for mental health may help nurses and other health care professionals when assessing the social support networks and preferences of older people to plan and implement the best practices to reduce or combat depression among the older people.

2.6 Conceptual Model of the Study

The theories and arguments given in earlier sections on the possible relationships between social support and mental health, in addition to the results of the literature review, reported in the next chapter, provided the basis for developing the conceptual model of this thesis. The conceptual model is the basis for the analysis of the data (Figure 2.1).

In this conceptual model, mental health is the dependent or outcome variable, and social support the main independent factor hypothesised to influence mental health. Social support was conceived as a positive and health promoting multi-faceted concept consisting of different dimensions (perceived and received social support) and aspects (functional and structural aspects), as discussed earlier (section 2.1.1). The functional aspect is nested in the dimensions whereas the structural aspect is independent of dimensions, thus has been shown in a separate box. The reasons for focussing on specific functions of social support, either perceived or received, or specific indicators of structural aspects, shown in Figure 2.1, arise from the literature and theories discussed in this chapter and further elaborated in Section 4.15.

As shown in the figure, the conceptual model integrates the two main models proposed by other researchers on the influence of social support, namely the main (direct) effect model and the stress-buffering effect model, thus both theoretical perspectives inform this thesis. In the main effect model, the direct association between social support, in different dimensions and aspects, and mental health is examined. In the stress-buffering model, social support is hypothesised as mediating in the relation between a stressor and mental health. The stressor I focused on in my research, shown in a red box in the figure,

was 'physical functioning limitation', the rationale for which I have discussed earlier (Section 2.4).

My conceptual model also hypothesizes that the gender of participants (shown in the triangle) may have different effects in the associations between all measures of social support and mental health. Also, it is hypothesised that sources of received social support play a different role in the relationships between support and mental health of men and women. (Section 2.5)

Other demographic and SES characteristics of individuals and their physical functioning health are hypothesised to be associated with the depressive symptoms of the older people and also associated with their social support, thus these covariates have been taken into account in the statistical analysis (Sections 2.1.3 and 2.2.2).

Figure 2.1: The conceptual model of the study - proposed interrelationships between study variables
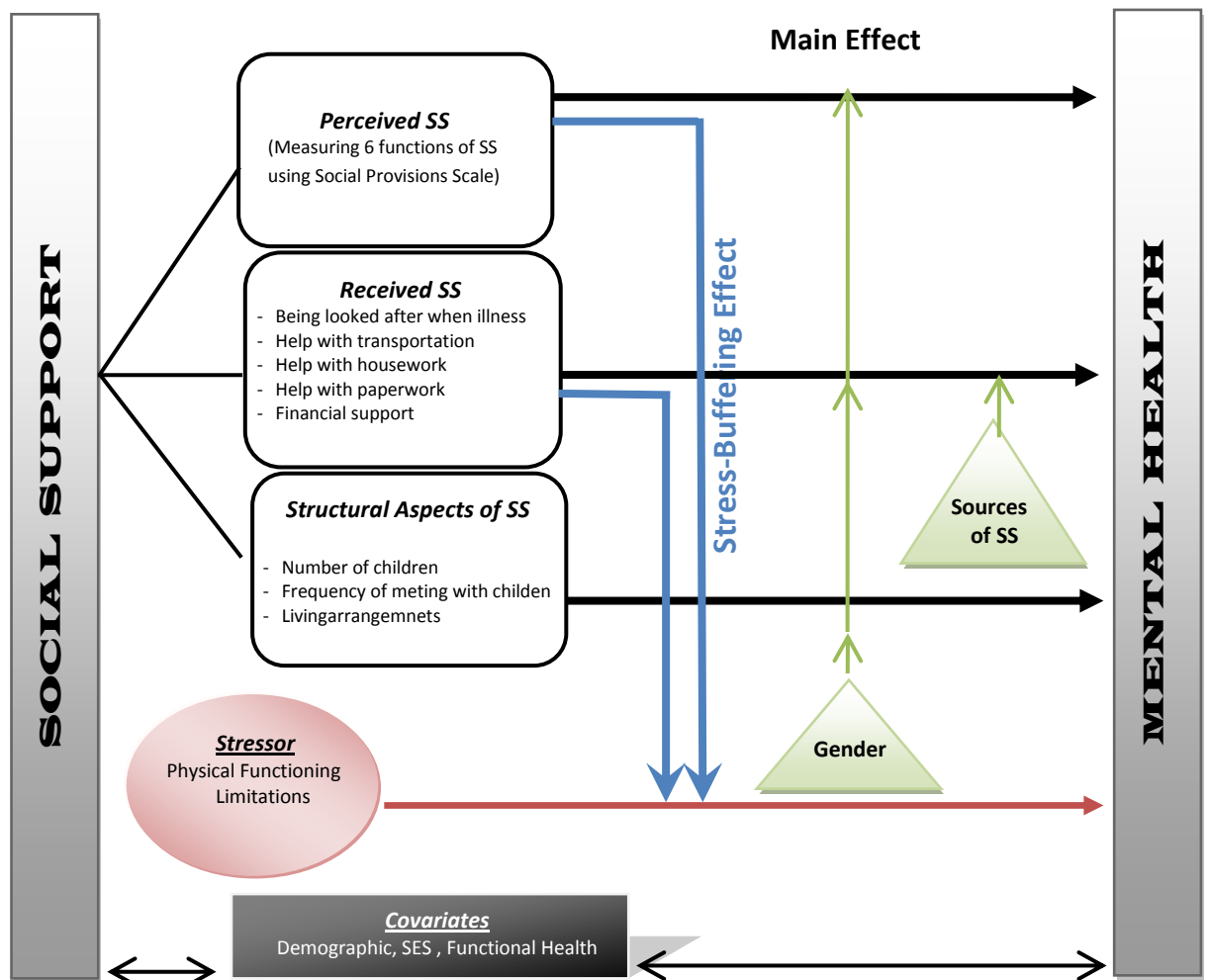
2.7 Study Hypotheses

On the basis of the conceptual model of study, I identified a number of specific hypotheses, in accordance with the objectives of the study (see Page 22), drawn from the literature, to test in this study. These are outlined as below:

1. Perceived social support has a main (direct) association with mental health: specifically, a lower level of perceived social support is associated with poorer mental health. (Matched with Objective 2)

2. The social support received for specific needs (i.e. being looked after when confined to bed, help with transportation, help with housework, help with paperwork and financial help) has a main association with mental health; specifically, lower levels of received social support in any form are associated with poorer mental health. (Matched with Objective 2)

3. Structural aspects of social support including number of children (daughters and sons), frequency of meeting with them, and living arrangements[3] have main associations with mental health: specifically, older people who have fewer children, less frequent meeting with children and those who live alone will have poorer mental health than those who have more children, more meeting and those who live with others. (Matched with Objective 2)

4. Social support (perceived and received) varies in its association with poor mental health according to the level of physical functioning limitation (stress-buffering association). Thus, those with poor social support would have worse mental health than people with the same level of physical functioning limitation who have higher levels of social support. (Matched with Objective 3)

5. Older men and women differ in associations between social support and mental health. In other word, gender moderates associations between social support and mental health; as Iranian older women are exposed to higher levels of stressors, they have higher needs and expectations for social support than have older men. Therefore, I hypothesise that the mental health of older women is more seriously

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[3] 'Living arrangements' is a term that usually is used to determine "the people that an individual are living with and the relationships between them and also the location of the household (community or institution)" (Victor, 2005:193).

affected, in comparison with men, when their social support needs are not met. (Matched with Objective 4)

6. Sources of social support received are important in the association between received social support and mental health of men and women. The literature and my knowledge of the Iranian context suggest that in Iran spouses are the main support of older men and children the main support for women. Thus lack of support from a spouse would have a more deleterious effect on the mental health of older men and, in contrast, lack of support from children would have a more deleterious effect on the mental health of women. (Matched with Objective 5)

3. LITERATURE REVIEW

This chapter is structured in three main sections: firstly, historical development of social support and health research was described and a summary of the main literature in this topic was presented. Secondly, according to the main literature, I justified the necessity of conducting a systematic review on the associations between social support and mental health in older people and accordingly a full report of the methodology and results of the systematic review that I conducted on the topic was presented. The last section included a conclusion of the review and a discussion on the findings.

This chapter has intentionally been placed after the conceptual framework chapter, because the main concepts of the thesis, such as 'social support' and 'mental health', needed to be defined and clarified first in order to decide on inclusion criteria for the systematic literature review. The conceptual model of the thesis was then further developed based on the results of this systematic review.

3.1 An Overview on the Development of Social Support and Mental Health Research and a Summary of Literature

Research interest in social support began in the 1970s (Bowling, 1994). A search of the Social Science Citation Index for articles with 'social support' in the title showed that between 1972 and 1976 only 2 papers per year were published. However, the same search in 1981 resulted in 43 articles, which increased to 83 articles in 1986 (Bowling, 1994; House et al., 1988). Another broader search for all papers with social support in the title in all medical and social science journals between January 1984 and February1991 resulted at 4247 papers with almost twice as many papers published in 1990 (n=817) as were published in 1984 (n=499) (Callaghan & Morrissey, 1993). These statistics are an indication of the growing interest in social support research from the 1970s to the 1990s. It seems that social support studies lost favour thereafter as the number of research papers published has gradually decreased since then (Callaghan & Morrissey, 1993). This is reflected in the inclusion of many older papers in the literature cited in this thesis. Moreover, as noted earlier, my recent search for studies on social support studies by setting in the 'ISI Web of Science' revealed that most of the retrieved citations related to studies from North America and with the majority of the others relating to other Western countries, with few studies of non-Western populations.

Social support research initially focussed on structural aspects of social support, but later, social scientists paid more attention to qualitative aspects (Berkman et al., 2000). Thus, social network approach, rooted in Durkeim's (1895) classic study relating social integration to suicide, had a strong influence on early social support research (Berkman & Syme, 1979; Mitchel, 1969; Lowenthal & Haven, 1968). Social support research gradually deemphasized network approaches in the 1980s, due to findings that the construct of social network provided an inadequate proxy for the concept of social support; this led to the development of specific measures of social support (Rhodes & Lakey, 1999).

The interest in social support and health research was triggered by a number of influential review papers published in the mid-1970s (Kaplan et al., 1977; Cassel, 1976 and 1974; Cobb, 1976). These review papers, although not clear about their definition of the concept of social support, generated a great deal of scientific interest in the

possibility that interpersonal relationships might protect health. Cobb in 1976 summarised the literature on social support and different health outcomes and reported that:

"Social support can protect people in crisis from a wide variety of pathological states: from low birth weight to death, from arthritis through tuberculosis to depression, alcoholism, and the social breakdown syndrome. Furthermore, social support may reduce the amount of medication required, accelerate recovery, and facilitate compliance with prescribed medical regimens." (p 300)

Currently the evidence that social support is beneficial for health and that poor social support leads to ill health is considerable (although nearly all studies are from Western countries). The available evidence shows that the provision of social support and good social relations counts as a resource for health and can make an important contribution to health (Wilkinson & Marmot, 2003; Schwarzer & Leppin, 1989; Cohen, 1988). On the other hand, a lack of social support may lead to an increased risk of physical and psychological illness (Cooper et al., 1999) and mortality (Blazer, 1982; Berkman & Syme, 1979). Berkman & Syme's classic study (1979) of almost 4000 residents of Alameda County in the USA, for example, revealed that people with the lowest levels of support contacts at the time the study commenced had age-adjusted mortality rates 2 to 4-5 higher than those reporting many social contacts after 9 or more years of follow-up. The positive relationship between social support and health also was well documented in the gerontological literature (e.g. Anderson & Dimond, 1995; Sugisawa, et al., 1994). There is evidence that the health benefits of social support remain influential into very old age (Grundy et al., 1996). In the social support literature, earlier papers mainly sought to identify a relationship between social support measures and health outcomes. More recent papers have tended to focus on specific groups or looked in more detail at timing of effects and possible mediators, such as coping strategies.

The concept of social support was first used in the mental, rather than physical, health literature and in social support research there has always been a strong emphasis and focus on mental health (House et al., 1988). This is because social support is believed to play an important role in moderating the effects of stress, particularly on mental health (Cooper et al., 1999). A brief review on the results of the studies exploring associations

between social support and mental health revealed that regardless of the research methods used, most of the available evidence (e.g. Paykel, 1994; Cohen & Williamson, 1991; Avison & Turner, 1988; Cohen, 1988; Bolton & Oatley, 1987; Brown et al., 1986; Kessler et al., 1985; Cohen & Wills, 1985; Kessler & McLeod, 1985; Leavy, 1983; Aneshensel & Stone, 1982; Henderson, 1981) reported a significant negative association between provision of social support and psychological distress.

However, most studies were cross-sectional and concerns were expressed about the direction of the association between social support and (mental) health (House et al., 1988). In recognition of the methodological shortcomings of retrospective and cross-sectional designs an increasing number of longitudinal studies were undertaken. These studies generally ruled out the possibility that low levels of support are merely a consequence of prior disorder (Kessler et al., 1985). Yet causal interpretation was to some degree uncertain even in longitudinal studies, mostly because of unmeasured common causes of social support and subsequent disorders (potential confounders) such as personality dispositions, coping resources, and personal or social competence, which may produce spurious association (Bums & Farina, 1984; Henderson et a1., 1981).

In the face of this ambiguity, experimental support interventions (Broadhead et al., 1983; Levy, 1983; Mumford et al., 1982; DiMatteo & Hays, 1981) have become increasingly popular. Most of these experimental studies suggested that social support may protect individuals at risk from subsequent mental disorders (Kessler et al., 1985). However, experimental studies had also some limitations; they were not designed to illuminate the mechanisms through which this influence occurs and also in these studies it was impossible to determine what aspects of support produced the impact (Kessler et al., 1985). Therefore, the relationship between social support and (mental) health, which appears to be extremely complex and multifaceted and to depend on many other factors, as well as the set of dimensions used to define social support, the characteristics of the sample and outcome measure, is still not fully understood.

Consequently, according to the literature summarized above, although social support has been researched since 1970 and generally a positive relationship between social support and mental health is accepted in the literature, still a number of issues are less clear or unanswered and have not been dealt with fully in previous reviews of the literature.

There is inconsistency between different review studies in terms of the magnitude of the associations between social support and mental health and the effect sizes (ESs) of the main and stress buffering associations; difference between review studies on the importance of various dimensions and aspects of social support on mental health; no review study so far specifically focused on older people; and the role of gender and providers of support on associations has received less attention. To address these issues, I conducted a systematic literature review investigating the associations between various aspects and dimensions of social support and mental health in older people, reported below.

3.2 Systematic Review of Studies Exploring Associations between Social Support and Mental Health in Older People

3.2.1 Introduction

In this section, I report methodology and results from a systematic review of quantitative research studies which have explored associations between social support and mental health in older people. The purpose of the review was to summarize the current state of research on the topic, identify significant gaps in the literature that need to be addressed, and aid in specification of the objectives and hypotheses of my thesis. This review, also critically assesses methodological limitations of the studies included. Where appropriate, further literature, identified in the papers included in this systematic review, was also reviewed.

To date, according to my search, this is the first systematic review that focuses on studies that examine associations between social support and mental health in the older population. The main question addressed in this systematic review was whether the literature provides evidence that social support is associated with vulnerability to psychiatric disorders among older people. Specifically, I address the following questions:

- What is the overall magnitude of the association between social support and mental health of older people across studies? Can effect sizes of main (direct) and stress buffering associations be separately identified?

- Are the stressors considered in studies associated with psychological disorders?

- Are perceived and received social support and functional versus structural aspects of social support differentially associated with the mental health of older people?

- Are associations moderated by gender?

- What is the role of providers of support in the associations between social support and mental health of older men and women?

- Which domains of the topic are less researched and what are significant gaps in the literature?

3.2.2 Methodology of the Systematic Review

Criteria for considering studies for this review

Two types of studies on the associations between social support and mental health were included in this review; review studies irrespective of date, and primary research studies published 2007-2012. Other types of publications such as commentaries were excluded. Although ideally it might have been desirable to include all primary studies, regardless of date of publication, a preliminary online search using the key search terms 'social support' and 'mental health' in older people identified over 400,000 references so this was clearly not practicable. Moreover, knowledge gained from these earlier studies is included indirectly in this review both through the inclusion of key review articles and because more recent studies have been informed in design and conceptualisation by the earlier literature.

A number of criteria were considered for selection of both review and primary research studies. Review articles were not restricted to systematic reviews but also included other

relevant non systematic reviews. Review articles were included if they discussed the empirical associations between social support and mental health and summarised the available literature from quantitative studies. But those reviews that focussed on other aspects such as the theoretical and methodological aspects of social support and mental health studies or policy implications were excluded. Review studies were not restricted to those focussed exclusively on the literature on older people, in order to ensure that papers reviewing key aspects of the topic as a whole were represented. However, those that focused exclusively on children or young people (e.g. Chu et al., 2010) were excluded.

In the review of primary research studies, I included all quantitative studies investigating the associations between any type of social support and mental health in older people conducted in the five years (2007-2012). Qualitative studies were excluded. 'Older people' were defined as those aged 60 or over. In some of the databases, such as Cochrane Collection databases, it was not possible to limit the search by age. Thus, further work was required to review the abstract or full text of papers to determine the age of participants.

The main search was limited to English language papers although an additional search was also made for papers relevant to Iran published in Farsi. No geographic limitation was given so papers reporting results from all over the world were considered eligible.

Exclusion criteria

In both types of publications, studies which measured both social support and mental health but did not examine the associations between them were excluded. Also, studies that investigated the combined effects of a series of factors including social support (but not only social support) on mental health (e.g. Ha & Ingersoll-Dayton, 2011; Kwag et al., 2011; Dirik & Karanci, 2010; Roth, 2009; Brown et al., 2009; Voils et al., 2007; Besser & Priel, 2007) were excluded because it was not possible to identify the separate effect of social support in these studies.

Studies focussed on 'Social Networks' (e.g. Macêdo Corrêa et al., 2011; Golden et al., 2009a) rather than social support were also excluded. As explained in Section 2.1.2, social support and social networks are related but distinct concepts. However, previous

research has sometimes used these concepts interchangeably and thus some of the social networks papers may cover social support too, even if this is not mentioned in their key words, titles or abstracts. Therefore, to avoid missing the social support studies, I initially included both terms and then read the abstracts (or full-text) of all papers before excluding those that dealt only with social networks. This distinction was based on the conceptualisations presented in Section 2.1.2. Thus papers were excluded if they dealt only with structural aspects of networks, rather than the relational content of network ties. Studies which considered both structural aspects and functional aspects were included.

Additionally, as this study has focused on informal support, studies that only measured associations between formal or professional support (such as the availability of community-based services or health care professional support) and mental health (e.g. Muramatsu et al., 2010) were excluded. If social support was measured in a study using just a single question such as 'whether someone is satisfied with his social support or not' (e.g. Ahn et al., 2012) that study was also excluded. A further requirement was that studies must include either or both items on received or perceived social support. Studies using a combined indicator of exchanges of support (both provided and received) (e.g. Litwin, 2009; Sicottea et al., 2008) were also excluded.

This review covered studies with a wide range of mental health measures. However, studies that investigated the associations between social support and outcome measures such as stress (e.g. Viswesvaran et al., 1999), life satisfaction (e.g. Perez-Garcia et al., 2011), loneliness (e.g. Golden et al., 2009b), posttraumatic stress disorder (e.g. Ozer et al., 2003) or burnout (e.g. Halbesleben, 2006) were excluded, although they were related to mental health in some ways.

Studies were not excluded on grounds of methodological quality.

Search strategy

Two main search methods were used to identify papers to include in this review: electronic searching, and hand searching of specific journals and other publications. In addition to searching for published studies, efforts were also made to search the grey literature on the topic. The grey literature search was a web-based search to obtain key

unpublished sources such as New York Academy of Medicine Grey Literature Report and Open Grey. The criteria used to search by hand or for grey literature were the same, as used in the electronic searches.

Electronic searching

Twenty one electronic databases, as listed below, were searched to identify studies that met the inclusion criteria of this review.

1. Age Info
2. CAB Abstracts (Ovid SP) (1973 to present)
3. Centre for Review and Dissemination (CRD)
4. Cochrane Collection databases (1993 to present)
5. Dissertations & Theses (N. American PhD theses) (1637 to present)
6. Eldis
7. EMBASE (Ovid SP) (1947 to present)
8. EThoS (UK theses)
9. FRANCIS (1984 to present)
10. Global Health (Ovid SP) (1910 to present)
11. IMEMR
12. Index to Theses of the British Isles (1716 to present)
13. International bibliography of the social sciences (IBSS) (1951 to present)
14. ISI Web of Science (Journal Citation Reports) (1970 to present)
15. JSTOR
16. Medline (Ovid SP) (1946 to present)
17. PsycARTICLES (EBSCOhost) (1894 to present)
18. PsycEXTRA (EBSCOhost) (1908 to present)
19. PsycINFO (1806 to present)
20. PubMed (EBSCOhost) (1950 to present)
21. Social Policy & Practice (social policy) (Ovid SP) (1890 to present)

To avoid bias toward Western-oriented papers by searching only among more common databases such as *PubMed* and to cover more literature from non-Western countries, I included databases such as *Eldis* and *IMEMR,* as seen above. The selection of databases and websites was made based on their relevance to my research area and also following consultation with a specialist librarian.

In the electronic searching, I started from the research topic, breaking the topic down into concepts and then ranking the concepts in order of importance. From these concepts I then determined appropriate text words and thesaurus terms related to 'mental health' and 'social support' to be used in the search. However search terms varied slightly by databases, as when applicable Medical Subject Headings (MeSH) terms were used. In PubMed, for example, both "Social Support" and "Mental Health" were searched by

MeSH terms, thus any word under these subheadings was also included in the paper selection. The following search terms or phrases were mainly used in most of the databases;

"Social Support"[Mesh] OR social [Title/Abstract] AND support[Title/Abstract] OR social [Title/Abstract] AND network*[Title/Abstract]*
AND
"Mental Health"[Mesh] OR "Mental Disorders"[Mesh] OR psych[Title/Abstract] OR depression*[Title/Abstract] OR anxiety*[Title/Abstract]*

Articles were identified by searching *keywords, abstracts* and *titles* in the electronic databases and selected websites. When reading the titles and abstracts was not sufficient to determine if the inclusion criteria were met, the full-text of the papers was obtained and read. In most of the databases limiting the search by publication type was possible. These were then searched twice; once to find review articles for all years and then to find individual original articles published in 2007-2012. However, some of the databases, such as CRD, allow searches for review articles only or do not allow searches by type of publication (e.g. FRANCIS).

Hand searching

In addition to electronic searching, a number of highly relevant journals (listed below alphabetically) were hand searched to insure as many relevant studies were included as possible, although most of these journals are indexed by the electronic databases mentioned above;

- Age and Ageing (1972 to present)
- Annual Review of Gerontology and Geriatrics
- Annual Review of Nursing Research (1983 to present)
- Annual Review of Psychology (1950 to present)
- Annual Review of Public Health (1980 to present)
- Annual Review of Sociology (1975 to present)
- Asia - Pacific Population Journal
- Eastern Mediterranean Health Journal
- Middle East Journal of Age and Ageing
- Social Science & Medicine (1998 to present)

In order to capture relevant Iranian literature published in Farsi, the official language of Iran, an electronic search of published articles and manual search of grey literature in Farsi was conducted using Iranian scientific websites such as the *Iranian Information*

and Documentation Centre (IRANDOC), university websites listing research theses and projects, and also contact with some informants.

Further searches

After electronic searching and hand searching, two further search strategies were also applied.

1) Searching the bibliographies of the included studies electronically or by hand. I scanned the reference lists of all included papers and contacted authors of relevant studies to seek out additional studies.

2) Once the main contributing authors to this topic, based on the reviewed articles, were identified, a further search was made using the name of these authors in order to ensure that the most relevant studies were included in the review[4].

Article identification and selection process

The process of study identification and selection for this review is illustrated in Figure 3.1. Additionally, the Table, provided in Appendix 3, shows the selection of studies by different databases or websites searched. Using different search methods and after applying the study criteria, the search initially retrieved 2052 citations. After removing the duplicates, the abstracts of all studies (n=1365) when available were read. For papers with no abstract (n = 58), their relevance was determined from the title and key words. References that did not meet the inclusion criteria were excluded after I screened the titles, abstracts and key words of the citations, leaving 247 citations for full-text review. This number also includes citations where some of the inclusion criteria, such as the age of participants, could not be identified from the abstract. Then, full-text copies of potentially relevant studies were obtained to determine whether they met the inclusion criteria. I was unable to locate or obtain the full text of 19 studies for further investigation, thus they had to be excluded. After reading the full-text of the available papers, 149 were excluded because they were clearly irrelevant. The remaining papers

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[4] The list of main authors that were searched for their relevant studies are as follows: Antonucci, T. C., Berkman, L. F., Cassel, J., Cobb, S., Cohen, S., Gottlieb, B., House, J. S., Kaplan, B. H., Kessler, R. c., Syme, S. L., Thoits, P. A., Uchino, B. N.

(n=79) including 40 review studies and 39 original studies were carefully scanned once more to investigate their eligibility for inclusion. I intentionally took a rather broad perspective in selection of studies in this stage to make sure that no relevant study was excluded.

Of 40 review articles, 23 were too general – either discussing broadly theoretical and methodological aspects of social support studies or relations of social support to health in general (rather than mental health only) or policy implications related to social support. These papers obviously were not eligible for inclusion in this systematic review; however they were helpful in i) understanding the main concepts of the study and key theoretical perspectives on social support and mental health and developing the conceptual framework of the study; ii) finding relevant primary research studies to be included in this review; and iii) summarising the history of research on the topic. These were used in the thesis where appropriate. Of the remaining review articles, 12 were excluded because although they considered the relation of social support to mental health, they were mostly theoretical. Consequently, despite finding a rather high number of review studies which initially seemed relevant, only 5 review articles were eventually included. One more review study that was published recently by my colleagues and I (Tajvar et al., 2013)[5] was also eligible and was added to the papers included, meaning 6 review studies were included in total.

Additionally, of 39 original articles, 21 articles were excluded for reasons mentioned in Section 3.2.2. Eventually, 24 citations (6 review and 18 original articles) were included. Once the included studies were identified, all records were stored in Endnote X4 software.

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[5] Tajvar, M., Fletcher, A., Grundy, E. and Arab, M. (2013), Social support and health of older people in Middle Eastern countries: A systematic review. Australasian Journal on Ageing, Vol 32 No 2 June 2013, 71–78. doi: 10.1111/j.1741-6612.2012.00639.x

Figure 3.1: Article identification and selection process

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│ 2052 citations initially │
│ retrieved               │
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            │                │ 687 duplicates excluded  │
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│ 1365 citations preliminary│
│ tested for inclusion from │
│ the abstracts and titles  │
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            │                │ 1118 excluded on the     │
            │                │ basis of the inclusion   │
            ▼                │ and exclusion criteria   │
┌─────────────────────────┐  └──────────────────────────┘
│ 247 papers selected for full│
│ text reading            │
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            │                │ 19 no full-text papers   │
            │                │ excluded                 │
            │                │ 149 irrelevant studies   │
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│ 79 papers (40 review +39 │
│ original) further investigated│
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            │                │ 1 recent review included │
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│ 24 papers (6 review +18  │
│ original) included for review│
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Data extraction and analysis

I extracted the data from the papers using a purposefully designed data extraction form. The following information was extracted from the primary research studies: the name of author(s), the year of publication, setting, main objective, sample size, characteristics of study population (gender, age, sampling method), response rate, design and methods of data analysis, measures of social support and mental health, and key findings.

For review studies, the name of author(s), the year of publication, the purpose of the study, the number of papers included in each review, whether the review was conducted systematically or not, the age of participants, the sample size and the main results and conclusion were collected.

The studies included were developed for a diversity of objectives, used a variety of measures, used different statistical techniques and included study participants with different characteristics and were distributed widely among countries. This diversity made formal meta-analysis impossible. Therefore, the results of similar dimensions or aspects of social support were identified and grouped together and then the findings were reported, compared and examined descriptively.

3.2.3 Findings

3.2.3.1 Findings from Review Articles

3.2.3.1.1 Description of Studies

As mentioned above, six review articles were included in my review. Among the studies included, all apart from one (Letvak, 2002), were conducted systematically, of which three were meta-analytic review studies. Of the six review articles, only the study of Salter et al. (2010) comprised a review of studies exclusively relating to older people, the others included studies of adults (including older people) or did not mention the age range of participants in papers reviewed. One review study was restricted to rural populations (Latvak, 2002); two other studies were also restricted to specific groups, including people who had a stroke (Salter et al., 2010) and first responders (defined as the people, such as police and fire-fighters, who, in the early stages of an accident or disaster, are responsible for the protection and preservation of life and property) (Prati & Pietrantoni, 2010), the other three did not restrict their review to specific groups. Wang (2003), Latvak (2002) and Tajvar et al. (2013) limited their search to studies conducted in Taiwan, the US and the ME countries respectively but the others had no geographic restriction. The number of primary studies included in these reviews ranged from only 4 in the study of Latvak (2002) to 182 (75 considering mental health outcomes) in the study of Wang (2003). Thus, as seen, none of the reviews focussed specifically on

studies examining associations between social support and mental health in general older population.

Most of the review studies included were fairly recent, conducted in the last 10 years. This may reflects recent developments in techniques such as meta-analysis for summarizing existing studies and estimating ES.

3.2.3.1.2 Main Results: the Relation of Social Support and Mental Health as Reported in Review Studies

Letvak (2002) in her study entitled 'the Importance of Social Support for Rural Mental Health' reviewed studies examining associations between social support and mental health in rural populations. Four studies (Koopman et al., 2001; Weinert, 2000; Okwumabua et al., 1997; McCullough, 1995) were included in this review. No information was given on how these studies were selected. According to this review, in all the four studies, social support was found to have an independent (direct) effect on the mental well-being of older people in rural populations. The only measure of social support that did not show a significant relationship with levels of depression and anxiety was 'family proximity' used in the study of McCullough (1995). However, as discussed earlier, 'family proximity' is a structural measure of social relationships which does not capture functional aspect of social support. Stress-buffering effect of social support was examined only in one study (Koopman et al., 2001) which reported that high levels of social support among rural-dwelling women who were newly diagnosed with breast cancer helped them to cope better with their diagnoses. This review concluded that the results of social support research could be used to plan interventions designed to provide help for rural residents in managing and coping with stress and mental health problems.

The second review included was the study of Wang et al. (2003). This review used formal Meta analysis to predict the ES of social support on 16 health outcome variables in Taiwan. 182 studies of Taiwan, published between 1984 and 2001, were included in the review of which 75 had measures related to mental health including psychological symptoms /responses (n=21), depression (n=8), psychosocial adjustment (n=10), coping behaviour (n=7) and stress (n=29). The subject ages in these studies ranged from 15 to 83 years and sample size ranged from 23 to 4049. All primary studies reviewed were cross-sectional and most (86%) used convenience sampling. The review found that,

according to the definition by Cohen (1988) [6], social support was moderately associated with depression (ES=-0.63), and with coping behaviour (ES=+0.46), and associated to a lesser extent with psychological symptoms and responses (ES=-0.25), psychosocial adjustment (ES=+0.34), and stress (ES=-0.16)[7]. However, all the ESs of social support were significantly correlated with mental health outcomes, suggesting that individuals with higher levels of social support had better mental health status and were less likely to have disorders. A limitation of this review, as discussed by the authors, was the diversity in definitions and measures of social support and health in the studies included. This review study considered only the direct effect of social support on health outcomes and suggested that the buffering effect of social support and its possible mechanism should be examined in future studies.

The same author, Wang, also conducted another earlier systematic review in 1998 entitled 'A Meta-Analysis of the Relationship between Social Support and Well-Being' similar to his more recent work described above. In this study, 21 primary studies with seven health outcomes were included. Social support showed a moderate association with positive mood state (ES = +0.54) and quality of life (ES =+ 0.43), and a small association with negative mood state (ES = –0.34), depression (ES = –0.32), and level of functioning (ES = –0.31) but no significant correlation was found between social support and perceived health status and physical symptoms. According to Wang et al. (2003), in general, the findings of both reviews support each other suggesting that social support may influence health outcomes.

Another review study conducted by Salter et al. (2010) examined the impact of social support interventions on depression or mood status in individuals with stroke. They hypothesised that perceived social support would be protective in terms of both onset and duration of post-stroke depression. 10 randomized controlled trials of different social support interventions were identified for inclusion in the review from an examination of the published literature from 1990–2008. Mean ages of participants ranged from 63 to 78 years. Of the 10 randomized controlled trials included in the review, only one study

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[6]   Effect size (ES) was expressed as units of a Standard Deviation where it is usually considered that an ES of 0.3 indicates an clinically relevant but small effect, 0.5 a moderate effect and 0.8 or above a large effect (Cohen, 1988)

[7]   The negative and positive signs before ESs indicate negative or positive factors

(Claiborne, 2006) reported a significant effect on mood status following receipt of the designated trial intervention. Salter et al. (2010) noted that the majority of interventions intended to provide support in the studies included in the review provided contact on an infrequent and irregular basis and might have been insufficient to create the desired perception of support.

The other meta-analytic review study included (Prati & Pietrantoni, 2010) aimed to examine the role of received and perceived social support in promoting mental health among first responders (defined earlier). In this review, 37 empirical studies were included; it was not clear whether these examined the buffering effects of social support or only main effects or both. The results of this meta-analysis review showed that although there was some controversy in the literature, social support was significantly related to mental health among first responders. Results showed that the ESs derived from 37 studies ranged from 0 to 0.46. The overall weighted mean ES was 0.27. Moreover, the analysis showed that the ES of perceived social support (ES=0.31) was significantly higher than the ES of received social support (ES=0.22). Participants' age and gender or research design (longitudinal/ cross-sectional) did not have an influence on the relationship between social support and mental health. Generally speaking, this study moderately supported the notion that social support is a resilience factor in the aftermath of potentially traumatic events.

Finally, our own review (Tajvar et al., 2013) aimed to systematically review studies exploring the association between social support and health (including mental health) in the ME countries. The search was restricted to original studies conducted in (one of) the ME countries among adults and older people. No restriction was put on the publication year or language. 22 studies were included in the review, of which, 9 considered 'Mental Health' as their outcome measure. This review found evidence of an inverse association between social support and poor mental health, with eight of the nine studies reporting that higher levels of social support were associated with a lower risk of mental illness. Perceived social support was the dimension of social support most researched and showed consistent associations with mental health. There was no association between 'received social support and mental health in one study in Iran (Motamedi-Shalamzari et al., 2002). Additionally, this review found inconsistent evidence of an association between social support and other health outcomes.

3.2.3.1.3 Summary and Discussion of the Review Studies

Although only 6 review studies were included in my review, as each review summarised the results of many studies their results are very valuable.

Overall, 156[8] studies were included in 6 review papers, of which 100 studies examined only the main effect of social support, 11 studies examined the stress- buffering effect of social support and the remaining 45 studies did not specifically provide information on this.

Of 100 studies examining the main effect of social support, 4 studies found a significant association between social support and mental health (Letvak, 2002), but the individual results of other 96 studies are not reported. Instead, it was reported that the pooled ES of social support in those studies were significantly correlated with all the mental health outcomes. However, it was also reported that the ES of social support on depression was medium in 75 of 96 studies (Wang et al., 2003) and small in 21 studies (Wang, 1998). The ES of social support on coping behaviour and positive mood state was reported to be medium and the ES of social support on psychological symptoms and responses, psychosocial adjustment, negative mood state and stress was reported as small.

Of the other 45 studies in which it was not clear whether stress buffering or main effects were considered, 8 studies reported a significant association between social support and mental health measures and the ES in 37 studies (Prati & Pietrantoni, 2010) was reported as to be medium. Moreover, both studies (Tajvar et al., 2013; Prati & Pietrantoni, 2010) that reported on the associations between dimensions of social support and mental health indicated a stronger association between perceived social support than received social support and depression.

Of 11 studies examining the stress-buffering effect of social support on mental health, only 2 (Claiborne, 2006; Koopman et al., 2001) found a significant buffering effect of social support on the association between a stressor and depression.

In summary, although most of the studies reported that social support has a significant main association with mental health, ESs in most of them were of medium or small

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[8] This is the number of all analyses of social support and mental health only and the analyses on other health outcomes are not included.

magnitude (as reported by the reviewers). There is less evidence to support the stress-buffering effect of social support. It should also be noted that most of the studies included were cross-sectional and so do not provide evidence of the temporal sequencing between the domains of evidence, let alone evidence of a causal relationship. Nevertheless, most of the review papers concluded that interventions aimed at increasing social support among individuals might promote their mental health. However, Salter et al. (2010)'s review of intervention studies found that only 1 of the10 randomized controlled trials included found a significant, positive effect of the social support intervention on depression.

The wide range of study designs, measures and sample characteristics used in the primary studies included in the reviews considered make it difficult to draw definitive conclusions. However, overall this overview of review studies provides moderate evidence to support the notion that social support has a protective effect on mental health.

3.2.3.2 Findings from Primary Research Articles

3.2.3.2.1 Description of Studies

As explained earlier, the systematic search for recent primary research studies on the association between social support and the mental health of older people published 2007-2012 led to identification of 18 studies which met the inclusion criteria. The characteristics of these studies are summarised in Table 3.1. Five of the included studies (Jawad et al., 2009; Bozo et al., 2009; Safezadeh, 2009; Koosheshi, 2007; Pasha et al. 2007) are the same as those also included in our previously published paper (Tajvar et al., 2013), due to having same inclusion criteria.

The studies included reported on research undertaken in 10 countries; five studies were conducted in the ME countries, including one study from Lebanon (Jawad et al., 2009), one study from Turkey (Bozo et al., 2009) and three from Iran. These three studies were all published in Farsi, and two of them (Koosheshi, 2007; Safezadeh, 2009) were identified through the hand searches, rather than from searches of electronic databases. Of the remaining studies, five were conducted in the USA, two studies in Canada and Taiwan each and one study in Norway, Spain, Brazil, and South Korea each.

Most of these primary research studies (n=13), specifically investigated the influence of social support on health as one of their main objectives. In the remaining five studies (Safezadeh, 2009; Rueda & Artazcoz, 2009; Cruza-Guet et al., 2008; Thygesen et al., 2008; Koosheshi, 2007) social support was not the main variable of interest but its association with health could be examined, although in general as the primary focus of these studies was on other topics, the influence of social support was less thoroughly investigated or discussed.

All studies focussed on the older population aged 60 years or more as this was an inclusion criterion, with two studies restricted to the older old, aged at least 75 (Thygesen et al., 2008) and 85 years (Lee & Dunkle, 2010). Two studies (Bierman & Statland 2010; Koosheshi 2007) did not report on the gender composition of the samples included. In twelve studies women predominated, as would be expected given the generally higher life expectancy of women compared with men, with the proportion of women ranging from 56% in the study of Wong et al. (2007) to 71% in Lee and Dunkle (2010)'s study of the oldest old. In the remaining studies (Safezadeh, 2009; Lien et al., 2009; Leung et al., 2007; Pasha et al., 2007), some of which were of particular population groups, the gender balance was equal or men predominated.

The participants in 14 studies were household community dwelling older people with no particular diagnosed diseases and in most cases drawn from random samples. The participants in Thygesen et al. (2008)'s study were community dwelling older people who were receiving home nursing. The study of Olutoyin Oni (2010) focused only on older people living in nursing homes. Pasha et al. (2007) included both community residents and those living in nursing homes and compared these two groups. Finally, Lien et al. (2009) considered older cancer patients who were undergoing surgery.

3.2.3.2.2 Methods and Methodological Critiques of the Studies

A summary of methods used by the studies included are detailed in Table 3.1. The studies were methodologically problematic on a number of counts:

First of all, most studies (n=16), used a cross-sectional methodology, assessing levels of social support and depression at a single point in time, making it difficult or impossible to assess the direction of causality between social support and depression (Mechakra-

Tahiri et al., 2009; Barnett & Gotlib, 1988). Only two studies included in this review were conducted longitudinally; one (Lien et al., 2009) had a pre-/post design, with a 10–14-day interval between the two data collection periods before and after surgery, and another (Bierman & Statland, 2010) was a 2-year longitudinal study. Both studies had a high participation rate in the next stage, limiting bias due to attrition during the study. Although the study of Bierman and Statland (2010) provided some evidence in favour of the stress buffering role of social support in that stratified analysis showed the association between ADL limitations and depression was weaker among older adults with high levels of social support, in this paper unstratified analyses provided little support for either main effects or stress buffering role of social support. However, longitudinal designs, although allowing temporality of associations to be investigated, are still inadequate to deduce causality.

Secondly, there was a lack of consistency in conceptualisation and measurement of social support. According to Cooper et al. (1999), there appear to be almost as many definitions and measures of social support as there are studies of it and this was apparent in the review. Seven studies (Alexandrino-Silva et al., 2011; Bierman & Statland, 2010; Mechakra-Tahiri et al., 2009; Safezadeh, 2009; Rueda &Artazcoz, 2009; Pasha et al., 2007; Han et al., 2007), either lacked a clear definition of social support, or applied conceptualisations of social support that were not compatible with the common definitions, or used measures that were not compatible with their definition of social support. Different measures were also used in the studies with little overlap in instruments. Two studies used the Social Provision Scale (SPS) (Russell & Cutrona, 1987) and two the Duke social support Scale (George et al., 1989), the other studies used a range of different measures of social support. Measurement of mental health similarly was inconsistent in most of the studies, but less diverse than that of social support. Overall, 8 studies used depression scales, 6 studies used more general mental health questionnaires such as the GHQ (Goldberg & Hillier, 1979), and 4 studies used more than one scale to measure different types of psychological symptoms. The GHQ was used in five studies and the Geriatric Depression Scale (GDS) (Yesavage et al., 1982-83) was used in three.

Additionally, 6 studies (e.g. Jawad et al., 2009; Koosheshi, 2007) relied on assessment instruments of poor validity and reliability, particularly for social support, or gave

insufficient information on the validity and reliability of the instruments they used. Also, it seems that in three studies (Alexandrino-Silva, et al. 2011; Koosheshi, 2007; Wong et al., 2007), the measures used were culturally not appropriate and there was an issue regarding translation and understanding of the measures. Six studies (e.g. Pasha et al., 2007; Nemeroff et al., 2010) measured only one aspect of social support, or did not report results for the types of social support that they measured separately.

Another limitation was small sample size in most of the studies. Eleven studies had sample sizes of less than 300. The smallest sample was that used by Lien et al. (2009) in Taiwan with only 43 participants. However, a few studies, for example, Mechakra-Tahriri et al. (2009)'s Canadian study with 2670 participants, had large samples. The studies with small sample size may have had limited statistical power to detect associations. This is particularly problematic when studies aim to identify interaction effects (Smith & Day, 1984), as did 8 studies in this review. Multicollinearity problems in multivariate analysis in some studies may also be a reason for not detecting the associations.[9] Also, most studies (n=10) did not report the RR of participants, making the estimation of potential response bias for these studies difficult. RRs where reported ranged from 61% in the study of Han et al. (2007) to 94% in the study of Safezadeh (2009).

In addition, many of the studies had limited external validity; eight studies either used convenience sampling (e.g. selection of samples from only one clinic or from public places such as parks) rather than population based random sampling or did not report any information on their sampling method. Also, 9 studies (e.g. Alexandrino-Silva et al., 2011; Lien et al., 2009) excluded some groups of the older population, such as those who were illiterate or those with psychiatric disorders, from their studies and thus their results were not representative for these groups or had too restricted inclusion criteria. For these reasons generalisability of results from several of the studies included in the review is limited. In studies in institutional settings, social support, especially support actually received, may be confounded by the setting because of the necessary provision of support at some level by the institution.

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[9] When two variables are highly correlated with each other, such as the correlation between instrumental and emotional support (r>0.7) in the study of Leung et al. (2007), entering both variables into the equation will diminish the likelihood that either variable attains significance.

Last but not least, there were problems with the statistical analysis or inappropriate presentation of the output of the analyses in some of the studies. There was limited or no adjustment for potential confounders in the association between social support and health in four studies (Safezadeh, 2009; Bozo et al., 2009; Lien et al., 2009; Pasha et al., 2007). The statistical analysis in these studies were either bivariate or multivariate but with a very limited range of variables. Another four studies (e.g. Pasha et al., 2007; Leung et al., 2007) used a cluster sampling method but the intra-class correlation of clusters and the structure of the data were not taken into account in their statistical approach meaning that standard errors were under estimated. Further, the study of Koosheshi (2007) only reported whether or associations were and did not report Odds Ratios (OR) or Coefficients from statistical analysis. Other limitations were a lack of information on the method of data collection; using mixed methods for data collection (both self-completed questionnaire and interview) without adjusting for that; and in some studies, lack of information on missing data and the methods used to deal with it.

These methodological limitations, may limit the validity of the results of the studies reported below.

3.2.3.2.3 Main Results: the Relation of Social Support and Mental Health as Reported in Primary Research Studies

The key results of the primary research studies (n=18) including reported associations between social support and mental health, gender effects, and sources of social support are reported in Table 3.1 and summarised below. Irrelevant results to the aim of this review are not reported.

3.2.3.2.3.1 Associations between Social Support and Mental Health

As discussed earlier (see Section 2.3.1), it is proposed that social support acts on health either directly (main effect model) or as a buffer against the detrimental influence of stressors on health (stress-buffering model). All of the primary research studies included in this review examined the main effect model, of which 8 studies also examined the stress-buffering model.

As discussed in the previous chapter, social support includes different interrelated dimensions (perceived and received) and aspects (structure and function). The functional

aspect is nested in the dimensions whereas the structural aspect is independent of them. Accordingly, the question of whether social support (in its different dimensions and aspects) is associated with vulnerability to psychiatric disorders and by which model has been addressed as follows:

I. *Main (direct) associations*

All the studies included examined whether social support had a direct association with mental health. Compatible with the general social support literature (Ibarra-Rovillard & Kuiper, 2011), perceived social support was more frequently investigated than received social support; 14 of the 18 studies examined the association between perceived social support and mental health while 6 of the 18 examined the association between received social support and mental health. Thus, 2 studies (Rueda &Artazcoz, 2009; Cruza-Guet et al., 2008) measured both dimensions. Additionally, two studies (Jawad et al., 2009; Han et al., 2007) also investigated structural aspects of social support. Most studies (n=11) used general scales to measure social support, usually a mixture of various types of social support perceived or received, but seven other studies specifically examined the association between one or more types of social support perceived or received and mental health. Consequently, while 18 studies were included in my review, as some of them examined the relationship between more than one dimension/aspect of social support and/or more than one measure of mental health there were in total 40 relevant analyses on which I report. Table 3.2 summarises the results of these 40 analyses.

Table 3.2: Summary of the results of analyses (n=40) on main associations between social support and mental health in the studies reviewed (n=18)

Dimensions	Perceived SS			Received SS				Structural Aspect
Aspects	Functional Aspect			Functional Aspect				
Results	General SS Scales	Instrumental SS	Emotional SS	General SS Scales	Instrumental SS	Emotional SS	Other SS Types	
Significant association	8	-	2	2	2	3	1	1
Significant association only in one gender	1M	-	1F	-	-	-	-	-
Not significant association	6	3	1	-	1	1	2	2
Significant but positive association	1	-	-	1	-	-	1	-
Total by aspects	**16**	**3**	**4**	**3**	**3**	**4**	**4**	**3**
TOTAL (40)	**23**			**14**				**3**

*M=Male, F=Female

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Of 40 analyses, 23 examined the associations between perceived social support and mental health, 14 examined the associations between received social support and mental health, and 3 examined the associations between the structural aspect of social support and mental health. Of the types (functions) of social support measured in the studies included, emotional social support was the most researched type (n=8) and instrumental social support was the second popular type measured (n=6); other types of support were rarely considered. As follows, the results of the associations between social support, by dimensions and aspects, and mental health are reported.

Associations between dimensions (perceived and received) of social support and mental health

As shown in Table 3.2, of 23 analyses examining associations between perceived social support and mental health, 10 analyses showed a significant association (Nemeroff et al., 2010; Olutoyin Oni, 2010; Jawad et al., 2009; Bozo et al., 2009; Cruza-Guet et al., 2008; Pasha et al., 2007; Han et al., 2007), and 10 a non significant association (Bierman & Statland, 2010; Mechakra-Tahiri et al., 2009; Thygesen et al., 2008). Additionally, one analysis was significant for women only (Rueda &Artazcoz, 2009) and one analysis was significant for men only (Alexandrino-Silva et al., 2011). All these analyses were in the expected direction (negative associations) but the study of Lien et al. (2009) found a significant- but positive- association between social support and anxiety (i.e. those with more support were more anxious). Leung et al. (2007)'s study of associations between perceived social support and mental health found various results depending on the type of social support; there were significant associations between emotional support and depression and anxiety, but associations with instrumental support were not significant.

Of 14 analyses examining the associations between received support and mental health, 8 found significant negative associations (Lee & Dunkle, 2010; Safezadeh, 2009; Rueda & Artazcoz, 2009), 4 no significant associations and 2 found significant positive associations (Cruza-Guet et al., 2008). Wong et al. (2007) and Cruza-Guet et al. (2008) found varying results depending on the outcome measure used and the type of social support.

Considering results by studies (n=18) rather than analyses, I found that of 14 studies examining perceived support, 8 studies found only significant associations with mental

health, 3 studies no significant associations and 3 studies reported mixed results. Of the 6 studies examining received support, 3 found only significant associations with mental health, 1 study found no significant association and 2 studies reported mixed results.

In short, as reported above, results of analyses using measures of received social support appear more diverse than those using perceived social support.

Associations between types (functions) of social support and mental health

Seven studies using 18 analyses specifically examined associations between different types of social support and mental health. Most of these were studies of received social support.

The evidence for an association between emotional support, the most researched function, and depression is almost strong so that six of eight analyses (Lee & Dunkle, 2010; Rueda & Artazcoz, 2009; Cruza-Guet et al., 2008; Wong et al., 2007, Leung et al., 2007) found a significant association between emotional support (whether perceived or received) and mental health. However, the evidence for an association between instrumental social support (particularly perceived instrumental social support) and depression is comparatively weak; only 2 of 6 analyses (Lee & Dunkle, 2010; Cruza-Guet et al., 2008) showed a significant association. Other types of social support (n=4) including informational, financial and language support showed varying associations with mental health. Some differences by outcome are also reported in some studies. Wong et al. (2007) found that emotional social support was significantly associated with depression and overall mental health score but not with anxiety, while financial social support was associated with anxiety only. Language and informational social support were not associated with any of the mental health measures. Cruza-Guet et al. (2008) found that overall social support and also informational social support (receiving advice and explanations) were unexpectedly associated with heightened psychological disorder, while instrumental and emotional support were associated with lower psychological disorders.

In summary, evidence for an association between emotional social support and mental health appears stronger than evidence for associations between instrumental or other types of social support (Table 3.2).

Associations between structural aspects of social support and mental health

Han et al. (2007) found no significant relationship between the size of support network and depression. Jawad et al. (2009) considered possible effects of the availability of a spouse and children on depression. These authors found that having more children was associated with a lower risk of depression but no significant association was found between presence of a spouse and depression.

Overall result of main associations

The results reported here from studies considering the main effects of social support on mental health are thus mixed. Overall, of the 40 analyses performed in the 18 studies, 21 showed a significant protective association (including 1 only in men and 1 only in women), 16 analyses found no significant associations and 3 analyses found a significant but positive association between social support and worse mental health (Table 3.2). Overall these results lend some support to the hypothesis of a protective main effect of support, but are far from conclusive.

II. Stress-buffering associations

Overall, 8 studies examined the relationships between life stress, social support, and mental distress. Some of these studies examined the buffering effect of various types of social support on different stressors and mental health measures so overall 18 analyses were reported.

Methods

Most of these studies (n=6) used hierarchical multiple regression analysis. The main variables including social support and stressors were entered into models (adjusted for the effects of covariates) step by step. In the first step, the separate main effects of social support and stressors on mental health were tested by adding them to the regression models one by one. Then, to investigate the moderating, or stress-buffering function of social support, an interaction term between the stressor and the measure of social support was created and added to the earlier model, statistically controlling for all of the main effects. A significant relationship between the interaction term and the mental health measure was taken to indicate support for a buffering effect of social support. In the

studies of Jawad et al. (2009) and Leung et al. (2007), however, a single step multivariate regression analysis was used so that all the variables and the interaction term were included in one model.

Associations between different stressors and mental health

 The studies considered various types of stressors; either a specific type of life stress such as financial stress (difficulties in paying for basic needs) (Cruza-Guet et al., 2008), or general stresses of life (Nemeroff et al., 2010; Lee & Dunkle, 2010; Jawad et al., 2009) measured by scales. Health related stressors including limitations in ADL functioning, cognitive impairment and chronic diseases received the most attention (Bierman & Statland, 2010; Bozo et al., 2009; Leung et al., 2007).

The results indicated that all stressors measured in these studies were significantly (and positively) associated with physiological distress, except the general stressors of life measured in Nemeroff et al. (2010)'s study. The predictive role of the stressors for mental distress was also supported by results from the only longitudinal study in this review (Bierman & Statland, 2010), where independent of controls, greater limitations in ADL were found to be positively related to changes in depressive symptoms over the course of the study.

One study (Alexandrino-Silva et al., 2011) found that life stressors as measured by Comprehensive Assessment and Referral Evaluation (SHORT-CARE) were associated with the mental health of women, but not men.

The moderating role (stress-buffering effect) of social support

The studies that examined the stress-buffering model, hypothesized that social support would moderate the deleterious effects of life stresses on mental health. However, of 18 analyses only two found a significant moderating role for social support. Leung et al. (2007) examined the buffering effects of perceived instrumental and emotional social support in the presence of health stressors (cognitive impairment and chronic diseases) on depression and anxiety. Results suggested a possible buffering effect of emotional support on depression in the presence of cognitive impairment but other interactions examined were not statistically significant. Lee and Dunkle (2010) found that received emotional social support from adult children, but not instrumental social support, had a

powerful buffering effect on the relationship between general stresses of life and depressive symptoms.

3.2.3.2.3.2 Gender Differences

While Bozo et al. (2009) and Pasha et al. (2007) found no gender differences in depression in their studies from Turkey and Iran respectively, most of the studies included (e.g. Alexandrino-Silva et al., 2011; Mechakra-Tahiri et al., 2009; Rueda & Artazcoz, 2009; Leung et al., 2007) reported that the mental health of women was worse than that of men, consistent with the wider literature on this topic (Noble, 2005; Schoevers et al., 2000). A range of biosocial factors have been proposed as explanations for this, including possible greater exposure to life stressors among women.

Studies included in this review generally did not find any significant gender differences in social support (Bozo et al., 2009; Thygesen et al., 2008; Leung et al., 2007; Pasha et al., 2007). In Koosheshi (2007)'s study on an Iranian sample, older women had larger social networks than older men but there was no gender difference in reported received social support. Another study from Iran found a lower level of social support among older women compared to men (Rambod & Rafaii, 2010).

The studies considered in this review shed little light on possible gender differences in the association between social support and mental health status. Only two studies in this review examined gender differences in the associations between social support and mental health. Alexandrino-Silva et al. (2011) found that perceived lack of social support was associated with depression among men, but not women. The authors attributed this finding to a differential effect of widowhood. They argued that men usually name their wife as their main or only source of emotional support and so widowers may be more vulnerable than widows to a lack of spousal support. Rueda and Artazcoz (2009), by contrast, consistent with the wider literature found that perceived emotional social support was associated with mental health status among women but not men. Evidence on gender differences in the associations between social support and mental health is thus limited and not wholly consistent.

3.2.3.2.3.3 Sources of Social Support and Mental Health

Bowling (1994) suggested that both the source and the type of social support have implications for health. However, only a few studies included in this review considered whether sources of perceived or received support were associated with mental health (see Table 3.1). Other studies either neglected to measure different support sources or measured them but did not report the results. This review provided evidence that in Asian and the ME countries, including Iran, the main sources of support are family members. Han et al., 2007's study of older people in S Korea found that children were the main source of support drawn on to meet all kinds of need (urgent help, long-term care needs, financial needs and emotional needs), even when the elder had a living spouse. Spouses were the next most common source of support. However, there are also studies conducted in Taiwan (Lien et al., 2009) and Turkey (Kara & Mirici, 2004) reporting that spouses were the main provider of social support.

In a study from Lebanon (Jawad et al., 2009) no significant association was found between presence of a spouse and depression, while having more children was found to be associated with lower risks of depression, indicating a more important supportive role of children compared to a spouse for the mental wellbeing of Lebanese older people. The studies of Alexandrino-Silva et al. (2011) in Brazil and Koosheshi (2007) in Iran reported gender differences with regard to sources of social support: they found that while women tend to have a close confiding relationship with children, men usually depend more on their wives for this kind of support. In Western countries, support from friends may also have a considerable influence on mental health. Olutoyin Oni (2010) found that in Canada friend support was a better predictor of depression among older people than family support. According to Olutoyin Oni (2010), family interaction may revolve around routine activities that are rarely emotionally inspiring, whereas activities with friends may more often involve mutual interests and pleasure. However, this may not be the case for all Western societies.

Consequently, the inconsistent evidence on the role of support provider in mental health of older people suggests that the importance of support of a specific source may vary by gender, setting and culture.

3.2.4 Discussion and Conclusion of the Systematic Review

Overall the studies included in this review provide evidence, albeit not wholly consistent, that social support has a moderate main, and a weak stress buffering effect on the mental health of older people. This conclusion differs from that reached in most of the old and new review studies several of which have argued for a stronger association between social support and health. Three major reviews of the literature published in the1970s (Kaplan et al., 1977; Cassel, 1976; Cobb, 1976), for example, suggested that there was a significant direct or modifying effect of social support on health and emphasized that much or most of the beneficial health effects of social relationships are due to their buffering properties in the presence of stress (Bowling, 1994). Additionally, Schwarzer and Leppin (1989) in their meta-analysis of 93 studies investigating the buffering hypothesis concluded that social support was the most important factor in modifying the health effects of hardship. A number of more recent review studies have also reported that available evidence consistently supports a link between social support and health outcomes (Lakey & Orehek, 2011; Brewin et al., 2000; Finch et al., 1999). However, there are also other reviews that have failed to find consistent significant main effects (George, 1989; Antonucci, 1985) or support for the buffering potential (Alloway & Bebbington, 1987) of social support on mental health. The result of my own review of the 6 review articles, as presented in Section 3.2.3.1, showed generally moderate evidence to support the notion that social support has a protective effect on mental health.

The main difference between this review and other reviews is on the focus here on the older population. The imbalance between social support needs of older people and what they receive may explain the approximately weaker evidence for an association of social support and mental health in my review compared to other more general reviews. There have generally higher rates of poor health at older ages limiting opportunities for social engagement and also higher risks of losing support sources as a result of widowhood or mobility of kin (Gottlieb, 1983; Broadhead et al., 1983). Thus, despite possibly greater needs for social support at older ages, available social support may diminish. According to Contingent Theory, the effects of social support are contingent upon people's pre-existing levels of health and so the amount of social support received should be commensurate with their needs (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.

Another relevant factor to consider is methodological limitation. Small numbers of older people included in some studies (11 of 18 studies had sample sizes of less than 300) may result in less statistical power to detect associations. This is particularly problematic when studies aim to identify interaction effects (Smith & Day, 1984), as did 8 studies in this review. On the other hand, it must also be recognised that some of the associations identified in studies included in this review may have been confounded and so may lack validity.

As noted earlier, evidence from the review to support the stress buffering role of social support was weak. Possibly this partly reflects the indicators of stressors used. Jawad et al. (2009) and Cruza-Guet et al. (2008) for example used measures such as familial conflict or financial problems, while it has been suggested that health decline, for instance, is a more important stressor predicting depression in old age (Brilman & Ormel, 2001; Chong et al., 2001). Additionally, Frazier et al. (2003) have suggested that received social support may not buffer stress because of the relational context in which support is offered and received. Nevertheless, due to the higher needs for instrumental social support in the older age, it is likely that receiving support has a greater mental impact among older people compared to young people. My review, despite evidence for less strong relationship between received social support and health compared to perceived social support in general adult populations (Fratiglioni et al., 2000; Wethington & Kessler, 1986; Henderson et al., 1981) found only slight differences.

With regard to the types of social support, stronger evidence was found for the association of emotional social support than instrumental social support or other types of social support with depression in this review. It has been suggested that in cross-sectional studies, the relationship between instrumental support and psychological symptoms may be confounded by the health status of participants. Ill people may receive more instrumental support than healthy subjects (Leung et al., 2007). Regarding the lack of a significant association between network size and depression, it has been discussed that network size alone is not a useful indicator of support and at least other quantitative

aspects, such as frequency of contact with network members should also be considered (Han et al., 2007).

In contrast to the expected negative association between social support and poor mental health, a number of studies in this review found a positive association. It has been suggested that ill-timed, unwanted, ineffective or excessive support may actually be stressful (Krause & Rook, 2003). This hypothesis is similar to the ''reverse buffering'' effect that suggested when the presence of social support does not protect from stress but actually exacerbates the trauma experience (Prati & Pietrantoni, 2010). However, most of evidence seems to point to helpful rather than harmful effects of social support (Prati & Pietrantoni, 2010).

In summary, diversity in the characteristics of the studies included in this systematic review, in addition to limitations in their size and methodology, makes comparisons and the estimation of the effects of social support on health complicated and the interpretation of their findings difficult.

Comparison of the literature of the world with that of the Middle Eastern countries

The relationship between social support and mental health has been most extensively researched in Western countries. It is likely that differences in cultural attitudes and behaviour, in societal conditions and structures or in health-care systems make the generalisability of results from Western studies to other nations including the ME countries difficult.

I previously conducted the first systematic review of quantitative studies investigating the association between social support and different dimensions of health in the ME region (Tajvar et al., 2013). The ME countries are culturally relatively similar to the context of my research, Iran, and so the results should be more applicable to this proposed research site.

In this systematic review of studies from ME countries, 22 studies were included, of which, 9 studies examined the association between social support and mental health in studies which included older people. 8 of the 9 studies examining the association of interest found that higher levels of social support were significantly associated with

lower risks of mental illness. Evidence on associations between social support and other health outcomes was inconsistent.

These findings are more consistent with the findings of the review of review studies included here, but rather less so with the review of primary studies. Possibly this reflects different patterns of association (and different methodological issues) in studies of older people as compared with general population samples, as discussed above. However, the general similarity of association between social support and mental health among the ME and the review studies highlights the relevance, applicability and importance of social support in mental health wellbeing across most of countries and cultural settings. Another similarity among the ME and the western literature is that perceived social support found as the dimension of social support that most researched and showed more consistent and strong associations with mental health in comparison to the received social support. However, despite similarities, the patterns of social support, its meaning and importance of different dimensions and types of social support may differ between Western and the ME settings. A behaviour that is counted as a support function provided by relatives in Western culture, may be counted as the expected duty of the relatives in the ME setting, which is not expected to be reflected in mental health improvements of the recipient of that support.

These arguments are, however, my own understanding on the similarities and differences between the two settings, drawn from the literature, which would need more research and evidence to support them.

Significant gaps in the research

My review highlights the following gaps in the social support and mental health literature for future research:

I. Most research to date has been conducted in Western countries. Studies need to be conducted across other cultures and geographic boundaries including the ME countries and Iran.

II. Studies of associations among older people are sparse.

III. Few studies measured the complex concept of social support comprehensively by its all dimensions and aspects and at the same time also examined its main and buffering effects on mental health. The complexity of social support theories should be matched by the instruments developed and piloted appropriately for each context.

IV. The association between received social support and health is less researched and understood compared with perceived social support.

V. The separate influence of the various functions of social support (such as emotional support and instrumental support) on mental health deserves more research and a more careful evaluation.

VI. The role of structural aspects of social support in mental health wellbeing is less researched.

VII. The evidence on gender differences in the association between social support and mental health is limited and inconclusive.

VIII. The role of different sources of social support (e.g., spouse, children, friend, etc) in relationships between social support and mental health needs further investigation.

IX. There is limited knowledge of the pathways whereby social support influences mental health.

X. Studies with prospective research design are sparse. Such studies need to be developed in order to examine temporal sequencing understanding.

XI. Intervention studies are also needed to verify the effectiveness of social support on mental health.

XII. Further studies are needed to investigate the stress-buffering effect of social support on various stressors, in particular health stressors.

I am able to address some, though not all, of these issues in my thesis, as indicated in my study objectives, provided in the first chapter.

Limitations and strengths of this systematic review

This review has a number of important strengths, for example, firstly, to my knowledge this is the first theory based systematic literature review examining the associations between social support and mental health in older people. Secondly, I reviewed numerous databases and published sources using various search method. This included hand searching, as well as use of electronic databases, and cross searching by, for example, names of key authors in the field. Thirdly, the results of studies were summarised and reported in a detailed form to provide clear information on the effects of various aspects and dimensions of social support on mental health studied to date. This detailed reporting should be useful for future investigators. Fourthly, although it greatly added to the time and efforts needed for completion of this review, I initially included search terms such as 'social network' in my electronic searching to find relevant publications that wrongly used these terms interchangeably with social support to avoid losing possibly relevant studies.

Despite considerable strengths of this review, it is also subject to a number of limitations: first of all, only one review author screened abstracts for relevancy and determined eligibility, applying quality criteria and extract data which may be biased by the reviewer. Also, for both practical reasons (language and location of the first author) and ones related to the topic of this thesis, the unpublished studies included were drawn mainly from Iran and thus unpublished research from other countries may have been under-represented. Additionally, only a few review and original studies were included with a high level of diversity, making the final estimation of the influence of social support on health inadequate. Furthermore, this review only included original studies published in the last five years, although the results of older studies may have been reflected in the newer ones (and was included indirectly in the review studies examined). Finally, meta-analysis was not performed, due to a high diversity among studies.

Table 3.1: Summary of studies included in the present systematic review (ordered chronologically)

Ref., Setting, Main Objective	N	Sample, Sampling	Design and Methods	Measures of SS and MH	Key Findings
Alexandrino-Silva et al. (2011) Brazil M *To examine the association of life events and SS in depression in late life.*	367	Household community sample of older people 60+, 65% female Over sampling people over 60 in a sampling frame of people 18+	XS Regression analysis	MH measure: 'Old age symptomatic depression' measured by CIDI 1.1 (RVT) SS measure: PSS measured by Assessment and Referral Evaluation (SHORT-CARE) inventory	Depression was associated with a perceived lack of SS in men but not in women. Thus, gender differences should be considered.
Nemeroff et al. (2010) USA M/B *To investigate the relative influence of SS and perceived control on the psychological distress under stressful life circumstances*	134	Community-dwelling older people aged 65+, 64% female Convenient sampling	XS Regression analysis	MH measure: BSI to detect psychological distress (RVT) SS measure: PSS measured by SSQSR (RVT)	In testing the main effects model, only SS but not stress (measured by Elders Life Stress Inventory) was found to be a significant predictor of psychological distress; Greater satisfaction with SS was associated with lower levels of psychological distress. The interaction of stress × SS had a non-significant relationship with psychological distress
Bierman & Statland (2010) USA M/B *To examine how SS resources and the timing of limitations intersect to shape the relationship between ADL limitations and changes in psychological distress*	1167	Community residents older people aged 65+ in wave 1 of the ASH study and 925 people (79% retention rate) after 2 years Random sampling RR=65%	Longitudinal study over a 2-year period Regression Analysis	MH measure: Depression measured by Hopkins Symptoms Checklist (Derogatis, et al., 1974) (RVT) SS measure: PSS measured by a 4-item scale adapted from Schieman (2005) (RVT)	Neither the main effect model, nor the buffering model of SS was significant; While, greater limitations in ADLs were positively related to changes in depressive symptoms over the course of the study, PSS was not significant. Also, PSS did not interact in the relationship between ADL limitations and depressive symptoms. Further analyses stratified by PSS indicated that the relationship between ADL limitations and depressive symptoms is weakened for older individuals, but only at higher levels of PSS.
Lee & Dunkle (2010) South Korea M/B *To investigate how worries and psychosocial distress are related to depressive symptoms*	193	Community-dwelling oldest old 85+ years old, 71% female	XS Hierarchical regression analysis	MH measure: Depression measured by 15-item version of GDS-SF (RVT) SS measure: Self developed 8-item questionnaire (4 items for received emotional SS and 4 items for received instrumental SS (RVT)	There was a strong correlation between worries and depressive symptoms. Both emotional support and instrumental support received from adult children had main effects on depressive symptoms. However, only emotional support from adult children had a powerful buffering effect on the relationship between worries and depressive symptoms.
Olutoyin Oni (2010) Canada M *To determine how specific types of informal social relationships affect the health of the elderly*	54	Older people aged 65+ in nursing homes, 70% women convenience sampling RR=87%	XS Regression analysis	MH measure: Depression measured by 15-item GDS (RVT) SS measure: Duke SS Scale (including 2 subscales; PSS from family and PSS from friends) (RVT)	Both support from family and support from friends were significantly associated with depression; however, friend support was a more reliable factor for predicting the levels of depression after controlling for all other covariates.

Ref., Setting, Main Objective	N	Sample, Sampling	Design and Methods	Measures of SS and MH	Key Findings
Jawad et al. (2009) * Lebanon M/B *To investigate the moderating role of various SS factors in the stress–depression relationship*	490	Community-residing older adults in post-civil war Lebanon aged 60+, 58% women	XS Regression analysis	MH measure: Depression measured by GDS-15 (RVT) SS measure: Availability of SS (having spouse and number of co-resident children) and quality of SS	Availability of SS: There was no significant association between presence of a spouse and lower depression but having more children was associated with lower depression. Quality of SS: Reported good relationships with others were associated with fewer depression symptoms. The buffering effect of SS depended on the nature of the stressor and the source of SS. But for 'total number of life stresses' SS did not show a buffering role.
Safezadeh (2009) * Iran M *To identify the associations between characteristics of older people with their mental health*	312	Community-resident older people 65+ years old, 55% men Stratified sampling method RR=94%	XS Bivariate analysis	MH measure: GHQ-12 to detect Psychiatric disorders SS measure: A single question asking whether SS is low, median or high	The mean GHQ scores of those with low, median and high SS were 30.8, 31.2 and 33.2 and differences were significant using bivariate analysis. Women, widowed, older, less educated, less income, and those with low class occupation had significantly poorer MH.
Bozo et al. (2009) * Turkey M/B *To examine the effects of ADL and perceived SS on the level of depression and the moderating role of SS in relations between ADL and depression*	102	Older people aged 60+ selected from three cities of Turkey, 67% women Convenient sampling	XS Hierarchical regression analysis	MH measure: Depression measured by BDI-21 (RVT) SS measure: PSS measured by MSPSS from different sources (RVT)	While both higher ADL functioning and higher PSS had significant associations with lower depression (main effect model), there was no interaction of PSS in the association between ADL impairment and depression, rejecting the stress-buffering theory of SS.
Mechakra-Tahiri et al. (2009) Canada M *To assess differences in the associations between social relationships and depression across urban and rural settings.*	2670	Community dwelling older persons aged 65+, 60% women Random sampling RR= 66%	XS Regression analysis	MH measure: ESA– Q measuring 9 associated symptoms of depression (RVT) SS measure: Three questions on SS (including availability of SS resources, emotional SS and instrumental SS)	None of the three indicators of SS including overall SS score indicated significant association with depression.
Lien et al. (2009) Taiwan M *To detect the relationships of uncertainty, SS and psychological adjustment during the period of the surgery*	43	Older cancer patients aged 65+ who were undergoing surgery, 93% men Purposive sampling RR=73%	pre-/post descriptive design (longitudinal correlative study 10-14 days) Bivariate analysis (before-after analysis)	MH measure: Anxiety and depression measured by Chinese version of HADS (RVT) SS measure: PSS measured by Interpersonal Support Evaluation List (RVT)	There was a positive relationship between anxiety and SS after surgery, so that with increasing SS, anxiety was also increased. There was no significant relationship between SS and depression neither before nor after surgery. Healthcare professionals were the main providers of information; while spouses, family members and friends provided mostly emotional support. Spouse is the main provider of SS in the social network.

Table 3.1: *(Continued)*

Ref., Setting, Main Objective	N	Sample, Sampling	Design and Methods	Measures of SS and MH	Key Findings
Rueda &Artazcoz (2009) Spain M *To analyze the social determinants of health in Catalonia, using a combined framework of socio-economic position, family roles and SS.*	2597	Older people 65-85 years old of a representative sample of the non-institutionalised population of Catalonia- Spain 57% women Random sampling	XS Hierarchical regression analysis	MH measure: GHQ-12 to detect psychiatric disorders (RVT) SS measure: Reduced version of Duke SS Scale (measuring confidant and affective SS) (RVT)	Confidant SS was negatively associated with poor MH in both sexes, whereas affective SS was only negatively associated with poor MH status of women.
Cruza-Guet et al. (2008) USA M/B *To test five theoretical models (including the main and buffering effects of SS) for explanations regarding the efficacy of naturally exchanged SS*	273	Community-dwelling Hispanic elders aged 70+ living in a Miami, Florida Neighbourhood, 59% female Random clustering	XS Hierarchical regression analysis	MH measure: A composite score of anxiety and depressive measured by STAI and CES-D respectively (both RVT) SS measure: Frequency of RSS and satisfaction with RSS in the forms of informational tangible and emotional SS (RVT)	In the main-effects model, satisfaction with RSS was associated with lower psychological disorders, whereas frequency of RSS was unexpectedly associated with heightened psychological disorders. Hispanic elders who receive SS in the form of informational SS, despite tangible and emotional support, exhibited higher levels of psychological disorders. Neither frequency of RSS nor did satisfaction with RSS buffer the noxious effects of financial strain on psychological disorders.
Thygesen et al. (2008) Norway M *To investigate the influence of risk factors and personal resources on perceived psychological distress*	214	Elderly aged 75+ receiving home nursing care in 7 municipalities in southern Norway, 70% female Selected randomly RR=65%	XS Regression analysis	MH measure: GHQ-30 cut off 4+ to detect psychiatric disorders (RVT) SS measure: PSS measured by revised SPS (RVT)	No significant association between SPS and psychological distress was found. Of other covariates in the multivariate analysis sense of coherence, education and subjective health complaints were factors that were significantly related to psychological distress
Pasha et al. (2007) * Iran M *To compare general health and SS of community-resident older people with those of institutionalised older people*	100	50 institutionalised (random selection) and 50 community resident older people (convenient sampling) Aged 65+ years, Same proportion of men and women	XS Bivariate analysis	MH measure : GHQ-28 to detect psychiatric disorders (RVT) SS measure : SS Philips Questionnaire (RVT)	SS was associated with better MH in both community residents and institutionalised people. Community residents reported better MH and higher SS compared to institutionalised people.

Ref., Setting, Main Objective	N	Sample, Sampling	Design and Methods	Measures of SS and MH	Key Findings
Koosheshi (2007) * Iran M *To investigate the relationship between living arrangements, SS and health of older people*	526	Community resident older people 60+ years old	XS Regression Analysis	MH measure: GHQ-12 to detect psychiatric disorders (RVT) SS measure: Received emotional and instrumental SS in the last 1 year, developed by the author	Neither emotional nor instrumental support had direct associations with MH While older men received SS from their wife more than other sources, the main source of SS for older women was their children
Wong et al. (2007) USA M *To examine whether SS is positively related to psychological well-being.*	200	Self-identified older Chinese and Koreans aged 65+, 56% women convenience sample RR= 75%	XS Regression analysis	MH measure: Overall psychological well-being measured by MHI-17 (domains: depression, anxiety and positive affect) SS measure: RSS (financial, information/advice, emotional/companionship and language) measured by a self developed 30-item questionnaire (RVT)	Having more emotional/companionship support significantly contributed to better overall psychological well-being, less depression and higher positive affect. Those who had less financial support were more likely to be anxious. Language support and information/advice support were not associated with any domain of psychological well-being.
Leung et al. (2007) Taiwan M/B *To investigate how SS and family functioning affect MH, and to examine the buffering effects of support in the presence of health stressors.*	507	Elderly 65+ years old in industrial city or a rural community in northern Taiwan, 63% male Cluster random	XS Hierarchical regression analysis	MH measure: Depression and anxiety measured by Chinese version of SCL-90-R (RVT) SS measure: PSS (instrumental and emotional) measured by SSRS (RVT)	Instrumental support had neither main effect nor buffering effect on depression and anxiety. Emotional support had significant main effects on both depression and anxiety. However, emotional support modified the stress of cognitive impairment on depression only but not on anxiety.
Han et al. (2007) USA M/B *To examine the relationships among acculturative stress, SS, and depression also examining main and buffering effect of SS*	205	Elderly Korean aged 60+ immigrants in the Baltimore area, 63% Female Selected randomly from a sampling frame RR=61%	Secondary research of XS Hierarchical regression analysis	MH measure: Depression measured by KDSKA (RVT) SS measure: Structural SS (network size and satisfaction with the support network resources available) and PSS measured by Korean-translated PRQ (part 1 and part 2) (RVT)	Higher acculturative stress and lower PSS were associated with higher depression, whereas network size and satisfaction with support were not. Neither structural SS nor PSS buffer the noxious effects of acculturative stress on depression in the sample of Korean elderly immigrants. Adult children were found to be the main source of support utilized by elders regardless of the type of need, even when the elder had a living spouse. Spouses were the next common source of support

Abbreviations: Social Support (SS); Mental Health (MH); Main or Buffering Effect (M, M/B); Sample Size (N); Perceived social support(PSS); Received social support(RSS); Reliability and validity tested (RVT); Cross-sectional (XS); General Health Questionnaire (GHQ); Social Provisions Scale (SPS); Personal Resource Questionnaire (PRQ); Composite International Diagnostic Interview 1.1 (CIDI 1.1); Hospital Anxiety and Depression Scale (HADS); Centre for Epidemiological Studies–Depression Scale (CES-D); Spielberger State Trait Anxiety Inventory (STAI); Brief Symptom Inventory (BSI); SS Questionnaire–Short Form (SSQSR); Symptom Checklist 90-R (SCL-90-R); SS Rating Scale (SSRS); Mental Health Inventory (MHI); Geriatric Depression Scale (GDS); Multidimensional Scale of Perceived Social Support (MSPSS); Kim Depression Scale for Korean Americans (KDSKA); Activities of Daily Living (ADL); Beck Depression Inventory (BDI); Ageing, Stress, and Health (ASH) study; Etude de Sante´ des Aine´s study questionnaire (ESA-Q)

* These studies were also included in our literature review paper published earlier (Tajvar et al., 2013).

4. METHODS

This chapter sets out the study design and an overview of the methods including the statistical strategy and type of analyses. Information on fieldwork activities and sample response and data processing also presented.

4.1 Study Design

Research undertaken for and presented in this thesis includes primary analysis of data collected through fieldwork activities undertaken in Tehran during an intense period of seven months.

The design of the study was cross-sectional. This design was chosen, despite its inherent limitations discussed in Section 7.3, for the following reasons: (i) relatively easy, inexpensive and quick to implement given time and logistical constraints; (ii) possibility of collecting data on many factors at the same time. The data were collected using a structured multi-sectional questionnaire administered to respondents through face-to-face interviews conducted in their own homes. The questionnaire included administration of the Social Provision Scale (SPS) and the General Health Questionnaire (GHQ) as the main instruments used to measure perceived social support and mental health respectively. This PhD was funded by Ministry of Health of Iran which provided me with a stipend and most of the fieldwork costs were covered by the Tehran University of Medical Sciences (TUMS).

4.2 Study Site: Iran-Tehran[10]

The setting of the study was Tehran city, located in the north-central part of Iran, as shown in Figure 4.1.

Iran is a middle income country, located in southwest Asia and is one of the ME countries. Iran currently contains 31 provinces and 397 cities. The principal language of the country is Farsi and the main ethnic groups are Persians (51%) and Azeris (24%). More than 99% of the population are Moslems. According to the last census conducted in 2011, the country contained a population of 75.2 million people of all ages and 21.2 million households. Tehran city comprised a population of 8.2 million and 2.5 million households. Thus, mean household size was 3.5 in the country as a whole and 3.3 in Tehran.

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[10] Most of the statistics provided in this section are based on census data available from the statistical centre of Iran.

Figure 4.1: Map of Iran and Tehran's location in Iran

In 2006, of the total population of Iran and Tehran, 7.3% and 8.7% respectively were aged 60+. In 2011, these proportions had increased to 8.2% and 9.6% in Iran and Tehran. In 2006, almost 14% of people aged 60 and over in the country were living in Tehran city. According to the SCI, while the national modal and mean age respectively were 27 and 30 years in 2011, equivalent figures for Tehran city were 31 and 34 years. These figures thus indicate that Tehran's population is older than that of Iran. One reason is a lower TFR in Tehran compared to whole country; in 2011, the TFR in Tehran was 1.3 compared with 1.7 in Iran. However, due to the higher in-migration rate, the annual growth rate[11] of population in Tehran is even higher than that of Iran; in 2011 it was 1.65% in Tehran versus 1.29% in Iran.

The residents of Tehran generally have a higher SES compared with the average for the whole country. In terms of the 'Human Development Index', Tehran is the most developed and privileged province in the country (World Bank, 2001). Based on the United Nations Development Programme (UNDP), the 'Human Poverty Index' was 11%

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[11] Annual growth rate of population is the fractional rate at which the number of individuals in a population increases over a year. Population growth is determined by four factors, births (B), deaths (D), immigrants (I), and emigrants (E). Using a formula expressed as $P \equiv (B-D)+(I-E)$

in Tehran versus 21% in the whole of Iran (including Tehran) in 1999. In 2006, average life expectancy at birth in Tehran was 72.7 versus 71.0 in the whole country. The concentration of governmental and political centres in Tehran attracts better living facilities and services. In the 20th century, Tehran experienced a large migration of people from all over Iran, mostly seeking jobs and better living conditions. According to the last census, more than 60% of residents of Tehran were born outside the capital. Today, Tehran city contains a mix of various ethnic and religious minorities and represents the ethnic/linguistic composition of Iran. However, Tehran suffers from its own special problems and health issues, such as a dense population (890 people in every km), heavy traffic, severe air pollution and a higher proportion of non-communicable diseases compared to the whole country.

There were several reasons for choosing the capital city as the study setting. First, familiarity with the context, including earlier field work research experience there, and the support of the TUMS and being able to draw on these resources for assistance with the fieldwork which were important practical considerations. Second, Tehran is the most developed city in Iran with the highest decline in the TFR during recent decades and has a comparatively high proportion of older people. Moreover, it is likely that older people in Tehran are from different SES groups and have more heterogeneous family structures and living arrangements than the rest of the country, making it a suitable setting in which to examine the effects of these factors on family support and health.

4.3 Study Population

The study population was community-resident people aged 60+ years in Tehran. This age cut-off was selected in accordance with the UN's categorisation of the older population (WHO, 2007b), which is also the official age of retirement in Iran. A small minority of people aged 60+ living in institutions or long term hospital care at the time of the survey were excluded from the research. Also, older people with severe mental or physical disorders were excluded on the likelihood they would be unable to participate in the study.

According to the census of 2006 the mean age of the population aged 60+ in Tehran was 69.4 years. Of the age group 60+, 35% were aged 60-64 years; the sex ratio was 106 (106 men per 100 women); 53% of women and 10% of men were widowed; 22% of women and 5% of men were living alone; 60% were literate including 5% having university education and 13% (24% men vs. 1% women) were economically active.

4.4 Sample Size

My principal study hypothesis was that there would be a higher level of depression in those with a lower level of perceived social support. The instruments initially selected to measure poor mental health and perceived social support were the Iranian versions of GHQ-28 (Malakouti et al., 2007) and the SPS (Zaki, 2009) respectively (more information in Section 4.15). I based the sample size calculations on an expected prevalence of poor mental health of 20% in those in quartiles 2-4 of the distribution of the SPS (the reference group) compared to an expected 34% prevalence of poor mental health in the lowest quartile of the SPS i.e. an OR of 2.

The estimate of poor mental health was based on the available, though limited, literature. The GHQ-28 scale validated for Iran by Noorbala et al. (2004) and used in the most comprehensive national epidemiological survey on mental disorders in Iran, reported a prevalence among people aged 60+ of 31% using a cut point of 6 or more for probable mental health problems. However, neither that study nor any other study in Iran or in a culturally similar population investigated whether poor mental health prevalence varied by social support or reported any measures of effect. A UK based study (Grundy & Sloggett, 2003) used the GHQ-12 with a threshold of 4+. The authors found an OR of around 1.4 for the association of "some lack" of social support with psychiatric morbidity and an OR of 2 for "severe lack" of social support with psychiatric morbidity in older people[12]. I hypothesised that in my study context the effect of poor social

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[12] The perceived social support, used in the study of Grundy and Sloggett (2003) was based on seven questions on support and encouragement from family and friends, each with three possible responses, allowing a range of 0 to 21 for total score. Those with scores of 21 were categorised as having no lack of social support, those with scores of18–20 as having some lack of social support and those with scores of less than 18 as having a severe lack of support.

support i.e. being in the lowest quartile of the SPS would be equivalent to a "severe lack".

The required sample size was thus calculated using EPI Info software with an alpha level of 0.05 and power of 80% using the assumption of an expected 20% prevalence of poor mental health in the reference group and an expected OR of 2. Detection of smaller effects (OR<2) would have required larger sample sizes than were feasible for my research. Based on these assumptions, the sample size was calculated at 485 people.

Due to the sampling method of my study (cluster sampling), the sample size had to be adjusted in order to take into account intra-cluster correlation (ICC). Based on earlier epidemiological studies conducted in Tehran (e.g. Hashemi et al., 2003), a design effect of 1.5 was taken for my study and the sample size was increased to 727 individuals. A further increase in the sample size was required to take account of non-response. According to my earlier survey on the older people in Tehran (Tajvar et al., 2008) with the RR of 94%, I allowed for a non-response of 10% and for this the sample size was increased to 800.

4.5 Sampling Plan

My study used a multistage stratified cluster sampling strategy with 'probability proportionate to size' (PPS) allocation method within study clusters. There are two reasons for selecting a cluster approach rather than selecting individuals who could be spread across diverse areas of the city; firstly, it is economic and time saving; second, cluster sampling was also necessary since there was no sampling frame of individuals in the appropriate age group available for the whole city. The following figure (4.2) shows the sampling process of the study which is explained in more detail below.

Figure 4.2: Sampling stages of the study

Tehran City (**22** Districts)

| District number **2** out of **7** high class districts was chosen | District number **14** out of **8** middle class districts was chosen | District number **17** out of **7** low class districts was chosen | → Stratification |

| **1** out of **30** Neighbourhoods was selected and enumerated | **1** out of **25** Neighbourhoods was selected and enumerated | **1** out of **12** Neighbourhoods was selected and enumerated | → Clustering |

| **172** out of **595** enumerated older people were selected | **199** out of **611** enumerated older people were selected | **429** out of **1291** enumerated older people were selected | → Random Selection |

Tehran city is divided into districts and neighbourhoods. Neighbourhoods are embedded inside districts. Tehran city consists of 22 districts and 374 neighbourhoods, comprising different population sizes, and different numbers of neighbourhoods in each district (For more information see www.Tehran.ir). The map of Tehran with its districts is shown in Figure 4.3.

Figure 4.3: Municipal districts of Tehran

93
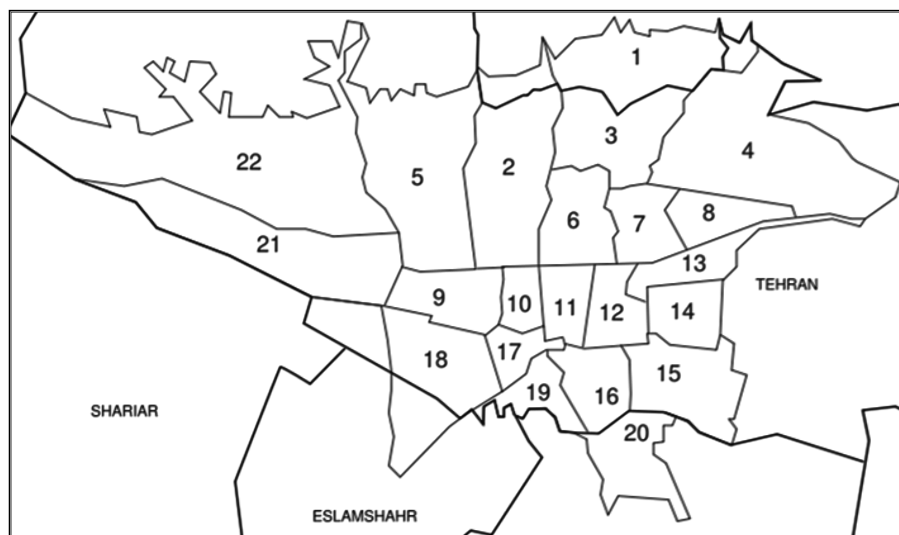
There were four stages in the sampling process for the study population, as explained below:

I.   Selection of districts

For the first stage of the sampling, three municipal districts of Tehran city were chosen from areas of different SES. The basis for classification of the districts into different SES groups was the study of Firouzabadi and Imani Jajarmi (2006), which includes information from the Ministry of Housing & Urban Development on the classification of Tehran's districts into three SES groups using five proxy indicators: the rate of in migration in the previous ten years; total employment rate; women's employment rate; proportion of professionals living in the district; and household income and expenditure. Based on this study, of 22 districts of Tehran, the districts 12, 18, 9, 17, 16, 19, 10 were classified as lower class, the districts 14, 7, 20, 8, 15, 11, 21, 13 as middle class and the districts 22, 6, 4, 5, 1, 2, 3 as higher class.

For my study, districts 2, 14 and 17 were chosen as high, middle and lower SES districts respectively. To aid the choice of the districts from different SES areas, I consulted a number of informants, such as municipal authorities or members of the city council and used the information on the characteristics of districts and neighbourhoods on the website for the municipality of Tehran (http://www.tehran.ir) to check the feasibility and representativeness of districts chosen.

Table 4.1: Characteristics of the selected districts in Tehran

Characteristics	High Class-District 2	Middle Class-District 14	Low Class-District 17
Geographical location in Tehran	North	East	South
Population size (2006)	606734	483432	256022
N of neighbourhoods in districts	30	25	12
Immigration rate	6.27	1.24	1.87
Proportion of professionals	27.42	12.04	8.33
Total employment rate	0.95	0.92	0.94
Women's employment rate	0.94	0.89	0.96
Household expenditures	48.85	25.34	20.44
Rank among 22 districts	**2**	**9**	**20**
Total development score	**0.82**	**0.53**	**0.16**

Source: Firouzabadi & Imani Jajarmi (2006)

Table 4.1 shows the information on the selected districts. Among the 22 districts in Tehran, district 2 was ranked the 2nd highest, district 14 ranked the 9th, and district 17 ranked the 20th in terms of their SES development using this schema. District 2 clearly differed from the two other districts on all indicators but districts 14 and 17 were less markedly differentiated.

II. *Selection of neighbourhoods*

For the second stage, one neighbourhood from each district was randomly selected. The decision about the number of neighbourhoods was based on the total sample size and logistical facilities for subject enumeration, and transport. However, before neighbourhoods were selected at random, those neighbourhoods with any exceptional characteristics that were in contrast with the study objectives had to be excluded so that the remainder could be representative of the whole district. For instance, private residential areas reserved for government workers, which usually lacked older people were excluded. Districts largely comprising minority groups were also excluded for practical reasons (difficulty of interviewing in another language) and because results are less likely to be generalisable beyond Tehran city. In selecting a neighbourhood in district number 2 (high SES), only 2 out of 30 neighbourhoods were excluded, namely *Ponak* and *Shahrak Gharb*, as the main population of *Ponak* was Turkish and a high number of the population in *Shahrak Gharb* were Christian and Jewish, minority religious groups in Tehran. Finally, *Darya* was randomly selected. In district number 17 (low SES), 2 out of 12 neighbourhoods were excluded, namely *Wasfnard* and *Moghaddam*, as the main population of *Wasfnard* was Turkish and a large number of the population in *Moghaddam* were Lorish (a minority ethnic group) and Sonnet (a minority religious group). Finally *Azari* was selected randomly from the remaining neighbourhoods. In addition, in district number 14 (middle SES), no neighbourhoods were excluded, and the *Mina* neighbourhood was selected randomly.

After finalising the clusters, information on the selected neighbourhoods and their characteristics was obtained from the municipality of Tehran and the management board of each district for further use. Characteristics of the randomly selected neighbourhoods are described in Table 4.2.

The population size and household numbers in the selected neighbourhoods were in approximately the same range. The employment and literacy rates were higher in the high-class neighbourhood compared to the middle and low-class and accordingly higher in the middle-class neighbourhood compared to the low class neighbourhood. Interestingly, while the richest area had the greatest availability of health centres and educational centres, poorer areas had more religious centres per 100,000 population.

Table 4.2: Characteristics of the selected neighbourhoods for the study

Neighbourhood Characteristics		High Class-Darya	Middle Class-Mina	Low Class-Azari
Population size		16386	13728	17335
Number of households		3588	3075	3316
Gender	Men	48.3%	50.8%	51.5%
	Women	51.7%	49.2%	48.5%
Employment rate		25%	23%	18%
Literacy rate		93%	86%	81%
Health centres (per 100,000)		85	43	11
Educational centres (per 100,000)		146	116	75
Religious centres (per 100,000)		12	80	103

Source: Census of 2006 Iran and the website of the Municipality of Tehran

III. Enumeration of people in the selected neighbourhoods

In order to make the sampling frame for the study, household enumeration was undertaken to identify all those aged 60 and over, as no information was available from population registers on the ages of individuals within households.

The Iranian Student's Polling Agency (ISPA) (http://www.ispa.ir/en) affiliated with Iranian Academic Centre for Education, Culture and Research undertook the enumeration of older people. ISPA is a centre which was established in order to conduct fieldwork commissioned by organisations and institutions. The fieldworkers of ISPA are university students or graduates and have been specifically trained in conducting interviews and filling out questionnaires, mostly in social and cultural sciences. Nine fieldworkers were hired from ISPA for this stage of the fieldwork.

The enumeration form had two sides: one side for recording the address of all households with one or more elderly residents; the other side to record the address, age, sex and telephone number of older people identified.

ISPA was equipped with up to date maps provided by the SCI for the districts and areas of Tehran (and other cities). On the maps, the borders of each neighbourhood were clearly defined. According to these maps, each neighbourhood was divided into several blocks with a unique number for each block in the city. The unit of enumeration was a block. There was a starting point (a household) in each block which was also an end point. Enumeration commenced at this point and proceeded clockwise until returning to the start.

For enumeration, the fieldworkers introduced themselves to the households by presenting their identification cards, briefly explained their purpose and asked whether anyone aged 60 or over lived there. As a confirmatory check, the fieldworkers checked the age of people said to be 60 years and over with their birth certificate where there was any uncertainty. In the event of inconsistency between the age given by older people and their birth certificates, the age was taken from the birth certificates.

When the enumerators identified older people in the household, information sheets were provided, explaining the purpose of the study and advising that if selected, they would be contacted further and an appointment made for a fieldworker to interview them at home. Their contact number was requested and the households were reassured that all information would be confidential. At this stage, they were given the option to refuse further participation. As seen in Table 4.3, in the enumeration stage about 14%, 3% and 1% in the districts 2 (high), 14 (middle) and 17 (low) respectively, refused to participate in the study and did not provide contact numbers to the fieldworkers.

Where there was no member of the household at home, the fieldworkers asked neighbours whether any older people lived in that household. If so, the fieldworkers put the information sheet in their mailbox asking them to call and provided the fieldworkers' contact number. According to the reports of fieldworkers, less than 10% of older people were absent at the time of enumeration and about half of these later provided their information to the fieldworkers via a telephone call.

The enumeration stage took one month and about 10,000 households were finally enumerated. Table 4.3 shows the results of the enumeration of older people.

According to the population size in the selected neighbourhoods in 2006 and aware that 7.3% of population in that year was 60+ years old, the numbers of older people enumerated in neighbourhoods 2 and 14 were lower than that I expected and the number in neighbourhood 17 was higher than expected. This might be because of the time interval between 2006 and the enumeration date (2009) and the different population growth rates between neighbourhoods. It is also possible that the distribution of older people among districts was not equal and that the geographical borders of neighbourhoods had been altered in recent years.

Comparing the neighbourhoods, high SES areas included a much lower proportion of older people and also a higher proportion of households with single older people compared to the two other neighbourhoods. Moreover, as Table 4.3 shows, not only was non response higher in high SES areas at this stage, but missing data in the information provided was also considerably higher in this area.

IV. *Sample selection*

Study individuals were randomly selected from the sampling frame of each neighbourhood provided in the previous stage. In the sampling frame, older people who refused to participate in the study (102 cases out of 2497) in the enumeration stage were excluded from the frame. The PPS allocation method was used to identify a sampling fraction for each of the neighbourhoods from the total sample size. Consequently, samples of 172, 199 and 429 people (in total 800 older people) were selected from the neighbourhoods Darya, Mina and Azari respectively. EPI info software was used in the random selection of individuals from the total list of neighbourhoods (Table 4.4).

Table 4.3: Information on the enumeration of older people in the selected neighbourhoods

Selected Neighbourhoods		High class-Darya	Middle class-Mina	Low class-Azari	Total
Total population (based on census 2006)		16,386	13,728	17,335	47,346
Number of Household (based on census 2006)		3,588	3,075	3,316	9,979
Expected number of older people (based on census 2006)		1,147	960	1,213	3,320
Households and older people enumerated	Total households including elders enumerated N (%)	485(24.8)	469(24.0)	999(51.1)	1,953(100.0)
	Households with 1 older person (%)	69.5	52.8	52.8	56.4
	Households with 2 or more older persons (%)	30.5	47.2	47.2	43.6
	Total elderly population enumerated N (%)	**539(21.5)**	**619(24.8)**	**1,339(53.6)**	**2,497(100.0)**
Gender	Male (%)	47.2	48.6	47.1	47.5
	Female (%)	45.7	50.2	50.3	49.2
	Missing data (%)	7.0	1.2	2.6	3.3
Age	Mean (S.D.)	68.7 (7)	70.1 (7.1)	69.8 (7.7)	69.5
	Male (S.D.)	68.8 (6.7)	71 (7.5)	70.6 (7.4)	70.1
	Female (S.D.)	68.6 (7.4)	69.2 (6.7)	69.1 (8)	68.9
	Missing data (%)	16.3	2.4	7.3	8.6
Telephone	Provided Tel No (%)	77.8	87.3	87.2	85
	Not provide Tel No — Refused to participate (%)	13.6	2.6	0.9	4.6
	Not provide Tel No — Absent/don't have/ don't know Tel No (%)	8.6	10.1	11.9	10.4

Table 4.4: Sample selection using PPS method

	Darya	Mina	Azari	Total
Total older people enumerated	539	619	1339	2497
Proportion of total sample size	21.5%	24.8%	53.6%	100%
Sample size	172	199	429	800

4.6 Sample Response

This section displays information on the results of data collection, response rate (RR) and the characteristics of non respondents.

4.6.1 Sampling Results and Response Rate

The sampling result, eligibility and response in the three sampled areas of the study are shown in Figure 4.4.

In total, 644 people (out of 800 sampled) responded. Those who were sampled but were not interviewed were classified as either 'non-respondents' or 'ineligibles'. 'Non-respondents' were defined as those who refused to take part in the study or were too ill to be interviewed. 'Ineligibles' were defined as those who had moved home; died between the period of enumeration and data collection; those not contactable at their addresses after at least two attempts and others (usually their neighbours) had no information on their whereabouts (reason unknown); cases where information gathered in the household screen proved incorrect (wrong address, no older person at the address), and being away from home (travelling or staying somewhere else) throughout the data collection period.

It was decided to replace the 'ineligibles' by taking a further random sample to attain the target study size. Re-sampling was from the enumerated list, excluding those already sampled and with over sampling to allow for further ineligibility. As shown in Figure 4.4, from the total 152 individuals in the second sample (including 40, 55 and 57 in Darya, Mina and Azari respectively), 79 people (52%) were interviewed and the others were either non-respondents or were away from home. This RR was lower, partly because, owing to resource and time constraints, it was possible to make only one contact attempt (via a home visit).

The first and second samples were compared in terms of their characteristics, including age, gender and the neighbourhood of residence. No systematic difference was found between the two samples.

The total RR for the combined first and second sample, excluding 'ineligibles', was 76%. There was, however, some variation in RR according to the socio-economic profile of the neighbourhood. The RR in the high class areas was only 67% compared with 82%

and 80% in the middle and low class neighbourhoods respectively. This is consistent with known socio-economic variations in willingness to participate in previous surveys (e.g. Koosheshi, 2007).

Figure 4.4: Sampling results and response rate
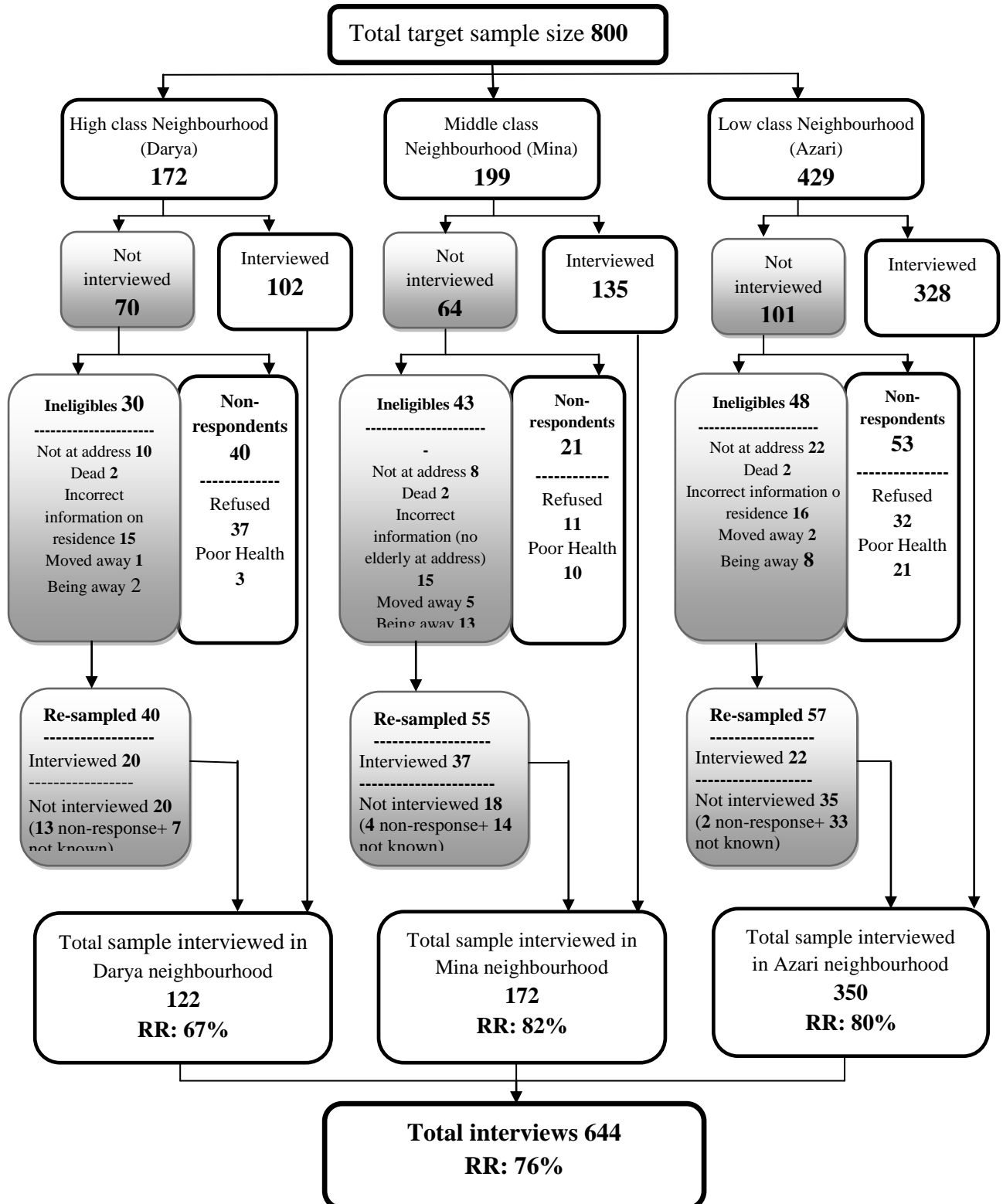
4.6.2 Characteristics of Non-Respondents

In total, 133 people, including 53, 25 and 55 in high, middle and low class neighbourhoods respectively, were recorded as 'non-respondents'. Table 4.5 describes the available information on the characteristics of these 133 non-respondents and compares them with the respondents. As shown, non-respondents were more likely to be from a high class area, more likely to be men (54%), and to be older than respondents (on average 1.5 years older).

Ninety percent of non-respondents in high class areas refused to participate citing only that they did not want to. Only 10% of non-respondents in high class areas compared with 40% or more in the middle class and low class areas cited poor health as a reason for non response. Also those that refused to take part in the study for health reasons were mostly women (22 women vs. 16 men), while those refused for other reasons were more likely to be men (55 men vs. 40 women).

Table 4.5: Comparison of non-respondents (n=133) and respondents (n=644) by gender, age, and reason for non-response by neighbourhood classification

Neighbourhood	RR (%)	Gender				Age		Reason for non-response	
		Resp.		Non-R.		Resp.	Non-R.	Poor health	Refused(any other reason)
		Men N (%)	Women N (%)	Men N (%)	Women N (%)	Mean (SD)	Mean (SD)	N (%)	N (%)
High class	67	64(52.0)	58(47.9)	30 (56.8)	23(43.2)	68.3(6.3)	69.0 (7.9)	5 (10.0) (1M, 4F)*	48 (90.0) (29M, 19F)
Middle class	82	85(49.2)	87(50.8)	16 (64.0)	9 (36.0)	70.1(7.3)	74.3 (7.7)	10 (40.0) (6M, 4F)	15(60.0) (10M, 5F)
Low class	80	173(49.0)	177(51.0)	25 (45.5)	30 (54.5)	70.1(7.4)	71.9 (8.9)	23 (41.0) (9M, 14F)	32 (58.9) (16M, 16F)
Total	76	322(50.0)	322(50.0)	71 (54.0)	62 (46.0)	69.8(7.2)	71.2 (8.4)	38 (28.8) (16M, 22F)	95 (71.2) (55M, 40F)

* M=Male/F=Female; Resp.=Respondents; Non-R.= Non respondents

4.7 Survey Instrument

The study data were collected using a structured multi-sectional questionnaire in Farsi. The English translated version of the questionnaire is available in Appendix 4.

The questionnaire included several instruments to measure different study variables in accordance with the conceptual model of the study, including GHQ to measure mental health, SPS to measure perceived social support, and Nagi scale to measure physical functioning status of the participants. In the last section of this chapter, detailed information are provided on how the key study concepts were measured and operationalised in the research. Many additional data were collected mainly for description of the participants' characteristics and as potentially important covariates (see Appendix 4).

When the study questionnaire was drafted, to ensure the face and content validity[13] of the questionnaire and its wording and cultural relevance, a meeting was held with experts in The TUMS who were sufficiently familiar with the setting of the study to judge whether the content of the questionnaire appeared appropriate in the Iranian context. Some sections of the questionnaire, such as the Iranian version of the GHQ-15, however, remained unchanged, as the validity and reliability of this scale had already been tested and demonstrated in Iran (see Section 4.15.1). Only a few changes were made in its wording, based on the comments of the experts. The questionnaire that was finalised in this stage was then piloted before use in the survey.

4.8 Pilot Study

In pilot testing I tried out the draft survey questionnaire in a population similar to the selected population to ensure that the questions were interpreted by the respondents as intended. In this stage, the process of data collection was also tested to identify problems, and ways to minimise the refusal rate. The pilot study also provided the opportunity to test the performance of fieldworkers and select the best ones for the main

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[13] Content validity is a non-statistical type of validity that involves "the systematic examination of the test content to determine whether it covers a representative sample of the behaviour domain to be measured" (Anastasi & Urbina, 1997:114). Face validity is very closely related to content validity. It is an estimate of whether a test appears to measure a certain criterion.

study and to evaluate the average cost for each interview and consider ways to decrease costs. Moser and Kalton (1971) have highlighted some of the important aims of pilot studies as follows:

1. To test the adequacy of the questionnaire.
2. To determine the way the respondent reacts to the questions.
3. To ensure the questions are meaningful to the respondents as well to the investigator.
4. To check the codes chosen for pre-coded questions: some categories may be added or omitted after the pilot.
5. To assess the probable cost and duration of the main survey and its various stages.
6. To reveal any practical difficulties and constraints and find ways to minimise them prior to the survey.

4.8.1 Describing the Pilot Study

To test the validity of the questionnaire in the pilot study, MSc students in health sciences were recruited through advertising in the health sciences department in the TUMS[14]. Fourteen students were registered initially. However, all students were told that their performance would be monitored and fieldworkers performing badly would be replaced. Two training sessions, as well as group practical training in fieldwork, were undertaken to teach the students how to conduct a good interview and the points that should be considered while interviewing.

The fieldworkers were provided with the same maps used for enumeration and a manual for completing the questionnaire. Other necessary forms, including information sheets and consent forms, and forms to record the information of non-respondents, were prepared for the students. A signed and stamped identification card from the TUMS was prepared for all fieldworkers and they were told to keep a stamp so that illiterate participants could finger print the consent form instead of signing.

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[14] I did not continue my contract with ISPA for data collection as due to the organisational bureaucracy I did not have enough direct contact with the fieldworkers of ISPA while regular contact is necessary to reassure that everything is going on truck and assess the quality of interviews and the data. Moreover, costs were estimated much higher with ISPA than the other method.

For the pilot study, a one page appraisal checklist was designed, which included some open questions asking students about all the problems they encountered in the process of finding the selected older people and interviewing them and about any ambiguous or unclear questions. Various methods were employed by the fieldworkers to find out which questions were misunderstood or ambiguous, for instance, by repeat interviews among some older people and asking a few of them to think aloud.

4.8.2 Results of the Pilot Study

For the pilot study, 45 cases were selected randomly from the sampling frame from those who did not have the chance to be selected for the main study. Of these, 28 were interviewed and the remainder were non-respondents for the following reasons: being away from home (n=10); being unable to participate because of severe health conditions (n=3); and refusal to participate (n=4). Due to the time limitation for the pilot study, those who were absent were not contacted again. Each fieldworker was asked to interview at least one person. I also interviewed four people to personally experience possible problems in the field and in the questionnaire.

After completing the pilot study, a debriefing session was held with the fieldworkers in order to find any problems in the process of work, comprehension and acceptance of the questionnaire and to consider suggestions for improvements. For each question, the fieldworkers either suggested changes required or that it remained unchanged. I was keen to check whether the fieldworkers understood and asked the questions in the same way. The pilot study also provided the opportunity to evaluate the performance of the fieldworkers and subsequently four of them were dropped as they lacked the required competency for the study.

4.8.3 Adjustments after the Pilot Study

Some of the main adjustments in the survey based on the pilot study were as follows:

1. The questionnaire was found to be too long and comprehension of some of the questions too limited. Also, the choices of some questions needed to be revised. I subsequently made the required changes and also replaced the Iranian version of GHQ-28 with the GHQ-15 in order to keep the questionnaire shorter.

2. In order to measure received social support, I had included an open question asking participants whether they regularly received any type of support or provided it to others that had not been listed in the table. Using answers to this question, I adjusted the classification of types of support for the main study.

3. Fieldworkers had initially been told to phone participants to make an appointment for the interviews. However, most of the fieldworkers found it too difficult to suddenly introduce themselves to strange people over the telephone, informing them about the research and making an appointment. As most participants were not familiar with research and had never been interviewed before, in the first instance some of them refused to participate. In contrast, when fieldworkers went directly to their home without a prior telephone call and made face-to-face contact instead, it was easier for potential respondents to get the information and make decisions about whether or not to participate. The participation rate with the second method was found to be much higher. Most of the fieldworkers reported a very good relationship with older people in face-to-face contacts and interviews. Consequently, we decided to follow this method. In the main study, a telephone call was used only in special circumstances, for instance difficulty in locating an address or correcting errors in interviews.

4. The information sheet and consent form were added to the first page of the main questionnaire.

5. Apart from the identification form, we also provided an identification card for fieldworkers to pin on their chests. We found the use of identification cards helpful for the security of fieldworkers and also in gaining the trust of participants.

6. The reasons for non-response needed to be recorded in more detail.

4.9 Data Collection

After the pilot study, the revised questionnaire was retested in a small number of people (n=5) from the sampling frame. I conducted these interviews and after some slight changes the questionnaire was finalised for use in the main interviews. Data collection was started with seven fieldworkers (four females and three males) from the pilot study. The fieldworkers comprised a coherent group with similar characteristics. All were MSc students in health subjects in the same age range (21-26 years old). They had good

verbal and listening skills in Farsi and some of them also in Azari[15]. Another training session was held to confirm and explain the changes made as a result of the pilot study. The final version of the questionnaire was read by the fieldworkers and any queries or ambiguities were rectified. They were provided with a detailed manual on completing the questionnaire.

The data collection was started in the *Mina* neighbourhood (middle SES area) followed by *Darya* (high SES area), and finally in *Azari* (low SES area). At the beginning of each week a list of selected samples and their addresses were provided to the fieldworkers. On a weekly basis, I reviewed with each fieldworker the status of the people on the list, e.g. successful interview, absent, incorrect address, refusal and reasons for refusal etc. I also reviewed the completed questionnaires checking for ambiguity, inconsistency or missing data. To avoid the problem of recall, the fieldworkers had been told to check the completed questionnaires on the night of the interview to correct any errors as soon as possible. Fieldworkers were required to telephone participants to clarify any inconsistencies or missing information.

Participants who were not available for interview at the time of the visit were visited at least once more and also contacted by telephone. If after several attempts, the individual could not be contacted at the address, this was recorded as an ineligible case (i.e. assumed to not reside at that address) and another person was selected from the sampling frame of the same neighbourhood.

As the study unit was the older individual not the household, if every older person in a household was selected at random, all were interviewed. In this case, the statistical analyses, as fully explained later, took account of within household correlation.

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[15] As *Azari* was the first language of 30% of population of Tehran (the second main ethnicity in Tehran), it was a strength point to include fieldworkers speaking Azari too. If a participant was able to speak Azari only, an Azari speaking fieldworker interviewed the participant. In a few cases where no fieldworker with the same language of participant was available, one of the relatives of the participant translated the interview.

4.10 Ethical Considerations

The research included in this thesis was approved by the ethical committee of the LSHTM as well as the ethical committee of the TUMS.

An identification letter and card for all the people involved in the fieldwork was obtained from the TUMS before starting the study. On making contact with household members the fieldworkers presented identification cards and described the purpose of the interview.

Fieldworkers gave assurances to participants that the data collected would be treated as confidential and only used in an anonymous format for research purposes. Participants were given the information sheets or these were read to them, and they were asked for their consent to participate. Participants' freedom to discontinue participation whenever they wished was stated in the information sheets. The consent forms had to be signed or fingerprinted before interviews.

Anonymity and confidentiality of all participants interviewed was ensured through numeric coding during all stages of the research. Questionnaires contained no identification of participants. In the event that participants were asked their names to avoid confusion, such as when two or more older people were selected from the same household, the names were removed from the questionnaires after interview and only the codes of interviewees were left. After completing the survey and entering the data into the electronic software, I was the only person with access to the completed questionnaires and electronic data. The questionnaires were stored in locked filing cabinets based at my home and data on password-protected servers on both laptop and PC. A number of copies were made of the dataset file on CDs and kept in a secure place.

To ensure the privacy of participants and avoid responses being influenced by the presence of others, (even when both members of a couple were selected for the study) fieldworkers were instructed to ask other household members to leave while the interview was conducted. Where the participant objected to this, or where the other person was required to act as an interpreter, this was noted in the questionnaire.

In case older people became upset because of the nature of the questions on family support and mental health, fieldworkers were trained to be sensitive and sympathetic to

participants' responses but without biasing them. If participants were particularly upset or depressed, the fieldworker recommended they seek advice, e.g. from neighbouring health centres, doctors or family consulting centres at the end of the interview. All participants were given contact details for the local organisations providing services for people, including older people.

4.11 Data Entry

After collecting the data, the information from the 644 completed questionnaires was entered into the statistical package SPSS by three experienced data entry clerks. An introductory training session was held to clarify the coding of the questions and the values for each variable and to explain what they should do in the case of observed errors. The importance and relevance of their work to the whole research process was emphasized in the training session. Two of the three clerks were the main fieldworkers who conducted nearly half of the interviews. I randomly checked about 20% of the cases with the original questionnaires for the accuracy of data entered. This stage took more than one month to complete.

I was personally responsible for the data at each stage, as the principal investigator. Fieldworkers and data entry personnel all reported to me and the completed electronic dataset and questionnaires were only accessible to me. Initially, the electronic dataset included 541 variables. More variables were created later based on the original variables in data management stage.

After completion of data entry, the data needed to be cleaned and the mistakes rectified to make the dataset ready for statistical analysis.

4.12 Data Cleaning

The controls and checks performed during fieldwork and data entry (interactive checking) to minimise errors in the process of transferring information from the sample to an electronic dataset have already been outlined. Hereafter, I only discuss the

activities performed after data entry (batch checking) in order to clean the electronic dataset and verify its quality.

Batch checking is particularly important in identifying inaccuracies and mistakes and rectifying those mistakes, and to ensure the coherence of the dataset and completeness and internal consistency of the data. In my study, all the data cleaning was performed in SPSS, as this was the data entry software used and was also more user-friendly, and then transferred to STATA for statistical analysis.

To perform controls and checks, descriptive statistical methods such as frequency, mean, standard deviation (SD), range, maximum and minimum values were used. Sorting the data for each variable was also a very useful and simple tool in SPSS software to check the values of the variables and the consistency between two related variables and uncover values that were unexpected and thus erroneous. The following activities were performed during data cleaning:

Range checks

Range checks were undertaken as a part of data cleaning for all variables, to ensure that data were within allowable ranges (e.g. sex must be either male or female) and only included valid values. For continuous variables, such as age without specific values, checking was undertaken to see whether values were at least logically acceptable and consistent with other related data. For instance, logically the first child must be at least 10 years younger than the mother, or number of years shown as living in a neighbourhood must not be more than a sample member's age.

Consistency checks

A great proportion of the data cleaning time was spent checking the consistency between variables. In particular, a specific consistency check was performed for the information on children, children in-laws and other family members of older people and also to check whether family members in the 'received social support' grid were consistent with the family members in the 'family' grid (see the questionnaire in Appendix 4). For instance, if a sample member was widowed, all the information for 'spouse' in the 'family' grid and also in 'received social support' grid had to be blank, as questions were only asked about living family members.

Information was entered for up to 10 children, but information for anything above 10 children was excluded, as in my study population only 5 respondents had more than 10 children (4 respondents had 11 children and 1 respondent had 12 children), otherwise all the variables for children would have to be repeated for the 11th child and over, which potentially could increase the rate of errors at the data entry stage.

Rectifying observed mistakes

After detecting errors for each variable, a consistent strategy was necessary to deal with them. If an inconsistency was obviously the result of a mistake made by the researcher/data entry clerk (for example if a person in an earlier question was recorded as having two children, whereas all other questions including the information on the family grid revealed that he/she had four children), the answer was corrected. If it was less obvious that the inconsistency was a mistake in recording, initially the error was checked with the original questionnaire and if the error could not be corrected using the original questionnaire, a discussion with the associated fieldworker/clerk or in a few cases a partial re-interview (asking only a few questions over the telephone) was conducted if possible. If re-interview was impossible or the fieldworkers could not help, the incorrect data was recoded to 'missing' value as the erroneous data could affect the validity of the study. In the event that many inconsistencies were observed in the information of a particular respondent or the questionnaire comprised many missing values, that individual was excluded from further analysis and was added to the non-respondent list. In total, only two questionnaires had to be excluded from analysis and finally data from 644 respondents were available for statistical analysis.

Assuming responses of missing information by checking other related variables

In the next step, as there were some missing data for different variables, I tried to infer responses for missing items where possible using the information from other related variables. For example, if the response to the question "how many older people are living in this household?" was missing, I checked the living arrangements of the participants and the information on household members and tried to correct the missing values using that information. However, many of the missing values still could not be corrected using the existing information and were left for the statistical analysis stage.

Differentiate between not-applicable (NA) and missing values

Many of the values were missing because a particular question was coded as NA for a respondent, not because the respondent refused to answer to that question, for example, people who did not have information about a second child because he/she had only one child. In my dataset, to avoid confusion between NA and missing values, I coded the NA data with "999" and missing values with dot symbol (.) in STATA, because in some analyses the NA group was important e.g. how the perceived social support of childless participants differed from the perceived social support of participants who had children.

Generating a unique individual identifier (ID) for individuals, households, and neighbourhoods

Separate variables were generated for the ID of individuals, households, and neighbourhoods. The reason for this was because it was necessary in statistical analysis to take into account that some respondents were from the same household or the same neighbourhoods and so were not independent of each other.

An individual ID was a 7-digit code combining the code of the individual, household and district. For instance, the individual with the ID *'1700451'* (17, 0045, 1) was the first individual in the household (it was possible to have more than one person in a household) number 45 in district 17. People from the same household had the same household code and households from the same neighbourhood had the same code for the neighbourhood.

Consequently, as a result of data cleaning, a dataset that (as far as was known) had no incorrect values and as much missing information had been completed as possible, was transformed to the statistical package of STATA for statistical analysis.

4.13 Data Management

Before starting the main statistical analyses, it was necessary to handle missing values, create new variables or manipulate the existing ones, or recode or re-categorise some variables. However, a copy of the original cleaned dataset was kept in a safe place as the main reference before doing any changes in the data.

Later in this chapter and also in Chapter 6, I have explained all data management activities that I undertook before main statistical analyses and how the key concepts of the study were operationalised in the analyses. Here a summary of those activities are outlined below:

Checking for missing data bias and handling missing values

Proper handling of missing values is important in all analyses as a part of data management and preparation step, otherwise there is a risk of obtaining invalid and insignificant results. In deciding how to deal with missing data in the analysis, it is helpful to initially know how many missing cases there would be in the multivariable analysis. If only a few cases are missing, it may not be necessary to evaluate the bias introduced by excluding them (Katz, 2006).

In this study, there were generally very few missing values. Only a few variables had 2.5% or more missing values and the highest one was for the "age of the first child" variable with 4.7% missing values, which could be the result of recall problems. Additionally, of 644 study respondents, 43.6% had no missing data and 20.4% had only a single missing value. However, a few respondents showed relatively higher missing values; 18 people had 20-100 and 3 people had 100-200 missing values out of 541 values in total. The rest of the participants had 2-19 missing values.

I compared characteristics of people with a high amount of missing data (≥20) to those who gave complete answers to all or most questions. The differences were described using means, numbers or percentages in Table 4.6, but no attempt was made to test the significance of these differences. The result indicated that the respondents with ≥20 missing values compared to the rest of the population were, on average, 4 years older, more likely to be male, reported higher mental problems (higher GHQ score), poorer physical functional health (lower Nagi score), and lower perceived social support (lower SPS score) and included an over representation of people who were illiterate. These findings suggested that disadvantage in terms of health, or demographic and SES characteristics were associated with missing values, consistent with findings from other studies (e.g. Koosheshi, 2007).

Although the rate of missing values in this study was low, the pattern of missing values also had to be checked, as, if the data were not missing randomly and the people with missing data were different from the people without, the validity of the results may be distorted. In my study, participants with and without missing data in the main independent (SPS) and dependent variable (GHQ) were compared using standard statistical tests of Chi Square and Student's t-test (Table 4.7). The results of these analyses did not show any significant difference between the two groups in terms of age, gender, the SES of living area, literacy, being married or not and number of children in responding neither to the SPS nor to the GHQ questions.

Consequently, based on the above results and the fact that the rate of missing values in this study was low, it seemed that disregarding observations with missing values for the dependent variable or any of the independent variables was the most appropriate method to deal with missing data. This method is known as "listwise deletion" or "complete case analysis". While a disadvantage of listwise deletion, the most common approach for handling missing data, is loss of information, and loss of statistical power, this limitation would be negligible in the case of my study, given the very low rate of missing values.

Table 4.6: Comparisons between participants with high rate of missing values (≥20) and the rest of the participants by selected factors

Selected Factors	Total N	Missing value	
		Participants with high missing values	Other participants
Age			
Mean (SD)	644	73.6 (8.6)	69.6 (7.1)
GHQ score			
Mean (SD)	644	20.0 (6.7)	16.6 (8.1)
SPS score			
Mean (SD)	644	69.6 (8.8)	71.8 (9.6)
Nagi score			
Mean (SD)	644	15.6 (5.8)	19.2(6.1)
Sex			
Male N(%)	322	12 (57.0)	310 (49.7)
Female N(%)	322	9 (43.0)	313 (51.3)
Literacy			
Illiterate N(%)	307	12 (57.0)	295 (47.3)
Literate N(%)	336	9 (43.0)	327 (52.0)
Total N (%)	644(100.0)	21 (100.0)	623 (100.0)

Table 4.7: Comparisons between participants with and without missing data on the SPS or GHQ by selected factors

Selected Variables	Total N	SPS		GHQ	
		Not missing	Missing	Not missing	Missing
Age					
Mean (SD)	644	69.8(7.0)	69.7(7.0)	69.7 (7.0)	72.4(10.0)
Sex					
Men N(%)	322	302(93.8)	20(6.2)	314(97.5)	8(2.5)
Women N(%)	322	305(94.7)	17(5.3)	315(97.8)	7(2.2)
SES of living area					
High class N(%)	122	113(92.6)	9(7.4)	119(97.5)	3(2.5)
Middle class N(%)	172	164(95.3)	8(4.7)	169(98.2)	3(1.8)
Low class N(%)	350	330(94.3)	20(5.7)	341(97.4)	9(2.6)
Literacy					
Illiterate N(%)	307	287(93.5)	20(6.5)	229(74.6)	8(5.4)
Literate N(%)	336	319(94.9)	17(5.1)	329(97.9)	7(2.1)
Married or not					
No N(%)	185	174(94.1)	11(5.9)	179(96.7)	6(3.3)
Yes N(%)	459	433(94.3)	26(5.7)	450(98.0)	9(2.0)
N of children					
Mean (SD)	644	4.7(2.0)	4.3(1.0)	4.6(2.0)	4.4(1.0)
Total N (%)	644(100.0)	607(94.3)	37(5.7)	629(97.7)	15(2.3)

Coding of variables

Some principles were followed when new variables were generated or original variables were recoded or categorised.

- Where continuous outcome variables met the assumptions of linearity and normal distribution, the variables were used in its original form rather than allowing a part of the information to be lost as a result of categorisation.

- Where variables were categorised, the categorisation was initially based on criteria that were biologically or socially meaningful rather than on statistical criteria. However, when numbers were too low in a particular category then I considered merging with another category if the direction and strength of association was similar, to minimise power loss for statistical analysis.

- All variables were coded in the same way in all analysis to allow the results to be compared.

- The baseline category (reference group) was ideally selected as the largest category to reduce the size of the standard errors of the effect estimates in the other categories. However, for analyses looking at 'poor' mental health, the 'best group' was selected as reference group even if it was not the largest category and risk group was selected as the 'worst category'. For example *illiterate* and *living alone* were risk groups (not reference groups) in the *education* and *living arrangement* variables.

Strategies for generating summary indicators

A range of new summary indicators was required, because some of the study concepts were measured using a long list of variables and although these have been described in the descriptive results, a summary indicator was required for use in analytical statistics.

For instance, in my study, different family factors were measured extensively using 230 variables. In such cases, summary indicators were derived from the original variables for further analysis using different strategies. These included, for example:

- A variable summing the information across similar types of family members relative to the participant, e.g. all children. This was done by reshaping the data from a wide to a long format using the '*reshape*' command in STATA.

- A variable summing results for each respondent by information on specific family members. Table 5.6, for example, was created using this 'hierarchical' approach. The classification in this table was hierarchical, in that inclusion in a higher category in the list removes the participants' eligibility for lower categories. In the case of Table 5.6, the highest level of support respondents' reported receiving from any family member (e.g. in category of children) was counted and reported. For this reason, the *'foreach'* command in STATA was used. The limitation of this approach was that it may have overestimated the level of support by selecting only the highest level and ignoring lesser contributions from other family members of the same type. The rationale, however, was that the highest level of support, e.g. receiving support all/most of the time even if only from one child, would be sufficient to meet the needs of the participant.

Bootstrapping analysis

To check whether a continuous variable with a non normal distribution could be used in the regression analysis in its original form, '*bootstrapping*' analysis was performed. If confidence intervals in bootstrapped form compared to the normal model were similar, then this suggested that the variable could still be used in continuous form. To check the similarity between the confidence intervals of the two models more carefully, post estimation analysis (the '*estat bootstrap, all*' command in STATA) was performed after bootstrapped analysis. In the results, the BC (bias-corrected) confidence intervals were compared with the confidence intervals of the normal model and the agreement or differentials between the two were reported.

4.14 Data Analysis

Statistical analyses in this thesis are based on the conceptual framework of my study. A variety of statistical analyses were used as summarised below.

4.14.1 Descriptive Statistics

Analyses started with descriptive statistics or univariate analysis to summarize the data, assist in data cleaning and also to understand the distribution, central tendency and dispersion of study variables. For the main continuous variables, such as the GHQ and the SPS data, I used histograms to check (a) the shape and distribution of the data (b) implausible values (c) gaps in values, and (d) extreme values. For continuous variables with normal distributions, mean and SD, or where relevant median and inter quartile range were used for presentation of the data. Categorical variables were presented using numbers and percentages of groups. The results of the univariate analysis are presented in descriptive tables and figures in chapter 5.

4.14.2 Multivariable Analysis

In order to determine the association between independent and dependent variables of the study, adjusting for a range of covariates, multivariable analyses were performed to determine the relative contributions of different independent variables to the dependent measure (mental health). As the dependent measure was binary, multivariable logistic

regression was used. I did not use linear regression due to the difficulty of interpretation of the coefficients. Also, given the characteristics of my data, multivariable OLS regression was also eligible for using. However, as the objective of my research was to identify associations of GHQ with poor social support rather than the associations across the whole scale, the OLS regression was not used. The results of multivariable analyses are presented in chapter 6.

4.14.3 Multilevel Analysis: Mixed-Effects Modelling

The data of my study are clustered and have a hierarchical structure. Individuals are nested within households within neighbourhoods within districts of Tehran. Considering the cluster sampling design of this study, the assumption of independence of observations with each other must be considered. Individuals within the same cluster are likely to be more similar to each other than to individuals from other clusters for both measured and unmeasured characteristics. Thus, it was essential that the study design of cluster sampling and the levels of neighbourhood and household were used in the statistical models. 'District level' was not taken into account in the modelling because districts were equivalent to neighbourhoods (one neighbourhood per district was selected). The reason for including the 'household level' in the modelling was that it was possible to include more than one participant from a household and this raises analysis issues, as responses from co-resident participants cannot be assumed to be independent of each other and indeed many variables of interest, such as 'living arrangements' are likely to be the same or very similar.

In the case of structured data, such as the data of this study, single-level multivariable analyses are inappropriate and multilevel models (also called hierarchical analysis) should be used instead. The main reason for this is that standard errors in single-level analyses may be too small, leading to confidence intervals that are too narrow, and p-values that are too small, leading to incorrect inferences.

There are several common methods for analysing clustered data. For the purposes of my research I used multivariable 'mixed-effects modelling'. This method has been known as a satisfactory approach to the analysis of clustered data with any number of levels of clustering and adjusts both the point estimate and standard error. Mixed-effects models are referred to as 'mixed' because they contain both 'fixed' and 'random' effects. The

fixed-effects portion is specified as a regression parameters in a manner similar to most other STATA estimation commands, that is, as a dependent variable followed by a set of regressors. The fixed effects are analogous to standard regression coefficients and are estimated directly. The random-effects portion of the model is specified by first considering the grouping structure of the data[16]. The random-effects are not directly estimated but are summarized according to their estimated variance and covariance.

Random-effects may take the form of either random intercepts (but fixed slopes) or random coefficients (random intercept and slope), and the grouping structure of the data may consist of multiple levels of nested groups. The random intercepts model allows, for example, the prevalence of mental disorders to vary across neighbourhoods (random intercepts), but forces the relationship between social support and mental disorders to be the same across neighbourhoods (fixed slopes). However, the random coefficients model with both random intercept and slope allows, for example, the effect of social support on mental disorders to vary across neighbourhoods. In this thesis I used the random intercepts model as I had no a priori reason to believe that the effect of any of variables would vary by neighbourhood or household.

Mixed-effects models can incorporate interval, binary, ordinal, and categorical outcomes. In STATA, a binary outcome is analysed using the *xtmelogit* (multilevel mixed-effects logistic regression) command. As the data in this study were structured in a three level hierarchy, three level (individual, household, and neighbourhood) mixed-effects logistic regression models were used for the analyses.

4.14.4 Description of the Modelling Strategy

Three main analytic models were used: analyses of associations between perceived social support and mental health; associations between different types of received social support and mental health; and associations between structural aspects of social support and mental health. For each set of these analyses, a number of three level mixed-effects logistic regression models, as described below, were run in sequential manner. In all models, only people with complete data on all variables were included. Further

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[16] For example, if random effects are to vary according to variable *district*, then the call to *xtmixed* would be of the form: *xtmelogit fixed-portion | | district: ...., options* (random-portion starts with | |)

information on specific methodological considerations before running each of the three main sets of analyses is provided in Chapter 6.

I.   *Crude analysis*

Standard Bivariate analyses such as Correlation or Chi Square tests which are usually performed after univariate analysis (descriptive statistics) to examine the relationships between key dependent and independent variables and selection of covariates were not conducted in this thesis. This is because, given the structure of my data, as discussed above, these standard single-level tests were inappropriate. Instead, crude analysis to examine individual association between each independent variable (including covariates and main independent variables) and dependent variable was performed using multilevel mixed-effect regression tests. After performing the crude analyses, multicollinearity among all independent variables was checked using the Stata command "Collin" and, in the case of a high correlation, one of the highly correlated variables in any pair was dropped from multivariable analyses.

II.   *Main effect model*

The main model of social support was tested by examining the association between social support and mental health adjusted for the effects of covariates. It was possible to check how the association between social support and mental health changes in the presence of other covariates.

III.   *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.

IV.   *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.

4.15 Measurement of Study Variables and Preparation of Data for Analysis

In this section, I describe how the key concepts of the study, categorised in four main groups including mental health, social support, physical functioning and other covariates were measured in my study and the methods of data processing and operationalisation for further analysis.

4.15.1 Mental Health

Measurement

To measure mental health, I used the Farsi 15-item version of the GHQ. The GHQ was originally developed by Goldberg in the late 1970s as a 60-item scale but a range of shortened versions including 30, 28, 20 and finally 12-item versions were developed later. The GHQ is a multidimensional, self-report screening instrument that measures symptoms of depressed mood, anxiety, social inadequacy and hypochondriasis (Donath, 2001; Schmitz et al., 1999; Jacob et al., 1997; Goldberg &Williams, 1988). Since its development, this scale has been translated into 40 different languages including Farsi and has been extensively used in different settings and different cultures including Iran (Noorbala et al., 2004). The GHQ was selected in my study as it is a very commonly used assessment of mental well-being and used in many different population settings, thus allowing for more valid comparisons.

The Farsi 15-item version of the GHQ, derived from the Iranian version of the 28-item version of the GHQ, was specifically tested on older people living in Tehran by Malakouti et al. (2007). Based on the results of the pilot study, described earlier, the Malakouti's 28-item version of the GHQ was judged to be too long considering the total length of my questionnaire, and including it might have had an adverse effect on the response rate. Thus, despite my initial proposal to use the 28-item version of the GHQ, upon which my sample size calculation was also based, I finally selected the 15-item

version. Permission to use the Iranian version of the GHQ-15 was obtained from Malakouti (the developer of the GHQ-15) before the fieldwork.

Reliability and validity

A review of studies on the validation of the GHQ in different countries demonstrates its high validity and reliability as a screening tool for mental disorders in the general population and older people and people with mild cognitive impairment (Noorbala et al., 2004; Papassotiropoulos et al., 1997; Goldberg & Williams, 1988). The validity and reliability of the Farsi version of the GHQ-28 has also been demonstrated in independent studies in Iran in the general population by Noorbala et al. (1999) and in a study of older people by Malakouti et al. (2007). Based on the last study, the GHQ-28 was an internally consistent measure and a suitable screening instrument for older Iranian residents, particularly those living in urban areas. In Malakouti's study, the GHQ-15 was derived using a loading factor of 0.6 or greater (α =0.9) from GHQ-28 and correlated well with that (r=0.97). Cronbach's α with the GHQ-15 were 0.9. However, the power of GHQ-15 as a screening instrument and its suggested cut-off point (see below) has not yet been validated in an independent study in Iran.

Scoring and data processing

The GHQ is scored using two methods; binary and Likert methods. In the binary method (0-0-1-1), the two least symptomatic answers across a 4 point response scale score 0 and the two most symptomatic answers score 1. In the Likert method, each item is rated on a four point scale (0-1-2-3). The GHQ-15 was scored using the Likert scoring method by Malakouti et al. (2007). In order to calculate the total GHQ score for participants with complete data on all items (n=629), the values of the 15 items of GHQ were added up and a new variable for total GHQ was created with scores ranging from 0 to 45 with higher scores indicating worse mental health status.

Different studies determined different cut-off points to discriminate between 'cases' (people who would be identified as having a mental health problem by a professional) and 'non cases' for a particular version of the GHQ. Malakouti et al. (2007) suggested the optimum cut-off score for GHQ-15 at 10/11(out of 45). However, as mentioned above, this cut-off point has not been validated in Iran yet. When the distribution of

GHQ scores of my participants was examined (see Figure 5.2), 75% scored above (i.e. worse than) the suggested threshold of 10/11. The main explanation for this may be that the study population of Malakouti was not representative of the older population of Iran or Tehran in terms of their SES. The study of Malakouti was conducted in a high class district of Tehran, using a relatively small sample (n=204). Only 14% of older people in the study of Malakouti were illiterate while in the same year, according to census data (SCI), this figure was 50% in Tehran and in my study it was 48%. Illiteracy has been shown to be an important risk factor for mental health in some studies in Iran (e.g. Noorbala et al., 1999) including the study of Malakouti and therefore may influence the sensitivity and specificity of various cut points. For these reasons I did not use the cut-off threshold suggested by Malakouti et al. (2007) as I did not consider it to be appropriate for my sample.

I reviewed other studies, published or grey literature, that had used the 15-item GHQ to see if they had established validated cut-off points in other settings. I found only a few relevant papers (Takeuchi, 1991; Benjamin et al., 1982). However, in each of these papers, different items of the original GHQ-60 were selected for GHQ-15 using Factor Analysis, thus making comparisons between these scales difficult. Additionally, only one study reported a cut-off point for GHQ-15 (Benjamin et al., 1982). This study which was conducted in the UK on a sample of 92 women aged 40-49 suggested a cut-off point of 12/13 using the standard Likert scoring method (range of 0-45), but, as for the Iranian version, this was not validated in an independent community sample.

Consequently, in the absence of a definitive validated cut point for the GHQ-15 I used the strategy of taking a cut point based on quartiles of the score distribution, comparing those with scores in the worst quartile 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. For example, the study of Prady et al. (2013) used the same approach to indicate people (sample: a multi-ethnic cohort located in an economically deprived city in the UK) at risk of worse mental health and set the threshold at the 75th percentile score due to uncertainty about the performance of the GHQ-28 in that multi-ethnic cohort. Similarly, Iheanacho et al. (2014) argued that due to population variations in thresholds for the GHQ-12 in their study setting, Nigeria, the threshold score for a high probability

of significant psychological distress was set at 75th percentile which was 11 out of 36 in their sample.

In the case of my study, using the table of the cumulative relative frequencies (see Appendix 6) the cut off point for being in the worst fourth of the GHQ score distribution was 22 out of 45 (see Table 5.3). As explained earlier, the sample size calculation in my study was based on an expected prevalence of mental disorders among Iranian older people aged 60+ at 31% using a cut point of 6 or more GHQ-28 according to the study of Noorbala et al. (2004). If it is assumed that in my study also 31% of older people have mental problems, the cut off point of GHQ-15 would be 20 or more (see the table of Appendix 6) which is almost equivalent to those in the worst quartile.

4.15.2 Social Support

Social support is a complex and multi-faceted concept which has been variously conceptualised and measured in a variety of studies. A great number of instruments have been developed to measure social support, but many of them have low or unknown validity and reliability (O'Reilly, 1988).

To cover the complexity of social support in the measurement and for a full understanding of the social support status of older people of Tehran, different dimensions and aspects of social support were measured based on my conceptualisation described in Section 2.1.1. Table 4.8 summarises these dimensions and aspects.

Table 4.8: Different dimensions and aspects of social support measured in this study

	Dimensions and Aspects of Social Support	Scale / Questions
Perceived Social Support	**Functional aspects (types):** - *Guidance* - *Reassurance of worth* - *Social integration* - *Attachment* - *Opportunity for nurturance* - *Reliable alliance* **Level**: *strongly disagree, disagree, agree, strongly agree*	*Social Provisions Scale (SPS)*
Received Social Support	**Functional aspects (types):** - *Being looked after* - *Transportation support* - *Housework support* - *Paperwork support* - *Financial support* **Level**: *not at all, to some extent, all/most of the time, haven't needed/asked* **Sources:** *Spouse, children, in-laws, grandchildren, siblings, relatives, friends, neighbours, nurse/servant, charity*	*How often do you receive each type of support from each family member in the list?*
	Structural aspects: - *Number of children (daughters and sons)* - *Frequency of meeting with children* - *Living arrangements*	*How many children you have?* *How often do you meet .....?* *Who do you live with?*

More detailed and specific information on the measurement of different dimensions and aspects of social support is provided as follows.

4.15.2.1 Perceived social support

Measurement

I reviewed a variety of available scales, such as the Norbeck et al. (1981) Social Support Questionnaire (NSSQ), the Medical Outcomes Study (MOS) Social Support Survey (Sherbourne & Stewart, 1991), and the Multidimensional Scale of Perceived Social Support (MSPSS) (Zimet et al., 1988). In addition, I looked at the questionnaires used in certain studies that included older people, specifically the English Longitudinal Study of Ageing (ELSA) (Institute for Fiscal Studies), the Health Survey for England (HSfE) (Health & Social Care Information Centre) and the social support questionnaire developed by Koosheshi (2007) in Iran. However, most of these scales do not adequately

measure all types of social support appropriate for older people; nor do they conform to the conceptualisation of perceived social support considered in my study. Also, some of the scales were developed to measure social support in specific conditions, such as the MOS Social Support Survey which is suitable for chronically ill patients (Sherbourne & Stewart, 1991).

Consequently, I selected the Farsi version of the Social Provisions Scale (SPS) originally developed by a research group at University of California at Los Angeles (UCLA) (Russell & Cutrona, 1987) based on the Weiss's (1974) model of social provision (see Section 4.15.2.1). The SPS measures six functions or provisions of social support including 'provision for attachment', 'social integration', 'opportunity for nurturing behaviour', 'reassurance of worth', 'reliable alliance' and 'obtaining of guidance' that can be experienced from relationships with others. Although I did not find evidence that the SPS was more appropriate in Iranian context than the other scales, I selected it as it is theory based, comprehensive and encompassing most of the functions of social support proposed by other investigators (Berkman, 1984). Additionally, as my literature review in the previous chapter showed, this scale is one of the most common social support scales used in various studies in different settings including the ME countries and Iran, allowing for more valid comparisons. It has psychometric properties, contains simply-worded questions and is relatively brief (Russell & Cutrona, 1987). This scale also has been recommended as a suitable scale for older people (O'Hara, 1998). Finally and importantly, the SPS had already been translated to Farsi and validated in Iran by Zaki (2009) and thus I did not have to check its validity before using, as it was impractical in my research. I obtained permission from the developer of the Farsi version of the SPS before fieldwork.

Reliability and validity

The reliability and validity of the SPS has been tested in many studies and with different groups. Among those studies that specifically sampled older people, the SPS was found as a valid and reliable instrument to measure perceived social support (Wheable, 1997; Ploeg & Faux, 1989; Cutrona et al., 1984)

The reliability and validity of the Farsi version of the SPS were assessed by Zaki (2009) in a survey of 200 male and female students of Isfahan University selected by

randomised cluster sampling. Goldberg's Well-being Questionnaire was used 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. Assessment of validity using factor analysis revealed that the six sub-scales of social support could be reduced to one factor, which could be referred to as social support. There was a significant relationship between social support and feelings of happiness (r=0.45) which the authors interpreted as indicating the validity of the instrument. Zaki concluded that SPS has highly significant validity and reliability and is suitable to Iranian culture, although this scale was not validated among older people in Iran.

Scoring and data processing

The SPS consists of 6 dimensions and 24 items with a four-point Likert scale, ranging from "strongly disagree" to "strongly agree". Four of items are placed in each of the dimensions as listed below. Items that are asterisked need to be reversed before scoring.

1.   Obtaining guidance: 3*, 12, 16, 19*
2.   Reassurance of worth: 6*, 9*, 13, 20
3.   Social integration: 5, 8, 14*, 22*
4.   Provision of attachment: 2*, 11, 17, 21*
5.   Opportunity for nurturance: 4, 7, 15*, 24*
6.   Reliable alliance: 1, 10*, 18*, 23

A total score for each dimension is computed as the mean of the scores of the items of which it is comprised ranged from 4-16. Thus, the total SPS scores ranged from 24-96, with higher scores indicating a higher degree of perception of social support.

I dichotomised the SPS scores into the lowest score quartile versus the rest. This was because I was interested in investigating whether low SPS scores (those in the worst quartile of SPS distribution) were associated with low GHQ scores.

4.15.2.2 Received social support

Measurement

To measure the other dimension of social support (received social support), I only considered the instrumental function, as defined in Section 2.1.1. This is because, as

mentioned earlier, instrumental social support has special importance in old age due to the high prevalence of physical functional limitations in later life and it may protect against worsening performance of daily living activities.

To measure received instrumental social support and decide on its items to be included in the study questionnaire, I initially reviewed the available relevant questionnaires, primarily those used (if any) in Iran and other the ME countries and secondly those in the rest of the world.

As a part of results of my systematic review on the ME countries including Iran, published recently (Tajvar et al., 2013), I found 5 studies investigating associations between received instrumental social support and health (including 3 studies with mental health outcomes), but none of them defined the type or items of instrumental social support that they had considered in their questionnaire. In my newer systematic review, as reported in Chapter 3, also 6 studies measured instrumental social support, of which two studies (Mechakra-Tahiri et al., 2009; Cruza-Guet et al. 2008) used just a single general question asking participants the level of instrumental social support they had received in the past but without any definition of the meaning of instrumental social support. Similarly, Leung et al. (2007) used a 10-item questionnaire but did not describe the items included. Koosheshi (2007) included 3 items- transportation, housework and financial support -in his measurement of instrumental social support. Wong et al. (2007) defined instrumental social support as consisting of financial, language, and information/advice support. Lee and Dunkle (2010) had a clearer definition of instrumental social support which consisted of help with ADL (eating, bathing, etc.), help with chores (cleaning, laundry, preparing meals), care when the elder is sick, and help with finances. Therefore my systematic reviews provided rather little information on the areas of instrumental social support considered in the literature.

In a wider review of questionnaires measuring various types of instrumental social support, I found the questionnaire of *Retirement and Retirement Plans Survey (1988/89) (RS)*[17] to be relevant (Disney et al., 1997). The RS used a nine-item scale including: getting a lift in a car, shopping, providing or cooking meals, looking after, gifts or loans

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[17] The RS sampled a group of households in the UK that contained at least one individual aged 55-69 in a period of 1988-1989 and followed-up the surviving individuals and re-interviewed them in 1994.

of money, housework (washing, ironing, cleaning), helping to sort out paper work, financial help, and no help received.

Consequently, using the results of my systematic reviews, in addition to the items of instrumental social support used in other questionnaires including the RS as well as my own understanding and knowledge of Iranian culture, I provided a list of instrumental social support types to be investigated in my research. In the pilot stage, as described in Section 4.9, in addition to the listed items of instrumental social support, an open question was included, asking participants whether they regularly received any other type of instrumental social support from others that had not been listed in the questionnaire or to identify ones that they never received or did not wish to receive. Their answers were used to make modifications to the items included.

Finally, the selected types of instrumental social support included were 'being looked after when confined to bed', 'help with transportation' (e.g. taking or accompanying to a doctor visit, etc), 'help with housework' (e.g. cleaning, repairing), 'help with paperwork' (e.g. bank affairs, bill payments), and 'financial help' (giving or lending money). Providers of each type of support were also identified from a list including 10 different categories [spouse, father and mother, children (maximum of 10), in-laws (maximum of 5), sisters and brothers (maximum of 5 each), grandchildren, other relatives, friends, neighbours, nurses/servants, and charities]. The main question for received instrumental social support was "*How often do you receive..... (each type of support) from .... (each source in the list)?*".

Additionally, further questions were asked regarding received social support including "the amount of received support in comparison to one year ago", "whether or not social support was received from formal sources", and "the extent of satisfaction with support received". Overall, the data of received support by study participants were collected using 140 variables included in a grid in my study (see Appendix 4).

Scoring and data processing

The levels of 5 types of received social support from different sources were measured using questions with 4 response categories. The response categories were "1.not at all", "2.to some extent", "3.all/most of the time" and "4.haven't needed/asked". Thus, the

support types were scored from 1 to 4, with higher scores indicating more support received. As there were 140 data for received social support measure, it necessarily had to be summarized for description and multivariable analysis.

Initially different sources of instrumental social support were summarised. I derived an indicator of 3 sources of support including spouse, children and others (using 8 different sources of distant relatives). Preliminary results showed that more distant relatives provided only little support. In the next step, a hierarchical approach, in which, inclusion in a higher category in the list (haven't needed/asked support) removed the participants' eligibility for lower categories, was used to derive an indicator of support from relatives in each category, with the highest reported level of support for each category being identified. For example, the indicator of support from children was based on that for the child reported by the participants to be providing the most support. Using this approach, the 140 original variables were collapsed into 15 variables (5 types of instrumental social support from 3 sources) as described in Table 5.6. Next, the information from the three sources was combined using the method explained above in order to create a single variable called 'anyone' (shown in the first column in Table 5.6) indicating instrumental social support received from any source.

In order to simplify the multivariable analyses, the instrumental social support variables were re-categorised to make binary variables comparing those received support "not at all" with the other participants.

4.15.2.3 Structural Aspects of Social Support

Measurement

Three questions were included as indicators of structural aspects of social support. The first question was on 'the number of children' (daughters and sons) of the participants. This indicator was selected based on the literature. Additionally, in accordance with the argument mentioned previously (see Section 3.2.4) a simple sum of the number of network members is not a useful indicator of support and at least frequency of contact with them also should be considered (Han et al., 2007). Thus, the second question (how often do you meet any of your children?) was also asked as another indicator of structural aspect of social support. The third question was regarding the 'living

arrangements' of participants. Living arrangements (refers to those people living with the older people) was recorded using a question to identify co-residents of the participant or living alone. Living arrangements is considered as an important factor for health of older people in the literature (Lim & Kua, 2011; Hays, 2002)

Data processing

'Number of children' (including number of sons and daughters) was used as a continuous variable in the analyses. The two other variables including 'frequency of meeting with children' and 'living arrangements' were simplified with converting the original categorical variables to binary variables, comparing those participants meeting at least one child everyday with those less than everyday (see Table 6.7) and also comparing those living alone with those living with others (see Table 6.8).

4.15.3 Physical Functioning

Measurement

Physical functioning status of participants was measured using the '*Nagi scale*'. The Nagi scale comprises a series of questions measuring 10 types of physical functions including 'vigorous activities' (such as running, lifting heavy objects, participating in strenuous sports); 'moderate activities' (such as moving a table, pushing a vacuum cleaner, ….); 'lifting or carrying groceries'; 'climbing one flight of stairs'; 'climbing several flights of stairs'; bending, kneeling or stooping'; 'walking more than a kilometre'; 'walking one block'; 'waking several blocks'; 'bathing or dressing yourself' that might be limited due to physical health conditions.

The Nagi scale, itself, evolved from the pioneering work of Saad Nagi (1965) on the conceptualisation of the disability process which was used by WHO in the derivation of International Classification of Impairments, Disabilities and Handicaps. 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., 2005b). I therefore drew the Nagi items included in my questionnaire from this instrument.

Scoring and data processing

For scoring, a variable was created to calculate the total Nagi score combining the scores for all 10 activities mentioned above ranging from 10 to 30 with lower scores indicating poorer functional status.

Given that there is no predefined cut-off point to discriminate physically ill people in my study population, I created a binary variable allowing comparisons between participants with poor physical functioning (those in the worst quartile) and those with good or fair physical functioning (those in other quartiles) in multivariable models.

4.15.4 Other Covariates

Apart from the main study variables, a wide range of covariates including demographic and SES characteristics of individuals were also measured mainly for the descriptive objective. The main covariates measured were as follows:

Age and gender: the age of participants was asked using two questions; 'How old you are?' and 'When were you born?' in order to cross-check in the case of inconsistency between the age reported by older people and their birth certificates.

Educational level: the question was 'What is the highest degree of education you achieved?' and the answer choices in accordance with the Iranian education system were illiterate/primary school/high school/diploma /university qualification/religious educations.

Economic status: the question was 'How would you describe your economic status compared the average of people in Tehran?' and the answer choices were poorer/average/better than the average of people in Tehran.

Marital status: the question was 'What is currently your marital status?' and the answer choices were married /never married/divorced/widowed.

5. DESCRIPTIVE RESULTS[18]

This chapter provides descriptive information of the characteristics of the study participants in response to the first study question (see Chapter 1, Page 22) including demographic and socio-economic factors, distribution of the study outcome of mental health and the primary independent variable of social support. The physical functioning status of the participants also is described.

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[18] Because of rounding numbers toward closest integers, some of the numbers reported in the text are slightly different from the corresponding tables.

5.1 Demographic and Socio-Economic Characteristics of Participants

The distribution of participants by gender and selected demographic and SES characteristics are summarised below and shown in Table 5.1. To check the extent to which the sample was representative of the Tehranian older population, some of the main characteristics of the sample were compared with characteristics of a comparable age group of the City of Tehran, using data from the census of 2006 (the most recently available census). Further information on the profile of participants is provided in Table of Appendix 5.

Age and gender

More than half (51%) the study participants were aged 60-69 with 34% aged 60-64 years old and only 11% were aged 80 years or over. The mean age was 69.4 years with men slightly older than women (70.6 vs. 68.9). According to the census of 2006, 35% of the older population aged 60+ in Tehran was 60-64 years old and the mean age of the older population was 69.4 years, so in terms of age there is a good correspondence between my sample and the older population of Tehran.

In my sample, men and women comprised exactly the same number, 322 men and 322 women, while the sex ratio in the 2006 census for people 60+ years old was 106 (106 men per 100 women). This indicates that my study may have slightly underrepresented older men.

Marital status

Seventy one percent of sample members were currently married, 27% widowed and only 1% were either never married or divorced. A much higher proportion of women than men were widowed (46% vs. 9%). The 2006 Census reported that 70% of the older people aged 60+ in Tehran were married. Widowhood was reported for 53% of women and 10% of men in the census. Again this indicates a good fit between my sample and the older population of Tehran, although the proportion of widows was slightly lower in my sample.

Education

Almost half (48%) the participants were illiterate and 33% had only primary education (up to 5 years of schooling). Illiteracy was twice as high among women compared to men (63% vs. 32%); more men (40% vs. 26%) reported having received primary education only. Only 121 people (19%) reported that they had been educated for more than 5 years, and 41 people (6%) had a university education. Again this distribution is very similar to that reported in the census which found 50% of older people aged 60+ were literate and 4% were highly educated.

Economic status

As mentioned in the previous chapter, a stratified sampling design was used with the sample selected from areas with various SES levels in Tehran. Over half the participants (54%) were living in the low class area, 27% in the middle class area and 19% in the high class area.

The results of my study showed that about 43% of the older people perceived their economic status as poorer than the average for the Tehranian population, less than 1% perceived their economic status as higher and 56% as the same as average population of Tehran. In another study (Tajvar et al. 2008) among the older population of Tehran, 52% described their economic status as moderate, 12% as good and 36% as poor; this indicates similar patterns between the two studies. In the present study women were more likely than men to report that their economic status was poorer than average (49% vs. 37%).

5.2 Mental Health Status of Participants

Table 5.2 shows the distribution of the individual 15 items of the GHQ scale and Figures 5.1 and 5.2 present the histogram and normal curve of the GHQ score, mean score and the SD in all participants and by gender.

The mean (SD) score was 16.79 (SD=8.09) in the range of 0-45. Women had higher mean GHQ scores (19.3 vs. 14.2) indicating poorer mental health than men. The

histograms and normal curve of the GHQ scores for all participants and by gender showed the GHQ scores were normally distributed.

Table 5.3 shows the distribution of participants in the 'worst' and 'other' quartiles of the GHQ-15 by gender and age. The cut off point for the worst quartile was calculated at 22 in the range of 0-45 using the table of the cumulative relative frequencies (see Appendix 6).

Age was associated with increased poor mental health score; while 18% of those in the age range 60-69 years were in the worst GHQ score quartile, this proportion was 28% and 39% among people aged 70-79 and 80+ years respectively. Women comprised a greater proportion of those with the worst GHQ; 33% of women compared to 15% of men were in the worst quartile.

Further questions on mental health also indicated poorer mental health of women; 23% of participants, of which 63% were women, reported regular use of antidepressants and 23% of women versus 13% of men (18% total) reported that they had been diagnosed with depression.

5.3 Social Support of Participants

5.3.1 Perceived Social Support

Perceived social support of the participants, as measured by the SPS, is described in Tables 5.4 and 5.5 and the distributions of the total SPS scores of all participants and for men and women are depicted in Histograms 5.3 and 5.4.

The histograms showed fairly normal distribution of the SPS scores with a slight left skew in the distribution for women. The normality of distribution of the SPS data was further tested using 'bootstrapping' analysis, as explained in Section 4.13. The results suggested a normal distribution for the SPS scores of total participants.

Table 5.4 shows the mean (SD) of the total SPS score and its dimensions for men and women. The mean (SD) score of all participants was 72 (9.7) in the range of 24-96, with higher scores indicating higher perceived social support. The highest score was in the

dimension of 'provision of attachment' and the lowest score was in the dimension of 'social integration'. The mean scores for men and women were very similar (men 72.5, women 71.2). However, when the SPS scores were dichotomised into the lowest score quartile (score range 24-66) versus the rest (score range 67-96), a higher proportion of women than men (32% vs. 23%) had scores in the lowest quartile (Histogram 5.4), showing a lower perception of social support among women (Table 5.5). Age was also associated with SPS score, 19% of people aged 60-69 versus 44% of those aged 80+ were in the worst SPS quartile, showing a decreasing level of the SPS score with increasing age (Table 5.5).

5.3.2 Received Social Support

Table 5.6, created based on the approach described in Section 4.13, indicates the levels of various types of social support received by the participants from different sources by gender. The results are summarised below by the types of social support.

Being looked after when confined to bed: a few participants reported that they had not needed or asked for care from their spouse (6%) and more (11%) reported not needing or asking for help from their children. However, if they needed to be looked after, more men than women (84% vs. 58%) received it from their spouse all/most of the time but more women than men (64% vs. 49%) received it from one or more of their children. Overall, 72% of participants (76% men vs. 68% women) received support all/most of the time from at least one person and only 3% had not been looked after by anyone when they needed support in sickness.

Help with transportation (e.g. shopping or doctor's visits): few participants reported not needing/asking for help with transportation either from their spouse or children. Among those women needing help with transportation, 64% and 61% received this support from their spouse and at least one child all/most of the time compared to 48% and 45% of men respectively. Thus spouse was slightly more helpful than children in this type of need. About 10% of the participants needing help with transportation had received no help at all from anybody.

Help with heavy housework (e.g. repairing furniture, heavy cleaning, etc): compared to the two previous types of support, more people reported needing help with heavy

housework from any source. Among men needing help, 76% received it all/most of the time from their spouses and 46% from at least one of their children, but among women needing help, only 37% received this type of support from their husbands and 58% received it from at least one of their children. Considerably more women lacked help with housework from their spouses compared with men (35% vs. 11%). This is not surprising because in past generations working in the house was not considered as a man's duty in Iranian culture. However, only a few proportion of participants (6%) finally remained helpless with heavy housework.

Help with paperwork (e.g. bank related work or bill payment): about 14% of participants (slightly more men) reported no need or ask for paperwork support from anyone. But of those needed support, more women received support from any source (72% vs. 54%), spouse (65% vs. 32%) or children (54% vs. 42%) most/all of the time compared to men. Men with unmet need for this type of support from all sources were higher than women (20% vs. 9%). This may be because these types of activities are more gender-based and fewer women, particularly in older generations, were able to manage their own paperwork, especially as a high proportion of them were not literate.

Financial help (receiving or borrowing money): compared with other types of support, a high proportion of participants (49% of men and 39% of women) reported they had not needed or asked for financial help. However, when they needed urgent financial help neither spouse nor children were a reliable and secure support provider for them, as 50% and 31% of all participants (particularly men) were not supported by their spouse or even one child respectively in the case of need. Overall, only 22% and 37% of all participants (particularly women) received financial help sometimes or most of the times from their spouse and at least one child respectively, but finally 17% of women and 20% of men who required financial help remained without help from any source.

The main findings on different types of received social support are summarised and compared below:

I.   In general, the main source of support for women was children, while the main source of support for men was the spouse. For all participants, more distant relatives or friends provided only little instrumental support.

II. In all the types of support (except in looking after where both men and women had the same figure) more men reported they do not need or ask for support. Thus, more women needed or demanded for support in all the types.

III. Of those men and women needed for support, more women received support in all the types all/most of the time from at least one child and at least one other relative compared to men, while more men reported lacking support in all the types from children and other relatives. Thus, women received more support from their parental and kinship relationship compared to men.

IV. In looking after and housework wife but in the other three types of support husband provided more support for their spouse. Thus, women generally received more support types from their marital relationship.

V. Generally couples were most helpful to each other in looking after one another when confined to bed and least helpful to each other in providing financial help.

VI. The pattern of financial help was to somehow different from the other types of social support received. Financial help was the highest unasked and also highest unmet need of both men and women.

5.3.3 Structural Aspects of Social Support

The selected indicators of structural aspects of social support of participants including the number of living daughters and sons, frequency of contact and living arrangements are described below.

The number of children (daughters and sons) of participants

Participants had on average 4.6 (SD=2.1) living children. The number of sons was slightly higher than number of daughters, the mean number of daughters was 2.2 (SD=1.4) and 2.4 (SD=1.3) for sons. Men had on average slightly more children than women (4.7 vs. 4.5). Most participants (52%) had 4-6 living children but only 17 people had no child.

Frequency of contact (meeting) with family members

As shown in Table 5.7, most participants reported daily contact with a family member (97% of men and 86% of women) with 76% of men and 72% of women reporting daily contact with at least one child (excluding childless people). Overall, the proportion of men without daily contact with at least one family member was lower compared to women (3% vs. 14%) reflecting the higher proportion of women who were widowed, childless and lived alone.

However, taking account of the proportion co-resident with children which was slightly higher for men (65% men vs. 52% of women), a higher proportion of women in the same situation as men had daily visits with at least one child. Also, a higher proportion of women than men reported daily or weekly contact with other relatives, including children in-law, grandchildren and siblings. (Table 5.7)

Living arrangements

Table 5.8 shows results related to the participants' living arrangements. Living arrangements differed considerably between men and women, largely reflecting the differences in their marital status and in particular the higher proportion of women who were widowed (48% vs. 10%).

Fifty-seven percent of men compared with 28% of women reported living with both spouse and children (at least 1 child) and 31% of men versus 23% of women were living with their spouse only. Only about 10% of men versus almost half of the women had other types of living arrangements; 24% of women versus 7% of men were living with children only, and one fifth of women (21%) versus only 3% of men were living alone. (Table 5.8)

5.4 Physical Functioning of Participants

Table 5.9 shows the distribution of participants reporting limitations in different aspects of functioning. Most people (79%) reported a significant limitation in vigorous activities, such as 'running', 'lifting heavy objects', and 'participating in strenuous sports'.

However, in simple functional aspects such as 'bathing or dressing', 80% of the participants reported no limitations.

For participants with complete information on the Nagi scale (n=637) the mean (SD) and median scores were 19.2 (6.2) and 18 respectively in the range of 10-30, with lower scores indicating poorer status. Women reported poorer physical functioning compared with men. The mean Nagi score (SD) for women was 17.0 (5.2) versus 21.3(6.3) for men.

The participants were dichotomized into two groups; those in the worst quartile of the Nagi score (n=182) (score of 14 or less) and those in the other three quartiles (n=455) (scores of 15 and over) (Table 5.10). Women were more likely to be in the worst quartile (39% of women and 19% of men). Of those aged 80 years and above, 62% had scores in the worst quartile, while only 17% of participants in the age range of 60-69 years had scores in the worst quartile.

5.5 Summary of Key Descriptive Results

The first study question (What are social support, mental health and socio-demographic characteristics of the older population of Tehran?) is answered in this chapter.

The socio-demographic characteristics of participants in my study were comparable to census data for a similar age group for the city of Tehran. My sample only slightly underrepresented older men (sex ratio was 100 compared to 106 in the census) mostly because of the lower RR among men in comparison to women (54% of all non-respondents were men). This indicates that my dataset is trustworthy and the sample is a valid representative for the older population of the capital.

For a number of characteristics, women were more disadvantaged compared to men; they were more likely to be illiterate (63% vs. 32%), widowed (46% vs. 9%), living alone (21% vs. 3%), and perceive themselves as economically poor (49% vs. 36%). There was also a large gender difference in mental health and physical functioning status; women had higher mean GHQ scores (19.3 vs. 14.2) indicating poorer mental health than men. 33% of women versus 15% of men had GHQ scores in the worst

quartile (Table 5.3). Also, women had lower mean Nagi scores (17.0 vs. 21.3) indicating poorer physical functioning status compared with men. 39% of women versus 19% of men were in the worst quartile of the Nagi scores distribution (Table 5.10). These differences were not a result of an older age distribution of women in the sample as in contrast to population based studies of Western populations, the women in my study were slightly younger on average than the men, as is the case for the Iranian population as a whole (for more information see Appendix 7). Therefore, the data suggests that 'gender' is an important variable for consideration in further analysis in this thesis.

The mean score of perceived social support of the participants, as measured by the SPS, was 71.8 in the range of 24-96 and there was little gender difference in this case (men 72.5, women 71.2). Also, most of the participants, particularly women, reported receiving a rather high level of support, except in the case of financial support. In 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 at least one of their support sources when they needed (Table 5.6). Gender differences in these responses varied by the type of help in ways consistent with gender norms about roles, for example more women than men reported receipt of support with transport needs whereas more men than women reported availability of support with housework (Table 5.6).

For all participants the family was the main source of support and more distant relatives and friends were less significant sources of all types of received social support. Specifically, the descriptive results of my study indicated that in general women primarily relied on their children, while men primarily relied on their wives for most types of support. The significance of these differences is examined in the next chapter.

The results of the selected indicators of the structural aspects of social support also showed that the respondents had on average 4.6 (SD=2.1) living children and most of them (76% of men and 72% of women) had a daily meeting with at least one child, while 21% of women and 3% of men were living alone.

Table 5.1: 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)
Gender			
Men	322(50.0)	-	-
Women	322(50.0)	-	-
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 5.2: Distribution of participants by items of the GHQ-15 (%)

Have you recently…		Scores			
		0	**1**	**2**	**3**
GHQ1	been getting any pains in your head?	No 39.9	Sometimes 24.0	Often 19.1	Always 16.9
GHQ2	lost much sleep over worry?	No 26.4	Sometimes 22.5	Often 29.0	Always 22.0
GHQ3	had difficulty in staying asleep once you are off?	Not at all 23.7	Sometimes 26.4	Many time 30.9	Always 18.9
GHQ4	been feeling nervous and strung-up all the time?	Not at all 23.8	Sometimes 31.0	Many time 30.4	Always 14.8
GHQ5	been taking longer over the things than usual you do?	Not at all 20.2	Sometimes 50.5	Many time 26.5	Always 2.8
GHQ6	been managing to keep yourself busy and occupied?	More so than usual 11.8	Same as usual 37.8	Rather less than usual 38.9	Much less than usual 11.5
GHQ7	felt on the whole you were doing things well?	More so than usual 2.9	Same as usual 55.4	Rather less than usual 35.2	Much less than usual 6.4
GHQ8	been satisfied with the way you've carried out your tasks?	More so than usual 2.9	Same as usual 59.7	Rather less than usual 31.6	Much less than usual 5.8
GHQ9	felt that you are playing a useful part in things?	More so than usual 3.4	Same as usual 60.9	Rather less than usual 29.6	Much less than usual 6.0
GHQ10	been able to enjoy your normal day-to-day activities?	More so than usual 2.9	Same as usual 58.8	Rather less than usual 32.1	Much less than usual 6.0
GHQ11	been thinking of yourself as a worthless person?	No 65.6	Sometime 20.4	Many time 10.9	Always 3.1
GHQ12	felt that life is entirely hopeless?	No 64.7	Sometime 17.4	Many time 13.3	Always 4.5
GHQ13	felt that life isn't worth living?	No 64.9	Sometime 14.3	Many time 15.6	Always 5.1
GHQ14	found at times you couldn't do anything because your nerves were too bad?	No 52.6	Sometime 23.6	Many time 19.6	Always 4.2
GHQ15	found yourself wishing you were dead and away from it all?	No 68.5	Sometime 11.7	Many time 10.4	Always 9.4

Table 5.3: Distribution of participants in the worst and other quartiles of the GHQ-15 scores, by gender and age groups, N(%)

GHQ score (scores range)	Worst quartile (22-45)	Other quartiles (0-21)	Total (0-45)
Gender			
Men	49 (15.2)	273 (84.5)	322 (100)
Women	106 (32.9)	216 (67.0)	322 (100)
Age groups			
60-69	59 (17.9)	270 (82.0)	329 (100)
70-79	69 (28.4)	174 (71.6)	243 (100)
80+	27 (38.6)	43 (61.4)	70 (100)

Table 5.4: Mean and SD of the total SPS score and its dimensions, by gender

SPS score	Total SPS scores range (24-96)	Dimensions of the SPS					
		Reliable alliance	Attachment	Guidance	Opportunity for nurturance	Social Integration	Reassurance of worth
Men	72.5 (9.0)	12.4(2.1)	12.9(1.9)	11.8(2.0)	12.5(2.3)	11.0(1.9)	11.6(1.7)
Women	71.2 (10.3)	12.6(2.5)	12.8(2.4)	11.2(2.6)	11.7(2.6)	10.7(2.3)	11.7(1.8)
Total	71.8 (9.7)	12.5(2.3)	12.8(2.2)	11.5(2.4)	12.1(2.4)	10.9(2.1)	11.7(1.8)

Table 5.5: Distribution of participants in the worst and other quartiles of the SPS scores, by gender and age group, N(%)

SPS score (scores range)	Worst quartile (24-66)	Other quartiles (67-96)	Total (24-96)
Gender			
Men	75 (23.3)	247 (76.7)	322 (100)
Women	102 (31.7)	220 (68.3)	322 (100)
Age groups			
60-69	63 (19.2)	266 (80.8)	329 (100)
70-79	82 (33.7)	161 (66.3)	243 (100)
80+	31 (44.3)	39 (55.7)	70 (100)

Table 5.6:* Distribution of participants in social support received by type, source and gender

How much do you receive the following supports from ..? 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

* Due to item non-response the sum of numbers in some of the columns are less than total 'n' in each column
**"Not applicable" are participants for whom the information was not applicable (e.g. had no child or spouse or other relatives). 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 people from any source including spouse/ children/ grandchildren/ sisters/ brothers/ kin/ friends/ neighbours/ nurse/ servant/ charities
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 5.7:* Frequency of meeting of participants with their family members, by gender and type of relatives

Frequency of meeting N (% excluding Not applicable)	Anyone **		Spouse		Children**		Others**	
	Men n=322	Men n=322	Men n=322	Women n=322	Men n=322	Women n=322	Men n=322	Women n=322
Everyday	311(96.5)	275(86.2)	282(97.2)	164(98.0)	241(76.0)	222(71.6)	106(32.9)	120(37.6)
Less than everyday but more than once a week	2(0.6)	32(10.0)	0(0.0)	0(0.0)	58(18.2)	78(25.1)	131(40.6)	136(42.6)
Less than once a week but more than once a month	4(1.2)	9(2.8)	2(0.7)	2(1.1)	12(3.7)	7(2.2)	55(17.0)	48(15.0)
Less than once a month but more than once a year	2(0.6)	1(0.3)	1(0.3)	1(0.6)	2(0.6)	2(0.6)	24(7.4)	11(3.4)
Not at all	3(0.9)	2(0.6)	1(0.3)	0(0.0)	4(1.2)	1(0.3)	6(1.8)	4(1.2)
Not applicable ***	0	3	32	153	5	12	0	3

* Due to item non-response the sum of numbers in some of the columns are less than total 'n' in each column (Including applicable and non-applicable)

**'Children' include at least 1 child, 'Others' include at least 1 in-laws/grandchild/ sibling, 'Anyone' include at least 1 spouse/child/ in-laws/grandchild/sibling

*** "Not applicable" are those with either no spouse, or no children, or no other relative. This group has not been included in the calculation of percentages.

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

Table 5.8: Living arrangements of participants, by gender

Living arrangements N (%)	Men (n=322)	Women (n=322)	Total (n=644)
Living alone	11(3.4)	68(21.1)	79(12.2)
Living with spouse and at least 1 child	185(57.4)	90(27.9)	275(42.7)
Living with 1+ child (but not with spouse)	24(7.4)	77(23.9)	101(15.6)
Living with spouse only	99(30.7)	75(23.2)	174(27.0)
Living with others *	3(0.9)	12(3.7)	15(2.3)

* This group includes those living with other relatives such as siblings or parents, those living with non-relatives and very small numbers with no fixed place or residence.

Table 5.9: Distribution of participants in different items of the NAGI scale N (%)

The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?	Yes, limited a lot (1)	Yes limited a little (2)	No, not limited (3)
Vigorous activities , such as running, lifting heavy objects, participating in strenuous sports	503(78.6)	96(15.0)	41(6.4)
Moderate activities such as moving a table pushing a vacuum cleaner, participating in light sports	334(51.9)	181(28.1)	128(19.9)
Lifting or carrying groceries	272(42.3)	182(28.3)	189(29.4)
Climbing one flight of stairs	164(25.5)	207(32.2)	272(42.3)
Climbing several flights of stairs	299(46.5)	183(28.5)	161(25.0)
Bending, kneeling or stooping	241(37.4)	208(32.3)	195(30.3)
Walking more than a kilometre	259(40.3)	171(26.6)	212(33.0)
Walking one block	264(41.0)	146(22.7)	234(36.3)
Waking several blocks	314(48.8)	137(21.3)	193(30.0)
Bathing or dressing yourself	39(6.1)	89(13.8)	515(80.1)

Table 5.10: Distribution of participants in the worst and other quartiles of the Nagi scores, by gender and age group

Nagi scores (scores range)	Worst quartile (10-14)	Rest quartiles (15-30)	Total (10-30)
Gender			
Men	60 (18.7)	260 (81.2)	320 (100)
Women	122 (38.5)	195 (61.5)	317 (100)
Age groups			
60-69	56 (17.2)	270 (82.8)	326 (100)
70-79	82 (34.2)	158 (65.8)	240 (100)
80+	43 (62.3)	26 (37.7)	69 (100)
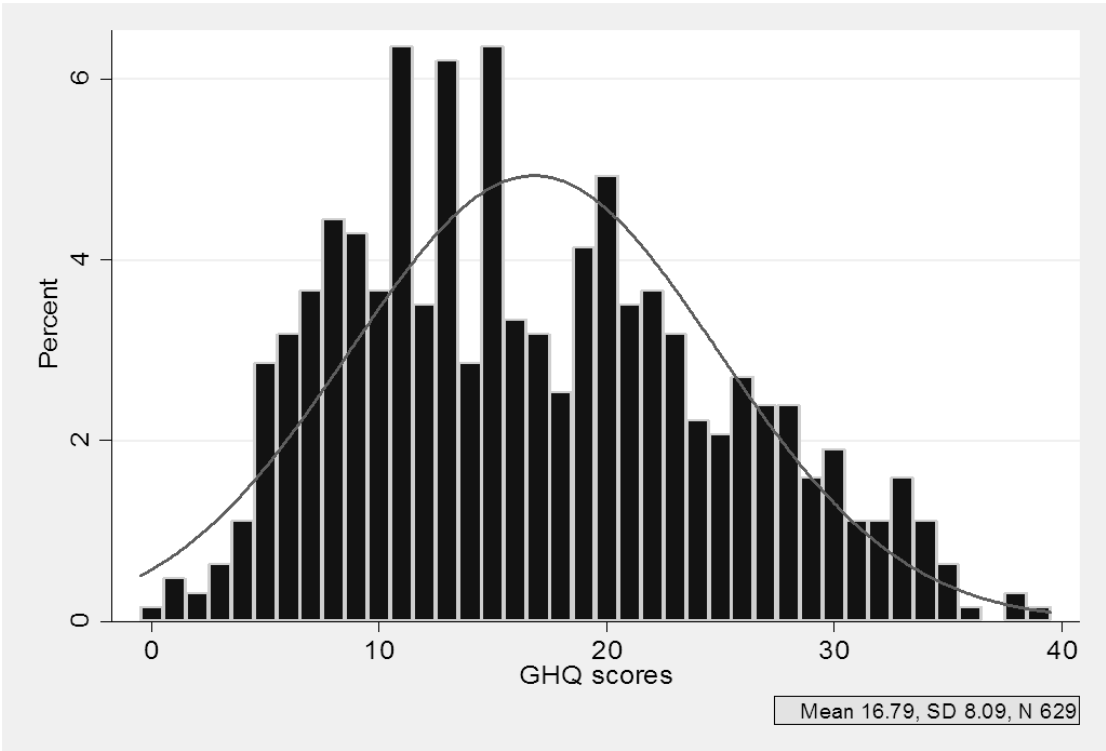
**Figure 5.1:
Histogram and
normal curve of
the GHQ scores for
all participants**

Mean 16.79, SD 8.09, N 629
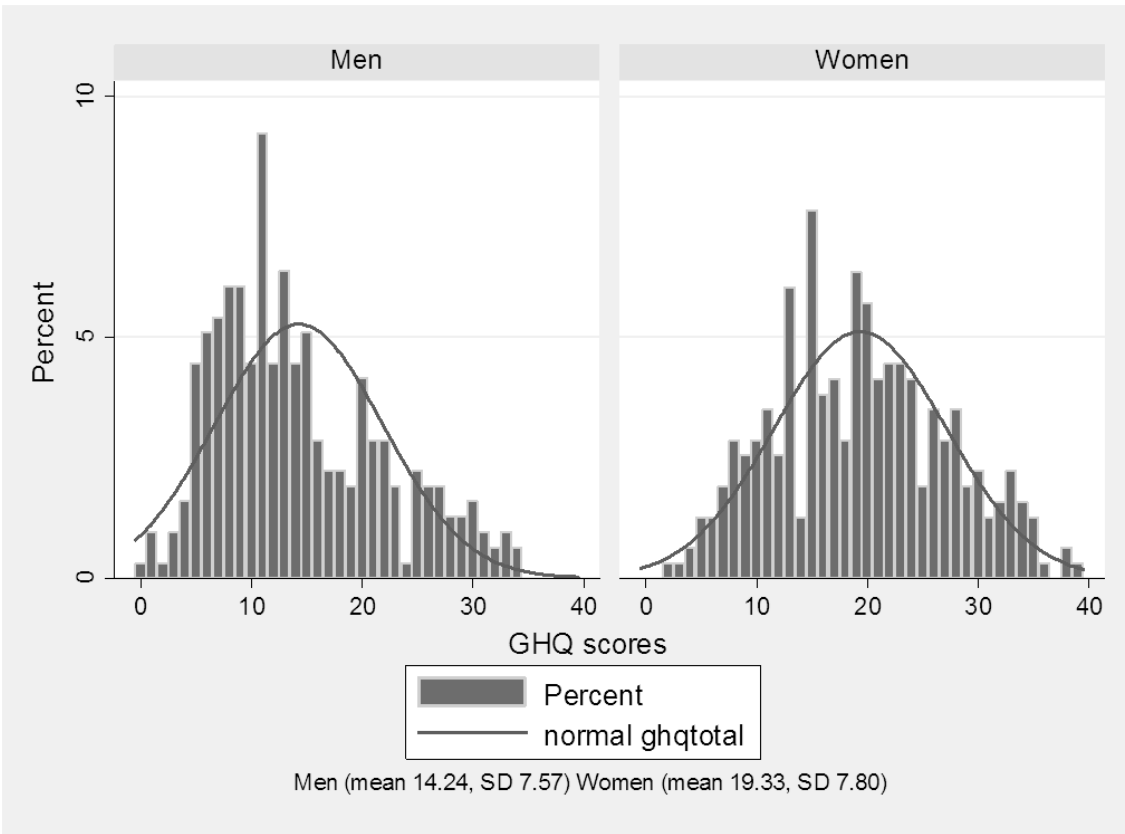
**Figure 5.2:
Histogram and
normal curve of
the GHQ scores for
men and women**

Men (mean 14.24, SD 7.57) Women (mean 19.33, SD 7.80)
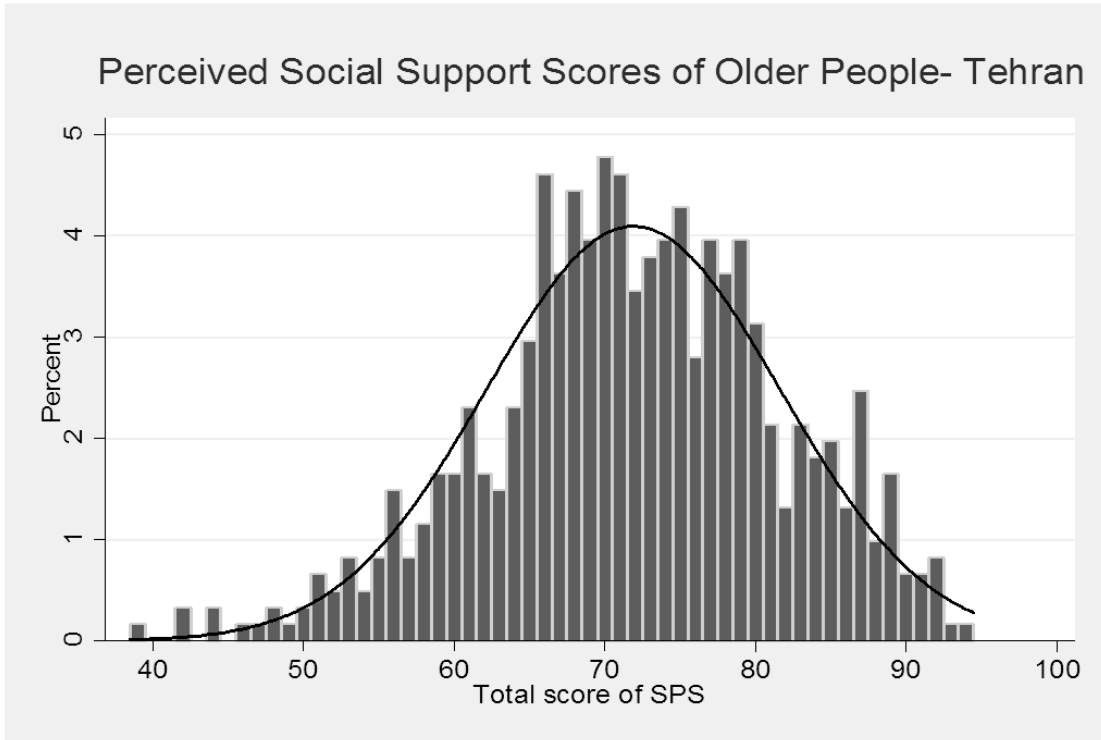
Figure 5.3: Histogram and normal curve of the SPS scores for all participants

Mean (SD) = 71.8(9.7)

Figure 5.4: Histogram and normal curve of the SPS scores for men and women

Men (mean 72.5, SD 9.0) Women(mean 71.2, SD 10.3)

6. MAIN RESULTS:

ASSOCIATIONS BETWEEN SOCIAL SUPPORT & MENTAL HEALTH

This chapter presents the results of the analyses of the associations between dimensions and aspects of social support and mental health. The analyses were undertaken to test the study hypotheses (Section 2.7) and answer to the study questions number 2-10 (Page 22) and were based on the conceptual model presented in Section 2.6 (Figure 2.1). The results are shown in three main sections, as below. Methodological considerations and the selection of covariates for models were described in each section.

- Associations between perceived social support and mental health
- Associations between different types of received social support and mental health
- Associations between structural aspects of social support and mental health

6.1 Associations between Perceived Social Support (SPS) and Mental Health (GHQ)

The following study questions (see Page 22) are addressed here:

- *Is there a main association between perceived social support and mental health?*

- *Has perceived social support a stress-buffering effect in the association between physical functioning limitation and mental health?*

- *Are there gender differences in the association between perceived social support and mental health?*

Methodological considerations and selection of covariates

The covariates included in the models on associations between the SPS and the GHQ were age, gender, economic status, literacy, marital status, and physical functioning status (measured using the Nagi scale). These covariates were selected based on the conceptual approach informed by the Iranian literature on the determinants of mental health as discussed in Section 2.2.2 (Table 2.1).

As the outcome was 'poor' mental health, I categorised the covariates so that the reference group was the 'best' group i.e. the group considered to be at the lowest risk of poor mental health. For example 'illiterate' was categorised as the risk group and 'literate' as the reference group in the 'literacy' variable.

As shown in Table 6.1, all the selected covariates showed strong crude associations with the GHQ score in the expected direction with those in older age groups, women, illiterate people, those not currently married and those perceiving a poor economic status being more likely to have poor GHQ scores. The indicator of physical functioning, the proposed potential "stressor" in this analysis, also showed a very strong association with the GHQ score. Those with a poor Nagi score had a more than 10 fold higher odds of being in the poorest quartile of the GHQ scores compared to those in the 'good or fair' category. All covariates were entered into the main models after checking collinearity (none was found).

Results

The results of analyses testing the hypotheses related to associations between the SPS and the GHQ are shown in Table 6.2 using the four models described in Chapter 4 (Section 4.14.4). In the crude analysis (without covariates) 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 (OR= 5.62, 95 % CI = 2.39–13.23, p=<0.001) (Model 1). Inclusion of the covariates described in Table 6.1 attenuated the magnitude of the OR (OR= 3.80, 95% CI= 1.48–9.79, p= 0.006), but there was still a strong main association with the GHQ score. (Model 2)

The results in Model 3 show the ORs stratified by SPS and Nagi scores. Poor SPS among people with a poor Nagi score was significantly associated with poor mental health (OR= 4.25, 95% CI= 1.50–12.30, p= 0.008). For people with poor SPS and good or fair Nagi score the association with poor mental health was weaker although the OR was still large (OR=3.11, 95% CI =0.96–10.05, p=0.06). However the p value for the interaction was 0.63, i.e. the difference between these two ORs was not significant. Thus there was no strong evidence from this study 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 mental health among both women (OR= 4.20, 95% CI= 1.33–13.27, p= 0.01) and men (OR=3.37, 95% CI= 1.05 – 10.77, p=0.04), with a larger effect for women. The 95% CIs for both ORs were very wide and the p value for the interaction was 0.74. Although this finding is consistent with my hypothesis that poor SPS has a worse effect on the mental health of older women than older men, there was no evidence for a significant difference in the ORs for men and women.

6.2 Associations between Received Social Support and Mental Health

Four of the study questions (see Page 22), as below, are addressed and reported on here:

- *Are there main associations between different types of received social support and mental health?*

- *Do different types of received social support demonstrate a stress-buffering effect in the associations between physical functioning limitation and mental health?*

- *Are there gender differences in the associations between different types of received social support and mental health?*

- *Do associations between different types of received social support and mental health among men and women vary by sources of support?*

Methodological considerations and selection of covariates

As described in Section 4.15.2.2, the five types of received social support measured in my study were: 'being looked after when confined to bed'; 'help with transportation'; 'help with housework'; 'help with paperwork', and 'help with finances'. There was too little variation in the responses to the question on 'being looked after when confined to bed' to allow analysis of this (only 20 people, equal to 6% of all respondents, reported they did not receive this type of support).

Respondents were asked to identify the level of different types of social support that they had received and the providers of each type of support chosen from a list of 10 potential sources listed (see Section 4.15.2.2). Analyses of three sources of support were undertaken; firstly support from anyone (i.e. from any of the 10 possible sources), with the reference category being those not receiving any support; secondly, for those with a spouse, support from a spouse (reference category no support from a spouse), and thirdly receipt of support from one or more children versus no support from children, again restricted to respondents who had at least one child.

In order to simplify the response variables for the analysis of level of support, I created a binary variable from the original categorical variables[19] distinguishing those who reported receiving no support from those who said they had some or a good level of support. People who stated they "haven't needed/asked" for a particular type of support were excluded from the analysis.

The literature on social support and mental health does not provide any consistent view on the relevance of particular covariates in analyses of dimensions of social support. In

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[19]   The response categories for received social support questions were to receive support 'not at all' or 'to some extent' or 'all/most of the time' or 'haven't needed or asked support'.

this analysis I used the same set of covariates previously identified (age, gender, economic status, literacy, marital status, and Nagi score) in the multivariable analyses.

Results

Tables 6.3-6.6 show results from the analysis of associations between receipt of different types of instrumental social support and GHQ score.

Help with transportation

As shown in Table 6.3, the results of the crude analysis showed a marginally significant association between poor mental health score and transportation support received either from any source or from a spouse. There was no association with help provided by children. Inclusion of the covariates (Model 2) increased the effect estimates; those who lacked transport support from anyone compared to those with some or good level of support were 3.5 times more likely to report poor mental health (p= 0.04). However, there was no significant association for transportation support provided by a spouse or by children on mental health although the ORs were increased.

The results of Model 3 also showed a statistically significant interaction between transportation support received from anyone and Nagi score with poor mental health (p interaction p=0.05), suggesting that receiving transportation support may buffer the harmful effect of poor physical functioning (the hypothesized stressor) on mental health. Participants with poor physical functioning who did not have transportation support 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). There was no evidence for effect modification of transportation support received from spouse or children and the Nagi score.

Lack of help with transport from anyone was strongly associated with poor mental health in women (OR=7.6, p=0.02) but not in men although the p value for interaction was 0.08. (Table 6.3)

Help with housework

In crude analysis people who reported they lacked help with housework from anyone (OR=4.7, p=0.002) or from a spouse (OR=2.4, p=0.02) were more likely to have poor mental health compared to those who received some level of support (Table 6.4). After adjustment for covariates the association was stronger for support received from anyone (OR=5.5, p=0.009), but there was no longer a significant association with support received from a spouse. Support provided by children was also not significantly associated with poor mental health.

The results in Model 3 (Table 6.4) show the ORs stratified by housework support and Nagi score. Despite a substantial difference between the ORs of people with poor Nagi score (OR=7.4, p=0.006) compared with people with good or fair Nagi score (OR=1.3, p=0.86), there was no evidence for an interaction between support from anyone and Nagi score in associations with GHQ score (p interaction= 0.23). The ORs of the two groups were highly similar when the sources of support were spouse or children. Thus there was no strong evidence in my study that housework support from any source moderated the association between Nagi score and mental health.

The results of analyses of the possible interaction between gender of participants and housework support provided by any source in relation to GHQ did not provide evidence for the hypothesized interaction (all p values > 0.05), despite the 11 fold higher risk of poor mental health among women (p=0.005) compared to men with no support from anyone (p interaction=0.10). However the numbers in these analyses were too small for reliable estimates. (Table 6.4)

Help with paperwork

As shown in Table 6.5, in crude analysis, there was no significant association between paperwork support provided by any of the three sources and poor mental health. However, after adjustment for covariates, a strong association was found between paperwork support provided by anyone and poor mental health. People who lacked this type of support were 3 times more likely to report poor mental health compared to those with some or a good level of support (p=0.03).

The results in Model 3 indicated that people with poor Nagi scores were more likely to have poor mental health (OR= 3.8, p=0.01) but the ORs were not significantly different (p interaction =0.21) from those with good or fair Nagi scores.

Women who did not receive paperwork support from any source compared to those who did were more than 14 times more likely to have poor mental health (OR= 14.7, 95% CI= 1.78–122.19, p= 0.01) (p interaction=0.03). However, lack of this type of support among men seemed not to be important for their mental health (OR= 0.94, 95% CI= 0.24–3.61, p= 0.92). Thus, the finding from this study was consistent with my hypothesis that an absence of help with paperwork has a more deleterious effect on the mental health of older women than older men. (Table 6.5)

Financial support

The crude analysis showed a significant association between financial support provided by anyone and poor mental health (OR=2.6, p=0.05), but provision of financial support by a spouse or children showed no significant association with mental health (Table 6.6). In Model 2 (Table 6.6), when the effects of covariates were controlled for, the ORs in all the three groups of support sources were doubled so that in addition to financial support from anyone (OR=4.5, p=0.04), children's support (OR=3.6, p=0.05) also showed significant associations with mental health.

People with poor Nagi scores who reported no financial support from anyone had high ORs for poor mental health (OR=7.2, p=0.02), whereas this was not found for people with good or fair Nagi scores (OR=1.9, p=0.5) (p interaction =0.22). A similar but weaker association was found for financial support provided by children.

In Model 3, poor financial support provided either by anyone or by a spouse, inconsistently with my hypothesis showed a worse effect on the mental health of older men than older women, although there was no evidence for a significant difference between men and women. However, women who lacked financial support from children were nearly 9 fold (p=0.02) more likely to have poor mental health compared to women with some or a good level of support from children while financial support provided by children was not a factor associated with the mental health of men (OR=1.3, p=0.76) (p interaction=0.07). (Table 6.6)

Results for sources of received social support and gender

I hypothesised that the lack of support from a spouse (among married people) might have a more serious effect on the mental health of men than women while the reverse might be the case for lack of support from children (Section 2.7). The results are shown in Model 4 of Tables 6.3 through 6.6.

For men, the results provided no evidence for a significant association between the lack of received social support of any type and poor GHQ, neither from spouse nor from children (all p values >0.05), and so there was no support for the hypothesis of different role of spouse and children in provision of instrumental support for men. However, although not statistically significant, there was a noticeable difference in the magnitude and direction of the ORs of social support provided by spouse and those provided by children, which is worthy of attention. While the ORs of different types of support provided by spouse (except in paperwork support expectedly) were all above 1, the ORs of support types provided by children (except in financial support) were all below 1. This may indicate that men expected to receive support from their wives and when their needs were not fulfilled by their wives their mental health was affected negatively. In contrast, the below 1 ORs of support from children may indicate the protective role of poor support from children for mental health of men; i.e. men not only did not expect or want to receive support from their children, those lacked support from children were less likely to report poor mental health than those received support from children.

For women, however, the results provided some evidence to support the hypothesis that the lack of support from children, but not from spouse, was important. The lack of support in any form from a spouse was found to be a not important factor for mental health of women, while the lack of financial support from children was associated with poor mental health among women (OR= 8.86, 95% CI= 1.33–59.16, p= 0.02). In other forms of instrumental support, the ORs for lack of support from children were also larger than those from spouse, although the differences were not statistically significant.

Consequently, considering the findings reported above, there is little evidence from my study to support the hypothesis that support provided by children and by spouse have different role in mental health of men and women.

6.3 Associations between Structural Aspects of Social Support and Mental Health

The last two questions of the study (see Page 22), as below, are answered in this section:

- *Are there main associations between structural aspects of social support (including number of children, frequency of meeting with them, and living arrangements) and mental health?*

- *Are there gender differences in the associations between structural aspects of social support and mental health?*

Methodological considerations and selection of covariates

The number of children and frequency of meeting them might be expected to be highly correlated, but in fact the correlation was very low (r=0.09). I therefore included both variables in the same models to examine the associations between them and GHQ to be able also to control for the effects of each other (Table 6.7), but the associations between living arrangements and GHQ were examined in separate models (Table 6.8).

I examined only the main effect theory on the structural aspects of social support, because it has been suggested that structural aspects may operate via the main effect mechanism not the stress-buffering mechanism (see Section 2.3). Possible differences between men and women in the associations between structural aspects of social support and GHQ were also examined.

In the analyses of the association between number of children and frequency of meeting them with GHQ, age and gender were included as covariates. I also included 'quality of relationship with children' as there is evidence that it may interfere in the relationship between availability of social support (indicated by number of children and frequency of meeting them) and mental health (Jawad et al., 2009; Han et al., 2007).

For the analyses of living arrangements and GHQ I reviewed the relevant literature as a guide. Most of the available literature from different cultures (e.g. McKinnon et al., 2013; Lim & Kua, 2011; Hughes & Walte, 2002; Tran et al., 2000) controlled for the following covariates in their analyses of associations between 'living arrangements' and mental health: 'age', 'gender', 'marital status', 'education', 'economic status', 'health status', 'urban/rural setting', 'working status', 'geographic proximity of residence with

family members', and 'race'. In my models, I included 'age', 'gender', 'literacy', 'economic status', and 'health status' (Nagi score), based on the literature and also considering specific aspects of the Iranian context. 'Marital status' and 'geographic proximity of residence with family members' were not included, because they were found to be highly correlated with living arrangements (r=0.81 and 0.74 respectively). 'Urban/rural setting' was also removed because my study participants were all living in urban setting. 'Working status' and 'race' were also excluded because there were too little variation in the responses and 'race' has mainly been included as a relevant variable in the US studies and is less relevant in the Iranian context. Also the available literature in Iran (Koosheshi, 2007) did not show an association between 'ethnicity' and living arrangements among older people in Tehran.

Results

The results of associations between number of children/frequency of meeting them and mental health are shown in Table 6.7 and the results of associations between living arrangements and mental health are shown in Table 6.8.

In crude analysis people who reported that they met their children less than everyday were less likely to have poor mental health compared to those who had everyday contact (OR= 0.46, 95% CI= 0.25-0.86, p= 0.02) (Table 6.7). After adjustment for covariates the association was weaker and no longer significant. Also, compared to people who lived with others, people those living alone had a higher odds of poor mental health (OR= 4.02, 95% CI= 1.70-9.50, p= 0.002) (Table 6.8) but this was considerably reduced after covariate adjustment (OR= 2.33, 95% CI = 0.94-5.79, p=0.07). Neither the number of children nor their gender was associated with poor mental health.

The results of analyses of the possible interaction between gender of participants and any measure of the structural aspects of social support in relation to GHQ did not provide evidence for the hypothesized interaction (all p values > 0.05). Men and women had similar ORs for all the indicators of structural aspects of social support, except for living arrangements; men who lived alone had a 5.6 fold higher risk for poor mental health compared to men who lived with others. This difference was 2 fold among women. However, the difference between men and women in the association between living arrangement and GHQ score was not statistically significant (p=0.38).

6.4 Summary of Key Results

This chapter addresses the study questions presented in Chapter 1 (Page 22). The results from this study showed that the main and stress-buffering associations between social support and mental health varied according to the aspects (functional and structural support), dimensions (perceived and received support) and types of support considered.

The results supported the hypothesis of a main (direct) association between the functional aspects of social support and mental health but none of the three measures of structural aspects of social support (number of children, frequency of meeting children, living arrangements) showed a main association with mental health. Perceived poor social support was strongly associated with poor mental health, with a nearly fourfold OR. Also, different forms of received instrumental social support showed highly similar associations with mental health; in all form of received social support, absence of support from anyone was associated with poor mental health, while lack of support from a spouse or children (among those with a spouse or children respectively) did not influence poor mental health. In the case of financial support there was also an effect of support from children. My hypothesis that social support provided by children and by spouse have different role in mental health of men and women was not statistically supported in my study, although all the ORs were in the expected direction.

The theorised stress-buffering effect of social support was also examined by investigating whether social support moderated the association between poor physical functioning (the proposed potential stressor in this thesis) and mental health. Poor Nagi score showed a strong crude association with poor GHQ score (OR=10.8, p=0.001). According to the results of my study, there was no strong evidence that perceived social support moderated the association between Nagi score and GHQ, although, according to the ORs, this may reflect lack of power to test the interaction. Possible buffering effects of received social support were also examined. The analysis showed that while for all the forms of received social support, the ORs provided some evidence to support the stress-buffering effect of support received from anyone, only the moderating role of transportation support showed statistically significant association with poor mental health. Support from a particular source -children or a spouse- was not found to be protective for mental health against the adverse effects of poor physical functioning.

Additionally, results for the analysis of gender interaction in the association between social support and mental health were inconsistent depending on the aspects and types of social support. With regard to the perceived social support, although the ORs indicated that poor perceived social support had a worse effect on mental health of older women than older men; statistical analysis did not support the significance of this difference. Also, the comparison between the ORs of men and women in all the types of received social support from anyone except financial support were consistent with my hypothesis, indicating that lack of other types of received social support from anyone had a more deleterious effect on mental health of women, but lack of financial support from anyone had a more deleterious effect on mental health of men. However, analyses showed that the only type of received support that showed a significant interaction with gender was paperwork support received from anyone (p interaction=0.03). Lastly, the results of my study did not provide an evidence for the hypothesized gender interaction between any measures of the structural aspects of social support and GHQ.

Table 6.1: Univariable association of selected covariates with poor GHQ score

Covariates	Crude analysis		
	n	OR (95% CI)	P
Nagi score			
Good or fair	455	Ref.	
Poor	182	10.80 (2.83-41.29)	0.001
Age			
60-69	329	Ref.	
70-79	243	1.93 (1.19-3.10)	0.002
80+	70	3.34 (1.60-6.94)	
Gender			
Men	322	Ref.	
Women	322	4.38 (1.91-10.04)	<0.001
Literacy			
Literate	307	Ref.	
Illiterate	336	3.22 (1.61- 6.47)	0.001
Perceived economic status			
Same or better than average in Tehran	366	Ref.	
Poorer than average in Tehran	274	3.07 (1.77-5.31)	<0.001
Marital status			
Married	459	Ref.	
Not married	185	4.66 (2.10-10.36)	<0.001

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

n= distribution of participants in each category

Table 6.2: Associations between perceived social support (SPS) and poor mental health (GHQ)

Variables	Model 1 Crude Analysis		Model 2 Main Effect		Model 3 Stress- Buffering Effect		Model 4 Gender Interaction	
	n	OR (95% CI) P	n	OR (95% CI) P	n	OR (95% CI) P	n	OR (95% CI) P
SPS								
Good or fair	177	Ref.	170	Ref.				
Poor	467	5.62 (2.39 - 13.23) <0.001	460	3.80 (1.48 – 9.79) 0.006				
SPS-Nagi interaction						P=0.63		
SPS in people with poor Nagi score								
Good or fair					73	Ref.		
Poor					105	4.25 (1.50-12.30) 0.008		
SPS in people with good or fair Nagi score								
Good or fair					97	Ref.		
Poor					355	3.11 (0.96- 10.05) 0.06		
SPS-Gender interaction								p=0.74
SPS in women								
Good or fair							97	Ref.
Poor							217	4.20 (1.33-13.27) 0.01
SPS in men								
Good or fair							73	Ref.
Poor							243	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
n= distribution of participants in each category (total 'n' is equal in models 2, 3 and 4)
'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 6.3: Associations between transportation support received by source and poor mental health (GHQ)

Transportation Support		From Anyone			From Spouse			From Children	
		n	OR (95% CI) p		n	OR (95% CI) p		n	OR (95% CI) p
Model 1:									
Crude Analysis									
Support	Some or good	491	Ref.		340	Ref.		439	Ref.
	None	64	2.13(0.97-4.65) 0.06		97	2.14(1.00-4.58) 0.05		148	1.08(0.62-1.87) 0.79
Model 2:									
Main Effect									
Support	Some or good	481	Ref.		336	Ref.		430	Ref.
	None	62	3.30(1.04-10.45) 0.04		93	2.36(0.83-6.68) 0.11		144	1.48(0.73-3.02) 0.28
Model 3:									
Stress-Buffering effect			p=0.05			p=0.42			p=0.89
Sup. in people with	Some or good	157	Ref.		75	Ref.		135	Ref.
poor Nagi score	None	10	5.69(1.41-22.98) 0.01		25	1.73(0.51-5.90) 0.38		34	1.43(0.61-3.38) 0.41
Sup. in people with	Some or good	324	Ref.		263	Ref.		295	Ref.
good or fair Nagi score	None	52	0.38(0.04-3.43) 0.39		68	3.89(0.70-21.53) 0.12		110	1.58(0.48-5.18) 0.45
Model 4:									
Gender Interaction			p=0.08			p=0.72			p=0.07
Support in women	Some or good	243	Ref.		132	Ref.		228	Ref.
	None	33	7.58(1.33-43.37) 0.02		28	1.92(0.43-8.47) 0.39		65	2.96(0.96- 9.12) 0.06
Support in men	Some or good	238	Ref.		204	Ref.		202	Ref.
	None	29	0.98(0.19-5.00) 0.98		65	2.70(0.73-9.89) 0.13		79	0.63(0.20-2.00) 0.43

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

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

n= numbers of people in each category (total 'n' is equal in models 2, 3 and 4)

'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 distribution

Table 6.4: Associations between housework support received by source and poor mental health (GHQ)

Housework Support		From Anyone		From Spouse		From Children	
		n	OR (95% CI) p	n	OR (95% CI) p	n	OR (95% CI) p
Model 1: **Crude Analysis**							
Support	Some or good	532	Ref.	355	Ref.	448	Ref.
	None	37	4.67(1.77-12.31)0.002	89	2.42(1.14-5.14)0.02	157	0.86(0.49-1.53) 0.61
Model 2: **Main Effect**							
Support	Some or good	521	Ref.	353	Ref.	437	Ref.
	None	35	5.54(1.53-20.04) 0.009	83	1.57(0.60-4.07) 0.35	155	1.00(0.50-2.02) 0.98
Model 3: **Stress-Buffering effect**			p=0.23		p=0.91		p=0.28
Sup. in people with poor Nagi score	Some or good	162	Ref.	74	Ref.	131	Ref.
	None	6	7.36(1.78-30.39) 0.006	26	1.50(0.45-5.05) 0.51	38	1.34(0.57-3.15) 0.50
Sup. in people with good or fair Nagi score	Some or good	359	Ref.	279	Ref.	306	Ref.
	None	30	1.25(0.10-16.05) 0.86	57	1.66(0.38-7.27) 0.50	117	0.60(0.19-1.96) 0.40
Model 4: **Gender Interaction**			p=0.10		p=0.52		p=0.15
Support in women	Some or good	259	Ref.	102	Ref.	223	Ref.
	None	24	11.29(2.05-62.15)0.005	55	1.24(0.38-3.98)0.72	70	1.63(0.63-4.26)0.31
Support in men	Some or good	263	Ref.	251	Ref.	214	Ref.
	None	11	1.11(0.12-10.25)0.92	28	2.30(0.51-10.31)0.27	85	0.51(0.15-1.71)0.28

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

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

n= numbers of people in each category (total 'n' is equal in models 2, 3 and 4)

'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 distribution

Table 6.5: Associations between paperwork support received by source and poor mental health (GHQ)

Paperwork Support		From Anyone		From Spouse		From Children	
		n	OR (95% CI) p	n	OR (95% CI) p	n	OR (95% CI) p
Model 1: **Crude Analysis**							
Support	Some or good	459	Ref.	248	Ref.	383	Ref.
	None	92	1.15(0.58-2.29)0.69	187	0.54(0.25-1.13) 0.10	193	0.81(0.46-1.44)0.48
Model 2: **Main Effect**							
Support	Some or good	447	Ref.	246	Ref.	373	Ref.
	None	92	2.99(1.11-8.06)0.03	181	0.87(0.36-2.11)0.76	191	1.26(0.64-2.45)0.50
Model 3: **Stress-Buffering effect**		p=0.21		p=0.24		p=0.49	
Sup. in people with poor Nagi score	Some or good	155	Ref.	65	Ref.	121	Ref.
	None	9	3.76(1.29-10.95)0.01	35	0.57(0.18-1.76)0.33	45	1.49(0.65-3.49)0.34
Sup. in people with good or fair Nagi score	Some or good	292	Ref.	181	Ref.	252	Ref.
	None	83	0.80(0.09-7.10)0.84	146	1.64(0.41-6.56)0.48	146	0.92(0.30-2.79)0.88
Model 4: **Gender Interaction**		p=0.03		p=0.88		p=0.11	
Support in women	Some or good	245	Ref.	128	Ref.	203	Ref.
	None	28	14.77(1.78-122.19)0.01	33	0.79(0.18-3.51) 0.76	81	2.35(0.79-6.96)0.12
Support in men	Some or good	202	Ref.	118	Ref.	170	Ref.
	None	64	0.94(0.24-3.61)0.92	148	0.91(0.31-2.71)0.87	110	0.57(0.17-1.88)0.35

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

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

n= numbers of people in each category (total 'n' is equal in models 2, 3 and 4)

'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 distribution

Table 6.6: Associations between financial support received by source and poor mental health (GHQ)

Financial Support		From Anyone		From Spouse		From Children	
		n	OR (95% CI) p	n	OR (95% CI) p	n	OR (95% CI) p
Model 1: **Crude Analysis**							
Support	Some or good	239	Ref.	98	Ref.	233	Ref.
	None	121	2.63 (0.99-7.03)0.05	224	0.80 (0.36-1.77)0.58	192	1.63 (0.75-3.53) 0.21
Model 2: **Main Effect**							
Support	Some or good	233	Ref.	98	Ref.	226	Ref.
	None	116	4.49 (1.10-18.28)0.04	217	1.37 (0.44-4.26)0.58	187	3.60 (1.00-12.90)0.05
Model 3: **Stress-Buffering effect**			p=0.22		p=0.46		p=0.55
Sup. in people with poor Nagi score	Some or good	80	Ref.	24	Ref.	80	Ref.
	None	33	7.15 (1.30-39.18)0.02	52	1.05 (0.29-3.79)0.94	50	4.51 (0.96-21.12)0.06
Sup. in people with good or fair Nagi score	Some or good	153	Ref.	74	Ref.	146	Ref.
	None	83	1.86 (0.35-10.03)0.47	165	2.22 (0.40-12.51)0.3́	137	2.52 (0.48-13.05)0.27
Model 4: **Gender Interaction**			p=0.71		p=0.36		p=0.07
Support in women	Some or good	136	Ref.	68	Ref.	133	Ref.
	None	53	3.81 (0.78-18.49)0.10	59	0.95 (0.25-3.67)0.95	84	8.86 (1.33-59.16)0.02
Support in men	Some or good	97	Ref.	30	Ref.	93	Ref.
	None	63	5.57 (0.88-35.44)0.07	158	3.18 (0.34-29.68)0.3́	103	1.26 (0.29-5.53) 0.76

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

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

n= numbers of people in each category (total 'n' is equal in models 2, 3 and 4)

'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 distribution

Table 6.7: Associations of number of children and frequency of meeting them and poor mental health (GHQ)

Variables	Model 1 Crude Analysis		Model 2 Main Effect		Model 3 Gender Interaction	
	n	OR (95% CI), P	n	OR (95% CI), P	n	OR (95% CI), P
N of children	643	0.97 (0.85-1.10), 0.62	620	1.05 (0.92-1.19), 0.44		
N of sons	639	0.89 (0.73-1.08), 0.24				
N of daughters	640	1.05 (0.90-1.23), 0.54				
Frequency of meeting at least 1 child						
Everyday	463	Ref.	460	Ref.		
Less than everyday	164	0.46 (0.25-0.86), 0.02	160	0.64 (0.34-1.20),0.17		
Model 3-1: **N of children-gender interaction**						p=0.53
N of children- men					620	0.95 (0.62-1.47), 0.83
N of children-women					620	1.08 (0.95-1.22), 0.22
Model 3-2: **N of sons-gender interaction**						p=0.41
N of sons- men					620	0.79(0.41-1.53), 0.48
N of sons-women					620	0.99(0.82-1.19), 0.92
Model 3-3: **N of daughters-gender interaction**						p=0.63
N of daughters – men					620	1.11(0.65-1.87), 0.70
N of daughters -women					620	1.18(0.99-1.40), 0.06
Model 3-4: **Frequency of meeting at least 1 child- gender interaction**						p=0.13
Meeting in women						
Everyday					221	Ref.
Less than everyday					86	0.45 (0.20 -1.02), 0.06
Meeting in men						
Everyday					239	Ref.
Less than everyday					74	1.17 (0.44 -1.08), 0.75

Except Model 1, other models included age, gender, quality of relationships with children and each of the response variables (N of children and meeting with them) for the other one

Analysis excluded those people without a child

n= numbers of people in each category (total 'n' is equal in models 2 and 3)

Model 1 includes 4 separate models one for each variable and Model 3 also includes 4 separate models to analyze the possible gender interaction in the associations between different response variables and GHQ.

Table 6.8: Associations of living arrangements and poor mental health (GHQ)

Variables	Model 1 Crude Analysis		Model 2 Main Effect		Model 3 Gender Interaction	
	n	OR (95% CI), P	n	OR (95% CI), P	n	OR (95% CI), P
Living arrangements						
Living with others	565	Ref.	552	Ref.		
Living alone	79	4.02 (1.70-9.50), 0.002	78	2.33 (0.94-5.79), 0.07		
Living arrangements-gender interaction						p=0.38
Living arrangements in women						
Living with others					249	Ref.
Living alone					67	2.00 (0.78 – 5.13), 0.15
Living arrangements in men						
Living with others					303	Ref.
Living alone					11	5.18 (0.65- 41.18), 0.12

Models 2 and 3 included age, gender, literacy, economic status and Nagi score

n= numbers of people in each category (total 'n' is equal in models 2, 3 and 4)

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7. DISCUSSION

This chapter starts with a brief summary of the background to the study, objectives and research questions. A summary of key findings of the thesis is then highlighted. Methodological considerations of the study including limitations and strengths are discussed. Then, on the basis of the conceptual model of the study, a critical appraisal of the study's findings was conducted. Finally, the implications of the study findings for policy and practice are discussed and then priorities for future research on the topic are highlighted.

7.1 Overview of the Thesis

As discussed in preceding chapters of this thesis, Iran has recently undergone an exceptionally fast transition from high to low fertility. The TFR is currently 1.8 compared with 7.7 in 1966 (Abbasi-Shavazi & McDonald, 2006; Aghajanian & Mehryar, 1999). There has also been a considerable decline in mortality rates and consequently an increase in life expectancy at birth from 37 for men and 40 for women in 1956 to 69 for men and 73 for women in 2008 (SCI). Consequently Iran is now experiencing rapid population ageing. It is projected that the proportion of older people aged 65 and over will increase from 5% in 2006 to 20-25% by 2050. 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 and characteristics of the country and its population. Currently 70% of the Iranian population live in urban areas, compared with 31% in 1956 and 50% in 1980 (UN, 2014). Also, there has been a rapid expansion of educational opportunities- 55% of relevant age groups are enrolled in tertiary education (UN, 2014). In particular, the SES of Iranian women including their education has improved considerably; the proportion of literate females (aged 6 years and over) increased from 18% in 1966 to 80% in 2000 (Abbasi Shavazi et al., 2009a) and currently female students in university classes outnumber men (64% vs. 36%) (SCI). (For more information see Appendix 1)

Given these demographic and social changes it might be expected that support structures for older people would also be changing or change in the future, with a potential decline in family support of older people. This is especially important as there is evidence that social support makes an important contribution to health (e.g. Kendler et al., 2005; Wilkinson & Marmot, 2003; Cohen, 1988) and a lack of social support may have negative effects particularly on mental health (e.g. Lakey & Cronin, 2008; Adams et al., 2000; Cooper et al., 1999; Grundy et al., 1996). Consequently, there is concern that the mental well-being of older people may be adversely affected if fewer children and smaller family sizes lead to a reduction in the support available to older people.

The aim of the research described in this thesis was to explore for the first time in the contemporary older population of Tehran how social support is related to mental health status. Specific questions addressed in my thesis focussed on gender differences in the

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association between social support and mental health, the level of support provided by children and other family members, and whether the source of support is itself associated with mental health. I investigated this in relation to both perceived and received support and also considered the role of social support as a buffer to stress by seeing if social support varied in its effects according to the physical functional limitations (the assumed stressor) and mental health.

A review of the existing literature indicated that, such evidence as there is, has largely focused on western high income countries and that the relationship between social support and mental health has not been studied or has been studied inadequately in Iran or other culturally similar countries such as the ME countries. It is likely that differences in cultural attitudes and behaviours, societal conditions and structures or differences in health care systems make it difficult to generalise study findings from western countries to non-western populations. The rationale for the study was a need to have a greater understanding of current associations between the support and mental well-being of older people in order to provide valuable insights into the implications of possible changes in the future. I aimed to provide original information and evidence on this topic for Iranian authorities and policymakers as well as advancing the study of a neglected topic in Iran. To develop policies for the growing ageing population in advance there is a need for sound evidence basis about this topic, which inspired my choice of topic for this thesis.

The study findings, presented in Chapters 5 and 6, are summarized in the next section. The findings will make an important contribution toward the scarce research evidence on social support and mental health of older people in Iran. The findings of this thesis may also offer one of the first opportunities in the literature for other ME countries with relatively similar cultures to consider the possible future impacts of demographic transitions on support sources and health status of older people. The results of this study may also be utilized to target older populations with lower rate of social support and thereby in higher risk of mental disorders.

The strengths of my 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), and the collection of comprehensive

and detailed information on perceived and received social support. My approach to the statistical analysis was guided by a conceptual model and used appropriate statistical analysis to take account of the multi-level sampling method. The main weakness of my study, as described in Section 7.3, is that it was a cross sectional survey where the temporal relationships between social support and mental health cannot be ascertained with confidence.

7.2 Summary of Main Findings

The main question that is addressed in this study was whether there is an association between social support and mental health. The results indicated that associations between social support and mental health varied according to the aspects (functional and structural support), dimensions (perceived and received support) and types of support considered.

The specific study questions (see Page 22) and a short response to each are provided below:

1. *What are social support, mental health and socio-demographic characteristics of the older population of Tehran?*

   In this study, 644 people (322 men and 322 women) with the mean age of 69.4 years old were participated. Seventy one percent were currently married and 27% widowed (46% of women vs. 9% of men). Forty eight percent were illiterate (63% of women vs. 32% of men) and 12% were living alone (21% of women vs. 3% of men). They had on average 4.6 (SD=2.1) living children and 74% of them had daily contact with at least one child. The mean GHQ (SD) score of the participants was 16.79 (8.09) in the range of 0-45 with higher scores among women (19.3) indicating poorer mental health and their mean (SD) Nagi score was 19.2 (6.2) in the range of 10-30 with lower scores among women (17.0) indicating poorer physical functioning status. The mean score of perceived social support of the participants was 71.8 in the range of 24-96 and most of them, particularly women, reported receiving a rather high level of support from others.

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2. *Is there a main association between perceived social support and mental health?*

Perceived poor social support was strongly associated with poor mental health, with a nearly fourfold OR (Table 6.2).

3. *Has perceived social support a stress-buffering effect in the association between physical functioning limitation and mental health?*

There was no strong evidence that perceived social support moderated the association between physical functioning limitation and mental health, although, according to the ORs, this may reflect lack of power to test the interaction (Table 6.2).

4. *Are there gender differences in the association between perceived social support and mental health?*

Although the ORs indicated that poor perceived social support had a worse effect on mental health of older women than older men; statistical analysis did not support the significance of this difference (Table 6.2).

5. *Are there main associations between different types of received social support and mental health?*

In all types of received social support, absence of support from anyone was significantly associated with poor mental health, while lack of support from a particular source (children or a spouse) did not influence poor mental health. In the case of financial support there was also an effect of support from children (Tables 6.3- 6.6).

6. *Do different types of received social support demonstrate a stress-buffering effect in the associations between physical functioning limitation and mental health?*

Although for all the types of received social support the ORs provided some evidence to support the stress-buffering effect, only the moderating role of transportation support received from anyone was statistically significant. Support from a particular source (children or a spouse) was not found to be protective for mental health against the adverse effects of poor physical functioning (Tables 6.3- 6.6).

7. *Are there gender differences in the associations between different types of received social support and mental health?*

The comparison between the ORs of men and women indicated that lack of transportation support, paperwork support and housework support from anyone had a more deleterious effect on mental health of women, but lack of financial support from anyone had a more deleterious effect on mental health of men. However, the only type of received support that showed a statistically significant interaction with gender was paperwork support received from anyone (p interaction=0.03) (Tables 6.3- 6.6).

8. *Do associations between different types of received social support and mental health among men and women vary by sources of support?*

Although all the ORs among men and women were in the expected direction, particularly among women, there is little evidence from my study for the interaction of sources of support in the associations between received social support and mental health (Tables 6.3- 6.6).

9. *Are there main associations between structural aspects of social support (including number of children, frequency of meeting with them, and living arrangements) and mental health?*

There was no evidence for a main association between any measures of the structural aspects of social support and mental health (Tables 6.7 and 6.8).

10. *Are there gender differences in the associations between structural aspects of social support and mental health?*

The results did not provide an evidence for the hypothesized gender interaction between any measures of the structural aspects of social support and mental health (Tables 6.7 and 6.8).

The following table highlights my study hypotheses (see Section 2.7) and whether or not the results of my analyses lent support to these hypotheses.

Table 7.1: Summary of study hypotheses and results

Hypotheses	Results
1. Perceived social support has a main association with mental health: specifically, a lower level of perceived social support is associated with poorer mental health	Evidence to support the hypothesis
2. The social support received for specific reasons (i.e. help with transportation, help with housework, help with paperwork and financial help) has a main association with mental health; specifically, lower levels of received social support in any form are associated with poorer mental health.	Evidence to support the hypothesis in that lack of support from anyone was associated with worse mental health, but no evidence to reject the null hypothesis of no association for lack of support from a spouse or children (except financial support from children)
3. Structural aspects of social support have direct associations with mental health: specifically, older people who have fewer children, less frequent meeting with them and those who live alone would have poorer mental health than those who have more children, more meeting and those live with others.	No evidence to reject the null hypothesis of no association
4. Social support (perceived and received) varies in its association with poor mental health according to the level of physical functioning limitation. Thus, those with poor social support would have worse mental health than people with the same level of physical functioning limitation who have higher levels of social support.	Evidence to support the hypothesis in the case of transportation support received from anyone, but no evidence to reject the null hypothesis of no association for other measures of received support and for perceived social support.
5. Older men and women differ in associations between social support and mental health. The mental health of older women is more seriously affected, in comparison with men, when their social support needs are not met.	Evidence to support the hypothesis in the case of paperwork support received from anyone, but no evidence to reject the null hypothesis of no association (no interaction of gender) for all the other measures of social support considered
6. Sources of social support received are important in the association between received social support and the mental health of men and women. Lack of support from a spouse may have a more deleterious effect on the mental health of older men and, in contrast, lack of support from children may have a more deleterious effect on the mental health of women.	Little evidence to reject the null hypothesis of no association (no interaction of sources of support)

7.3 Methodological Considerations; Limitations and Strengths

Here I raise a number of methodological issues for consideration including strengths and methodological and other limitations relevant to the study and discuss the ways I tried to address them. Any interpretation of the findings must be made in light of these issues, particularly the study limitations.

I. *Cross-sectional study design*

My study had a cross-sectional design which means that the temporal association between social support and mental health cannot be ascertained and reverse causation cannot be ruled out as an explanation for the associations found. If the perception of being supported and receiving social support is influenced by an individual's general state of psychological well-being, as seems likely (Gore, 1981), at least some of the association between more support and better mental health could reflect differences in reporting receipt of support, rather than real differences in receipt of support. For example, people who are depressed may perceive and report inadequate support despite receiving a high level of support whereas those in good mental health may report adequate receipt of support even if the actual amount received is low (Berkman, 1984). It is also possible that mental health influences receipt of support. For example, those who are depressed may tend to isolate themselves, experience strained relationships with others, avoid reception of support and fail to maintain social contacts (Mechakra-Tahiri et al., 2009; House et al., 1988). This may be a particular problem in studies relying on retrospective reporting of receipt of support (Holt-Lunstad et al., 2010).

There are two competing theories with regard to the reverse causation issue; the first, called 'social causation theory', posits that social support determines well-being, while the second, called 'social selection theory', conceives that well-being determines social support (Dohrenwend, 2000; Johnson et al., 1999). The existing literature offers support for both theories, but there are also studies with mixed results. A recent longitudinal study among victims of a natural disaster in Mexico provided support for 'social causation theory'(support-to-distress relationship) in the earlier post-disaster phase, but only 'social selection theory' accounted for the social support and distress relationship at 18 to 24 months after the event (Kaniasty & Norris, 2008). However, although

longitudinal studies similar to this Mexican study are needed for perceived and received social support to be demonstrated to be predictive of mental health, currently much of literature is based on cross-sectional studies.

Therefore, although I cannot rule out reverse causation as the mechanism explaining or partially explaining the results of the study, Taylor and Lynch (2004) concluded on the basis of a review that existing evidence supports the idea of reciprocal relationships between social support and mental health, with much less evidence to support the idea of mental health affecting social support than vice versa. Questions on structural aspects of social support are also less likely to be as influenced by reverse causation problems since responses are generally not as subjective (Berkman, 1984).

Another limitation in cross-sectional studies is that mental health may change slowly in response to external factors including recent changes in social support levels, and therefore there may be a time lag in terms of the effect on mental health.

In order to assess how changes in the health status of participants affected their received social support over the previous year, my survey included a question asking: "how much support do you currently receive compared to one year ago?" To this, 4.5% (n=27) reported less and 6% (n=36) reported more support now compared to one year ago while the remainder (n=574, 90%) reported the same level of support as before. On the other hand, in another question when participants were asked "how has your health status changed over the last year?", only 8.5% reported that their health had improved and 61% reported that it was worse or much worse now compared to one year ago. Thus, it could be argued that the health status of participants had little immediate influence, at least on the level of support they received from the family, probably due to having constant sources of support. However in interpreting these results, it is important to acknowledge that people's recall may be imperfect and, importantly, may be influenced by current circumstances.

II. Considerations of internal validity of the study

Judgement on validity of my study involved the following considerations:

Power of the study

A sample size of 800 individuals, including 10% non response, was judged to be adequate to detect relevant associations between SPS and GHQ (the main hypothesis). Thus, the study had 80% power to detect an OR of at least 2.0 at an alpha level of 0.05 on the assumption of an expected 20% prevalence of a poor GHQ score. My study results of a 3.8 OR for the association between poor SPS and GHQ scores showed a higher OR, indicating that our sample size calculations were appropriately conservative. However, my study was not designed to investigate interaction effects such as differences in the magnitude of the OR between men and women or by level of functional problems. Detection of interaction effects would have required larger sample sizes than were feasible for my research. Smith and Day (1984: 364) suggest that "if one of the important aims of an investigation is to identify interaction effects then the size of the study that is designed should take this into account. The likely consequence of this is that the study may need to be four or more times larger than that designed merely to detect a main effect the same size as the interaction effect." Nevertheless, a number of significant interaction effects in some of the models (Tables 6.3 and 6.5) were found. In other cases some findings of interaction effects of borderline significance might be due to inadequate statistical power, in short a larger study might have identified these as statistically significant.

Statistical methods

One of the strengths of my analysis was the application of multilevel modelling, which was appropriate given the complex study design and hierarchical structure of my data. This model allowed for unbiased estimation of the effect and improved the internal validity of the research. Less sophisticated methods of analysis might have resulted in drawing incorrect inferences (see Section 4.14.3 for more information).

Controlling for covariates

Unmeasured confounders are an important potential source of bias in observational studies. In my study I carefully identified possible confounders based on the systematic review of the literature. However, confounding effects may still be present but unknown or unmeasured because of difficulties inherent in operationalising some relevant factors or presence of previously unidentified confounders. For example, coping resources, social competence, genetic endowment and personality traits (optimism/pessimism, or hostility) may be associated with mental health and also with perceptions of social support (Thoits, 2011; House et al., 1988; Uchino, 2004). These factors were not measured in my study, or in most of the other studies of social support and health, based on my literature review.

III. *Considerations of external validity of the study*

My study used a multistage stratified cluster sampling strategy with PPS method, thus ensuring a representative sample of the Tehran population. The response rate was high (76%). The high response rate was facilitated by the fieldwork team, who skilfully conducted the interviews after training by me. To find people who were absent from home the fieldworkers attempted to reach them on several different occasions. Also, the bulk of interviews were deliberately scheduled for different hours and days to be convenient for people to participate in the study after their daily duties were fulfilled. To avoid a high number of missing values, the fieldworkers were told to check the completed questionnaires shortly after the completion of the interview. They were able to telephone the participants to clarify any inconsistencies or missing information. However, since 24% of the target sample people were non-responders, participant bias cannot be excluded. As shown in Table 4.5, non-respondents were more likely to be from a high class area; to be men and to be older compared to respondents, suggesting that the sample may have underrepresented older people from more advantaged SES strata, men and older old age groups.

I compared some of the main characteristics of the sample with those of the older people of Tehran, using data from the last census to check the extent to which the sample was representative of at least the Tehranian older population. The results shown in Section 5.1 indicated a high comparability of my sample with the older population of Tehran in

terms of their demographic and SES characteristics, indicating that my sample is representative of the older population of the city.

The results of the study are not generalisable to older people living in institutions or those hospitalised at the time of my survey. I also excluded community resident older people with severe mental or physical disorders (4% of all those sampled) on the likelihood they would be unable to participate in the study. This inevitably meant that the least healthy older people were excluded from the study. However, due to the very low proportion of those excluded on these grounds, it is less likely that these factors would have substantially changed the direction or magnitude of the associations observed within the study sample.

In general, the moderately high response rate of my study, little missing data, and comparability of the characteristics of the participants with the older population of Tehran provide confidence in the external validity of my study.

IV. *Fieldwork considerations*

Fieldwork spanned an intense period of 7 months and included several stages. It started with making a sampling frame to use for random selection of individuals in contrast to surveys that use convenience methods of sample selection, such as sampling from those coming to health centres, mosques, or parks. Although this stage added to the time and cost in conducting my study, this guarded against selection bias and helped to obtain a sample representative of the population of interest.

A successful pilot study greatly contributed to the smooth and successful completion of the fieldwork. In particular, this stage helped me to test the questions in the questionnaire and make amendments to improve the process of interviews, to explore the issues to be considered in the main interviews and also to select the most reliable fieldworkers.

Fieldworkers were selected based on their previous experience, training and performance during training. Additionally, I attempted to ensure that the characteristics of the interviewers were as homogenous as possible to minimize interviewer effects. Interviewers were MSc students in health subjects, from the same age range (22-26 years old) composed of men and women. A gender effect between interviewee and interviewer is established in the literature (Johnson et al., 1999). Efforts were made to match

interviewer and interviewee by sex. I emphasised to the interviewers that they should be impartial and not known to participants and to encourage them to speak openly and freely in response to the questions. One check that was made for interviewer bias during the fieldwork was that I asked for a limited number of interviews to be repeated by a different fieldworker to check for consistency between the answers. Also, after completion of the data collection, I formally checked how the pattern of responses to some of the main variables differed based on the interviewer and results showed no systematic difference by interviewer. Nevertheless, the influence of interviewers cannot be completely ruled out due to possible inconsistencies in the way questions were asked.

V. *Self-reporting and face-to-face interviews*

My data was gathered using the method of face-to-face structured interviews and study variables were measured using self-reporting. A high proportion of my study population were illiterate and in the face-to-face approach the fieldworkers were able to clarify any ambiguity or misinterpretation for respondents. However, there are some limitations inherent in studies using the method of face-to-face self-reporting interviews.

Reporting errors can occur when participants report what they believe the researcher expects to hear, particularly if questions are poorly worded (Cook & Campbell, 1979). In the preparation for my study, every effort was taken to make the wording of questions clear and not lead participants to a particular response. I trained the interviewers to ask the questions in an impartial way to avoid leading questions. Self-reported measures gathered in surveys may be influenced by the perception of participants, their personal attributes and moods at the time of interview (Walker, 2005). As noted earlier, it is possible that respondents who had a pessimistic outlook may have over-reported poor mental health and poor support, while respondents who were generally optimistic may have tended to under-report poor health and over-report their social support level.

A problem with recall can also happen in self-report studies. In my study, most of the questions asked were about current status rather than past events. However, some questions including GHQ questions may be subject to a-thirty day recall of symptoms, if people who had suffered from the symptoms more than 30 days previously responded positively.

VI. Other sources of error or bias

Although other household members were asked to leave the interview place to ensure the privacy of participants, in 240 (37%) of the interviews the presence of someone else for whole or part of the interview was reported, of which 51 (8%) interviews were attended by a translator, usually family members. One cannot rule out the influence of the presence of someone else on the views expressed by participants. I checked for differences in the pattern of responses of those with and without someone else present for main factors. The results indicated that having a family member present may have slightly affected responses. People may have reported receiving higher levels of support from the family because it was difficult to report otherwise in front of a family member. On the other hand, they reported their health status as slightly poorer (possibly poorer health was sometimes a reason for needing or wanting a family member to be present during the interview). However, these results may also have been explained by other factors. Those people with someone present at the interview were on average 4 years older than those interviewed alone. Being older was associated with poorer health. Moreover, although in only 8% of all interviews a translator was necessary, the accuracy and reliability of translation is uncertain. Capturing the nuances and intensity of feeling expressed in particular words can be at best approximated but not matched when moving from one language to another. However in structured interviews such as those used here, this problem may be less serious than in studies using a less structured design.

7.4 Discussion of Findings

In this section, the main study findings have been interpreted and discussed in accordance with the conceptual model of the study (see Figure 2.1, Page 44), which was the basis for statistical analyses of the study data. My study findings have also been compared with the previous literature, placing them within wider context of work in the related area and highlighting my study's contribution. The discussion on the descriptive findings with regard to the mental health and social support status of the study population has been located in Appendix 8, due to less centrality of these findings to the study aim.

The analytical findings indicated that associations (main or stress-buffering) between social support and mental health are varied according to the aspects, dimensions and types of social support considered, discussed as follows:

Associations between perceived social support and mental health

The results of the analyses of main association between perceived social support and mental health indicated that those who had poor SPS scores were 3.8 times more likely to experience poor mental health than people with higher SPS scores (p= 0.006) (Table 6.2). This finding is consistent with most of the wider literature (e.g. Nemeroff et al., 2010; Olutoyin Oni, 2010; Cruza-Guet et al., 2008; Han et al., 2007; Leskelä et al., 2006; Stice et al., 2004; Clara et al., 2003), the ME countries (e.g. Bozo et al., 2009; Kuscu et al., 2009; Jawad et al., 2009; Kara & Mirici, 2004; Auslander & Litwin, 1991) and also with both of the two available studies in Iran (Shakerinia, 2012; Pasha et al., 2007)[20]. There are also a few studies, for example one conducted in Canada (Mechakra-Tahiri et al., 2009) and the other conducted in Norway (Thygesen et al., 2009) that have not found an association between perceived social support and mental health.

Of the suggested pathways linking perceived social support and mental health discussed in Section 2.3.2, the psychological pathway seems to be most relevant. A high perception of social support may promote self-esteem (Uchino et al., 2012; Thoits, 2011 and 2006) which, in turn, is associated with lower symptoms of anxiety and depression (Taylor & Stanton, 2007; Baumeister et al., 2003; Turner & Lloyd, 1999; Turner & Roszell, 1994). Looking specifically at the dimensions of SPS, 'social integration' and 'attachment' are respectively held to enhance a sense of belonging and security (Thoits, 2011; Cohen et al., 2000). These positive psychological states, in turn, may protect against the emergence of mental disorders (Kawachi & Berkman, 2001; Cohen et al., 2000). Additionally, giving people 'reassurance of worth' (the third dimension of SPS) helps individuals to maintain a sense of mastery and control over life (Uchino et al., 2012; Thoits, 2011; Bisconti & Bergeman, 1999; Cooper et al., 1999), which directly or

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[20] Both the Iranian studies focused on older people aged 65+; one (Shakerinia, 2012) was conducted after my study and only considered a small group of men (n=84) with chronic pain selected from physiotherapy section of hospitals in Rasht city. The other (Pasha et al., 2007) using convenience sampling selected 50 community residents and 50 people living in institutions in Ahvaz city and compared them using bivariate analysis. Thus, these studies were small and in a select group of people.

through improving one's confidence to overcome major stressors, is associated with lower anxiety and depression (Taylor & Stanton, 2007; Mirowsky & Ross, 2003; Turner & Lloyd, 1999; Steptoe et al., 1996; Turner & Roszell, 1994). Moreover, 'opportunity for nurturance' (the fourth dimension of SPS) is important for the older person's feeling of being useful that enhances health (Russell & Cutrona, 1987). Further, 'reliable alliance', the next dimension, may reduce psychological distress by reducing feelings of isolation and mistrust (Bisconti & Bergeman, 1999; Krause, 1993). Finally, giving 'guidance' to someone (the last dimension of SPS) may protect against the emergence of mental disturbances through increased motivation for self-care and healthy lifestyle.

Although a significant main association was found between SPS and GHQ scores in my study, I reemphasise that my study was cross-sectional and, as discussed in Section 7.3, in cross-sectional studies it is difficult to clarify temporal associations between the two variables. A high perception of social support is likely to be influenced by general psychological well-being as well as by actual network functions (Gore, 1981). The available longitudinal studies with a prospective research design also provided inconsistent results. Some of them suggest that greater social support protects against the onset of major depression (Kendler et al., 2005; Henderson et al., 1981), while others have failed to provide evidence for this effect (Bierman & Statland, 2010; Burton et al., 2004; Wade & Kendler, 2000; Lewinsohn et al., 1994; Mor-Barak et al., 1991). Results from intervention studies are even sparser reflecting the logistical and ethical difficulties involved in setting up such studies. Therefore, the real interrelationships and direction of associations between perceived support and mental health of Iranian older people, as in many other studies, still remain uncertain.

The stress-buffering effect of perceived social support on mental health, hypothesised in my initial conceptual model, was not confirmed in my study. There was no evidence that the association of perceived social support with mental health differed according to the level of poor physical functioning (Table 6.2). Evidence for the stress-buffering effect of social support on mental health in the literature is less consistent and less strong than for main effect of social support. Yet, most previous studies which have examined the issue do suggest such a stress-buffering effect. Three major review studies published in the1970s (Kaplan et al., 1977; Cassel, 1976; Cobb, 1976) concluded that much or most

of the beneficial health effects of social relationships are due to their buffering properties in the presence of stress. The meta-analysis of 93 studies by Schwarzer and Leppin (1989) and the review of Cohen and Wills (1985) found evidence for a stress-buffering model for perceived availability of support that are responsive to the needs elicited by stressful events. In contrast, there are also a number of early review studies (Alloway & Bebbington, 1987; Payne & Graham Jones, 1987) and a relatively recent one (Lakey & Cronin, 2008), that in common with my study, failed to find consistent significant support for the buffering potential of perceived social support with respect to the stressors. It has been suggested that stress-buffering represents a more complex set of pathways than the main effect pathways described in the preceding section, because of the involvement of stressors (Thoits, 2011)[21]. Possible explanations for contradictory results of my study with the most literature are considered below:

First of all, my study may have lacked power to test the interaction of SPS in the Nagi-GHQ association, as the sample size calculations were based on having a sufficiently large sample to detect important main effects, rather than interaction effects for which a much larger sample size may be needed (Smith & Day, 1984). Second, the cross-sectional design of my study meant that I only had information on the current availability and perception of social support. This may not always be a good reflection of longer term patterns of social support, which may be more relevant to mental health. Mental health usually changes slowly in relation to external factors including decline or increase in social support levels, so there may be a time lag in terms of the effect of external factors on mental health. Third, relatives and friends may increase their provision of support to an older person whose mental health seemed to deteriorating in the face of physical limitations. Such a reverse causation process would lead to a positive association between poor mental health and greater support and hence disguise any

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[21] In the presence of stressors, social support may increase coping capacities, encourage help-seeking behaviour, reduce the need for professional help, limit periods of disability, strengthen positive health-related behaviours (Stansfeld, 2006; Lakey, 2000; Minkler, 1981) and regulate the neuroendocrine response to stress (Kawachi & Berkman, 2001; Cohen et al., 2000). According to Kawachi and Berkman (2001), in the pathway between stressful events and mental health, social support may act in two main ways. First, in the face of a stressful event, perceived social support may promote less threatening interpretations of adverse events, thereby making them more manageable (Stansfeld, 2006; Lakey, 2000; Thoits, 1986). Second, after the occurrence of a stressful event, perceived or received support may reduce the negative emotional reaction to the stressful event or reduce the physiologic/ behavioural responses to stress.

buffering effect of social support. Fourth, compatibly with 'Contingent theory' explained earlier (Section 3.2.4), it is possible that the psychological disorders were so high among my participants that their current perception of social support was not sufficient and did little to ameliorate the effects of stressors. Cruza-Guet et al. (2008) suggested that the benefits of social support, particularly in elders who are severely distressed, may only be evident when congruency between needs and level of social support is achieved. Fifth, although in my study there was not a stress buffering effect of social support in the face of physical functional limitations (Nagi score), this does not necessarily imply that social support may not have had a buffering effect against other forms of stressor that I did not investigate. This is the reason that many social support studies (e.g. Aldwin, 1990) use inventories to test stress-buffering effect of social support against all the usual concerns of older people rather than using a specific and single stressor (Nemeroff et al., 2010). Discrepancies between my results and those of other studies which have investigated the stress buffering effect of social support may also reflect differences in the cultural background and context as well as differences between characteristics of study populations (Bierman & Statland, 2010). Lack of consistency in operational definition and measurement of social support in my study and previous studies may also be relevant (Cruza-Guet et al., 2008).

Cohen and McKay (1984) suggested that in order to see a buffering effect of social support there has to be a match between the type of support offered and the demands of a particular stressor (Matching theory). In the case of my study, there may not have been a sufficiently close match between the dimensions of the SPS and poor physical functioning to elicit an effective buffering effect. Another more specific matching theory is "Optimal Matching theory" which was proposed by Cutrona and Russell some years later in 1990. This theory differentiates between controllable and uncontrollable stressors and the life domain in which the stressor occurs. Cutrona and Russell (1990) proposed that uncontrollable events require emotional support, while controllable events require instrumental support to encourage the individual's efforts at problem solving. It has been argued that "optimal matches" between the individual's needs and support should buffer the psychological impacts of the stressor most effectively (Thoits, 2011). Poor physical functioning seems to be a controllable stressor that is optimally matched with instrumental support, rather than the support types included in the SPS. However, I argue

that the support types suggested as to be appropriate for a specific stressful condition by the above models may still vary by culture; a type of support matched with a condition in one culture may not be exactly matched with the same situation in another culture. Further culture-specific studies are thus required to investigate this assumption.

Associations between received instrumental social support and mental health

Despite the proposed conceptual model of the study, associations between being looking after during illness and mental health were not examined as there was little variation in the responses to this question (see Section 6.2). All the other types of instrumental support received from anyone showed strong main associations with mental health, but not support received from a specific source [22] (except in the case of financial support received from children). However, significant stress-buffering effect was found only for transportation support (Tables 6.3- 6.6).

The results of my study showed that those who lacked help with transportation, housework, paperwork and finance from anyone were respectively 3.3, 5.5, 3 and 4.5 times more likely to report poor mental health compared to those with some or a good level of support. Lack of financial support from children was also associated with an elevated risk of 3.6 (Tables 6.3- 6.6). The results of the wider literature on the main associations between received instrumental support and mental health are inconsistent. While many studies (Bolger & Amarel, 2007; Bolger et al., 2000; Finch et al., 1999; Barrera, 1986), including Iranian studies (Koosheshi, 2007; Motamedi-Shalamzari et al., 2002), have found no link between receipt of instrumental support and mental health or have found that receiving instrumental support is linked to worse mental health, there are also some studies (Lee & Dunkle, 2010; Cruza-Guet et al., 2008; Chi & Chou, 2001) that, like my study found a significant negative association between receipt of instrumental support and mental disorders. The results of my systematic literature review

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[22] Different forms of instrumental support showed similar main associations with mental health in this study. This may be due to the high correlation between receipt of the types of instrumental support measured. Bierman and Statland (2010) argued that different types of support are often intermixed within social relationships, and may even be performed by the same actor in a social setting. Thus, they suggested that measures which combine different types of support rather than using separate measures by type (as I did here) are likely to provide a more representative measure for the overall level of social support.

also showed weak evidence for main associations between instrumental support and mental health (see Page 71).

The studies with findings of no association or positive association between received instrumental support and mental disorders have offered two main explanations for this: first, they argued that receiving support may have some negative effects (in addition to positive effects) on older people's mental health. These negative effects might include lowered self-esteem, loss of control, demoralization and feelings of weakness and being dependent to others (Umberson & Montez, 2010; Brown et al., 2003; Liang et al., 2001; Kawachi & Berkman, 2001; Newsom & Schulz, 1998; Ulbrich & Warheit, 1989). Also, it is argued that sometimes support provided by others may be unwanted, ineffective and beyond or below a certain threshold, which may invalidate the beneficial role of support (Krause & Rook, 2003; Newsom & Schulz, 1998; Krause, 1997; Markides & Krause, 1985). Secondly, they have argued that positive relationships between received support and mental disorders may 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; Barrera, 1986). On the other hand, the second group of studies suggesting the important role of received instrumental support in improving mental health of older persons emphasized that the provision of tangible or enacted support may be especially important and even more important than other types of support for mental health of older people, due to the increased risk of physical limitations in old age (Bisschop et al., 2004b; Chi & Chou, 2001; Prince et al., 1997; Oxman et al., 1992).

Therefore, one possible reason for inconsistency in results among studies is variations in the age groups investigated. Older people, particularly those with more physical and functional limitations, may have a greater need for instrumental support than younger people. Older people with physical limitations, such as many of the participants in my study, 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, housework and paperwork. In other words, the need for enacted support among them was probably higher than the negative effects of

receiving visible support. It is argued that when people grow older, they often adapt to unfavourable situations and thus the stressors (e.g. negative effects of received support) that are detrimental for young people may not be as stressful among older people (Dale et al., 2010). Additionally, there may be an important cultural dimension which influences this association; many Westerners value independence and autonomy, while people from other cultures may value and prefer interdependence and exchange of support (Eyetsemitan, 2002), thus the lack of support may have more deleterious mental effects for them than for people from Western cultures.

The evidence from my study suggested that lack of support from a spouse or children was not associated with poor mental health, while lack of support from anyone (including spouse or children) was associated with poorer mental health. As shown in the tables (6.3- 6.6), the numbers not receiving any help in the "anyone category" is much lower than the numbers not receiving any support in the individual categories of spouse or children. From this I infer that the lack of association with poor mental health with spouses or children was because a high proportion was, in fact, receiving support from the other categories. For example, 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, I conclude that at least for help with transport, housework and paperwork, receipt of support is more important than source of support. In other word, in this context the main distinction is between receipt or not of support needed because of the very high need of my participants for instrumental support. With regard to financial support, I found an association of children's support on mental health (Table 6.6). Children were the main source of financial support of both men and women (see Table 5.6 and Section 5.3.2), thus 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. Methodological issues could also be relevant with regard to the lack of effect of spouse support. I necessarily excluded the non married from this sub analysis (n=185, 30% of all participants) with a consequent loss of statistical power. This is not relevant to the finding of the lack of effect of instrumental support from children, as only 17 people were childless.

With regard to the stress-buffering effect, for all types of instrumental support, the magnitude of ORs for lack of support from anyone and mental health in those with poor physical functioning was higher than for those in good or fair physical functioning. However, probably because of inadequate power of my study to detect interaction effects, only for transportation support was the p-value for effect modification less than 0.05. The confidence in the analysis is limited by the small numbers, especially in the group with poor physical functioning and not receiving support (10/167 for transport, 6/168 for housework, 9/164 for paperwork). These results also demonstrate that only a very small number of people did not receive any support and those people were indeed at high risk of poor mental health (Tables 6.3- 6.6). Based on the results of my own systematic review (see Page 74) and also other review studies (e.g. Cohen & Wills, 1985), there is little evidence to support the stress-buffering role of instrumental support according to the level of physical disability, although studies that have investigated this relationship have generally not been of high quality.

The findings on instrumental support in this study, as expected based on the earlier discussions (see Page 190) are compatible with the "Optimal Matching theory" (Cutrona & Russell, 1990); poor physical functioning seems to be a controllable stressor that is optimally matched with instrumental support. In particular, it seems that, compatible with "matching theory" (Cohen & McKay, 1984), there is a high match between transportation support against the demands of the stressor (physical functioning limitation) and subsequently a significant buffering effect was observed; whereas, other types of received support, particularly financial support and paperwork support, were less directly and sufficiently matched with the demands of poor physical functioning to create a significant stress-buffering effect for mental health.

Associations between structural social support and mental health

Inconsistent with my hypothesis, the analyses found no evidence for main associations between any of the three indicators of structural social support measured in this study and mental health.

In the case of number of children, there was no evidence for a higher prevalence of mental disorder among participants with fewer children (either daughters or sons) (Table

6.7). The available literature in this regard is inconsistent. Among the available Iranian studies while the studies of Kashfi et al. (2010), Mokhtari and Ghasemi (2011) and Ghaderi et al. (2012) found no significant association between number of children and mental health of older people, the study of Gholizadeh and Shirani (2010) found a weak negative correlation between increasing number of children and general satisfaction with life in older people (r = -0.10, p=0.04). The authors discussed that having more children is associated with poorer SES and this in turn is linked with lower life satisfaction. However they did not conduct an analysis which would have allowed the possible confounding effect of SES on number of children to be investigated. Evidence from South Korea (Chi & Chou, 2001) and Lebanon (Jawad et al., 2009), in contrast, showed that having more children was associated with fewer depressive symptoms among older people. It has been suggested that support from children depends on the number of children available to provide such support, and that the effect of number of children on mental health is mediated by social support (Knodel & Chayovan, 2009; Zimmer & Kim, 2008). On the other hand, it has been discussed that fewer children does not necessarily mean fewer caregivers for older parents. Simulations of future support scenarios in Asia have shown that fertility decline alone is not likely to result in the collapse of a traditional support system (Hermalin, 2005). Likewise, having more children does not in itself imply having more support as children could also be a source of tension for their elderly parents, in addition to or instead of a source of support (Byers et al., 2008). It has even been suggested that the decline in the number of children may result in improved inter-generational relations and thus in better care and support of older parents (Kinsella & Phillips, 2005).

Similarly, no association was found between less frequent visits with children (the second indicator of structural social support) and a higher level of mental disorders among the participants (Table 6.7). It has been suggested that frequency of meeting children by itself may not imply the level of social support received from children and the quality and desirability of social contacts rather than its quantity is more important in the psychological wellbeing of older people (Jawad et al., 2009; Han et al., 2007). Thus, I adjusted the analysis for the effects of quality of relationships with children, although the preliminary analysis showed little correlation between quantity and quality of relationships with children, suggesting that having more visits with children does not

necessarily mean an intimate relationship between parents and children or vice versa in the Iranian context.

As mentioned earlier, most of the participants reported a high level of interaction with children. However, it has been suggested that social contacts may be a source of both joy and distress in old age (Bisschop et al., 2004a) due to the complex nature of social relationships, which may provide social support as well as create burdens (Drageset & Lindstrom, 2005). Having more contact and interaction may create more conflict and tension due to the pressures and responsibilities stemming from a larger number of relationships (Stokes, 1983). A high frequency of contacts may also mean a lack of privacy for older people and conflict with norms of independence, although as discussed above, such norms may be culturally specific. Consequently, the costs and benefits of high interaction with children are complex but the final outcome of the exchanges between them did not appear to influence the mental health of older people in my study. Furthermore, there is a possibility of a reverse association between frequent visits and poor mental health such as depression. These comments are based both on my own understanding of Iranian culture or based on western literature (due to the lack of evidence for Iran) and thus need investigation in further studies in the Iranian context.

The third indicator of structural social support, living arrangement, also was not associated with mental health. The results showed that the odds of poor mental health was higher for those living alone than for those living with others (OR= 2.33), however, the difference between the groups was statistically weak (95% CI = 0.94-5.79, p=0.07) (Table 6.8). Research on the associations between living arrangements and psychological well-being of older people has largely yielded inconsistent findings in the literature. Studies from the United States, Hong Kong, Japan, the Netherlands, and Thailand have reported that older people living alone were more likely to be depressed than their counterparts living with others (Cheng et al., 2009; Chou & Chi, 2000; Mui, 1998; Chantamoon, 1996; Dean et al., 1992). These studies have argued that living with others helps to improve social support of older people, while individuals who live alone may face some potential disadvantages; for instance, there is a greater risk among people living alone that urgent needs for assistance in case of a crisis or accident remain unnoticed (Knodel & Chayovan, 2008). On the other hand, other studies, including one

Iranian study (Malakouti et al., 2006), have not found associations between living alone and higher levels of depressive symptoms (Lim & Kua, 2011; Lee & Dunkle, 2010; Darawuttimaprakorn & Punpuing, 2006; Chou et al., 2006; Kawamoto et al., 2005; Carey, 2004). Authors of these studies have argued that although intergenerational co-residence often results in older people receiving needed support, co-residence does not by itself appear to affect their psychological well-being.

One of the explanations for discrepant findings is the effect of 'loneliness'. In much of the earlier literature, the concepts and measurements of living alone and loneliness were often used interchangeably, and while they are not equivalent they should be distinguished (Lim & Kua, 2011). Although living alone may increase the risk for loneliness and loneliness is associated with depression (e.g. Cacioppo et al., 2002; Chou & Chi, 2004), not all older people who live alone feel lonely. In the study of Lim and Kua (2011) those older people who felt that their children had not provided the expected level of support, even though living with them under the same roof, felt lonely and reported poor mental health, while others, even living apart from children, did not perceive their needs as unmet by their children and did not feel lonely. Evidence from the Philippines (Peterson, 1990), Korea (Ehn, 1987), Indonesia (Florentina, 1991) China (Cai, 1991), and many other countries indicates that family members are still important in providing emotional support and care to their older relatives living alone. Additionally, in some contexts older people who live alone participate in social activities and voluntary organizations more frequently than others. In a longitudinal study of elderly Singaporeans (Lim & Kua, 2011) those who lived alone reported significantly higher frequency of social contacts than their counterparts who lived with others. Culture also seems to be important in the association between living arrangements and health. In collectivist cultures, such as Asia, where there is a strong emphasis on family togetherness, living alone may have a stronger negative effect on the well-being of older people than the other cultures (Lim & Kua, 2011). In the case of my study it also seems that there is a less strong tendency toward intergenerational co-residence among older people than those in some of the other settings (see Appendix 8).

There are recent trends in living arrangements in which older parents may live alone but in close proximity to children or other relatives allowing easy access to support sources

(Lim & Kua, 2011). Hermalin (2005) suggested that such arrangements might provide greater privacy for both older people and their children while retaining close interaction and the possibility of mutual exchange of support and care. Studies in Thailand (Knodel et al., 1995) and Philippines (Natividad & Cruz, 1997) have revealed a preference for this arrangement by both older people and their children, especially if the older people are in good health. In a focus group study in Thailand (Asis et al., 1995) both generations reported that lack of privacy was a disadvantage of co-residence. Therefore, it should not be assumed that co-residence is always the preferred option for older people even in Asian and ME countries where co-residence is common. The results of my study showed a high frequency of meeting of older people with their children while on the other hand there was comparatively less co-residency. There is a need for more studies on the links between living arrangements and the mental health of Iranian older people and particularly a need for research on a variety of settings including those living in smaller cities and rural areas where cultural norms may be different.

Gender role in associations between social support and mental health

The descriptive analyses provided evidence for considerable gender inequalities in SES and health status among older people in Tehran and suggest prioritising older women in social, economic and health improvement policies in Iran.

Taking a gender-specific approach could be important both for research and policy. According to Caetano et al. (2013), a gender perspective in health studies of older people is limited and in most studies of the association between social support and health, gender has only been considered as a confounder. According to findings from earlier studies in Iran (Tajvar et al., 2008; Koosheshi, 2007; Vahdaninia et al., 2005; Goshtasbi et al., 2003) indicating that older women are exposed to higher levels of stressors and thus need more social support, I, accordingly, hypothesised that the mental health of older women in comparison with older men would be more seriously affected, when their social support needs are not met. This hypothesis was tested in my study.

The results of my analyses were inconsistent depending on the aspects and types of social support. The comparison between the ORs of men and women showed that poor perceived social support and also poor instrumental support in the forms of help with

transport, housework and paperwork received from anyone had a worse effect on mental health of older women, whereas poor financial support received from anyone and living alone had a worse effect on mental health of older men. However, despite my initial hypothesis, the only measure of social support that its effect on mental health was significantly modified based on gender was paperwork support.

The finding that most of the measures of social support used in my study were more strongly linked with mental health of women than men is in line with most of the earlier studies. These studies found that social support is associated with the mental health of women only (Caetano et al., 2013; Rueda & Artazcoz, 2009) or women report more depression symptoms than men when they experience a lack of social support (Asfar et al., 2007; Cheng & Chan, 2006; Brugha et al., 1990; Slavin & Rainer, 1990).Women also appear to benefit more from support when it is available (Taylor et al., 2000; Matthews et al., 1999). Conversely, there are also studies showing that low perceived social support was associated with poor mental health in men only (Sonnenberg et al., 2013; Alexandrino-Silva et al., 2011) or that there was no gender difference in the association between social support and mental health (e.g. Bierman & Statland, 2010). Therefore, evidence on gender differences in the associations between social support and mental health is limited and not wholly consistent. The discrepancies among studies may be explained by different gender roles in the society, socializing patterns and cross-cultural variations between countries. Also, different characteristics including age, marital status and SES may confound or moderate the associations within men and women groups which may have been overlooked in analysis in some studies. Furthermore, there were variations in aspects and types of social support measured in the studies, each of which may operate differently as risk factors for psychological distress in men and women (Stansfeld et al., 1998).

The studies that found stronger psychological impacts of poor support for women offered several explanations for this. First, it is well-known that women tend to maintain more emotionally intimate relationships than men with others, regardless of age and marital status (Cheng & Chan, 2006; Gurung et al., 2003); thus women suffer more from lack of emotional support than men particularly from whom they feel emotionally close (Belle, 1982). Secondly, it is argued that women generally are more skilled and better

prepared to recruit and mobilize social supports from more people during periods of stress, while men are more reluctant to ask for help (Unger et al., 1999). However, this also means that the women who lack support during stressful events suffer mentally more than men do (Belle, 1982). Third, women generally provide more frequent and more effective social support to others than what they receive (Belle, 1982) and they feel more responsible toward other persons especially to their spouse compared to men (Sonnenberg et al., 2013). Consequently, as the flow of support is unequal [termed as "support gap" by Belle (1982)], they may feel burdened and overloaded and the result of receiving poor support may be demoralization and depression (Neff & Korney, 2005; Belle, 1982). Fourth, women in both collectivistic and individualistic societies (Kashima et al., 1995) may be more sensitive to their own and other person's need for support (Flaherty & Richman, 1989) and may feel in need of more support compared to how men feel in the same situation (Cooper et al., 1999). In my study despite the finding that women received more support than men, their perceived support was equal to that of men. Thus, lack of support may have more deleterious effects on women's mental health. Some or all of the above explanations may also be relevant to my study participants, as according to the ORs, most of the measures of social support were more strongly linked with mental health of women.

The ORs in my study also showed that the risk of poor mental health among men with poor financial support from anyone was marginally higher than that of women. The possible explanation for this is that men are usually known as the head of household (73% men vs. 27% women in my sample) and have the breadwinner role and dominant position in family particularly in past generations in Iran. Older women's economic well-being usually depends more on family or spouse than individual economic position, while men usually depend only on their own. Therefore when men are poor and do not receive financial support, not only their own material needs remain unmet, they feel inadequate in fulfilling their breadwinner role and meeting their family's financial requirements, which could be highly stressful and thus more depressive. Living alone also showed a worse effect on the mental health of men than women (OR 5.2 vs. 2.0). In my study living alone among older people also means being widowed/widower, as all the married people were living with their spouse and there was a high correlation between marital status and living arrangements (r=0.81). I suppose that the most

negative psychological effect is attributed to widowhood rather than living alone as living alone did not show a significant main association with mental health (Model 2, Table 6.8). According to Alexandrino-Silva et al. (2011) widowers may be more vulnerable than widows to the lack of spousal support, because spouse is the main source of support of men in most cultures. In the prospective study of Sonnenberg et al. (2013), male respondents living alone were more likely to experience onset of depression than women.

Lack of support with paperwork from anyone, despite the methodological limitations discussed earlier, showed a significant gender interaction in the association with mental health (Table 6.5). Women who did not receive paperwork support from any source were more than 14 times more likely, compared to those who did, to have poor mental health, whereas lack of this type of support among men seemed not to be important for their mental health (p interaction=0.03). This finding is not surprising; a very high proportion of older women (63%) was illiterate or had primary education only (26%) (see Section 5.1). Also, most of them lacked required knowledge and skills to do their own paperwork affairs, as in Iranian households these kinds of activities are mostly male roles. Therefore, provision of paperwork support, compatibly with the matching theory (Cohen & McKay, 1984) discussed earlier, seems to be absolutely essential for illiterate and unskilled older women and the absence of this type of support might be very stressful and threatening for their psychological wellbeing.

Role of sources in associations between received support and mental health

The descriptive results from my study indicated that the family was the main source of support for older people and more distant relatives and friends provided only a little support (Table 5.6). Specifically, my descriptive findings 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; Chappell, 1992). In a further question, also consistently most married men reported their best relationship was with their wife, while most married women reported their best relationship was with their children.

A number of theories have been proposed related to the sources of social support. '*Hierarchical compensatory theory*', proposed by Cantor (1979), declares that older individuals exhibit a hierarchy of preferences regarding who should provide support. Based on this theory, older people prefer to receive support from spouses; then, they turn to children, followed by other relatives, friends, neighbours, and finally to professional services. However, the study of Penning (1990) rejected this theory and instead offered '*Task-specific theory*', declaring that there are differences in the ability of particular groups to provide different types of support rather than a hierarchical structure. According to Penning, neighbours can best handle immediate emergencies; friends usually offer support with social and leisure activities and areas that require agreement and positive affect; and kin are most appropriate for long-term commitments such as personal care. My descriptive findings lend little support for the hierarchical compensatory theory. Irrespective of gender, three types of support, including looking after when ill, transportation and housework support were primarily provided by spouse, but paperwork and financial support were primarily provided by children. Considering gender, paperwork and housework were also primarily provided by children for men and women respectively (Table 5.6). Therefore, it seems that in my study a role differential in provision of different types of support from different sources (task-specific theory) is more appropriate than the hierarchical pattern, although these theories are drawn from studies of Western populations. For instance, Iranian older men may be less likely to expect support with paperwork from their wives, due to the high illiteracy rate among older women (OR= 0.91, p=0.87).

According to the patterns of preferred sources of support among Iranian older men and women based on the earlier literature (Koosheshi, 2007), I initially hypothesised that the lack of support from a spouse has a more serious effect on mental health of men and lack of support from children 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 provided by spouse and children for men and women in the hypothesised direction, the p-values suggested little evidence to support the hypothesis. Also, small numbers in some of the categories of support from spouse and from children limits the confidence in the analysis and a sensible interpretation of the results (Tables 6.3- 6.6).

According to the ORs which were all in the expected direction, it is possible that my study was underpowered to detect the real differences between the ORs, thus, conducting further studies with a larger sample in Tehran are suggested. Another explanation for this result is that although men preferred support from spouse and women preferred support form children, there could be a substitute source of support in the absence of support from the desired sources, which may have attenuated the negative effects of lack of support from the preferred sources. Additionally, the role differential in Iranian family, as mentioned above, may also explain the differences in the magnitude of the ORs.

It is possible that the preferences of older people to receive support from different sources vary by culture and setting, in addition to gender. Studies from Brazil (Alexandrino-Silva et al., 2011) and Turkey (Kara & Mirici, 2004), contrary to my study, suggest the importance of specific support sources for the mental wellbeing of older people. On the other hand, some US studies of older people (Jeon, 2005; Carey, 2004; Dunkle et al., 2001) found little effect on depressive symptoms of support from children in contrast to older people living in South Korea (Lee & Dunkle, 2010; Han et al., 2007). In another US study adult children were described as more a source of tension for their elderly parents, rather than a source of support (Byers et al., 2008). Even among South Koreans, instrumental support from adult children attenuated depression in the presence of worries only when this kind of support helped the older people feel a strong emotional relationship with their adult children (Lee & Dunkle, 2010).

7.5 Speculations on Health of Future Iranian Older People in Relation to Family Support, According to the Study Findings

An important conclusion from the results of my study is that, contrary to my hypothesis, none of the social support measures related to children (except financial support received from children) showed an association with mental health[23]. Consequently, despite the

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[23] There was no evidence from my study that having fewer children, or less frequent meeting them, or living in separate residence are associated with a higher risk of mental disorders for older people versus having more children, or having more contact or living with them in the same residence. Similarly, the participants lacking instrumental support from their children had no more risk of mental disorder compared to those who benefited from children's instrumental support (See Chapter 6).

initial assumptions of this thesis and concerns of Iranian authorities, there is little evidence from my study that in future generations fewer children will lead to reduced social support of older parents and thereby negative effects on their mental health.

In my experience and based on some evidence from Iran, older people with larger families and more children, although they potentially have more support sources, may also have higher living expenses and lower SES (Gholizadeh & Shirani, 2010), little or no free time to spend on themselves, little or no privacy, more conflicts stemming from a larger number of relationships, and are exposed to demands from more children (for example to provide separate dwelling for married sons and 'jahiziye'[24] for married daughters). Therefore, it cannot be assumed that more children necessarily means more support but the characteristics and behaviour of the children may be more important than their number for the mental wellbeing of their parents.

It has been argued that "parents increasingly recognize that large numbers of surviving children do not guarantee a contribution to their support, and that educating and ensuring the health of a smaller number of children may be a better investment" (UNFPA, 1998: 35). Compatible with 'exchange theory' (Himes, 1992), it is also suggested that with fewer children, more attention and resources can be devoted to each and this perhaps may improve their potential for supporting parents later on (Asis et al., 1995). Also, some believe that the decline in the number of children may result in improved inter-generational relations and in better care and support of older parents (Kinsella & Phillips, 2005). This topic has been extensively investigated by John Knodel in developing countries especially in Southeast Asia and particularly in Thailand. In a recent study by him and his colleague to investigate the future of family support for Thai older people (Knodel et al., 2013) it was found that currently adult children generally proclaim willingness to live with and care for parents. However, it remains an open question whether these intentions will be carried out in future especially if they have established themselves and their own conjugal families elsewhere. Thus, a major disjuncture exists between norms and the changing empirical reality in Thailand. In Iran, due to the lack of evidence it is difficult to speculate how the intergenerational relations and emotional support of future older people would vary than those today, yet, it is at

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[24] The bride's family's responsibility to provide all the furniture and household appliances, called 'Jahiziye', required for the couple's new life together.

least expected that most of the future adult children in Iran would be better educated and more wealthy, thus may have more potential to provide instrumental support for their parents. Formal support also is expected to be more available for Iranian older people in future than today, because of rapid increase in proportion of older people and pressure of public and relevant NGOs on government for preparing better living conditions for older people. Therefore, it seems that there are little reasons for a significant distress about the social support of future older people and their mental health in Iran.

This notion seems to be especially true when considering characteristics of future older people compared to their counterparts today. It has been projected by the UNFPA (1998) that future older people in the world, especially older women, in general would be healthier, better educated, have paid jobs or more pensions and have larger and more diverse social networks and friends outside the family. Thus, they would have alternative sources of support on which to draw and generally more empowered to contribute to family and community, which might be sufficient to compensate for the absence of children. For instance, it is less likely that lack of financial support from children in future would have the same negative effect on mental health of older parents, as it has today based on my study (Table 6.6), because of probably lower financial needs of future older people. However, it is not known whether, for example, higher education in future would have the same effect on social support and health of older people as it has today in Iran, because many older people in future would have higher education.

For current or future childless older people or those with not accessible children, however, special attention in policy interventions is required. Childless older women should particularly be prioritised, because children were reported to be the main sources of support of older women (versus spouse for older men) and lack of support from children may challenge their health more negatively. Currently, while older people have on average 4.6 living children, 21% of women and 3% of men are living alone. These numbers are expected to be much higher among future older people. Although 'living alone' was not found to be associated with poor mental health of older people, this may be because a large proportion of them (74%), particularly women, have daily visits with at least one child, which is not expected to be such in future due to having no or few children. Currently, policies that empower older people, particularly older women, to be

less dependent on their children or support themselves are required. Change in this area will arise in any case in future due to the recent large improvements in the educational status of women. Nevertheless, it is will be necessary to increase the number of currently limited residential institutions or nursing homes by the next decade for those older people who will remain without care or alone, either by choice or circumstance, or to provide equivalent long-term care at home.

My research similarly did not provide evidence of an important role for spousal support as a protection against poor mental health. In the future, however, it may be that this becomes more important as people will have fewer children to provide alternative sources of support. It is very difficult to speculate on the changes that may happen in the quantity and quality of spousal support among Iranian older people in future. However, I suppose that the availability of spousal support would be generally higher among more recent cohorts compared to current cohorts. Demographic changes and decline in mortality rate[25] predict there will be fewer widowers/widows (particularly widows) in the future as the age of losing a spouse will be later. Also, the age gaps among future older people will be smaller than in current cohorts[26], proposing a shorter period of widowhood among recent cohorts, particularly women, and thus having longer period of spousal support in their old age. On the other hand, it is expected that the proportion of never married[27] and divorced older people [28] will be higher in future, a group who will need special attentions, particularly the first group, due to lacking both spousal and filial support.

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[25] There is an increase in life expectancy at birth of Iranian people from 37 for men and 40 for women in 1956 to 69 for men and 73 for women in 2008 (SCI)

[26] There is an increase in mean age at marriage for Iranian women from 18.4 to 23.3 and for men from 25 to 26.2 from 1966 to 2006 and therefore reduction in the age difference between couples is expected (SCI-census data).

[27] The proportion of Iranian women who were never married by age 30-34 has increased from 1.7% in 1966 to 9.3% in 2000 (Doroudi Ahi, 2001; SCI, 2000)

[28] Based on the National Organization for Civil Registration (NOCR) in 2006, overall marriages across the country decreased 1.2% compared to the previous year, while the registered divorces increased 12% compared to the year before. In 2010 registered divorces showed a 9% increase compared to the year before. An unofficial source (reported by Tabatabayee in Aftab national newspaper) based on the NOCR statistics reported that divorce rate has had 37% increases during 2005- 2010.

7.6 Recommendations for Policy and Practice

In this section, the study findings are translated into a series of recommendations for policy and practice that aim to improve the health status of older people.

Of the most important findings was a strong adverse relationship between perceived social support and mental health with a nearly fourfold increase in the chance of having poor mental health in those with low SPS scores. This robust finding with a high internal and external validity (see Section 7.3) supports the main hypothesis of the study which was the basis for deciding on the study sample size and design. Similarly, strong main associations were also found between different forms of instrumental support received (from anyone) and mental health.

Associations found between functional social support and mental health imply that developing appropriate social support interventions for older people lacking such supports would be beneficial in terms of their psychological wellbeing. With regard to developing perceived social support interventions, one way forward would be to focus on strengthening the functions of the SPS as defined by Weiss (1974) (including provision for attachment, social integration, opportunity for nurturing behaviour, reassurance of worth, guidance, and reliable alliance) because having poor status in any of these functions is linked with poor mental health. In particular, actions should be taken to enhance 'social integration' function of SPS among older people, as it had the lowest score among the others (Table 5.4). Possible pathways linking each of the functions of the SPS to mental health, discussed in Page 187, may also be useful for guiding the development of appropriate policy interventions.

With regard to developing appropriate instrumental social support interventions in the context of my research, considerations should be taken to focus on the needs and demands for support types with higher priority among older people, according to the study findings. Financial support was the uppermost and most unmet need of older people (Table 5.6). This is important, particularly as it may be that older people in other parts of Iran are even more likely to have unmet financial needs. In provision of instrumental support for older people full considerations should be taken to avoid from

possible negative effects of received support as much as possible, discussed in Page 191, as they may lower or invalidate the beneficial role of instrumental support.

Regardless of the types of social support, to design appropriate interventions and strategies to enhance social support of older people the following general considerations are needed to be taken: first of all, any intervention in policy and practice should be evidence based, preferably guided by prior qualitative studies and, where possible, randomised controlled trial of specific interventions. Also, in this stage, holding national congresses for researchers, social workers and policymakers may be useful to share experiences and facilitate communication among them which helps to find resources for social support and discuss possible policy interventions. Secondly, any intervention should be appropriate for each community setting, as not every intervention successful in one community and in one group of population would have the same result in others. Third, further studies are required to identify congruence of types of support with the social support needs of older people in the Iranian context. Any policy intervention should also be matched with individual characteristics of older people and policies that are developed for future older people should take account of changing characteristics of future older people. Fourth, proposed policies could be either preventive or remedial and either general or selective of those exposed to higher risk of low social support and stressful life events, based on the results of studies. Finally, proposed supportive interventions for older people should not only be provided by government, but also by the public (e.g. family and relatives, social organizations, work place). For instance, establishing charitable organisations to harness volunteers to take care of older people at their home particularly for those who have fewer available carers may be a useful intervention. Given projected marked increase in the number of older people in Iran in near future it would be difficult for government to take full responsibility in this regard.

The descriptive analyses provided evidence for considerable gender inequalities in favour of older men in SES and health status (see Page 141), demanding for prioritising older women in relevant interventional programmes. In planning social support interventions, also a gender-specific approach should be taken, because social support needs of Iranian older men and women and their psychological effects on these groups are different. According to descriptive findings, older women needed and demanded for

all the types of instrumental support more than men (see Section 5.3.2). Perceived social support was also slightly lower among women (see Section 5.3.1). Multivariable analyses also indicated stronger psychological impacts of poor support for women. Therefore, women should be in focus of social support interventions. Specially, lack of support with paperwork among older women had considerable negative effects on their mental health (Table 6.5). Further research is required to specifically investigate the ways that best meet different paperwork needs of older women in the community of Iran. However, in the special case of poor financial support, which had a worse effect on mental health of older men, focus should be on men prior to women (Table 6.6).

My study analyses also indicated that all the ORs for the stress-buffering effect of perceived and different types of received support were in the hypothesised direction, however, none of the social support measures (except transportation support) alone was powerful enough to have a significant buffering effect against harmful effects of stressors (e.g. functional limitations) on mental health of older people. Generally high prevalence of psychological disorders among older people in Tehran may imply that the collective negative effects of the stressors including functional limitations on their mental health were higher than the collective positive effects of social support measures. Consequently, along with strategies to enhance quantity and quality of social support to improve mental health of older people, other strategies should also be simultaneously developed to combat their common life stressors or limit harmful effects of stressors, as in this case a synergic effect may also occur. Example is providing accessible physical and social environment, safe and accessible home and adequate equipments and facilities for older people with physical functioning limitations to improve their physical mobility and travelling possibilities, as poor physical functioning ability was found as an key stressor, associated strongly with poor GHQ score of my study participants (Table 6.1).

7.7 Future Research Priorities

In addition to the need for research on the appropriate policy interventions, recommended above, a number of recommendations for the direction of future research and areas that merit further investigation, again explicitly based on my research findings, are highlighted below:

Firstly, the factors associated with high rate of mental disorder among older men and women should be prioritised in health services research in Iran.

Secondly, the finding of my research that there was no significant main association between indicators of structural social support (number of children, meeting them, and co-residence with children) and mental health should be further investigated. Whatever I discussed in this regard earlier was based on my own understanding on the Iranian context and culture. Exploring this is a research gap which may be answered best through qualitative studies. Such studies may also help to explain the lack of a significant effect of specific sources of support on the mental health of older people found in my research.

In the case of investigating the stress-buffering effect theory of social support, it is suggested that further studies use inventories that appropriately measure all the usual concerns of old age rather than using a single stressor such as limitations in physical functioning, as I did in my study. Inventories could be more informative and valid to test the stress-buffering hypothesis (Nemeroff et al., 2010).

Another research priority is to focus on the possible pathways and mechanisms whereby social support influences health and test explicit hypotheses regarding these proposed pathways. Understanding these pathways would help in the development of more valid and effective social support interventions. Pathways may vary in different contexts and especially between Western and non-Western countries, so studies in different settings are needed. An extensive qualitative study may suggest other explanations for social support-mental health linkages in the community of Iran.

Furthermore, very similar findings and high correlations were found among the types of received instrumental support measured in my study. It is recommended that further studies use measures which combine different types of received instrumental support rather than using measures of single stressors, in the case of my study. These may provide a more representative measure for the overall level of received instrumental social support (Bierman & Statland, 2010).

Additionally, despite the evidence that received support and perceived support are distinct and not highly correlated (Uchino, 2009; Haber et al., 2007; Wills & Shinar,

2000), the "social support deterioration deterrence model" (Norris & Kaniasty, 1996) suggests that the effect of received social support on health is mediated by perceived social support. This would merit further investigation in future work, as correlations between them have implications for social support interventional programs.

My study had a number of limitations that further research should address. For example, my 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, my study was cross-sectional so I only had information on the current availability and perception of social support. This may not always be a good reflection of longer term patterns of social support, which may be more relevant to mental health. Undertaking a longitudinal study may help to address this concern and also clarify the direction of relationships, which is necessary before developing effective social support policies. Also, the validity of the Farsi GHQ-15 and its proposed cut-off point to screen cases with mental disorders and the validity and reliability of the Farsi SPS for use in the older population in Iran should be fully evaluated before using in further studies. Moreover, I excluded older people living in institutions from my study, because currently a very low proportion of older people in Tehran are living there. However, it is expected that in the future there might be a considerable rise in older people living in institution. Thus, it is recommended that future studies target institutionalised older people, as well as those in the community, to identify their support availabilities and mental health effects.

Finally, to anticipate future support scenarios of older people in Iran and the effect of fertility decline on the current traditional support system, further investigation using studies with simulation techniques is recommended. Such simulation studies might also be designed to investigate possible scenarios with regard to spousal support in the future.

7.8 Dissemination of Research Findings

Various strategies will be used to ensure that my study findings reach a broad audience of policymakers, as well as other researchers working in the relevant areas.

First, many of the findings from this research are likely to be particularly relevant to the health ministry of Iran. As part of the requirements for all the students studying who were funded by the Ministry of Health, a detailed report will be prepared reviewing the research objectives and methods, and focusing on the specific lessons learned from this research. This report will also focus on the specific issues that would need to be considered by the ministry. Specifically, a meeting will be scheduled with the Elderly Health Department of the Ministry in order to share these research findings and also provide an opportunity to collaborate and working with them on further research or policy.

Second, following a previous presentation of part of my research in the Public Health School of the TUMS (which was well received by many of doctoral students and researchers), I will give a further presentation in the TUMS to share research methods, fieldwork activities, research findings and their implications for future of Iran with other researchers. A summary of the findings will also be made available for download from the TUMS website for use by other researchers in this area.

Third, disseminating the relevant findings from this study to older people is essential for ensuring that they directly benefit from the research. I will schedule a presentation for older people who have membership in "Farhangsaraye Salmandan", which is a socio-cultural welfare organisation, administered by the Municipality of Tehran. This meeting will also help to receive the comments of older people in my research and to maintain their engagement in future research endeavours.

Finally, dissemination at national and international conferences and through academic publications is another strategy. The following presentations have been given at international conferences already:

● The International Association of Gerontology and Geriatrics Conference in Swansea University (UK), July 2010: *"The influence of family change on social support and health of ageing population in Iran"*

● VII IAGG European congress in Bologna (Italy), April 2011: *"Consequences of family changes in social support of older people in Iran"*.

● VII IAGG European congress in Bologna (Italy), April 2011: *"Perceived social support and mental health in ageing population of Iran"*

Abstracts of the last two presentations also published in "Aging Clinical and Experimental Research" journal, Vol 23, Suppl. To No. 1, Feb 2011

The following paper based on this PhD research was also published, cited as below:

● Tajvar, M., Fletcher, A., Grundy, E. and Arab, M. (2013), "*Social support and health of older people in Middle Eastern countries: A systematic review*." Australasian Journal on Ageing, 32: 71–78

● Another paper entitled "*Exploring Associations between Social Support and Mental Health in Older People: A systematic Narrative Review*" also was accepted for publication in International Journal of Geriatric Psychiatry (manuscript number GPS-15-0270).

Several other papers are also under preparation for publication.

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APPENDIXES

Appendix 1: Family changes in Iran

Appendix 2: Figure of prevalence of selected common chronic conditions among older people in Tehran, 2011

Appendix 3: Table of selection stages of eligible studies for systematic review from different sources

Appendix 4: The study questionnaire

Appendix 5: Table of further characteristics of participants, by gender

Appendix 6: The table of cumulative relative frequencies of GHQ-15 scores of study participants

Appendix 7: The sex ratio of the older population in Iran

Appendix 8: Mental health status and social support of older people in Tehran

Appendix 1: Family changes in Iran

Some of the important indicators of demographic and family changes in Iranian society (for which data are available) are summarised and highlighted below:

● The decline in the TFR from 7.7 in 1966 to 1.9 in 2006 (Aghajanian & Mehryar, 1999; Abbasi-Shavazi & McDonald, 2006) and decline in household size from 5.4 in 1966 to 4 in 2006 (partly reflecting smaller family size) (Abbasi-Shavazi & Askari-Nodoushan, 2008)

● The increase in the use of birth control between marriage and the first pregnancy from 3.4% in the marriage cohorts of 1971-1975 to 20.3% in the 1996-2000 marriage cohorts (Abbasi Shavazi et al., 2009a)

● The increase in mean age at marriage for women from 18.4 to 23.3 and for men from 25 to 26.2 from 1966 to 2006 and associated reduction in the age difference between couples (SCI-census data). Also, the increase in the proportion of women who have not married by the age of 15-19 from 53% to 82% during the same period as above (SCI-census data) and by age 20-24 from 21% in 1976 to 50% in 2006 (Abbasi Shavazi et al., 2009a). Also the proportion of women who were never married by age 30-34 has increased from 1.7% in 1966 to 9.3% in 2000 (Doroudi Ahi, 2001; SCI, 2000).

● The increase in the proportion of women participating in the choice of their spouse from 18% of the 1960-64 marriage cohort to 54% of the 1995-2000 marriage cohort (Askari-Nodoushan et al. 2006)

● The increase in the proportion of literate females aged 6 years and older from 18% in 1966 to 80% in 2000 (Abbasi Shavazi et al., 2009a) and higher participation of women in university education to the extent that female students now outnumber men. In 2008, the proportion of women in university classes was 64% (SCI). Additionally, greater participation of women in important political positions, for example, selection of a woman as a minister (health minister) for the first time in the history of Iran in 2008.

● Increased urbanisation from 31% to 61% between 1956 and 1996 (UN, 2014, Human Development Index).

● A 37% increase in divorce rate in the 5-year period between 2005 and 2010 (NOCR).

Appendix 2: Figure of prevalence (%) of selected common chronic conditions among older people aged 60+ in Tehran by gender, 2011

	Asthma	Diabetes	Hypertension	Osteoarthritis	Heart Diseases	Stroke	Cancer	Visual Impaiments	Hearing Impairments
Men	5.6	17.4	32	48.1	30.1	16.1	1.2	36.3	11.5
women	6.5	19.9	54	78.3	37.6	10.6	1.2	39.4	13.3
Total	6	18.6	43	63.2	33.8	13.3	1.2	37.9	12.4
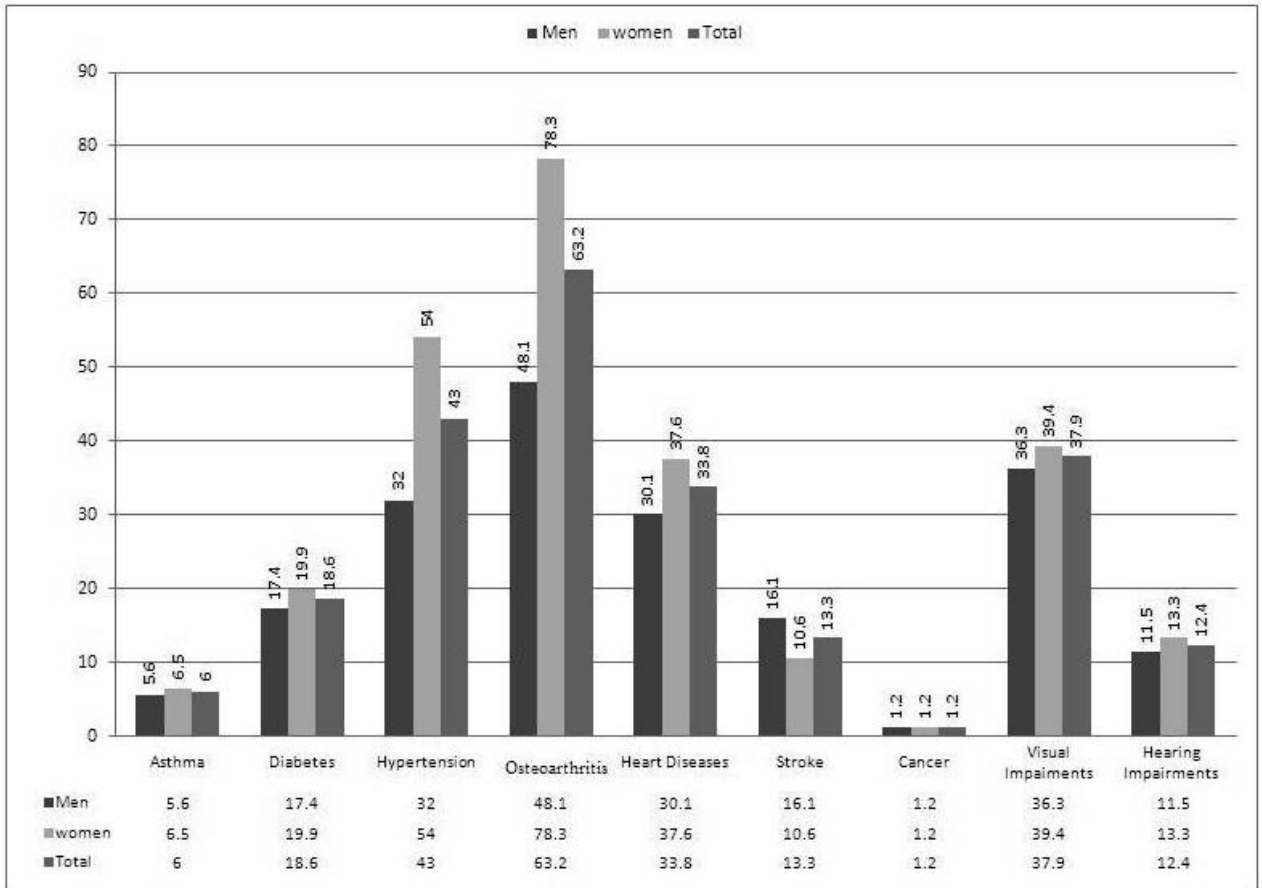
Source: This survey

Appendix 3: Table of selection stages of eligible studies for systematic review from different sources

Sources Searched	1. Citation retrieved initially in online searching*	2. Citations remained after reading abstracts	3. Final included studies **
Electronic Searching:			
- Centre for Review and Dissemination (CRD)	9	0	0
- (CAB Abstracts, EMBASE, Global Health, Medline, Social Policy & Practice) searched via OVID	556	45	5 (1R+4O)
- Cochrane Collection databases	99	8	0
- FRANCIS	31	6	0
- Psychology portal (inc PsycArticles, PsycEXTRA, PsycINFO) searched via EBSCOhost	194	37	3(1R+2O)
- IBSS (social sciences)	314	14	0
- Age Info	0	0	0
- IMEMR	4	0	0
- Eldis	9	1	0
- ISI Web of Science (Journal Citation Reports)	325	67	7(1R+6O)
- PubMed	317	41	3 O
- JSTOR	57	6	0
- Theses: - EThoS (UK theses),	27	0	0
- Dissertations & Theses (N. American PhD theses),	25	5	1O
- Index to Theses of the British Isles	35	1	0
Grey Literature:			
- New York Academy of Medicine Grey Literature Report	22	1	0
- Open Grey	28	2	0
Hand Searching:			
- Annual reviews (public health, psychology, sociology, nursing research, Gerontology and Geriatrics)	-	-	1R
- Journal of Age and Ageing	-	-	0
- Journal of Social Science Medicine	-	-	2(1R+1O)
- Asia - Pacific Population Journal	-	-	0
- Eastern Mediterranean Health Journal	-	-	0
- Middle East Journal of Age and Ageing	-	-	1O
Papers by searching the bibliography of the included papers:			
	-	5	1R
Papers by searching the main authors of the included studies:			
	-	8	0
Final Results	**2052**	**247**	**23 (6 R+18 O)**

* The numbers in the first column include duplicates but in the next two columns the duplicates were removed

** In the last column, R stands for Review articles and O stands for Original articles.

Appendix 4: The study questionnaire

Entrydat. Name of who entered data…..

Intervie. Name of fieldworker…………   *code.* Code of respondent …………

District. District…………………….   *Neighborhood.* Neighbourhood ………………………

Address…………………………… …………………………………… Tel…………….

Housenum. The number of household members □

over60. The number of people 60+ years in this household □

sampnum. The number of Sample in this household □

relation. If there is more than one over 60, what is their relationship? ……………………………….

Head. Who is head of household? □ 1.Mysef   2.Spouse   3.Children   4.Grandchildren   5.Brother/sister   6.Other

Date of interview…………………….   *Duration.* Interview started at…… finished …….

Other. Was someone else listening and present while interviewing? 1.Yes   2. No

Translat. Did somebody translate this interview for you? 1.Yes   2. No

---

Hello.

I am a research student working with Tehran University of Medical Sciences. I am conducting a study on the family circumstances and health of senior residents of Tehran city. I would like to ask you some questions about your family, your health and your social support. It is important for policy makers to have information of this kind to help them understand the needs of older residents.

All the information that you choose to provide is voluntary, and will be kept strictly confidential. You are free to stop the interview at any point, without giving any reason, or to not answer any of the questions that we ask.

Have you got any questions you would like to ask? Are there any things you would like me to explain again or say more about?

Do you agree to be interviewed? *Record response   Yes / No*

If you have any other question about this study later, you can contact me, Maryam Tajvar, at [INSERT PHONE NUMBER].

Thank you.

Signed (participant):…………………………… Date: ……………………………….

D. DEMOGRAPHIC INFORMATION

D1. Gender of respondent: 1.Male☐   2.Female ☐

D2. How old you are (should be checked with the year of birth)? Year…….….…

D3. Where did you born? (Country/City)……………………………….

D4. How long is it that you are living in Tehran……………

D5. What is your main language? (ethnic or cultural group)

1. Persian ☐   2.Azari ☐   3.Lori ☐   4.Kordish ☐   5.Shomali ☐   6.Baloch ☐   7.Arab☐   8.other…

D6. What, if any, is your religion? ☐

1. Islam (shia)   2.Islam (Sonnet)   3.Jewish 4.Christian 5.No religion   6.Other

D7.How important is religion in your life? ☐   1very important   2 somewhat important   3 not important

D8.What is currently your marital status? (if choice 2 go to Q16)

1. Married   2.Never married   3.Divorced (time being divorced)   4.Widowed (time being widowed)

D9. What was your age at first marriage? …………

D10. How many times did you marry? …………….

D11. Do you have children from your past marriage(s)? 1Maried just once   2Yes   3 No   4.If yes how many

D12. How about your last spouse? How many times did he/she marry?......

D13. Does he/she have children from his/her past marriage(s)? 1Maried just once   2Yes   3 No   4.If yes how many

D14. How many (alive) children you have currently with your (last) spouse?......

D15. Do you have kinship relationship with your (last) spouse? 1 Yes   2 No

SES. SOCIO-ECONOMIC STATUS

SES1. Highest degree of education achieved? ☐

    1. Illiterate   2. Primary school   3. High School   4. Diploma   5. University Qualification   6. Religious educations

SES2. Your current occupation status: ☐ 1.Employed   2. Retired (with income) 3.housekeeper/unemployed (no income)

SES3. What has been your main Job throughout your life? ………………….

SES4. What has been your spouse main Job throughout his/her life? ………………….

SES5. How is the economic status of your household? ☐

    1. Dependent to others   2.enough for living expenses but unable to save   3.more than required and can save

SES6. How you describe your economic status compared the average of people in Tehran? ☐ 1. Poorer 2.average 3.better

SES7. What is/are the sources of your living expenses? ☐

    1.Current job   2.saving/wealth   3.pension   4.children or others financial support   5.formal support

SES8. How much is currently the level of your investment or saving: ☐ 1.Nothing or Low   2.Moderate   3.High

SES9. What type of home you are living in? ☐ 1.living in children's house 2.Owner 3.shared ownership 4.Rented 5.Other

SES10. What is the size of your accommodation per person? ☐ 1.Less then 25SM 2. 25-6025SM   3. More than 60 SM

SES11. Do you receive any financial help from any governmental/charity organisation?

    1. No   2.Yes Emam committee   3.Yes Welfare organisation 4. Yes other organisations

F. FAMILY INFORMATION (The grey cells do not need to be completed)

Family (Only alive members)		Family structure and characteristics								Living arrangement
		Age	Gender *Male 1* *Female 2*	Children No		Marital status *Married 1* *Never married2* *Divorced 3* *Widowed 4*	Economic status *better 1* *average2* *poorer 3* *Still young ad dependent 4*	Occupational status of …. *employed 1* *Retired 2* *housekeeper/u nemployed3* *Student 4*	Highest educational degree achieved? *Illiterate1* *Primary school2* *Diploma 3* *Upperdiploma/BSc 4* *Postgraduate 5* *Religious certificates 6*	*Where are living the following people?* *With me 1* *same neighborhood 2* *same city3* *same country4* *Abroad 5*
				Daughter	*Son*					
		Age	Sex	D	S	Mar	Econ	Ocup	Edu	LA
Spouse S										
P	Father F									
	Mother M									
Children (older to younger)	C1									
	C2									
	C3									
	C4									
	C5									
	C6									
	C7									
	C8									
In-laws for children in the above order	L1									
	L2									
	L3									
	L4									
	L5									
	L6									
	L7									
	L8									
Sisters (older first)	Si1									
	Si2									
	Si3									
	Si4									
	Si5									
Brothers (older first)	B1									
	B2									
	B3									
	B4									
	B5									

Fsize Family size:

Spouse N	Children N		Grandchildren N		Great-grandchild	In-laws N	Sister/brother	Parents	Total
	Daughter	Son	Daughter	Son					
1	2	3	4	5	6	7	8	9	10

Fmember Household size: How many people are currently living with older people?.............

FLA2 If no one, so: 1. Alone ☐   2. Other relatives ☐   3.Unrelated people ☐   4.No stable place for living ☐

SS. SOCIAL SUPPORT
SS. Received Social Support (Source, type and level)

Sources of Support		RSS 1.Quality and quantity of relationships		RSS2.Instumental social support				
		1.1 How often do you meet: *every day 1 at least once a week 2 at least once a month 3 Several times a year 4 Not at all 5*	**1.2** How your relationship is intimate and close: *Very much 1 Highly 2 To some extent 3 A little 4 Not at all 5*	**2.1**. if you confined to bed, how much….looki ng after you? *Not at all 1 To some extent2 Most of the time 3 Don't know 4* (looking after)	**2.2** If you need to go out for shopping or visit a doctor, how much…helps you in this regard? *Not at all 1 To some extent 2 Most of the time 3 Don't know 4* (Transporting)	**2.3**.In the indoor works, such as repairing something, deep cleaning, how much….helps you? *Not at all 1 To some extent 2 Most of the time 3 Don't know 4* (Indoor)	**2.4**.in the outdoor works, such as bank and other official works, how much….helps you to do that? *Not at all 1 To some extent 2 Most of the time 3 Don't know 4* (Outdoor)	**2.5** If you need some money, how much…will provide this money to you? *Not at all 1 To some extent 2 Most of the time 3 Don't know 4* (Barrowing)
Spouse S								
Children (older to younger)	C1							
	C2							
	C3							
	C4							
	C5							
	C6							
	C7							
	C8							
In-laws for children in the above order	L1							
	L2							
	L3							
	L4							
	L5							
	L6							
	L7							
	L8							
Grandchildren GC								
Sister/brother SB								
Kin Kin								
Friends Fr								
Neighbors N								
Nurse/servant SN								
Charities CH								

RSS3. In general, which of your children is the most helpful? 1. Name……   2. No different   3.no children

RSS4. Daughters are in general more helpful to you or sons?1. Daughters 2.Sons 3. No different   4.no children

RSS5. How about daughter-in-laws or son-in-laws? 1. Daughter-in-laws 2.Son-in-laws 3. No different 4.no in-laws

RSS6. In general, how much you are satisfied by all the support type (mentioned above) that your family gives you?

   1. Very satisfied   2.middle satisfaction   3.unsatisfied   4.I don't ask for any help

RSS7. How the amount of support that you are receiving from others has been changed compared last year?

   1. very lower than last year 2.lower than last year 3.about the same 4.more than last year 5.very higher than last year

RSS8. If great change, please write the main reason ………………………

GSS. Given Social Support

Have you ever provided help in the following cases to others during last one year?	1. Yes	2. No	3. Unable to help	4. nobody asked help	GSSwho. If yes lease show to whom (can be selected more than 1 choice)				
					Family 1	Kin 2	Friends 3	Neighbours 4	Others 5
1.housework (washing, cleaning, ironing)									
2.Listen to them and sympathy									
3.giving or lending something									
4.shopping									
5.Looking after									
6.Taking care of children									
7.giving or lending money									
8.acting as a guarantor for bank loan									

PSS. Perceived Social Support - Social Provisions Scale (Russell & Cutrona, 1984)

1. In answering the following questions, think about your current relationships with everybody you know. Please indicate to what extent each statement describes your current relationships with other people.	Strongly Disagree1	Disagree 2	Agree 3	Strongly Agree 4
PSS1 There are people I can depend on to help me if I really need it.				
PSS2 I feel that I do not have close personal relationships with other people.				
PSS3 There is no one I can turn to for guidance in times of stress.				
PSS4 There are people who depend on me for help.				
PSS5 There are people who enjoy the same social activities I do.				
PSS6 Other people do not view me as competent.				
PSS 7 I feel personally responsible for the well-being of another person.				
PSS 8 I feel part of a group of people who share my attitudes and beliefs.				
PSS 9 I do not think other people respect my skills and abilities.				
PSS 10 If something went wrong, no one would come to my assistance.				
PSS 11 I have close relationships that provide me with a sense of emotional				
PSS 12 There is someone I could talk to about important decisions in my life.				
PSS 13 I have relationships where my competence and ski11 are recognized.				
PSS 14 There is no one who shares my interests and concerns.				
PSS 15 There is no one who really relies on me for their well-being.				
PSS 16 There is a trustworthy person I could turn to for advice if I were having				
PSS 17 I feel a strong emotional bond with at least one other person.				
PSS 18 There is no one I can depend on for aid if I really need it.				
PSS 19 There is no one I feel comfortable talking about problems with.				
PSS 20 There are people who admire my talents and abilities.				
PSS 21 I lack a feeling of intimacy with another person.				
PSS 22 There is no one who likes to do the things I do.				
PSS 23 There are people I can count on in an emergency.				
PSS 24 No one needs me to *care* for them.				

H. Health Status

QOL. Quality of Life (SF- 12)

QOL1.In general how would you describe your health compared with other people of your age?

Excellent (1) □   very good (2) □   good (3) □   fair (4) □   poor (5) □

QOL2.Compared to one year ago, how would you rate your health in general now? □

Much better now than one year ago (1) Somewhat better now than one year ago (2) About the same as one year ago(3)

Somewhat worse now than one year ago (4)   Much worse now than one year ago (5)

QOL3.The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?	Yes, limited a lot 1	Yes limited a little 2	No, not limited 3
3.1. Vigorous activities , such as running, lifting heavy objects, participating in strenuous sports			
3.2. moderate activities such as moving a table pushing a vacuum cleaner,…			
3.3. lifting or carrying groceries			
3.4. climbing one flight of stairs			
3.5. climbing several flights of stairs			
3.6. Bending, kneeling or stooping			
3.7. walking more than a kilometre			
3.8. walking one block			
3.9. Waking several blocks			
3.10. bathing or dressing yourself			

QOL4.During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

4.1. accomplished less than you would like	Yes 1	No 2
4.2. were limited in the kind of work or other activities	Yes 1	No 2

QOL5. During the past 4 weeks have you had any of the following problems with your or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

a. accomplished less than you would like	Yes 1	No 2
b. didn't do work or other activities as carefully as usual	Yes 1	No 2

QOL6. During the past 4 weeks, did you have pain? 1.yes□   2.No□

QOL6.1.If yes how much did pain interfere with your normal work (including both work outside the home and housework)

Not at all (1) □   slightly (2) □   moderately (3) □   quite a bit (4) □   extremely (5) □

QOL7. These questions are about how you feel and how things have been with you during the past 4 weeks. For each question please give the one answer that comes closest to the way you have been feeling. How much of the time during the past weeks:	All of the time 1	Most of the time 2	A good bit of the time 3	Some of the time 4	A little of the time 5	None of the time 6
7.1. have you felt calm and peaceful?						
7.2 did you have a let of energy?						
7.3 have you felt downhearted and blue?						

QOL8. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?

All of the time 1□ Most of the time 2 □ Some of the time 3 □ A little of the time 4 □ None of the time 5 □

GHQ-15. GENERAL HEALTH QUESTIONNAIRE

We should like to know if you have had any medical complaints and how your health has been in general, *over the past few weeks.* Please answer ALL the questions on the following pages simply by underlining the answer which you think most nearly applies to you. Remember that we want to know about present and recent complaints, not those that you had in the past. Have you recently

GHQ1	been getting any pains in your head?	No 1	Sometime 2	Many time 3	Always 4
GHQ2	lost much sleep over worry?	No 1	Sometime 2	Many time 3	Always 4
GHQ3	had difficulty in staying asleep once you are off?	Not at all 1	Sometime 2	Many time 3	Always 4
GHQ4	been feeling nervous and strung-up all the time?	Not at all 1	Sometime 2	Many time 3	Always 4
GHQ5	been taking longer over the things than usual you do?	Not at all	Sometime 2	Many time 3	Always 4
GHQ6	been managing to keep yourself busy and occupied?	More so than usual 1	Same as usual 2	Rather less than usual 3	Much less than usual 4
GHQ7	felt on the whole you were doing things well?	More so than usual 1	Same as usual 2	Rather less than usual 3	Much less than usual 4
GHQ8	been satisfied with the way you've carried out your task?	More so than usual 1	Same as usual 2	Rather less than usual 3	Much less than usual 4
GHQ9	felt that you are playing a useful part in things?	More so than usual 1	Same as usual 2	Rather less than usual 3	Much less than usual 4
GHQ10	been able to enjoy your normal day-to-day activities?	More so than usual 1	Same as usual 2	Rather less than usual 3	Much less than usual 4
GHQ11	been thinking of yourself as a worthless person?	No 1	Sometime 2	Many time 3	Always 4
GHQ12	felt that life is entirely hopeless?	No 1	Sometime 2	Many time 3	Always 4
GHQ13	felt that life isn't worth living?	No 1	Sometime 2	Many time 3	Always 4
GHQ14	found at times you couldn't do anything because your nerves were too bad?	No 1	Sometime 2	Many time 3	Always 4
GHQ15	found yourself wishing you were dead and away from it all?	No 1	Sometime 2	Many time 3	Always 4

H1. Do you have any capability that causes difficulty to you for doing personal and day-to-day activities? ☐ 1 Yes 2 No

H2. How often do you fill loneliness? ☐ 1. Never   2. Rarely   3.Sometimes   4.Most of the time   5.Always

H3. Have you fall ever in the last 6 months? ☐   1 Yes   2 No

H4. In the last three months, were you admitted to the hospital? ☐   1 Yes   2 No   If yes for what reason………

H5. In the past three months how many medical visits did you make to physicians? ....

H6. Do you regularly use medication? ☐   1 Yes   2 No

H7. Do you regularly use antidepressant or other nervous medication? ☐   1 Yes   2 No   3Don't know

H8. Do you have any medical insurance? ☐ Yes1   No 2   Type (specify)………….

H9. How often do you smoke cigarettes? ☐   1 regularly   2 occasionally   3 never   4I used to smoke, but now I gave up

H10. How often do you physical activity? ☐   1 regularly   2 occasionally   3 never   4 I used to do exercise, but not now

LONG-TERM DISEASES

H11. Have you been professionally diagnosed as currently having any of these conditions? Please tick	Yes	Duration (year) (if applicable)
H.11.1 Asthma		**H.11.1 Dur**
H11.2. Diabetes		**H11.2 Dur**
H11.3. Blood Pressure		**H11.3 Dur**
H11.4. Depression and other mental disorders		**H11.4 Dur**
H11.5 Arthrosclerosis diseases		**H11.5 Dur**
H11.6 Heart Diseases		**H11.6 Dur**
H11.7 Stroke		**H11.7 Dur**
H11.8 Cancer		**H11.8 Dur**
H11.9 Sight Impairments		**H11.9 Dur**
H11.10 Hearing Impairments		**H11.10 Dur**

SP. Social Participation

How often do you participate in the following social activities?	Never 1	Sometime 2	Most of the time/always 3	I am unable 4
SP1 Funeral ceremony of friends and neighbours				
SP2 celebrations and happy ceremonies of friends and neighbours				
SP3 Mourning events and other religious ceremonies				
SP4 Friday praying				
SP5 Elections				
SP6 Help to the poor and the disinterred people (charity activities)				
SP7 Recreational activities e.g. going to park, cinema, with others				
SP8 Parties, friendship gatherings, and so on				
SP9 Quran citation sessions and public religious presentations				
SP10 Group physical activities (e.g. Climbing…)				

N. Neighbourhood Information

N1. How long it is you are living in this neighbourhood?....

N2. I general, how are you satisfied with living in this neighbourhood?

   1.Very much satisfied   2. Very satisfied   3. So-so   4. To somehow satisfied   5. Very few satisfaction

N3. How much you are filling safety in this neighbourhood? 1. Very much   2. To some extent   3. Very few

N4. How much you are happy by environmental health and green spaces in your neighbourhood?

   1. Very much   2. To some extent   3. Very few

N5. How are your neighbourhood in terms of crime, delinquency and other social abnormalities?

   1.Safe   2. To some extent   3. Not safe   4.Don't know

N6. How much you trust to your neighbours and people in this neighbourhood?

   1.Highly   2. So-so   3.lowly   4. I don't know my neighbours

N7. How often your neighbours cooperate to solve the neighbourhood problems?

   1.Most of the time   2. Sometimes   3. Rarely   4. I don't know

N8 Do people in your neighbourhood participate in each other's happy or sad events?

   1.Most of the time   2. Sometimes   3. Rarely   4. I don't participate

[INTERVIWER INFORMATION]

DATE………………….

SIGN OF INTERVIWER……………………

END

Appendix 5: Table of further characteristics of participants, by gender

Characteristics N (%)	All (n=644)	Men (n=322)	Women (n=322)
Household size			
Mean (SD)	3.0(1.7)	3.3(1.7)	2.7(1.6)
Co-resident with other sample member			
Yes	100(15.5)	50(15.5)	50(15.5)
No	544(84.5)	272(84.5)	272(84.5)
Number of older persons living in the household of samples			
1(just sample member)	295(45.8)	141(43.7)	154(47.8)
2	343(53.2)	177(54.9)	166(51.5)
3	6(0.9)	4(1.2)	2(0.6)
Relationship of participant to head of household			
Him/her self	415(64.4)	301(93.4)	114(35.4)
Spouse	156(24.2)	5(1.5)	151(46.8)
Parent	65(10.0)	14(4.3)	51(15.8)
Other	8(1.2)	2(0.6)	6(1.8)
Duration of living in Tehran			
Mean years (SD)	50.8 (14.4)	51.5 (14.7)	50.2 (14.2)
Current occupational status			
Active	50(7.7)	48(14.9)	2(0.6)
Retired	221(34.3)	207(64.2)	14(4.3)
Housekeeper/unemployed	372 (57.8)	66(20.4)	306(95.0)
Perceived economic status			
Dependent on others(no income)	105(16.3)	41(12.2)	64(19.8)
Enough for living	534(82.9)	276(85.7)	258(80.1)
More than enough	5(0.7)	5(1.5)	0(0.0)
Main source of income			
Pension	405(62.8)	203(63.0)	202(62.8)
Current job	97(15.0)	69(21.4)	28(8.6)
Children or others	100(15.5)	36(11.1)	64(19.8)
Savings/wealth	33(5.1)	12(3.7)	21(6.5)
Formal support	9(1.4)	2(0.6)	7(2.1)
Accommodation tenure			
Owned	561(87.1)	288(89.4)	273(85.0)
Rented	45(6.9)	25(8.0)	20(6.6)
Living with children	35(5.4)	7(2.1)	28(8.6)
Other	3(0.4)	2(0.6)	1(0.3)
Ethnicity			
Persian	389(60.4)	192(59.6)	197(61.2)
Azari	229 (35.5)	118(36.6)	111(34.5)
Other	26(4.1)	12(3.7)	14(4.3)
Religion			
Islam	638 (99.3)	320 (99.4)	318 (99.3)
Other	4 (0.6)	2 (0.6)	2 (0.7)
Importance of religion for participant			
Very important	578 (90.3)	279 (86.6)	299 (93.0)
Less important	62 (9.7)	42 (13)	20 (6.8)

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

The Table in Appendix 5 indicates that the average household size of participants was 3 people (including the respondent). Men were living in larger households than women. Sixty four percent of sample members identified themselves as the head of the household, 24% reported that their spouse was the head of the household and 11% reported that a child or someone else was the head of the household. As would be expected, far fewer women compared to men (27% vs. 73%) identified themselves as the head of the household.

The sample was designed to be representative of the older population rather than of households containing older people, which meant that all people aged 60 and over in sampled households were eligible to participate. However, of 54% (n=349) of households containing more than one older people aged 60+, in 15% (n=100) both older persons were selected for inclusion in the study by chance, so that 100 participants were from households including another sample member, of which 98 were married couples. This clustering was taken into account in the analysis as reported in Chapter 4.

Over 99% of respondents reported that they were Muslim. Ninety percent reported that religion was very important to them. Sixty percent of participants were Persian (the main ethnicity) and spoke Farsi, 36% were Azaris and 4% were from other minor ethnicities speaking different languages.

Only 50 participants (8%) were employed at the time of interview, and 221 (34%) were retired and receiving a pension. Most people (58%, of whom 82% were women) were in unpaid work, such as housekeeping, or unemployed. Most people (63%) reported that their pension was their main source of income. While most men reported they were mostly independent, more women reported that they were reliant on their husbands' pensions or support from children. Most people (87%) owned their accommodation including 5% shared ownership, 7% rented their accommodation and 5%, mostly women, were living in their children's houses.

The average duration of residence in Tehran was 51 years at the time of the interview. Only 14% of participants had been born in Tehran.

Appendix 6: The table of cumulative relative frequencies of GHQ-15 scores of study participants

The following table indicates the cumulative relative frequencies of GHQ-15 scores in my sample. As indicated in bold, the cut off point for the worst quartile (75th percentile) was calculated at 22 in the range of 0-45. It means that all people with the GHQ scores higher than 22 were considered as those with high probability of significant psychological distress

```
     GHQ Scores
   distribution |      Freq.       Percent        Cum.
   ------------+------------------------------------
           0 |          1          0.16          0.16
           1 |          3          0.48          0.64
           2 |          2          0.32          0.95
           3 |          4          0.64          1.59
           4 |          7          1.11          2.70
           5 |         18          2.86          5.56
           6 |         20          3.18          8.74
           7 |         23          3.66         12.40
           8 |         28          4.45         16.85
           9 |         27          4.29         21.14
          10 |         23          3.66         24.80
          11 |         40          6.36         31.16
          12 |         22          3.50         34.66
          13 |         39          6.20         40.86
          14 |         18          2.86         43.72
          15 |         40          6.36         50.08
          16 |         21          3.34         53.42
          17 |         20          3.18         56.60
          18 |         16          2.54         59.14
          19 |         26          4.13         63.28
          20 |         31          4.93         68.20
          21 |         22          3.50         71.70
          22 |         23          3.66         75.36
          23 |         20          3.18         78.54
          24 |         14          2.23         80.76
          25 |         13          2.07         82.83
          26 |         17          2.70         85.53
          27 |         15          2.38         87.92
          28 |         15          2.38         90.30
          29 |         10          1.59         91.89
          30 |         12          1.91         93.80
          31 |          7          1.11         94.91
          32 |          7          1.11         96.03
          33 |         10          1.59         97.62
          34 |          7          1.11         98.73
          35 |          4          0.64         99.36
          36 |          1          0.16         99.52
          38 |          2          0.32         99.84
          39 |          1          0.16        100.00
   ------------+------------------------------------
       Total |        629        100.00
```

Appendix 7: The sex ratio of the older population in Iran

In all the regions of the world there are usualy far more older women than men. In 2009, there were 83 men to every 100 women aged 60+ (UN, 2009). This is the result of the higher life expectancy of women compared to men. However, this trend, despite the higher life expectancy of women (see Figure 7.a), has never been seen in Iran. In contrast to the rest of the world (except for a few countries) the sex ratio- the ratio of males to females in a population- of the older population aged 60+ in Iran has always been higher than 100 (see Table 7.b), indicating a higher proportion of older men compared to older women.

Ahmadi and her colleagues (2006) in Iran investigated the explanations for inconsistency between higher life expectancy of women but lower proportion of them based on the data of subsequent censuses. They found that a considerable proportion of a cohort of women aged 25-34 did not have the chance to reach the next age group of 35-44 until 1976 (see Table 7.c) probably due to a high maternal mortality rate at that time. Thus, in cohorts who are now old it may be that female mortality was higher than that of men. However, this issue needs more investigation.

Other factors, including age misreporting, greater age exaggeration by older men than women, and historically a sex preference in favour of males, particularly in rural areas, may have contributed to some extent to the high sex ratio in favour of men (Ahmadi et al., 2006; Mirzaee & Shams, 2007).

Figure 7.a Life expectancy of men and women at birth in Iran
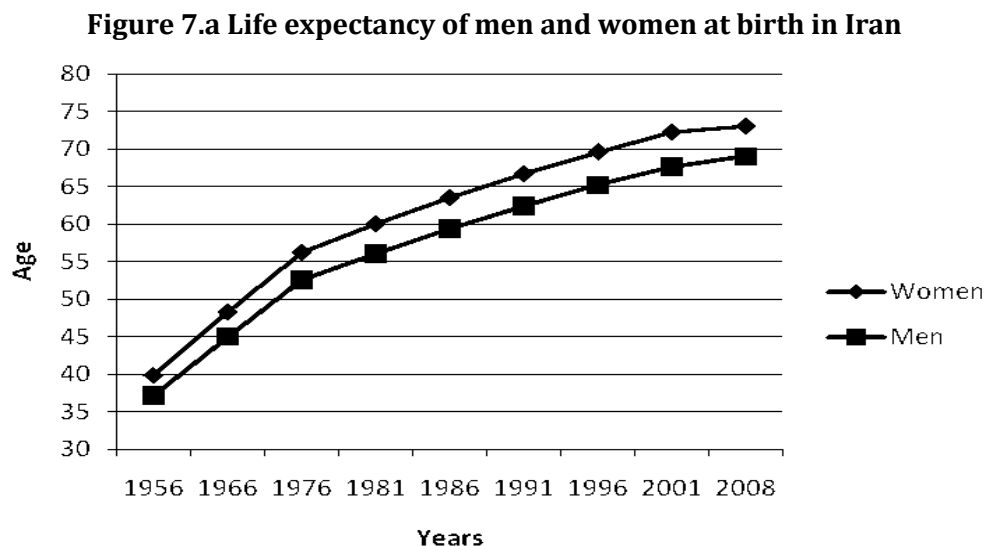
Source: Statistical centre of Iran

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Table 7.b Sex ratio of older people in Iran's censuses 1956-2006

Year/Age group	1956	1966	1976	1986	1996	2006	2009
60+	111	110	109	112	116	106	101
70+	107	110	112	98	113	113	-
80+	105	104	113	93	94	108	111

Source: censuses 1956-2006 except the data for 2009 which is based on UN (2009)

Table 7.c The trend of sex ratio of total population and by age groups in Iran

	All ages	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84
1956	104	106	99	98	119	105	112	111	102
1966	107	109	97	96	121	115	107	114	113
1976	106	109	98	94	109	120	118	106	122
1986	105	105	103	102	99	111	118	112	91
1996	103	103	99	102	104	99	114	117	109
2006	104	-	-	-	-	-	-	-	-

Source: data of censuses 1956-2006

Appendix 8: Mental health status and social support of older people in Tehran

Here, descriptive findings of my study with regard to mental health and social support of the study population are discussed.

Mental Health

The results of my study found that the mean score on the GHQ-15 was 16.8 (SD=8.1) [women 19.3 (SD=7.8) vs. men 14.2 (SD=7.6)] in the range of 0-45 with higher scores indicating poorer mental health. Also, 18% of participants (23% women, 13% men) reported that they had at some time been diagnosed with depression or another mental health disorder by a physician (average of 10 years previously) and nearly one in four, of whom 63% were women, reported regular use of antidepressants. The true magnitude of mental health problems among older people in Tehran may be even higher. In the selection of participants, persons with severe psychological disorders were excluded on the likelihood they would be unable to participate in the study. Also, among those who declined to participate in both enumeration and data collection stages, persons with severe psychological distress might be over-represented. Additionally, because socially desirable responses are more likely in face-to-face interviews than in self-administered surveys (Moum, 1998) and also because of the stigma surrounding mental illness (WHO, 2013) it is possible that psychological distress was under-reported in my study. Earlier studies in Iran have reported differing rates of prevalence of psychiatric disorders among older people, but there is a consensus among most of them that it is relatively high (e.g. Mortazavi et al., 2011; Kashfi et al., 2010; Manzouri et al., 2009; Montazeri et al. 2005; Noorbala et al., 2004). A nationally representative epidemiological survey (Noorbala et al., 2004), for example, reported that the prevalence of psychiatric disorders using the GHQ-28 and a cut point of 6+ to indicate 'caseness' was 21% among the general adult population (15+ years old, n= 35014) and 31% in people aged 65+ years old (n= 3063) in Iran.

Comparing the result of my study (and other Iranian evidence) with the global data is complicated by the varying definitions used (e.g. mental health, mental disorders, depression), as well as the method, diagnostic procedures and instruments used and the criteria for categorisation. Nevertheless, based on global data mainly from the WHO website presented below, it may tentatively be concluded that the mental health of Iranian older people is not as good as their counterparts elsewhere. It is estimated that the overall prevalence rate of depressive

disorders among older people varied between 10 and 20%, depending on the cultural situation (WHO, 2001a). According to a newer estimation, published by the Institute for Health Metrics and Evaluation (2010) and reported by the WHO (2013), approximately 15% of those aged 60 and over worldwide suffer from a mental disorder. The results of a systematic review of 74 original research studies that surveyed a total of 487,275 older people aged 60+ residing in various parts of the world, the median prevalence rate of mental disorders was determined to be 10.3% (Barua et al., 2011). Generally unfavourable demographic and SES characteristics such as the high rate of illiteracy and financial strains, in addition to a high prevalence of chronic diseases, disability and poor functioning limitations among Iranian older people including my study population (see Chapter 5) may partly explain the high rate of psychological problems among them.

Social support

Perception of social support of participants

The mean score of the SPS for all participants was 72 (SD=9.7) in the range of 24-96, with higher scores indicating higher perceived social support (Table 5.4). This score is lower than sample mean of 82 (SD=10) in a sample of 1792 adults in the USA provided for the SPS by Russell and Cutrona (1987), the developers of the original SPS. A recent study in Iran (Harouni et al., 2013) indicated a high level of perceived social support, particularly from the family, among older adults. It has been suggested that expectations of support are likely to influence perceived support (Pierce et al., 1991). When people grow older, they often adapt to unfavourable situations, such as losses and reduced capabilities, and accordingly adjust their expectations (Dale et al., 2010). Thus, they may perceive their social support as better than an objective evaluation might indicate, because the gap between their actual and expected state is reduced (Paul et al., 2007; Grundy, 2006).

According to Tiikkainen et al. (2004), people need all the various types of support included in the SPS scale because each type corresponds to specific social need, and deficits in one area cannot be compensated for by strengths in another. Participants' mean scores on the dimensions (types) of the SPS in this study were rather similar, ranging from 12.8 on the dimension of 'provision of attachment' to 10.9 on the dimension of 'social integration' (score ranges 4-16) (Table 5.4), indicating that needs for all the types of support were satisfied to a similar extent. Slightly higher scores on the 'attachment' dimension are consistent with the study finding that

older people reported generally a very good relationship with most of their family members (results not shown), which is closely correlated with 'attachment' (Dale et al., 2010). On the other hand, the lower scores of participants on the 'social integration' dimension, which is associated with increased contacts with friends and peers (Dale et al., 2010), may be attributed to their poor health, particularly poor physical functioning, which may inhibit their social participations and contacts.

Provision of social support of participants

Participants in this study received a relatively high level of instrumental social support, except financial support. With respect to being looked after when confined to bed, transport, housework and paperwork, 72%, 67%, 73% and 63% of participants respectively reported receiving support 'all or most of the time' from at least one of their support sources when they needed it (Table 5.6). In a separate question, only 7% of participants reported that they were unsatisfied with the overall amount of instrumental support that their family provided for them. With respect to financial support, however, 50% and 31% of participants (particularly men) received no support from their spouse or children respectively when they needed it and 19% of needy people had no support from anyone. One (or the main) reason for relatively poor financial support of older people could be the inability of their family members to help with finance. A high proportion of older people (44%) reported that they never asked for (or needed) financial help. This may reflect a cultural attitude; many older people, particularly men, may feel unable to ask for this type of support even from their better off children. Men's breadwinner role and their dominant position in the family, especially in past generations in Iran, may mean they feel inadequate in some way if they ask for support for their daily activities or with finance. Economic status, however, was found as the most important factor affecting health-related quality of life of older people in Tehran in my earlier study (Tajvar et al., 2008) and thus it may be the uppermost priority need of older people.

Structural social support of participants

Participants had on average 4.6 living children. Most participants (74%) reported daily meeting and 22% reported less than daily but at least weekly meeting with children (Table 5.7), indicating that there was a high level of interaction between older parents and their children. Of those older people living apart from children, a higher proportion of women had daily visits with

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children, possibly reflecting their greater need (for example because of poorer health status), a higher proportion being widowed, having more free time (less than 1% of women versus 15% of men were working) and closer emotional bonds with children. These findings are consistent with well established gender differences in social interaction (Cheng & Chan, 2006; Gurung et al., 2003).

With regard to the living arrangements of older people, the results showed that 43% of the participants were living with both spouse and children in the same residence and 12% were living alone. However, this differed considerably between men and women. A higher proportion of women compared to men were living alone (21% vs.3%) and a less proportion (28% vs. 57%) were living with both spouse and children (Table 5.8). This largely reflects the higher proportion of women who were widowed (48% vs. 10%).

To compare the living arrangements patterns of older people in my study with those living in other countries in Asia I used available data from the UN (2005b) and summarised the findings in the following Table. The comparisons indicate that while Tehran had a low percentage of older people aged 60+ in 2009, it had almost the same proportion of older people living alone as Japan, a country with one of the highest proportions of older people in the world. The proportion of older people in Tehran co-residing with their children, distant relatives or non-relatives is lower in comparison than in the other populations considered. This may imply less preference or less strong co-residence norms and attitudes towards intergenerational co-residence in urban older people in Iran compared to other Asian countries, which merits further investigations.

Living arrangements of older people aged 60+ years in my study and selected countries

%	% of population aged 60+ in 2009	Living alone	Living with Spouse only	Living with Children& spouse/ /in-law/others*	Living with Others**	Total
My study (2009)	**7**	**12.2**	**27.0**	**58.3**	**2.3**	**100**
Armenia (2000)	14	8.7	16.2	70.0	5.2	100
Bahrain (1991)	4	0.7	5.2	86.8	7.3	100
Bangladesh (1999)	6	1.8	4.3	88.1	5.8	100
Egypt (2000)	7	8.3	12.1	73.7	2.3	100
India (1999)	7	3.3	8.2	81.4	7.1	100
Indonesia (1997)	9	7.3	16.9	62.8	13.0	100
Japan (2000)	30	12.7	34.5	48.3	4.6	100
Jordan (1991)	6	7.0	10.3	77.8	4.9	100
Tunisia (1991)	10	2.7	8.6	84.2	4.5	100
Turkey (1998)	9	8.5	29.4	57.5	4.6	100
Yemen (1992)	4	4.0	10.7	74.8	10.7	100

*This category includes living with children and spouse or in-laws or others, ** 'Others' include grandchildren, other relatives and non-relatives. Source of data for first column is UN (2009) and for other columns UN (2005b)