



Chew, J., & Haase, A. M. (2016). Psychometric Properties of the Family Resilience Assessment Scale: A Singaporean perspective. *Epilepsy and Behavior*, 61, 112-119. DOI: 10.1016/j.yebeh.2016.05.015

Peer reviewed version

Link to published version (if available):  
[10.1016/j.yebeh.2016.05.015](https://doi.org/10.1016/j.yebeh.2016.05.015)

[Link to publication record in Explore Bristol Research](#)  
PDF-document

This is the author accepted manuscript (AAM). The final published version (version of record) is available online via Elsevier at <http://www.sciencedirect.com/science/article/pii/S1525505016300981>. Please refer to any applicable terms of use of the publisher.

## University of Bristol - Explore Bristol Research

### General rights

This document is made available in accordance with publisher policies. Please cite only the published version using the reference above. Full terms of use are available:  
<http://www.bristol.ac.uk/pure/about/ebr-terms.html>

***Title***

Psychometric Properties of the Family Resilience Assessment Scale: A Singaporean perspective.

***Author names and affiliations***

Judith Chew<sup>a,b</sup> and Anne M Haase, PhD<sup>a</sup>

<sup>a</sup>School for Policy Studies, University of Bristol

8 Priory Road, Bristol BS8 1TZ

United Kingdom

<sup>b</sup>Medical Social Work Department, KK Women's and Children's Hospital

100 Bukit Timah Road, S(229899)

Singapore

***Corresponding author***

Correspondence for this article should be addressed to Judith Chew

Email: [judith.chew@bristol.ac.uk](mailto:judith.chew@bristol.ac.uk) or [judith.chew.fh@kkh.com.sg](mailto:judith.chew.fh@kkh.com.sg)

## Abstract

Families of young people with chronic illnesses are more likely to experience higher levels of stress. In turn, their ability to cope with multiple demands is likely to affect young people's adaptation. The purpose of this study was to examine psychometric properties of the Family Resilience Assessment Scale (FRAS), an assessment tool that measures the construct of family resilience. A total of 152 young people with epilepsy, aged 13 to 16 years old, from KK Women's and Children's Hospital, Singapore, completed the FRAS along with Rosenberg's Self-Esteem scale. Factor structure of the FRAS was examined. Exploratory factor analysis resulted in a 7-factor solution – Meaning making and Positive outlook; Transcendence and spirituality; Flexibility and Connectedness; Social and economic resources (community); Social and economic resources (neighbors); Clarity and Open emotional expression; Collaborative problem-solving – accounting for 83.0% of the variance. Internal consistency of the scale was high ( $\alpha=0.92$ ). Family resilience was significantly correlated with higher levels of self-esteem. Our study provides preliminary findings that suggest FRAS is a reliable and valid scale for assessing the construct of family resilience among young people with epilepsy in Singapore.

## Key words

Family resilience; Young people; Adolescents; Epilepsy; Factor analysis, Instrument

## 1. Introduction

Studies have shown that young people with epilepsy are three to nine times more likely to have poorer outcomes when compared to healthy peers, young people with other medical conditions and/or their siblings [1-3]. The impact of epilepsy is not restricted to individuals but is also extended to their families. Having a child with epilepsy is likely to place additional stress and burden on families in coping with unpredictable patterns of seizure occurrence, seizure severity, and complexities of medical treatment. Thus, living with a family member affected by epilepsy is likely to have an impact on family functioning.

Preventing and reducing psychosocial problems in young people with chronic illnesses have been of interest to both researchers and practitioners [4]. As young people are situated within several systems, such as families, peers and schools, it is necessary to consider these influences on young people's adaptation [5]. Family functioning, which plays a significant role in young people's adaptation, has been identified as one of the modifiable processes for intervention [6, 7]. Compared to their peers, young people with epilepsy had poorer parent-child relationships, greater problems with family functioning (e.g., poorer communication between family members, lower family cohesion), higher levels of stress and conflict within their families [8]. Associations between family functioning and a range of psychosocial and health outcomes in young people with epilepsy has also been demonstrated. Poorer levels of family functioning have been shown to predict higher levels of behavioral problems [9, 10], lower self-esteem [11], social competencies [10, 12], academic achievement [13, 14], and treatment adherence [15, 16].

Overall, these findings demonstrate the influence of family functioning on young people's outcomes. However, the number of studies that examined family influences on young people's outcomes is lacking. Among quantitative studies that examined relationships between family factors and psychosocial outcomes, most used parent reports to measure family functioning. In addition, these studies often adopt a deficit perspective and utilize assessment measures that focus on family pathology. This is in contrast with the proliferation of literature in areas of individual and family resilience that emphasizes a strengths perspective. Alongside the proliferation of research in the area of resilience, a range of scales is available for measuring this construct [17]. However, the majority focus on identifying individual traits (e.g., personality) and intrapersonal factors (e.g., emotional

regulation) and fail to consider the influence of higher level systemic factors, such as family processes. Commonly used assessment measures, such as Family Adaptability and Cohesion Scales (FACES-IV), Family Assessment Device (FAD), and Family Assessment Measure (FAM), may not be suitable for examining resilience prompting processes as they focus on family dysfunction. There are several measures for families with an explicit focus on strengths, such as Family Resource Scale and Family Support Scale [18], yet these measures identify sources of support and do not focus on specific family processes.

Therefore, with an increasing emphasis on resilience, there is a need for assessment measures to reflect the construct of family resilience, instead of dysfunction. Sixbey [19] responded to this need by developing the Family Resilience Assessment Scale (FRAS), which measures family resilience as conceptualized by Walsh [20], to aid understanding in how families deal and cope with adversity. According to Walsh [20], there are nine key processes within three domains of family functioning that promote family resilience. In the first domain of family functioning – **family beliefs** – processes that promote resilience include making meaning of adversity, positive outlook, and transcendence and spirituality. Processes that foster resilience in the second domain of family functioning – **organizational patterns** – are flexibility in a family's structure, connectedness among family members and utilization of social and economic resources. The third dimension of family functioning – **communication** – involves processes that have clarity, involve open emotional expression, and facilitate collaborative problem-solving [20]. Sixbey's family resilience measure (i.e., FRAS) has six subscales, which measured these nine family processes [19].

The FRAS, which was developed in the United States, offers promising potential utility in measuring family resilience. It provides researchers and practitioners with a tool to assess, plan and evaluate interventions designed to promote family resilience and its influence on young people's outcomes. Therefore, it is essential for this measure to be reliable and valid when used with other populations from different cultures. However, as meanings of constructs such as family resilience are likely to vary across cultures, it begs the question of whether there is conceptual equivalence when using Western-developed measurement scales instead of developing culturally specific instruments. Several studies used FRAS as a measure of family resilience [21-27]. When reported, Cronbach's alpha coefficients for FRAS ranged between 0.76 and 0.93 [23, 25, 26]. Of these studies, only Kaya and Arici [23]

examined the factor structure of FRAS and found a four-factor structure instead of the original six-factor structure. In order to address concerns regarding FRAS' factor structure, a more thorough analysis of its psychometric properties is warranted. Hence, the aim of this study was to examine the reliability and validity of the FRAS in Singapore, a multi-cultural population where the measure has yet to be tested.

## **2. Methods**

### 2.1 Participants

Between November 2013 and August 2014, young people who met the following criteria: (i) diagnosed with epilepsy, (ii) aged between 13 and 16 years old, and (iii) attending mainstream school, were recruited from the pediatric neurology services in KK Women's and Children's Hospital, Singapore (KKH). KKH is an 830-bed academic healthcare institution that provides specialized pediatric and women's healthcare services. It is one of two public hospitals in Singapore with a pediatric neurology unit providing inpatient and outpatient services, such as diagnosis and management of young people with epilepsy [28].

### 2.2 Procedures

SingHealth Centralised Institutional Review Board approved this study. Consent was obtained from young people and their parents. Young people completed the survey while waiting to see their physicians at KKH.

### 2.3 Measures

Only young people completed self-reported measures of family resilience and self-esteem. They also provided individual-level demographic data, while their parents provided family-level data, such as household income and family structure. Physicians provided clinical information on number of medications, seizure frequency, and their assessment of seizure control (i.e., whether seizures were effectively controlled by AED).

#### 2.3.1 Family Resilience Assessment Scale (FRAS)

As mentioned, FRAS measures the construct of family resilience, specifically, processes that support a family's ability to cope successfully with adversity [19]. Although the 54-item FRAS was developed to measure nine distinct family processes as conceptualized by Walsh [20], Sixbey's original study demonstrated a six-factor solution instead [19]. These six subscales include; (i) family communication and problem solving (e.g., *'We consult with each other about decisions'*), (ii) utilizing social and economic resources (e.g., *'We ask neighbors for help and assistance'*), (iii) maintaining a positive outlook (e.g., *'We trust things will work out even in difficult times'*), (iv) family connectedness (e.g., *'We show love and affection for family members'*), (v) family spirituality (e.g., *'We attend prayers/services at temple/mosque/church/other places of worship'*), and (vi) ability to make meaning of adversity (e.g., *'We accept that stressful events as part of life'*). Respondents indicated on a 4-point Likert scale, which ranged from 1 (*Strongly disagree*) to 4 (*Strongly agree*), rating their level of agreement with statements that describe family processes. Four items were negatively phrased (33, 37, 45, and 50) and were reversed scored before summing all items to obtain a total score for family resilience. The total score range for FRAS lies between 54 and 216, with higher scores indicative of higher levels of family resilience. Similarly, subscale scores were obtained through the summation of values for items in each subscale. Cronbach's alpha coefficients for total and subscales are reported in Table 2a.

### 2.3.2 Rosenberg Self-Esteem Scale (RSS)

Young people's global self-esteem was measured with Rosenberg Self-Esteem Scale (RSS) [29]. This 10-item scale evaluates global self-esteem through positive and negative perceptions of self. Examples of positive and negative worded items are, *'On the whole, I am satisfied with myself'* and *'At times I think I am no good at all'*, respectively. Respondents rated each item on a 4-point Likert scale ranging from 1 (*Strongly disagree*) to 4 (*Strongly agree*). Items that reflected negative perceptions were reverse scored (3, 5, 8, 9, and 10) and all 10 items were summed to provide a total score that range between 10 and 40. Higher scores are indicative of higher levels of global self-esteem, i.e. a positive sense of one's value as a person [29]. The Cronbach's alpha coefficient was 0.90.

### 2.3.3 Illness severity

The severity of young people's illness has been determined based on: (i) seizure types, (ii) seizure frequency, and (iii) number of AED and its side effects [30-33]. Often, composite scores were derived from these classifications. In this study, illness severity was operationalized as the extent to which young people's seizures were controlled by AED use: (i) No seizures, AED not required (Low); (ii) Seizures controlled with AED (Moderate); and (iii) Seizures despite AED (High).

## 2.4 Data analysis

### 2.4.1 Exploratory factor analysis

Exploratory factor analysis with principal axis factoring was conducted to examine the factor structure of FRAS. Based on existing recommendations, a reasonable absolute minimum sample size of 50 was required to yield reliable results from an exploratory factor analysis [34, 35]. Additionally, simulation studies demonstrated that sample size adequacy is partly determined by the nature of the data [35-37], thus, factor-to-variable ratio (over-determination) and communality of variables were examined to determine whether the current sample size was sufficient.

Prior to conducting an EFA, Kaiser-Meyer-Olkin's (KMO) measure of sampling adequacy and Bartlett's test of sphericity were used to determine if the data was suitable for factor analysis [36]. Kaiser's criterion (eigenvalues  $\geq 1.0$ ), percentage of variance accounted by the number of factors, and scree plots were used to determine the number of factors to be retained [36]. In addition to orthogonal (varimax) rotation, oblique (direct oblimin) rotation method was used as family processes were hypothesized to be interrelated. Individual items were retained if its factor loading on a single factor was above 0.4, and had at least a 0.2 difference from other factors. Missing variables ( $n=7$ ) were excluded listwise and the final sample used for EFA was 145.

### 2.4.2 Reliability and validity

Cronbach's alpha coefficient was used to assess the internal consistency of FRAS and its subscales. A high Cronbach coefficient value ( $\alpha > 0.70$ ) was indicative of a reliable measure [38]. To evaluate validity of FRAS scores, we examined associations between FRAS and theoretically relevant variables such as self-esteem and illness severity. Based on existing evidence, we hypothesized that young people with higher self-esteem report correspondingly higher levels of family resilience [39-41].



In contrast, young people who experienced greater illness severity would have significantly lower levels of family resilience [8, 10, 42-45]. Correlational analyses were performed to establish the statistical significance of relationships between measures of family resilience and young people's self-esteem. One-way analysis of variance (ANOVA) with post-hoc comparisons were conducted to test the hypothesis that young people with higher illness severity had lower levels of family resilience. Hochberg's GT2 post-hoc test was used, as group sizes were different. All statistical analyses were performed using SPSS version 21.0.

### 3. Results

A total of 176 young people were invited and 156 participated in this study (response rate of 88.6%). No further information is available on the twenty young people who declined participation. Scores from 152 young people (79 males, 73 females) were included in the analyses, as four questionnaires were incomplete. Clinical and demographic characteristics of this sample of young people are presented in Table 1.

#### 3.1 Preliminary analysis

Kaiser-Meyer-Olkin (KMO) statistic was 0.85, which is above the minimum criterion of 0.5, indicating that the sample size is adequate for factor analysis. In addition, KMO values for individual items, which were greater than 0.63, were above the minimum acceptable limit of 0.5 [38]. Bartlett's test of sphericity was significant ( $\chi^2=11021.51$ ,  $p<0.001$ ), indicating that FRAS items were adequately correlated for a factor analysis to be performed.

#### 3.2 Exploratory factor analysis

Exploratory factor analyses using principal axis factoring were conducted, and similar results were obtained from varimax and oblimin rotations. Both rotations yielded seven factors, accounting for 80.56% of the variance. There was no difference in patterns of item loadings for each rotation, i.e., individual FRAS items loaded onto the same factors. However, the seven-factor solution produced a factor with only two items (Factor 7). When allowed to correlate, through the use of direct oblimin rotation, correlation between factors ranged between -0.57 (Factor 2 and Factor 6) and 0.36 (Factor 4 and Factor 7). This provides evidence that the constructs are interrelated, with each factor measuring

a unique aspect of family resilience. As recommended by Henson and Roberts (2006), both pattern and structure matrices derived from the EFA through use of an oblique rotation method, are presented in Table 2(a) and (b).

The results from the EFA did not support Sixbey's six-factor structure of the FRAS. Instead, a seven-factor solution emerged from the analyses. Upon examination, it was noted that these factors and its corresponding items had closer approximation to Walsh's family resilience framework. On this basis, it was concluded that the current seven-factor solution provided a better representation of family resilience. A summary of FRAS item classifications according to Walsh's conceptual framework, the six-factor and seven-factor solutions yielded from Sixbey's and this current study are presented in Table 3.

### 3.3 Reliability and validity

Internal consistency for the total FRAS scale was high with Cronbach's alpha value of 0.92. As all 54 items had factor loadings greater than 0.40, they were summated according to their respective factors to form FRAS sub-scales. Cronbach's alpha coefficients of these subscales, which ranged between 0.93 and 0.97, are reported in Table 2a.

As hypothesized, there was a significant positive relationship between family resilience (i.e., FRAS total scale score) and self-esteem,  $r=0.58$ ,  $p<0.001$ . Young people who reported higher levels of family resilience also had higher levels of self-esteem. One-way ANOVA revealed significant differences in young people's family resilience across illness severity conditions,  $F(2,142)=4.84$ ,  $p<0.01$ . Hochberg's GT2 post-hoc comparisons indicated that young people who had seizures despite medication (high illness severity) had significantly lower levels of family resilience when compared to those who did not have seizures (low or moderate severity). However, there was no significant difference in average FRAS scores between young people with low and those with moderate illness severity.

## 4. Discussion

### 4.1 Factor structure of FRAS

The objective of this study was to examine the psychometric properties of FRAS. Sixbey's original FRAS six-factor structure was not replicated. Instead, a seven-factor solution emerged from the exploratory factor analysis and it reflected dimensions of family resilience put forward by Walsh's conceptual framework [20]. These seven factors – Meaning-making and Positive outlook; Transcendence and spirituality; Flexibility and Connectedness; Resources – Community; Resources – Neighbors; Clarity and Open emotional expression; Collaborative problem-solving – accounted for approximately 83% of the total variance with factor loadings ranging from 0.40 to 0.91. The total FRAS scale also demonstrated good internal consistency, suggesting that the 54-items functioned collectively to characterize the concept of family resilience.

There are various reasons that could account for the lack of distinction between processes within Walsh's conceptualization of specific family functioning domains, for example, items measuring family beliefs of meaning-making and positive outlook loaded onto a single factor instead of two. Thus, it may be possible that FRAS items measure a single construct instead of distinct family processes. Another reason might be that these items may not be sufficiently distinct to differentiate various concepts of family processes. For example, young people may have interpreted the statement, '*We can work through difficulties as a family*', as an indication of their families' ability to resolve problems instead of reflecting their family beliefs. Third, the relationship between processes belonging to the same family functioning domain may have masked distinctions, resulting in extraction of a single factor. For instance, it is possible that a positive relationship between key communication processes such as '*Clarity*' and '*Open emotional expression*', exists. It is likely for families, which encourage expression of emotions (e.g., '*We can ventilate at home without upsetting someone*') would also tend to adopt processes that encourage clarity in communication between family members (e.g., '*We can be honest and direct with each other in our family*'). Concurrently, there may be a small number of families with high levels of clarity in their communication, but were less open in their expression of emotions or vice versa. This lack of heterogeneity among communication processes within families of the current sample may be one reason why a single factor was extracted instead of two.

It is of interest to note that items describing 'Social and economic resources' loaded onto two distinct but correlated factors. Based on further examination of these items, it is postulated that young people made a distinction between the availability of community resources (Factor 4) and the extent to which

their families actually sought and received help from their neighbors (Factor 7). Another possible reason for the distinction between factors is Asian families, such as Chinese and Indians, tend to rely either on themselves [46] or on extended family members [47], instead of their neighbors.

#### 4.2 Reliability and validity

There was low to moderate correlation between two pairs of subscales, '*Flexibility and Connectedness*' and '*Collaborative problem-solving*'; '*Resources – Community*' and '*Resources – Neighbors*'. These correlations suggest young people's perceptions of family processes were related but also conceptually distinct. Furthermore, it indicates that these subscales measure different aspects of family resilience and supports the theoretical understanding of resilience as a multidimensional construct [20, 48].

It appears the dimensionality of FRAS differed across countries in which its factor structure has been examined. Kaya and Arici [23] conducted a confirmatory factor analysis (CFA) to examine the factor structure of the Turkish version of FRAS. Results from their analysis did not support the original six-factor structure but demonstrated a four-factor structure instead. One reason behind this diversity could be differences in meanings of family resilience. Processes that foster resilience within families, such as receiving aid from extended families versus neighbors and communities, may be dependent on cultural contexts. Sample characteristics is another issue to consider when attempting to explain differences in dimensions of family resilience. For example, Sixbey [19] recruited participants ranging between 16 and 77 years old (mean=36.2 years). Kaya and Arici [23] recruited university students with an average age of approximately 22 years old. In contrast, the average age of young people in this study was 15 years. Participants' age may reflect corresponding family life cycles and potential variations in family processes during each period. In turn, these differences could be reflected in the different FRAS structures.

Significant associations found between FRAS scores and measures of young people's self-esteem and illness severity, provide support for concurrent validity. As hypothesized, there was a strong positive relationship between family resilience and self-esteem, where young people who reported higher levels of self-esteem also perceived higher levels of resilience within their families. These results are similar to findings in previous studies that examined the relationship between young

people's self-esteem and family functioning [40, 41, 49, 50]. It is possible that these family processes supported young people's efforts in managing illness-related demands and influenced how they viewed themselves. The significant relationship between family resilience and young people's self-esteem underscores the importance of considering family factors when attempting to understand factors influencing psychosocial adaptation to a chronic condition such as epilepsy. Therefore, future research should continue to examine the influence of family factors on young people's outcomes. In particular, young people's perspectives regarding their families and its processes, as there is a lack of research in this area.

Family resilience was significantly lower among those who continued to have seizures despite AED, compared to young people who achieved seizure control. This is similar to results from existing studies that examined family functioning among young people with chronic illnesses [42-45]. For example, greater neurological impairment was associated with higher levels of conflict and less supportive family relationships within the family [45]. This contributes to the growing evidence that the demands of epilepsy is likely to have a negative effect on young people and their families. Taken together, this suggests that family processes are potential targets for interventions. Young people and their families who exhibit moderate to high distress, particularly those who fail to achieve seizure control despite medication could receive additional support services to promote positive outcomes.

Findings from this study have implications for practitioners who provide psychosocial interventions for young people with epilepsy. With empirical evidence indicating that the FRAS is a reliable and valid measure, practitioners could utilize this tool to measure and identify family processes, and in turn, provide valuable information needed to develop interventions aimed at promoting resilience.

Additionally, it can be used to evaluate the effectiveness of these interventions.

#### 4.3 Methodological considerations

The relatively small sample size ( $n=145$ ) and low ratio of participants to number of variables (2.7:1) may raise concerns about the EFA factor solution, as both do not meet traditional recommendations regarding required sample sizes for factor analyses. However, there remain differing opinions on adequate or acceptable sample sizes [35-37]. Early recommendations either emphasized minimum sample size (e.g., at least 200) or a required ratio of participants to number of variables. Based on

findings from simulation studies, several authors argued that greater emphasis on high factor over-determination and communality of variables, instead [34, 35, 37, 51]. Although large samples are beneficial, EFA should not be ruled out on the sole basis of a small sample size [34, 35]. Item communalities of 54 items in FRAS ranged from 0.6 to 0.9 and these values were considered to be high [52]. With the exception of one factor, the remaining six factors had at least 4 variables with factor loadings of 0.8, indicative of high over-determination of factors. Despite the relatively small sample size, conditions such as high communalities among variables and high factor over-determination were met. Therefore, we have confidence that factor solutions in this study are reliable.

#### 4.4 Limitations of this study and future research

Existing limitations of this study should be taken into consideration. First, due to a small sample size, only an EFA was performed. It is recognized that using subsets of the data for confirmatory factor analyses would have provided additional evidence to either corroborate or contradict EFA findings. However, this was not feasible due to the sample size of this study. Second, the FRAS factor structure was derived from a clinical sample. Further research among the general population of young people and adult population is necessary to determine if the current structure is invariant across different populations. Third, the present study used a cross-sectional design and no assessments were made to determine whether the seven-factor structure was constant over time. Assessments of test-retest reliability in future studies could provide insight to the stability of this measure. Fourth, the exclusive reliance on self-reports may give rise to common method variance, e.g., social desirability and acquiescence. Future research could minimise such variances by obtaining data from various sources such as their family members. Supplementing young people's views by obtaining data from other sources such as parents, siblings or significant others, is likely to be beneficial. The convergence or divergence of data obtained from multiple perspectives provides valuable information of different aspects of family processes. For instance, differences in family members' perspective regarding family processes could also suggest conflicting expectations and needs [53-55]. Left unresolved, these differences could lead to increased stress and conflict within families.

## 5. Conclusion

In conclusion, these findings provide preliminary evidence that FRAS is an adequate family resilience measure for use among young people with epilepsy in Singapore. The seven-factor FRAS structure reflects the construct of family resilience as theorized by Walsh and can be used to facilitate practitioners' assessments of and supporting families in harnessing processes that foster resilience in order to meet epilepsy-related challenges.

## 6. Acknowledgements

This exploratory factor analysis of Family Resilience Assessment Scale forms part of the first author's dissertation about young people's experiences with epilepsy; this PhD study was supported by SingHealth Talent Development Fund. We would like to thank the following individuals for their assistance during the recruitment and data collection for this study: Gina Tan and Mavis Teo from the hospital's Medical Social Work Department; and Dr. Derrick Chan and his team from the Department of Paediatrics, Neurology Service. The findings and conclusions of this report are those of the authors and do not necessarily represent the official position of KK Women's and Children's Hospital or School for Policy Studies, University of Bristol.

## Reference

1. McDermott, S., S. Mani, and S. Krishnawami, *A population-based analysis of specific behavior problems associated with childhood seizures. Journal of Epilepsy*, 1995. **8**(2): p. 110-118.
2. Plioplys, S., D.W. Dunn, and R. Caplan, *10-year research update review: Psychiatric problems in children with epilepsy. Journal of the American Academy of Child & Adolescent Psychiatry*, 2007. **46**(11): p. 1389-1402.
3. Rodenburg, R., et al., *Psychosocial issues for children with epilepsy. Epilepsy & Behavior*, 2011. **22**(1): p. 47-54.
4. Ekeland, E., et al., *Exercise to improve self-esteem in children and young people. Cochrane Database Systematic Reviews*, 2004(1).
5. Carpenter, J. and R. McConkey, *Disabled children's voices: The nature and role of future empirical enquiry. Children & Society*, 2012. **26**(3): p. 251-261.

6. Rodenburg, R., et al., *Family predictors of psychopathology in children with epilepsy*. *Epilepsia*, 2006. **47**(3): p. 601-614.
7. Wallander, J.L. and J.W. Varni, *Effects of pediatric chronic physical disorders on child and family adjustment*. *Journal of Child Psychology and Psychiatry*, 1998. **39**(1): p. 29-46.
8. Rodenburg, R., et al., *Family factors and psychopathology in children with epilepsy: A literature review*. *Epilepsy & Behavior*, 2005. **6**(4): p. 488-503.
9. Austin, J.K., et al., *Behavioral issues involving children and adolescents with epilepsy and the impact of their families: Recent research data*. *Epilepsy & Behavior*, 2004. **5**(s3): p. 33-41.
10. McCusker, C.G., et al., *Adjustment in children with intractable epilepsy: Importance of seizure duration and family factors*. *Developmental Medicine & Child Neurology*, 2002. **44**(10): p. 681-687.
11. Austin, J.K., et al., *Self- esteem and symptoms of depression in children with seizures: Relationships with neuropsychological functioning and family variables over time*. *Epilepsia*, 2010. **51**(10): p. 2074-2083.
12. Tse, E., et al., *Social skills problems in children with epilepsy: Prevalence, nature and predictors*. *Epilepsy & Behavior*, 2007. **11**(4): p. 499-505.
13. Fastenau, P.S., et al., *Neuropsychological predictors of academic underachievement in pediatric epilepsy: Moderating roles of demographic, seizure, and psychosocial variables*. *Epilepsia*, 2004. **45**(10): p. 1261-1272.
14. Mitchell, W.G., et al., *Academic underachievement in children with epilepsy*. *Journal of Child Neurology*, 1991. **6**(1): p. 65-72.
15. DiMatteo, M.R., *Social support and patient adherence to medical treatment: A meta-analysis*. *Health Psychology*, 2004. **23**(2): p. 207-218.
16. Mitchell, W.G., L.M. Scheier, and S.A. Baker, *Adherence to treatment in children with epilepsy: Who follows "doctor's orders"?*. *Epilepsia*, 2000. **41**(12): p. 1616-1625.
17. Windle, G., K.M. Bennett, and J. Noyes *A methodological review of resilience measurement scales*. *Health and Quality of Life Outcomes*, 2011. **9**, 1-18 DOI: 10.1186/1477-7525-9-8.
18. Early, T., *Measures for practice with families from a strengths perspective*. *Families in Society: The Journal of Contemporary Social Services*, 2001. **82**(3): p. 225-232.



19. Sixbey, M.T., *Development of the family resilience assessment scale to identify family resilience constructs*. 2005, University of Florida.
20. Walsh, F., *Family resilience: A framework for clinical practice*. *Family Process*, 2003. **42**(1): p. 1-18.
21. Buchanan, T., *Family resilience as a predictor of better adjustment among international adoptees*, in *Social Work*. 2008, The University of Texas at Arlington.
22. Cripe, C.T., *Family resilience, parental resilience and stress mediation in families with autistic children*. 2013, Northcentral University.
23. Kaya, M. and N. Arici, *Turkish version of shortened Family Resiliency Scale (FRAS): The study of validity and reliability*. *Procedia - Social and Behavioral Sciences*, 2012. **55**: p. 512-520.
24. Lum, C., *The development of family resilience: Exploratory investigation of a resilience program for families impacted by chemical dependency*. 2008, San José State University.
25. Openshaw, K.P., *The relationship between family functioning, family resilience, and quality of life among vocational rehabilitation clients*. 2011, Utah State University.
26. Plumb, J.C., *The impacat of social support and family resilience on parental stress in families with a child diagnosed with an autism spectrum disorder*, in *Social of Social Policy and Practice*. 2011, University of Pennsylvania.
27. Faqurudheen, H., S. Mathew, and T.M. Kumar, *Exploring family resilience in a community mental health setup in south India*. *Procedia Economics and Finance*, 2014. **18**: p. 391-399.
28. Chan, D., et al., *Pediatric epilepsy and first afebrile seizure in Singapore: Epidemiology and investigation yield at presentation*. *Journal of Child Neurology*, 2010. **25**(10): p. 1216-1222.
29. Rosenberg, M., *Society and the adolescent self-image*. 1965, Princeton, NJ: Princeton University Press.
30. Austin, J.K., D.W. Dunn, and G.A. Huster, *Childhood epilepsy and asthma: Changes in behavior problems related to gender and change in condition severity*. *Epilepsia*, 2000. **41**(5): p. 615-623.
31. Devinsky, O., et al., *Risk factors for poor health- related quality of life in adolescents with epilepsy*. *Epilepsia*, 1999. **40**(12): p. 1715-1720.

32. Cramer, J.A., et al., *Development of the Quality of Life in Epilepsy Inventory for Adolescents: the QOLIE-AD-48*. *Epilepsia*, 1999. **40**(8): p. 1114-21.
33. Heimlich, T.E., et al., *Brief report: Adolescents' attitudes toward epilepsy: Further validation of the Child Attitude Toward Illness Scale (CATIS)*. *Journal of Pediatric Psychology*, 2000. **25**(5): p. 339-345.
34. de Winter, J.C.F., D. Dodou, and P.A. Wieringa, *Exploratory factor analysis with small sample sizes*. *Multivariate Behavioral Research*, 2009. **44**(2): p. 147-181.
35. Hogarty, K.Y., et al., *The quality of factor solutions in exploratory factor analysis: The influence of sample size, communality, and overdetermination*. *Educational and Psychological Measurement*, 2005. **65**(2): p. 202-226.
36. Costello, A.B. and J.W. Osborne, *Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis*. *Practical Assessment Research & Evaluation*, 2005. **10**(7): p. 1-9.
37. MacCallum, R.C., et al., *Sample size in factor analysis*. *Psychological methods*, 1999. **4**(1): p. 84-99.
38. Field, A., *Discovering statistics using SPSS: (and sex and drugs and rock 'n' roll)*. 3rd ed. 2009, London: SAGE Publications.
39. Drotar, D., *Relating parent & family functioning to the psychological adjustment of children with chronic health conditions: What have we learned? What do we need to know?* *Journal of Pediatric Psychology*, 1997. **22**(2): p. 149-165.
40. Preechawong, S., et al., *Relationship of family functioning, self-esteem, and resourceful coping of Thai adolescents with asthma*. *Issues in Mental Health Nursing*, 2007. **28**(1): p. 21-36.
41. Shek, D.T.L., *Family functioning and psychological well-being, school adjustment, and problem behavior in Chinese adolescents with and without economic disadvantage*. *The Journal of Genetic Psychology*, 2002. **163**(4): p. 497-502.
42. Zashikhina, A. and B. Hagglof, *Family functioning and juvenile chronic physical illness in Northern Russia*. *Acta Pædiatrica*, 2009. **98**(2): p. 355-360.

43. Iobst, E.A., et al., *Pain, fatigue, family functioning, and attitude toward illness in children with juvenile rheumatic diseases*. Journal of Developmental and Physical Disabilities, 2007. **19**(2): p. 135-144.
44. Rodrigues, N. and J.M. Patterson, *Impact of severity of a child's chronic condition on the functioning of two-parent families*. Journal of Pediatric Psychology, 2007. **32**(4): p. 417-426.
45. Reiter-Purtill, J., et al., *Parental distress, family functioning, and social support in families with and without a child with Neurofibromatosis 1*. Journal of Pediatric Psychology, 2008. **33**(4): p. 422-434.
46. Shek, D.T.L., *Help-seeking patterns of Chinese parents in Hong Kong*. Asia Pacific Journal of Social Work and Development, 1998. **8**(1): p. 106-119.
47. Ow, R., *Burden of care and childhood cancer: Experiences of parents in an Asian context*. Health & Social Work, 2003. **28**(3): p. 232-240.
48. Luthar, S.S. and D. Cicchetti, *The construct of resilience: Implications for interventions and social policies*. Development and Psychopathology, 2000. **12**(04): p. 857-885.
49. Burt, C., L. Cohen, and J. Bjorck, *Perceived family environment as a moderator of young adolescents' life stress adjustment*. American Journal of Community Psychology, 1988. **16**(1): p. 101-122.
50. McNelis, A.M., et al., *Factors associated with self-concept in children with asthma*. Journal of Child and Adolescent Psychiatric Nursing, 2000. **13**(2): p. 55-68.
51. MacCallum, R.C., et al., *Sample size in factor analysis: The role of model error*. Multivariate Behavioral Research, 2001. **36**(4): p. 611-637.
52. Tabachnick, B.G. and L.S. Fidell, *Using multivariate statistics*. 6th ed. 2013, Boston, MA: Pearson.
53. Van Roy, B., et al., *Understanding discrepancies in parent-child reporting of emotional and behavioural problems: Effects of relational and socio-demographic factors*. BMC Psychiatry, 2010. **10**(1): p. 56.
54. Silva, N., et al., *Why the (dis)agreement? Family context and child-parent perspectives on health-related quality of life and psychological problems in paediatric asthma*. Child: Care, Health and Development, 2015. **41**(1): p. 112-121.

55. Huygen, A.C.J., W. Kuis, and G. Sinnema, *Psychological, behavioural, and social adjustment in children and adolescents with juvenile chronic arthritis*. *Annals of the Rheumatic Diseases*, 2000. **59**(4): p. 276-282.

Table 1. Characteristics of young people who participated in the survey ( $n=152$ ).

	n	(%) <sup>1</sup>
<b>Individual-level demographics</b>		
Age, mean $\pm$ SD	15.0 $\pm$ 1.13	
Gender		
Male	79	(52.0)
Female	73	(48.0)
Ethnicity <sup>1</sup>		
Chinese	95	(62.5)
Malay	37	(24.3)
Indian	18	(11.8)
Others (Arab, Burmese)	2	(1.3)
Living arrangements		
Parents and siblings	135	(88.8)
Parents, siblings and relatives	10	(6.6)
Single parent and siblings	4	(2.6)
Single parent, siblings and relatives	2	(1.3)
Step-family	1	(0.7)
<b>Young person's medical information</b>		
Age at which young person was diagnosed with epilepsy (mean $\pm$ SD, range)	8.79 $\pm$ 3.94 ( $\leq$ 1-16 years)	
Number of years with epilepsy (mean $\pm$ SD, range)	6.21 $\pm$ 3.68 ( $\leq$ 1-15 years)	
AED		
Not on medication	18	(11.8)
Single AED	86	(56.6)
Multiple AED	48	(31.6)
Seizures		
No seizures	95	(62.5)
At least once a month	35	(23.0)
Every three months	14	(9.2)
Single seizure episode within the past 3 months	8	(5.3)
Illness severity ( $n=152$ )		
No seizures, AED not required	18	(11.8)
Seizures controlled with AED	77	(50.7)
Seizures despite AED	57	(37.5)
<b>Family-level demographics</b>		
Respondents ( $n=148$ ; 4 did not participate)		
Father	48	(32.4)
Mother	100	(67.6)
Age of parent (mean $\pm$ SD, range)	48.3 $\pm$ 4.90 (37-59 years)	
Employment ( $n=140$ )		
Employed	97	(69.3)
Unemployed	43	(30.7)
Highest qualification attained ( $n=146$ )		
Below secondary	13	(8.9)
Secondary (GCE 'O' or 'N' level)	57	(39.0)
GCE 'A' level / ITE	33	(22.6)
Polytechnic / other diplomas	23	(15.8)
University	20	(13.7)

	n	(%) <sup>1</sup>
Household income ( <i>n</i> =146)		
No working person	2	(1.4)
Less than 1,999 SGD	16	(11.0)
2,000 – 4,999 SGD	60	(41.1)
5,000 – 9,999 SGD	33	(22.6)
10,000 SGD and above	35	(24.0)

<sup>1</sup>Percentages for '*Ethnicity*' and '*Household income*' do not add up to 100% due to rounding errors □  
n – study sample; SD – Standard deviation; NA – Not available; AED – Anti-epileptic drugs; GCE 'O', 'N' and 'A' levels refers to Singapore-Cambridge General Certificate of Education Ordinary, Normal and Advance level, respectively; ITE – Institute of Technical Education; SGD – Singapore Dollars.

Table 2a: Pattern matrix of exploratory factor analysis (direct oblimin rotation).

Item No.	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
<i>Meaning making and Positive outlook</i>							
13	.909						
40	.898						
4	.898						
18	.878						
36	.869						
7	.864						
21	.861						
22	.858						
51	.853						
34	.841						
26	.837						
5	.829						
24	.814						
<i>Flexibility and Connectedness</i>							
47		.879					
3		.872					
8		.835					
9		.832					
30		.832					
1		.828					
54		.812					
33		.807					
45		.756					
10		.730					
<i>Clarity and Open emotional expression</i>							
14			.940				
15			.916				
53			.913				
48			.910				
16			.909				
29			.903				
20			.897				
23			.858				
41			.855				
37			.767				
<i>Resources - Community</i>							
31				.911			
49				.889			
39				.883			
32				.876			
2				.857			
38				.833			
19				.819			
50				.627			
<i>Transcendence and spirituality</i>							
12					.916		
42					.896		
35					.881		
44					.819		
<i>Collaborative problem-solving</i>							
17						-.890	
27						-.872	
25						-.869	
28						-.867	
52						-.849	
6						-.757	
46						-.672	
<i>Resources - Neighbors</i>							
43							.838
11							.753
Initial eigenvalues	12.92	12.53	8.87	4.41	2.65	2.28	1.17
% of variance explained	23.92	23.21	16.43	8.16	4.91	4.22	2.17
Cronbach's alpha coefficients	0.97	0.97	0.97	0.96	0.93	0.96	0.90

Table 2b: Structure matrix of exploratory factor analysis (direct oblimin rotation).

Item No.	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
<i>Meaning making and Positive outlook</i>							
13	.915						
40	.907						
4	.905						
18	.902						
36	.900						
7	.897						
21	.885						
22	.871						
51	.871						
34	.869						
26	.868						
5	.845						
24	.817						
<i>Flexibility and Connectedness</i>							
47		.943				-.607	
3		.932				-.589	
8		.915				-.581	
9		.913				-.576	
30		.894				-.589	
1		.880				-.661	
54		.875				-.555	
33		.837				-.533	
45		.774					
10		.757				-.440	
<i>Clarity and Open emotional expression</i>							
14			.957				
15			.937				
53			.927				
48			.924				
16			.924				
29			.912				
20			.896				
23			.892				
41			.878				
37			.712				
<i>Resources - Community</i>							
31				.936			
49				.930			
39				.910			
32				.905			.444
2	.442			.905			.401
38				.855			
19				.833			
50				.733			.436
<i>Transcendence and spirituality</i>							
12					.923		
42					.896		
35					.882		
44	.427				.869		
<i>Collaborative problem-solving</i>							
17		.573				-.912	
27		.583				-.909	
25		.538				-.908	
28		.541				-.902	
52		.554				-.896	
6		.669				-.833	
46		.539				-.815	
<i>Resources - Neighbors</i>							
43				.477			.929
11				.452			.859



Table 3: *Family Resilience Assessment Scale (FRAS)*.

No.	Items	Walsh's framework (9 constructs) <sup>1</sup>	Sixbey's study (6 factors) <sup>2</sup>	Current study (7 factors) <sup>3</sup>
4	We accept stressful events as a part of life	MM	AMM	MMPO
5	We accept that problems occur unexpectedly	MM	AMM	MMPO
7	We are able to work through pain and come to an understanding	MM	FCPS	MMPO
18	We can deal with family differences in accepting a loss	MM	FCPS	MMPO
24	We can work through difficulties as a family	MM	FCPS	MMPO
40	We learn from each other's mistakes	MM	FCPS	MMPO
13	We believe we can handle our problems	PO	MPO	MMPO
21	We can solve major problems	PO	MPO	MMPO
22	We can survive if another problem comes up	PO	MPO	MMPO
26	We define problems positively to solve them	PO	FCPS	MMPO
34	We feel we are strong in facing big problems	PO	MPO	MMPO
36	We have the strength to solve our problems	PO	MPO	MMPO
51	We trust things will work out even in difficult times	PO	MPO	MMPO
12	We attend prayers/services at temple/mosque/church/other places of worship	TS	FS	TS
35	We have faith in Buddha/Deities/Allah/God/Hindu gods/Others	TS	FS	TS
42	We participate in temple/mosque/church/other religious activities	TS	FS	TS
44	We seek advice from religious advisors	TS	FS	TS
1	Our family is flexible and can deal with unexpected events	FI	FCPS	FLCO
8	We are adaptable to demands placed on us as a family	FI	FCPS	FLCO
9	We are open to new ways of doing things in our family	FI	FCPS	FLCO
3	The things we do for each other make us feel a part of the family	Co	AMM	FLCO
10	We are understood by other family members	Co	FCPS	FLCO
30	We feel good giving time and energy to our family	Co	FCPS	FLCO
47	We show love and affection for family members	Co	FC	FLCO
33	We feel taken for granted by family members*	Co	FC	FLCO
45	We seldom listen to family members concerns or problems*	Co	FC	FLCO
2	Our friends value us and who we are	SER	FC	R-C
11	We ask neighbors for help and assistance	SER	USER	R-N
19	We can depend upon people in this community	SER	USER	R-C
31	We feel people in this community are willing to help in an emergency	SER	USER	R-C
32	We feel secure living in this community	SER	USER	R-C
38	We know there is community help if there is trouble	SER	USER	R-C
39	We know we are important to our friends	SER	USER	R-C
43	We receive gifts and favors from neighbors	SER	USER	R-N
49	We think this is a good community to raise children	SER	USER	R-C
50	We think we should not get too involved with people in this community*	SER	FC	R-C
14	We can ask for clarification if we do not understand each other	CI	FCPS	COEE
15	We can be honest and direct with each other in our family	CI	FCPS	COEE

20	In our family, we can question or clarify when we do not understand the communications between family members	CI	FCPS	COEE
23	We can talk about the way we communicate in our family	CI	FCPS	COEE
41	We mean what we say to each other in our family	CI	FCPS	COEE
53	We understand communication from other family members	CI	FCPS	COEE
54	We work to make sure family members are not emotionally or physically hurt	OEE	FCPS	FLCO
16	We can ventilate at home without upsetting someone	OEE	FCPS	COEE
29	We feel free to express our opinions	OEE	FCPS	COEE
48	We tell each other how much we care for one another	OEE	FCPS	COEE
37	We keep our feelings to ourselves*	OEE	FC	COEE
6	We all have input into major family decisions	CPS	FCPS	CPS
17	We can compromise when problems come up	CPS	FCPS	CPS
25	We check with each other about decisions	CPS	FCPS	CPS
27	We discuss problems and feel good about the solutions	CPS	FCPS	CPS
28	We discuss things until we reach a resolution	CPS	FCPS	CPS
46	We share responsibility in the family	CPS	FCPS	CPS
52	We try new ways of working with problems	CPS	FCPS	CPS

<sup>1</sup> MM=Making meaning of adversity; PO=Positive outlook; TS=Transcendence and spirituality; FI=Flexibility; Co=Connectedness; SER=Social and economic resources; CI=Clarity; OEE=Open emotional expression; CPS=Collaborative problem-solving.

<sup>2</sup> AMM=Ability to make meaning of adversity (3 items); FCPS=family communication and problem-solving (27 items); MPO=Maintaining a positive outlook (6 items); FS=Family spirituality (4 items); FC=Family connectedness (6 items); Utilizing social and economic resources (8 items).

<sup>3</sup> MMPO=Meaning making and Positive outlook (13 items); TS=Transcendence and spirituality (4 items); FLCO=Flexibility and Connectedness (10 items); R-C =Resources – Community (8 items); R-N=Resources - Neighbors (2 items); COEE=Clarity and Open emotional expression (10 items); CPS=Collaborative problem-solving (7items). \*Reverse scored.