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Determinants of nasal CPAP compliance ☆

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Abstract

Background: Obstructive sleep apnea is a prevalent condition with potentially serious medical and psychosocial consequences. Nasal continuous positive airway pressure (CPAP) is the treatment-of-choice and has been shown to reduce the frequency of nocturnal respiratory events, improve sleep architecture and decrease daytime sleepiness. Patient compliance with CPAP is disappointingly low. Previous studies examining determinants of CPAP compliance have limited the variables studied to patient (sociodemographic), disease status, and treatment variables, with few reliable determinants found.

Methods: The purpose of the current study was to investigate the relationship between objectively measured CPAP compliance and variables from social cognitive theory (SCT) and the transtheoretical model (TM). Scales that measure variables from each model were developed and reliability evaluated. The relationship between the SCT and TM variables and compliance at 1-month post-CPAP-fitting was prospectively evaluated on 51 first-time CPAP users. SCT and TM variables were measured on the day of CPAP-fitting, at 1-week post-CPAP-fitting, and at 1-month post-CPAP-fitting.

Results: SCT variables measured 1-week post-CPAP-fitting ($R^2 = 0.261$, $P = 0.001$) and TM variables measured 1-week post-CPAP-fitting ($R^2 = 0.17$, $P = 0.002$) accounted for a statistically significant amount of variance in objective CPAP compliance measured at 1 month. The decisional balance index (from TM) individually accounted for a significant amount of variance in objective CPAP compliance in the above analyses.

Conclusions: The ability of these new behavior change scales to predict CPAP compliance provides us with a new direction of research to better understand factors associated with compliance. The principal advantage of these theory-driven and empirically validated scales are that they measure modifiable factors that can provide the basis for sound interventions to improve CPAP compliance.

Keywords: Sleep apnea; Continuous positive airway pressure; Patient compliance; Behavior change; Self-efficacy; Social cognitive theory; Transtheoretical model

1. Introduction

Obstructive sleep apnea (OSA) is a disorder characterized by repeated cessations of breathing during sleep [1]. Consequences of OSA include excessive daytime sleepiness [2], altered sleep architecture [3], impaired neurocognitive performance [4], dysphoric mood [5], and significant psychosocial disruption [6]. Patients with OSA have increased morbidity from cardiovascular events [7] and automobile accidents [8]. Higher rates of mortality have been seen in middle-aged adults having more than 20 apneas per hour of sleep [9] or having a combination of snoring and excessive daytime sleepiness [10].

The treatment-of-choice for OSA is nasal continuous positive airway pressure (CPAP) [11]. CPAP has been shown to reduce daytime sleepiness [12], oxyhemoglobin desaturations [13], heart rate and pulmonary pressure [14], improve cognitive performance [15], and increase health-related quality of life [16]. Compliance with CPAP is associated with significant reductions in physician claims and hospital stays [17].

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Despite the documented efficacy of CPAP, it is estimated that over 50% of those started on CPAP will not be using it 1 year later [18]. Of those using it 1 year later, most are not using CPAP for the entire night as prescribed. Published compliance rates in the United States range from 4.7 to 5.3 h per night [19,20]. Rates outside the United States tend to be somewhat higher: 5.6 h per night in the United Kingdom [21], 5.6–6.5 in France [22,23]. Because CPAP is accepted by only 50% of patients over a 1-year period and because those who do accept it are not using it as prescribed, it stands to reason that CPAP compliance could be significantly improved.

Determinants of CPAP compliance that have been studied can be classified into one of the three categories: patient/sociodemographic, disease-related, and CPAP-related. Few reliable determinants have been found [24], although improvement in sleepiness level appears to be associated with higher CPAP compliance [25]. Because CPAP is an aid and not a cure, significant behavior change on the part of the patient and the patient's family is necessary. Indeed, the sleep community is beginning to recognize the importance of the 'human factor' in CPAP compliance, e.g. the beliefs and behaviors of the patient and professional/patient interactions [26]. We decided to look at two contemporary, well-supported models of behavior change, social cognitive theory (SCT) and the transtheoretical model (TM), to better understand factors associated with CPAP compliance. Appendix A provides a description of these models. SCT hypothesizes that those patients with (a) higher perceived self-efficacy, (b) higher outcome expectancies for CPAP, (c) greater functional social support, and (d) greater knowledge will be more compliant with CPAP. The TM hypothesizes that those patients (a) with more pros than cons and (b) who use more processes of change will be more compliant with CPAP.

The purpose of this study was to investigate the relationship between objectively measured CPAP compliance and variables from SCT and TM. First, scales that measure variables from each model were developed and psychometric properties evaluated. Second, the ability of SCT and TM variables to predict compliance at 1-month post-CPAP-fitting was prospectively evaluated on 51 first-time CPAP users. It was hypothesized that SCT and TM variables measured: (a) on the day of CPAP-fitting would not be predictive of CPAP compliance and (b) at 1-week post-CPAP-fitting and at 1-month post-CPAP-fitting would be predictive of CPAP compliance.

2. Methods

2.1. Participants

Seventy-seven consecutive patients presenting to the Pulmonary Clinic at the Veterans Affairs San Diego Healthcare System (VASDHS) were asked to participate and 51 patients agreed. Eight individuals did not qualify for study because of either having used CPAP previously or being severely cognitively impaired. Eighteen individuals qualified for the study, but did not participate because of living outside the county, not starting CPAP, or declining to participate in a research study. *T*-tests showed no differences in apnea/hypopnea severity or body mass index (BMI) between the 18 qualified individuals who did not participate and the 51 individuals who did participate. Data collection began in August 1998 and was completed in May 1999. All participants were prescribed nasal CPAP therapy to treat diagnosed sleep apnea and all participants were first-time users of CPAP. None of the participants had previous surgical treatment for sleep apnea. The UCSD Institutional Review Board approved the protocol and all participants signed consent forms.

Forty-nine men and two women were studied. Fifty-three percent were married, 31% were divorced, 4% were widowed, 2% were separated, and 10% were never married. Sixty-five percent of the sample were Caucasian, 14% African–American, 18% Hispanic, and 4% Asian/Pacific Islander. Screening for alcohol abuse revealed that none of the included participants reported significant current alcohol use.

2.2. Apparatus

All CPAP users were prescribed the Respironics Aria LX CPAP machine (Respironics, Inc., Pittsburgh, PA, USA). The CPAP machines were outfitted with an internal clock counter that recorded usage data. Usage data were downloaded onto a portable laptop computer using Respironics' Encore software program, which allowed CPAP data management, including calculation of nightly use for a specified date range. CPAP compliance was defined as the average nightly use (hours per night) over a 1-month time period.

2.3. Scales

The Epworth sleepiness scale (ESS) is a validated 8-item measure of daytime sleepiness [27]. It asks the respondent to estimate how likely they are to doze in eight different situations. The score is based on a 0–24 point scale, with higher scores representing greater levels of sleepiness. The ESS is able to discriminate the sleepiness level of OSA patients from the normals [27].

SCT (self-efficacy, outcome expectations, social support, and knowledge) and TM (processes of change and decisional balance index (DBI)) scales were developed for the present study and psychometric properties evaluated. Items were modeled after existing scales [28–30] and according to published criteria [31,32]. See Appendix B for scale items. Scales were sent to 434 patients who had previously been prescribed a CPAP machine at the VASDHS. Of these, 156 completed questionnaires were returned.

Table 1
Summary of standard regression analysis of selected demographic variables on CPAP pressure[a]

Variable	*B*	SE *B*	*P*-value
BMI	0.153	0.019	<0.001
AHI	2.64×10^{-2}	0.007	<0.001
Age	1.49×10^{-2}	0.013	0.239

[a] $R^2 = 0.746$, adjusted $R^2 = 0.730$, $P < 0.001$.

Reliability was assessed using coefficient alpha, which is an indication of the proportion of variance in the scale scores attributable to the true score. Measures with an alpha of 0.70 and higher are acceptable for initial predictive research [32]. It was the sole measure of reliability for the SCT and TM variables. Test–retest reliability was not deemed an appropriate measure for these constructs as they are considered dynamic variables, specific to the time, context, and experience of the subject. As such, these scale scores are expected to change over short periods of time, across contexts, and with experience. Each scale was found to have acceptable internal consistency (range: 0.66–0.93).

Factor analysis is applied in scale development to examine scale dimensionality [31,32]. It was hypothesized that the processes of change, self-efficacy, outcomes expectations, social support, and knowledge scales were unidimensional. The decisional balance scale was hypothesized to consist of two dimensions, pros and cons. Principal components extraction with varimax rotation was employed. The number of components to retain was determined by using the Kaiser Eigenvalue-greater-than-one rule, examination of screen plots, and examination of the residual correlation plots. Each scale was found to be consistent with the hypothesized number of factors. In summary, the scales were found to be psychometrically sound and suitable for administration in the present study.

2.4. Procedure

Patients had the study explained to them and informed consent was obtained prior to study participation. CPAP-fitting was performed either in the patient's home by a home healthcare company representative under contract by the VASDHS or in the Pulmonary Clinic at the VASDHS. For patients who were set-up at home, the research staff either visited the home or sent the questionnaire via mail. For patients who were set-up at the VASDHS, the research staff either scheduled an appointment at the hospital or sent the questionnaire via mail. SCT and TM questionnaires were administered at CPAP-fitting, 1-week post-CPAP-fitting, and 1-month post-CPAP-fitting. The 1-month post-CPAP-fitting visit occurred either at the patient's home or at the VASDHS and included downloading CPAP compliance data.

2.5. Data analyses

Separate hierarchical regression analyses were performed to examine the proportion of variance accounted for in compliance level by SCT and TM variables. Variables from each model were included as a block in step 2 of the regression. The ESS and CPAP pressure were included as covariates in step 1 of each analysis. The amount of variance accounted for by the block of SCT or TM variables beyond that accounted for by the covariates on step 1 was the outcome of interest. Analyses were done comparing the data from each of the three time points to the 1-month post-CPAP time point. Pairwise plots of residuals by predicted values provided a check for normality, linearity, and heteroscedasticity. Leverage was examined by Mahanlobis' distance and influence was examined by Cook's distance and DfFit scores [33]. In tests of statistical significance, the alpha level was set to 0.05. On the day of CPAP-fitting regression analyses, data were available on a subset of the full sample. Data analyses were performed using SPSS for Windows (v.9.0) [33].

Rather than include all potential covariates, thereby decreasing degrees of freedom in the analyses, reducing the number of covariates was explored. Potential covariates in the present study included age, BMI (kg/m^2), apnea–hypopnea index (AHI) (total number of apneas and hypopneas per hour of sleep), CPAP pressure, and daytime sleepiness, each of which has been found in some studies to be associated with CPAP compliance. It has been shown that CPAP pressure is in large part a function of BMI and AHI [34,35]. To investigate the relationship between CPAP pressure and BMI and AHI in the current sample, a standard multiple regression was performed which found that a sample-adjusted 73% of variance in CPAP pressure was accounted for by a set of independent variables including age, BMI, and AHI (see Table 1). In the interest of using few covariates, CPAP pressure was selected as one of the two covariates (the other was the ESS) in the data analyses for the current study.

3. Results

Table 2 provides descriptive statistics on the sample including age, AHI, initial CPAP pressure, BMI, and

Table 2
Demographic characteristics of the sample

	Mean	SD	Range
Age (years)	54.1	12.3	30–76
BMI (kg/m^2)	36.4	9.0	21–61
AHI	40.4	25.3	2.1–120
CPAP pressure (cm H_20)	9.1	2.0	6–15
CPAP compliance (hours per night)	3.4	2.5	0.1–10.8

Table 3
Summary of hierarchical regression analysis of SCT variables measured at 1 week on CPAP compliance ($N = 49$)

Variable	B	SE B	P-value	R^2	Adjusted R^2	P-value
Step 1:				0.088	0.048	0.122
CPAP pressure	0.28	0.18	0.118			
ESS	−0.11	0.07	0.115			
Step 2:				0.395	0.309	0.001
CPAP pressure	0.33	0.16	0.045			
ESS	−0.17	0.06	0.005			
Self-efficacy	0.15	0.09	0.070			
Outcome expectations	5.00×10^{-2}	0.01	0.600			
Social support	2.22×10^{-2}	0.04	0.598			
Knowledge	0.33	0.18	0.083			
ΔR^2 (Step 2 − Step 1)				0.308	0.261	0.001

compliance. Four subjects had an AHI score less than 15, but were included because of a clinical history strongly suggestive of sleep apnea, including witnessed apneas, excessive daytime sleepiness, and loud snoring nightly.

3.1. Day of CPAP-fitting results

3.1.1. SCT

A hierarchical regression was performed between CPAP compliance as dependent variable and self-efficacy, outcome expectancies, social support, and knowledge as independent variables while controlling for CPAP pressure. The R for regression was not significantly different from zero, $F(4, 20) = 1.972$, $P = 0.138$, indicating that the SCT variables measured on the day of CPAP-fitting were not associated with CPAP compliance at 1 month.

3.1.2. TM

Likewise, when a regression was performed between compliance and the TM variables, the R for regression was not significantly different from zero, $F(1, 23) = 0.005$, $P = 0.944$, indicating that the TM variables measured on the day of CPAP-fitting were not associated with CPAP compliance at 1 month.

3.2. One-week post-CPAP-fitting results

3.2.1. SCT

A hierarchical regression was performed between CPAP compliance as the dependent variable and the four SCT factors as the independent variables while controlling for CPAP pressure and sleepiness level. Table 3 displays the unstandardized regression coefficients (B) and associated standard error (SE B), and the R^2 and adjusted R^2 for SCT variables measured 1-week post-fitting. R for regression was significantly different from zero, $F(4, 42) = 5.339$, $P = 0.001$. None of the individual independent determinants were found to be significantly different from zero. An adjusted 26% of the variance in CPAP compliance scores could be accounted for by knowing the scores on these four independent variables at 1 week, beyond that accounted for by CPAP pressure and sleepiness level. The total model entered on step 2 of the regression analysis accounted for an adjusted total of 31% of the variance in CPAP compliance.

3.2.2. TM

A hierarchical regression was performed between CPAP compliance as the dependent variable and the DBI as the independent variable while controlling for CPAP pressure.

Table 4
Summary of hierarchical regression analysis of TM variables measured at 1 week on CPAP compliance ($N = 48$)

Variable	B	SE B	P-value	R^2	Adjusted R^2	P-value
Step 1:				0.110	0.070	0.073
CPAP pressure	0.39	0.19	0.044			
ESS	0.08	0.07	0.230			
Step 2:						
CPAP pressure	0.30	0.17	0.093	0.289	0.240	0.002
ESS	−0.10	0.06	0.093			
DBI	0.12	0.04	0.002			
ΔR^2 (Step 2 − Step 1)				0.179	0.170	0.002

Table 4 displays the regression results for the TM variables measured 1-week post-fitting. The R for regression was significantly different from zero, $F(1,44) = 11.04$, $P = 0.002$. DBI alone accounted for an adjusted 17% of the variance in CPAP compliance, beyond that accounted for by CPAP pressure and sleepiness level. The total model entered on step 2 of the regression analysis accounted for an adjusted total of 24% of the variance in CPAP compliance.

3.3. One-month post-CPAP-fitting results

3.3.1. SCT

A hierarchical regression was performed between CPAP compliance as the dependent variable and SCT factors as independent variables while controlling for CPAP pressure. The R for regression was significantly different from zero, $F(4,41) = 9.544$, $P < 0.001$. The SCT variables together accounted for an adjusted 40% of the variance in CPAP compliance scores, indicating that the SCT variables were highly associated with CPAP compliance at 1-month.

3.3.2. TM

Likewise, when a regression was performed between compliance and the TM variables, the R for regression was significantly different from zero, $F(2,43) = 29.318$, $P < 0.001$. The TM variables together accounted for an adjusted 33% of the variance in CPAP compliance, indicating that the TM variables were highly associated with CPAP compliance at 1-month.

4. Discussion

Compliance with CPAP therapy is disappointingly low, yet no studies to our knowledge have identified reliable, modifiable determinants of compliance upon which interventions may be based. This paper described the development and initial validation of scales that measure variables from SCT and TM, then found that these variables measured at 1-week post-CPAP-fitting were highly associated with CPAP compliance measured at 1 month. In addition, as hypothesized, these variables were not associated with compliance when measured prior to starting CPAP, and were highly associated with compliance when measured after using CPAP for 1 month. These results are encouraging because they provide us with a new direction of research in order to better understand the factors associated with CPAP compliance. The principal advantages to studying these types of variables are that they are theory-driven and modifiable, and thus can provide the basis for sound interventions to improve CPAP compliance.

These data suggest that the scales are best administered after the patient has had experience with CPAP. It appears that it is only with experience that patients can give informed answers to the items on these scales. This is consistent with the finding that consistent and inconsistent users can be distinguished within the first week of treatment [36]. Converging evidence suggests that CPAP patients decide early in the treatment process about whether to continue to use the machine. These scales appear to help identify problems experienced by the patient and may lead to interventions to help solve these problems. These interventions can be implemented within the context of an individual or group session.

Self-management groups based on SCT have been shown to be effective in treating chronic illnesses in general [37] and in particular, such as arthritis [38]. Self-management refers to the day-to-day tasks an individual must undertake to control or reduce the impact of disease on physical health status. Self-management groups are professional led educational groups that focus on the facilitation of performing these tasks and changing the desired behaviors. These groups are effective in increasing health behaviors and health status and decreasing medical utilization [37,38]. Because sleep apnea can be viewed as a chronic illness and its main treatment is an aid and not a cure, it follows that structuring an intervention as a self-management group holds great promise as a potential way to effectively manage this condition. Of course, sleep clinic staff can be trained in methods to increase the self-management skills of patients on a one-to-one basis as well.

The mean compliance level in this study, 3.4 h $\pm$ 2.5, was lower than that reported by other studies done in the United States, e.g. 4.7 h per night [20] and 5.3 h per night [19]. The mean compliance level in this study was also lower than that reported in some European countries such as Belgium (5.0 h per night) [39], United Kingdom (5.6 h per night) [21], and France (5.7–6.5 h per night) [22,23]. Factors accounting for these international differences have not been systematically studied. Pepin et al. (1999) [40] speculated that the treatment initialization procedure might be quite variable not only between countries, but regionally as well, which would be consistent with results from small-area variation studies done in the health services research area in the United States [41,42].

Because CPAP is prescribed to be used indefinitely (unless weight significantly decreases or some other change occurs), it would be interesting to perform a study that tests whether SCT and TM variables are associated with compliance over a longer follow-up period. Furthermore, it may be the case that the effects of these SCT and TM variables last longer when efforts are made to increase them, e.g. engage in efforts to increase one's confidence in their ability to engage in a particular behavior or to help reduce the cons of using CPAP and increase the pros of using CPAP. No efforts were made in this study to intervene on these or any other variables. This will be important to test empirically.

Several limitations to the current study may limit interpretation of the current results. Generalizability may be limited to the VA population given that the Veteran population is unique. Ninety-six percent of the sample in the

present study was male and so the findings of the present study may not generalize to women. Psychiatric status was not assessed. Because part of this sample was referred from the Department of Psychiatry, it may be that the prevalence of psychiatric disorders is higher in this sample than in a random US sample of individuals with OSA.

The present study has found that new behavior change scales are significantly associated with CPAP compliance and provides us with a new direction of research to better understand factors associated with CPAP compliance. To our knowledge, no CPAP compliance interventions exist that are based upon theory-driven and empirically validated factors. The principal advantage of these theory-driven and empirically validated scales are that they measure modifiable factors that can provide the basis for sound interventions to improve CPAP compliance.

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Appendix A. Description of SCT and the TM

SCT posits multiple influences on behavior, with an emphasis on personal (e.g. cognitive) and environmental (e.g. social) factors [43]. Variables derived from this model include self-efficacy, outcome expectations, social support, and knowledge. Self-efficacy refers to the beliefs in one's abilities to engage in a particular behavior [44]. Outcome expectations refer to beliefs that engaging in a particular behavior will result in certain outcomes [44]. Because these judgments occur in, and are influenced by, social situations, social support is a key variable of the model. Social support refers to the availability and usefulness of the tangible support of family, friends, and medical staff. Though knowledge alone rarely translates into health-related behavior change, SCT [45] holds that accurate information provides the basis for such change.

SCT has provided the basis for both specific and general chronic disease self-management programs. Self-management refers to the day-to-day tasks an individual must undertake to control or reduce the impact of disease on health status. In particular, an SCT-based self-management program designed for arthritis patients has been shown to decrease pain levels, decrease physician visits, and reduce overall health costs [46]. Another SCT-based self-management program designed for chronic disease in general has been shown to improve compliance with the recommended medical regimen, improve health status, and reduce health care utilization [37].

The TM is a multidimensional approach to behavior change that integrates behavior change processes and principles from across leading theories (i.e. *trans*theoretical) [47,48]. The core construct, around which the other dimensions are organized, is the stages of change. These represent ordered categories along a continuum of motivational readiness to change a specific behavior. Five categories comprise the stage of change construct and include pre-contemplation, contemplation, preparation, action, and maintenance. Pre-contemplation is the stage at which there is no intention to change behavior in the near future. Many individuals in this stage are unaware of their options. Contemplation is the stage in which the individuals are seriously considering changing their behavior, but has not yet made a commitment to take action. Preparation is the stage that combines both intention and behavioral aspects. The individual in the preparation stage has clear intentions to change behavior and has made some behavioral attempts. In action, the individuals modify their behavior, experiences, or environment in order to make the change. The individual in the action stage has made overt behavioral changes that have required considerable time and energy, and has typically done so for a defined period of time, often 1 month or more. Maintenance is the stage in which the individual has engaged in behavior change for a defined period of time, typically 6 months or more.

Transitions between stages are said to occur through identifiable ways, or processes of change, which may be classified as overt (behavioral) or covert (cognitive) [49]. The process of change dimension enables us to understand *how* shifts in behavior occur. For example, more cognitive processes of change are used to move through the early stages of change, while more behavioral processes are used to move through the later stages [50].

The model further asserts that patients engage in a decisional 'balance sheet' of comparative potential gains and losses, termed the decisional balance. The decisional balance is a summary index of the pros and cons of engaging in the behavior. The balance between the pros and the cons varies depending on which stage the individual may be classified in, and is said to get at the *why* of behavior change. For example, it has been shown that the number of cons significantly outweigh the number of pros for an individual in the pre-contemplation stage of change, while the number of pros outweigh the number of cons for an individual in the maintenance stage of change [51].

Appendix B. Scale items

Self-Efficacy

Directions: For each item below, please circle the response that best describes you over the next month.

	disagree completely				agree completely
1. I am confident I can use CPAP regularly	1	2	3	4	5
2. I have the ability to use CPAP regularly	1	2	3	4	5
3. I am confident I will use CPAP regularly even if I do not feel like it	1	2	3	4	5
4. I am confident I will use CPAP regularly even if I experience uncomfortable side effects	1	2	3	4	5
5. I can operate the CPAP machine to make it more comfortable for me	1	2	3	4	5

Outcome Expectations

Directions: For each item, please circle the response that best describes your rating of each item.

	not at all effective				extremely effective
1. How effective do you believe regular use of CPAP is:					
(a) in managing your sleep apnea?	1	2	3	4	5
(b) in reducing your daytime sleepiness?	1	2	3	4	5
(c) in improving your ability to concentrate?	1	2	3	4	5

	not at all important				extremely important
2. How important do you believe regular use of CPAP is for controlling your sleep apnea?	1	2	3	4	5

Social Support

Directions: Please indicate how much you agree or disagree with each item.

	disagree completely				agree completely
1. I have people in my life who will support me in using CPAP regularly	1	2	3	4	5
2. I have people in my life who will encourage me to keep using CPAP even when it is uncomfortable	1	2	3	4	5
3. I have people in my life who will encourage me to use CPAP even when it is noisy	1	2	3	4	5
4. I have people in my life who will give me ideas for making CPAP more comfortable	1	2	3	4	5
5. I have people in my life who will help me adjust to using CPAP	1	2	3	4	5
6. I have people in my life who will be upset if I stopped using CPAP	1	2	3	4	5
7. I have people in my life who will support me in using CPAP nightly	1	2	3	4	5
8. I will get the help I need to use CPAP nightly	1	2	3	4	5
9. The healthcare staff will be helpful in helping me to use CPAP nightly	1	2	3	4	5

Knowledge

Directions: Please circle "T" if the answer is true, or "F" if the answer is false.

1. One of the main symptoms of sleep apnea is excessive daytime sleepiness	T	F
2. If CPAP is not comfortable to use, it should be permanently discontinued	T	F
3. Being overweight can make sleep apnea worse	T	F
4. Only one type of CPAP mask is available	T	F
5. Sleep apnea may contribute to thinking problems, such as memory loss and difficulty concentrating	T	F
6. CPAP results in a cure of sleep apnea	T	F
7. Sleep apnea may contribute to heart problems and high blood pressure	T	F
8. For best results, CPAP must be used every night	T	F
9. CPAP pressure cannot be adjusted to reduce apneas	T	F
10. After 2 years of regular use, CPAP cures the sleep apnea and does not need to be used anymore	T	F
11. Sleep apnea is best managed with the help of healthcare professionals trained in sleep disorders medicine	T	F
12. It is OK to use CPAP for only the first three hours of the night	T	F

Stage of Change

Directions: Please circle the number of the one (1) response that best describes your current use of CPAP.

I currently do not use CPAP and I do not intend to start using CPAP in the next 2 weeks	0
I currently do not use CPAP, but I am thinking about starting to use CPAP in the next 2 weeks	1
I currently use CPAP sometimes, but not nightly	2
I currently use CPAP nightly and I have begun doing so within the last 2 weeks	3
I currently use CPAP nightly and have done so for longer than 2 weeks	4
I have used CPAP nightly in the past, but I am not doing so currently	5

Decisional Balance Index

Directions: Based on what you know and understand about CPAP therapy right now, without ever having used CPAP, please circle the response that best estimates your answer.

	disagree completely		not sure		agree completely
1. Based on what I know now about CPAP, when I regularly use CPAP:					
(a) I will feel less sleepy during the day	1	2	3	4	5
(b) I will experience side effects	1	2	3	4	5
(c) I will feel healthier	1	2	3	4	5
(d) I will sleep better	1	2	3	4	5
(e) I will experience discomfort	1	2	3	4	5
(f) I will have improved concentration during the day	1	2	3	4	5
(g) I will have problems sleeping	1	2	3	4	5
2. I will find it difficult to use CPAP nightly for various reasons	1	2	3	4	5
3. CPAP will probably not provide the benefit needed to make it worthwhile to use	1	2	3	4	5
4. Lots of things will probably get in the way of using CPAP	1	2	3	4	5
5. I will need assistance in order to use CPAP nightly	1	2	3	4	5

Processes of Change

Directions: The following questions refer to experiences that can affect your use of CPAP. Think about these or similar experiences you may have had. Then rate how frequently the experience occurred. Please circle the number that best describes your answer for each experience.

	Never	Seldom	Occasionally	Often	Repeatedly
1. I read articles about using CPAP in an attempt to learn more about it	1	2	3	4	5
2. I put things around my home to remind me to use CPAP	1	2	3	4	5
3. I tell myself that if I try hard enough, I can keep using CPAP regularly	1	2	3	4	5
4. I get frustrated with myself when I don't use CPAP regularly	1	2	3	4	5
5. I make commitments to use CPAP regularly	1	2	3	4	5
6. I find things changing in ways that make it easier for the CPAP user	1	2	3	4	5
7. When I'm feeling tired, I find using CPAP is a great way to relieve my sleepiness	1	2	3	4	5
8. I react emotionally to warnings about not using CPAP	1	2	3	4	5
9. I have a family and friends that encourage me to use CPAP when I don't feel like it	1	2	3	4	5
10. When I use CPAP regularly, I tell myself that I am being good to myself by taking care of my body	1	2	3	4	5
11. I am aware of more and more people encouraging me to use CPAP regularly these days	1	2	3	4	5
12. I do something nice for myself for making efforts to use CPAP regularly	1	2	3	4	5
13. I have someone who provides feedback about using CPAP regularly	1	2	3	4	5
14. I look for information related to using CPAP	1	2	3	4	5
15. I remind myself that I am the only one who is responsible for my health and well-being, and that only I can decide whether or not I will use CPAP	1	2	3	4	5
16. I think about the type of person I will be if I keep using CPAP regularly	1	2	3	4	5
17. I realize that I might be able to influence others to be healthier when I use CPAP regularly	1	2	3	4	5
18. When I don't feel like using CPAP, I make myself use it anyway because I know I will feel better afterward	1	2	3	4	5
19. Warning about the health hazards of sleep apnea move me emotionally	1	2	3	4	5
20. I am considering the idea that regular use of CPAP would make me a healthier, happier person to be around	1	2	3	4	5

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