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Adolescent Attitudes toward Psychiatric Medication: The Utility of the Drug Attitude Inventory

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Background and Significance

Despite the effectiveness of psychotropic treatment in alleviating symptoms of psychiatric disorders, youth adherence to psychotropic medication regimens is low. Adherence rates range from 10-80% in the adolescent literature (Swanson, 2003; Cromer & Tarnowski, 1989; Lloyd, Horan, Borgaro, Stokes, Pogge, & Harvey, 1998; Brown, Borden, & Clingerman, 1985; Sleator, 1985).

Non-adherence is strongly associated with symptom relapse in adults with mental illnesses. Non-adherent patients are 3.7 times more likely to relapse than patients who take psychotropic medications as prescribed (Fenton, Blyler, & Heinssen, 1997), experience persistent psychiatric symptoms, (Fortney, Rost, Zhan, & Pyne, 2001), and require multiple hospitalizations (Weiden & Olfson, 1995; Weiden & Glazer, 1997). Most concerning are findings that premature discontinuation of lithium was related to completed suicide in adults (Muller-Oerlinghausen, Muser-Causemann, & Volk, 1992), which have implications for unsupervised discontinuation of medication.

Youth outcome data present an equally sobering picture. Youth with bipolar disorder experience fewer inter-episode remissions than adults (Birmaher, Axelson, & Strober, 2006), a protracted illness course, and poor social development (Geller, Tillman, Craney, & Bolhofner, 2004). Youth with co-morbid conduct disorder and depression are at increased risk of poor academic and social outcomes (Ingoldsby, Kohl, McMahon, & Lengua, 2006). These youth face increased potential for substance abuse, legal problems, suicide attempts, and completed suicide (see review by Birmaher & Axelson (2006).

Certain mental illnesses, such as oppositional defiant disorder and substance abuse, are linked with non-adherence (Bernstein, Anderson, Hektner, & Realmuto, 2000; Lloyd, Horan, Borgaro, Stokes, Pogge, & Harvey, 1998). Co-morbidity studies have outlined populations in which adherence may be especially problematic or in which response to pharmacological intervention may depend upon patient-specific factors (Christian, Pagano, Demeter, McNamara, Lingler, Bedoya, Faber, & Findling, 2008). Other research links medication formulation, dosage, or side effect profiles to non-adherence (Sleator, Ullman, & von Neumann, 1982; Efron, Jarman, & Barker, 1998; Brown, Borden, and Clingerman, 1985).

While these studies have provided valuable information regarding diagnostic factors and attributes of medication that are linked with non-adherence, it is likely that adherence is a more complex construct that is also affected by internal cognitive processes. Ajzen and

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Fishbein (1980) suggest that three mechanisms predict individuals' health-related behavior: 1) individual attitudes toward the behavior, 2) perception of social norms regarding the behavior, and 3) the intention to perform the behavior. Behavior is determined partly by whether an individual values the health-related behavior and its consequences. While there is extensive documentation of youth non-adherence to psychotropic treatment, little is known about youth attitudes toward psychiatric medications. Youth adherence studies would benefit from a measure designed to characterize these attitudes.

The Drug Attitude Inventory (DAI) was created to measure attitudes toward medications in adults (Hogan, Awad & Eastwood, 1983). It predicted adherence in schizophrenia and depression studies (Hogan, Awad & Eastwood, 1983; Gervin, Browne, Garavan, Roe, Larkin & O'Callaghan, 1999; Rossi, Arduini, Stratta & Pallanti, 2000; Kampman, Lehtinen, Lassila, Leinonen, Poutanen & Koivisto, 2000; Sajatovic, Rosch, Sivec, Sultana, Smith & Alamir, et al., 2002; Pae, Lee, Kim, Lee, Bahk, Lee & Lee, et al., 2003; Brook, van Hout, Nieuwenhuyse & Heerdink, 2003), and has been used as a validation standard for other scales (Jeste, Patterson, Palmer, Dolder, Goldman & Jeste, 2003; Chen, Tam, Wong, Law & Chiu, 2005).

The original DAI was validated in a sample of 150 outpatient adults diagnosed with schizophrenia and taking typical antipsychotic medications (Hogan, Awad & Eastwood, 1983); it discriminated 88% of the time between adherent and non-adherent patients. The DAI was the best predictor of medication adherence in hospitalized adults with schizophrenia (Donohoe, Owens, O'Donnell, Burke, Moore, & Tobin, et al., 2001). Patients taking atypicals had more positive attitudes toward medication than patients on typical antipsychotics (Ritsner, Perelroyzen, Ilan, & Gibel, 2004). "Pharmacophobic" patients were more likely to rate medications as disruptive to daily life (Sibitz, Katschnig, Goessler, Unger, & Amering, 2005).

No studies have been identified that have used the DAI in adolescent psychiatric populations. A review of empirical work with adolescents reveals only one study of adolescents' subjective experiences with psychotropics (Schimmelfmann, Paulus, Schacht, Tilgner, Schulte-Markwort, and Lambert (2005). That study used Naber's (1995) Subjective Well-Being on Neuroleptics Scale, included only twenty inpatient adolescents, and did not examine adherence. The authors found that adolescents' ratings of subjective well-being were related negatively to side effects.

The present study was undertaken to evaluate the utility of the DAI for measuring medication attitudes and predicting adherence in an adolescent psychiatric population. The factor structure of the DAI was examined as well as whether DAI scores were associated significantly with adherence.

Methods

Study Sample

Adolescents were recruited from the child/adolescent psychiatry division at a midwestern university medical center and from community mental health settings. Sampling was intended to recruit youth who were representative of outpatient mental health care and who suffered from a variety of psychiatric illnesses. Written informed consent (primary caregiver) and assent (youth) were obtained prior to performance of study procedures. Study procedures were reviewed and approved by the medical center's Institutional Review Board for Human Investigation.

Criteria for study participation included: age between 12-17 years; an axis one diagnosis for which psychotropic medication was prescribed; and the availability of a parent/guardian with whom the adolescent resided. Youth with diagnoses of mental retardation, pervasive developmental disorder, seizure disorder, or organic brain injury were excluded. Youth who had not taken psychiatric medication at least once in the past 30 days per parent and youth report were ineligible to participate.

Study Measures

Youth attitudes toward psychotropic medications were measured using an adaptation of the 30-item DAI (Hogan, Awad, & Eastwood, 1983). The wording of the items was identical to the items presented to adults in the original DAI study. However, response options of the instrument were changed from dichotomous (true/false) choices to a five-point, Likert-type scale, ranging from 1 (“strongly disagree”) to five (“strongly agree”). Using a dichotomized response format requires respondents to endorse one of two polar opposites; attitudes toward medication may be characterized more precisely using a range of responses that reflect attitude intensity and polarity (Spector, 1992, pg. 4). Half of the items were reverse-scored to decrease response set bias. Those items were recoded prior to data analysis such that higher scores indicated more positive attitudes toward medication for all items. A subsample of youth completed the DAI twice – a second administration was given three months after the first administration.

Youth adherence was captured via self- and parent-report on a Likert-type scale designed for this study. Respondents chose from one of four adherence categories that indicated the degree to which youth follow prescribed medication regimens: 1 (“not at all”), 2 (“sometimes”), 3 (“usually”) and 4 (“all of the time”). Parents and youth were given the opportunity to complete these self-report measures separately. As the primary purpose of this exploratory study was to examine adolescent attitudes about psychotropic medication, other measures such as serum levels, pharmacy refill records, or electronic bottle monitors were not obtained. The self-report data collected were gathered as would be done in a typical clinic visit.

Demographic and Clinical Variables

Parent-report data regarding adolescents' primary and co-morbid diagnoses, primary and concomitant medications, age, gender, years of education, and ethnicity were collected. Age of first medication treatment was available for 43 respondents.

Statistical Methods

Univariate Data Analysis

Each DAI item was inspected to verify that all response options were used and to ensure that the distributions of item responses were not skewed or kurtotic. Data were inspected for missing responses.

Internal Consistency

Internal consistency was evaluated for the total measure using Cronbach's alpha.

Association with Adherence

Correlations were computed between average teen DAI score and their self-reported adherence to medication. It was expected that teens who endorsed positive attitudes toward their medications would be more likely to take them as prescribed.

Test-retest Reliability of the Teen DAI

Test-retest reliability was assessed by computing a bivariate correlation between the initial administration of the DAI and an additional administration administered three months later.

Confirmatory Factor Analyses

Structural equation modeling using Lisrel 8.0 was used to conduct confirmatory factor analysis (CFA) comparing the adult model found by Hogan, Awad, and Eastwood (1983) to the data derived from the adolescent sample. Figure 1 depicts the SEM conceptual diagram.

The factor structure found in adults consisted of seven correlated components: positive attitudes toward medication [8 items], negative attitudes toward medication [6 items], illness model [3 items], external locus of control [2 items], internal locus of control [2 items], relapse prevention [2 items], and harm/toxicity [2 items]). CFA was employed to determine whether this model fit the adolescent DAI data. A variance-covariance matrix was computed for the adolescent DAI items and used to obtain parameter estimates. Values for missing data were imputed in the PRELIS program using linear interpolation for each item as recommended by Little (2006). Maximum likelihood estimation was employed to estimate the parameters of the hypothesized model. The values of the latent constructs were fixed at 1.0 to allow for model identification. All other values were free to vary. Error values for the DAI items were modeled as uncorrelated. Fit indices (chi-square, RMSEA, NNFI, CFI) were examined to determine degree of model fit.

Evaluation of model fit was based on (1) the degree to which the adult DAI model fit the adolescent data [chi-square, RMSEA], and (2) model fit relative to a null hypothesis of complete independence between the instrument items [NNFI, CFI]. RMSEA (root mean squared error of approximation) values can range from 0 to 1.0, with lower values signifying better fit. Cutoffs recommended by Browne and Cudek (1993) were used to evaluate model fit, with values less than .05 indicating “close fit”, values between .05-.08 indicating “fair fit”, and values greater than .10 indicating “poor fit”. Comparative fit indices (non-normed fit index (NNFI), comparative fit index (CFI)), provided estimations of model fit relative to a null model of independence between items. These also range from 0 to 1.0, with recommended standards of $\geq .95$ (Kaplan, 2000, p. 107).

Power

A sample size of 122 youth demonstrated adequate power to evaluate the 32-parameter model based on the original DAI factor structure (Little, 2006).

Results

One hundred and twenty-two adolescents completed the DAI. Their demographic characteristics are presented in Table 1. Average DAI scores were slightly above neutral at 3.61 ($SD=.60$). Their average adherence rating was 3.60 ($SD=.63$), midway between “usually” and “all of the time”. The sample was comprised mostly of Caucasians; approximately one quarter of the participants was African-American. The most common primary psychiatric diagnoses per parent report were bipolar disorder, major depressive disorder, and attention-deficit/hyperactivity disorder.

Univariate Data Analysis

Results showed that each response option was utilized for all thirty items. All DAI items fell within a normal range of skewness (± 2.0) and kurtosis (± 7.0) (Ferguson, 1976). Inspection of missing data revealed that 4% of the items were left unanswered (150 missing

data points out of 3600 possible). These values were imputed in PRELIS using linear interpolation (Little, 2006).

Internal Consistency

Results indicated high internal consistency ($\alpha = .889$). Inspection of the individual items indicated that Cronbach's alpha would decrease by .01 - .10 if any of the items was removed.

Association with Adherence

Correlations were computed between average teen DAI scores and self-reported adherence to medication. It was expected that to the extent that teens endorsed a positive attitude toward medications, they would be more likely to take them as prescribed. Results indicated a low, but significant positive correlation ($r = .205, p < .05$).

Test-retest Reliability of the Teen DAI

Bivariate correlation coefficients were computed for DAI scores from a subsample of 24 teens who completed a second administration of the DAI three months after the initial administration. Univariate analyses of variance demonstrated no significant differences in age, number of psychiatric medications, years of education, or average DAI score between youth who completed the second administration and those who did not. Chi-square tests revealed no significant psychiatric diagnosis or gender differences between the two groups. The correlation between the two DAI administrations was significant ($r = .71, p < .01$), indicating high stability in youth attitudes toward medication over the three-month time period.

Confirmatory Factor Analysis Results

The structural equation model used in this study evaluated whether the factor structure obtained from the DAI in adults (Hogan, Awad, & Eastwood, 1983) fit the adolescent data. Results indicated that the adult factor structure was a “fair fit” for the adolescent data. The RMSEA for the adolescent model was .061, not achieving the “close fit” standard of .05. Comparative fit indices (NNFI = .938, CFI = .948), fell below the recommended ideal of .95 (Kaplan, 2000), also suggesting room for improvement between the adult model and the adolescent data.

Comparison of Adult and Adolescent Factor Structures

Table 2 presents the factor loadings for each latent construct in the model, rank-ordered by item, within groups. Direct comparisons between the adult and adolescent data cannot be made because the response options of the DAI were changed to a Likert-type scale for the adolescents. However, rank-ordering provides a way of “standardizing” the relative salience of the items based on their degree of relationship to the underlying factors.

Several interesting patterns can be seen in the factors which retained the greatest number of items. For example, item 29 (“I am in better control of myself on medication”) is ranked second out of eight items which loaded onto the factor “Positive Feelings toward Medications” for adolescents; however, it ranked seventh out of eight for the adults. This suggests that being in control of one's behavior is more salient to the youth than to the adults in their assessment of positive feelings about medication. Similarly, item 21 (“My thoughts are clearer on medication”) ranked first out of eight for adolescents, whereas this item ranked fifth out of eight for adults. These results are consistent with emerging empirical work indicating that youth evaluate cognitive and behavioral improvements when assessing whether medications are effective (Floersch, Townsend, Longhofer, Munson, Winbush, Kranke, Faber, Thomas, Jenkins, & Findling, in press).

Items which were ranked similarly included item 26 (“I feel happier, feel better, when taking medications”), item 15 (“I get along better with people when I am on medication”), and item 2 (“For me, the good things about medication outweigh the bad”). The rankings of these items suggest that they are valued similarly by adolescents and adults when considering positive aspects of medications.

There were more similarities than differences in the item rankings for the factor “Negative Feelings toward Medications”. Item 28R (“I can't relax on medication”) is an exception. This item had the highest ranking under the negative feelings factor for adolescents, but had the lowest ranking for adults. This suggests that inability to relax was a salient negative attribute of medication for the youth, but not for the adults. The other items were ranked similarly, suggesting that tiredness, sluggishness, inability to concentrate, and persistent unpleasant effects had similar salience for both groups.

The factor “Health and Illness Model” had only three items, two of which ranked similarly for adolescents and adults. Of particular interest, item 13R (“I take medication only when sick”) ranked lowest for adolescents and highest for adults. This may indicate that adolescents and adults view the term “sick” differently or that they hold different views about the need for consistency in their medication regimen. Less information can be gleaned from the rankings of items which loaded onto the other factors given that only two items were retained per factor.

Factor Correlations

Table 3 presents factor correlations from the adolescent model. Hogan, Awad, & Eastwood (1983) did not present factor correlations, making it difficult to compare results from the two studies.

Most of the factors had moderate to high correlations ($r = .50$ or higher), with the exception of the correlation between “External Locus of Control” and “Negative Subjective Feelings toward Medication” ($r = .341$). This correlation is relatively low, yet may indicate an important developmental aspect of psychotropic treatment for youth: being controlled by external forces (including mental health symptoms and medications) may represent a barrier to adolescents' emerging autonomy, such that believing that one's mental health symptoms are controlled by external forces is consistent with a negative perception of medication.

Discussion

Comparison of the adolescent and adult factor loadings indicated similarities and differences in the salience of particular items to each group. Of specific interest are disparities in the salience of items reflecting self-control, inability to relax, and consistency of medication regimen. These differences may underlie the lack of close fit between the adult and adolescent DAI models as well as the low association of the adolescent DAI with adherence.

Emerging work suggests that adolescents measure the impact of psychotropic medication on their emotions, cognitions, behavior, and interpersonal relationships against side effects which affect daily life (Floersch, Townsend, Longhofer, Munson, Winbush, Kranke, Faber, Thomas, Jenkins, & Findling, in press). This work supports the idea that differences between characteristics of adults and youth and their medications may underlie disparities between their responses to the DAI items. These characteristics fall broadly under developmental stage, symptom chronicity, diagnosis, and medication class.

Adolescents exist within a unique developmental context; they are under the control of parents and other authority figures; simultaneously, they are engaging in a process of

differentiation from adult caregivers, seeking independence and autonomy. The average age of the adults in the Hogan study was 40.0 ($SD=12.4$) for males and 42.1 ($SD=10.8$) for females, rendering the age range between 27.6-54.5 years; the average age of the adolescents in the present study was 14.49 ($SD=1.70$). Age-specific developmental mechanisms may render adolescents' experiences of treatment different than those of adults. Adults retain the ability to engage in treatment or to reject it except in very specific circumstances. Whether or not one can control treatment decisions may affect one's view of medication and its role.

Additionally, the adults in the Hogan study likely experienced their illnesses for many years prior to completing the DAI, whereas the adolescents in this study had been diagnosed for a shorter time (mean age of first medication trial = 9.42, $SD=3.24$). Age of first treatment was not reported for the Hogan study. Dealing with a mental illness for a significant portion of adulthood may generate different perceptions of chronicity and need for ongoing treatment than one might have with a newer diagnosis. In fact, some youth view mental health issues as transient rather than requiring sustained management (Townsend, Floersch, & Findling, unpublished data). Underlying differences in how adults conceptualized their mental illnesses and the role of medication may have generated differences in the salience of the relapse prevention items.

Furthermore, the Hogan study included adults with schizophrenia only, whereas the adolescents were diagnosed with a range of Axis I disorders. The majority of youth in this sample were diagnosed with bipolar disorder, major depressive disorder, or attention-deficit/hyperactivity disorder. Differences in symptoms between those with schizophrenia and those who have mood, behavior, or other disorders may generate different DAI responses. For example, the item tapping self-control had high salience for the adolescents, who, according to their diagnostic profiles, were more likely to exhibit disruptive behavior, aggression, or hyperactivity. In contrast, adults with schizophrenia often struggle with negative or internalized symptoms, including social withdrawal, poverty of speech, or thought disorder. Given that patients typically have awareness of how others view their behavior, it is logical to conclude that they may define improvements in those domains as a positive effect of medication.

Lastly, the adults and adolescents were prescribed different classes of medication. Adults in the original DAI study were taking typical antipsychotics, which are linked with extrapyramidal side effects, including involuntary muscle movements that may be visible to others (Gao, Kemp, Ganocy, Gajwani, Xia, & Calabrese, 2008). Adolescents in this study took atypical antipsychotics, mood stabilizers, stimulants, and antidepressants. Atypicals were designed to reduce extrapyramidal symptoms; indeed, tolerability studies examining the side effect profiles of typical and atypical antipsychotics indicate significantly different side effects (Karow, Schnedler, & Naber, 2006). However, weight gain associated with atypicals is a predominant concern among teens (Townsend, Floersch, & Findling, unpublished data). None of the DAI items assesses weight gain. Items may need to be altered to account for the side effect profiles of newer medications.

Limitations

Use of a self-report adherence measure is one limitation of this study. Furthermore, variability in the range of adherence levels reported was low - most adolescents reported adhering to their medications "usually" or "all the time". Low variability may have attenuated the association between DAI scores and adherence. The DAI may perform differently between adolescents who report high levels of adherence and those who adhere less, affecting the generalizability of these findings.

Additionally, the six-year age span of the participants and the diagnostic heterogeneity of this cohort might be considered methodological limitations. However, the paucity of prior studies in this field, as well as the exploratory nature of this study led to the study design decisions employed in this work. Future studies are needed to examine whether attitudes differ according to age, diagnostic, and medication characteristics.

Conclusions

The DAI is a strong predictor of adult medication adherence. However, the treatment experiences of adults may not represent the experiences of youth. Results of this study suggest that DAI items may require alteration to reflect adolescent experiences with psychotropic treatment. Differences in developmental stage, symptom chronicity, diagnosis, and medication class may explain why the adult DAI model demonstrated only “fair fit” to the adolescent data and why the correlation between DAI scores and adherence was low. The DAI may be improved for use with adolescents by creating items reflecting autonomy concerns, diagnostic characteristics, **treatment length**, and side effect profiles relevant to adolescent experiences. Also potentially relevant to youth attitudes and adherence to psychotropic treatment are social and structural barriers, such as family attitudes toward mental health and medication, peer and school influences, stigma-related experiences, and insurance/affordability issues.

A strong measure of youth attitudes toward psychotropic treatment will improve clinical practice and provide opportunities for youth to participate actively in their treatment. An instrument designed to reflect attitudes derived from adolescent treatment experiences may improve prediction of adherence and engage adolescents and families in discussions regarding maximizing clinical benefit while minimizing side effects that impede adherence. The ability to measure youth attitudes toward medication may increase early detection of factors that contribute to decompensation, suicidal ideation, and negative outcomes by highlighting aspects of treatment that prompt non-adherence. It may also serve as a tool that clinicians can use to engage adolescents and their families in conversation about the advantages and disadvantages of various treatment options.

Key Points

- Adolescent adherence to psychotropic medications is low; a measure of youth attitudes toward these medications may increase understanding of this problem.
- The Drug Attitude Inventory (DAI) predicts adherence to psychotropic medication in adults with mental health disorders; this study examined its psychometric properties in adolescents.
- The factor structure of the adult DAI demonstrated “fair” but less than optimal fit to the adolescent data and demonstrated a low but significant association with self-reported adherence.
- Differences in developmental stage, symptom chronicity, diagnosis, and medication class between adults and adolescents may underlie their differing responses on the DAI. Changes in the DAI that reflect adolescent experiences with medication may improve measurement of their attitudes and improve understanding of non-adherence.

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Figure 1.
DAI Structural Equation Model-Conceptual Diagram

Table 1
Demographic Characteristics of Teen DAI Sample (N=122)

<u>Gender</u>	<u>n</u>	<u>Average DAI Score</u>
Male	58	3.61 (<i>SD</i> =-.60)
Female	64	
<u>Ethnicity</u>		<u>Avg. Self-reported Adherence</u>
Caucasian	79	3.60 (<i>SD</i> =.63)
African-American	37	
Hispanic	3	<u>Avg. Age</u>
Other	2	14.49 (<i>SD</i> =1.70)
<u>Diagnosis</u>		<u>Avg. No. of Psychiatric Medications</u>
Bipolar	40	1.99 (<i>SD</i> =1.12)
Depression	33	
ADHD	22	
Other	27	

Table 2

Rank-ordered Factor Loadings for Adolescents and Adults

Item	"Positive Feelings"	Teen Factor Loadings	Item	"Positive Feelings"	Adult Factor Loadings	Rank Order (Teen, Adult)
21	My thoughts are clearer on medication	.829	18	I feel more normal on medication	.79	1,5
29	I am in better control of myself on medication	.801	26	I am happier, feel better, when taking medications	.77	2,7
26	I am happier, feel better, when taking medications	.774	6	I am more aware of what I am doing...on medications	.7	3,2
18	I feel more normal on medication	.762	15	I get along better with people when I am on medication	.69	4,1
15	I get along better with people when I am on medication	.672	21	My thoughts are clearer on medication	.64	5,4
6	I am more aware of what I am doing...on medications	.606	9	Medication makes me feel more relaxed	.6	6,3
2	For me the good things about medication outweigh the bad	.506	29	I am in better control of myself on medication	.53	7,8
9	Medication makes me feel more relaxed	.473	2	For me the good things about medication outweigh the bad	.48	8,6
Item	"Negative Feelings"	Teen Factor Loadings	Item	"Negative Feelings"	Adult Factor Loadings	Rank Order (Teen, Adult)
28R	I can't relax on medication	.62	3R	I feel weird, like a 'zombie' on medication	.71	1,6
3R	I feel weird, like a 'zombie' on medication	.609	25R	Things that I could do easily are much more difficult on medication	.68	2,1
25R	Things that I could do easily are much more difficult on medication	.605	12R	Medication makes me feel tired and sluggish	.67	3,2
12R	Medication makes me feel tired and sluggish	.517	16R	I can't concentrate on anything when I am taking medication	.66	4,3
16R	I can't concentrate on anything when I am taking medication	.405	11R	The unpleasant effects of medication are always present	.53	5,4
11R	The unpleasant effects of medication are always present	.379	28R	I can't relax on medication	.42	6,5
Item	"Health/Illness Model"	Teen Factor Loadings	Item	"Health/Illness Model"	Adult Factor Loadings	Rank Order (Teen, Adult)
20R	It is unnatural for my mind and body to be controlled by medication	.492	13R	I take medication only when I am sick	.65	1,2
1R	I don't need to take medications once I feel better	.396	20R	It is unnatural for my mind and body to be controlled by medication	.6	2,3

Item	"Positive Feelings"	Teen Factor Loadings	Item	"Positive Feelings"	Adult Factor Loadings	Rank Order (Teen, Adult)
13R	I take medication only when I am sick	.147	1R	I don't need to take medications once I feel better	.56	3,1
Item	"External LOC"	Teen Factor Loadings	Item	"External LOC"	Adult Factor Loadings	Rank Order (Teen, Adult)
24	It is up to the doctor when I go off medication	.566	24	It is up to the doctor when I go off medication	.81	1,1
17R	I know better than the doctor when to go off medication	.537	17R	I know better than the doctor when to go off medication	.57	2,2
Item	"Internal LOC"	Teen Factor Loadings	Item	"Internal LOC"	Adult Factor Loadings	Rank Order (Teen, Adult)
5R	If I take medication, it's only because of pressure from other people	.595	5R	If I take medication, it's only because of pressure from other people	.63	1,1
8	I take medication of my own free choice	.361	8	I take medication of my own free choice	.49	2,2
Item	"Relapse Prevention"	Teen Factor Loadings	Item	"Relapse Prevention"	Adult Factor Loadings	Rank Order (Teen, Adult)
23	Taking medication will prevent me from having a breakdown	.767	30	By staying on medication, I can prevent getting sick	.8	1,2
30	By staying on medication, I can prevent getting sick	.562	23	Taking medication will prevent me from having a breakdown	.62	2,1
Item	"Harm/Toxicity"	Teen Factor Loadings	Item	"Harm/Toxicity"	Adult Factor Loadings	Rank Order (Teen, Adult)
14R	Medication is slow-acting poison	.619	7	Taking medication will do me no harm	.63	1,2
7	Taking medication will do me no harm	.375	14R	Medication is slow-acting poison	.48	2,1

Table 3

Factor Correlation Matrix for the DAI SEM Model

	Positive	Negative	Illness	ExtLOC	IntLOC	RelapseP	Toxicity
Positive	1.000						
Negative	0.542 (0.088)	1.000					
Illness	6.148 0.751 (0.165)		1.000				
ExtLOC	4.540 0.684 (0.119)	3.995 0.341 (0.152)		1.000			
IntLOC	5.744 0.611 (0.156)	2.247 0.563 (0.170)	4.588 0.788 (0.256)		1.000		
RelapseP	3.930 0.754 (0.082)	3.304 0.577 (0.111)	2.939 0.566 (0.192)	3.376 0.664 (0.149)		1.000	
Toxicity	9.146 0.630 (0.144)	5.200 0.615 (0.160)	2.949 1.046 (0.276)	4.462 0.674 (0.204)	2.338 0.713 (0.237)		1.000
	4.368	3.848	3.784	3.309	3.007	3.430	