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Perceived social support in African American breast cancer patients: Predictors and effects

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Abstract

Rationale—Social support plays an important role in quality of life and health outcomes after breast cancer diagnosis and treatment.

Objective—To examine changes in perceived social support in African American women during the two years following a new breast cancer diagnosis.

Methods—This secondary analysis uses data collected from 2009 to 2015 from 227 newly diagnosed, African American women with breast cancer (mean age 56 [$SD = 10$], 59% household income < \$25,000; 28% married/partnered, 72% early stage) participating in a randomized controlled trial testing the effects of a video-communication intervention on quality-of-life and follow-up care. Participants, all of whom received treatment in one metropolitan area of the Midwestern United States, completed five telephone interviews over 2-year follow-up; demographic, psychosocial, quality of life, and clinical data were collected. Growth curve models were used to examine change in perceived social support (measured by the Medical Outcomes Study Social Support Survey) as well as correlates of baseline levels of social support and predictors of change in individuals' social support. Additional analyses examined whether change in social support over the first year affected depressive symptoms (Center for Epidemiologic Studies Depression Scale) and general health perceptions (RAND SF-36 subscale) at two years.

Results—Being married, reporting greater spirituality, and reporting fewer depressive symptoms at baseline were significantly associated with higher initial levels of perceived social support. Women whose social support declined during the first year after diagnosis reported more severe depressive symptoms and worse general health perceptions at two years.

Conclusion—Clinicians should periodically assess perceived social support among African American women with breast cancer to help find support resources for those who have low initial social support and for those whose support declines in the first year after diagnosis.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.socscimed.2017.09.035>.

Keywords

Social support; Breast cancer; Quality of life; Longitudinal study; Depression; African Americans

Breast cancer is the most commonly diagnosed non-skin cancer among women in the U.S., including among African American women (DeSantis et al., 2016). Although African American women are diagnosed with breast cancer at similar rates compared with White women, they are 42% more likely to die from the disease (DeSantis et al., 2016). Only 78% of African American women diagnosed with breast cancer survive five years, compared to 92% of White women (Office of Minority Health, 2013). In addition, there are differences between African American and white women in adherence to follow-up care recommendations, with African American patients having lower rates of clinic visits and surveillance mammography (Advani et al., 2014). The disparity in outcomes has been attributed to a variety of factors, including stage at diagnosis, type of tumor, access to care, and socioeconomic status, but much of the disparity remains unexplained (American Cancer Society, 2013).

Healthy People 2020, the blueprint of health goals for the U.S., states that an individual's health is determined in part by “the resources and supports available in our homes, neighborhoods, and communities” (U.S. Department of Health and Human Services, 2014). Greater social support is associated with better health and wellbeing, both in the general U.S. population (Galea et al., 2011; Umberson and Montez, 2010; Uchino, 2009) and among cancer survivors (Kroenke et al., 2013; Mols et al., 2005). Social support plays an important role in quality of life and health outcomes after breast cancer diagnosis and treatment (Epplen et al., 2011; Courtens et al., 1996). Higher levels of social support are associated with lower mortality (Kroenke et al., 2013; Pinguart and Duberstein, 2010; Chou et al., 2010), greater posttraumatic growth (Schroevers et al., 2010), higher levels of physical activity (Barber, 2012), better physical health (Ganz et al., 2003), and lower levels of distress (Andreu et al., 2012). Lower levels of social support after diagnosis and during treatment have been associated with development of depression and anxiety (Hill et al., 2011; Patten et al., 2010; Schroevers et al., 2003). Social support may affect health through both social mechanisms that help promote engagement in healthy behaviors (Umberson et al., 2010) and one's emotional wellbeing (Thoits, 2011) and biological mechanisms, which can affect the tumor microenvironment and tumor growth (Hinzey et al., 2016; Lutgendorf and Sood, 2011).

Social support is measured in various ways, including assessing perceptions of availability of support or receipt of supportive acts (Uchino, 2009) and examining structural factors such as social ties or social integration (Umberson et al., 2010). Perceived availability of support, the focus of the current study, can be measured both as a global construct or as distinct subtypes of support (e.g., emotional, instrumental) (Sherbourne and Stewart, 1991; Uchino, 2009; Thoits, 2011). Findings from prior research on perceived social support in breast cancer patients are mixed. Prior work has suggested that many women report having increased support around the time of cancer diagnosis, but that this support often decreases over time after treatment (Den Ouden et al., 2010; Courtens et al., 1996; Bloom and

Kessler, 1994), a decrease that may be associated with negative psychosocial outcomes (Thompson et al., 2013). Not all studies have found a decline in social support after diagnosis, however. Scores on the Medical Outcomes Study Social Support Survey (MOS-SSS) were stable among Australian breast cancer patients from time of diagnosis to three years later (Leung et al., 2014). These mixed findings suggest that declines in social support may differ across geographic regions and perhaps race/ethnicity, and that it is important to consider the time intervals at which social support is measured. In particular, these findings also suggest that it may be particularly important to monitor social support in the first few years following a breast cancer diagnosis.

A smaller body of research has investigated perceived social support in African American women with breast cancer. In a cross-sectional study of racially/ethnically diverse breast cancer patients within five years of diagnosis, scores on the MOS-SSS were higher for African Americans than for women in other racial/ethnic groups (Giedzinska et al., 2004). In contrast, another cross-sectional study of patients within three years of diagnosis who had various types of cancer found that African Americans reported lower perceived social support than Whites, and that higher levels of perceived support were associated with better mental health quality of life (a summary measure based on four subscales of the SF-36) in African Americans but not in Whites (Matthews et al., 2012). Qualitative studies with cancer survivors more than a year post-diagnosis suggested that a number of African American breast cancer patients may have unmet needs for social support, particularly emotional support, during treatment and survivorship (Haynes-Maslow et al., 2016; Lewis et al., 2012).

Less is known about how social support changes over time in African American women with breast cancer, and what the consequences of changes in social support might be. Growth curve analyses in early-stage breast cancer patients (Thompson et al., 2013) demonstrated that, compared with White breast cancer patients, African American patients reported higher initial levels of perceived social support a mean six weeks after definitive surgical treatment *and* showed a steeper decline in social support over 2-year follow-up. Among African American and White women with early- and late-stage breast cancer, higher perceived emotional support at diagnosis was found to be associated with a moderate decrease in all-cause mortality over the ensuing 10 years (Soler-Vila et al., 2003).

Building upon this previous work, our study examined predictors and effects of change in perceived social support over time in a sample of African American women newly diagnosed with early-stage and locally advanced breast cancer. There were three hypotheses: 1) Perceived social support would decline significantly over time; 2) Individuals' change in social support over time (slope) and estimated initial levels of social support (intercept) would be predicted by demographic, psychosocial, quality of life, and clinical variables; and 3) Greater decline in social support and lower social support intercept would be associated with poorer general health perceptions and greater severity of depressive symptoms at 2-year follow-up.

1. Methods

This secondary analysis included data from a 2-year randomized controlled trial of 227 African American women newly diagnosed with breast cancer who were randomly assigned to two arms: 107 in the intervention arm; 120 in the control arm. The intervention arm received a novel, interactive, broadcast-quality video program designed to deliver clinically relevant cancer-related information to African American breast cancer patients (Pérez et al., 2014). The intervention, delivered three times over the first year of the study, aimed to increase patients' quality of life and adherence to follow-up care recommendations (see Online Supplement). Participants in the control arm received standard of care and were not exposed to the videos. African American women receiving breast cancer treatment at Siteman Cancer Center at Barnes-Jewish Hospital and Washington University School of Medicine and at Saint Louis University School of Medicine between 2009 and 2012 were mailed letters approximately three days after each patient's surgical consultation for newly diagnosed breast cancer to invite them to participate. Patients were eligible for inclusion if they self-identified as African American, were ≥30 years of age, and had a first primary ductal carcinoma *in situ* (stage 0) or invasive breast cancer (stages I – III). Patients were excluded if they had a history of breast cancer, metastatic (stage IV) breast cancer, bilateral mastectomy (precluding surveillance mammography, which was one of the outcomes of interest), mental or cognitive problems that would preclude responding to interview questions, and inability to speak English. Of 371 eligible patients invited to participate, the study team enrolled 227 (61.1%). Participants gave informed consent and were paid \$25 per interview. This study was approved by the institutional review boards at both institutions.

Participants completed computer-assisted telephone interviews five times over 2-year follow-up. Baseline interviews (Time 1) occurred shortly after commencement of neoadjuvant therapy (for eligible patients) or after a post-operative visit; subsequent interviews occurred approximately one month after baseline (Time 2), then six (Time 3), 12 (Time 4), and 24 months (Time 5) after definitive surgical treatment. Eighty-five percent of participants were retained through the final interview.

1.1. Measures

Variables in the models included those reported to be related to social support in the literature, including marital status (Von Ah et al., 2012), depressive symptoms (Patten et al., 2010), religious/spiritual beliefs and practices (Haynes-Maslow et al., 2016; Holland et al., 1998), income (Mickelson and Kubzansky, 2003), general health (Jaffe et al., 2012), age (Schroevens et al., 2010), and treatment-related variables including surgery type (Thompson et al., 2013).

Social support—The Medical Outcomes Study Social Support Survey (MOS-SSS; Sherbourne and Stewart, 1991) measured perceived availability of social support at each interview. Respondents were asked “How often is each of the following kinds of support available to you if you need it?” for 19 items, with 5-point Likert-type response options ranging from 0 (*none of the time*) to 5 (*all of the time*). The MOS-SSS item scores were used to compute a total score for perceived availability of social support; mean scores were

transformed into standardized scores ranging from 0 to 100, with higher scores indicating greater perceived support (RAND Corporation, 2014). The MOS-SSS, which was developed to measure perceived availability of social support in community-dwelling adults with chronic conditions, has been used in diverse samples of breast cancer patients, including patients at different cancer stages who received different treatment modalities (e.g., Ashing-Giwa and Rosales, 2013; Giedzinska et al., 2004; Pérez et al., 2017). In our sample, Cronbach's α was >0.96 at each interview.

Depressive symptoms—Depressive symptoms were measured using the Center for Epidemiologic Studies Depression Scale (CES-D, Radloff, 1977) at each interview. This 20-item measure assesses depressive symptoms over the past 7 days and yields scores of 0–60, with higher scores indicating greater depressive symptoms. The CES-D has shown good reliability and validity in a range of populations (Ashing-Giwa and Rosales, 2013; Radloff, 1977). In this sample, Cronbach's α was 0.92 at baseline.

General health perceptions—General health was assessed at each interview using the General Health subscale of the RAND 36-item Health Survey 1.0 (Hays et al., 1993). Higher scores indicate better health perceptions. This measure has been shown to have good reliability and validity in diverse populations (e.g. Wolinsky et al., 2004). The 5-item general health subscale was reported to be more strongly associated with physical health than with mental health (McHorney et al., 1993). In this sample, Cronbach's α for the general health subscale was 0.75 at baseline.

Spirituality—Religious and spiritual beliefs and practices were measured by the Systems of Belief Inventory-15R (SBI; Holland et al., 1998), a scale assessing religious behaviors as well as spiritual aspects of coping that was designed to be used with individuals reporting a range of religious affiliations, including those who are atheist, agnostic, or without religious affiliation. The scale, which consists of 15 items with Likert-type response options ranging from 0 (*strongly disagree*) to 3 (*strongly agree*), yields scores of 0–45, with higher scores indicating stronger spiritual beliefs and practices. In this sample, Cronbach's α was 0.88 at baseline.

Other demographic and clinical variables—Demographic variables included self-reported age (in years), employment status (working at least part-time versus not), level of education (grades 1–8; grades 9–11; high school diploma/equivalent; 1–3 years college; 4 + years of college), and annual household income from all sources (six categories ranging from $< \$10,000$ to $> \$100,000$). Relationship status was categorized as binary (1 = currently married/partnered, 0 = not currently married/partnered). Comorbidity was measured using the interview adaptation (Katz et al., 1996) of the Charlson comorbidity index (Charlson et al., 1987), from which a weighted score (range 0–31) is computed, with higher scores indicating a greater number and/or severity of comorbid conditions. Cancer stage (early [stage 0, I, or IIA] vs. locally advanced [stage IIB or III]) was determined by clinical staging and surgical pathology. Cancer treatment information was obtained from both self-report and the medical record (surgery type, [mastectomy vs. breast-conserving surgery], and receipt of chemotherapy, radiation therapy, and hormone therapy [each yes = 1]).

1.2. Analysis plan

Growth curve models, a form of structural equation modeling that requires three or more waves of data, were used. This modeling technique allows researchers to differentiate between a construct's systematic change over time (i.e., the slope) and the estimated initial level of a construct (i.e., the intercept) (Curran and Hussong, 2003). Growth curve models can handle data that are not normally distributed (Curran et al., 2010), which was observed previously for MOS-SSS scores (Thompson et al., 2013). Because the trial involved two study arms, differences between a one-group and a two-group model were examined using a series of difference tests as described by Bollen and Curran (2006, p. 171).

Hypothesis 1—that that perceived social support would decline significantly over time—was tested using an unconditional model (Model 1) in which the only variables were MOS-SSS scores at each time point (Fig. 1A) (Bollen and Curran, 2006). A significant mean slope would indicate the sample as a whole showed systematic change in social support over time. Significant variability in social support slope would indicate between-participant variability in social support trajectories (Bollen and Curran, 2006).

Hypothesis 2—that individuals' change in social support over time (slope) and estimated initial levels of social support (intercept) would be predicted by demographic, psychosocial, quality of life, and clinical variables—was tested using a conditional growth curve model (Model 2) in which the slope and intercept were treated as outcomes predicted by other variables (Bollen and Curran, 2006) (Fig. 1B). This model assessed which variables predicted change in social support and which variables were correlated with initial level of social support.

Hypothesis 3—that greater decline in social support and lower social support intercept would be associated with poorer perceived general health and more severe depressive symptoms at 2-year follow-up—was tested using a growth curve model (Model 3) in which the latent factors of social support slope (over the first year) and intercept were used as *predictors* of perceived general health and severity of depressive symptoms at two years (Fig. 1C). The initial model controlled for study arm and levels of general health perceptions and depressive symptoms at baseline, and a subsequent model controlled for baseline values of other predictor variables. To establish temporal order between predictors and outcomes, these models estimated slope and intercept based on social support scores over the first year (i.e., over the first four time points only).

Descriptive analyses and bivariate analyses were performed in IBM SPSS Statistics 22 (Armonk, NY). Growth curve modeling was conducted in Mplus version 7.1 (Muthén and Muthén, 1998–2011) using the MLR estimator, which provides maximum likelihood estimation with robust standard errors. Model fit for growth curve models was assessed using several fit indices (Curran et al., 2010): a model chi-square test; the Tucker-Lewis incremental fit index (TLI) (Tucker and Lewis, 1973); the root mean square error of approximation (RMSEA) (Steiger and Lind, 1980); and the standardized root mean square residual (SRMR) (Jöreskog and Sörbom, 1981). Values of 0.90 and higher are considered acceptable for the TLI. Values of 0.08 or lower are considered acceptable for the RMSEA

and SRMR (Hu and Bentler, 1999). Significance for all growth curve tests was set at $p < 0.05$.

1.3. Missing data

Missing data were handled with multiple imputation (Allison, 2009). A set of 10 imputed datasets was created in Amelia II (Honaker et al., 2012), and the MLR estimator in Mplus estimated model results that were averaged across all datasets. Diagnostic tests indicated successful imputation of missing values (Honaker et al., 2012).

Over the course of 2-year follow-up, nine participants died. Models were run both with and without participants who died during follow up; the significance of model parameters was identical, with one exception (noted below). Results are presented here for models in which the cases of deceased participants were excluded, with a sample size of 218 for the growth curve models.

2. Results

Table 1 provides descriptive statistics for the sample. At baseline, 28.2% of participants were married/partnered. Mean age was 56.0 ($SD = 10.0$), and the majority of participants reported annual household income below \$25,000. Most patients had early-stage cancer and were treated with breast-conserving therapy. Most patients (99.0%) were treated at Siteman Cancer Center. All but three patients received either breast-conserving surgery or mastectomy. Mean MOS-SSS score at baseline was 81.9 ($SD = 19.8$).

A series of difference tests were conducted to examine the differences between one-group and a two-group models for growth curve analyses (Bollen and Curran, 2006); the tests suggested that a linear model was a good fit and that intercepts, slopes, and variances did not differ significantly by study arm. Thus, all growth curve models used a one-group unconditional model that controlled for study arm.

Hypothesis 1, that perceived social support would decline significantly over time, was not supported. Model 1 was fit to the repeated measures social support data. This model demonstrated excellent fit ($\chi^2(10) = 13.84$, RMSEA = 0.04, TLI = 0.99, SRMR = 0.06). The mean intercept of social support was significantly different from zero (mean intercept = 81.79, $p < 0.001$), but the mean slope was not significantly different from zero, indicating no significant change in average levels of social support over time for the sample as a whole (mean slope = -0.073 , $p = 0.835$). There was, however, significant variability in change in social support among participants ($p < 0.001$), indicating that individuals had varied trajectories not fully described by mean scores from the full sample.

Hypothesis 2, which stated that change in social support over time (slope) and estimated initial levels of social support (intercept) would be predicted by demographic, psychosocial, quality of life, and clinical variables, was partially supported. Table 2 shows results from Model 2. This model demonstrated good fit ($\chi^2(58) = 80.45$, RMSEA = 0.04, TLI = 0.95, SRMR = 0.03), with the exception of a significant model chi-square statistic. Because it seemed likely that this indicator of poor fit was due to the large number of non-significant

parameters in the model, the model was re-run with only study arm plus significant or nearly significant variables ($p < 0.10$; variables retained included marital status, spirituality, depressive symptoms, education, and receipt of chemotherapy); the model then demonstrated good fit (i.e., the chi-square was no longer significant).

In support of Hypothesis 2, several variables were associated with estimated initial levels of social support (intercept). Being married/partnered (standardized coefficient = 0.33, $p = 0.042$) and reporting higher levels of spirituality (standardized coefficient = 0.31, $p = 0.002$) were associated with higher estimated initial levels of social support, and more severe depressive symptoms were associated with lower initial levels of social support (standardized coefficient = 0.33, $p < 0.001$). Contrary to Hypothesis 2, other variables included in the model were not associated with social support intercept, and none of the variables predicted individuals' social support slope.

Hypothesis 3—which stated that greater decline in social support and lower social support intercept would be associated with poorer general health perceptions and more severe depressive symptoms at 2-year follow-up (controlling for study arm and levels of general health and depressive symptoms at baseline)—was partially supported (Table 3).

Results from Model 3 indicated that both social support slope and intercept were significantly associated with general health perceptions at 2-year follow-up. Women who had lower social support intercept and declines in social support in the first year (i.e., Times 1–4) were more likely to report poorer levels of general health at Time 5 (standardized coefficient for intercept = 0.21, slope = 0.26, each $p < 0.05$). Results also indicated that both social support intercept and slope were significantly associated with severity of depressive symptoms at 2-year follow-up. Patients who had lower social support intercept and greater declines in social support during the first year were more likely to report more severe depressive symptoms at Time 5 (standardized coefficient for intercept = -0.20 , slope = -0.40 , each $p < 0.05$).

When covariates from baseline were added to Model 3, all significant relationships described above held, with the exception of the effect of social support intercept on depressive symptoms, which was attenuated (standardized coefficient = -0.16 , $p = 0.069$). However, the model with baseline covariates added showed relatively poor fit ($\chi^2(58) = 346.38$; RMSEA = 0.09, TLI = 0.73, SRMR = 0.09), most likely due to the large number of non-significant parameters.

3. Discussion

In this sample of African American women with breast cancer, mean perceived social support scores were high and remained stable over time, but there was significant variability in social support trajectories among individual participants. Spirituality, depressive symptoms, and marital status were associated with the estimated initial levels (intercept) of social support; greater spirituality and being married at baseline were associated with higher levels of perceived social support, and greater depressive symptoms at baseline were associated with lower support. None of the variables in the model—including variables

related to cancer treatment—predicted change in individuals' perceived support over time, but a decline in perceived support during the first year after diagnosis was associated with higher depressive symptoms and poorer general health perceptions at two years.

On average, participants reported having high levels of social support, comparable to previous results among African American women with breast cancer (Giedzinska et al., 2004; Thompson et al., 2013). The stability of social support over time was unexpected given previous research (Den Oudsten et al., 2010; Courtens et al., 1996; Bloom and Kessler, 1994), and especially because a recent study of early-stage breast cancer patients in this metropolitan area found that African American patients experienced steeper decline in social support over time compared to White women (Thompson et al., 2013). It is possible that the difference in social support change between studies could be explained by factors such as new forms of support available at the treatment centers or in the broader community. In a separate qualitative substudy of 15 breast cancer patients drawn from this same sample, participants spoke of receiving support from their doctors, other staff, and from research study personnel affiliated with this and other research studies in which patients participated (Thompson, 2016). It is possible this type of support helped mitigate the effects of a cancer diagnosis on participants' perceived social support. It is also possible greater disability and other post-treatment challenges reported among African American women (Barsevick et al., 2016; Dean et al., 2015) lead them to solicit and perceive higher availability of support in the two years after a cancer diagnosis.

Results underlined the role played by depressive symptoms, marital status, and spirituality in contributing to initial levels of social support. Consistent with previous research indicating that marriage and other intimate partnerships can be an important source of support for African American women with cancer (Von Ah et al., 2012), we found that being married was associated with higher initial levels of social support. Also consistent with prior work, depressive symptoms at baseline were associated with lower levels of social support (Patten et al., 2010; Thompson et al., 2013).

Our findings also point to the importance of spirituality in African American breast cancer patients' adaptation to cancer. Spirituality was significantly associated with initial levels of social support. In the general population, religious beliefs and practices have been found to be positively associated with social support (Koenig and Larson, 2001) and religion can play an especially important role in African American women's coping with breast cancer (Haynes-Maslow et al., 2016).

Although mean levels of social support did not change in the sample as a whole, some individuals experienced declines in social support over the first year, and these declines were associated with greater depressed mood and poorer general health perceptions at 2-year follow-up. These findings suggest the potential value of screening for social support at time of diagnosis, during treatment, and into survivorship. Such screening is consistent with the Institute of Medicine's recommendation for survivorship care plans (Institute of Medicine, 2006). Although many patients cope well after a breast cancer diagnosis, some patients struggle and may benefit from survivorship-care planning (Kvale et al., 2016) that takes into account the social context of the patient, including attending to the patient's mental health

needs, supports from organized religion, and support from intimate partners. A brief measure of social support can be integrated easily into clinical practice to identify newly diagnosed patients' needs for support and provide referrals when necessary.

Screening for and monitoring changes in social support and depressive symptoms during active treatment and into post-treatment survivorship would allow clinicians to connect patients who lack the sufficient support in their daily lives to support resources (e.g., religious or secular support groups, or additional support from the care team). The association between depression and social support is especially important given that there are empirically supported psychosocial treatments for depression (Cuijpers et al., 2008), including evidence-based cognitive-behavioral treatments developed specifically for breast cancer patients (Stagl et al., 2015).

More research is needed to explore additional factors that may affect social support in African American women with breast cancer. We found that there was significant variability in individuals' social support trajectories, but none of the baseline variables investigated in the current study predicted this individual change. This lack of significant predictors was unexpected based on prior research (Thompson et al., 2013). Future research could investigate additional factors that may affect change in social support in cancer patients, including relationship quality (Robles et al., 2014) and neighborhood characteristics (Gomez et al., 2015). Many women in this sample may have been juggling multiple roles (e.g., as daughters, parents, spouses, and employees) that could have affected their social support. Taking a life span perspective would suggest the importance investigating effects of shifting social roles (e.g., parent, caregiver) on social support (Bailey et al., 2010; Thoits, 2011; Umberson et al., 2010), as well as assessing stressors that accumulate over the course of many years (Williams et al., 2016).

Additional modeling techniques may illuminate the processes that produce and sustain social support. Dyadic studies, for example, could help examine interdependence between psychosocial and physical health outcomes for patients and partners, as well as help examine the processes by which partners of African American breast cancer patients or other family members provide support to patients (Kenny et al., 2006). Ecological momentary assessment data could provide information about fluctuations in social support over shorter time intervals than those included in this study (Shiffman et al., 2008), as well as insights into how social support changes after patients complete different treatments.

This study extends research about social support among African American women with breast cancer by examining changes in perceived support and analyzing the effects of such changes on general health perceptions and depressive symptoms. Strengths include a relatively large sample of African American breast cancer patients who participated in a randomized clinical trial, as well as having five waves of data collected over two years. There also was a relatively high rate of retention over the study period.

3.1. Limitations

The MOS-SSS is a measure of perceived availability of support and does not provide information about particular sources of support (e.g., partners, adult children) or receipt of

supportive acts. It also does not provide information about negative social interactions or intrusive support attempts, factors which may be important to consider when evaluating the balance between the positive and negative consequences of social ties (Umberson and Montez, 2010). Future research could investigate these components of social support among African American breast cancer patients. Strategies such as community-based participatory research could be valuable both in assessing existing social support measures for use in low-income or African American populations and in developing new measures of social support that capture additional dimensions of support.

In addition, more needs to be known about the clinical significance of MOS-SSS scores and the changes in those scores. These analyses showed that declines in perceived availability of social support over the first year after a breast cancer diagnosis were associated with higher levels of depressive symptoms and poorer self-reported general health perceptions at 2-year follow-up, but if such information is to inform clinical practice, it will be important to determine the levels of decline that are clinically meaningful. One possibility is to define clinically meaningful changes in perceived availability of social support as the amount of change associated with clinically meaningful shifts in particular mental and physical health outcomes.

Finally, results from this study may not be generalizable to other populations. The African American women in this study were predominantly low-income and came primarily from one Midwestern metropolitan area. In addition, the vast majority of participants received treatment at a National Cancer Institute-designated Comprehensive Cancer Center, which may be very different from the treatment patients may receive in other settings. It is also possible that women who volunteer for research studies may have different or more stable levels of support than women who decline to participate.

3.2. Conclusions

The current study shows that spirituality, intimate partnerships, and mental health play important roles in perceived availability of social support overall among African American women with breast cancer. Declines in perceived support over the first year after diagnosis can be problematic for breast cancer patients' experience of depressive symptoms and general health perceptions at 2-year follow-up, and interventions, including psychosocial treatment, should be considered for women who perceive that they have low support or who experience declines in support.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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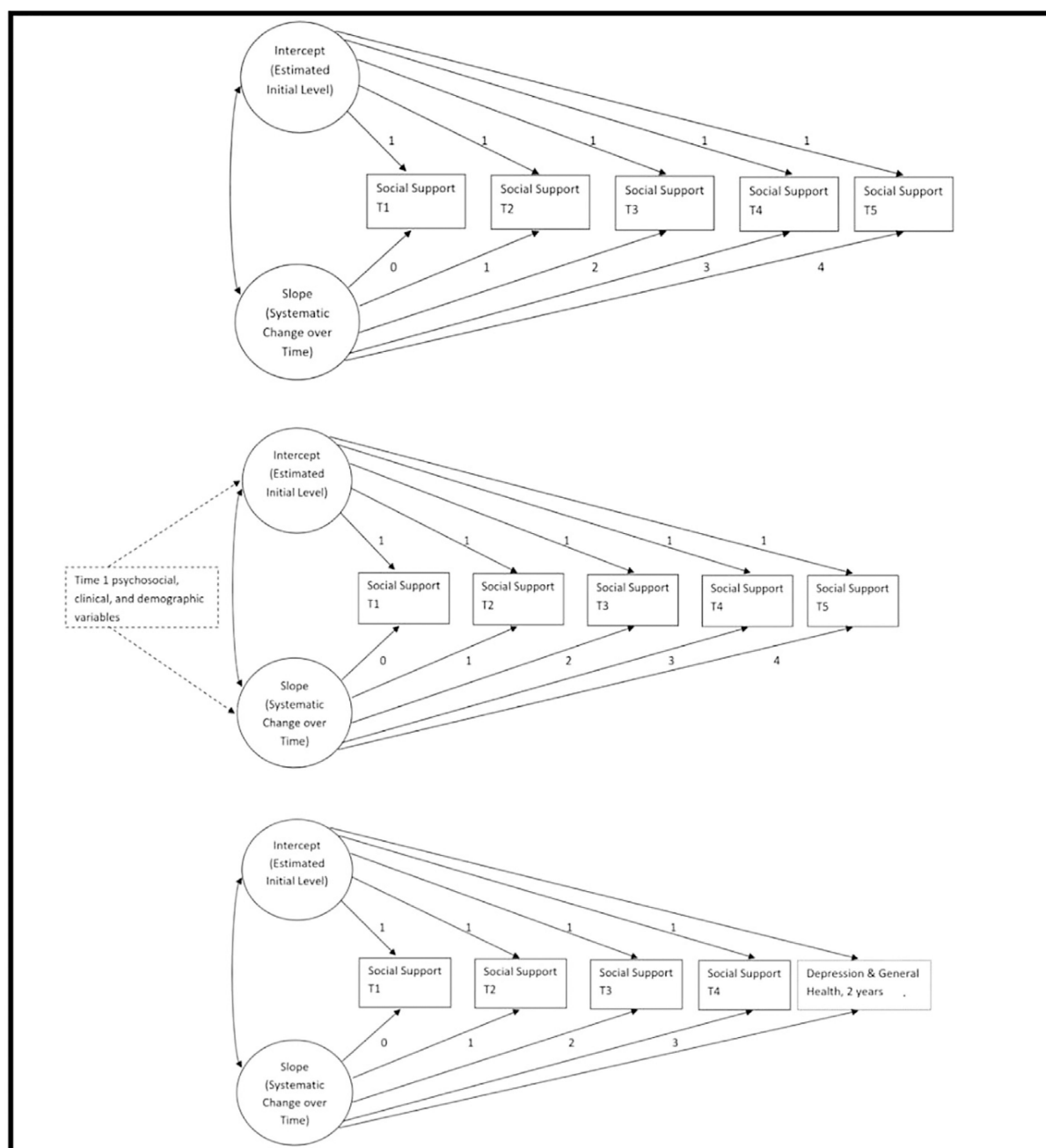
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**Fig. 1.**

Growth curve models. Fig. 1A: Unconditional model: Intercept and slope are latent variables influencing observed perceived social support scores at all interviews (adapted from Thompson et al., 2013) Fig. 1B: Conditional model (Model 2) in which Time 1 variables influence the latent variables of social support slope and intercept. Fig. 1C: In Model 3, latent variables of social support slope and intercept, estimated from the first four time points, predict general health perceptions and depressive symptoms at two years. Not shown: Controls for study arm and baseline general health perceptions and depressive symptoms.

Table 1

Characteristics of African American women with breast cancer in the Survivor Stories Study ($N = 227$) at baseline.

Variables	% (N) or Mean (SD)
Categorical variables	
Married/partnered	28.2% (64)
Private insurance	45.7% (101)
Working at least part-time	44.1% (100)
Education	
Grades 1–8	2.2% (5)
Grades 9–11	14.1% (32)
High school/GED	30.8% (70)
Some college	32.6% (74)
College degree	20.3% (46)
Household income	
< \$10,000	31.1% (69)
\$10,000–\$24,999	27.9% (62)
\$25,000 – \$49,999	25.7% (57)
\$50,000–\$74,999	7.7% (17)
\$75,000–\$99,999	5.9% (13)
\$100,000	1.8% (4)
Cancer stage	
Early (stages 0/I/IIA)	72.2% (164)
Locally advanced (stage IIB/III)	27.8% (63)
Surgery type	
Breast-conserving surgery	68.8% (154)
Mastectomy	31.3% (70)
Hormone therapy	63.1% (142)
Radiation therapy	77.4% (175)
Chemotherapy	49.6% (112)
Continuous variables	
Age	56.0 (10.0)
MOS-SSS score	81.9 (19.8)
CES-D score	11.9 (11.4)
SBI score	40.5 (5.8)
SF-36 general health perceptions	59.1 (22.4)
Comorbidity	1.0 (1.4)

Note: At baseline, data were missing as follows: insurance (6 participants), income (5), surgery type (3), hormone therapy (2), radiation therapy (1), chemotherapy (1), and SBI score (1). MOS-SSS = Medical Outcomes Study Social Support Survey; CES-D = Center for Epidemiologic Studies Depression scale, SBI = Systems of Belief Inventory.

Table 2

Results from Model 2 (conditional growth curve model) of predictors of social support slope and correlates of social support intercept in 218 African American breast cancer patients.

Variables	Estimate	Standardized coefficient
Intercept correlates		
Study arm	2.20	0.13
Married/partnered	5.54 *	0.33 *
Age	−0.04	−0.03
Working	−3.40	−0.21
Education	−1.14	−0.07
Income	1.05	0.08
Insurance	0.95	0.06
Late stage cancer	−4.93	−0.30
Surgery type	0.44	0.03
Radiation therapy	−0.77	−0.05
Chemotherapy	4.54	0.27
Hormone therapy	1.49	0.09
Comorbidity	−0.67	−0.06
Depressive symptoms (CES-D)	−0.48 *	−0.33 *
General health (SF-36)	−0.01	−0.02
Systems of Belief Inventory score	0.86 *	0.31 *
Slope predictors		
Study arm	0.43	0.12
Married/partnered	0.12	0.03
Age	−0.05	−0.13
Working	0.31	0.08
Education	−0.70	−0.18
Income	−0.03	−0.01
Insurance	1.05	0.28
Late stage cancer	0.23	0.06
Surgery type	−0.24	−0.06
Radiation therapy	0.80	0.21
Chemotherapy	0.33	0.09
Hormone therapy	0.78	0.21
Comorbidity	−0.14	−0.05
Depressive symptoms (CES-D)	−0.03	−0.08
General health perceptions (SF-36)	0.00	−0.01
Systems of Belief Inventory score	0.03	0.05

Note. The partially standardized coefficient is used for categorical variables, and the fully standardized coefficient is used for continuous variables. The coefficient for married/partnered was significant ($p = 0.033$) in the model in which patients who died over the course of the study were excluded (presented here); the coefficient was nearly significant ($p = 0.066$) in the model that included those participants with imputed data.

*
 $p < 0.05$.

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Table 3

Results from Model 3 using social support intercept and slope estimated across four time points to predict outcomes at two years after baseline in African American breast cancer patients.

Predictors	Estimate	Standardized coefficient
General health perceptions		
Social support intercept	0.29 *	0.21 *
Social support slope	1.37 *	0.26 *
Study arm	0.72	0.03
General health perceptions at baseline (SF-36)	0.60 *	0.58 *
Depression		
Social support intercept	-0.15 *	-0.20 *
Social support slope	-1.09 *	-0.40 *
Study arm	-1.56	-0.13
Depression (CES-D) at baseline	0.46 *	0.44 *
Fit statistics: $\chi^2(21) = 23.80$, RMSEA = 0.04, TLI = 0.98, SRMR = 0.04		

Note. The partially standardized coefficient is included for categorical variables, and the fully standardized coefficient is included for continuous variables. RMSEA = root mean square error of approximation, TLI = Tucker-Lewis incremental fit index, SRMR = standardized root mean square residual.

* $p < 0.05$.