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Evaluation of a social support measure that may indicate risk of depression during pregnancy

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Abstract

Background—Strong social support has been linked with positive mental health and better birth outcomes for pregnant women. Our aim was to replicate the psychometric properties of the Kendler Social Support Interview modified for use in pregnant women and to establish the inventory's relationship to depression in pregnancy.

Methods—The modified Kendler Social Support Interview (MKSSI) was evaluated using principal components analysis. The association with depression was used as an indicator of external validity and was assessed by logistic regression.

Results—Data from 783 subjects were analyzed. One large principal component, termed “global support,” (eigenvalue=6.086) represented 22.5% of the total variance. However, 6 of the 27 items (frequency of contact with spouse, siblings, other relatives, and friends, and attendance at church and clubs) had low levels of association (<0.4) and thus were excluded from suggested items for a total score. Varimax rotation of the remaining 21 items resulted in subscales that fell into expected groupings: mother, father, siblings, friends, etc. One unit and two unit increases in the global support score were associated with 58.3% (OR=0.417, 95% CI=0.284-0.612) and 82.6% (OR=0.174, 95% CI=0.081-0.374) reductions in odds for depression, respectively.

Limitations—The ability of this social support scale to predict future depression in pregnancy has not yet been established due to cross-sectional design.

Conclusion—The MKSSI is reliable and valid for use in evaluating social support and its relationship to depression in pregnant women.

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Conflict of interest

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Keywords

Social support; Pregnancy; Depression; Women; Psychometrics

1. Introduction

Low levels of social support have been linked to the risk of developing depression in pregnancy or in the postpartum period (Barnet et al., 1996; Brugha et al., 1998; Collins et al., 1993; Cutrona, 1984; McKee et al., 2001; McKenry et al., 1990; O'Hara and Swain, 1996; Seguin et al., 1995; Stuchberry et al., 1998; Turner et al., 1990; Verkerk et al., 2003; Webster et al., 2000), although the strength of this risk factor varies among studies (c.f. O'Hara and Swain, 1996 for review (O'Hara and Swain, 1996)). In part, inconsistencies may be a result of the characteristics of the social support scales. For example, some investigations used scales that assessed only a few domains of support (Collins et al., 1993; Da Costa et al., 2000; Lee et al., 2005; McKenry et al., 1990; Norbeck et al., 1983; Norbeck and Tilden, 1983; Stuchberry et al., 1998; Turner et al., 1990; Webster et al., 2000), while others explored domains inconsistently through the use of open-ended, rather than structured questions about sources of support (Brugha et al., 1998; Norbeck et al., 1983; Seguin et al., 1995; Stuchberry et al., 1998). To our knowledge, no prior study of social support and depression in pregnant women has utilized a diagnostic interview for depression rather than a continuous measure of symptom severity or a screening questionnaire. Given the potential health risks of low social support in pregnancy and the need for an accurate and feasible social support instrument, this study evaluated the reliability and validity of the Kendler Social Support Interview modified for use in pregnant women (Kendler et al., 2005). A depressive disorder diagnosis was generated using the Composite International Diagnostic Interview (WHO, 1997) and the relationship between the social support interview score and depressive diagnosis in the first trimester of pregnancy was examined.

2. Methods

Pregnant women were recruited from obstetrical and psychiatric settings throughout Connecticut and Western Massachusetts. Women were eligible if they spoke English or Spanish, to their knowledge were having a singleton pregnancy and did not require insulin for diabetes. Subjects were interviewed face-to-face prior to completion of 16 weeks of pregnancy and were then re-interviewed by phone at 28 weeks of pregnancy and 2 months postpartum. They were reimbursed \$20 per interview and an additional \$20 for completing all 3 interviews. Interviewers underwent several days of training and completed a minimum of 6 practice interviews and at least two supervised interviews of each type. Interviews were fully scripted and were taped. At least 5% of tapes were reviewed for quality control. An additional 5% of subjects were re-contacted by supervisory staff to confirm critical elements of the interview. Approval was obtained from the Human Investigation Committee at Yale University School of Medicine and from affiliated hospitals and all participants provided verbal and written consent.

2.1. Assessment measures

Diagnostic instruments included depression and anxiety modules from the Composite International Diagnostic Index (CIDI) (WHO, 1997) and the Post Traumatic Stress Disorder Symptom Scale-Self-Report (Falsetti et al., 1993). The CIDI has excellent test-retest and procedural reliability, and validity (Farmer et al., 1987; Wittchen, 1994). Social support was assessed with a modification of the Kendler Social Support Interview that is based on the Social Interaction Scale developed at the Institute for Social Research (Schuster et al., 1990). It

showed significant ability to predict the risk of a depressive disorder among women participating in a study of 1057 opposite sex dizygotic twin pairs (Kendler et al., 2005). The original 24 items were designed to assess “quality of support” with questions based on concepts of emotional support and instrumental support, the latter operationalized as provision of relevant material goods. Information about frequency of contact and network size was also gathered. The emotional support and instrumental support items were asked in regard to specific personal relationships with spouse, parents, co-twin, children, other relatives, and friends (see Appendix for item examples) (Kendler et al., 2005).

We modified the social support interview to include 27 items and refer to it as the Modified Kendler Social Support Interview (MKSSI) for clarity. Items about the co-twin were substituted with the group “Siblings”. As the average age of our subjects was younger than the Kendler sample, we eliminated “support from children”. Additionally, we divided the “Parents” subscale into separate “Mother” and “Father” subscales. The first 24 items assessed the quality of social support and frequency of contact with Spouse/Partner, Mother, Father, Siblings, Other Relatives, and Friends. The last three questions assessed frequency of attendance at church, clubs or meetings and confidant network size.

Values ranged from 0 to 5 for frequency of contact and 1 to 5 for emotional and instrumental support questions. Since participants typically lived with spouses, frequency of contact was “0”, if the respondent reported no spouse or partner and hence no contact, and “5”, the highest level of contact, if the respondent had a spouse or partner. Respondents with more than 5 confidants were given a value of 5. Respondents without the living applicable relative were given the minimum value of 0 for frequency of contact and the minimum value of 1 for the respective emotional and instrumental items. A composite MKSSI score variable was obtained by averaging items that were retained in the principal components analysis. For subscales of the MKSSI score, items were grouped by principal factor analysis and then averaged.

2.2. Statistical analysis

SAS version 9.1.3 on Windows XP Pro 2002 was utilized for all analyses. To construct the MKSSI score, principal components analysis was used. Principal factor analysis with varimax rotation was used to interpret the MKSSI and construct MKSSI score subscales. Reliability of the MKSSI score was measured with Cronbach’s coefficient alpha.

Logistic regression models estimated the relationship between social support and depression in the first trimester of pregnancy as a test of external validity. All regression models included age, race, and education. Age was categorized as 20 years old or less, between 20 and 30, or over 30 years old. Education as defined by grade level, was grouped as less than 12th, between 12th and 15th, and 16th or greater. Race was combined into three categories: White+Asian, Black, and Other (Hispanic+Mixed+Other). For the first regression model, depression was the outcome variable and MKSSI score was the predictor. Probabilities of depression predicted by the model were charted against MKSSI score for all $N=783$ subjects in the data set. For the second regression model, the dependent variable of depression was predicted by each source of support in individual models. p -values and odds ratios, with 95% confidence intervals, were calculated for each one unit increase in composite source of support.

3. Results

3.1. Sample

There were 2758 subjects screened on or before August 18, 2006. Of those, 510 were women with probable current or recent depression, PTSD or antidepressant treatment, who were

considered “exposed” and selected. From the remaining “non-exposed” women, 423 (32%) were randomly selected to participate in the study.

Of the 933 total subjects eligible, 791 successfully completed the home interview in the specified time frame of pregnancy. Eight additional subjects were excluded due to improper administration of the MKSSI, leaving $N=783$ in the final dataset. Women with major depressive disorder (MDD) or minor depressive disorder (MinD) determined by CIDI score in any of the first 3 months of pregnancy were considered depressed.

Of the $N=783$ subjects analyzed, the majority were married (72%), over 30 years old (59%), White (79%), completed 4 years of college (55%), and had a combined family income of \$50,000 or greater (69%). However, a sizeable minority of the population were never married (10%), 20 years old or younger (5%), Black (7%) or Hispanic (11%), did not complete high school (6%), and had a combined income of \$20,000 or less (11%). Among these 783 women, 6% had major depression and 3% had minor depression (Table 1).

3.2. Construction of the MKSSI score

From the 27 questions included in the MKSSI, one large principal component (eigenvalue=6.086) representing 22.5% of the total variance emerged. Six additional components with eigenvalues greater than unity (3.437, 3.012, 2.383, 2.337, 2.109, 1.163) gave 7 components in total, accounting for 76.0% of the total variance. The first component, seen in Table 2, had positive loadings on all items as in the Kendler study (Kendler et al., 2005) and was termed “global social support.” As a dominant component that accounted for greater than 20% of the total variance, it formed the basis of the MKSSI score. Questions with loadings of less than the significance cutoff of 0.4 on this component were omitted from the MKSSI score, and included frequency of contact with spouse, siblings, other relatives, and friends, and attendance at church and clubs (Hatcher and Stepanski, 1994). A total of 21 questions remained with loadings ranging from 0.425 to 0.612 (Table 2). Because these loadings were close in range, we calculated the MKSSI score as the simple average of unweighted values. The MKSSI score had high reliability with Cronbach’s coefficient alpha of 0.86.

3.3. MKSSI subscales

Varimax rotation of the 21 question MKSSI score subset showed clear decomposition by source of support. The item subgroups that follow were averaged to create MKSSI score subscales: 1) father quality of support+frequency questions; 2) mother quality of support+frequency questions; 3) spouse quality of support questions; 4) friend quality of support+number of confidants questions; 5) other relatives quality of support questions; and 6) siblings quality of support questions. In the logistic regression model, subscales were examined for their relationship to a depressive diagnosis.

3.4. MKSSI score and depression

Observed MKSSI score values ranged from 1 to 5 (see Table 3). The mean of 3.521 and median of 3.571 were approximately equal, roughly corresponding to a support level between “Some” and “Quite a bit” for a typical relationship category. Percentile differences were not large, with a difference of 1.000 between the 1st and 3rd quartiles, and a difference of 2.000 between the 10th and 90th percentiles.

A higher MKSSI score was associated with significantly ($p<0.001$) reduced odds for depression in the first trimester. As seen in Table 4, a one unit increase in the score was associated with a 58.3% reduction in odds for depression (OR=0.417, 95% CI=0.284-0.612). A two-unit increase in the score was associated with an 82.6% decrease in odds for depression (OR=0.174, 95% CI=0.081-0.374). The model predicted women with very high MKSSI scores greater than

4.7, $n=17$ or 2.2%, to have low probabilities of depression between 2.5% to 3.6% (Fig. 1). In contrast, predicted probabilities for depression in women with scores between 2.0 and 2.5, $n=46$ or 5.9% were higher, varying between 17.7% and 35.1%. For the women with scores of 2.0 or less, $n=19$ or 2.4%, predicted probabilities of depression ranged from 27.1% to 53.4%.

When subscale scores for individual sources of support were evaluated, reduced odds for depression were significantly related to higher values for spouse (OR=0.777), mother (OR=0.802), father (OR=0.754), other relatives (OR=0.698), and friends+number of confidants (OR=0.621) (Table 4). Sibling support was not significantly associated with a depressive diagnosis. The composite MKSSI score maintained the strongest association with depression, with an odds ratio of 0.417 for a one unit increase in score.

4. Discussion

After item reduction, the Modified Kendler Social Support Interview (MKSSI) was internally consistent and demonstrated construct and external validity in a large cohort of pregnant women. Additionally, a high MKSSI score was significantly correlated to decreased odds of depression in the first trimester of pregnancy, providing excellent external validation of this interview.

While the relationship between social support and depression was significant in both the Kendler (Kendler et al., 2005) and our study, the results of our principal components analysis and hence items retained for our social support score were different. In Kendler et al. (2005), all frequency questions and social integration were deemed relevant to the “global social support” principal component, whereas our data showed that frequency of contact items for mother and father only were related to global social support. We can infer that for our subjects, frequency of contact from only their mother or father was important to overall social support. Additionally, frequency of contact with clubs/church was not significant to overall support. This information would be helpful in the creation of social support interventions for pregnant women, where we may hypothesize that perception of social support from parents would need to address contact with the subject, while interventions with other social relationships would not need to focus on that aspect of support.

The variation in items we retained in our study versus the Kendler study (Kendler et al., 2005) can be a result of either or both different analytic techniques or group differences. As the actual factor loadings are not presented in the Kendler study, perhaps different levels of significance were used for item loadings. Additionally, we included subjects missing certain categories of relationships, such as those having a deceased father, instead of excluding them from the analysis as in the Kendler study. Therefore, subjects missing certain categories of relationships still received a score on the interview in that category. Finally, perhaps the items that did not load are less relevant to our cohort, as our cohort varied dramatically in age and gender from the initial study. As a result of this difference, we would suggest eliminating these items from the MKSSI for future analysis of social support in pregnant women.

Social support has been theorized to consist of several different measurable domains from both sociological and psychological perspectives (House, 2002, Schwarzer and Leppin, 1992). While different hypothesized types of social support, in addition to sources of support, were measured in our analysis, our subjects perceived the construct of support according to source of support as compared to the various qualities of emotional support or frequency of support. This is frequently seen in social support literature (Turner, 1992) and consistent with the Kendler study (Kendler et al., 2005). We can elaborate that this is a good measure of general perceived social support from particular sources of support, such as mother or father, and that each relationship has a different strength and nature of support to our pregnant subjects.

Therefore, it is important to evaluate and score each of these categories separately in the overall construction of the summed scale, rather than use a broad evaluation of relationships such as Family. The significance of each source of support was further illuminated by logistic regression. All individual sources of support except siblings showed a statistically significant relationship to depression. However, it remains that the combination of these scores provides the strongest association with depression. That these results were similar to the original Kendler factor structure of subscales and their relationship to depression reinforces the validity of the scale modification.

This was the first study of social support and depression in pregnancy to utilize a diagnostic interview for depression using current DSM IV diagnostic criteria. Other studies have used either depression symptom severity measures (Cutrona, 1984) or screening questionnaires that are not able to diagnose depression specifically but can be elevated by general emotional distress, concurrent psychiatric illness or general medical conditions (Fechner-Bates et al., 1994; Yonkers and Sampson, 2000). They are highly subjective and can be biased by a few symptoms that may be far more severe than others.

The health risks of depression in pregnant women may be uniquely harmful. Depression in pregnancy has been implicated as a risk factor for many problems such as poor weight gain, late or delayed prenatal care, self-neglect (c.f. Stewart et al., 2006 for review (Stewart et al., 2006; Zuckerman et al., 1989)), poor birth outcomes (Hedegaard et al., 1993; Misra et al., 2001; Orr et al., 2002; Paarlberg et al., 1999; Reeb et al., 1987; Steer and Scholl, 1992; Zimmer-Gembeck and Helfand, 1996), and postpartum depression (Dietz et al., 2007). Women who are depressed have a higher prevalence of comorbid poor health habits such as cigarette smoking, drug and alcohol use (Dietz et al., 2007; Zuckerman et al., 1989). In 2000-2002, the British Confidential Enquiry into Maternal Deaths described psychiatric illness as the leading cause of maternal deaths overall (RCOG, 2004). In their extensive review, Fields et al. detail the constellation of negative behavioral, physiological, and biochemical effects that depression during pregnancy has on the developing child (Fields et al., 2006). It is clear that the need for instruments to anticipate depression in pregnancy is great.

We have focused on the need to predict depression because social support interventions have been evaluated with little success in preventing poor birth outcomes (Hodnett and Fredericks, 2003). Perhaps depression is a mediator/moderator of the relationship between low social support and poor birth outcomes and by screening for low social support and then managing depression that we may address this association.

There are several limitations to this study. Feasibility dictated that only perceived social support can be evaluated by the MKSSI. Self-report measures are difficult to verify and may be more influenced by personality, mood, or anxiety disorders than actual social support received. Additionally, although external validity of the MKSSI has been established using the CIDI, convergent validity cannot be established with another social support instrument, as there is no gold standard social support scale.

Because this is a cross-sectional study, we cannot claim that low social support precedes depression. In order to determine if high social support protects a subject from depression onset, this study must be longitudinal and beginning with a group of subjects who have no current symptoms of depression.

Furthermore, in our model we did not control for prior history of depression. It would be important to see how a prior history of depression would influence the relationship between depression and social support, especially in a longitudinal analysis. In the Kendler study (Kendler et al., 2005), it did not affect the magnitude of the relationship; it increased the baseline risk of depression in the subjects.

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Appendix

Appendix A. Example of interview items

Emotional item 1: How much does your ____ listen to you if you need to talk about your worries or problems?

Emotional item 2: How much does your ____ understand the way you feel and think about things?

Instrumental item: How much does your ____ go out of their way to help you if you really need it?

Frequency of contact item (personal relationships): How frequently do you or your ____ see each other, talk on the phone, or communicate through letters or email?

Frequency of contact item (church, clubs): How often do you attend ____?

Number of confidants: Is there anyone with whom you have a close confiding relationship and can share your most private feelings? and 2) With how many people do you have this kind of relationship?

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Fig. 1. Probability of first trimester depression predicted by logistic regression on Modified Kendler Social Support Interview (MKSSI) score, controlling for race, education, and age.

Table 1

Demographics of study population

Characteristic		Frequency (%)
Marital status	Married	561 (72)
	Living with partner	125 (16)
	Divorced	6 (1)
	Separated	7 (1)
	Widowed	2 (0)
	Never married	82 (10)
Age	≤20	42 (5)
	>20 and ≤30	277 (36)
	>30	464 (59)
Race	White	616 (79)
	Asian	19 (2)
	Black	54 (7)
	Hispanic	87 (11)
	Mixed	6 (1)
	Other	1 (0)
Education	Less than high school	49 (6)
	High school or some college	308 (39)
	College or more	426 (55)
Income	<\$20,000	82 (11)
	\$20,000-\$49,999	155 (20)
	\$50,000-\$99,999	287 (37)
	≥\$100,000	243 (32)
Depression	MDD	45 (6)
	MinD	23 (3)

Table 2

Loadings of MKSSI items on the “Global Social Support” component (see Appendix for interview item examples)

MKSSI item	Loading	MKSSI item	Loading
Spouse frequency	0.341	Relatives frequency	0.364
Spouse emotional 1	0.449 ^a	Relatives emotional 1	0.528 ^a
Spouse emotional 2	0.448 ^a	Relatives emotional 2	0.563 ^a
Spouse instrumental	0.442 ^a	Relatives instrumental	0.612 ^a
Sibling frequency	0.297	Friends frequency	0.283
Sibling emotional 1	0.478 ^a	Friends emotional 1	0.435 ^a
Sibling emotional 2	0.484 ^a	Friends emotional 2	0.449 ^a
Sibling instrumental	0.530 ^a	Friends instrumental	0.475 ^a
Mother frequency	0.425 ^a	Church frequency	0.081
Mother emotional 1	0.589 ^a	Club frequency	0.097
Mother emotional 2	0.595 ^a	# of confidants	0.483 ^a
Mother instrumental	0.586 ^a		
Father frequency	0.473 ^a		
Father emotional 1	0.591 ^a		
Father emotional 2	0.595 ^a		
Father instrumental	0.584 ^a		

^aItem included in the MKSSI

Table 3

Percentiles of observed MKSSI score values

Percentile	MKSSI score value
100th (max)	5.000
90th	4.571
75th	4.048
50th	3.571
25th	3.048
10th	2.571
0th (min)	1.000

Table 4

Odds ratios for one unit increases in MKSSI score and subscales

Source	OR	OR 95% CI	<i>p</i> -value
Spouse	0.777	(0.633, 0.953)	0.016
Sibling	0.917	(0.755, 1.113)	0.379
Mother	0.802	(0.667, 0.964)	0.019
Father	0.754	(0.623, 0.912)	0.004
Relatives	0.698	(0.567, 0.858)	0.001
Friends+# confidants	0.621	(0.468, 0.825)	0.001
MKSSI score	0.417	(0.284, 0.612)	<0.001