

Effectiveness of Partner Social Support Predicts Enduring Psychological Distress After Hematopoietic Stem Cell Transplantation

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Objective: Hematopoietic stem cell transplant (HSCT) survivors who are 1 to 3 years posttransplant are challenged by the need to resume valued social roles and activities—a task that may be complicated by enduring transplant-related psychological distress common in this patient population. The present study investigated whether transplant survivors who receive adequate social support from their spouse or intimate partner experience lower distress. **Method:** Effects of receiving a greater quantity of partner support (a common approach to studying enacted support) were compared with effects of receiving more effective partner support (i.e., support that more closely matches their needs in terms of its quantity and quality). Men and women ($N = 230$) who were 1 to 3 years posttransplant completed measures of partner support quantity (Manne & Schnoll, 2001), partner social support effectiveness (Rini & Dunkel Schetter, 2010), and psychological distress (Brief Symptom Inventory; Derogatis & Spencer, 1982). Potential medical and sociodemographic confounds were controlled in analyses. **Results:** As hypothesized, survivors reported less distress when they received more effective partner support ($p < .001$). Quantity of partner support was not associated with distress ($p = .23$). An interaction revealed that when partner support was effective, the quantity of support survivors received was not associated with their distress ($p = .90$); however, when partner support was ineffective, receiving a greater quantity of partner support was associated with substantially elevated distress ($p = .002$). **Conclusions:** Findings suggest that clinical approaches to addressing or preventing enduring distress after HSCT should target features of partner support related to its appraised effectiveness.

Keywords: hematopoietic stem cell transplantation, social support, psychological adjustment

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Hematopoietic stem cell transplantation (HSCT) is an aggressive treatment for hematological and lymphatic cancers along with a growing number of other diseases (Copelan, 2006). It usually involves a lengthy hospitalization that begins with a potentially lethal regimen of high-dose chemotherapy (sometimes with total body irradiation), followed by a life-saving infusion of blood-producing stem cells. Patients and their caregivers must cope with numerous medical and psychosocial challenges, including distressing medical procedures (e.g., protective isolation due to immunosuppression), risk for life-threatening complications (e.g., graft versus host disease [GvHD], infections, organ toxicities, relapse, secondary cancers), acute and chronic side effects (e.g., immunosuppression, sexual dysfunction, occupational disability, negative body image, fatigue, cognitive impairment), and practical problems (e.g., ongoing medical care, disrupted family and work roles, difficulties with social reintegration, financial difficulties; Andrykowski & McQuellon, 1999; Bevans, Mitchell, & Marden, 2008; Copelan, 2006; Syrjala, Kurland, Abrams, Sanders, & Heiman, 2008; Wingard, Vogelsang, & Deeg, 2002).

Transplant recipients are also at risk for clinical and subclinical distress, including symptoms of depression and anxiety as well as more general forms of distress such as those related to existential concerns and loneliness (e.g., Rusiewicz et al., 2008; see Mosher, Redd, Rini, Burkhalter, & DuHamel, 2009, for a review). On average, distress peaks around the time of HSCT and then declines in the year thereafter (Broers, Kaptein, Le Cessie, Fibbee, & Hengeveld, 2000; Keogh, O'Riordan, McNamara, Duggan, & McCann, 1998; Syrjala et al., 2004). However, this trajectory does not describe all transplant recipients equally well; although estimates vary, on average their distress is higher than that of healthy controls, and up to 40% of survivors report distress even years after transplant (Andrykowski et al., 2005; Bishop, 2008; Broers et al., 2000; McQuellon et al., 1998; Syrjala, Chapko, Vitaliano, Cummings, & Sullivan, 1993; Syrjala et al., 2004; see Hoodin, Harper, & Posluszny, 2010, and Mosher et al., 2009, for reviews).

Research has identified various sociodemographic and medical predictors of elevated distress among transplant recipients, including worse pretransplant psychological adjustment (e.g., Broers et al., 2000; Syrjala et al., 1993), poor posttransplant physical functioning (Broers et al., 2000), being female (Syrjala et al., 2004), and having chronic GvHD (Syrjala et al., 1993, 2004; see Hoodin et al., 2010, for a more complete listing). In addition, although some studies have reported modest or minimal effects of social support (Molassiotis, van den Akker, & Boughton, 1997), most evidence has shown that it is associated with psychological adjustment to transplant (e.g., Frick, Ramm, et al., 2006; Hochhausen et al., 2007; Jacobsen et al., 2002; Jenks Kettmann & Altmaier, 2008; Syrjala et al., 2004; Wells, Booth-Jones, & Jacobsen, 2009). For instance, transplant recipients with more negative perceptions of pretransplant support have more depressive symptoms posttransplant (Jenks Kettmann & Altmaier, 2008; Syrjala et al., 2004), and they report worse posttransplant quality of life (Hochhausen et al., 2007). Fewer studies have measured social support posttransplant, but one study linked lower posttransplant support with greater posttraumatic stress symptomatology (Widows, Jacobsen, & Fields, 2000).

There is also evidence that HSCT can have long-lasting detrimental effects on transplant recipients' relationship with their spouse or intimate partner (Andrykowski et al., 2005). This evi-

dence is notable because most transplant recipients name their partner as their primary caregiver (e.g., Eldredge et al., 2006; Fife, Monahan, Abonour, Wood, & Stump, 2009; Frick, Rieg-Appleson, Tyroller, & Bumeder, 2006; Siston et al., 2001; Stetz, McDonald, & Compton, 1996). Thus, like psychosocial stress more generally (Rini & Dunkel Schetter, 2010), this challenging treatment has the potential to undermine a critical source of social support for transplant recipients, with implications for their posttransplant psychological recovery. Taken together, this evidence highlights a pressing need for a more in-depth understanding of social support within the intimate relationships of transplant survivors. Such research should focus specifically on partner support rather than measuring support aggregated across multiple support providers (e.g., family members or unspecified close others), as past research has done.

Guided by the foregoing, the present study investigated partner support as a predictor of distress among transplant survivors. We focused on posttransplant partner support among survivors who were 1 to 3 years posttransplant, which allowed us to investigate a time frame during which enduring elevated distress is likely to hinder a critical turning point in recovery from HSCT. Specifically, 1 year posttransplant is a psychological milestone at which many survivors turn their attention to resuming valued roles and activities—a key task in long-term recovery, and one that can be stressful for both survivors and their loved ones (Lee, 2008; McQuellon et al., 1998). We also sought to address two shortcomings of existing research that limit its usefulness for guiding development of interventions. First, as noted above, existing studies have investigated support aggregated across multiple support providers (e.g., Frick, Ramm, et al., 2006; Heinonen et al., 2001; Hochhausen et al., 2007; Jacobsen et al., 2002; Jenks Kettmann & Altmaier, 2008; Molassiotis et al., 1997; Wells et al., 2009). In our view, research focused on partner support would provide a strong foundation for the development of effective social support interventions because it would enable them to target support from the most likely main support provider.

Second, most existing studies have investigated perceived social support (i.e., the extent to which it is perceived to be available if needed; e.g., Heinonen et al., 2001; Hochhausen et al., 2007; Jacobsen et al., 2002; Jenks Kettmann & Altmaier, 2008; Wells et al., 2009). Findings from these studies are relatively unhelpful for guiding interventions because they provide little information about support behaviors that should be promoted or addressed. Even past studies that investigated a more behavioral aspect of support (i.e., enacted support) are not optimally useful because they have applied a traditional measurement approach in which a greater quantity of social support is conceptualized as representing better support—that is, more plentiful resources for the recipient. Yet, because of individual differences in skill, motivation, and ability to overcome their own burdens, some partners are less likely than others to provide support that truly helps transplant recipients cope effectively with their treatment. Partners do not always understand the best way to help or, if they do, they may not implement it effectively.

Indeed, many transplant recipients report instances of ineffective or problematic support from their partner and others. For instance, Andrykowski et al. (1999) found that many survivors report concerns related to others not understanding their needs (56% of survivors), others not knowing what to say to them or how

to treat them (51%), others being overprotective (49%), and problems communicating with their spouse or partner (49%). General concerns about the effect of transplant on their relationship with their partner are also prevalent (46%). At the same time, transplant recipients rely on their partner for various types of support, and partner support has the potential to be a valuable resource for helping them cope with survivorship issues such as long-term and late effects of transplant, continuing medical follow-up, and complex self-care routines such as those related to screening (Rizzo et al., 2006).

In sum, social support attempts are not always successful at providing their intended benefit from the perspective of the recipient. In the present study we applied a theoretical framework that explicitly considers features of social support attempts associated with recipients' appraisals of their effectiveness. Specifically, the *social support effectiveness* framework (Rini & Dunkel Schetter, 2010) enables investigation of the effectiveness of social support attempts made by a specific provider, with effective support defined as emotional, informational, and instrumental support appraised by recipients as providing a good match for their needs in terms of their amount and type, not being difficult to obtain, being skillfully delivered, and not negatively influencing their self-concept. In our research investigating social support effectiveness in pregnancy, we found that women who received more effective partner support in early pregnancy reported lower concurrent prenatal anxiety as well as lower prenatal anxiety in later pregnancy (Rini, Dunkel Schetter, Glynn, Hobel, & Sandman, 2006).

In sum, in the present study we investigated associations between partner support and transplant survivors' distress, evaluating the value of differentiating between the quantity of partner support (*partner support quantity*) and its effectiveness (*partner social support effectiveness* or *partner SSE*) in order to provide useful information to guide development of interventions. Participants were 230 men and women who were 1 to 3 years posttransplant. We hypothesized that more effective partner support (i.e., greater partner SSE) would predict lower survivor distress. We also hypothesized that the association between partner support quantity and survivors' distress would be moderated by partner SSE. Specifically, we hypothesized that receiving a greater quantity of partner support would be associated with lower survivor distress only for survivors whose partner provided effective support. In contrast, we hypothesized that receiving a greater quantity of partner support from a partner who provided ineffective support would be associated with greater survivor distress.

Method

Participants and Procedure

The sample was composed of 230 HSCT survivors who participated in screening for a randomized controlled trial testing a cognitive behavioral intervention for distressed HSCT survivors (DuHamel et al., 2010). They had not begun the intervention at the time of data collection, nor were they required to meet the trial's distress-related criteria to be included in these analyses. Potential participants were identified through oncologists and patient databases at three hospitals in the Northeastern United States, mailed a recruitment letter and study materials (including an informed consent form), and telephoned to verify their eligibility and inter-

est. Seven hundred and fifty-one survivors were prescreened to evaluate whether they met criteria for entry into screening: They had to be at least 18 years old, English speaking, and 1 to 3 years posttransplant. They were excluded from screening if they were awaiting another transplant ($n = 15$), because such patients face different psychosocial challenges than do patients who have successfully completed transplant. They were also excluded if language barriers prevented them from completing consent procedures and study measures ($n = 43$). Eligible survivors who agreed to participate completed a mailed questionnaire and a telephone interview conducted by a trained research assistant. Consent was obtained at the beginning of the interview. The questionnaire and interview each took about 60 min to complete and included measures for the present study as well as other psychosocial measures not reported here. Of the 498 survivors who met criteria for parent study screening, 452 (91%) consented to screening, and 328 (73%) of these participants subsequently completed the screening interview and questionnaire. The other 118 were lost to contact ($n = 48$), withdrew from the study ($n = 28$), became ineligible (e.g., due to relapse; $n = 10$), or did not complete the measures before the study ended ($n = 26$). Most of the 328 participants ($n = 303$, 92%) provided necessary medical data through medical record review. Of these 303 participants, 230 (76%) were married, cohabiting, or had a main intimate partner and were therefore included in the present study. The institutional review boards at all three institutions approved the study.

Measures

Partner support quantity. Partner support quantity was assessed with the eight-item Partner Responses to Cancer Inventory (Manne & Schnoll, 2001), which measures the frequency with which partners provide specific types of informational, instrumental, and emotional support (e.g., "comforted me by showing me some physical affection") in the prior month. Responses are made on a scale from 1 = *never responds this way* to 4 = *often responds this way* (with behaviors that have not occurred coded as "not applicable"). Items are averaged, and higher scores indicate a greater quantity of support received in the prior month (Cronbach's $\alpha = .82$).

Partner social support effectiveness. Partner social support effectiveness was assessed with the 25-item Social Support Effectiveness–Questionnaire (Rini & Dunkel Schetter, 2010). For each of three types of partner support (emotional, informational, instrumental), participants read a brief description of the type of support then respond to questions assessing (a) how well the quantity of the support matched the amount needed (0 = *very poor* to 4 = *excellent*); (b) the extent to which the respondent wished it had been different somehow (0 = *not at all* to 4 = *extremely*); (c) the extent to which it was perceived to have been provided skillfully (0 = *not at all* to 4 = *extremely*); (d) how difficult it was to get (0 = *never* to 4 = *always*); and (e) whether the partner ever offered the support without being asked (0 = *never* to 4 = *always*). An additional 10 items assess unintended negative byproducts of receiving support (e.g., feelings of guilt or indebtedness; 0 = *yes* and 2 = *no*). Responses focus on support provided in the prior 3 months. Total scores can range from 0 to 80, with higher scores indicating more effective support during that time period (Cronbach's $\alpha = .95$).

Distress. Distress was assessed with the 53-item Brief Symptom Inventory (BSI; Derogatis & Spencer, 1982), which includes symptoms related to depression, anxiety, somatization, hostility, paranoid ideation, interpersonal sensitivity, obsession–compulsion, psychoticism, and phobic anxiety. Participants rated the extent to which each symptom caused them discomfort in the prior month on a scale from 0 = *not at all* to 5 = *extremely*. Distress was indexed by the BSI Global Severity Index (BSI–GSI), which uses responses to all 53 items and is the scale’s most sensitive indicator of distress (Derogatis & Spencer, 1982; Cronbach’s $\alpha = .94$).

Sociodemographic characteristics. Sociodemographic data were self-reported and included age, sex, relationship status (1 = *married*, 0 = *not married*), annual household income, education (1 = *college degree*, 0 = *no college degree*), work status (1 = *working part or full time*, 0 = *other status*), and race/ethnicity (1 = *non-Hispanic White*, 0 = *other*). History of mental health problems prior to diagnosis was assessed by asking whether participants had seen “anyone for emotional or psychiatric problems” and, if they answered “yes,” how long ago. This variable was coded “yes” if the visit(s) occurred prior to their cancer diagnosis.

Medical characteristics. We abstracted from medical charts data regarding diagnosis, history of disease relapse (*yes/no*) and prior transplant (*yes/no*), weeks since transplant, type of transplant (1 = *allogeneic*, 0 = *autologous*), human leukocyte antigen (HLA) match (1 = *matched*, 0 = *unmatched*), presence of acute and chronic GvHD (*yes/no*), number of serious transplant-related complications (not counting GvHD; e.g., infections, mucositis), number of posttransplant hospitalizations, and current disease status (1 = *alive with disease*, 0 = *free of disease*). Physical functioning was assessed with a self-report version of the Karnofsky Performance Scale (Karnofsky, Abelmann, Craver, & Burchenal, 1948), which uses a 7-point response scale ranging from 40 (*disabled, requiring special care and help*) to 100 (*normal*) in 10-point increments. Scores have been associated with quality of life and clinically significant illness in HSCT patients (Wingard, Curbow, Baker, & Piantadosi, 1991).

Data Analysis

First, descriptive statistics were computed. No variable had more than eight missing values, so missing values were mean or mode replaced (for continuous and categorical variables, respectively). Univariate analyses were used to examine the distributional properties of study measures. Variables for number of serious transplant complications and posttransplant hospitalizations were moderately positively skewed and were therefore trichotomized (0, 1, ≥ 2). Next we investigated the need to control sociodemographic (age, patient sex, marital status, education, income, work status, race/ethnicity) and medical variables (diagnosis, history of relapse and prior transplant, type of transplant, HLA match, weeks since transplant, presence of acute and chronic GvHD, number of serious transplant-related complications, number of posttransplant hospitalizations, current disease status, current self-reported physical functioning) by examining bivariate associations between these variables and distress. Any that were significantly associated with distress were evaluated as potential control variables in the main analysis, which was a hierarchical multiple regression analysis in which distress was regressed on partner

support quantity, partner SSE, and their interaction. Continuous variables were mean centered, and interactions terms involving continuous variables were calculated using mean-centered variables to reduce multicollinearity and enhance interpretability of findings.

Results

Description of Sample

Descriptive statistics for the sample are shown in Table 1. Participants were primarily non-Hispanic White and married. There were approximately equal numbers of men and women. The median annual household income was over \$80,000, with a broad range that represented the entire scale. Participants’ ages ranged from 23 to 80 years, with an average age of 55 years. Most had completed at least some college, although a modest percentage had a high school education or less. Fewer than half were working full or part time. The most common diagnoses were multiple myeloma, lymphoma, or leukemia. Two thirds of participants had undergone autologous transplant. Most participants (66%) reported that they were able to perform normal activities with either no or minor physical complaints. BSI–GSI scores indicated that 24% of survivors met criteria for probable clinically diagnosable distress. On average, partner support quantity was relatively high, with mean scores falling between *sometimes responds this way* and *often responds this way* ($M = 3.44$, $SD = 0.56$), although observed scores spanned the full range of the scale. Average partner SSE was also relatively high ($M = 61.52$, $SD = 14.70$); observed scores nearly spanned the full scale (9–80).

Predictors of Survivors’ Posttransplant Distress

Correlations among primary study variables are shown in Table 2. Potential confounds that were significantly associated with distress in bivariate analyses included sex (women reported more distress than men), $F(1, 228) = 8.70$, $p = .004$; age ($r = -.24$, $p < .001$); education (survivors with more than a high school education reported less distress than those with a high school education or less), $F(1, 228) = 7.47$, $p = .01$; income ($r = -.14$, $p = .03$); history of mental health problems (survivors with a history of problems prior to diagnosis reported higher distress than those who did not), $F(1, 228) = 6.66$, $p = .01$; number of posttransplant hospitalizations ($r = .20$, $p = .002$); HLA match (unmatched allogeneic transplant was associated with greater distress than autologous or matched allogeneic transplant), $F(1, 228) = 4.67$, $p = .03$; number of serious transplant-related complications ($r = .13$, $p = .048$); and physical functioning ($r = -.45$, $p < .001$). The most important of these variables were selected for entry into the final model by entering them in a simultaneous multiple regression predicting distress and retaining those that uniquely predicted distress at a conservative level of $p < .25$ (sex, income, age, and physical functioning).

In the final model these control variables were entered in Step 1, partner support quantity was entered in Step 2, partner SSE was entered in Step 3, and the interaction between partner support quantity and partner SSE was entered in Step 4. As shown in Table 3, partner support quantity did not explain a significant proportion of variance in distress in Step 2 ($\beta = -.07$, $t = -1.20$, $p = .23$).

Table 1
Descriptive Statistics

Variable	<i>n</i> (%)	<i>M</i> (<i>SD</i>)	Range
Sex			
Male	123 (54%)		
Female	107 (46%)		
Marital status—Married	215 (94%)		
Race/ethnicity			
Non-Hispanic White	205 (89%)		
Hispanic/Latino	7 (3%)		
African American/Black	6 (3%)		
Other	11 (5%)		
Missing	1 (0%)		
Age in years		54 (10)	23 to 80
Median annual household income		>\$80,000	<\$10,000 to >\$80,000
Education			
High school or less	32 (14%)		
Partial college	45 (20%)		
Four-year college degree	95 (41%)		
Graduate degree	58 (25%)		
Working full or part time	98 (43%)		
Diagnosis			
Multiple myeloma	77 (33%)		
Lymphoma	72 (31%)		
Leukemia	42 (18%)		
Other	39 (17%)		
History of pretransplant disease relapse	23 (10%)		
Type of transplant			
Autologous	154 (67%)		
Allogeneic (matched)	38 (17%)		
Allogeneic (unmatched)	38 (17%)		
Weeks since transplant		93 (27)	27 to 173
History of prior transplant(s)	15 (7%)		
No. of serious transplant complications			
None	158 (69%)		
One	38 (17%)		
Two or more	34 (15%)		
Graft versus host disease			
Acute	11 (5%)		
Chronic	20 (9%)		
No. of posttransplant hospitalizations			
None	141 (61%)		
One	46 (20%)		
Two or more	43 (19%)		
Current disease status			
Free of disease	164 (71%)		
Alive with disease	66 (29%)		
Self-reported physical functioning ^a		86.80 (11.22)	
No physical complaints	50 (22%)		
Minor physical complaints	97 (42%)		
Normal activity with effort	45 (20%)		
Other	30 (13%)		
Missing	8 (3%)		

Note. *N* = 230.

^a Measured with the Karnofsky Performance Scale (Karnofsky et al., 1948) adapted for self-report (Wingard et al., 1991).

However, Step 3 results revealed that survivors reported significantly less distress when their partner provided more effective support ($\beta = -.44$, $t = -6.74$, $p < .001$). With partner SSE in the model, the parameter estimate for partner support quantity changed substantially, becoming a significant positive predictor of distress ($\beta = .15$, $t = 2.46$, $p = .02$). This finding suggests that the unique variance associated with receiving more partner support after partialing out variance associated with the effectiveness of that sup-

port was associated with greater distress. In addition, there was a significant interaction between partner support quantity and partner SSE ($\beta = -.16$, $t = -2.64$, $p = .01$). As illustrated in Figure 1, the amount of partner support received was not associated with distress when the support was highly effective (simple slope $B = .01$, $SE = .06$, $t = 0.13$, $p = .90$), whereas receiving more partner support was related to greater distress when the support was highly ineffective (simple slope $B = .15$, $SE = .05$, $t = 3.20$, $p = .002$).

Table 2
Correlations Between Study Variables

Variable	1	2	3	<i>M</i>	<i>SD</i>	Range
1. Distress	—	-.09	-.49***	0.47	0.41	0.00–2.27
2. Partner support quantity		—	.50***	3.44	0.56	1.10–4.00
3. Partner social support effectiveness			—	61.52	14.79	9.00–80.00

Note. *N* = 230.

*** *p* < .001.

The positive association between partner support quantity and distress was marginally significant at average levels of partner SSE (simple slope $B = .08$, $SE = .05$, $t = 1.71$, $p = .09$). As is also clear in Figure 1, survivors who received more effective partner support reported significantly less distress than did those who received less effective partner support, and this association was significant at all levels of partner support (all simple slope $ps < .001$). Splitting the sample into high versus low partner support quantity and partner SSE using the midpoints of the two scales enabled us to compare distress scores for the 8% of the sample that reported receiving a high quantity of partner support that was appraised as being ineffective. Mean BSI–GSI in this subgroup was substantially higher ($M = 0.90$, $SD = 0.55$) than the mean BSI–GSI for the rest of the sample ($M = 0.41$, $SD = 0.35$). The effect size for this difference (Cohen's $d = 1.07$) demonstrates the clinical significance of the elevated distress in this subgroup.

In addition, survivors reported more distress if they were younger ($\beta = -.16$, $t = -3.06$, $p = .003$), had a lower income ($\beta = -.11$, $t = -2.22$, $p = .03$), and reported worse physical functioning ($\beta = -.33$, $t = -5.95$, $p < .001$). An interesting finding was that in Steps 1 and 2 survivor sex was a significant predictor, such that women reported more distress than men. However, the effect of survivor sex became nonsignificant once partner SSE was added to the model, suggesting that women reported greater distress because, on average, they received less effective support from their partner compared with their male counterparts.

Discussion

We investigated partner support as a key resource that may help explain why some survivors suffer from enduring distress during a key psychological transition that takes place 1 to 3 years posttransplant, evaluating the usefulness of differentiating between the quantity of partner support and its effectiveness. Consistent with the SSE framework (Rini & Dunkel Schetter, 2010) and our past work (Rini et al., 2006), we defined partner SSE as emotional, informational, and instrumental support appraised by recipients as providing a good match for their needs in terms of their amount and type, not being difficult to obtain, being skillfully delivered, and not negatively influencing their self-concept. We found that receiving more effective partner support (vs. receiving more support without reference to its effectiveness) predicted lower distress after controlling for potential sociodemographic and medical confounds. Furthermore, survivors who received a greater quantity of support from a partner who provided ineffective support reported higher distress than did survivors who received partner support that represented other combinations of quantity and effectiveness. Receiving a greater quantity of ineffective support appears to have had adverse effects, perhaps because of greater exposure to ineffective support. This finding is notable in light of the fact that people with cancer often cope by seeking or accepting social support and are particularly likely to do so if they are experiencing

Table 3
Multiple Regression Analysis Predicting Patients' Posttransplant Distress

Variable	Step 1		Step 2		Step 3		Step 4	
	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Intercept	.39	.03***	.39	.03***	.44	.03***	.46	.03***
Female ^a	.17	.05***	.17	.05***	.06	.05	.06	.05
Age	-.01	.002**	-.01	.002**	-.01	.002**	-.01	.002**
Income	-.02	.01 [†]	-.02	.01	-.02	.01 [†]	-.03	.01*
Physical functioning	-.02	.002***	-.02	.002***	-.01	.002***	-.01	.002***
Partner support quantity			-.05	.04	.11	.05*	.08	.05
Partner social support effectiveness (SSE)					-.01	.002***	-.01	.002***
Partner Support Quantity × Partner SSE							-.005	.01**
ΔF for step	23.60***		1.43		45.37***		6.98*	
R^2 for step	.30		.00		.12		.02	
<i>F</i> for full model							24.53***	
R^2 for full model							.44	

Note. *N* = 230.

^a Coded 1 = female, 0 = male to indicate the survivor's sex.

[†] $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

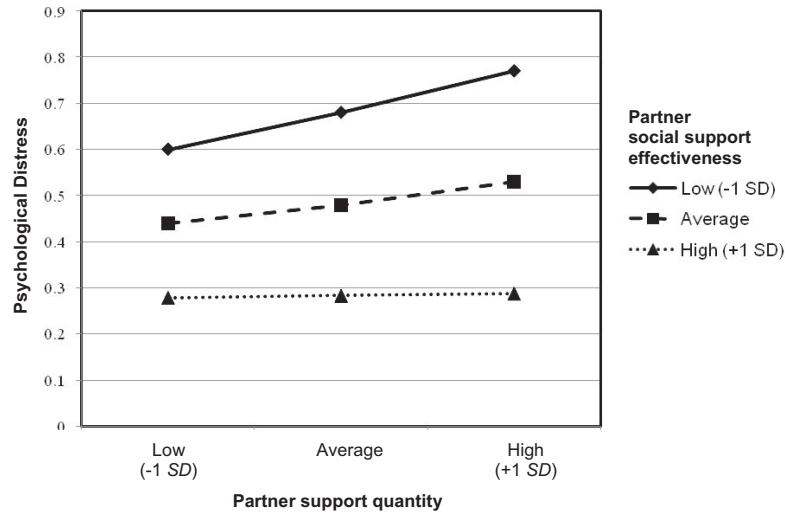


Figure 1. Interaction between posttransplant partner social support effectiveness and partner support quantity predicting patient distress.

greater stress as a result of their cancer (e.g., Deimling et al., 2006; Dunkel-Schetter, Feinstein, Taylor, & Falke, 1992).

The results of the present study are consistent with findings from Frick, Ramm, et al. (2006), who showed that negative support, although not as common as positive support, was more strongly associated with poor quality of life among people preparing for HSCT. It is also consistent with a broader literature showing that, compared with positive support, negative support is more strongly associated with recipient well-being (Franks et al., 1992; Pagel, Erdly, & Becker, 1987; Rook, 1984).

We should note that the measure of partner support quantity we used is well validated and has provided valuable insights into support processes in the context of cancer (e.g., Manne et al., 2008; Manne & Schnoll, 2001; Rini et al., 2008). Yet, although the behaviors it assesses may often be provided effectively, that will not always be the case. For instance, household chores or errands completed by a partner may ease the recipient's burden, but they may also fail to meet the survivor's standards or they may be enacted in a way that communicates resentment. When support is provided ineffectively in these and other ways, receiving a greater quantity of support is unlikely to reduce distress, and it may actually increase it, as suggested by our findings.

Implications for Interventions

It has been noted that cancer patients who do not have adequate social support would benefit from intervention to improve their support (Spiegel & Diamond, 2001). The SSE framework provides a theoretical basis to guide intervention development, and our findings suggest the potential value of using it to improve partner support for distressed HSCT survivors.

A central feature of the SSE framework is its recognition that the type of support most likely to match support recipients' needs at any given time is not always apparent to support providers, much less to researchers or clinicians. Because open communication is the best way for providers to find out recipients' support needs, interventions for couples coping with HSCT should include

methods for enhancing communication. Our findings suggest that interventions may be particularly useful if they reduce the occurrence of ineffective partner support, although improving the effectiveness of support is also a worthy goal. It may be possible to adapt existing interventions that use cognitive behavioral techniques to enhance communication and related skills in couples coping with cancer (e.g., Manne et al., 2007; Porter et al., 2009), refocusing them to address factors related to the appraised effectiveness of partner support (e.g., matching by quality or amount, or the appraised difficulty of obtaining it; see Rini & Dunkel Schetter, 2010). For instance, partners could be trained to determine the support most likely to meet the survivor's needs at a given time, and survivors could be trained to communicate their needs in a nonthreatening manner.

Although good communication is likely to improve the extent to which the quality and quantity of support matches survivors' needs, our research suggests that good communication may also enhance partner SSE through other pathways. Specifically, in our research with pregnant women we found that women appraised their partner's support as more effective when they were more satisfied with their relationship and perceived it to be more intimate and equitable (Rini et al., 2006). To the extent that good communication enhances intimacy and other aspects of relationship quality (Porter, Keefe, Hurwitz, & Faber, 2005), improving couples' communication may enhance survivors' appraisals of the effectiveness of partner support both directly (by allowing couples to clarify each other's support needs) and indirectly (by improving the perceived quality of the relationship).

There are other skills that should enable partners to provide more effective support, as shown by our research with a small sample of partners of pregnant women (Rini & Dunkel Schetter, 2010). For instance, we found that partners' caregiving skills (e.g., their ability to recognize and interpret their partner's needs, show appropriate physical affection, balance cooperation vs. control when providing support, and avoid overinvolvement; Kuncie & Shaver, 1994) predicted women's appraisals of the effectiveness of

their support. Improving these types of skills may help partners enact difficult types of support more effectively.

Techniques to address cognitive processes should also be explored for enhancing the effectiveness of partner support. For instance, it may be useful to train survivors to reappraise problematic partner support in more favorable terms, recognizing the positive intent that motivates it (Bradbury & Fincham, 1992; McNulty & Karney, 2001). Acceptance-based approaches to couples therapy (e.g., Christensen et al., 2004; Jacobson, Christensen, Prince, Cordova, & Eldridge, 2000) could be adapted for this purpose. Applying the SSE framework would require a focus on features of support most likely to contribute to survivors' appraisals of the effectiveness of support provided to them (e.g., reasons why support may seem difficult to get).

It is important to note that different subgroups of couples may require different intervention approaches. For instance, there may be different dynamics in short-term versus long-term relationships that would affect how support needs are communicated and appraised as well as how they are fulfilled (e.g., Ray, 2006). Relationship duration is also likely to be confounded with the age of the survivor and partner, implicating issues surrounding the normative or nonnormative nature of serious illness and the need for caregiving (which is likely to be more expected in older than younger couples).

In addition to addressing problems that reduce the effectiveness of partner support once these problems become apparent, it may also be possible to take a more preventive approach in couples at risk for the occurrence of ineffective partner support. This approach would involve screening for longstanding patterns of ineffective support or risk-related individual factors (e.g., dispositional characteristics that hinder provision or receipt of effective support, poor social skills) and/or relationship characteristics (e.g., poor relationship quality, intimacy, and equity; Rini et al., 2006). Intervening to address stable dispositional characteristics and longstanding relationship issues would most likely be unrealistic in this population. A more feasible approach would be to target problems caused by the novel and emotionally difficult challenges of transplant. This is not to say that preexisting dispositional and relationship issues should be ignored. Interventions are likely to be more effective for individual couples if they address specific patterns of deficits that exist in the couple (e.g., skill-related vs. situational).

Interventions for couples facing HSCT will need to minimize burden on these already-stressed couples. We have found that delivering interventions via telephone can be effective and is well accepted (DuHamel et al., 2010). Any intervention targeting partners will also need to account for the emotional and practical challenges they face as caregivers. Research has shown a high degree of distress among partners (Bishop et al., 2007; Fife et al., 2009; Frick, Rieg-Appleson, et al., 2006; Siston et al., 2001), and they may also be faced with providing care while coping with their own health issues. Training in coping skills that help partners manage these types of issues and mobilize support for themselves would be a promising addition to the intervention approaches discussed above (Given, Given, & Kozachik, 2001).

Finally, there may be couples for whom it is not possible to improve the effectiveness of partner support, for instance, those with longstanding relationship difficulties. In such cases it might be possible to supplement partner support with support from others in the survivor's intimate social network, such as friends or family

members (Rini et al., 2008). Because it is not always the case that support from others can compensate for ineffective or negative partner support (Pistrang & Barker, 1995), research is needed to understand ways to circumvent negative effects of ineffective partner support that cannot be addressed.

Directions for Future Research

In addition to intervention development, there are other promising directions for future research. Studies that apply qualitative and/or observational methods would be useful for investigating the nature and qualities of support attempts that survivors find to be effective (or ineffective). Furthermore, research is needed to investigate whether findings from this research generalize to other populations. One population of interest would be patients undergoing solid organ transplant, who share some characteristics with HSCT patients (e.g., immunosuppression and associated risks) but not others (e.g., the high-dose chemotherapy used in HSCT). Social support processes similar to those described in the present study may occur among individuals receiving solid organ transplants, particularly if they face an extended recovery.

An additional avenue for research is investigation of behavioral outcomes (e.g., compliance with treatment and self-care regimens, healthcare utilization) and physical health outcomes (e.g., rehospitalizations, relapse and other morbidities, mortality). Past research has revealed an association between social support and these types of outcomes, and some of it suggests a role for social support effectiveness. For instance, Rodrigue, Pearman, and Moreb (1999) found that people with more "stable" pre-HSCT social support (defined in terms of the strength of the relationship between the patient and the caregiver and caregiver characteristics that would impede provision of effective support) were more likely to be alive posttransplant. Similarly, Frick, Motzke, Fischer, Busch, and Bumeder (2005) found that HSCT recipients who had reported more problematic pretransplant support had a higher likelihood of dying after transplant. Research is needed to replicate these findings, investigate the role of partner SSE, and examine potential mediators.

Limitations and Strengths

We would like to note several limitations of this study. The first is its cross-sectional design, which makes it impossible to draw causal conclusions about the association between partner SSE and survivor distress. Further research is needed to replicate these findings with a prospective, longitudinal study design. A second limitation is the fact that the sample excludes individuals who are divorced or single. Therefore, findings may not apply to social support provided within highly distressed relationships or by caregivers other than partners. Third, many of our participants were non-Hispanic White, and many had moderate to high income and more than a high school education. Thus, findings may not apply to patients who are non-White or of lower socioeconomic status. However, evidence suggests that our sample approximates the population of HSCT recipients in terms of race/ethnicity (e.g., Joshua et al., 2010; Kollman et al., 2004), and economically disadvantaged patients may be generally underrepresented in HSCT populations because some will lack financial and supportive resources evaluated during pretransplant screening (Hamadani,

Craig, Awan, & Devine, 2010). Nonetheless, researchers should consider adjusting sampling methods to ensure more diverse samples. Finally, we assessed only the patient's perspective. Future research on these processes would be most informative if the perspectives of both members of these couples are assessed. It should also account for the health of caregivers, many of whom may be coping with their own health problems.

The present study also has a number of important strengths, including its focus on social support from the most likely primary caregiver—the partner. In addition, it is one of the few studies to have investigated the social support actually received by transplant survivors (i.e., enacted support) rather than perceived available support, an approach that yields information highly relevant to the development of psychosocial interventions for transplant survivors. Overall, our findings highlight the value of studying partner support in a way that explicitly accounts for the extent to which it is a good match for survivors' needs in terms of its quality and quantity, as defined by the social support effectiveness framework, with one notable finding being the identification of a group at risk for elevated posttransplant distress: survivors who receive a relatively large quantity of support from partners who are perceived to provide ineffective support. The importance of the quality of caregiving in transplant outcomes is increasingly recognized, as is the potential for stresses of transplant to adversely affect survivors, caregivers, and their relationship (Fife et al., 2009; Zabora, Smith, Baker, Wingard, & Curbow, 1992). Unfortunately, there is little research to guide development of psychosocial interventions that consider caregivers' role in supporting survivors during and after transplant. The present study provides a rich and valuable starting point for development of such interventions.

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