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Psychosocial Predictors of Lifestyle Management In Adults with Epilepsy

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Abstract

The purpose of this article is to describe a test of psychosocial variables predicting lifestyle management among people with epilepsy. The variables selected for the model were based on social cognitive theory and the results of previous studies examining psychosocial predictors of self-management among people with chronic physical health conditions. Variables included in the model were self-efficacy, outcome expectancies, depressive symptoms, and social support. Participants for the study were recruited from epilepsy treatment facilities in Boston, MA and Atlanta, GA. Half of the participants were female, 81% were white, and their mean age was 43.1 years. As predicted by social cognitive theory, self-efficacy was related to lifestyle management and explained 23% of its variation. Depressive symptoms were related to both self-efficacy and social support. Social support was related to self-efficacy. These findings suggest that lifestyle management is influenced by a number of relationships between psychosocial variables, particularly by self-efficacy.

Introduction

Epilepsy self-management is broadly defined as a “class of adaptive behaviors used by persons to control their seizures” (1). Although taking medications to control seizures is often viewed as the most important management technique for people with epilepsy, antiepileptic drugs (AED) do not control seizures completely in approximately 30% of people treated with them (2,3). For these people in particular, it is important to engage in the

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full scope of self-management activities in order to minimize seizure frequency and improve quality of life.

Lifestyle management is an often-ignored component of epilepsy self-management. Yet for some, it can have a substantial effect on seizure expression. Lifestyle management is defined as the “knowledge, attitudes, skills, and behaviors required to promote general physical and mental health and a good quality of life” (4). The following lifestyle management behaviors have been linked to seizure frequency among people with epilepsy: 1) stress management, 2) sleep behavior and 3) diet and exercise. Of these, stress management and sleep behavior are known to have the most direct relationship with seizure expression (5–10). Specifically, higher levels of stress have been associated with increases in seizure frequency (11–13). In fact, stress is consistently reported by people with epilepsy as the most common precipitant of their seizures (14–17). Both Frucht et al. and Nakken et al. have found that approximately 25% of people with epilepsy say that emotional stress is their most frequent seizure precipitant (14,15). Further, some investigators have demonstrated that stress reduction strategies can diminish seizure frequency in people whose epilepsy is not well controlled (5–7).

Sleep behavior, the second dimension of lifestyle management, has also been empirically linked to seizure frequency among people with epilepsy. Both sleep deprivation and poor sleep increase seizure frequency, especially in people whose epilepsy is not fully controlled by AEDs (8–10). Sleep deprivation is commonly used to induce seizures among inpatients undergoing electroencephalography monitoring (9). This technique is particularly effective in patients with primary generalized and absence seizures. It has also been employed successfully in seizure-type-combined groups of women and people who experienced their first seizure before the age of twenty (18). Accordingly, it is important for many people with epilepsy to avoid sleep deprivation or poor sleep in order to minimize their seizures.

The last dimensions of lifestyle management included in this analysis, diet and exercise, have not been empirically linked to seizure frequency. They are important, however, as people with epilepsy should take the same steps to improve their overall health as people in the general population. Furthermore, both of these behaviors are tied to stress and sleep, and are therefore indirectly tied to seizure frequency. For example, exercise has been associated with both stress reduction and the improvement of sleep quality (19–21). Similarly, several dietary behaviors (e.g. caffeine use) are known to reduce sleep efficiency (22). Diet and exercise, taken together with stress reduction and sleep behavior, comprise an important area of self-management for people with epilepsy.

Although psychosocial predictors of medication adherence have been studied in several populations with chronic physical health conditions, factors predicting lifestyle management are not frequently evaluated (23). The purpose of this article is to 1) describe a model of predictive relationships among psychosocial variables and lifestyle management and 2) test the model among people with epilepsy. The variables selected for the model were based on social cognitive theory and empirical studies of psychosocial variables and self-management.

Theoretical Perspective

Social cognitive theory (SCT) posits that behavior is influenced by a dynamic interaction between personal factors, environmental factors and behavior itself (24). In this study, we examined the roles of three personal factors—self-efficacy, outcome expectancies, and depressive symptoms—and the environmental factor of social support in predicting lifestyle management. Self-efficacy refers to confidence in one’s ability to perform a specific task in a specific situation (24). Based on SCT, we hypothesized that self-efficacious people would

be more likely to engage in lifestyle management behaviors like stress reduction. SCT posits that outcome expectancies, one's belief about the consequences of an activity, also influence behavioral decisions. Accordingly, we hypothesized that people who expect a behavior to yield positive outcomes would be more likely to perform the behavior (25). For example, people with epilepsy who expect stress reduction to reduce their seizure frequency would be more likely to engage in stress reduction activities. SCT proposes that depression has a negative effect on behavior and tends to diminish participation (25). We anticipated that people who reported higher levels of depressive symptoms would be less likely to engage in lifestyle management behaviors. Lastly, SCT suggests that perceived support from family and friends increases self-efficacy as encouragement from others improves one's perceived capability to handle a task (24). These relationships are presented in Figure 1. The theoretical and empirical justifications for the proposed relationships are presented below.

The path from self-efficacy to lifestyle management

Studies of self-management among individuals with chronic illnesses consistently detect a strong and positive relationship between self-efficacy and self-management (23,24,26,27). Among people with epilepsy, higher levels of self-efficacy are associated with higher scores on self-management measures (1,28,29).

The path from self-efficacy to outcome expectancies to lifestyle management

According to SCT, self-efficacy plays an important role in the development and maintenance of personal motivation. In SCT, outcome expectancies are one of three types of cognitive motivators (25). Some self-management studies report a significant association between self-efficacy and outcome expectancies (23,27,30), others do not (23,31,32). Clark et al. (23) found that outcome expectancies for stress management significantly predicted stress reduction. However, when studied with respect to exercise behavior, outcome expectancies have, by in large, not been significantly associated with self-management (31,32). Additionally, DiIorio et al. did not find outcome expectancies to be a significant predictor of medication management when evaluating outcome expectancies as a mediator between self-efficacy and medication management [2].

The path from self-efficacy to depressive symptoms to lifestyle management

Self-efficacy influences people's beliefs in their ability to handle difficult situations (25). Persons with high self-efficacy are less likely to report symptoms of depression or anxiety. Self-efficacy displays a consistent protective effect against depression in populations with (29) and without (27,33–35) epilepsy. Depression has also consistently been found to suppress management activity (36–40).

The path from perceived social support to self-efficacy

SCT posits that individuals' self-efficacy is greatly influenced by the amount of support they perceive from the people who are important to them (25). Empirically, however, investigators report an inconsistent relationship between social support and self-efficacy (1,26,28,29,41). In epilepsy populations, DiIorio et al. have found consistently significant associations between the two (1,28,29). The relationship is not consistently significant in non-epilepsy populations (26,41).

Summary

The a priori model was based on psychosocial constructs derived from SCT and empirical research. The model proposes that self-efficacy influences lifestyle management both directly and indirectly through outcome expectancies and depressive symptoms. It also posits that social support influences self-efficacy. Although findings regarding some of the

proposed relationships are inconsistent, the model's theoretical structure and relevance of the existing evidence warrants their inclusion. Specifically, the outcome expectancies construct is included because of its strength with regard to stress management, as seen by Clark et al. (23). A relationship between social support and self-efficacy has been detected in epilepsy populations (1,28,29) and is considered accordingly.

Methods

The data used in this analysis are from Project EASE, a three-year study funded by the National Institute of Nursing Research. The primary purpose of the study was to examine psychosocial predictors of self-management in people with epilepsy. Patients were recruited from two epilepsy centers—one in Boston, MA and one in Atlanta, GA—and a neurology clinic in Atlanta. Eligibility criteria included a diagnosis of epilepsy and current use of AEDs.

Prior to study initiation, study protocol was approved by the institutional review boards at each research setting. After providing consent, participants completed three interviews: baseline, 3-month, and 6-month assessments. The study staff assisted participants through the initial sections of the assessments after which measurements were conducted primarily through audio computer-assisted interviewing technology. At each time point, participants provided background information and completed cognitive assessments and SCT-based psychosocial measures. (See DiIorio et al., 2004 for a more detailed description of the methods).

Instruments

Lifestyle Management was measured using the Epilepsy Self-Management Scale (ESMS). The ESMS is composed of 38 items and measures the degree to which people consistently perform tasks to manage their epilepsy. Five factors emerged when the structure of the 38 item scale was examined using principal components analysis with varimax rotation: 1) medication management, 2) information management, 3) seizure management, 4) safety management and 5) lifestyle management. The lifestyle management subscale was used as the primary outcome measure for this analysis. The 5 items in the subscale include questions about stress management, sleep, exercise, and eating behaviors. The response options for each item range from 1 to 5, where 1 indicates "never" and 5 indicates "always." An example of an item is: "I make sure I get enough sleep." In prior studies of people with epilepsy, the full 38 item scale has displayed a coefficient alpha between .81 and .84 (1,28). In the present sample, the lifestyle management subscale had a coefficient alpha of .67.

Self-efficacy for lifestyle management was measured using the Epilepsy Self-Efficacy Scale (ESES). The ESES is composed of 33 items and measures the self-efficacy that people have about managing their epilepsy. The self-efficacy for lifestyle management subscale used in this analysis was identified in two ways. First, items that corresponded to the lifestyle management topics of stress management, sleep, exercise and eating behaviors were identified. Principal components factor analysis with varimax rotation then confirmed the presence of the subscale. The subscale includes 7 items. The response options for each item range from 0 to 10, where 0 indicates "I cannot do at all" and 10 indicates "Sure I can do." An example of an item is: "I can always use stress management techniques to stop my seizures." In prior studies of people with epilepsy, the full 33 item scale displayed a coefficient alpha between .91 and .94 (1,28,42). In the present sample, the self-efficacy for lifestyle management subscale had a coefficient alpha of .77.

Outcome expectancies were measured using an outcome expectancies for seizure management scale (2). The scale is composed of 8 items and asks participants to consider

general outcomes they can expect if they manage their seizures well. The response options for each item range between 1 and 5, where 1 indicates “strongly disagree” and 5 indicates “strongly agree.” An example item is: “I will be more independent and feel more in charge of my life.” In the present population, the scale had a coefficient alpha of .72.

The Center for Epidemiologic Studies Depression Scale (CES-D) was used to measure depressive symptoms. The scale was developed for use in the general population to measure depressive symptomatology (43). It has also been used in epilepsy populations (29). The scale is composed of 20 items. The response options for each item range between 1 and 4, where 1 indicates “rarely or none of the time” and 4 indicates “most or all of the time.” An example item is: “I talked less than usual.” In prior studies of people with epilepsy, the CES-D displayed a coefficient alpha of .92 (2). In the present sample, the scale had a coefficient alpha of .91.

Perceived social support was measured using the Personal Resource Questionnaire 85 Part 2 (PRQ85-2). The scale is composed of 25 items that address perceived intimacy, social integration, assistance and affirmation of worth (36). The response options for each item range between 1 and 7 where 1 indicates “strongly disagree” and 7 indicates “strongly agree.” An example item is: “There are people who are available if I need help over an extended (long) period of time.” In prior studies of people with epilepsy, the PRQ85-2 displayed a coefficient alpha of .92 (2). In the present sample, the scale had a coefficient alpha of .91.

Data Analysis

The analysis began with an assessment of the variables. Exploratory and descriptive statistics, including skewness and kurtosis, were calculated using SPSS v. 13. To reduce skewness, all observations outside three standard deviations from the mean were removed. Path analysis was conducted using Maximum Likelihood Estimation in LISREL Student Version 8.0. Model fit was assessed through two standard fit indicators: 1) the Root Mean Square of Error Approximation (RMSEA) (44) and 2) the Goodness of Fit Index (GFI) (45). Acceptable model fit is indicated by a RMSEA $\leq .10$ (where 0.0 indicates perfect fit) and a GFI $\geq .90$ (where 1.0 indicates perfect fit). Model modification indices were used to explore possible fit improvements (46).

Results

Sample

The initial sample included 318 individuals. Following the exclusion of outlying responses, 306 were included in the analysis. Participants were between 19 and 74 years of age, with a mean age of 43.1 years. The sample was half female and primarily (81.0%) white. Approximately half (48.0%) of the sample was married and almost all participants (97.6%) had graduated from high school. About one third (38.2%) of participants worked full time and more than half (58.1%) of participants reported an annual household income above \$30,000 per year.

Participants also completed a series of questions about their seizures. The majority (85.2%) of participants experienced their first seizure before age 40, and most (75.4%) reported having a seizure in the year prior to baseline assessment. In this population, people were slightly more likely to experience generalized (43.2%) than partial (38.4%) seizures.

The descriptive statistics and coefficient alphas for each variable are presented in Table 1. A ceiling effect is seen in the responses to the self-efficacy, outcome expectancies and

perceived social support variables. Though largely addressed through the exclusion of outlying responses, the measures of significance associated with the model need to be interpreted with caution because of these deviations from normality. The internal consistency reliability for self-efficacy and outcome expectancies is adequate. The alpha coefficient for lifestyle management is .67. The implications of these values are discussed below.

Testing of the a priori model showed that self-efficacy for lifestyle management was directly related to lifestyle management. It also showed that social support was directly related to self-efficacy. Neither outcome expectancies nor depressive symptoms, however, were directly related to lifestyle management. Additionally, while the GFI was within acceptable range (.92), the RMSEA (.226) indicated that the model fit was unfavorable. Model modification indices suggested that outcome expectancies be dropped from the model.

The initial positioning of depressive symptoms as a mediator of the relationship between self-efficacy and lifestyle management was based on common usage of SCT and prior studies that determined self-efficacy to be a predictor depressive symptoms (27,29,33–35). The decision to change the direction of the relationship between depressive symptoms and self-efficacy was based on a reappraisal of SCT and support from the literature. Bandura posits that mood and self-efficacy have a reciprocal relationship, (25) and some investigators have found that depressive symptoms can be a predictor rather than a consequence of self-efficacy (47,48). Thus, the model was retested with self-efficacy mediating of the relationships between both 1) perceived social support and lifestyle management and 2) depressive symptoms and lifestyle management. This final model yielded a RMSEA of .068 and a GFI of .99. The standardized path coefficients for the final model are displayed in Figure 2. Depressive symptoms and social support collectively explained 24 percent of the variation of self-efficacy. Self-efficacy explained 23 percent of the variation in lifestyle management.

Discussion

The model tested in this study was created using the constructs and theoretical orientation of SCT. Within the final model, all paths were statistically significant. Self-efficacy for lifestyle management had a direct influence on lifestyle management behavior. Depressive symptoms and perceived social support both had a direct influence on self-efficacy and an indirect influence on lifestyle management. Lastly, depressive symptoms and perceived social support were significantly correlated. These findings indicate that self-efficacy is an important factor in the regulation of lifestyle management behaviors among people with epilepsy including stress management, sleep, diet and exercise. The findings also indicate that depressive symptoms and perceived social support can affect individuals' self-efficacy, which can in turn alter lifestyle management behaviors. Lastly, they confirm that, on average, people reporting higher levels of perceived social support report fewer depressive symptoms.

These results support previous findings within both epilepsy (1,2,28,49) and other chronic physical health conditions (23,31,32,47,48,50). Using the same sample of adults with epilepsy, DiIorio et al. (2004) found that self-efficacy was one of two social cognitive variables that had a direct effect on self-management for medications. Positive relationships between self-efficacy and self-management have also been seen in other populations with (1,28,49) and without (23) epilepsy. A positive, direct influence was seen between perceived social support and self-efficacy. This result has been found in previous studies of persons with epilepsy (1,28,29). Both findings support the construct relationships proposed by SCT [25].

Based on social cognitive theory, we expected that outcome expectancies would be directly related to lifestyle management in the model. Although this association was present in the bivariate correlation ($p=0.001$), the direct path between outcome expectancies and self-management was non-significant when outcome expectancies was included as a mediator of the relationship between self-efficacy and lifestyle management. This finding is not consistent with Bandura's proposal that self-efficacy influences outcome expectancies, which in turn influence behavior choice [25]. Because the bivariate relationship between outcome expectancies and lifestyle management was significant, it is likely that the inclusion of multiple variables in the model, diluted this relationship. DiIorio et al. obtained the same result when they positioned outcome expectancies as a mediator of the relationship between self-efficacy and medication management [2]. Another possibility for the results is the general nature of the outcome expectancies scale. The scale refers to general outcomes if seizures are managed well. The findings suggest that a scale that relates specifically to lifestyle management outcomes may function better in a multivariate model.

DiIorio et al. also found that depressive symptoms were not significantly related to self-management when depressive symptoms mediated the relationship between self-efficacy and medication management. In the present study, bivariate correlations confirmed the expected relationship ($p<0.0001$) but the association was no longer significant when depression was introduced as a mediator.

In the final model, the path from depressive symptoms to self-efficacy to lifestyle management was significant. This finding supports results from previous studies which found depressive symptoms to reduce self efficacy [46,47,49]. For example, Cinciripini et al. report that the relationship between depressive symptoms and smoking-cessation was mediated by self-efficacy(47). Within this analysis, they found that depressive symptoms had a negative effect on self-efficacy. Though not conducted within populations of persons with epilepsy, studies such as this validate the alternate relationship proposed by Bandura: depressed mood can affect self-efficacy. All of the other relationships in the final model support SCT. Support from friends and family members increases perceived self-efficacy and is associated with decreases in reported depressive symptoms. Self-efficacy is consistently a strong predictor of behavior.

Limitations

The sample selected for this study was nonrandom and composed of individuals interested in completing surveys of epilepsy self-management. Additionally, because only baseline data were used for this analysis, the relationships within the model cannot be interpreted as causal. The internal consistency reliability for the lifestyle management variable was low. Although adequate, the internal consistency of the self-efficacy variable was also lower than desired. In the case of the lifestyle management scale, the low internal consistency may be attributable to the limited number of items included in the measure. However, both of these internal consistency coefficients could indicate a larger issue with viewing sleep, stress management and diet and exercise as a single set of behaviors. This possibility is supported by the fact that low inter-item correlations were noted among the diet and stress items, as well as the diet and sleep items, on both the self-efficacy and lifestyle management scales. Because a large number of people with epilepsy identify stress as a direct cause of their seizures (14–17), it is conceivable that they would view stress reduction as more important than eating well. Further research is needed to determine the degree to which these behaviors are truly associated in epilepsy populations. Lastly, the a priori model was modified following initial analysis, and replication of the study is needed to confirm this theoretically and empirically derived set of relationships.

Implications for epilepsy care providers

Lifestyle management is an important part of healthy living with epilepsy. Especially for the 30% of people who cannot fully control their seizures with medication, lifestyle management can vastly improve quality of life. It is important to understand the factors that contribute to a patient's decision to lead a healthier lifestyle. Providers should realize that self-efficacy strongly influences lifestyle management. Helping patients understand that lifestyle management resources (e.g. counseling centers or gym memberships) are accessible and attainable could increase patient usage of those services. Additionally, as social support has a direct effect on self-efficacy, it is also important to share this information with patients' friends or family members.

Depression is common in people with epilepsy (51). In a review of the literature, Hermann and colleagues found lifetime rates of major depression ranging between 8 and 48%. In addition to negatively affecting disease management, depression has profound effects on patient quality of life (52). People with epilepsy need to be aware of the mental health services available to them. If affordable counseling services or support groups are not available in the immediate area, practitioners can facilitate the development of patient-coordinated support groups.

Further research is needed to determine both additional predictors of lifestyle management and long term outcomes of lifestyle management. This is especially true in the case of stress- and sleep-related behaviors. Although stress is casually referred to as a seizure precipitant, very few empirical trials have assessed the magnitude or conditional variability of this effect (53). Stress responses may affect some people differently than others—it would be useful to understand the subpopulations in which stress reduction has the greatest clinical effect. Similarly, while sleep deprivation is known to induce seizures, the exact mechanism by which this occurs is not well understood (18). Exploration of these relationships could lead to better lifestyle management interventions and improved quality of life for people with epilepsy.

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References

1. DiIorio C, Faherty B, Manteuffel B. Epilepsy self-management: partial replication and extension. *Research in Nursing & Health*. 1994; 17(3):167–174. [PubMed: 8184128]
2. DiIorio C, Shafer P, Letz R, Henry T, Schomer D, Yeager K. Project EASE: a study to test a psychosocial model of epilepsy medication management. *Epilepsy & Behavior*. 2004 Dec; 5(6):926–936. [PubMed: 15624235]
3. Green LW, Simons-Morton DG. Denial, delay and disappointment: discovering and overcoming the causes of drug errors and missed appointments. *Epilepsy Res Suppl*. 1988; 1:7–21. [PubMed: 3072191]
4. DiIorio, C., editor. *Epilepsy Self -Management*. American Epilepsy Society Annual Meeting; San Diego. 2006.

5. Cabral RJ, Scott DF. Effects of two desensitization techniques, biofeedback and relaxation, on intractable epilepsy: follow-up study. *Journal of Neurology, Neurosurgery & Psychiatry*. 1976; 39(5):504–507.
6. Schmid-Schonbein C. Improvement of seizure control by psychological methods in patients with intractable epilepsies. *Seizure*. 1998; 7:261–270. [PubMed: 9733400]
7. Sirven JI, Drazkowski JF, Zimmerman RS, Bortz JJ, Shulman DL, Macleish M. Complementary/alternative medicine for epilepsy in Arizona. *Neurology*. 2003; 61(4):576–577. [PubMed: 12939447]
8. Mendez M, Radtke RA. Interactions between sleep and epilepsy. *Journal of Clinical Neurophysiology*. 2001 Mar; 18(2):106–127. [PubMed: 11435803]
9. Salinsky M, Kanter R, Dasheiff RM. Effectiveness of multiple EEGs in supporting the diagnosis of epilepsy: An operational curve. *Epilepsia*. 1987 Jul–Aug; 28(4):331–334. [PubMed: 3622408]
10. Fountain NB, Kim JS, Lee SI. Sleep deprivation activates epileptiform discharges independent of the activating effects of sleep. *Journal of Clinical Neurophysiology*. 1998 Jan; 15(1):69–75. [PubMed: 9502515]
11. Klein P, van Passel L. Effects of stress related to the 9/11/2001 terror attack on seizures in patients with epilepsy. *Neurology*. 2005; 64:1815–1816. [PubMed: 15911825]
12. Neufeld M, Sadeh M, Cohn D. Stress and epilepsy: the Gulf War experience. *Seizure*. 1994; 3:135–139. [PubMed: 8081640]
13. Swinkels WA, Engelsman M, Kasteleijn-Nolst Trenite DG, Baal MG, de Haan GJ, Oosting J. Influence of an evacuation in February 1995 in The Netherlands on the seizure frequency in patients with epilepsy: A controlled study. *Epilepsia*. 1998; 39(11):1203–1207. [PubMed: 9821985]
14. Frucht MM, Quigg M, Schwaner C, Fountain NB. Distribution of seizure precipitants among epilepsy syndromes. *Epilepsia*. 2000; 41(12):1534–1539. [PubMed: 11114210]
15. Nakken KO, Solaas MH, Kjeldsen MJ, Friis ML, Pellock JM, Corey LA. Which seizure-precipitating factors do patients with epilepsy most frequently report. *Epilepsy & Behavior*. 2005; 6(1):85–89. [PubMed: 15652738]
16. Spector S, Cull C, Goldstein LH. Seizure precipitants and perceived self-control of seizures in adults with poorly-controlled epilepsy. *Epilepsy Research*. 2000 Feb; 38(2–3):207–216. [PubMed: 10642047]
17. Temkin NR, Davis GR. Stress as a risk factor for seizures among adults with epilepsy. *Epilepsia*. 1984; 25(4):450–456. [PubMed: 6745217]
18. Degen R, Degen H, Reker M. Sleep EEG with or without sleep deprivation? Does sleep deprivation activate more epileptic activity in patients suffering from different types of epilepsy? *European Neurology*. 1987; 26(1):51–59. [PubMed: 3816886]
19. Singh N, Clements K, Fiatarone M. A randomized controlled trial of the effect of exercise on sleep. *Sleep*. 1997; 20(2):95–101. [PubMed: 9143068]
20. Berger B, Owen D. Stress reduction and mood enhancement in four exercise modes: swimming, body conditioning, hatha yoga, and fencing. *Research Quarterly for Exercise and Sport*. 1988; 59(2):148–159.
21. King A, Oman R, Brassington G, Bliwise D, Haskell W. Moderate-intensity exercise and self-rated quality of sleep in older adults. A randomized controlled trial. *JAMA*. 1997; 277(1):32–37. [PubMed: 8980207]
22. Bonnet M, Arand D. Caffeine use as a model of acute and chronic insomnia. *Sleep*. 1992; 15:526–536. [PubMed: 1475567]
23. Clark N, Dodge J. Exploring self-efficacy as a predictor of disease management. *Health Education & Behavior*. 1999; 26(1):72–89. [PubMed: 9952053]
24. Bandura, A. Self-efficacy: The exercise of control. New York: W. H. Freeman and Company; 1997.
25. Bandura, A. Self-efficacy in changing societies. New York: Cambridge University Press; 1995.
26. Strating M, van Schuur W, Spurmeijer T. Contribution of partner support in self-management of rheumatoid arthritis patients. An application of the Theory of Planned Behavior. *Journal of Behavioral Medicine*. 2006; 29(1):51–60. [PubMed: 16400533]

27. Luszczynska A, Scholz U, Schwarzer R. The general self-efficacy scale: multicultural validation studies. *Journal of Psychology*. 2005; 139(5):439–457. [PubMed: 16285214]
28. Dilorio C, Faherty B, Manteuffel B. Self-efficacy and social support in self-management of epilepsy. *Western Journal of Nursing Research*. 1992; 14(3):292–307. [PubMed: 1615646]
29. DiIorio C, Shafer P, Letz R, Henry T, Schomer D, Yeager K. Behavioral, social, and affective factors associated with self-efficacy for self-amangement among people with epilepsy. *Epilepsy and Behavior*. 2006; 9:158–163. [PubMed: 16798100]
30. Elliot J, Jacobson M, Seals B. Self-efficacy, knowledge, health beliefs, quality of life, and stigma in relation to osteoprotective behaviors in epilepsy. *Epilepsy & Behavior*. 2006; 9:478–491. [PubMed: 16935031]
31. Jones F, Harris P, Waller H, Coggins A. Adherence to an exercise prescription scheme: the role of expectations, self-efficacy, stage of change and psychological well being. *British Journal of Health Psychology*. 2005; 10(3):359–378. [PubMed: 16238853]
32. Wilson P, Blanchard C, Nehl E, Baker F. Predicting physical activity and outcome expectations in cancer survivors: an application of self-determination theory. *Psycho-Oncology*. 1006; 15:567–568. [PubMed: 16304621]
33. Bisschop M, Kriegsman D, Beekman A, Deeg D. Chronic disease and depression: th emodifying role of psychosocial resources. *Social Science & Medicine*. 2004; 59:721–733. [PubMed: 15177830]
34. Brody BL, Roch-Levecq AC, Gamst AC, Maclean K, Kaplan RM, Brown SI. Self-management of age-related macular degeneration and quality of life: a randomized controlled trial. *Archives of Ophthalmology*. 2002; 120(11):1477–1483. [PubMed: 12427060]
35. Tsay S, Healsted M. Self-care self-efficacy, depression, and quality of life among patients receiving heamodialysis in Taiwan. *International Journal of Nursing Studies*. 2002; 39:245–251. [PubMed: 11864647]
36. Katon W, Ciechanowski P. Impact of major depression on chronic medical illness. *J Psychosom Res*. 2002 Oct; 53(4):859–863. [PubMed: 12377294]
37. Ciechanowski PS, Katon WJ, Russo JE, Hirsch IB. The relationship of depressive symptoms to symptom reporting, self-care and glucose control in diabetes. *Gen Hosp Psychiatry*. 2003 Jul–Aug; 25(4):246–252. [PubMed: 12850656]
38. Ciechanowski PS, Katon WJ, Russo JE. Depression and diabetes: impact of depressive symptoms on adherence, function, and costs. *Arch Intern Med*. 2000 Nov 27; 160(21):3278–3285. [PubMed: 11088090]
39. DiMatteo MR, Lepper HS, Croghan TW. Depression is a risk factor for noncompliance with medical treatment: meta-analysis of the effects of anxiety and depression on patient adherence. *Arch Intern Med*. 2000 Jul 24; 160(14):2101–2107. [PubMed: 10904452]
40. Lustman PJ, Anderson RJ, Freedland KE, de Groot M, Carney RM, Clouse RE. Depression and poor glycemic control: a meta-analytic review of the literature. *Diabetes Care*. 2000 Jul; 23(7): 934–942. [PubMed: 10895843]
41. Amir M, Roziner I, Knoll A, Neufeld MY. Self-efficacy and social support as mediators in the relation between disease severity and quality of life in patients with epilepsy. *Epilepsia*. 1999; 40(2):216–224. [PubMed: 9952270]
42. DiIorio, C.; Yeager, K. The Epilepsy Self-Efficacy Scale. In: DiIorio, OLSC., editor. *Measurement of Nursing Outcomes: Self Care and Coping*. 2 ed.. New York: Springer Publishing Company; 2003. p. 40-51.
43. Radloff LS. The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*. 1977; 1(3):385–401.
44. Browne, M.; Cudeck, R. Alternative ways of assessing model fit. In: Bollen, K.; Long, J., editors. *Testing structural equation models*. Newbury Park, CA: Sage; 1993. p. 136-162.
45. Jöreskog, KGS. D. LISREL-VI user's guide. 3rd ed.. Mooresville, IN: Scientific Software; 1984.
46. MacCallum RC. Specification searches in covariance structure modeling. *Psychological Bulletin*. 1986:107–120.

47. Cinciripini P, Wetter D, Fouladi R, Blalock J, Carter B, Cinciripini L, et al. The Effects of Depressed Mood on Smoking Cessation: Mediation by Postcessation Self-Efficacy. *Journal of Consulting & Clinical Psychology*. 2003; 71(2):292–301. [PubMed: 12699023]
48. Haley W, Roth D, Coleton M, Ford G, West C, Collins R, et al. Appraisal, Coping, and Social Support as Mediators of Well-Being in Black and White Family Caregivers of Patients with Alzheimer's Disease. *Journal of Consulting & Clinical Psychology*. 1996; 64(1):121–129. [PubMed: 8907091]
49. DiIorio C, Hennessy M, Manteuffel B. Epilepsy self-management: a test of a theoretical model. *Nursing Research*. 1996; 45(4):211–217. [PubMed: 8700654]
50. Stewart S, Kennard B, Lee P, Hughes C, Mayes T, Emslie G, et al. A Cross-Cultural Investigation of Cognitions and Depressive Symptoms in Adolescents. *Journal of Abnormal Psychology*. 2004; 113(2):248–257. [PubMed: 15122945]
51. Hermann BP, Seldenberg M, Bell B. Psychiatric comorbidity in chronic epilepsy: Identification, consequences, and treatment of major depression. *Epilepsia*. 2000; 41(6 SUPPL. 2):S31–S41. [PubMed: 10885738]
52. Boylan LS, Flint LA, Labovitz DL, Jackson SC, Starner K, Devinsky O. Depression but not seizure frequency predicts quality of life in treatment resistant epilepsy. *Neurology*. 2004; 62:258–261. [PubMed: 14745064]
53. Yardi N. Yoga for control of epilepsy. *Seizure*. 2001; 10:7–12. [PubMed: 11181093]

Figure 1.
Theoretic Model of Stress-Management in Epilepsy

Figure 2.
Final Model
* $p < 0.01$
** $p < 0.001$

Table 1

Descriptive statistics

Variable	N	Mean	SD	Skewness	Kurtosis	α	Levels	No. of Items	Range
Lifestyle Management	306	19.18	4.05	0.16	-0.25	0.67	1 - 5	5	1 - 25
Self-Efficacy for LM	306	50.06	13.23	-0.09	-0.47	0.77	0 - 10	7	0-70
Depressive Symptoms	306	35.44	11.38	0.87	0.14	0.91	1 - 4	20	1-80
Outcome Expectancies	306	32.50	4.77	-0.42	-0.26	0.72	1 - 5	8	1-40
Social Support	306	139.27	22.58	-0.66	0.17	0.91	1 - 7	25	1-175

* The high end of the range for each scale indicates a greatest quantity of that attribute (e.g. Lifestyle Management = 25 indicates strongest reported lifestyle management skills; Depressive Symptoms = 80 indicates the greatest number of depressive symptoms)