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Positive and negative aspects of relationships and psychological health in adolescents and young adults with cancer

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Abstract

Objective. Interpersonal relationships between adolescents and young adults (AYAs) with cancer and their primary caregivers, other family members, close friends, and medical staff were examined in relation to AYAs' positive and negative psychological health.

Methods. AYAs (*n*=115, 51% male, ages 12-24, *M(SD)*=16.07(2.29)) in outpatient cancer treatment reported on their perceived support and conflict within different relationships and positive and negative psychological health.

Results. AYAs perceived more support and conflict within familial relationships than other relationships. Perceived support from family members was associated with positive psychological health and conflict with negative psychological health; in other relationships, support but not conflict was associated with psychological health. Relationships with family and with friends most strongly predicted distress and other psychological health outcomes, respectively.

Conclusions. Across different relationships, AYAs report varying levels of support and conflict, which are differentially related, both in significance and magnitude, to positive and negative aspects of psychological health.

Keywords: Adolescents and young adults, cancer, support, conflict, relationships, psychological health

Positive and negative aspects of relationships and psychological health in adolescents and young adults with cancer

Over 68,000 adolescents and young adults (AYAs) are diagnosed with cancer annually in the United States (National Institutes of Health, 2012). AYAs' cancer diagnoses and treatments can lead to high levels of psychological distress (PD) (Meeske, Ruccione, Globe, & Stuber, 2001) and posttraumatic stress symptoms (PTSS) (Brown, Madan-Swain, & Lambert, 2003). Conversely, many AYA patients also report posttraumatic growth (PTG) (Barakat, Alderfer, & Kazak, 2006; Bellizzi et al., 2012; Mattsson, Ringner, Ljungman, & Essen, 2007) and high levels of positive affect (PA) (Schroevers, Sanderman, van Sonderen, & Ranchor, 2000). These aspects of psychological health are often related to AYAs' perceptions of support and conflict within their interpersonal relationships (Alderfer, Navsaria, & Kazak, 2010; Corey, Haase, Azzouz, & Monahan, 2008; Manne & Miller, 1998). Notably, relationships with different close others may be related to different aspects of AYAs' psychological health (Decker, 2007; Haluska, Jessee, & Nagy, 2002; Manne & Miller, 1998), but this is not yet well-understood. Furthermore, it is important to consider the valence of the psychological health outcome in question because positive (e.g., PA and PTG) and negative (e.g., PD and PTSS) aspects of psychological health are typically not strongly correlated (Barakat et al., 2006; Schroevers et al., 2000; Zoellner & Maercker, 2006), yet both are important indicators of well-being (Bech, Olsen, Kjoller, & Rasmussen, 2003). Moreover, positive (i.e., perceived support) and negative (i.e., perceived conflict) aspects of one's relationships may be independently associated with psychological health (Abbey, Abramis, & Caplan, 1985; Manne & Miller, 1998; Rafaeli, Cranford, Green, Shrout, & Bolger, 2008; Sheeber, Hops, Alpert, Davis, & Andrews, 1997).This research examines AYA cancer patients' perceived support and conflict within four of their primary

interpersonal relationships – their caregiver, other family members, close friends, and medical staff – in relation to positive and negative aspects of their psychological health.

In a variety of life contexts and patient populations, support and conflict within interpersonal relationships are shown to have important health implications. Supportive relationships are associated with greater positive or lower negative aspects of psychological health (Corey et al., 2008; Decker, 2007; Manne & Miller, 1998; Orbuch, Parry, Chesler, Fritz, & Repetto, 2013; Ozono et al., 2010; Woodgate, 2010; Zoellner & Maercker, 2006). Among AYAs with cancer, perceived support from parents, who are typically perceived as their primary source of support (Ritchie, 2001), is associated with lower depression and PTSS (Ozono et al., 2010) and better psychological quality of life (Orbuch et al., 2013). In addition, AYAs report desire and need for support from other relationships, including their friends, family members, and health care professionals (Decker, 2007; Hokkanen, et al., 2004; Zebrack, et al. 2007). However, it is not clear whether these relationships are differentially related to their psychological health and whether this depends on the specific psychological health outcome being assessed. That is, certain relationships may be more important for some versus other aspects of AYA cancer patients' psychological health.

AYAs with cancer also experience conflict within their relationships (Manne & Miller, 1998; Schultz et al., 2007). Similar to healthy AYAs (Laursen, Coy, & Collins, 1998), AYAs with cancer face developmental challenges including autonomy building, identify formation, and seeking independence. At the same time, however, they are often heavily reliant on others, especially their caregivers, and therefore come across impasses in their natural sought-after independence and transition to adulthood, which can lead to conflict with their parents (Grinyer, 2009). AYAs with cancer often experience treatment-related physical symptoms or changes in

their physical appearance that may create difficulties at school or during other recreational activities (Hokkanen, Eriksson, Ahonen, & Salantera, 2004). Moreover, their friends likely do not fully understand what they are going through and may respond poorly to their needs (Abrams, Hazen, & Penson, 2007). All of these situations can lead to conflict. To date, existing evidence suggest that conflict in different relationships are differentially related to psychological health, but the findings are largely inconsistent. For instance, conflict with mothers but not other relationships has been linked with higher levels of PD (Manne & Miller, 1998), and conflict with family members is associated with higher levels of PTSS (Ozono et al., 2010), but not always (Brown et al., 2003). As most research on interpersonal conflict among AYAs with cancer focuses on the association between familial relationships and negative aspects of psychological health, less is known about the importance of conflict in other relationships and on how conflict may be related to positive aspects of psychological health. Therefore, research examining the relative importance of conflict within different relationships for both negative and positive psychological health is needed.

The Current Research

We sought to better understand the role that perceived support and conflict within different relationships may play in positive and negative aspects of psychological health among AYAs with cancer. We had three main goals. First, we examined AYA cancer patients' perceived support and conflict within their relationships with their primary caregiver, other family members, close friends, and medical staff. We hypothesized that AYAs with cancer would report greatest perceived support from primary caregivers (e.g., Ritchie, 2001).

Second, within each relationship, we examined whether perceived support or conflict was more strongly associated with negative (PD and PTSS) and positive (PA and PTG) aspects of

psychological health. Based on prior research demonstrating correlations between support and conflict and positive and negative psychological health, we hypothesized both support and conflict would predict psychological health, although we did not have a priori expectations about whether perceived support or conflict would be stronger predictors of psychological health and whether this would vary across different aspects of psychological health.

Third, we compared the magnitude of the associations between perceived and conflict and psychological health across the different relationships in order to examine which relationship most strongly predicted psychological health. Given that AYAs with cancer report their relationships with their primary caregiver as being most important (Ritchie, 2001), we hypothesized perceived support and conflict within this relationship would be the strongest predictor of each measure of psychological health.

In pursuing these issues, it is important to consider that preliminary research has linked demographic and medical characteristics to psychological health of AYAs with cancer. For example, AYAs report that they desire less support as they get older (Britto et al., 2004; Laursen et al., 1998; Zebrack et al., 2007). Thus, it may be that AYAs' interpersonal relationships are less predictive of psychological health among older AYAs compared to younger AYAs. Some evidence indicates that AYAs with cancer report their medical visits as stressful and report that they could be better supported during their visits (Hokkanen et al., 2004). This suggests that healthcare utilization (i.e., the number of health care visits) may play a part in their psychological health and perceptions about their interpersonal relationships. Finally, as patients who are diagnosed with cancer longer ago tend to have better psychological health (Corey et al., 2008), and report desiring different forms of support from their medical providers and social networks

(Zebrack et al., 2007), we included patients' age, health care utilization, and time since initial cancer diagnosis as covariates in our analyses.

Method

Participants & Procedures

Eligible participants were identified by the oncology department of a large pediatric research hospital. AYAs between the ages of 12–24 receiving outpatient cancer treatment, spoke English or Spanish, and had caregivers who spoke English or Spanish, were eligible to participate. Caregivers were required to give written consent, after which patients provided written assent or consent (if over age 18). AYAs were first approached within 60 months of their initial cancer diagnosis, and completed the study 2-80 months after their diagnosis (M=32.17; SD=22.28). In total, during a 12-month recruitment period, 86% of eligible AYAs (n=115; 51% male, ages 12-24, M=16.07, SD=2.29) who were approached to participate completed the study. Study materials were completed online or on paper, at the hospital or at home; method and location of study completion were not associated with differences in any outcome measure (ps > .05). Participants were compensated for their time. Procedures were approved by the hospital's Institutional Review Board.

Measures

Demographic and medical information. Participants' age, ethnicity, gender, and cancer type were obtained and time since diagnosis was calculated from hospital records. Health care utilization was calculated as the number of visits to the hospital's medical facilities in the 30 days prior to the patient's survey completion.

Perceived social support and conflict. Perceived support from and conflict with primary caregivers, other family members, close friends, and medical staff were assessed using two items

each, focusing on the previous week (Abbey et al., 1985; Gil-Rivas, Holman, & Silver, 2004). Support was measured by asking how often people within these relationships helped the participant "understand or figure things out," and "provide you with encouragement." Conflict was measured by asking how often the participant had "a disagreement" and "become openly angry" within each relationship. Items were rated on a scale from 1 (never) to 5 (all the time), with an option for "not applicable." Support items were averaged for each relationship (primary caregivers: α=.80; other family members: α=.76; close friends: α=.82; medical staff: α=.84) as were conflict items (primary caregivers: α=.83; other family members: α=.73; close friends: α=.66; medical staff: α=.67). Higher scores of support or conflict indicate participants perceive more support or conflict within that relationship.

Positive psychological health. Positive affect (PA) was assessed using the 15 positive affect items from the Positive and Negative Affect Scale for Children (PANAS–C; Laurent et al., 1999).[1] Participants rated the frequency with which they experienced positive emotions on a scale from 1 (never) to 5 (all the time). The PANAS-C is well validated and widely used among children and adolescents (e.g., Ebesutani, Okamura, Higa-McMillan, & Chorpita, 2011). Scores were averaged (α=.92). Higher scores indicate higher PA.

Posttraumatic growth (PTG) was assessed using the 21-item Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996). The PTGI has been used among adolescents and adults dealing with a range of traumas, including chronic illness (e.g, Meyerson, Grant, Smith Carter, & Kilmer, 2011). Items were rated on a scale from 1 (not at all) to 6 (to a very great degree). Scores were averaged (α=.94); higher scores indicate greater PTG.

[1] Negative items in the PANAS scale were not included because overlapping constructs were measured in the Brief Symptom Inventory.

Negative psychological health. Participants' psychological distress (PD) was assessed using the 18-item Brief Symptom Inventory (BSI-18; Derogatis, 2001). Items were rated on a scale from 1 (not at all) to 5 (extremely). The BSI is widely used and well-validated in medical populations. BSI scores were averaged (α=.86); higher scores indicate greater PD.

Posttraumatic stress symptoms (PTSS) were assessed using 16 items from the PTSD Checklist–Civilian Version (PCL; Weathers, Litz, Herman, Huska, & Keane, 1993).[2] Items were rated on a scale from 1 (not at all) to 5 (extremely). The PCL is well-validated and widely used to assess PTSS following a range of traumas in a wide range of populations. Scores were averaged (α=.84); higher scores indicate higher levels of PTSS.

Statistical Analyses

Preliminary analyses were conducted to examine the associations between the positive and negative psychological health measures and demographic and medical characteristics.

Bivariate correlations were obtained to assess the association between perceived support and conflict within AYAs' different relationships (i.e., primary caregiver, other family members, close friends, medical staff).

To determine whether support or conflict within each relationship more strongly predict psychological health, multiple hierarchical regression models were run separately for each relationship and each measure of psychological health. First, in each model, demographics (age, ethnicity) and medical characteristics (health care utilization, time since diagnosis) were entered in Step 1, support was entered in Step 2a, and conflict was entered in Step 2b (with support

[2] The original PCL (Weathers et al., 1993) includes a 17th item, "Suddenly acting or feeling as if a stressful experience were happening again (as if you were reliving it)". This item was removed from the current survey because cancer patients continue to experience stressful events throughout their treatment.

removed). Effect sizes (Adjusted R^2) of support and conflict were then visually compared. These steps were used to determine whether the relative importance of support or conflict depends on the psychological health measure being assessed and whether this is consistent across relationships.

To determine which relationship was most strongly associated with each measure of psychological health, perceived support and conflict were included in the regression models together in Step 3. The overall effect sizes (the overall adjusted R^2) were then visually compared across the four relationships. Because gender was not associated with independent or dependent variables, and we did not predict that gender would have an effect, it was not included in the models. To adjust for running four models with each outcome measure a Bonferroni corrected (p=.05/4) α<.013 was used to determine significance for all regression analyses.

Results

Participant Characteristics

Of the 115 participants, 49 (42.6%) were Hispanic or Latino, 41 (35.7%) Caucasian, 13 (11.3%) Asian, and 12 (10.4%) were mixed or other ethnicities. Forty-one participants were diagnosed with leukemia (36%), 24 with lymphoma (21%), 17 with germ cell or gonadal cancer (15%), 10 with bone cancer (9%), 8 with sarcomas (7%), 7 with brain or central nervous system cancers or glioma (6%) and 8 other cancers (7%). Mean time since diagnosis was 32.22 months (*SD*=22.76, range = 2-80) prior to their completion of the study. Patients had an average of 2.82 days of health care visits in the month prior to survey completion (*SD*=3.96, range=0-19).

Preliminary Analysis

For demographic and illness characteristics, one-way ANOVAs indicated that ethnicity was associated with differences in PA [$F(3,111)=2.82$, $p=.042$] and PTG [$F(3,109)=3.46$,

p=.019] but not PD or PTSS (*p*s>.05). Bonferroni *post-hoc* analyses revealed that Hispanic participants reported higher PA than mixed-ethnic participants, and higher PTG than Caucasian participants (*p*<.05); there were no other between-group differences. No associations were found between age, gender, time since diagnosis, or health care utilization and any measure of psychological health.

Bivariate correlations of psychological health measures indicated that PA was correlated positively with PTG (*r*=.377, *p*<.001) and negatively with PD (*r*=-.383, *p*<.001) and PTSS (*r*=-.291, *p*=.002). PD and PTSS were positively correlated (*r*=.616, *p*<.001).

Perceived Support and Conflict

Mean levels and bivariate correlations of support and conflict within each relationship are presented in Table 1; support was correlated across all relationships and conflict was correlated across most relationships.

Bonferroni-corrected paired-sample *t*-tests (α<.008) measured within-subject differences in perceived support and conflict within each relationship. Patients perceived significantly more support from primary caregivers than from close friends [*t*(108)=2.837, *p*=.005] or medical staff [*t*(101)=3.375, *p*=.001]. AYAs perceived more conflict with primary caregivers than with close friends [*t*(105)=5.580, *p*<.001] or medical staff [*t*(100)=9.279, *p*<.001], more conflict with other family members than with close friends [*t*(106)=5.222, *p*<.001] or medical staff [*t*(100)=8.896, *p*<.001], and more conflict with friends than medical staff [*t*(98)=6.339 *p*<.001]. None of the demographic or medical characteristics were significantly associated with perceived support or conflict in any relationship (*p*s>.05).

Comparing Effect Sizes of Perceived Support and Conflict on Psychological Health

Hierarchical regression analyses for each relationship tested whether perceived support or conflict explained more variance in each measure of psychological health. In relationships with primary caregivers (ΔR^2s are presented in Table 2), PD and PTSS were more strongly associated with perceived conflict ($R^2_{adjusted}$: PD =.166; PTSS =.077) than with perceived support ($R^2_{adjusted}$: PD =.035; PTSS=.001); PA and PTG were more strongly associated with perceived support ($R^2_{adjusted}$: PA=.079; PTG=.109) than conflict ($R^2_{adjusted}$: PA=.013; PTG=.030). The same pattern was true in relationships with other family members (ΔR^2s are presented in Table 3): PD and PTSS were more strongly associated with conflict ($R^2_{adjusted}$: PD =.168; PTSS=.071) than support ($R^2_{adjusted}$: PD =.026; PTSS = .011), and PTG was more strongly associated with perceived support ($R^2_{adjusted}$=.170) than conflict ($R^2_{adjusted}$=.066). PA was not associated with perceived support ($R^2_{adjusted}$=.042) or perceived conflict ($R^2_{adjusted}$=.002) with other family members. Thus, among familial relationships, conflict more strongly predicted negative psychological health outcomes, and support more strongly predicted positive psychological health outcomes.

In contrast, in relationships with close friends (ΔR^2s are presented in Table 4), perceived support more strongly predicted all psychological health measures ($R^2_{adjusted}$: PD=.106; PTSS=.105; PA=.223; PTG=.213) compared to perceived conflict ($R^2_{adjusted}$: PD=.073; PTSS=.049; PA=.025; PTG=.061). Last, in relationships with medical staff (ΔR^2s are presented in Table 5), PA and PTG were more strongly predicted by perceived support ($R^2_{adjusted}$: PA=.124; PTG=.204) than perceived conflict ($R^2_{adjusted}$: PA=.028; PTG=.097), and neither PD nor PTSS were associated with perceived support ($R^2_{adjusted}$: PD=-.003; PTSS=.029) or conflict ($R^2_{adjusted}$: PD =-.018; PTSS=.001).

Comparing Overall Associations of Relationships and Psychological Health

To determine the overall strongest predictor of each measure of psychological health, support and conflict were both included in Step 3 of each model, and the overall model adjusted R^2s were compared across relationships. Relationships with primary caregivers (Table 2) and other family members (Table 3) explained more variance in PD than did relationships with close friends (Table 4) or medical staff (Table 5). However, relationships with close friends explained more variance in PTSS, PA and PTG than any of the other relationships, and relationships with medical staff explained more variance in PA and PTG than caregiver or other familial relationships.

Discussion

This research examined AYA cancer patients' perceived support and conflict in their relationships with primary caregivers, other family members, close friends, and medical staff. We assessed whether perceptions of support or conflict within these relationships more strongly predicted positive and negative psychological health, and identified which relationships most strongly predict different psychological health measures. Our findings highlight the importance of positive and negative aspects of multiple relationships, as well as of multiple measures of psychological health.

Perceived Support and Conflict

AYAs' perceptions of both support and conflict were higher within familial relationships (i.e., primary caregivers and other family members) than within relationships with friends or medical staff. Perceptions of support and conflict were negatively correlated within the primary caregiver relationship, but were otherwise uncorrelated, indicating the importance of measuring both aspects of relationship interactions when studying interpersonal relationships. Given that

perceived support was correlated across relationships as were perceptions of conflict, there may be perceptual biases in how AYAs with cancer identify support and conflict. Alternatively, patients' attributes (e.g., personality factors) may promote or inhibit support and conflict across multiple relationships.

Contrary to our predictions, age, time since diagnosis, and health care utilization were not associated with AYAs' perceptions of support or conflict. Our results indicate that their perceptions of support and conflict may not actually differ according to age, time since diagnosis, or health care utilization, despite AYAs' beliefs that they might (Britto et al., 2004; Hokkanen et al., 2004; Zebrack et al., 2013). Our findings suggest that interpersonal relationships matter equally for AYAs, regardless of how old they are and their medical characteristics.

Associations between Perceived Support and Conflict and Psychological Health

Within familial relationships, we found that perceived support was associated with positive measures of psychological health and perceived conflict was associated with negative measures of psychological health. Thus, both positive and negative aspects of AYAs' relationships with primary caregivers and other family members may be beneficial and detrimental, respectively, for their psychological health. On the other hand, only perceived support from friends and medical staff was associated with any measure of psychological health. This suggests that positive aspects of relationships with close friends and medical staff may serve a protective function for psychological health in AYAs with cancer and may be more important than negative aspects (i.e., perceptions of conflict) within these relationships. Notably, the low levels of and small variability in perceived conflict within these relationships (compared to relationships with caregivers and other family members) may partly account for the null findings.

Comparing Overall Associations of Relationships

Contrary to our hypothesis, relationships with primary caregivers were the strongest predictor of only one of the psychological health measures, namely PD. Instead, relationships with close friends were the strongest predictor of three aspects of psychological health (PTSS, PA and PTG). These findings suggest that relationships with primary caregivers and close friends may be important factors for understanding negative psychological health (i.e., cancer-specific and general psychological distress) in AYAs with cancer. Moreover, relationships with close friends appear to be tied to positive aspects of AYAs' psychological health, making these relationships a potential target for interventions. Overall, the strong associations between relationships with close friends and psychological health highlight the relative importance of close friendships compared to other relationships. Since AYAs are typically less satisfied with support from friends than from parents (Haluska et al., 2002), the relationships with close friends may be important to address and a potential target for increasing positive psychological health in AYAs with cancer; future research on this topic is warranted.

Limitations

Our cross-sectional study design prohibits inferences about directionality of effects. As such, AYAs' perceptions of support and conflict may be associated with psychological health not because good relationships lead to better psychological health, but because better psychological health leads to better relationships. This also limits the interpretations that can be made about the non-significant effects of age, ethnicity, time since diagnosis, and health care utilization. Future work using longitudinal designs to examine how AYA cancer patients' relationships change over time and with disease progression are needed and would allow testing of the directionality of the associations between psychological health and support and conflict within relationships. Finally,

while our diverse sample provided a broad view of the AYA cancer experience, these findings should be generalized to other AYA cancer patients with care.

Conclusions

Our findings provide insights into the importance of multiple relationships and of assessing multiple measures of psychological health when studying AYAs with cancer. Given that relationships with primary caregivers, other family members, close friends and medical staff were all associated with positive and/or negative aspects of psychological health, each relationship, including both negative and positive aspects thereof, may be potentially important targets for interventions. Specifically, targeting support provision among relationships with friends or medical staff, and both support provision and conflict resolution among familial relationships, may be associated with improved psychological health among AYAs. Finally, this research indicates that among AYAs with cancer, positive and negative measures of psychological health have different correlates; including both types of measures in future research will provide a more accurate understanding of the psychological health of this special patient population.

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Table 1. Means and Correlations of Perceived Support and Conflict across Relationships

		Primary Caregiver		Other family members		Close friends		Medical staff
	M (*SD*)	Support	Conflict	Support	Conflict	Support	Conflict	Support
Primary caregiver								
Support	3.90 (1.10)	-						
Conflict	2.18 (1.03)	-.232*	-					
Other family members								
Support	3.71 (1.18)	.556**	-.098	-				
Conflict	2.07 (0.95)	-.050	.534**	-.160	-			
Close friends								
Support	3.58 (1.18)	.364**	-.138	.611**	-.110	-		
Conflict	1.62 (0.70)	-.215*	.333**	-.331**	.494**	-.162	-	
Medical staff								
Support	3.50 (1.35)	.505**	.039	.659**	-.032	.506**	-.187	-
Conflict	1.16 (0.41)	-.132	.042	.150**	.064	-.027	.249*	-.121

Note. *n* varies from 100–110 due to missing data and "not applicable" responses. **p<.01, *p<.05.

Table 2. AYAs' Relationships with Primary Caregivers and Psychological Health

		Distress		Posttraumatic Stress		Positive Affect		Posttraumatic Growth	
		n=(105)		*n*=(107)		*n*=(107)		*n*=(105)	
Step		β (SE)	ΔR^2	β (SE)	ΔR^2	β (SE)	ΔR^2	β (SE)	ΔR^2
1	Age	.244(.015)*	.094	.210(.021)	.075	.023(.029)	.069	.149(.048)	.092
	Ethnicity[a]								
	Hispanic	.046(.075)		.073(.106)		-.092(.146)		.255(.243)	
	Asian	.033(.113)		-.027(.163)		.003(.223)		.239(.363)	
	Other	.063(.114)		-.096(.163)		.214(.223)		.198(.365)	
	Time since diagnosis	.261(.002)		-.021(.003)		.003(.004)		.072(.006)	
	Health care utilization	.384(.010)*		-.016(.015)		-.029(.020)			
2a	Support	.081(.030)	.001	.061(.043)	.001	.260(.059)*	.071*	.271(.099)*	.077*
2b	Conflict	.394(.034)**	.128**	.283(.049)*	.064*	-.035(.067)	.009	.024(.111)	.003
3	Final model $R^2_{adj}(\Delta R^2)$	.166(.136)**		.073(.068)		.071(.072)		.100(.078)	
	F(df, df)	3.583(8, 96)**		2.046(8,98)		2.013(8,98)		2.449(8,96)	

Note. Beta coefficients shown are estimates from the final model. ΔR^2 reflects the change in R^2 for each step. Step 2a added support; Step 2b removed support and added conflict. Step 3 included both support and conflict. Final adjusted R^2 and ΔR^2 are for Step 3 relative to the covariates alone. Sample sizes differ due to listwise deletion of missing data. *Bonferroni corrected $p<.013$, **$p<.001$.
[a] Reference group is Caucasian patients.

Table 3. AYAs' Relationships with Other Family Members and Psychological Health

		Distress		Posttraumatic Stress		Positive Affect		Posttraumatic Growth	
		n=(103)		*n*=(105)		*n*=(105)		*n*=(103)	
Step		β (SE)	ΔR^2	β (SE)	ΔR^2	β (SE)	ΔR^2	β (SE)	ΔR^2
1	Age	.296(.015)*	.092	.230(.021)	.074	-.029(.029)	.069	.052(.045)	.125
	Ethnicity[a]								
	Hispanic	.007(.075)		.045(.111)		-.078(.152)		.242(.234)	
	Asian	.013(.115)		-.041(.169)		-.002(.232)		.201(.351)	
	Other	.081(.116)		-.102(.169)		.230(.232)		.189(.352)	
	Time since diagnosis	.213(.002)		-.090(.003)		.048(.004)		.062(.006)	
	Health care utilization	.385(.010)*		-.042(.015)		-.018(.021)		-.013(.031)	
2a	Support	-.003(.029)	.001	-.039(.043)	.003	.198(.059)	.038	.324(.092)*	.102*
2b	Conflict	.398(.037)**	.133**	.258(.054)*	.060*	-.007(.074)	.001	-.039(.113)	.005
3	Final model $R^2_{adj}(\Delta R^2)$	.159(.136)*		.063(.061)		.033(.038)		.163(.103)*	
	F(df, df)	3.411(8,94)*		1.875(8,96)		1.437(8,96)		3.477(8,94)*	

Note. Beta coefficients shown are estimates from the final model. ΔR^2 reflects the change in R^2 for each step. Step 2a added support; Step 2b removed support and added conflict. Step 3 included both support and conflict. Final adjusted R^2 and ΔR^2 are for Step 3 relative to the covariates alone. Sample sizes differ due to listwise deletion of missing data. *Bonferroni corrected $p<.013$, **$p<.001$

[a] Reference group is Caucasian patients.

Table 4. AYAs' Relationships with Close Friends and Psychological Health

		Distress		Posttraumatic Stress		Positive Affect		Posttraumatic Growth	
		n=(102)		*n*=(104)		*n*=(104)		*n*=(102)	
Step		β (SE)	ΔR^2	β (SE)	ΔR^2	β (SE)	ΔR^2	β (SE)	ΔR^2
1	Age	.297(.015)*	.087	.266(.021)*	.074	-.112(.026)	.067	.031(.044)	.125
	Ethnicity[a]								
	Hispanic	-.023(.078)		.032(.109)		-.097(.136)		.212(.232)	
	Asian	-.062(.115)		-.084(.162)		.001(.202)		.226(.338)	
	Other	.023(.115)		-.114(.162)		.175(.202)		.160(.338)	
	Time since diagnosis	.143(.002)		-.120(.003)		.066(.003)		.138(.006)	
	Health care utilization	.225(.011)		-.141(.015)		.046(018)		.112(.031)	
2a	Support	-.262(.031)*	.081*	-.289(.044)*	.092*	.466(.054)**	.209**	.405(.093)**	.143**
2b	Conflict	.183(.051)	.050	.155(.070)	.040	-.073(.088)	.024	.032(.153)	.001
3	Final model $R^2_{adj}(\Delta R^2)$	.127(.110)*		.118(.113)*		.219(.213)**		.205(.144)**	
	F(df, df)	2.841(8,93)*		2.729(8,95)*		4.617(8,95)**		4.265(8,93)**	

Note. Beta coefficients shown are estimates from the final model. ΔR^2 reflects the change in R^2 for each step. Step 2a added support; Step 2b removed support and added conflict. Step 3 included both support and conflict. Final adjusted R^2 and ΔR^2 are for Step 3 relative to the covariates alone. Sample sizes differ due to listwise deletion of missing data. *Bonferroni corrected $p<.013$, **$p<.001$

[a] Reference group is Caucasian patients.

Table 5. AYAs' Relationships with Medical Staff and Psychological Health

		Distress		Posttraumatic Stress		Positive Affect		Posttraumatic Growth	
		n=(96)		*n*=(98)		*n*=(98)		*n*=(96)	
Step		β (SE)	ΔR^2	β (SE)	ΔR^2	β (SE)	ΔR^2	β (SE)	ΔR^2
1	Age	.163(.018)	.056	.176(.024)	.078	-.016(.031)	.080	.093(.050)	.163*
	Ethnicity[a]								
	Hispanic	.024(.087)		.88(.120)		-.175(.153)		.188(.246)	
	Asian	-.049(.138)		-.150(.191)		.040(.244)		.319(.383)*	
	Other	.001(.124)		-.133(.171)		.232(.219)		.192(.346)	
	Time since diagnosis	.072(.002)		-.164(.003)		.124(.003)		.144(.006)	
	Health care utilization	.221(.011)		-.136(005)		.008(.019)		.033(.030)	
2a	Support	-.128(.028)	.015	-.156(.039)	.021	.372(.050)**	.107*	.337(.080)*	.099*
2b	Conflict	-.006(.092)	-.001	-.036(.128)	.001	.202(.163)	.018	.068(.263)	.001
3	Final model $R^2_{adj}(\Delta R^2)$	-.014(.015)		.019(.022)		.154(.143)*		.199(.103)*	
	F(df, df)	.834(8,87)		1.233(8,89)		3.203(8,89)*		3.995(8,87)**	

Note. Beta coefficients shown are estimates from the final model. ΔR^2 reflects the change in R^2 for each step. Step 2a added support; Step 2b removed support and added conflict. Step 3 included both support and conflict. Final adjusted R^2 and ΔR^2 are for Step 3 relative to the covariates alone. Sample sizes differ due to listwise deletion of missing data. *Bonferroni corrected $p<.013$, **$p<.001$

[a] Reference group is Caucasian patients.

Online Supplement

Participant Recruitment & Procedures

During the 12-month recruitment period, research personnel approached adult caregivers of 194 patient-caregiver dyads to assess their interest in participating. Of these, 58 caregivers and/or patients (30%) declined participation. Among 136 dyads who indicated interest, 133 consented; five dyads were subsequently excluded because they became ineligible over the course of the study (e.g., patient was transferred into inpatient unit). Of the remaining 128 eligible dyads, 117 AYA patients (91%) and 112 caregivers (88%) completed the survey, representing 110 complete dyads.

Ninety-two (84%) and 18 (16%) participating dyads were recruited from the cancer clinic and OPI center, respectively. Participants recruited from OPI did not differ significantly from those recruited from the clinic on any main study variables (*p*s>.05).

Both patients and caregivers each completed an approximately 30-minute online or paper survey at home or at the hospital. The majority (56%) of AYA patients completed paper surveys at the hospital, followed by online surveys at home (24%), paper surveys at home (15%), and online surveys at the hospital (5%). Most (>50%) caregivers completed paper surveys at the hospital, followed by online and paper surveys at home (both 23%), and online surveys at the hospital (4%). All AYA patients and 68% of caregivers completed surveys in English (32% in Spanish). Average time between dyad members' survey completion was 5.03 days (*SD*=50.00).

Actor-Partner Interdependence Model for Dyadic Analyses

Increasingly, researchers use the Actor-Partner Interdependence Model (APIM)[1] to study dyadic phenomena in the context of chronic disease including breast,

lung, and prostate cancer[2-4], and metabolic syndrome[5], as this statistical technique matches the conceptual understanding of the dyad's interdependence and has several advantages over conventional statistical strategies (e.g., multiple regression). For instance, the APIM is tested in a structural equation modeling (SEM) framework, which fits regression coefficients to each of four effects: AYA patients' and caregivers' perceptions of subjective severity with their own PTSS (two within-person effects) and with each other's PTSS (two crossover effects). This accounts for the fact that patients and caregivers are nested within a dyad and for the shared variances and correlated error variance of their dependent and independent variables. Also, all effects are tested simultaneously within a single model; this yields four independent regression estimates, pulling apart the interdependence of the examined constructs (and the dyad) in a meaningful way. The magnitude of the four effects can then be compared using model constraints (i.e., model paths are set to be equal) to test whether one effect is stronger than the other(s). In addition, SEM maximizes power when analyzing dyadic data because it uses a Full Information Maximum Likelihood (FIML) method to estimate parameters[6], so all dyads and individuals are included in the analyses even if they are missing a score on one of the variables.

Sample

Details regarding patients' illness characteristics and objective illness severity outcomes appear in Table 1. Patient and caregiver demographic information appears in Table 2.

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Table 1. Diagnostic information and objective indicators of illness severity (*n*=110 patients).

Cancer	***n*(%)**	
Hemotologic malignancies	62(56)	
Sarcomas	19(17)	
Germ cell tumors	17(16)	
CNS	8(7)	
Other	4(4)	
Risk prognosis		
Low	30(27)	
High	80(73)	
	***M*(*SD*)**	**Range**
Time since diagnosis	3.84 yrs(1.86)	2-80 mths
Healthcare utilization[a] (in days)	3.64(4.80)	1-21
Medical costs[a]	$1,315($1,870)	$21-$9,725

Notes. Hemotologic malignancies: leukemia and lymphoma; Sarcomas: bone tumors and soft tissue; Germ cell tumors: gonadal and nongonadal; CNS: central nervous system tumors. [a]Average per month; *n*=107.

Table 2. Demographic information (n(%)) for AYA patients and caregivers

	AYA Patients	Caregivers
Age		
12-17	86(78)	
18-24	24(22)	
	M(*SD*)=15.94(2.24); range=12-24	*M*(*SD*)=45.20(7.03); range=24-68
Gender		
Female	53(48)	98(89)
Male	57(52)	12(11)
Ethnicity		
Hispanic	49(44)	50(45)
Caucasian	41(37)	44(40)
Asian	16(15)	11(10)
Other/Not specified	4(4)	5(5)
Caregiver relationship		
Mother		93(84)
Father		11(10)
Other female		5(5)
Other male		1(1)

Table 2. Demographic information (n(%)) for AYA patients and caregivers (Con't)

	AYA Patients	Caregivers
Marital status		
Married		76(69)
Separated/Divorced/Widowed		14(13)
Single		7(6)
Domestic partnership		5(5)
Education		
Less than high school		28(26)
High school degree/GED		19(17)
Some college		20(18)
Associate/Certificate degree		8(7)
Bachelor's degree or beyond		29(26)
Household income		
<$10,000		11(10)
$10,000-$29,999		30(27)
$30,000-$49,999		12(11)
$50,000-$74,999		11(10)
$75,000-$149,999		20(18)
≥$150,000		10(9)

Notes. *n*=110 dyads. Some percentages do not equal 100 due to missing data. GED=General Education Development.