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HEALTH PSYCHOLOGY | RESEARCH ARTICLE

The impact of social constraints and sense of coherence on the psychological adjustment of adolescents and young adults with CF

Kaya L. Beinke¹, Frances V. O'Callaghan^{1*} and Shirley Morrissey¹

Abstract: In the last two decades, the medical understanding of Cystic Fibrosis (CF) has dramatically improved, however, there are still significant gaps in our understanding of the psychological adjustment of families coping with CF. We examined the utility of the Social Cognitive Processing (SCP) Model in understanding the interactions of parents and young people with CF. We also examined the relationship between social constraints, a key construct in the SCP model, sense of coherence (SOC) and other psychological adjustment indicators for young people with CF. Participants comprised 49 individuals with CF, aged 16–25, recruited through state-based CF organisations in Australia. The results indicated that participant ratings of difficulties with communication (social constraints) were positively associated with ratings of depression, anxiety, and stress and negatively related to ratings of positive affect and seeing life challenges as predictable, manageable and meaningful (SOC). Ratings of SOC were also positively related to ratings of positive affect and negatively related to ratings of depression, anxiety and stress. A significant mediating effect of SOC was also identified in the relationships between social constraints and positive affect and social constraints and stress. The theoretical and clinical implications of these findings are discussed.

Subjects: Behavioural Medicine; Chronic Diseases; Psychological Science

Keywords: adolescents; communication; cystic fibrosis; psychological adjustment; sense of coherence; social cognitive processing model; young adults

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PUBLIC INTEREST STATEMENT

The study examined how communication between parents and adolescents and young adults with Cystic Fibrosis (CF) impacts the psychological adjustment of young people with CF. We found that symptoms of depression, anxiety and stress in young people with CF were related to difficulties in discussing their feelings about CF with their parents. It was also found that difficulties in communication with parents were related to young people seeing life challenges as being difficult to predict and manage. These findings can be used by researchers and practitioners to assist in developing support programmes to help improve communication between parents and children in families with children with CF.

1. Introduction

Cystic fibrosis (CF) is a congenital illness that causes individuals to experience breathing difficulty, recurrent chest infections, unusually salty sweat and poor processing of lipids (World Health Organisation, 1996). In Australia, one in every 2,500 newborns is affected by CF (Cystic Fibrosis Association of Queensland [CFQ], 2001). Over the last 30 years, there have been significant improvements in the medical treatments available for CF. While a child with CF born in the 1980s would have only been expected to live into their teens, a baby born with CF today is expected to live to 40 years or beyond (Cystic Fibrosis Foundation, 2010). While our medical understanding of CF has significantly improved, there are significant gaps in our psychological understanding of teenagers and adults with CF. Health professionals working with the CF population need to understand the unique needs of these older patient groups in order to be able to provide the best possible support (Crosier & Wise, 2001).

Social support is a factor that has consistently been found to have a positive impact on the psychological well-being of individuals with chronic illness (De Riddler & Schreurs, 1996). Likewise, other investigations of the social experiences of individuals with chronic illness have also indicated that difficulties with communication and support received from close family members and friends can have a significant negative impact on their psychological well-being (Lepore & Helgeson, 1998; Lepore & Revenson, 2007). Given that individuals with CF often report hesitation in disclosing details of their illness to friends and acquaintances, it is common that individuals with CF turn to their parents for support regarding CF-related concerns (Graetz, Shute, & Sawyer, 2000). Furthermore, adolescents and young adults with CF often obtain independence from the family unit later than individuals without chronic illness which extends the usual time in which parents play a central support role for their children (Hamlett, Murphy, Hayes, & Doershuk, 1996; McGuffie et al., 2008). What is noted, however, is that parents are usually more adept at providing support regarding practical and medical aspects of CF rather than support for emotional difficulties related to CF (Graetz et al., 2000). Therefore, understanding the processes that lead to these difficulties in parent-child communication in families coping with CF is important for this group. Furthermore, De Riddler and Schreurs also emphasise that when investigating relationships between social support and psychological outcome measures it is now important to understand *how* social support impacts the well-being of individuals with chronic illness; that is, identifying and understanding the role of possible mediating factors in this relationship.

The Social Cognitive Processing (SCP) Model (Lepore, 2001) and the construct of sense of coherence (SOC; Antonovsky, 1979) appear to provide us with a framework to further understand communication between young adults with CF and their parents and psychological outcomes for these young adults. Essentially, the SCP model suggests that difficulties in communication between a patient and a support person impede opportunities for the patient to discuss and process illness-related concerns which, in turn, increases the likelihood of psychological distress for the patient (Lepore, 2001). Lepore (2003) uses the term “social constraints” to describe challenges in patient-support person communication and defines social constraints as conditions where patients feel “unsupported, misunderstood, or otherwise alienated from their social network when they are seeking social support or attempting to discuss trauma-related thoughts, feelings, or concerns” (p. 1). The SOC construct explains how individuals perceive and process challenging events and the resources they have available to cope with these challenging events. Those with a strong SOC are considered to view life as manageable, meaningful and comprehensible (Antonovsky, 1979).

SOC has recently been identified to account for significant variance in psychological adjustment after accounting for the impact of social support and other psychosocial variables within both chronic illness (Vogel et al., 2012) and community samples (Tsuno & Yamazaki, 2012). Putting the research on SOC and the SCP model together, we propose that SOC may play a mediating role between social constraints and psychological outcomes for young adults with CF. It would appear that having a less supportive social environment may reduce an individual's opportunity to process thoughts pertaining to distressing CF-related events, thereby weakening their SOC and increasing their psychological distress.

1.1. The SCP model

As introduced above, the SCP model examines how negative social interactions inhibit cognitive processing of trauma-related events (Lepore, 2001). This model is based on the premise that talking about a trauma brings related memories into consciousness, making them available for cognitive processing (Lepore, Ragan, & Jones, 2000). The SCP model suggests that when individuals function in a constrained social environment, they will feel less comfortable about discussing their concerns. This then impedes cognitive processing and psychological resolution of the trauma. Contrary to this process, an unconstrained environment is proposed to enhance disclosure, thus facilitating processing of the trauma and aiding in psychological recovery (Lepore & Kernan, 2009; Lepore, Silver, Wortman, & Wayment, 1996).

Given that the diagnosis of a chronic illness or a significant event compromising one's health can elicit a traumatic response in individuals; this is a useful model to examine how social interactions impact the psychological functioning of individuals with chronic illness (Cordova, Studts, Hann, Jacobsen, & Andrykowski, 2000). Research has shown that social constraints between patients and partners negatively impact the psychological adjustment of individuals with breast cancer (Cordova, Cunningham, Carlson, & Andrykowski, 2001) and prostate cancer (Lepore & Helgeson, 1998) and are related to lower adherence to self-care for individuals with diabetes (Braitman et al., 2008).

Research examining individual and family based adjustment for individuals with CF has highlighted that support received from the social environment can have a significant impact on their psychological adjustment (e.g. Cappelli, McGrath, MacDonald, Katsanis, & Lascelles, 1989; Graetz et al., 2000; Peek, 2001; Wong & Heriot, 2008). Thus, the SCP model appears fitting to apply to this patient group and has the potential to make a unique contribution to the literature on both CF and the SCP model. Given the key role of parents in treatment activities across childhood and beyond, it may be that parents are unlikely to disengage from CF-related discussions. However, the discussion of CF-related treatment protocols and the discussion of CF-related emotional concerns are two quite distinct areas of communication. Accordingly, research has suggested that parents may be more skilled in providing support for the first domain rather than the latter (Graetz et al., 2000). Specifically, parents who themselves are struggling with their own concerns about the life-threatening nature of CF or more personal emotional concerns may be less equipped to provide emotional support for their teenagers and young adult offspring than those who are coping well.

1.2. Sense of coherence

The construct of SOC derives from Antonovsky's (1979) salutogenic model of health and illness. This model conceptualises health and disease as being two extremes of a continuum. Antonovsky (1979; 1987) suggested that an individual's current state of well-being is a function of the stressors they have encountered and the coping resources they have available to challenge the stressor. SOC is conceptualised as a stable disposition comprising three constituent factors: (1) Comprehensibility—A cognitive factor incorporating the degree to which an individual believes future life experiences will be predictable, ordered, and unambiguous; (2) Manageability—A behavioural factor examining how confident one is that they have adequate resources available to them either internally or in their immediate environment to cope with stressful situations; and (3) Meaningfulness—A motivational factor that examines the extent to which demanding events are perceived as challenges worth confronting (Geyer, 1997; Lindstrom & Eriksson, 2005).

Antonovsky (1979; 1987) proposed that SOC begins to develop during childhood and later stabilises in early adulthood. It is theorised to be a product of one's biological and psychological traits, as well as cultural tenets and social experiences (Lindstrom & Eriksson, 2005). Recent research has highlighted the importance of a supportive social environment in developing and maintaining a strong SOC (Nilsson, Holmgren, & Westman, 2000; Skarsater, Langius, Agren, Haggstrom, & Dencker, 2005). Baker examined the impact of SOC on self-care behaviour of adolescents with CF and identified that having a strong SOC predicted enhanced self-care (Baker, 1998; Baker & Denyes, 2008). Unfortunately, no further studies can be identified which have examined the role of SOC for individuals with CF.

In a number of cross-sectional studies SOC has been shown to have a strong inverse relationship with both depressive and anxious symptomatology and a strong positive relationship with positive affect (e.g. Black & White, 2005; Oztekin & Tezer, 2009). Consistent with Antonovsky's (1979) propositions, having a strong SOC is also a protective factor following trauma experiences (Engelhard, van den Hout, & Vlaeyen, 2003). Given the progressive nature of CF, adolescents and adults with this illness will likely encounter challenging health events across their lifetime. SOC therefore is an important construct to examine for this population given its role as a protective factor, its strong associations with measures of psychological adjustment and its role in predicting self-care behaviours for individuals with CF.

1.3. The proposed model

While there are strong individual arguments for the application of the SCP model and SOC to understanding the psychosocial experiences of young adults with CF, a key aim of this study was to examine the relationship between the SCP model and SOC, and their role in predicting psychological outcomes of young adults with CF. Patient ratings of SOC were hypothesised to mediate the relationship between social constraints with parents and patient outcomes. While SOC was initially proposed by Antonovsky (1979) to be a stable trait in individuals, recent research has identified that an individual's SOC can change over time. Specifically, a longitudinal study conducted by Nilsson et al. (2000) with a community sample identified that a perceived loss of social support is one of the factors that can lead to a decrease of SOC in both men and women over time. Thus, it is reasonable to suggest that an increase in social constraints over time may also negatively impact an individual's SOC.

Two studies can also be identified which have used hierarchical regression models to identify the individual impacts of social support and SOC on individuals' psychological adjustment. Similar to Nilsson et al. (2000), Tsuno and Yamazaki (2012) examined the impact of perceived social support on SOC with a community sample. This study identified that SOC accounted for significant variance in mental health ratings after accounting for social support, optimism, humour and socio-demographic variables. Vogel et al. (2012) examined the role of perceived social support and SOC in the health-related quality of life (HR-QOL) of primary care patients with a range of presenting concerns. While social support was significantly correlated with HR-QOL, it did not hold a significant individual relationship with HR-QOL when SOC and number of chronic conditions were also entered into the model, whereas the latter factors made strong individual contributions. These studies give strong support for the proposal of SOC as a factor that mediates the relationship between social constraints and psychological adjustment for young adults with CF.

1.4. Aims and hypotheses

The study presented here makes a number of unique contributions to the literature examining the psychological adjustment of teenagers and adults with CF. It is the first quantitative study to our knowledge to apply the SCP model to the CF population and to understanding interactions of a parent-child dyad. It is also the first study to examine the relationship between SOC and other psychological adjustment measures within the CF population. Finally, it is also the first study to test the role of SOC in mediating the relationship between social constraints and psychological outcomes.

Individuals aged 16–25 were recruited for the study as this is the time when parents and medical professionals transfer the majority of responsibility for self-care to CF patients and thus a particularly important time to examine communication and adjustment (Hamlett et al., 1996; Williams, Mukhopadhyay, Dowell, & Coyle, 2007). We predicted that: (a) ratings of SOC would be negatively associated with ratings of psychological distress and positively associated with ratings of psychological well-being; (b) ratings of SOC would be negatively associated with ratings of social constraints with parents; (c) ratings of social constraints with parents would be positively associated with ratings of psychological distress and negatively associated with patient reports of psychological well-being; and (d) ratings of SOC would mediate the relationship between social constraints and psychological adjustment measures. Practical implications for helping to support individuals and families coping with CF are discussed.

2. Method

2.1. Participants

2.1.1. Recruitment

Participants were recruited through three state-based CF support organisations across Australia. Administrative staff from the participating organisations mailed information about the study and consent forms to all households on their member registers with an adolescent or young adult with CF aged between 16 and 25 years. For young persons aged 16 and 17 years, parental consent was also required for participation. Individuals with severe psychiatric difficulties, intellectual impairment and severe CF-related complications and adjunct illnesses were excluded from participation. Individuals who were interested in participating in the study returned their consent form directly to the primary researcher. All ethical aspects of this study were approved by the authors' University's Human Research Ethics Committee.

2.1.2. Demographics

A total of 49 individuals participated in the study: 19 males and 30 females ($M = 19.41$ years; $SD = 2.84$ years). The majority of participants (95%) identified themselves as having a Caucasian racial background and 75% were single. About 70% of the participants were studying, 15% were working, 8% were not working or studying for health reasons and 6% were not working or studying for other reasons. Indications of illness severity were measured using two sub-scales from the Cystic Fibrosis Questionnaire-Revised—Teen/Adult Version (CFQ-R; Quittner, Modi, Watrous, & Davis, 2000) and patients' predicted $FEV_1\%$ at their last clinic appointment. The patients' distribution of severity of impairment in lung functioning was comparative to that reported in the Australian Adult CF Registry data (Cystic Fibrosis Australia, 2010) with approximately 72% having mild or moderate impairment. The CF-related burden and functioning reported by the current sample was almost identical to a larger adult sample from the United States (Quittner et al., 2010). This suggests that from a medical perspective, our small sample of young adults with CF is representative of the wider young adult CF population.

2.2. Measures

2.2.1. Social constraints

Difficulties in parent-patient communication were measured using the Social Constraints Scale (SCS; Lepore & Ituarte, 1999). This is a 15-item scale measuring the extent to which a patient perceives difficulty in expressing thoughts and feelings about their illness to a significant other. In the current study, participants reported perceived constraints from their nominated parent only. Responses were measured on a four-point Likert-type scale (1- *never* to 4- *often*), and participants were asked to rate how often in the past month their parent had engaged in or omitted certain social behaviours (e.g. "How often did your parent seem to be hiding their feelings?" and "How often did your parent tell you to not worry so much about your health?"). The 15 items were summed to give a total scale score. Possible scores ranged from 15 to 60. Excellent internal consistency was obtained for this measure in our study (Cronbach's $\alpha = .91$).

2.2.2. Sense of coherence

Participants' belief in the predictability of the world and their ability to face health-related crises was examined using the 13-item Sense of Coherence Questionnaire (SOC-13; Antonovsky, 1987). This measure includes three underlying domains that examine individuals' perceptions of comprehensibility (five items), manageability (four items) and meaningfulness (four items) of their life at the current time. All items are measured on a seven-point Likert-type scale; however, each of the items has a different anchor description which corresponds with the item's content. Examples include: "When you face a difficult problem the choice of solution is:" (1- *always confusing and hard to find* to 7- *always completely clear*), "Do you have the feeling that you're being treated unfairly?" (1- *very often* to 7- *very seldom or never*) and "Until now your life has had:" (1- *no clear goals or purpose at all* to 7- *very clear goals are purpose*), respectively. Although there are three underlying domains in the

SOC-13, Antonovsky suggests that only the total score should be interpreted. Hence, the total score for this scale was generated by summing responses to each item. Possible scores ranged between 13 and 91, with higher scores indicating a stronger SOC. Internal consistency was excellent for this measure (Cronbach's $\alpha = .87$).

2.2.3. Psychological adjustment

The brief version of the Depression Anxiety and Stress Scale (DASS-21; Lovibond & Lovibond, 1995) was used to measure the psychological adjustment of participants. The DASS-21 consists of three subscales, each with seven items, assessing depression, anxiety and stress levels. The *depression* subscale identifies individuals experiencing depressive symptoms such as disengagement, pessimism and gloominess (e.g. "I felt that I had nothing to look forward to"). The anxiety and stress scales assess different features of anxious affect. The *anxiety* subscale examines autonomic arousal, and acute anxiety related experiences (e.g. "I was worried about situations in which I might panic and make a fool of myself"); whereas the *stress* subscale examines features of chronic, non-specific anxious affect (e.g. "I found it difficult to relax"). Participants responded to questions in relation to their experiences in the past week on a four-point Likert-type scale (0- *did not apply to me at all* to 3- *applied to me very much, or most of the time*). Items within each subscale of the DASS-21 were summed to give a preliminary total score and then doubled to allow interpretation of scores using criteria set for the DASS-42. Thus, possible total scores ranged from 0 to 42, with higher scores indicating greater psychological maladjustment. Excellent internal consistency was obtained for all subscales (depression subscale $\alpha = .90$; anxiety subscale $\alpha = .79$; stress subscale $\alpha = .85$).

Adaptive adjustment of the participants was also examined using the positive affect scale of the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). The *positive* affect subscale of the PANAS included 10 items (e.g. interest, excitement and enthusiasm) and participants were required to indicate the extent they have experienced each emotional state in the past week on a five-point Likert-type scale (1- *very slightly/not at all* to 5- *extremely*). Items were summed to give a total score. Thus, possible scores for this scale ranged between 5 and 50, with higher scores indicating the experience of a high level of positive affect. Internal consistency was excellent for this measure ($\alpha = .92$).

2.3. Procedure

As noted previously, participants were first contacted through their respective state CF organisations, each being sent an information and consent package, as well as a reply paid envelope addressed to the primary researcher to return their completed consent form. Upon receipt of completed consent forms, participants were sent the questionnaire package, a prize draw entry form and a reply paid envelope to return these materials. Three months after the questionnaires were distributed, the study was closed and the prizes were drawn.

3. Results

Table 1 presents the descriptive statistics obtained for all key predictor and outcome variables. The results obtained from the DASS data suggested that the majority of participants presented with symptoms of depression, anxiety and stress in the normal range. The percentage of participants

Table 1. Descriptive statistics for social constraints, SOC and psychological adjustment measures ($n = 49$)

Scale	Mean	SD	SE	Range
Social constraints	21.83	7.52	1.07	15-54
Sense of coherence	59.41	11.59	1.66	22-82
DASS-Depression	7.32	8.14	1.18	0-34
DASS-Anxiety	5.29	6.41	0.93	0-32
DASS-Stress	8.92	8.22	1.19	0-30
PANAS-Positive affect	32.62	8.12	1.18	15-50

reporting symptoms in the moderate to severe range for depression, anxiety (internal/bodily anxiety symptoms) and stress (external/worry type anxiety symptoms) were 15, 20 and 12% respectively. While the majority of participants presented with scores in the normal range for the DASS, the distribution of scores was acceptable and data transformations were not required for inclusion of this data in further analyses. The distributions of the social constraints, PANAS and SOC data were also acceptable. Hypotheses 1–3 were tested using Pearson’s *r* correlational analyses and hypothesis 4 was tested using bootstrapping procedures from the Hayes (2013) PROCESS macro. The level of statistical significance was set at $p = .05$.

Our first hypothesis predicted that ratings of SOC would be negatively associated with ratings of psychological distress and positively related with ratings of psychological well-being. Participants’ ratings of SOC had a significant positive relationship with positive affect and significant negative relationships with psychological distress measures. As participant ratings of SOC increased, their reports of symptoms of depression, anxiety and stress decreased. The effect sizes indicated that the relationships obtained were in the moderate to strong range and are reported in Table 2. In hypothesis 2, we predicted that ratings of SOC would be negatively associated with ratings of social constraints with parents. As shown in Table 2, there was a strong negative relationship identified between these two variables. As participants’ ratings of SOC increased, their ratings of social constraints with parents decreased.

The third hypothesis predicted that ratings of social constraints with parents would be positively associated with ratings of psychological distress and negatively associated with participant reports of psychological well-being. The results revealed moderate to strong relationships between social constraints and psychological distress indicators. As participants’ perceptions of social constraints with parents increased, their reports of depression, anxiety and stress symptoms also increased. Social constraints were also found to be negatively related to psychological well-being; a moderate size relationship was identified. These results indicate that when participants’ perceptions of social constraints with parents increased, their reported experience of positive affect decreased. These relationships are demonstrated in Table 2.

The final hypothesis tested the role of SOC as a mediator between social constraints and the four psychological adjustment measures. This indirect effect was tested for significance using the bootstrapping procedures outlined by Hayes (2013). Bootstrapping uses random sampling with replacement to increase accuracy in sampling estimates. The PROCESS macro, model 4, was used to test our model. This analysis used 5,000 bootstrap samples created from our original sample to estimate bias-corrected standard errors and 95% confidence intervals for the indirect effect of social constraints on psychological adjustment measures via SOC. Four separate analyses were run to test our model for the four psychological adjustment measures of depression, anxiety, stress and positive affect. As described by Hayes, indirect effects are considered significant at $p < .05$ if zero is not included in the 95% confidence interval.

Table 2. Pearson’s *r* correlations between participants’ perceptions of social constraints with their parents and SOC and psychological adjustment measures ($n = 49$)

	1	2	3	4	5	6
1. Social constraints	1.00	-.59***	.45**	.58***	.60***	-.37**
2. Sense of coherence		1.00	-.65***	-.62***	-.66***	.49***
3. DASS–Depression			1.00	.60***	.72***	-.64**
4. DASS–Anxiety				1.00	.75***	-.36**
5. DASS–Stress					1.00	-.32*
6. PANAS–Positive affect						1.00

*Level of significance at $p < .05$.

**Level of significance at $p < .01$.

***Level of significance at $p < .001$.

Results of the bias-corrected bootstrapped analyses identified that SOC significantly mediated the relationship between social constraints and two of the four psychological outcome measures. The first analysis identified that SOC significantly mediated the relationship between social constraints and positive affect. The bias corrected confidence intervals ranged from $-.55$ to $-.05$. As shown in Table 3, when the direct effect of social constraints on positive affect was considered it accounted for significant variance in this model. However, when social constraints and SOC were entered together into the model predicting positive affect, it was only SOC that independently accounted for significant variance in positive affect.

SOC was also found to significantly mediate the relationship between social constraints and stress. The bias corrected confidence intervals ranged from $.09$ to $.33$. The results of this analysis followed the same pattern of the first mediation model. While both social constraints accounted for significant variance in stress when their direct effects on this variable were considered; only SOC accounted for significant independent variance when SOC and social constraints were considered together as predictors of stress. The coefficients for these models are shown in Table 3.

The third analysis identified that SOC did not significantly mediate the relationship between social constraints and depression. The bias corrected confidence intervals ranged from -1.57 to $.34$ for this analysis. As shown in Table 3, neither social constraints nor SOC accounted for significant independent variance in depression in the indirect model. The final analysis also revealed a non-significant effect of SOC as a mediator in the relationship between social constraints and anxiety. In this analysis the bias corrected confidence intervals ranged from $-.16$ to $.11$. Again, neither social constraints nor SOC accounted for significant variance in anxiety in the indirect model.

4. Discussion

4.1. Contributions of the current research

We predicted that participants' ratings of SOC would be negatively associated with their reports of distress and positively related with reports of positive affect. This hypothesis was fully supported. To our knowledge, this study is the first since Baker and Denyes (2008) to apply the SOC construct to the

Table 3. Regression coefficients examining the role of SOC as a mediator in the relationship between social constraints and psychological outcome measures ($n = 49$)

Effect	Predictor	sr^2	p	R^2	p
DV: Positive affect					
Direct effect	Social constraints	–	–	0.13	.009
Indirect effect	Social constraints	0.01	0.435	–	–
	Sense of coherence	0.11	0.012	0.25 ^a	.001
DV: Stress					
Direct effect	Social constraints	–	–	0.21	.001
Indirect effect	Social constraints	0.01	0.441	–	–
	Sense of coherence	0.22	<.0001	0.43 ^a	<.0001
DV: Depression					
Direct effect	Social constraints	–	–	0.14	.008
Indirect effect	Social constraints	0.03	0.200	–	–
	Sense of coherence	0.04	0.117	0.18 ^a	.009
DV: Anxiety					
Direct effect	Social constraints	–	–	0.02	.392
Indirect effect	Social constraints	0.02	0.392	–	–
	Sense of coherence	<0.01	0.796	0.02 ^a	.673

^aTotal variance accounted for by social constraints and sense of coherence in DV.

examination of patient outcomes in CF. While Baker demonstrated that SOC was related to self-care behaviour in adolescents with CF, our results have demonstrated relationships between SOC and other adjustment indicators for adolescents and young adults with CF. These results are consistent with other studies which have demonstrated a strong relationship between SOC and depressive and anxious symptoms and positive affect across a range of both illness- and trauma-affected populations, as well as general populations (Black & White, 2005; Oztekin & Tezer, 2009). Also consistent with Antonovsky (1987), these results support the notion that SOC is a resilience or risk factor (depending on the strength of SOC) in individuals' adaption to life events.

The current study also demonstrated a new relationship between SOC and an interpersonal process variable. A significant inverse relationship was identified between CF patients' perceptions of social constraints with their parents and their reported SOC, supporting hypothesis 2. This finding was consistent with predictions based upon studies which demonstrated that an emotionally supportive environment can assist in developing and restoring an individual's SOC in the context of trauma or illness (Nilsson et al., 2000; Skarsater et al., 2005). Therefore, the findings suggest that, in addition to SOC being related to interpersonal support, it is also related to indicators of problematic interpersonal relationships. As discussed earlier, this suggests that having a less supportive social environment may reduce the individual's opportunity to process thoughts relating to distressing events that may be retained and lead to a weakening of SOC.

Hypothesis 3 predicted that patients' perceptions of social constraints with their parents would be positively related to patient reports of psychological distress and negatively related to patient reports of well-being. This hypothesis was fully supported and to our knowledge is the first set of quantitative data to demonstrate the utility of the SCP model for the CF patient population. The significant relationships obtained between social constraints and psychological distress indicators are consistent with a number of other studies conducted utilising the SCP model and again support the notion that problems in communication and the provision of support in close partnerships, if unresolved, can lead to patient distress (e.g. Cordova et al., 2001; Lepore et al., 1996; Lepore & Helgeson, 1998).

Another new finding identified in the current study is the significant negative relationship identified between social constraints and patient well-being. It was theoretically plausible that if social constraints increased patients' distress, then social constraints should also be associated with decreases in patient well-being. Yet Lepore and Kernan (2009), who discussed these other applications of the SCP model, identified that no previous studies had tested this prediction. Thus, the findings of the current study support Lepore and Kernan's suggestions and also provide a basis for future applications of the SCP model with other indicators of patient adjustment beyond those of patient distress indices.

The current research also tested the mediating effect of SOC on the relationship between social constraints and measures of psychological adjustment. The results obtained in our study only partially supported hypothesis 4. While SOC significantly mediated the relationships between social constraints and positive affect and social constraints and stress ratings (external/worry type anxiety symptoms), SOC was not found to mediate the relationships between social constraints and depressive symptoms or social constraints and anxiety (internal/bodily type anxiety symptoms). The significant mediating effects for positive affect and stress partially support the hypothesised relationships between the SCP model and SOC, while the models for anxiety and depression that did not result in a significant mediating effect of SOC were contrary to predictions.

There was also a noticeable difference between these two non-significant effects. Significant variance in depression was accounted for by social constraints and SOC when entered together in the model, yet social constraints and SOC did not account for significant variance in anxiety when entered together in the model. While these results were surprising to us, a study by Tselebis et al. (2013) also found differences between predictors of anxiety and depression in a large sample of

adults with Chronic Obstructive Pulmonary Disease. These researchers identified that SOC plays a significant role in the development of depression (but not anxiety), whereas family support played a significant role in the development of anxiety.

Konttinen, Haukkala, and Uutela (2008) have suggested that measures of SOC and depression can have significant overlap which may limit the interpretation of relationships between these variables. Thus, it is possible that this may have been a factor that contributed to the non-significant findings identified in this study. Another possibility is that a number of factors in addition to SOC may be important in the development of depression. From a cognitive perspective, it is considered that depression stems from a negative view of self, others, and the world (Young, Rygh, Weinberger, & Beck, 2008), which is consistent with an expected contribution of SOC and social constraints in accounting for variance in depression. However, in more severe cases of depression it is usually considered that there may be some biological contributions to the presentation (Craske & Barlow, 2008).

Regarding the non-significant effect of SOC mediating the relationship between social constraints and anxiety, it may be that factors outside of social interactions and SOC may contribute to this. The measure of anxiety included in this study focused on internal bodily symptoms of anxiety. Barlow (2004) argues that biological sensitivity in relation to some individuals' experience of anxiety may lead individuals to believe that there is something physically wrong with them as opposed to seeing these symptoms as symptoms of anxiety. Furthermore, other studies have identified that misinterpretation of bodily symptoms is a key factor in panic disorder (Clark et al., 1997). It is possible therefore that our measure of anxiety which focused on bodily symptoms of anxiety is less impacted by difficulties in social relationships and perceptions of the manageability, meaningfulness and comprehensibility in the world than positive affect and stress (worry) ratings.

4.2. Limitations of the current research and future research directions

While the current study has substantially contributed to the understanding of the experiences of individuals and families coping with CF, some limitations are noted. The CF patient sample was a relatively small and well-adjusted group. These factors and the cross-sectional nature of the study limited the analyses available to investigate the data. Further studies would benefit from a longitudinal approach and larger sample size. A larger sample size would allow us to examine whether any differences are evident in the observed effects between the adolescent and emerging adult age groups included in our sample of 16–25 year olds. Regarding the impact of a well-functioning sample being recruited in the current study, it is possible that some of the results obtained may not be representative of individuals who are encountering higher levels of psychological distress. Two alternatives are possible. It is possible that even stronger relationships between social constraints and outcomes measures may be identified with a sample of individuals experiencing clinical levels of depression or generalised anxiety or panic. However, as suggested from the interpretation of the non-significant effect of SOC as a mediator between social constraints and depression, there may also be other factors that contribute to these more severe presentations. This is a domain which would benefit from further investigation for the CF population.

It was also noted that neither social constraints nor SOC accounted for significant variance in symptoms of biological symptoms of anxiety. As discussed earlier, given the specific factors related to development of this condition, upon reflection, this may not be the best measure of psychological adjustment to include in research that aims to understand the SCP model with the young adult CF population. Two other considerations for future research can be suggested in relation to our measures. As the order of items was not varied within our questionnaires, it is possible that order effects may have impacted our results. Counterbalancing of the questionnaires is suggested in future studies in this domain. It may also be beneficial to obtain psychometric data from other family members regarding their perceptions of communication and patient adjustment to reduce the possible effect of common method variance and further clarify the role of all factors considered in our model.

Regarding future directions for the research, recent applications of the SCP model have also identified that social constraints reported by adults with diabetes are related to both patient distress and self-care behaviour (Braitman et al., 2008). Thus, future research with this model with the adolescent and young adult CF population may also assist in identifying factors for intervention to improve both patients' psychological health and self-care behaviour. Given the detrimental impact of treatment non-adherence on personal health and family functioning within families coping with CF (e.g. DeLambo, Ievers-Landis, Drotar, & Quittner, 2004; Iles & Lowton, 2010; Miller, 2009), this may be a particularly promising area in which to extend the current research findings.

Within the field of research examining the Salutogenic Model of Health and Illness, attention is being focused on clarifying the role of factors, such as interpersonal process variables, in the development of SOC in adults and its role in processing the experience of a traumatic event (e.g. Nilsson et al., 2000; Vogel et al., 2012). For the CF population, it would be beneficial to conduct longitudinal research examining social constraints and SOC over time, possibly from late childhood through to late adolescence. This would allow us to more clearly identify the role of social constraints in the development of SOC. It would also be beneficial to conduct longitudinal research examining the role of SOC as a protective or risk factor following challenging health events for the young adult and older CF population. This would help to clarify the predicted mediating role of SOC between the experience of a challenging health event and psychological adjustment. Replications of these kinds of studies would also be beneficial with other chronic illness groups. Given that the current study also identified that difficulties with parent child communication can significantly impact the psychological functioning of adolescents and young adults with CF, future research would also benefit from identifying the factors that lead to difficulties in parent-child communication in families coping with CF.

4.3. Implications

Although the current research adopted a specific theoretical approach to the examination of the psychosocial experiences of adolescents and young adults living with CF and support was obtained for the adopted approach, the results also have more general implications for practitioners who work with the CF population. From the data obtained it appears that while there are significant relationships between social constraints, SOC, and all measures of psychological adjustment measured in this study, SOC was only found to mediate the relationships between social constraints and positive affect and social constraints and stress. This would suggest that if we could help young families with a child with CF to have more supportive and open communication with their child from an early age this would positively support the development of a strong SOC and provide a protective factor against the development of stress and general low mood. This suggests that the development of support programs to increase the effectiveness of parent-child communication would be particularly beneficial for this group.

However, our data also suggests that intervention across a number of domains would be required to assist individuals with CF from developing more severe forms of psychopathology such as depressive disorder and panic disorder. From our findings it would appear that in addition to family and communication-based interventions, identification and treatment of biological sensitivity to anxiety and depression could form a key component of a preventative intervention.

For health practitioners working with families coping with CF at the present time, our findings suggest that it is important for these practitioners to thoroughly assess communication between parents and children for all families who present to clinics and to investigate possible biological factors contributing to clinic with more severe psychopathology. From this referrals should be made to allow access to specialised psychological support for any young person with CF presenting with difficulties with stress, mood or anxiety.

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