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Internal and External Resources and the Adjustment of Parents of Premature Infants

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Abstract
Studies have shown premature birth and infant hospitalization to be associated with increased levels of parental distress. Internal and external psychological resources have been found to mitigate distress among persons coping with stressful medical events. The current study evaluated psychological resources and distress in 87 parents (57 mothers and 30 fathers) to whom an infant was born prematurely and hospitalized in the NICU of a large tertiary medical center. Parents were administered standardized measures of internal (problem-solving skills) and external (total spousal support, adequacy of spousal support) psychological resources and of psychological distress (depression, posttraumatic symptoms, and mood). Findings indicated that higher levels of problem-solving skills and more adequate spousal support, but not total spousal support, were related to lower levels of parental distress. Adequacy of spousal support and parents' problem-solving skills accounted for 18% of the variance in overall mood and 13.8% of the variance in posttraumatic stress symptoms. A significant two-way interaction was found between adequacy of spousal support and problem-solving skills such that individuals with better problem-solving skills reported better overall mood independent of the adequacy of spousal support they receive. However, for individuals with poor problem-solving skills, the adequacy of the spousal support they receive was a significant factor in determining their overall mood. The theoretical and clinical implications of these findings are discussed in terms of the accessibility of these resources to assessment and their potential for change via existing intervention approaches.

Keywords Premature infants · Parental distress · Problem-solving skills · Spousal support

Premature birth, whether preceded by a normal or medically complicated pregnancy, often finds parents lacking in emotional and cognitive preparedness due to the often-unexpected birth and hospitalization, as well as the compromised medical condition of the infant, leading to increased psychological distress (Baum, Weidberg, Osher, & Kohelet, 2011; Goldberg & DiVitto, 2002; Lindberg, 2007; Taubman-Ben-Ari, 2011). The psychosocial challenges associated with premature birth have become, and are likely to become more, salient as the incidence of preterm births rises owing to medical and technological advances in the Western and developed world. These advances include artificial reproductive techniques which relate to a higher incidence of multiple pregnancies and an increase in the average age of the birth mother (Martin et al., 2010; McDonald et al., 2009), increased incidence of births that occur through cesarean section (Beck et al., 2010), and an overall increase in survival rates of infants born preterm (Field, Dorling, Manktelow, & Draper, 2008).

The present study examines the moderating influence of parents' internal psychological resources, in the form of social problem-solving skills, and external resources, in the form of spousal support, on the psychological adjustment of fathers and mothers of preterm infants during the period of the postnatal hospitalization.

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Parental Adjustment to Premature Birth

A premature infant is defined as one born before the 37th week of pregnancy usually with a birth weight of less than 2500 g. In the US, premature births account for 11% of all live births (Blencowe et al., 2012), while in Israel 7% of the infants born in the years 2008–2010 were born preterm (Rabinowitz, 2009; Reichman, Levitsky, Boyko, & Lerner-Geva, 2012). Parents experience premature birth differently from a normal and timely birth due to the infant's often-lengthy hospitalization in the neonatal intensive care unit (NICU) and due to its often-precarious medical condition (Jackson, Ternestedt, & Schollin, 2003). Studies have shown that fathers and mothers of premature infants tend to exhibit higher levels of emotional distress, such as anxiety (Carter, Mulder, Bartram, & Darlow, 2005), depression (Baum et al., 2011), and acute and posttraumatic stress disorders (Ahlund, Clarke, Hill, & Thalange, 2009; Feeley et al., 2011), in comparison to parents of infants born full term and with no medical complications.

Fathers and mothers differ in their experience of their infant's premature birth. Men's concerns tend to focus on their need to understand the situation and care for the mother and child (Lindberg, 2007), whereas women's experiences center on the early and unexpected separation from the developing fetus and the interrupted bonding process (Keren, Tiano & Sirota, 2000; Kersting et al., 2004). Research has shown that women may also differ from one another in the way they respond to the premature birth, with some new mothers believing that early birth saved their child's life, and others experiencing disappointment and self-blame in light of unfulfilled expectations for completing a full pregnancy and having a healthy child (Baum et al., 2011; Taubman-Ben-Ari, 2011).

Psychological stress is the product of an interaction between a stressful event, the way the person cognitively appraises the event, the resources available to the individual, and the coping strategies that he or she employs (Lazarus & Folkman, 1984). Cognitive appraisal involves an assessment of the significance of the stressful event to one's personal welfare (initial assessment) and of the actions available to counteract the source of pressure (secondary appraisal) (Folkman, Lazarus, Gruen & Delongis, 1986; Lazarus, 2006). One's personal and environmental resources also affect the way he or she experiences the event and responds to it. Internal resources are those that the individual brings to the challenging situation, including past experience and history, personality characteristics, aptitudes, and abilities. External resources refer to those provided via one's surroundings, such as financial status or social support. The current study examines two such resources, social problem-solving skills (internal) and spousal support (external), in relation to their potential moderating influence on parental adjustment following the birth of a premature infant.

Social Problem-Solving Skills

Social problem-solving theory provides a framework for understanding how a person perceives and approaches problems of everyday life. A problem, in this context, is defined as a life event or a task that originates from within the person or his environment, requiring him to react on a personal, interpersonal, or social level (D'Zurilla & Nezu, 2010). The person's ability to solve problems is affected by the way he or she appraises the situation cognitively, i.e., problem orientation, and the way he or she behaves in reaction to it, i.e., problem-solving style. A positive problem orientation is characterized by a belief that problems are challenges that can be solved in a successful and constructive way, requiring time and effort, as well as a commitment to addressing the problem rather than avoiding it. Negative problem orientation involves a tendency to view problems as threats that are unsolvable, leading to a sense of pessimism and a tendency toward avoidance, impulsivity, and dependency (D'Zurilla & Nezu, 2010; Morera et al., 2006). Problem-solving style refers to the person's behavior in response to the problem situation, which may be systematic and rational or dysfunctional. Rational problem-solving strategies involve the ability to define the problem, generate alternative solutions, weigh options, make decisions, and implement the chosen solution. Dysfunctional problem-solving tendencies include the impulsive style in which solutions arrived at quickly and partially and the avoidant style, characterized by indifference, passivity, and procrastination (D'Zurilla, Nezu, & Maydeu-Olivares 2002; Morera et al., 2006). Taken together, positive problem orientation and rational problem-solving strategies comprise constructive problem solving, while negative problem orientation and avoidant/impulsive strategies comprise dysfunctional problem solving.

Studies have demonstrated a positive association between constructive problem-solving skills and psychological adjustment in a variety of populations. These range from studies of academic achievement in children and students (Kim, Park, & Baek, 2009; Rodrõâ, Maydeu-Olivares, & Rodriguez-Fornells, 2000), to alcohol and marijuana use among teenagers (Jaffee & D'Zurilla, 2009) and the quality of the relationship between partners (Sullivan, Pasch, Johnson, & Bradbury, 2010). Studies involving medical stressors have found constructive problem-solving skills to be related to improved adjustment and lower levels of emotional distress among patients with life-threatening and chronic conditions (Kurlyo, Elliott, & Shewchuk, 2001; Prachakul, Grant, & Keltner, 2007; Shaw, Feuerstein, Haufler, Berkowitz, &

Lopez, 2001), as well as among family caregivers (Couper et al., 2009; Dolgin et al., 2007; Kurlyo, Elliott, & Shewchuk, 2001; Grant, Elliott, Giger, & Bartolucci, 2001; Malcarne et al., 2002). Importantly, problem-solving skills lend themselves to modifying intervention. Studies have shown that enhancing one's problem-solving skills contributes to improved emotional well-being and quality of life (Chinaveh, 2010), increased investment in parenting (Bugental, Beaulieu, & Silbert-Geiger, 2010), reduced psychological distress among those suffering from depression (Bell & D'Zurilla, 2009), improved parental adjustment following the diagnosis of cancer in their child (Sahler et al., 2005, 2013), and reduced depression following the birth of a premature infant (Cournos & Goldfinger, 2011; Silverstein et al., 2011). A meta-analytic review examining the effectiveness of problem-solving skills interventions found them to be superior to no treatment, treatment as usual, and placebo (Malouff, Thorsteinsson, & Schutte, 2007). Thus, a significant body of research supports the utility of social problem-solving theory in explaining adjustment to a range of stressors, as well the benefits of interventions aimed at enhancing problem-solving skills.

Spousal Support

Most couples see their partner as the main support figure in their lives (Marks, 1996). Studies have shown that spousal support is one of the main avenues for coping with stressors among parents, such as pregnancy, childbirth, premature birth (Sloan, Rowe & Jones, 2008), and children's illness (Hoekstra-Weebers, Jaspers, Kamps, & Klip, 2001; Morrow, Hoagland, & Carnrike, 1981). With the birth of a premature infant, both parents face a common stressor, which intensifies yet challenges the role of spousal support in comparison with that of other supporting figures (Coppola, Cassibba, Bosco & Papagna, 2013; Miles, Carlson, & Funk, 1996; Schwarzer & Knoll, 2007). Support between partners enables them to shape the way they perceive the stressor, to affirm their ability to face the challenges ahead, to increase feelings of competence and self-esteem, and to decrease negative emotion and the physiological arousal that accompanies them (Collins, Dunkel-Schetter, Lobel, & Scrimshaw, 1993; Holditch-Davis, Schwartz, Black, & Scher, 2007; Schwarzer & Knoll, 2007; Singer, Davillier, Bruening, Hawkins, & Toyoko, 1996).

Studies that have examined the role of spousal support among pregnant and postpartum mothers have found that mothers who reported receiving more support were less likely to experience a preterm birth (Zachariah, 2009), experienced easier labor and less depression after it (Collins et al., 1993), and exhibited less emotional distress following a premature birth (Singer et al., 1996, 2010) or a still birth (Cacciatore, Schnebly, & Froen, 2009). Spousal support has been demonstrated to be a significant psychological resource among parents of premature infants, predicting reduced stress among mothers of premature infants, and being identified by fathers as more preferred and valued than support provided by other caregivers, such as doctors and nurses (Sloan et al., 2008).

A meta-analysis by Chronister et al. (2008) examined the mechanisms whereby spousal support may be beneficial and concluded that the degree to which the support is perceived to be adequate to the person's needs (being satisfied with the support received and perceiving the support as an available resource) is correlated with a higher well-being and is a better predictor of physical and mental well-being than the absolute amount of support received (Lawrence et al., 2008). Spousal support which is not adapted to the needs of the spouse may lead the receiver of the support to feel dissatisfied (Manne et al., 2004), and more prone to psychological distress (Reichman, Miller, Gordon, & Hendricks-Munoz, 2000) and to lower levels of psychological well-being (Beach & Gupta, 2006; Matire, Stephens, Druley, & Wojno, 2002).

Discrepancies between the couple's support interactions and needs may result from variables such as gender, personality traits, and attachment styles (Helgeson, 2003), as well as the frequently changing medical condition of the premature infant (De Rouck & Leys, 2009; Jones, Rowe, & Becker, 2009; Rowe & Jones, 2010). In addition, the spouses' subjective perceptions of the support needed and its availability may differ. On the one hand, the provider may believe he or she has given greater support than they actually provided due to the desire to see oneself as empathic and caring (Schwarzer & Knoll, 2007). The recipient of the support may believe she or he received less support due to not being aware of the support given (Bolger, Zuckerman, & Kessler, 2000), not having received the type or level of support needed, or by having experienced a negative mood such as depression, which led to a negative appraisal of the situation and of the support provided (Beach & Gupta, 2006; Bielawska-Batorowicz, & Kossakowska Petrycka, 2006; Cutrona, Hessling, & Suhr, 1997). While the literature has established a correlation between spousal support and the marital and emotional well-being of spouses when dealing with stress-related illness, pregnancy, and childbirth, little is known about the adequacy of spousal support as it relates to parental adjustment following an infant's preterm birth.

In the present study, we hypothesized that higher and more adequate spousal support, as an external resource, would moderate and be associated with better adjustment outcomes after the birth of a premature infant as defined by lower levels of depression, negative mood, and posttraumatic symptoms (dependent variables). In addition, we examined internal coping resources in the form of constructive

problem-solving skills and hypothesized that a parent's constructive problem-solving skills would serve as an internal resource moderating and facilitating better emotional adjustment following the birth of a premature infant. The choice and significance of these resources lies in their accessibility to assessment and in the potential to effect change via available intervention approaches.

Method

Participants

Participants were 87 Hebrew-speaking parents, 57 mothers and 30 fathers, of infants born before the 37th week of pregnancy and admitted to the neonatal intensive care unit (NICU) at a large tertiary medical facility in central Israel. Exclusion criteria included (1) multiple births beyond twins; (2) birth of twins, one of whom died; and (3) infants not expected to survive the NICU stay as assessed by NICU staff. Table 1 shows the demographic characteristics of the parents who participated in the study. Parental age ranged from 21 to 50 ($M = 32.4$, SD = 5.32), and for 41% of them ($N = 36$) it was the first birth.

Table 2 presents data related to the characteristics of the pregnancy, birth, and infant's medical condition. Fifteen of the mothers (26.3%) had a previous preterm birth, and for 39 (68.4%) the current birth was of a single infant. Average gestation period was 32 weeks (range = 25.1–37.1; SD = 2.43), birth weight 1.64 kg (SD = 0.38), and NICU stay 29 days (SD = 17.06).

Measures

Spousal Support

The Support in Intimate Relationships Rating Scale-Revised (SIRRS-R) (Brock & Lawrence, 2009) was developed on the

Table 1 Sociodemographic characteristics of parents

	Range	*M*	SD
Age	21–50	32.4	5.32
Number of children	1–9	2.04	1.31
		N	%
Marital status	Married	78	89.7
	Partnered	9	10.3
Education	High school	24	27.6
	Post-high school	3	3.4
	College	60	69

Table 2 Characteristics of pregnancy, birth, and infant's medical condition

	N	%
Pregnancy characteristics		
Previous premature infant pregnancies	15	26.3
Artificial reproductive techniques or infertility treatment	25	43.9
Medical complications	49	85.9
Abnormalities in obstetric ultrasonography	19	33.3
Birth characteristics		
Single birth	39	68.4
Twins birth	18	31.6
Natural birth	22	38.6
Cesarean birth	35	61.4
Range	*M*	SD
Birth week 25.1–37.1	32.47	2.43
Birth weight (kg) 0.86–2.47	1.64	0.38
Infants age (days) 2–82	16.32	15.07

basis of a SIRRS questionnaire (Dehle, Larsen, & Landers, 2001) in order to assess the degree of spousal support at times of pressure, stress, or challenge. The SIRRS-R comprises 25 items measuring four dimensions of spousal support: (1) emotional (e.g., "Said he/she thought I handled a situation well"); (2) physical (e.g., "Held my hand."); (3) informative (e.g., "Gave me suggestions about how to handle a situation"); and (4) tangible (e.g., "Did something to help me indirectly"). Participants are asked to assess the frequency of specific behaviors employed by the other spouse on a five-point Likert scale, ranging from 0 *(never)* to 4 (*almost always*). The total score of the questionnaire is calculated as the weighted average of the four sub-scales. Higher scores represent higher levels of spousal support. This SIRRS-R has been found to be valid and reliable over time, with internal reliability coefficients of 0.86–0.92 (Barry, Bunde, Brock, & Lawrence, 2009; Brock & Lawrence, 2009). In order to assess the adequacy of spousal support, participants were also asked to indicate for each item their preferred frequency of receiving each support behavior on a three-point scale of less/same/more. Ratings of "less" or "more" were interpreted as inadequate support, while ratings of "same" were considered as adequate. Adequacy scores are calculated for the four dimensions of support and summed for a weighted total score. The adequacy measure has yielded reported internal reliability coefficients of 0.94 (Brock & Lawrence, 2009). Reliability coefficients for the current sample were 0.93 for total spousal support and 0.74 adequacy of spousal support.

Problem-Solving Skills

The Social Problem-Solving Inventory—Revised (SPSI-R) (D'Zurilla et al., 2002) is a self-report questionnaire composed of 52 items reflecting five dimensions of social problem-solving ability, including cognitive orientation (positive or negative orientation) and behavioral styles for solving problems (rational, impulsive, avoidant). Items are rated on a five-point Likert scale, ranging from 1 (*not true at all*) to 5 (*very true*). Sample items from the questionnaire include the following: "When my first efforts to solve a problem fail, I know that if I persist and do not give up too easily I will eventually find a good solution" (positive problem orientation), "I feel nervous and unsure of myself when I have an important decision to make" (negative problem orientation), "After carrying out my solution to a problem, I analyze what went right and what went wrong" (rational problem-solving style), "When I am attempting to solve a problem, I act on the first idea that comes to me" (impulsive style), and "I wait to see if a problem will resolve itself first, before trying to solve it myself." (avoidant style). Positive problem orientation combined with a rational problem-solving strategy reflects constructive problem solving. Negative problem orientation and avoidant/impulsive strategies constitute dysfunctional problem solving. Higher total SPSI-R scores indicate more constructive problem-solving skills. The SPSI-R has demonstrated good reliability and validity with internal consistency coefficients ranging from 0.72 to 0.92 among diverse samples (Clark et al., 2011; Dixon-Gordon, Chapman, Lovasz, & Walters, 2011; D'Zurilla & Chang, 1995; D'Zurilla et al., 2002). Reliability coefficients for the current sample were 0.88.

Mood

The Profile of Mood States (POMS) (McNair, Lorr, & Droppleman, 1992) is a self-report questionnaire consisting of 65 mood-related items referring to the preceding week rated on a five-point Likert scale ranging from 1 (*not at all*) to 5 (*very much*). The POMS includes six sub-scales (stress/anxiety, depression/despair, anger/hostility, fatigue, confusion, vitality) with higher total scores indicating more negative mood and affect. The POMS scales have well-documented psychometric properties and internal consistency coefficients ranging from 0.84 to 0.95 (Grussu, Quatraro, & Nasta, 2005; Wyrwich & Yu, 2011). Reliability coefficients for the current sample were 0.94.

Posttraumatic Stress

The Impact of Event Scale—Revised (IES-R) (Weiss & Marmar, 1997) is a 22-item self-report measure that assesses posttraumatic symptoms in accordance with the criterion of PTSD as outlined in the DSM-IV (American Psychiatric Association, 2000) (arousal, avoidance, and intrusion). Sample items include the following: "Any reminders brought back feelings about it" (Intrusion), "I felt irritable and angry" (Arousal), and "I stayed away from reminders about it" (avoidance). Items are rated on a five-point Likert scale, ranging from 0 (*not at all*) to 4 (*very much*) and yield a total score that is the weighted average of the three sub-scales. Higher scores represent higher levels of posttraumatic symptoms. The IES-R has well-documented psychometric properties and its scales have internal consistency coefficients ranging from 0.84 to 0.91 (Weiss & Marmar, 1997). Reliability coefficients for the current sample were 0.88.

Depression

The Beck Depression Inventory-II (BDI-II) is a 21-item self-report measure of depressive symptoms and its cognitive, emotional, and behavioral components. Sample items include the following: "I am not particularly discouraged about the future"; "I don't feel particularly guilty." Items are endorsed on a four point Likert scale ranging from 0 *(not at all)* to 3 *(greatest severity)*. For example, a statement scored

as 0 describes the lack of sadness ("I do not feel sad"), while a statement scored a 3 reflects the full severity of sadness ("I am so sad or unhappy that I can't stand it"). The BDI-II is widely used for clinical and research purposes and has well-established psychometric properties (Beck, Steer, Ball, Ciervo, & Kabat, 1997). Reliability coefficients for the current sample were 0.89.

Demographic and Medical Data

Demographic data were collected for each participant, including age, marital status, number of children, socioeconomic status, education level, occupation, and religious observance. Medical data included relevant medical and birth history such as previous premature births, fertility treatments, complications during pregnancy, and nature of the current delivery.

Procedure

Study measures underwent translation/back-translation and psychometric validation procedures for use with Hebrew-speaking samples (Dolgin, Goldman, & Iohan, in press). The study protocol was approved by the hospital's Institutional Review Board. Eligible parents were approached consecutively and offered participation in the study and, from those who agreed, informed consent was obtained followed by administration of the study measures. Appropriate measures were taken to ensure participant confidentiality at all study stages. In order to facilitate maximum response rates, eligible parents were approached by the research team from 5 days after the date of birth, as this was deemed well within the acute postpartum adjustment period, yet beyond the point at which many parents are unavailable, emotionally or otherwise, for enrollment. Following consent, measures were completed, according to participant preference, either in the NICU or at home, in which case they were returned at the following NICU visit. A member of the research team reviewed all returned measures for completeness and offered a debriefing opportunity to participants.

Results

Spousal Support and Parental Adjustment

Descriptive statistics for all study measures appear in Table 3. We hypothesized that parents who reported higher and more adequate levels of spousal support would exhibit better adjustment in terms of overall mood, depression, and posttraumatic symptoms. To test this hypothesis, Pearson correlations were conducted between the total spousal support scores (Table 4), as well as adequacy of spousal support scores (Table 5), and measures of parental adjustment.

Table 3 Descriptive statistics for study measures

	M	SD	Range
Problem-solving skills	13.59	2.31	8.71–16.67
Spousal support	64.57	17.77	19.00–98.00
Spousal support adequacy	5.01	5.02	−1.00–18.00
Depression	9.97	8.18	0.00–36.00
Posttraumatic symptoms	28.44	13.77	4.00–64.00
Mood	27.53	37.35	−28.00–127.00

As is evident from Table 4, no significant relationships were found between overall levels of spousal support and total adjustment scores of overall mood, depression, and posttraumatic symptoms. A significant correlation was found between overall levels of spousal support and parents' sense of vitality ($r = -.242$, $p < .05$), a relationship derived from overall levels of informational ($r = -.221$, $p < .05$) and emotional ($r = .222$, $p < .05$) support. Overall, these relationships held true for both mothers and fathers, although overall spousal support was related to significantly lower depression scores among mothers, as measured by the BDI ($r = -.391$, $p < .01$).

Table 5 illustrates significant relationships between levels of adequacy of spousal support and parental adjustment measures of overall mood and posttraumatic symptoms. More adequate spousal support was found to be significantly correlated to less negative mood and fewer posttraumatic symptoms. In terms of negative mood, more adequate spousal support, particularly emotional support, was related to less anxiety/stress, depression, and anger/hostility. In terms of posttraumatic symptoms, more adequate spousal support was related to fewer posttraumatic symptoms overall, and to lower levels of avoidance symptoms in particular. Here, too, adequate levels of emotional support played an especially strong role. Levels of clinical depression, as measured by the BDI, were not significantly related to levels of adequacy of spousal support. Comparison of the correlation coefficients between adequacy of spousal support and adjustment outcomes for mothers and fathers was carried out using Preacher's (2002) method for comparing correlation coefficients obtained from independent samples. These analyses yielded no significant differences in the strength of the associations between the study variables for mothers versus fathers. In sum, these findings suggest that levels of adequacy of spousal support, as opposed to absolute levels of spousal support, are related to better parental adjustment.

Table 4 Total spousal support and parental adjustment

Parental adjustment		Spousal support				
Measure/subscale		Spousal support—total	Informative spousal support	Physical spousal support	Tangible spousal support	Emotional spousal support
Depression	BDI	−0.192	−0.098	−0.175	−0.127	−0.205
Posttraumatic symptoms	IES total	−0.075	0.081	−0.087	−0.149	−0.086
	Arousal	−0.080	0.060	−0.125	−0.112	−0.089
	Avoidance	−0.127	0.057	−0.046	−0.236*	−0.153
	Intrusion	0.013	0.073	−0.041	−0.027	0.019
Mood	POMS total mood	−0.128	0.059	−0.150	−0.130	−0.181
	Depression	−0.104	0.096	−0.210	−0.090	−0.146
	Stress	−0.064	0.107	−0.025	−0.123	−0.138
	Anger	−0.076	0.132	−0.090	−0.116	−0.154
	Fatigue	−0.156	−0.035	−0.168	−0.131	−0.164
	Confusion	0.006	0.169	−0.046	−0.037	−0.067
	Vitality	0.242*	0.221*	0.170	0.142	0.222*

*$p < .05$; **$p < .01$

Table 5 Adequacy of spousal support and parental adjustment

Parental adjustment		Adequacy of spousal support				
Measure/subscale		Spousal support—total	Informative spousal support	Physical spousal support	Tangible spousal support	Emotional spousal support
Depression	BDI	−0.146	−0.128	−0.082	−0.110	−0.114
Posttraumatic symptoms	IES total	−0.260*	−0.184	−0.098	−0.212*	−0.256*
	Arousal	−0.191	−0.133	−0.043	−0.147	−0.213*
	Avoidance	−0.238*	−0.177	−0.089	−0.190	−0.231*
	Intrusion	−0.194	−0.133	−0.098	−0.169	−0.171
Mood	POMS—total mood	−0.268*	−0.192	−0.172	−0.185	−0.240*
	Depression	−0.221*	−0.147	−0.150	−0.095	−0.238*
	Stress	−0.235*	−0.150	−0.112	−0.234*	−0.201
	Anger	−0.299**	−0.272*	−0.188	−0.173	−0.251*
	Fatigue	−0.164	−0.116	−0.142	−0.118	−0.122
	Confusion	−0.184	−0.183	−0.096	−0.070	−0.178
	Vitality	0.196	0.066	0.149	0.228*	−0.157

*$p < .05$; **$p < .01$

Problem-Solving Skills and Parental Adjustment

We hypothesized that parents with better problem-solving skills would exhibit better adjustment in terms of overall mood, depression, and posttraumatic symptoms. To test this hypothesis, Pearson correlations were conducted between the indices of problem-solving skills and measures of parental adjustment (Table 6).

As is evident from Table 6, total problem-solving skills scores were significantly correlated with improved parental adjustment in terms of total scores for overall mood, depression, and posttraumatic symptoms. These associations were particularly strong for indices of negative problem orientation and impulsive problem-solving behavior. In terms of posttraumatic symptoms, better problem-solving skills were significantly related to reduced arousal and avoidance symptoms. In terms of overall mood, better problem-solving skills were significantly related to lower levels of depression, stress/anxiety, anger/hostility, fatigue, and confusion. Comparison of the correlation coefficients between problem-solving skills and adjustment outcomes for mothers and fathers was carried out using Preacher's (2002) method for comparing correlation coefficients obtained from independent samples.

Table 6 Problem-solving skills and parental adjustment

Parental adjustment		Problem-solving skills					
Measure/subscale		Problem-solving skills—total	Positive problem-solving orientation	Negative problem-solving orientation	Rationale problem-solving skills	Impulsivity	Avoidance
Depression	BDI	−0.233*	−0.245*	0.336**	−0.179	0.027	0.073
Posttraumatic symptoms	IES total	−0.303**	−0.106	0.443**	−0.007	0.308**	0.215*
	Arousal	−0.271*	−0.114	0.467**	0.006	0.232*	0.150
	Avoidance	−0.422**	−0.247*	0.398**	−0.135	0.425**	0.337**
	Intrusion	−0.067	0.073	0.217*	0.090	0.032**	0.053
Mood	POMS—total mood	−0.366**	−0.241*	0.532**	−0.050	0.213*	0.272*
	Depression	−0.410**	−0.238	0.540**	−0.052	0.305**	0.332**
	Stress	−0.214*	−0.091	0.441**	0.018	0.095	0.136
	Anger	−0.331**	−0.172	0.476**	−0.019	0.308**	0.207
	Fatigue	−0.242*	−0.192	0.377**	−0.005	0.092	0.189
	Confusion	−0.471**	−0.375**	0.572**	−0.163	0.275*	0.326**
	Vitality	−0.135	−0.175	0.198	−0.070	−0.100	0.142

*$p < .05$; **$p < .01$

These analyses yielded a significantly stronger association between problem-solving skills and posttraumatic symptoms for fathers ($r = -.62$) compared to mothers ($r = -.12$) ($p < .01$). Other associations between problem-solving skills and adjustment outcomes were not significantly different for fathers versus mothers. In light of these findings, the association between parental problem-solving skills and indicators of parental adjustment was confirmed.

Cumulative Contribution of Internal and External Resources to Parental Adjustment

In order to examine the cumulative contribution of internal resources, in the form of the individual's problem-solving skills, and external resources, in the form of spousal support, to the variance in parental adjustment, three hierarchical multiple regression analyses were conducted. These

Table 7 Predicting parental adjustment by adequate spousal support and problem-solving skills

	Model 1: predicting mood			Model 2: predicting posttraumatic symptoms			Model 3: predicting depression		
	B	B SE	β	B	B SE	β	B	B SE	β
Step 1									
Adequate spousal support	−0.268	0.105	−0.268*	−0.26	0.105	−0.260*	−0.146	0.107	−0.146
ΔR^2	7.2%			6.8%			2.1%		
F change	6.5*			6.17*			1.84		
Step 2									
Adequate spousal support	−0.215	0.1	−0.215*	−0.218	0.103	−0.218*	−0.112	0.107	−0.112
Problem-solving skills	−0.332	0.1	−0.332**	−0.269	0.103	−0.269*	−0.225	0.107	−0.215*
ΔR^2/accumulative R^2	10.8%/18%			7.0%/13.8%			4.5%/6.6%		
F change	11.02**			6.8*			4.06*		
Step 3									
Adequate spousal support	−0.243	0.099	−0.248*	−0.223	0.104	−0.223*	−0.091	0.107	−0.091
Problem-solving skills	−0.383	0.101	−0.388**	−0.277	0.106	−0.277*	−0.179	0.109	−0.179
Spousal support X problem-solving skills	0.235	0.114	0.209*	0.039	0.12	0.034	−0.17	0.123	−0.151
ΔR^2/accumulative R^2	4.0%/22%			0.01%/13.9%			2.0%/8.7%		
F change	4.24*			0.105			1.893		

* $p < .05$; **$p < .01$

analyses were conducted for each of the adjustment outcome measures (Table 7). In the first step, the adequacy of spousal support score (Z score) was entered. In the second step, the total problem-solving skills score (Z score) variable was entered, followed by an adjusted interaction variable in the third step.

As indicated in Table 7, adequacy of spousal support and parents' problem-solving skills accounted for 18% of the variance in the overall mood and 13.8% of the variance in the posttraumatic stress symptoms. Problem-solving skills, but not spousal support, accounted for 4.5% of the variance in depression. In addition, a significant two-way interaction was found between adequacy of spousal support and problem-solving skills ($\beta = 0.214$, t (83) = 2.076, $p < .05$) for overall mood, accounting for an additional 4% of the variance in this variable (F (3,80) = 7.801, $p < .00$) for a total of 22% variance explained. In order to further elucidate the nature of the interaction of adequacy of spousal support and parent problem-solving skills in accounting for overall mood, the Preacher, Curran, and Bauer (2006) method was applied. In this method, the predictor variables are presented along three sampling points (mean, one SD above the mean, and one SD below the mean) at which points the significance of the slope differences in the outcome variable is examined. As illustrated in Fig. 1, among individuals with poor problem-solving skills ($\beta = -0.388$, t (80) = −3.001, $p = .004$), those with inadequate spousal support had significantly lower overall mood scores than those with adequate spousal support ($\beta = -0.487$, $p = .004$). No such differences were found for individuals with better problem-solving skills. At the same time, individuals with poor problem-solving skills and inadequate spousal support ($\beta = -0.248$, t (80) = −3.662, $p = .000$) had significantly lower overall mood scores than those with high problem-solving ability ($\beta = -0.621$, $p = .000$). No such differences were found for individuals receiving adequate spousal support. In sum, individuals with stronger internal resources in the form of better problem-solving skills report better overall mood independent of the adequacy of spousal support they receive. However, for individuals with poor problem-solving skills, the adequacy of the spousal support they receive is a significant determining factor in their overall mood.

Discussion

The current findings demonstrate that internal resources in the form of problem-solving skills and external resources in the form of adequate spousal support contribute to and interact in determining parental distress following the birth of a premature infant. Absolute levels of spousal support, however, were not found to be related to parental distress. Two possible explanations can be offered for these findings: first, it is possible that parents who do not receive adequate support from their partners seek and find support from other sources, such as extended family and friends (Cacciatore et al., 2009; Ensor & Hughes, 2010; Levitt, Weber & Clark, 1986). Second, spousal support in and of itself, if either more or less than adequate, can lead to an increase in emotional distress (Ibarra-Rovillard & Kuiper, 2011; Rafaeli & Gleason, 2009), resulting from the recipient's feeling obligated to the partner (Dunbar, Ford, & Hunt, 1998), being reminded of the stress factor (Lazarus, 1991) or by impairing his/her sense of efficacy and autonomy (Bolger et al., 2000). These findings reinforce the importance of spousal support that is adequately adapted for the needs of the recipient. Indeed, inadequate spousal support was related to higher levels of posttraumatic symptoms and depressed mood. These findings are consistent with previous studies that show that couples' support leads to better outcomes when it is reactive (Maisel & Gable, 2009) and adapted to the partner's current and expected needs (Beach & Gupta, 2006; Ibarra-Rovillard & Kuiper, 2011; Rafaeli & Gleason, 2009). Overall, and in consideration of the limited sample size, similar patterns of

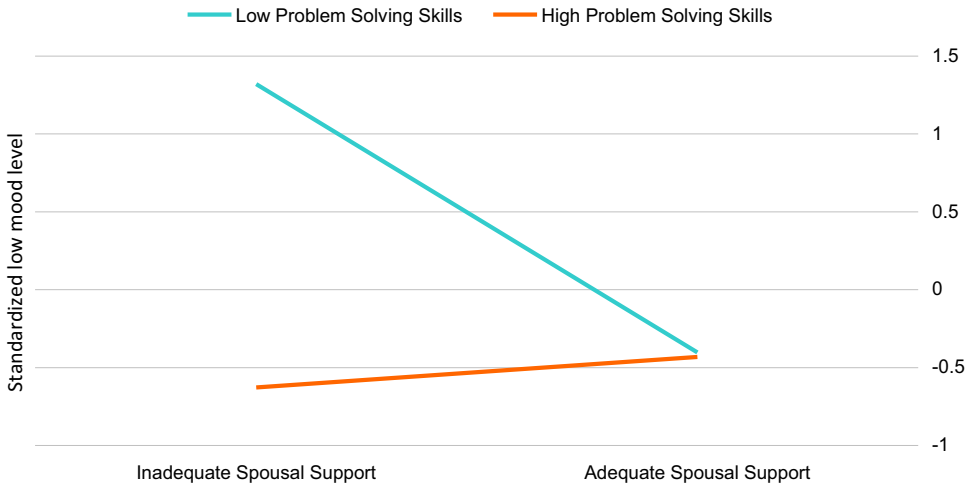

Fig. 1 Overall mood as a function of problem-solving skills and adequacy of spousal support

association between spousal support and parental adjustment emerged for both fathers and mothers.

In the current study, poorer problem-solving skills were related to higher levels of negative mood and posttraumatic symptoms for both fathers and mothers. The association of problem-solving skills and posttraumatic symptoms was found to be especially strong for fathers. According to role-limiting theory, different parental roles expose men and women to different sources and levels of demands and pressures that lead women to employ emotional coping strategies and seek social support, while men tend toward problem-solving strategies (Day & Livingstone, 2003; Levy-Shiff, 1999; Tamres et al., 2002). From the current findings, it appears that successful use of problem-solving strategies may be particularly important for fathers in mitigating posttraumatic symptoms. Parents of preterm infants have been found to experience higher levels of distress when assessing the birth and hospitalization as uncontrollable stressors and when employing avoidance mechanisms (Jones et al., 2009; Reichman et al., 2000). Consistent with these findings, previous studies have found an association between problem-solving skills and distress among spouses (Ko et al., 2005), parents of chronically ill children, and parents of preterm infants (Gennaro, 1988).

The current findings highlight the additive and interacting effects of internal and external resources in the face of a stressful life event. Parents with poorer problem-solving skills and inadequate spousal support were those who reported significantly greater distress in terms of posttraumatic symptoms and negative mood than parents with better problem-solving skills and adequate spousal support. Still, individuals with stronger internal resources in the form of better problem-solving skills report better overall mood independent of the adequacy of spousal support they receive. However, for individuals with poor problem-solving skills, the adequacy of the spousal support they receive is a significant determining factor in their overall mood. It is possible that individuals with better problem-solving skills are less vulnerable to the effects of inadequate spousal support because, as mentioned above, these individuals may be more adept at accessing support elsewhere. This suggests that strong internal resources, as "constants," promote resilience in the presence or absence of external resources. However, when these internal resources are not well developed, adequate external resources are crucial for mitigating distress.

Limitations and Implications for Further Research

In interpreting the current findings, several limitations must be considered. First, the study was conducted at a single site and included a sample primarily characterized by average to high levels of income and education. Previous studies have shown that sociodemographic characteristics including education, socioeconomic status, and belonging to an ethnic minority have bearing on the risk of preterm birth and parental coping and adjustment (Adler et al., 1994; Li, Sundquist, Kane, Jin, & Sundquist, 2010). Therefore, future studies with more diverse populations are recommended in order to confirm the generalizability of these findings. Future studies employing larger samples will allow more complex analyses of the impact of internal and external resources of parental coping as a function of moderating variables such as sociodemographic and medical variables (e.g., ethnicity, education, pregnancy characteristics, birth weight and medical condition of the infant). In addition, future studies employing a wider range of medical, psychological, and demographic variables might employ statistical models (e.g., path analysis) that can map the direct, indirect, and moderating influences of the variables on adjustment outcomes. It would also be important to examine these relationships among men and women separately since gender differences may be context specific (Hyde, 2013). According to role-limiting theory, for example, parental roles expose men and women to different levels and kinds of demands and pressures that lead women to evaluate the stressor as more negative and to employ emotional coping strategies and seek social support, while men employ more instrumental and problem-solving strategies (Brougham, Zail, Mendoza, & Miller, 2009; Day & Livingstone, 2003; Levy-Shiff, 1999; Tamres, Janicki, & Helgeson, 2002).

Also related to sample selection is the fact that the infants of parents in the current study were all in stable medical condition. These findings cannot be automatically generalized to parents of infants in more precarious medical conditions. In this context, it is important to note, however, that neonates in the current study, which includes those born between 34 and 37 weeks (late prematurity) are also at higher risk for developmental delays and increased morbidity and mortality, compared with full-term infants (Engle, Tomashek & Wallman, 2007). On a related point, parents in the current sample, all consenting volunteers, cannot necessarily be assumed to represent those who declined participation in terms of their psychological resources, their distress, or the associations between them.

Certain measurement issues should be taken into account when interpreting the current findings. The BDI-II was employed here as a measure of clinical depression and was not found to be significantly related to internal or external psychological resources. Clinical depression may not be a common outcome among parents of premature infants, while depressed mood may be more prevalent and provide a more appropriate outcome variable (Carter, Mulder, & Darlow, 2007). Indeed, depressed mood, as measured by the POMS here, was found to be significantly related to both problem-solving skills and adequacy of spousal support. Another

measurement issue is the current study's reliance on self-report measures. Studies have shown that self-reported questionnaires yield a gap between men and women's reports of the level of support received, whereas this gap does not emerge when employing observational measures (Brannon, 2016; Verhofstadt, Buysse, & Ickes, 2007). Future studies utilized additional sources of data (e.g., multiple informants) would reinforce the validity of the current findings.

Finally, as a correlational cross-sectional study, the current findings cannot lead to causal conclusions. While the premise here relied on studies highlighting the influence of psychological resources on parental adjustment, it is plausible that psychological distress may impact an individual's ability to effectively utilize available resources (Christiansen, Elklit, & Olff, 2013). Multiple measurement methods and experimental designs aimed at modifying target variables (i.e., internal and external resources and their utilization) would serve to elucidate the directional relationships among these variables.

Conclusions and Clinical Implications

Given the importance of early experiences to parent and infant emotional health, bonding, and development, it is important to identify and intervene with parents of preterm infants who may be at greater risk for emotional distress. The psychological resources posited here to impact parental adjustment were chosen because of their theoretical relevance, but also because of their accessibility to assessment and intervention. The adequacy of spousal support among parents of preterm infants can be assessed using measures such as those employed here but is also often quite evident to NICU staff observing parent behavior and interaction. Discussion of parents' mutual expectations and needs can promote more adequate spousal support. Problem-solving skills training can provide a useful focus of intervention, and has been proven effective in a variety of circumstances and settings (Malouff et al., 2007). For example, studies have demonstrated the efficacy and specificity of problem-solving skills training for parents of children diagnosed with life-threatening illness (e.g., Sahler et al., 2005, 2013). While the current findings demonstrate both the independent and additive contributions of internal and external resources to parental adjustment, the interaction found between these resources highlights the importance of promoting internal parental resources, in this case problem-solving skills, which were associated with improved outcomes independent of spousal support. The finding indicates that this may be especially important for father's adjustment. Parents of infants in neonatal units are often available and open to guidance and intervention, and the acute neonatal period may have implications for a broad range of later outcomes (e.g., attachment, bonding) well beyond the acute stage. Integrating routine assessment of parental resources and adjustment and providing informed and evidence-based intervention as needed may be helpful for mitigating the stress inherent in preterm birth and for promoting optimal outcomes.

Compliance with Ethical Standards

Conflict of interest Tal Shani-Sherman, Michael J. Dolgin, Leah Leibovitch, and Ram Mazkereth declare that they have no conflict of interests.

Ethical Approval All procedures involving human participants were performed in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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