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Examination of the Factor Structure of the Adolescent Sleep–Wake Scale (ASWS)

Bonnie Essner,

Seattle Children's Research Institute

Melanie Noel,

Seattle Children's Research Institute

Matthew Myrvik, and

Medical College of Wisconsin

Tonya Palermo

Seattle Children's Research Institute

Abstract

This study examined the factor structure of the Adolescent Sleep–Wake Scale (ASWS) among 491 adolescents (12–18 years) with and without pediatric health conditions. Exploratory factor analyses were conducted using iterated principal axis factoring with varimax rotation. Highly cross-loading items were systematically removed and analyses were rerun until a clean solution was attained. The final solution explained 57.1% of the total model variance, including 10 items and three factors: Falling Asleep and Reinitiating Sleep-Revised, returning to Wakefulness-Revised, and Going to Bed-Revised. Internal consistency reliability scores were acceptable to good, with the exception of the Going to Bed-Revised subscale for the healthy sample. Adolescents with chronic pain reported significantly poorer overall sleep quality and more problems in falling asleep, reinitiating sleep, and returning to wakefulness as compared to healthy adolescents, providing preliminary evidence for construct validity of the new factors. The resulting ASWS version is a concise assessment tool with empirically derived, distinct behavioral sleep dimensions that can be used for clinical and research purposes.

Behavioral sleep problems are common among children and adolescents in the general population (Smaldone, Honig, & Byrne, 2007). Adolescents appear particularly vulnerable to sleep disturbance secondary to the complex transaction between maturational changes in the central nervous system and dramatic changes in biological, psychological, and sociocultural factors occurring during this developmental period (Carskadon, 2011a, 2011b; Colrain & Baker, 2011; Dahl & Lewin, 2002; McKnight-Eily et al., 2011). Adolescents have been shown to demonstrate inconsistent and delayed sleep patterns (Wolfson & Carskadon, 1998), decreased duration of sleep (Leger, Beck, Richard, & Godeau, 2012), excessive daytime sleepiness (Millman, 2005), discrepancies between weekday and weekend sleep

patterns (National Sleep Foundation, 2006), and high rates of insomnia (Morrison, McGee, & Stanton, 1992; Ohayon, Caulet, & Lemoine, 1998; Roberts, Roberts, & Duong, 2008). Given the various sleep-related issues unique to this developmental stage, examination of sleep in adolescence is an increasing focus of research.

Adolescents with medical conditions (e.g., juvenile rheumatoid arthritis, asthma, chronic pain, cancer) are particularly vulnerable to sleep problems (for review of this topic, see Lewandowski, Ward, & Palermo, 2011). Data indicate that acute and chronic medical conditions appear to increase youth risk of sleep disruptions (Huntley, Campo, Dahl, & Lewin, 2007; Hysing, Sivertsen, Stormark, Elgen, & Lundervold, 2009; Passarelli et al., 2006) and there is some evidence that sleep problems are more often chronic and persistent in youth with chronic conditions compared to those without chronic conditions (Sivertsen, Hysing, Elgen, Stormark, & Lundervold, 2009). Over the past decade, research has increasingly recognized the importance of sleep and the adverse daytime consequences and health outcomes of untreated sleep disturbances and sleep disorders. Sleep quality is an important aspect of the comprehensive assessment of sleep in pediatric medical populations.

Subjective sleep measures provide valuable information about perceived sleep patterns and sleep-related behaviors and are considered an essential component of comprehensive sleep evaluations (Lewandowski, Toliver-Sokol, & Palermo, 2011). One of the best known and most widely used measures of sleep quality in adolescents is the Adolescent Sleep–Wake Scale (ASWS; LeBourgeois, Giannotti, Cortesi, Wolfson, & Harsh, 2005). Developed as an adaptation of the Children’s Sleep–Wake Scale (LeBourgeois, Hancock, & Harsh, 2001; LeBourgeois & Harsh, 2001), the ASWS is a 28-item measure that assesses sleep quality among 12–18-year-old adolescents. Respondents are asked to report the frequency of various sleep problems within the past month using a six-point scale with anchors “always” and “never.” The measure is comprised of five conceptually driven, behavioral dimensions of sleep quality: (a) going to bed, (b) falling asleep, (c) maintaining sleep, (d) reinitiating sleep, and (e) returning to wakefulness. Five subscale scores corresponding to each behavioral dimension and a total sleep quality score can be yielded with higher scores reflecting better sleep quality.

The ASWS has been utilized in a community sample (LeBourgeois, Giannotti, Cortesi, Wolfson, & Harsh, 2004; LeBourgeois et al., 2005) and in various pediatric medical and psychiatric samples, including adolescents with multiple sclerosis (Zafar, Ness, Dowdy, Avis, & Bashir, 2012), depression (Murray, Murphy, Palermo, & Clarke, 2012), cancer (Walker, Johnson, Miaskowski, Lee, & Gedaly-Duff, 2010), and chronic pain (Palermo, Fonareva, & Janosy, 2008; Palermo, Toliver-Sokol, Fonareva, & Koh, 2007b; Palermo, Wilson, Lewandowski, Toliver-Sokol, & Murray, 2011). Overall, internal consistency has been found to be poor to good for the subscales ($\alpha = .60-.82$) and good for the total scale ($\alpha = .80-.86$) (LeBourgeois et al., 2005; Murray et al., 2012; Palermo, Fonareva, et al., 2008; Palermo et al., 2011; Walker et al., 2010). However, there has been very limited psychometric evaluation of the measure since its original publication. Because of its frequency of use in the literature, the ASWS has been reported as an evidence-based measure that is “approaching well-established” (i.e., measure presented in two or more peer-reviewed papers, with sufficient detail to allow critical review and reliability information

presented in vague terms) in general adolescent populations (Lewandowski, Toliver-Sokol, et al., 2011) and as “well-established” (i.e., measure presented in two or more peer-reviewed papers by different investigatory teams with sufficient detail to allow critical review, and detailed information indicating good reliability and validity) in adolescents with chronic pain (de la Vega & Miro, 2012).

Since the ASWS was developed, the measure has been a valuable tool for assessing the multifaceted nature of subjective sleep quality across a range of adolescent populations. Nevertheless, the ASWS has not undergone psychometric testing beyond analysis of reliability and the factor structure has not yet been empirically examined. Factor analysis is requisite for determining the distinctiveness and utility of the ASWS behavioral subscales. Such an analysis would provide quantitative evidence for the original conceptually determined subscales, or could introduce alternative subscale item groupings that reflect different domains of sleep quality than those that were originally proposed. Factor analysis could also define the substantive content or meaning of the factors and inform the relative utility (e.g., redundancy or distinctiveness) of items. Moreover, it is possible that a shorter, revised measure might more efficiently capture the behavioral dimensions and offer a more practical tool for use in busy clinical and research settings.

The primary objective of this study was to empirically examine the factor structure of the ASWS in a large sample comprised of healthy adolescents and adolescents with sickle cell disease, traumatic brain injury (TBI), idiopathic chronic pain, and depressive disorders. We predicted that factor analysis would yield a multidimensional solution (i.e., multiple latent variables representing distinct dimensions of sleep quality) in this diverse adolescent sample. A secondary objective of this study was to test the construct validity of the newly derived ASWS factors by comparing mean factor scores of youth with chronic pain with those of healthy adolescents for each dimension. As youth with chronic pain have been found to have worse sleep quality as compared to youth without chronic health conditions (Haim et al., 2004; Meltzer, Logan, & Mindell, 2005; Palermo, Toliver-Sokol, Fonareva, & Koh, 2007a), we predicted that in our sample, youth with chronic pain would also report significantly lower subjective sleep quality ratings on all newly derived factors as compared to youth in the healthy adolescent comparison group.

METHOD

Participants and Procedures

Data were pooled from five research studies involving heterogeneous samples of adolescents with non-disease-related chronic pain, sickle cell disease, traumatic brain injury (TBI), or depressive disorders, as well as adolescents who were otherwise healthy, from three sites in the Northwest and Midwestern United States. Inclusion criteria were: (a) 12–18 years of age, (b) meeting criteria for inclusion in one of the medical condition groups or the healthy cohort, and (c) ability to read and comprehend questionnaires in English. Adolescents were excluded from participation if they had significant developmental delays or a chronic disease other than sickle cell disease. Participants were recruited from a variety of sources, including referrals from pediatric medical subspecialties, a health maintenance organization pharmacy database, ongoing psychological intervention trials, a hospital trauma registry, and

community advertisements. Information regarding recruitment for several of these studies has been previously published (Holley et al., 2013; Law, Dufton, & Palermo, 2012; Murray et al., 2012; Palermo, Law, Churchill, & Walker, 2012; Palermo et al., 2011).

The final sample included 491 adolescents (80% Caucasian, 62% female) aged 12–18 years ($M = 14.79$, $SD = 1.68$). Primary diagnoses were idiopathic painful conditions (e.g., chronic idiopathic headache, functional abdominal pain, musculoskeletal pain; $n = 249$), sickle cell disease ($n = 19$), TBI ($n = 50$), and depressive disorders ($n = 59$). A cohort of healthy adolescents ($n = 114$) was also included. Demographic characteristics of the sample are shown in Table 1.

Procedures for all studies were approved by the institutional review boards of participating sites. All adolescents provided assent and caregivers gave consent prior to initiating study procedures. In all studies, adolescents completed the ASWS during an initial study visit (e.g., prior to receiving intervention).

Measures

Demographics—Parents provided information regarding the teen’s age, gender, race, and family income.

Adolescent Sleep–Wake Scale (ASWS)—The ASWS is a 28-item measure of subjective sleep quality for adolescents aged 12–18 years. Twenty-eight items describing the occurrence of various behavioral sleep characteristics over the previous month are scored on a six-point Likert scale, ranging from 1 (always) to 6 (never). Higher scores indicate better sleep quality. These items yield a total sleep quality score, along with five subscales: (a) Going to Bed (e.g., “In general, I am ready to go to bed at bedtime”), (b) Falling Asleep (e.g., “When it’s time to go to sleep, I have trouble settling down”), (c) Maintaining Sleep (e.g., “During the night, I toss and turn in bed”), (d) Reinitiating Sleep (e.g., “After waking up during the night, I feel scared”), and (e) Returning to Wakefulness (e.g., “In the morning, I wake up feeling rested and alert”). Internal consistency has been found to be poor to good for the subscales ($\alpha = .60-.82$) and good for the full scale ($\alpha = .80-.86$; LeBourgeois et al., 2005; Murray et al., 2012; Palermo, Fonareva, et al., 2008; Palermo et al., 2007b; Palermo et al., 2011; Walker et al., 2010).

Data Analysis

Statistical analyses were performed using the Statistical Package for the Social Sciences, Version 20. Specific items were reverse-coded according to scoring procedures described by measure authors (LeBourgeois et al., 2005) so that higher values on all items represented better sleep quality. Fourteen cases with greater than 20% of ASWS data missing were eliminated from analyses and mean imputation was used to replace missing data for cases with at least 80% complete ASWS data (i.e., 23 of 28 items completed). For mean imputation for missing data, missing scores were replaced with the subsample (i.e., painful conditions, sickle cell disease, TBI, depression, healthy) mean for that item. We conducted exploratory factor analysis (EFA) on the ASWS items to explore whether an item was strongly and differentially correlated with latent subscales (factors). EFAs were conducted

using iterated principal axis factoring, as this method allows factors to correlate and thereby produce a more accurate, reproducible solution (Cox, Swinson, Parker, Kuch, & Reichman, 1993). In selecting a factor structure, we used criteria that eigenvalues were ≥ 1.0 (Costello & Osborne, 2005) and approximately 50% of variance was explained (Tabachnick & Fidell, 2001). In addition, the initial scree plot was also used to determine the initial number of factors to retain and, in part, to inform decisions about superiority of models. EFAs were conducted on different model variants to test the superiority of each and inform selection of a final model. Given that factors demonstrated weak correlations, orthogonal (varimax) rotation was deemed to be the most appropriate rotation method.

For each EFA, items were retained if they had a primary factor loading of $>.40$. Items cross-loading on more than one factor but that had factor loading values that were twice the other were retained. Based on these criteria, we systematically removed items one at a time and analyses were rerun. Each prior analysis informed decisions about which items to subsequently remove. Items were removed until clean solutions were attained, defined as primary factor loadings that were $>.40$, and at least double the value of secondary loadings. Final clean solutions for all tested models were then examined to determine the superiority of each based on interpretability and overall variance accounted for.

Internal consistency was examined with the alpha coefficient. Reliability scores for overall sleep quality and each dimension of sleep quality were examined for the entire sample and separately for adolescents with chronic conditions and healthy adolescents. Independent samples *t*-tests were conducted to examine mean differences in sleep quality scores for adolescents with chronic pain conditions versus healthy adolescents.

RESULTS

EFA with iterated principal factor extraction resulted in 6 factors with initial eigenvalue estimates above 1.0 and 62.2% variance explained. The scree plot was suggestive of a four-factor model. Thus, six-, five-, and four-factor models were tested by forcing each of these solutions and results were contrasted based on interpretability of factors. The five-factor and four-factor model variants explained 58.6% and 54.3% of the variance, respectively, upon initial estimate.

After systematically removing weak loading and highly cross-loading items to obtain clean solutions for each of the model variants tested, the six-factor model accounted for 59.8% of the variance; however, one factor was comprised of only one item. The five-factor model accounted for 54.8% of the variance. and although several item loadings were similar to the derived four-factor model, the fifth factor was not deemed to be as readily interpretable (i.e., lack of conceptual consistency of items within factors). The four-factor model explained 53.9% of the variance and produced a solution with conceptually interpretable factors. However, two items comprising one of the factors in this solution (i.e., sleep talking and restless legs) were inconsistent with a measure of behavioral sleep quality. Therefore, these two items were removed and a three-factor model that included all other items of the four-factor model was tested.

The resulting three-factor model was identical to the four-factor solution, with the exception of the two items removed, as indicated. This three-factor model (Table 2) was selected as the final model based on both interpretability and superiority over other model variants as indicated by the scree plot for this EFA. The final solution consisted of three factors comprised of 10 items overall: (a) Falling Asleep and Reinitiating Sleep-Revised (5 items); (b) Returning to Wakefulness-Revised (2 items); and (c) Going to Bed-Revised (3 items). We use the original labels of the subscales proposed by LeBourgeois and colleagues to enhance comparisons with the original measure; the notation “revised” indicates that the items included on the subscale differ from the original measure. This final three-factor solution explained 57.1% of the variance, with the following distribution of percentage of variance explained by each factor, respectively: (a) 33.4%, (b) 13.4%, and (c) 10.3%. The final solution did not contain any cross-loading items and all items had primary factor loadings of $>.50$.

Internal Consistency of the Final Three-Factor Model

Internal consistency was computed for the entire sample and it was also conducted separately for adolescents with health conditions and for healthy adolescents (Table 3). Each of the empirically derived ASWS dimensions ranged from good to poor (George & Mallory, 2003). Consistent with previous research, the internal consistency for the ASWS total score was good for the total sample and for adolescents with health conditions; it was slightly lower, in the acceptable range, for healthy adolescents.

Validation of Empirically Derived ASWS Dimensions

As an assessment of construct validity, independent samples *t*-tests were conducted to compare mean overall sleep quality scores and mean scores on each of the three newly derived behavioral sleep dimensions between adolescents with chronic pain versus adolescents in the healthy adolescent group. As predicted, adolescents with chronic pain reported significantly poorer overall sleep quality [$(M = 3.61, M = 4.13), t(361) = -5.36, p < .01$], and more problems with falling asleep and reinitiating sleep [$(M = 3.88, M = 4.74), t(275.05) = -6.92, p < .01$] and returning to wakefulness [$(M = 2.44, M = 3.28), t(191.14) = -6.37, p < .01$]. However, contrary to hypotheses, adolescents with chronic pain ($M = 3.93$) reported fewer problems with going to bed than healthy adolescents [$(M = 3.66), (t(361) = 2.10, p = .04)$].

DISCUSSION

To our knowledge, this is the first study to report the results of an exploratory factor analysis of the ASWS in a relatively large, diverse sample including both adolescents with health conditions and physically healthy adolescents. Subjective assessment of sleep quality in adolescents is important given the unique vulnerability to sleep disturbance that is characteristic of this developmental stage (Carskadon, 2011a, 2011b; Colrain & Baker, 2011; Dahl & Lewin, 2002; McKnight-Eily et al., 2011). As the most widely used self-report measure of sleep quality designed for use in adolescence, the ASWS is emerging as a useful tool for the measurement of subjective sleep quality in a variety of pediatric populations (de la Vega & Miro, 2012; Lewandowski, Toliver-Sokol, et al., 2011).

Nevertheless, utility of the measure has been limited because the original conceptually derived subscales and items had not undergone further validity testing.

Our results using EFA extend the construct validity of the ASWS by revealing a three-factor solution, comprised of 10 of the original 28 items (LeBourgeois et al., 2005). The three revised factors (in order of contribution to the overall variance accounted for) included (a) Falling Asleep and Reinitiating Sleep-Revised, (b) Returning to Wakefulness-Revised, and (c) Going to Bed-Revised. Results of the EFA extend the literature in several important ways. First, the number of subscales of the measure was reduced. Whereas the original ASWS was comprised of five behavioral sleep dimensions, EFA suggested that a more streamlined three-factor solution better captured the dimensions of sleep quality described by the ASWS items. In general, the new Falling Asleep and Reinitiating Sleep-Revised factor consisted of a combination of two items from the original subscales, Falling Asleep and Reinitiating Sleep. The remaining two factors—Returning to Wakefulness-Revised and Going to Bed-Revised—were similar to the originally proposed subscales of the same names. Items comprising the original maintaining sleep subscale were eliminated from this empirically derived factor solution, including two items that were removed due to their inconsistency with the domain of behavioral sleep quality.

Secondly, the factor solution suggested that an abbreviated version of the ASWS including fewer items overall may be valid for the measurement of adolescent sleep quality. Consistent with previous research (Palermo, Lewandowski, Long, & Burant, 2008), extraneous items with weak factor loadings or similar loadings on multiple factors, thereby not contributing to the distinctiveness of each subscale, were removed. This resulted in a more concise measure that preserved a large portion of variance to explain the overall model; in fact, reduction of items using this systematic, empirically driven approach substantially increased the variance accounted for as compared to the original 28-item measure. Whereas each of the original ASWS subscales included five to six questions per scale for a total of 28 items, the factor solution suggested by our EFA consisted of 10 items, with factors ranging from 2 to 5 items per factor. These 10 items represent the most salient items from the original measure that are distinct to the particular dimension of sleep quality/factor to which they are assigned. A shortened version of the ASWS using only these 10 items could be implemented in research and practice to begin to understand its utility. With further validation, a revised version would offer the field a concise tool for assessment of sleep quality in adolescents that can be efficiently used in busy clinical and research settings with a diverse range of patient populations. This may increase the likelihood of its inclusion in clinical trials of interventions as well as a variety of clinical settings. On the other hand, clinicians may wish to use the ASWS in its entirety in order to obtain further description of sleep quality and sleep behaviors that may complement the clinical interview.

Further examination of the newly derived three-factor model revealed that the internal consistency for each factor ranged from good to acceptable (Falling Asleep and Reinitiating Sleep-Revised: $\alpha = .84$; Returning to Wakefulness-Revised: $\alpha = .87$; Going to Bed-Revised: $\alpha = .71$) for the full study sample. The internal consistency of these new factors is improved compared to that of the previous originally proposed subscales ($\alpha = .60$ to $.82$; LeBourgeois, Avis, Mixon, Olmi, & Harsh, 2004; LeBourgeois et al., 2005; Walker et al., 2010). The

internal consistency of the going to bed (revised) subscale was found to be lower than optimal in healthy youth and requires further study to understand the utility of this particular subscale in assessing behavioral sleep quality in youth who are otherwise healthy. Further concurrent validity testing is needed in larger healthy populations.

As expected, we found that adolescents with chronic pain reported significantly worse sleep quality overall and more problems with reinitiating sleep and returning to wakefulness, as compared to healthy adolescents. These findings offer preliminary evidence for the construct validity of the newly derived ASWS full scale and factor scores. Although healthy adolescents were unexpectedly found to have significantly lower scores than adolescents with chronic pain on the going to bed dimension, as mentioned, this finding should be interpreted with caution given the lower internal consistency of this subscale in healthy youth. Moreover, an alternative explanation might also be that the items on the going to bed subscale have different meanings for adolescents with chronic pain and for healthy adolescents. Specifically, the three items assess an adolescent's readiness to go to bed, desire to stay up later and do other activities, and attempts to delay going to bed. In clinical pain samples where daily functioning, activity participation, and routines are impaired, and high levels of fatigue are present, adolescents might endorse greater readiness for bedtime. Healthy adolescents with normative daily functioning, on the other hand, may demonstrate more behaviors characteristic of delays in going to bed due to involvement in activities, schoolwork, and socializing with peers. Future research is needed to understand these differences among adolescent populations.

Despite several strengths of our validation study, there are limitations that might be addressed in future research. Although the multisite collaboration provided a large sample that spanned a variety of pediatric conditions, analyses were limited to measures that were collected uniformly across sites. Indeed, sites differed in the types and formats of information that were collected from participants on other measures of interest (e.g., measures of social and emotional functioning). In addition, the wide variety of medical and psychiatric conditions comprising our sample suggests the applicability of using the ASWS across pediatric conditions; however, sample sizes within each condition were not sufficiently large to conduct planned comparisons among all groups, which would have provided further construct validity for the revised measure. Finally, due to differences in data collection across sites, it was not possible to assess the potential impact of medication use on reported sleep quality among the full sample and between youth with various chronic conditions. However, our concerns about the influence of medication are reduced by our findings of strong internal consistency of the ASWS total and factor scores among the full sample of participants, and of the validity of the factor scores in differentiating sleep quality between youth with chronic pain and healthy adolescents. Future studies are needed, however, that comprehensively assess and consider the impact of medication use on behavioral sleep quality as assessed by the ASWS.

Future research is needed to further support our initial psychometric evaluation of the factor structure of the ASWS. In particular, the relationship between factor scores and external correlates (e.g., anxiety and depressive symptoms, sleep behaviors) will provide further support of the validity of the factor scores. In addition, future studies should examine the

relative fit of the three-factor solution yielded in the current investigation with other model variants using confirmatory factor analysis. Results of confirmatory factor analysis could further identify unreliable items and facilitate the creation of a short form of the ASWS. Importantly, additional aspects of reliability and validity need to be examined including test–retest reliability, predictive validity, and sensitivity to change following intervention. It will be important to replicate our findings in other samples of physically healthy youth and those with health conditions. This is a particularly fruitful area of research given emerging evidence for the powerful role of sleep in the mental and physical health of adolescents (Dosi et al., 2013; Mitchell, Rodriguez, Schmitz, & Audrain-McGovern, 2013; Murray et al., 2012; Shochat, Cohen-Zion, & Tzischinsky, 2013).

This large multicenter study is the first to empirically examine the factor structure of the ASWS in a diverse sample of adolescents with and without a variety of pediatric medical and psychiatric conditions. Using a systematic empirical approach, a three-factor abbreviated version of the ASWS was found to be superior to the five-factor conceptually derived measure proposed in previous literature. This extends prior literature and offers a concise tool that can be readily used in clinical and research settings. Future research is needed to provide additional evidence for the factorial validity of this three-factor model using confirmatory factor analysis and to elucidate the meaning of the derived subscales through examinations of validity. Given the significance of sleep for adolescent health and the vulnerability to sleep disturbances during this developmental stage, validated measures of sleep quality such as the ASWS are an important part of sleep assessment in pediatrics.

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TABLE 1

Sample Demographic Characteristics

	N = 491 n (%)
Age	<i>M</i> = 14.70 (<i>SD</i> = 1.68)
Sex	
Male	187 (38.1)
Female	304 (61.9)
Race ^a	
White	371 (75.6)
African American	54 (11.0)
Asian/Native Hawaiian/Pacific Islander	14 (2.9)
American Indian/Alaskan Native	16 (3.3)
Other	28 (5.7)
Household income ^b	
\$10,000 or less	9 (1.8)
\$10,000–\$29,999	41 (8.4)
\$30,000–\$49,999	72 (14.7)
\$50,000–\$69,999	77 (15.7)
\$70,000 or more	239 (48.7)
Group	
Painful conditions	249 (50.7)
Sickle cell disease	19 (3.9)
Depressive disorder	59 (12.0)
TBI	50 (10.2)
Healthy comparison	114 (23.2)

^aData missing for 8 participants.

^bData not available for 32 participants in sickle cell disease and healthy cohorts recruited from Midwestern treatment center; data also missing for 21 other participants.

TABLE 2

Factor Loadings Specified in the Final Three-Factor Model

<i>ASWS Item</i>	<i>Falling Asleep & Reinitiating Sleep-Revised</i>	<i>Returning to Wakefulness-Revised</i>	<i>Going to Bed-Revised</i>
1. When it's time to go to bed, I want to stay up and do other things (R)			.69
2. In general, I am ready for bed at bedtime			.57
3. In general, I try to "put off" or delay going to bed (R)			.75
4. When it's time to go to sleep, I have trouble settling down (R)	.51		
5. In general, I <i>need help</i> getting to sleep (for example, I need to listen to music, watch TV, take medication, or have someone else in the bed with me) (R)	.56		
6. After waking up during the night, I have trouble going back to sleep (R)	.82		
7. After waking up during the night, I have trouble getting comfortable (R)	.82		
8. After waking up during the night, I <i>need help</i> to go back to sleep (for example: I need to watch TV, read, or sleep with another person) (R)	.64		
9. In the morning, I wake up and feel ready to get up for the day		.85	
10. In the morning, I wake up feeling rested and alert		.87	

Note: (R) = item reverse-scored.

TABLE 3

Internal Consistency of ASWS Subscales for Final Three-Factor Model

<i>ASWS Subscale</i>	<i># Items</i>	<i>Cronbach 's Alpha</i>
Total sample		
Falling Asleep and Reinitiating Sleep-revised	5	.84
Returning to Wakefulness-revised	2	.87
Going to Bed-revised	3	.71
Total measure	10	.81
Health conditions sample		
Falling Asleep and Reinitiating Sleep-revised	5	.83
Returning to Wakefulness-revised	2	.84
Going to Bed-revised	3	.74
Total measure	10	.81
Healthy sample		
Falling Asleep and Reinitiating Sleep-revised	5	.80
Returning to Wakefulness-revised	2	.89
Going to Bed-revised	3	.64
Total measure	10	.78