


The relationship between social support networks and depression in the 2007 National Survey of Mental Health and Well-being

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Abstract

Purpose Social isolation and low levels of social support are associated with depression. The purpose of the current study was to investigate the relationship between depression and social connectivity factors (frequency of contact and quality of social connections) in the 2007 Australian National Survey of Mental Health and Well-being.

Methods A national survey of 8841 participants aged 16–85 years was conducted. Logistic regression was used to investigate the relationship between social connectivity factors and 12-month prevalence of Major Depressive Disorder in the whole sample, as well as across three age groups: younger adults (16–34 years), middle-aged adults (35–54 years), and older adults (55+ years). Respondents indicated how often they were in contact with family members and friends (frequency of contact), and how many family and friends they could rely on and confide in (quality of support), and were assessed for Major Depressive Disorder using the World Mental Health Composite International Diagnostics Interview.

Results Overall, higher social connection quality was more closely and consistently associated with lower odds of the

past year depression, relative to frequency of social interaction. The exception to this was for the older group in which fewer than a single friendship interaction each month was associated with a two-fold increased likelihood of the past year depression (OR 2.19, 95% CI 1.14–4.25). Friendship networks were important throughout life, although in middle adulthood, family support was also critically important—those who did not have any family support had more than a three-fold increased odds of the past year depression (OR 3.47, 95% CI 2.07–5.85).

Conclusions High-quality social connection with friends and family members is associated with reduced likelihood of the past year depression. Intervention studies that target the quality of social support for depression, particularly support from friends, are warranted.

Keywords Depression · Social support · Social network, isolation

Introduction

Social connection is important for human health. The study of social relationships and health can be traced back to the work of the early sociologists, with Durkheim first reporting that socially disconnected people were more likely to commit suicide than well-integrated individuals [1]. Subsequent epidemiological research has firmly established that the frequency of social interaction and quality of social relationships affect morbidity and mortality at levels that are comparable to factors such as smoking, blood pressure, and obesity [2].

Social networks refer to a social structure made up of a web of social relationships, which includes close personal relationships and social interactions as well as broader

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social ties [3]. Social networks are critically important to mental health, with individuals who have smaller networks, fewer interpersonal relationships, or lower levels of social support consistently reporting elevated rates of depression [4, 5].

The kind of support offered by one's network also appears to be important for mental health. Social support refers to the functional content of social relationships, which is the extent to which one can access assistance and resources afforded from people in their networks [6]. The distinction between social networks and social support is important—while social networks are the linkages between individuals, support refers to the functions that can be garnered from these linkages. Social support is a multi-dimensional construct, which includes emotional forms of support, such as those derived from intimate, confiding relationships, but also instrumental support, which confers more pragmatic and practical assistance such as providing advice [7]. A recent meta-analysis found that emotional forms of support were more closely associated with depression than instrumental forms of support, particularly among adults aged 18–50 years [8]. However, many studies amalgamate these social support factors, precluding the ability to distinguish between their roles in depression.

To explain the relationship between social support factors and depression, theorists have proposed that without the protection afforded by one's social network, maladaptive reactions to stressors trigger depression [9]. This can occur via one of two pathways, either via a main effect process, or a stress-buffering process [9]. The main effect model suggests that social connectedness is beneficial regardless of whether one is under stress by promoting healthy psychological states, while the stress-buffering hypothesis proposes that social support is beneficial only once an event has been appraised as stressful. That is, social connectedness interacts with stress to avoid depression by either reducing or eliminating the stressful reaction, or facilitating adaptive coping. Evidence evaluating these models has been mixed, with some studies finding support for a main effects model, while other studies favour the stress-buffering hypothesis [10, 11]. Given the support for both models in the empirical literature, these models do not appear to be mutually exclusive [9]. Therefore, evidence suggests that if a person faces adversity or stress, being embedded in a strong social support network acts as a protective factor, as does having a strong social support network more generally.

Several reviews of the literature [12–14] have brought together investigations across both quantitative (e.g., how many people one lives with, frequency of interaction) and qualitative (e.g., perceptions of relationship quality) features of social networks. These studies have found that while both frequency of interaction and quality of social

connection are important, relationship quality is more closely associated with health outcomes [12, 13] and depression [14]. In addition to relationship quality, there are other factors such as the source of social relationships and life stage, which may have differential relationships to depression. According to the Socioemotional Selectivity Theory (SST) of motivation for social contact across the lifespan [15], it is suggested that with age, individuals become increasingly selective about with whom they invest in socially and emotionally. It is common for this increase in social partner selectivity to cause a systematic narrowing of a social network, because it allows people to conserve resources such as time and energy for selected social relationships that will fulfil the emotional needs of the individuals [15]. Indirect support for this theory can be drawn from evidence suggesting that among middle-aged and older adults, friendship networks may confer greater protection against depression and promotion of well-being over family networks [16, 17]. Conversely, the importance of family connections during childhood and adolescence has been shown consistently [11, 12], which makes sense from developmental perspectives of where young people are first socialised and most likely to seek support [18].

The emerging picture is that structural components of one's social network (such as size and source of the network and frequency of interaction), together with functional components such as the perceived quality of relationships, and whether these provide emotional or instrumental support, are important predictors of mental health and depression. However, the relative importance of these factors and their association with depression in terms of network type (family or friendship networks), support offered (emotional or instrumental), and how this interacts with life stage, is not yet known.

Aims

The aim of this study was to investigate the relationship between depression and social network factors (frequency of contact and quality of social connections) in a large population-based sample. Although this issue has been the focus of the previous inquiries [8, 14], the current study extends the literature by examining the relationships between qualitative and quantitative factors of social networks and depression across three distinct age groups in an Australian sample: young adults (16–34), middle-aged adults (35–54), and older adults (55+). Our research questions were as follows:

1. Are the quality and frequency of social interactions associated with depression?

2. Are family and friendship support networks associated with depression?
3. Are emotional and instrumental social support types associated with depression?
4. Do associations vary across specific age groups (young, middle, and older adulthood)?

It was hypothesised that relationship quality would be more strongly associated with depression, relative to frequency of contact. However, we expected that these would both be significantly associated with depression, such that poorer relationship quality and fewer interactions would be associated with higher symptom levels. We predicted that both family and friendship network variables (quality and frequency) would be associated with depression, but that family networks would be more important to the young adult group than friendship networks, but that by middle and late adulthood, friendship networks would more important [11, 15, 16]. We expected that relationships providing emotional support (operationalised as individuals in whom one can confide) would be more closely related to depression than those providing instrumental support (operationalised by those whom one can rely on), but that both these relationship types would correlate with depression. Based on the recent review of the literature [8], this relationship was expected to be strongest in the middle-aged adult group.

Methods

Study sample

Data for the current study were collected as part of the 2007 Australian National Survey of Mental Health and Well-being, a nationally representative survey of individuals aged between 16 and 85 years. Participants were randomly selected from a stratified, multistage area probability of private Australian households. The data from this study were not subject to ethical review, because it is from a population-based survey. Participants provide written consent for this data to be collected at the time of interview. Data were collected via computer-assisted personal interviews conducted by trained staff from the Australian Bureau of Statistics. The sample excludes those residing in hospitals, nursing homes, jails, and those living in remote and sparsely populated areas of Australia. A total of 14,805 individuals were initially selected to participate in the survey. Of those, 8841 (60%) completed the full survey. Oversampling of older and younger age groups was conducted to ensure greater representation of these traditionally under-represented groups. A comprehensive

description of the sampling procedures and the study design can be found elsewhere [19].

Measures

Social connectivity variables

Social connectivity questions were generated by academic experts and survey methodologists who developed the broader national survey (see [19] for more information about survey development). In separate questions, respondents were asked how often they were in contact with family members and friends. Response options were: everyday, three-to-four times per week, one-to-two times per week, one-to-three times per month, and less than once per month. Respondents also provided information about the quality of their social relationships, by answering questions about access to emotional and instrumental support. Emotional support was measured by indicating the number of family member and friend participants felt that they could confide in, while instrumental support was measured by asking about the number of family members and friends that they felt that they could rely on. For these questions, response options were: three or more, one to two, and zero, see Appendix 1 for question details.

Depression

Detailed information about depressive symptoms was assessed using the World Mental Health Composite International Diagnostic Interview (WMD-CIDI; [20]). DSM-IV criteria were used to generate diagnosis of Major Depressive Disorder (MDD) in the past 12 months. The WMH-CIDI has been widely used in epidemiological studies [20], and has excellent inter-rater and test-retest reliability [21] and high levels of agreement with clinician diagnoses [22].

Demographic variables

Age was assessed and categorised in terms of three different age groups (16–34, 35–54, and 55+), which were based on both meaningful (i.e., an attempt to identify young, middle-aged, and older adults) and pragmatic considerations (i.e., observed frequencies in each age group). Analyses were conducted on both the whole sample and these different age groups. Marital status and gender were assessed and entered into analyses as covariates because of their known impact on the relationship between social networks and depression; specifically, being married protects against depression [2]; women have higher rates of depression than men [23], and there are gender-specific network structures and patterns [24].

Analytic strategy

Appropriate estimation procedures were applied to all data analyses using Jackknife Replicate Weights provided by the Australian Bureau of Statistics to ensure correct estimation of standard errors. The regression analyses were based on the weighted sample, which takes into account nonresponse and provides estimates that are generalisable to the Australian population. The “survey design with replicate weights” (*svrepdesign* function) in the “*survey*” package in R was used to calculate the standard errors required for data with a complex sampling design. Logistic regression models were estimated using the *svyglm* function to explore the relationship between quantity and quality of social connectivity outcomes [25]. Separate models assessed the univariate and multivariate associations between the frequency and quality of social connectedness variables and the past year diagnosis of MDD in the total sample and across different age groups (i.e., 16–34, 35–54, and 55+). The significance of each predictor in each model was evaluated using the likelihood ratio test implemented in *regTermTest* function. Given the categorical nature of the predictors in the model, the conventional variance inflation factor (VIF) could not be used to test multicollinearity. Alternatively, VIF was calculated using the McFadden’s *R* squared (adapted for binary variables).

Results

Table 1 presents weighted sociodemographic characteristics in the total sample and in each age group. Respondents were relatively evenly split in terms of gender (50.4% female), just more than half of the sample was married (53%), and depression prevalence for the previous year was 5.9%. The sample breakdown across the three age groups was also relatively even, with approximately one-third of respondents making up each of the age groups (31, 33, and 36% for 16–34, 35–54, and 55+ years, respectively). As can be seen from the percentages listed in Table 1, there were differences between age groups in terms of social connectivity variables, with the younger group having more frequent contact with family and friends than the older age cohorts. The youngest group also reported having more friends and family members to rely on and confide in than the older two age groups. In terms of family connections, there was a relative decrease in the number of family members to confide for the middle age cohort, before increasing in the older age group. Conversely, there was an age-related decrease in number of high-quality friendships (see Table 1).

Tables 2, 3 present univariate odds ratios (OR) and their confidence intervals (CI) from the logistic regression

model for the past year MDD in the total sample and in each age group. Tables 4, 5 report multivariate adjusted odds ratios (AOR) and CIs from the logistic regression (controlling for the effects of sex and marital status). VIFs were less than four for different predictors across models. In the total sample (Table 4), results indicated that respondents who were younger, female, had never married, or were separated had significantly higher odds of the past year MDD. Taking into consideration the social connectedness variables in the same model means that results reflect unique relationships between the social connectivity variable being examined and depression, adjusting for sex and marital status.

Family networks

In the total sample, frequency of contact with family members was not related to the past year MDD. However, having no family members to confide in increased the odds of the past year MDD (OR 2.64, 95% CI 1.84–3.81, $p < 0.001$) while having three or more family members to confide in decreased the odds of the past year MDD (OR 0.52, 95% CI 0.4–0.69, $p < 0.001$). The same pattern was observed for number of family members to rely on; that is, having no family members to rely on increased the odds of the past year MDD (OR 2.47, 95% CI 1.66–3.72, $p < 0.001$), whereas having three or more family members to rely on decreased the odds of the past year MDD (OR 0.59, 95% CI 0.42–0.85, $p < 0.005$).

Results from the multivariate analyses showed that frequency of contact with family members was not related to the past year MDD. However, having no family members to confide in increased the odds of the past year MDD (AOR 1.78, 95% CI 1.11–2.88, $p < 0.05$) while having three or more family members to confide in decreased the odds of the past year MDD (AOR 0.61, 95% CI 0.46–0.81, $p < 0.001$). Sensitivity analysis indicated that these results remained robust regardless of the presence of marital status in the models.

Friendship networks

Lower frequency of contact with friends was related to higher odds of the past year MDD; having less than a single interaction with a friend in the past month increased the odds (OR 3.01, 95% CI 1.69–5.39, $p < 0.001$), as did contact with a friend only one-to-three times per month (OR 1.94, 95% CI 1.18–3.2, $p < 0.05$). In terms of quality, having no friends to confide in increased the odds of the past year MDD (OR 2.05, 95% CI 1.38–3.08, $p < 0.001$). Similarly, having no friends to rely on increased the odds of the past year MDD (OR 1.99, 95% CI 1.32–3.04, $p < 0.005$) while having three or more friends to rely on

Table 1 Weighted sociodemographic characteristics in the total sample and among different age groups

	Total sample	16–34	35–54	55+
<i>N</i> (%)	8841 (100%)	2761 (31%)	2902 (33%)	3178 (36%)
Sociodemographic				
Male	4385 (49.6%)	1397 (50.6%)	1439 (49.6%)	1545 (48.6%)
Female	4456 (50.4%)	1364 (49.4%)	1463 (50.4%)	1633 (51.4%)
Married	4686 (53%)	649 (23.5%)	1939 (66.8%)	2196 (69.1%)
Separated	1282 (14.5%)	72 (2.6%)	467 (16.1%)	823 (25.9%)
Never married	2873 (32.5%)	2040 (73.9%)	496 (17.1%)	156 (4.9%)
Last year MDD	522 (5.9%)	174 (6.3%)	223 (7.7%)	105 (3.3%)
Contact frequency with family				
Everyday	5405 (61.2%)	1908 (69.11%)	1691 (58.33%)	1806 (56.95%)
3–4 weeks	1091 (12.35%)	293 (10.61%)	340 (11.73%)	458 (14.44%)
1–2 weeks	1456 (16.49%)	373 (13.51%)	523 (18.04%)	560 (17.66%)
1–3 months	542 (6.14%)	133 (4.82%)	208 (7.17%)	201 (6.34%)
Less than month	337 (3.82%)	54 (1.96%)	137 (4.73%)	146 (4.6%)
Contact frequency with friends				
Everyday	3850 (43.6%)	1631 (59.07%)	1144 (39.46%)	1075 (33.9%)
3–4 weeks	1794 (20.31%)	530 (19.2%)	579 (19.97%)	685 (21.6%)
1–2 weeks	1973 (22.34%)	419 (15.18%)	720 (24.84%)	834 (26.3%)
1–3 months	737 (8.35%)	111 (4.02%)	288 (9.93%)	338 (10.66%)
Less than month	477 (5.4%)	70 (2.54%)	168 (5.8%)	239 (7.54%)
Number of family members to confide in				
3 or more	4145 (46.94%)	1410 (51.07%)	1260 (43.46%)	1475 (46.52%)
1–2	3933 (44.54%)	1182 (42.81%)	1334 (46.02%)	1417 (44.69%)
0	753 (8.53%)	169 (6.12%)	305 (10.52%)	279 (8.8%)
Number of family members to rely on				
3 or more	5519 (62.5%)	1904 (68.96%)	1762 (60.78%)	1853 (58.44%)
1–2	2734 (30.96%)	742 (26.87%)	893 (30.8%)	1099 (34.66%)
0	578 (6.55%)	115 (4.17%)	244 (8.42%)	219 (6.91%)
Number of friends to confide in				
3 or more	3797 (43%)	1428 (51.72%)	1253 (43.22%)	1116 (35.19%)
1–2	3901 (44.17%)	1136 (41.14%)	1301 (44.88%)	1464 (46.17%)
0	1133 (12.83%)	197 (7.14%)	345 (11.9%)	591 (18.64%)
Number of friends to rely on				
3 or more	4592 (52%)	1658 (60.05%)	1493 (51.5%)	1441 (45.44%)
1–2	3197 (36.2%)	906 (32.81%)	1077 (37.15%)	1214 (38.28%)
0	1042 (11.8%)	197 (7.14%)	329 (11.35%)	516 (16.27%)

decreased the odds of the past year MDD (OR 0.61, 95% CI 0.48–0.79, $p < 0.001$).

Multivariate friendship outcomes indicated that reduced frequency of contact was related to higher odds of the past year MDD with increased odds for those who had fewer than a single friendship interaction per month (AOR 1.97, 95% CI 1.01–3.84, $p < 0.05$), or only one-to-three contacts per month (AOR 1.73, 95% CI 1.05–2.87, $p < 0.05$). Having three or more friends to confide in decreased the odds of the past year MDD (AOR 0.48, 95% CI 0.71–0.33, $p < 0.001$), as did having three or more friends to rely on (AOR 0.42, 95% CI 0.29–0.62, $p < 0.001$).

Family and friendship networks split by age (Tables 3, 5)

In the 16–34 age sub-sample, frequency of contact with family members was not related to the past year MDD. Having no family members to confide in increased the odds (OR 2.47, 95% CI 1.44–4.27, $p < 0.005$), while having three or more family members to confide in decreased the odds of the past year MDD (OR 0.54, 95% CI 0.36–0.85, $p < 0.01$). Having family members to rely on was also important, with those who did not have any family members to rely on showing an increased odds of the past year

Table 2 Univariate associations between social connectedness variables and past year MDD in the total sample

Predictor	OR	95% CI
Model for family and friends predictors		
Contact frequency with family		
Everyday	0.67	0.46–1
3–4 weeks	0.83	0.51–1.38
1–2 weeks	1	–
1–3 months	1.44	0.7–3
Less than once a month	1.55	0.89–2.73
Number of family members to confide in		
3 or more	0.52	0.4–0.69
1–2	1	–
0	2.64	1.84–3.81
Number of family members to rely on		
3 or more	0.59	0.42–0.85
1–2	1	–
0	2.47	1.66–3.72
Contact frequency with friends		
Everyday	0.9	0.65–1.25
3–4 weeks	1.17	0.8–1.72
1–2 weeks	1	–
1–3 months	1.94	1.18–3.2
Less than once a month	3.01	1.69–5.39
Number of friends to confide in		
3 or more	0.87	0.69–1.12
1–2	1	–
0	2.06	1.38–3.08
Number of friends to rely on		
3 or more	0.61	0.48–0.79
1–2	1	–
0	1.99	1.32–3.04

Bold values refer to statistically significant odds ratios at the $p < .05$ level

MDD (OR 2.43, 95% CI 1.31–4.56, $p < 0.01$). With respect to friendship networks, frequency of contact was not related the past year MDD. However, having three or more friends to confide in decreased the odds of the past year MDD (OR 0.56, 95% CI 0.39–0.84, $p < 0.005$), as did having three or more friends to rely on (OR 0.37, 95% CI 0.25–0.58, $p < 0.001$).

In the 35–54 age sub-sample, daily contact with family members decreased the odds of the past year MDD (OR 0.51, 95% CI 0.28–0.97, $p < 0.05$). Not having any family members to confide in increased the odds of the past year MDD (OR 3.472, 95% CI 2.07–5.85, $p < 0.001$) while having three or more family members to confide in decreased the odds of the past year MDD (OR 0.51, 95% CI 0.32–0.82, $p < 0.01$). This same pattern was observed for reliance; not having any family members to rely on

increased the odds (OR 2.78, 95% CI 1.46–5.32, $p < 0.005$) while having three or more family members to rely on decreased the odds of the past year MDD (OR 0.49, 95% CI 0.28–0.88, $p < 0.05$). With respect to friendship in this age group, frequency of contact was related to higher odds of the past year MDD, for those who had less than monthly contact (OR 3.90, 95% CI 1.76–8.63, $p < 0.001$), or contact only 1–3 times per month with their friends (OR 7.94, 95% CI 1.03–3.70, $p < 0.05$). For friendship quality, not having any friends to confide in (OR 4.04, 95% CI 2.4–6.84, $p < 0.001$) or rely on increased the odds of the past year MDD (OR 3.78, 95% CI 2.2–6.53, $p < 0.001$).

In the final age group of those older than 55 years, frequency of contact and quality of relationships with family members did not impact MDD. For friendship, frequency (but not quality) was associated with the past year MDD; having less than monthly contact with friends was associated with increased odds for the past year MDD (OR 2.19, 95% CI 1.14–4.25, $p < 0.05$).

In the multivariate analysis stratified by age group, results indicated that female respondents and those who were separated had significantly higher odds of the past year MDD. In the 16–34 age group (Table 5), having three or more friends to rely on was related to decreased odds of the past year MDD (AOR 0.26, 95% CI 0.11–0.65, $p < 0.005$). In the 35–54 age group, not having any family members to confide in increased the odds of the past year MDD (AOR 2.34, 95% CI 1.18–4.64, $p < 0.05$). Friendship quality was important to this age group, with not having any friends to rely increasing the odds of the past year MDD (AOR 2.38, 95% CI 1.11–5.11, $p < 0.05$). However, having three or more friends to confide in (AOR 0.39, 95% CI 0.23–0.7, $p < 0.001$) or rely on (AOR 0.58, 95% CI 0.36–0.97, $p < 0.05$) decreased the odds of the past year MDD. Finally, in the over 55 years, age group only frequency of contact with friends was related to the past year MDD, with those reporting less than a single interaction each month having an increased odds of MDD (AOR 2.01, 95% CI 1.07–3.78, $p < 0.05$). Sensitivity analyses indicated that these results remained robust regardless of the presence of marital status in the models.

Discussion

The results of this study were consistent with the hypothesis that the qualitative of social relationships within ones network is related to depression. Specifically, having three or more family members and friends to confide in or rely on was associated with lower levels of the past year depression, while not having any family members from whom to seek emotional support was associated with an increased likelihood of having had a depressive episode

Table 3 Univariate associations between social connectedness variables and past year MDD among different age groups

Predictor	16–34		35–54		55+	
	OR	95% CI	OR	95% CI	OR	95% CI
Contact frequency with family						
Everyday	0.85	0.51–1.42	0.51	0.28–0.97	0.81	0.45–1.47
3–4 weeks	0.93	0.29–3.03	0.76	0.38–1.56	1.04	0.48–2.3
1–2 weeks	1	–	1	–	1	–
1–3 months	0.87	0.38–2	1.65	0.66–4.18	1.51	0.37–6.22
Less than once a month	1.71	0.49–6.05	1.3	0.48–3.54	1.86	0.84–4.15
Number of family members to confide in						
3 or more	0.54	0.36–0.85	0.51	0.32–0.82	0.49	0.27–0.91
1–2	1	–	1	–	1	–
0	2.48	1.44–4.27	3.47	2.07–5.85	1.06	0.54–2.09
Number of family members to rely on						
3 or more	0.7	0.45–1.11	0.49	0.28–0.88	0.58	0.34–1.02
1–2	1	–	1	–	1	–
0	2.48	1.31–4.56	2.78	1.46–5.32	1.48	0.66–3.34
Contact frequency with friends						
Everyday	0.74	0.43–1.28	0.75	0.44–1.3	1.05	0.56–2
3–4 weeks	0.72	0.34–1.55	1.4	0.74–2.69	1.56	0.72–3.43
1–2 weeks	1	–	1	–	1	–
1–3 months	2.45	0.73–8.29	1.94	1.03–3.7	1.87	0.87–4.06
Less than once a month	2.56	0.93–7.06	3.9	1.76–8.63	2.19	1.14–4.25
Number of friends to confide in						
3 or more	0.56	0.39–0.84	1.17	0.75–1.85	0.91	0.53–1.56
1–2	1	–	1	–	1	–
0	1.49	0.71–3.13	4.04	2.4–6.84	1.02	0.55–1.9
Number of friends to rely on						
3 or more	0.37	0.25–0.58	0.83	0.54–1.3	0.67	0.38–1.23
1–2	1	–	1	–	1	–
0	1.18	0.56–2.51	3.78	2.2–6.53	1.37	0.69–2.73

Bold values refer to statistically significant odds ratios at the $p < .05$ level

within the last year. These results were consistent across multivariate and univariate analyses and replicate the previous reports that both emotional and instrumental forms of support are important factors in the experience of depression [8]. Interestingly, frequency of contact with *family members* was not associated with depression, but having fewer than three interactions with a *friend* each month was associated with an increased likelihood of the past year depression. The association was even more pronounced among individuals reporting fewer than a single interaction with a friend.

The results from the analysis conducted separately for each age group largely mirrored findings from the overall sample, and extend the literature by uncovering age-related differences in the relationship between social connection factors and depression. To our knowledge, only two previous studies have examined these variables across different age groups [26, 27], with the first finding that although

self-efficacy mediated the relationship between social relationships and depression, the type of self-efficacy differed between middle and older adults [26]. Similarly, age-related differences emerged in the second study which found that buffering effects of social connection differed for younger and older adults as a function of the source of the interaction [27]. Our results extend these findings by providing additional evidence of important age-related differences in how social connection relates to depression.

Our findings also extend the existing literature by uncovering age-related relationships between social network factors and depression which can be understood in the context of the SST [15]. As expected, the youngest age group reported more frequent contact and a greater number of relationships than other age groups. The number of high-quality relationships retained by individuals in the different cohort groups was not markedly reduced in the older cohorts, with more than 80% of all individuals reporting

Table 4 Multivariate associations between social connectedness variables and past year MDD in the total sample

Predictor	AOR	95% CI
Model for family and friends predictors		
Contact frequency with family		
Everyday	0.82	0.56–1.23
3–4 weeks	0.97	0.58–1.63
1–2 weeks	1	–
1–3 months	1.23	0.57–2.66
Less than once a month	0.85	0.48–1.52
Number of family members to confide in		
3 or more	0.61	0.46–0.81
1–2	1	–
0	1.78	1.11–2.88
Number of family members to rely on		
3 or more	0.97	0.63–1.5
1–2	1	–
0	1.35	0.79–2.32
Contact frequency with friends		
Everyday	0.8	0.56–1.15
3–4 weeks	1.14	0.75–1.73
1–2 weeks	1	–
1–3 months	1.73	1.05–2.87
Less than once a month	1.97	1.01–3.84
Number of friends to confide in		
3 or more	0.48	0.71–0.33
1–2	1	–
0	1.02	0.65–1.62
Number of friends to rely on		
3 or more	0.42	0.29–0.62
1–2	1	–
0	1.5	0.96–2.36

Bold values refer to statistically significant odds ratios at the $p < .05$ level

Sex, age, and marital status were controlled for multivariate models

having at least one or more family and friend they could confide in and/or rely on. High-quality relationships during the middle age cohort were related to depression, which is accounted for by the proposal that individuals invest more time into fewer high-quality relationships as they age [15]. While it was surprising that quality was not related to depression in the older cohort, a single friendship interaction in this group was associated with lower odds of depression as compared to no-contact at all, which could be because social resources that fulfil emotional needs are required from only very few individuals to confer benefit. Notwithstanding this older age group, overall results are largely in accordance with the existing literature, showing that relationship quality is more consistently associated with depression than frequency of interaction (e.g., [28]).

Friendship support was important at all stages of life, with qualitative aspects most important in early and mid-adulthood, and frequency of interaction important in the later life stage. This is consistent with the previous work, showing that friends may be better suited to assist with psychological issues, at least in older individuals [29, 30]. Presumably, this may reflect the fact that friends are selected based on shared values and interests, and provide a source of intimacy and closeness [31] that is not always necessarily the case with family members (with the exception of romantic partners).

In the young adult age group (aged 16–34 years), frequency of contact with family or friends was not related to depression. Although it was expected that family connections would be associated with depression in this age group, only quality of friendship was related to depression, with those who had three or more friends on whom to rely were less likely to have had depression in the past year. Practical, instrumental support may be particularly important for those entering early adulthood. The period from 16 to 34 years represents a transition into adulthood, marked by the shift from family dependence to autonomy [32]. It is also the time when people typically establish careers, acquire financial responsibilities, and start families. It makes sense that there is value in having practical support from a diverse friendship network during this busy and often stressful time.

In the 35–54 age group, quality of interaction was associated with depression, and this extended to both family and friendship networks. Specifically, having no family members at all to provide emotional support was associated with a greater than two-fold increased likelihood of the past year depression. Therefore, there is great benefit in having at least one family member in whom one can confide. This is a relatively low threshold, but highlights the important role that even just a single family member can have. Replicating the pattern of friendship results from the overall sample, both forms of support from more than three individuals were associated with lower odds of the past year depression. Interestingly, having no friends to rely on was associated with a two-fold increased likelihood of depression, again contributing to the evidence indicating that hand-on support from peers is a key factor among working age individuals.

In the older adult age group (55 years and over), a different pattern of results emerged. Frequency of contact was important, with individuals who reported less than a single interaction with a friend each month having a two-fold increased likelihood of the past year depression. This is consistent with the evidence base linking depressive risk and social isolation in older adults [5, 33]. It is notable that neither family relationships nor relationship quality was associated with depression odds in the older age group. It may be the case that in later adulthood, family members

Table 5 Multivariate associations between social connectedness variables and past year MDD among different age groups

Predictor	16–34		35–54		55+	
	AOR	95% CI	AOR	95% CI	AOR	95% CI
Contact frequency with family						
Everyday	0.93	0.57–1.54	0.70	0.35–1.4	1.00	0.53–1.91
3–4 weeks	0.92	0.35–2.49	0.96	0.45–2.07	1.04	0.49–2.24
1–2 weeks	1.00	–	1.00	–	1.00	–
1–3 months	0.75	0.33–1.71	1.31	0.47–3.68	1.52	0.34–6.85
Less than once a month	1.16	0.3–4.59	0.58	0.2–1.68	1.56	0.57–4.32
Number of family members to confide in						
3 or more	0.63	0.4–1.01	0.66	0.38–1.18	0.57	0.28–1.2
1–2	1.00	–	1.00	–	1.00	–
0	1.70	0.83–3.51	2.34	1.18–4.64	0.73	0.27–2.04
Number of family members to rely on						
3 or more	1.17	0.71–1.96	0.82	0.37–1.8	0.88	0.47–1.67
1–2	1.00	–	1.00	–	1.00	–
0	1.43	0.68–3.04	1.26	0.53–3.04	1.52	0.44–5.23
Contact frequency with friends						
Everyday	0.88	0.52–1.5	0.75	0.42–1.35	0.96	0.5–1.85
3–4 weeks	0.76	0.36–1.64	1.51	0.75–3.06	1.50	0.67–3.39
1–2 weeks	1.00	–	1.00	–	1.00	–
1–3 months	2.58	0.72–9.35	1.53	0.83–2.85	1.90	0.78–4.66
Less than once a month	1.77	0.65–4.86	1.83	0.65–5.21	2.01	1.07–3.78
Number of friends to confide in						
3 or more	0.53	0.24–1.2	0.39	0.23–0.7	0.53	0.24–1.22
1–2	1.00	–	1.00	–	1.00	–
0	1.16	0.42–3.26	1.31	0.67–2.6	0.48	0.23–1.05
Number of friends to rely on						
3 or more	0.26	0.11–0.65	0.58	0.36–0.97	0.53	0.23–1.24
1–2	1.00	–	1.00	–	1.00	–
0	0.65	0.24–1.81	2.38	1.11–5.11	1.78	0.76–4.21

Bold values refer to statistically significant odds ratios at the $p < .05$ level

Sex and marital status were controlled for multivariate models

and relatives become less available due to their own aging and death [34], or alternatively, there may be a shift in focus from the provision of support (rather than receipt of it), such as helping with grandchildren, which may leave this age group more vulnerable to depression if their own support needs are not met. Control over social relationships has been shown to mediate the relationship between social relationships and depression [35], which explains why in later life, those who are able to maintain control over their friendship interactions (potentially indexed by having the opportunity for at least one social encounter with a friend each month) are afforded decreased odds of depression.

Several limitations warrant mention. First, self-report questions were used to assess social network quality and frequency information. While self-report measures are subject to bias, social relationship quality is inherently a subjective perception, and therefore, subjective self-report

data are appropriate. Second, it was not possible to divide the 16–34 age group into two groups, due to the low base rate of participants meeting criteria for depression in this group over the previous 12 months. As 16–34 captures a wide age range and life stage (e.g., adolescence through to early–middle adulthood), there is good reason to expect the relationship between social network factors and depression may have differed at the lower and upper ends of this age spectrum. The link between parental support factors and psychological well-being during adolescence is well-established (e.g., [36]), and therefore, it is likely that including this wide age range may have prevented genuine family effects from being detected in the younger age group. Third, there were several additional variables that were not measured and may have impacted the results as confounders, such as socioeconomic status, history of depression, and the presence of other mental disorders.

Moreover, the data used in this study are from 10 years ago and it is possible that social connection patterns may have changed, particularly in light of the growing role of the internet in social interactions.

Finally, the cross-sectional nature of this study precludes conclusions being drawn about the causal relationship between depression and social network factors. Furthermore, the current data do not allow for assumptions to be made about how social connection patterns change over time. While such questions are best suited to longitudinal cohort studies, the practical and economic limitations in following up large population samples across the entire life span from adolescence to old age preclude this. Within this context, key strengths of the current study include the large population-based sample, the large age range of the sample, the use of a structured, psychometrically sound diagnostic interview, and concurrent assessment of qualitative and quantitative aspects of social relationships.

This research contributes to our understanding of the association between social network factors and depression in the general population. Having friends and family members from whom support can be drawn is associated with decreased likelihood of past year depression. The relative importance of friendship vs family support networks differs as a function of life stage, with friends playing a key role throughout life but particularly in later life, whereas family connections are more important during middle adulthood. This has implications for the timing of social support interventions for depression. The current data suggest that for optimal outcomes, social support interventions could be tailored to the needs of specific age groups. For example, focusing on interventions that facilitate the opportunity to develop and maintain frequent friendship interactions might be best targeted towards older adults, while family-focused programs might be better delivered in middle adulthood. This idea is partially supported by a meta-analytic review which found that from a range of psychological interventions, social support programs had the greatest impact in the prevention of depression in the elderly, relative to adults and younger participants [37]. In terms of the best way to ameliorate social isolation in older adults, it may be that providing the opportunity for older people to develop and maintain close relationships over which they have autonomy and control, rather than traditional approaches such as attending weekly psychosocial meetings or participation in general activities, that is most useful [35, 38].

Another implication that follows on from the current study is that screening for depressive risk could be improved by focusing on the social support factors most closely associated with depression. For example, screening questions for older adults might focus on the level of support outside of family networks, while for those in mid-

adulthood, it may be more important to assess the level and quality of family and friendship support. Future research could help to identify whether age-based social support screening tools that assess quality and frequency of interaction, as well as source of support, can effectively identify those at risk of depression. Another important future area of work will be to address how the internet, social media, and online communities are changing the ways that individuals interact with their social networks. These emerging social platforms offer new ways to interact and communicate, and how this relates to depression will to be evaluated.

The current study has provided evidence for the association between social network factors and depression and extends our understanding of this relationship by focusing on quality, source, and type of social relationships in different age groups. The findings suggest that the relative importance of family and friendship connections is different in young, middle, and older adulthood, which needs to be used to guide the focus and target of interventions aimed at improving social support and reducing depression.

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