
The Conceptual Adequacy of the Drug Attitude Inventory for Measuring Youth Attitudes Toward Psychotropic Medications: A Mixed Methods Evaluation

Journal of Mixed Methods Research
4(1) 32–55
©The Author(s) 2010
Reprints and permission: <http://www.sagepub.com/journalsPermissions.nav>
DOI: 10.1177/1558689809352469
<http://jmmr.sagepub.com>



Lisa Townsend,¹ Jerry Floersch,¹
and Robert L. Findling²

Abstract

Adolescents are routinely treated with psychiatric medications; however, little is known about their attitudes toward pharmacological intervention. The authors used a concurrent triangulation, mixed methods design to assess whether the Drug Attitude Inventory (DAI), developed for adults, is suitable for measuring adolescent attitudes toward psychiatric medications. Factor analytic techniques and qualitative data were used to investigate whether the instrument provides comprehensive measurement of medication-related constructs in adolescents. Findings suggest that the DAI contributes to knowledge of youth attitudes toward psychotropic treatment; however, limitations were uncovered by the mixed methods approach. This study enhances the measurement and mixed methods literature by showing how qualitative and quantitative techniques served as parallel data reduction strategies for examining an instrument's utility with a new population.

Keywords

Drug Attitude Inventory, adolescents, mental health, adherence

Increasing numbers of children and adolescents are being treated with psychiatric medication; however, we know very little about their attitudes toward pharmacologic intervention. In part, this lack of knowledge exists because there are no psychometrically tested instruments to measure youth attitudes toward psychotropic medication. In the study reported here, we have used the Drug Attitude Inventory (DAI; Hogan, Awad, & Eastwood, 1983), which was developed

¹Rutgers University, New Brunswick, NJ, USA

²Case Western Reserve University, Cleveland, OH, USA

Corresponding Author:

Lisa Townsend, School of Social Work/Center for Education and Research on Mental Health Therapeutics,
Rutgers University, 536 George Street, New Brunswick, NJ 08901, USA
Email: ltownsend@ssw.rutgers.edu

for adults, to assess adolescent attitudes toward psychiatric medications. We used a concurrent, triangulation, mixed methods design (Creswell, Fetters, & Ivankova, 2004) formulated to describe the factor structure, validity, and reliability of the DAI in adolescents and to use qualitative data to evaluate whether the items in the existing instrument are comprehensive enough to represent youth attitudes toward psychotropic medication. The juxtaposition of quantitative and qualitative data with equal emphasis served this purpose by simultaneously eliciting the factor structure of an existing instrument in adolescents and investigating the adequacy of the instrument in measuring attitudinal constructs relevant to youth who are undergoing psychotropic treatment. This study contributes to the field of instrument development and the mixed methods literature by showing how qualitative and quantitative techniques can serve as equally valuable data reduction strategies in the examination of an instrument's applicability to a new population.

Three factor analytic techniques (confirmatory, exploratory, and parallel analysis) were employed to examine the factor structure of the DAI in adolescents. Simultaneously, qualitative data were gathered to investigate whether the existing instrument provides comprehensive coverage of medication-related constructs relevant to adolescents. Findings suggest that the DAI contributes to our knowledge of youth attitudes toward psychotropic treatment, but that it also has specific limitations that were uncovered by the mixed methods approach.

Factor analytic findings are presented first to provide the reader with an overview of the factor structure of the DAI in youth. Subsequently, qualitative data are provided that offer new information to assist with interpretation of the factor structure of the instrument. Finally, quantitative and qualitative findings are integrated and recommendations made for further instrument development. Results of this study illustrate how psychometric interpretation of factor structure can benefit from the incorporation of qualitative data and highlight the role that qualitative data can play in improving a quantitative instrument with less than optimal psychometric properties. The article concludes with implications for the role that mixed methods may serve in psychometric research and instrument development.

Background and Significance

During the past several decades, there has been growing recognition that children and adolescents suffer from mental illnesses that were previously thought to affect only adults; at the same time, prescription of psychotropic medications for youth has increased (Harpaz-Rotem & Rosenheck, 2004; Thomas, Conrad, Casler, & Goodman, 2006). Safer, Zito, and dos Reis (2003) reviewed nationwide studies demonstrating that both psychotropic monotherapy and use of concomitant psychotropic medications have increased substantially over the past two decades.

The effectiveness of pharmacologic treatment for some youth psychiatric disorders has been documented extensively. The clinical trials literature on children and adolescents has proliferated, summarizing a wide range of medications and their effectiveness in treating problems such as attention deficit hyperactivity disorder, depression, and bipolar disorder (Banaschewski, Roessner, Dittmann, Santosh, & Rothenberger, 2004; Emslie et al., 1998; Findling et al., 2003; Findling et al., 2005; Klein et al., 1998; Pelham et al., 2002; Ryan & Varma, 1998; Swanson et al., 1998; Wigal et al., 1999).

Despite the effectiveness of psychotropic treatment for improving symptoms, youth adherence to these medication regimens is low. Adolescents are among the least adherent subgroup of all other pediatric and adult populations (Hack & Chow, 2001). Adherence rates range from 10% to 80% (Brown, Borden, & Clingerman, 1985; Cromer & Tarnowski, 1989; Lloyd et al., 1998; Sleator, 1985; Swanson, 2003), depending on the population and medication studied.

The consequences of nonadherence are sobering. Nonadherence has a strong association with symptom relapse in adults: Nonadherent patients with schizophrenia are 3.7 times more likely to relapse than patients who take psychotropic medications as prescribed (Fenton, Blyler, & Heinsen, 1997). Fortney, Rost, Zhang, and Pyne (2001) reported a significant positive association between adherence to treatment as specified in clinical guidelines and the persistence of major depression. Medication adherence is linked inversely with rehospitalization in adults with schizophrenia (Weiden & Olfson, 1995). Increased utilization of expensive inpatient services is related to low adherence to psychotropic prescriptions (Weiden & Glazer, 1997). Especially concerning is the finding that premature discontinuation of lithium even under medical supervision was related to completed suicide in adults (Muller-Oerlinghausen, Muser-Causemann, & Volk, 1992). Although little work has been done regarding youth nonadherence, existing work supports the link between medication nonadherence and rehospitalization in youth with psychotropic illnesses (Gearing et al., 2009).

Emerging research shows that outcomes for youth with bipolar disorder may be worse than those of adults (Townsend, Demeter, Wilson, & Findling, 2007). Youth with bipolar illness exhibit fewer interepisode remissions than adults (Axelson et al., 2006), have a higher risk of psychosocial trauma (Wozniak et al., 1995), and a protracted illness course with poor social development (Geller, Tillman, Craney, & Bolhofner, 2004). These data provide compelling evidence of the importance of understanding the low rates of medication adherence in youth with serious mental health disorders.

Attitudes toward health-related behaviors are predictive of actual performance of those behaviors. The theory of reasoned action (Ajzen & Fishbein, 1980) attempts to explain how individuals make decisions regarding a variety of health behaviors, including medication adherence. The theory posits three mechanisms that predict individuals' health-related behavior: (a) the person's attitude toward the behavior, (b) the person's perception of subjective norms held by significant others in their environment, and (c) the person's intention to perform the behavior. Behavior is determined in part by whether the individual values the health-related behavior and its consequences.

The theory of reasoned action has garnered significant empirical support. In a study of beliefs about cervical cancer screening in young adult Hispanic women, Byrd, Peterson, Chavez, and Heckert (2004) found that beliefs about need for screening as well as knowing other women who had undergone screening significantly predicted whether or not an individual had used screening themselves. In a series of meta-analyses examining condom use, Albarracin, Johnson, Fishbein, and Muellerleile (2001) found that decisions to use condoms were related to personal attitudes and perceived subjective norms regarding safer sexual practices. Ford et al. (2004) showed that young adults' beliefs about the consequences and treatment of curable sexually transmitted diseases were correlated significantly with their willingness to undergo home-based testing.

Riekert and Drotar (2002) showed that youth health beliefs accounted for a significant proportion of the variance in adherence to asthma, HIV, and irritable bowel disorder treatments. Similarly, Skinner and Hampson (2001) showed that youth who perceived their diabetes treatment regimens as effective were more likely to comply with dietary restrictions. Additionally, beliefs about the effectiveness of asthma medication have been shown to be determinants of adolescent adherence to respiratory therapy (Buston & Wood, 1999).

The theory of reasoned action was extended by the theory of planned behavior, which provides a model for translating behavioral intentions into actual performance (Ajzen, 1991). Planned behavior theory accounts for imperfect translation of intentions into behavior by acknowledging the roles of volition, self-efficacy, and contextual factors as intervening variables between intention and performance. Linking the theories of reasoned action and planned behavior allows one to examine antecedent cognitive processes, the influence of social norms, and

internal motivational factors that support or impede adherence. Our study focuses on measurement of antecedent attitudes toward adherence behavior, which is one variable in a complex process of taking medication as prescribed.

The DAI is a widely used instrument that measures the subjective experience of and attitudes toward psychotropic medications (Hogan et al., 1983). This measure has predicted adherence in a number of adult studies of schizophrenia and depression (Brook, van Hout, Nieuwenhuyse & Heerdink, 2003; Gervin et al., 1999; Hogan et al., 1983; Kampman et al., 2000; Pae et al., 2004; Rossi, Arduini, Stratta, & Pallanti, 2000; Sajatovic et al., 2002) and is frequently used as a validation standard in the design of other scales (Chen, Tam, Wong, Law & Chiu, 2005; Jeste et al., 2003).

The DAI was validated in a sample of 150 outpatient adults who were diagnosed with schizophrenia and taking neuroleptic medications (Hogan et al., 1983). Items used in the instrument were based on patients' descriptions of their experiences with medications in clinical interactions with psychiatrists. The instrument discriminated 88% of the time between patients who were adherent versus nonadherent to their medication, highlighting the relevance of patients' attitudes toward medication in relation to adherence.

We are aware of no studies that have used the DAI in adolescent psychiatric populations. Although there is extensive documentation of youth nonadherence to psychotropic treatment, little is known about youth attitudes toward psychiatric medications. Gathering attitude information with an instrument validated for use with adolescents may shed light on youths' low adherence to medication.

The aim of this study was to elucidate the factor structure of the DAI in adolescents and investigate its adequacy for measuring attitudinal constructs relevant to youth who are undergoing psychotropic treatment. Figure 1 depicts the structure of the study, including the sequence of data collection and analysis for the quantitative and qualitative study arms.

The following questions were examined:

1. What is the factor structure of the DAI in youth undergoing psychotropic treatment? (quantitative question)
2. Is the DAI associated significantly with adherence? (quantitative question)
3. Will qualitative data reveal dimensions of youth attitudes toward psychotropic medication not captured by the DAI, or is the existing instrument comprehensive? (qualitative question)

Methods

Participants

A convenience sample of 122 adolescents was recruited from an outpatient psychiatry practice at a U.S. Midwestern academic medical center and outpatient community mental health settings in the region. Criteria for study participation included: age between 12 and 17 years; a *Diagnostic and Statistical Manual of Mental Disorders*, fourth edition (*DSM-IV*), Axis I 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 from the study. Youth who had not taken psychiatric medication at least once in the past 30 days per parent and youth report were ineligible to participate.

A total of 46 of the 122 participants in the quantitative sample were part of a simultaneous, separate qualitative study regarding youth subjective experiences of psychotropic treatment (for

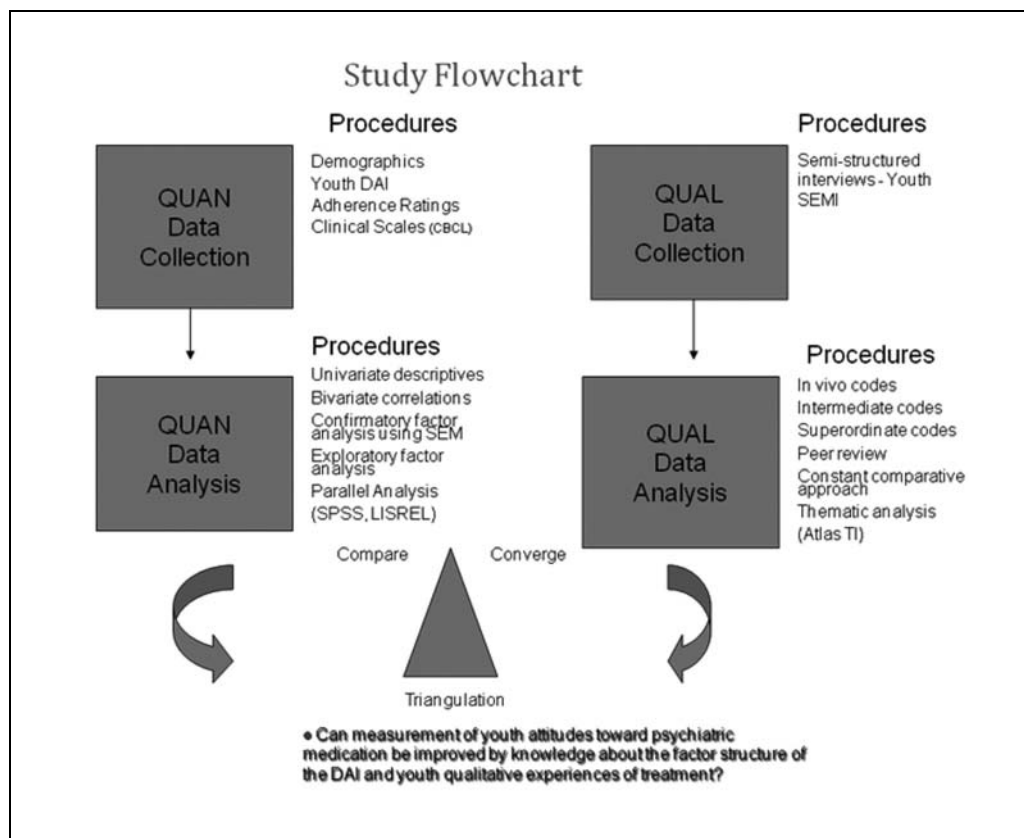


Figure 1. Concurrent triangulation study design: quantitative (QUAN)/qualitative (QUAL) study arms with data collection and analysis procedures

a description of this study, see Floersch et al., 2009). That study had the same inclusion/exclusion criteria as the present investigation. A subset of 20 qualitative interviews was randomly selected from this group for inclusion herein. Our decision to use a random sample of the qualitative interviews differs from traditional sampling methods in qualitative research. The exploratory nature of this research guided our sampling decisions. We wished to reflect a broad range of adolescent medication experiences rather than sampling based on constructs from the clinical literature, which are often predicated on clinician/researcher conceptualizations of adherence (Townsend, 2009). Random selection also meant that we did not select the “best” interview material related to youth attitudes, nor did we select only the most articulate youth, or those whose interviews “stood out” because of extreme positive or negative attitudes toward medication. Our sample size of 20 adolescents was chosen based on saturation of themes in a previous analysis of the qualitative data set employed in this study (Floersch et al., 2009).

Demographic Variables

Data regarding the adolescents’ primary and comorbid diagnoses, type and number of primary and concomitant medications, length of time on current medications, and involvement in non-pharmacologic treatments were collected. Youth adherence was captured via self- and parent-report on a Likert-type scale. Respondents chose from one of four adherence categories that

reflected the degree to which youth follow prescribed medication regimens: 1 (*not at all*), 2 (*sometimes*), 3 (*usually*), and 4 (*all of the time*). This adherence assessment was designed to reflect the verbal report method by which adherence information is typically collected during clinical office visits; therefore, serum levels, electronic bottle monitor data, and pharmacy refill information were not gathered.

Instruments

Youth attitudes toward psychotropic medications were measured using the DAI (Hogan et al., 1983). Factor analytic results from the *original* adult study revealed seven components: positive and negative subjective feelings about medications, patients' personal models of health and illness, internal and external loci of control, relapse prevention, and concern about harm/toxicity. Items were presented to youth using wording identical to the items presented to adults in the original study. However, for the current study, the response options of the DAI were changed from dichotomous (true/false) choices to a 5-point Likert-type scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Using a dichotomized response format requires people to endorse one of two polar opposites; it is possible that attitudes toward medication can be characterized more precisely by offering a range of responses that reflect not only polarity (positive or negative attitude toward medication) but also the intensity with which the attitude is held (Spector, 1992, p. 4). Half of the items were reverse-scored to decrease response set bias. Items were recoded prior to data analysis such that higher scores indicated more positive attitudes toward medication for all items.

Qualitative data were gathered from youth regarding their experiences with medication using the Subjective Experience of Medication in Youth semistructured interview (SEMI; Floersch, et al., 2009). The interview schedule contained 150 questions, which included 9 domains of mental illness and treatment experience: (a) treatment, illness, and medication history; (b) perceptions of medication; (c) medication management; (d) parent and adolescent interaction regarding medication; (e) stigma; (f) medication management at school; (g) peer interactions; (h) access to mental health services; and (i) race, gender, and religious influences regarding medication experience. It is important to note that the SEMI was designed as an interview guide rather than an instrument to be delivered verbatim to respondents. As such, questions were employed to initiate the interview process and were used to ensure that a broad range of topics was covered. The SEMI was used in a nondirective manner with respondents. Questions were open-ended and designed to avoid leading or biasing participant responses.

The interviews were conducted by the first (LT) and second authors (JF), in addition to two doctoral-level interviewers. The second author (JF) has extensive experience in ethnographic research, qualitative methods, and clinical practice with adults who have serious mental illness. The first author (LT) received doctoral training in qualitative methods and has extensive clinical experience working with adolescents diagnosed with mental health disorders. The doctoral level interviewers were required to observe several interviews conducted by the first and second authors prior to assisting with data collection; their work was reviewed regularly by the first and second authors. Interviewers focused on generating dialogue about medication without emphasizing any particular aspect of medication experience, such as side effects or adherence. The open-ended design of the interview instrument strengthens the comprehensiveness of the data gathered by not limiting adolescents to a priori medication topics. Interviews were conducted with adolescents in a private office located in an outpatient psychiatry clinic or in their homes. Length of response to individual items varied, given that interviewers followed the lead of the participants; some questions were not asked if the content was spontaneously covered by the participant in another section of the interview. Interview length ranged from 1 to 2.5 hours.

Qualitative responses were audiotaped and transcribed verbatim. The random sample of 20 youth interviews was selected prior to initiation of qualitative data analysis.

Quantitative Data Analysis

Three factor analytic techniques were used. Structural equation modeling was used to conduct confirmatory factor analysis (CFA), followed by exploratory factor analysis (EFA) and parallel analysis to elucidate the factor structure of the instrument. Parallel analysis was employed within EFA to verify that EFA did not overextract factors that were not conceptually meaningful. The three techniques were used to derive a core set of robust items and to ensure that the final factor structure was not an artifact of the type of analysis conducted (Kaplan, 2000, pp. 301-308).

Confirmatory Factor Analysis

Structural equation modeling was employed using Lisrel 8.0 to evaluate the fit of the adult DAI factor structure to the adolescent data (Townsend, Floersch, & Findling, in press). The DAI instrument was evaluated using a structural equation model that reflected the original factor structure of the DAI in adults, which consisted of seven correlated factors: 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 medication harm/toxicity (2 items). Maximum likelihood estimation was employed to estimate the parameters of the hypothesized model. Fit indices (RMSEA [root mean squared error of approximation], NNFI [nonnormed fit index], and CFI [comparative fit index]) were examined to determine degree of model fit. RMSEA values can range from 0 to 1.0, with lower values signifying better fit. Cutoffs recommended by Browne and Cudeck (1993) were used to evaluate model fit, with values less than .05 indicating "close fit," values between .05 and .08 indicating "fair fit," and values greater than .10 indicating "poor fit." Comparative fit indices (NNFI, CFI) provided additional estimations of model fit compared with a null model of complete independence between items. These parameters can also range from 0 to 1.0, with recommended ideal standards of >.95 (Kaplan, 2000, p. 107).

Exploratory and Parallel Factor Analyses

Subsequently, all DAI items were subjected to exploratory factor analysis using maximum likelihood estimation with oblique rotation (SPSS 14.0). Maximum likelihood estimation was used to provide a comparable extraction method to that employed in the structural equation model. Oblique rotation reflected the expectation that factors would be correlated. An eigenvalue greater than 1.0 (DeVellis, 2003, p. 114) was used as a criterion for factor selection.

Parallel Analysis

Parallel analytic techniques provide alternative ways to evaluate the factor structure of an instrument that are less vulnerable to overextraction. This method compensates for the propensity of the eigenvalue greater than 1.0 rule to overextract factors that are not conceptually meaningful. The technique generates multiple random data sets and compares the number of factors extracted from the actual data with those extracted from the random data sets. Factors are retained to the extent that they account for greater variance than factors extracted from

Table 1. Demographic Characteristics of Adolescents in the Quantitative (QUAN) and Qualitative (QUAL) Study Arms

	QUAN (N = 122)	QUAL (N = 20)
Gender		
Male	58	7
Female	64	13
Ethnicity		
Caucasian	79	10
African American	37	9
Hispanic	3	1
Other	2	9
Diagnosis		
Bipolar	40	7
Depression	33	4
ADHD	22	6
Other	27	0
Schizophrenia	0	1
Eating disorder	0	1
Undetermined	0	1
Average age (years)	14.49 (SD = 1.70)	14.20 (SD = 1.70)
Average DAI score	3.61 (SD = .60)	NA
Average self-reported adherence	3.60 (SD = .63)	NA
Average number of psychiatric medications	1.99 (SD = 1.12)	1.80 (SD = .77)

Note: ADHD = attention-deficit hyperactivity disorder; DAI = Drug Attitude Inventory.

random data (O'Connor, 2000). For this study, a series of 2,000 random data sets was used to generate eigenvalues that were compared with the eigenvalues of the actual data set calculated by SPSS.

Quantitative Results

A total of 122 adolescents completed the DAI instrument. A sample size of 122 youths demonstrated adequate power to evaluate the 32-parameter model based on the original DAI factor structure (Little, 2006). Average DAI scores were slightly above neutral at 3.61 ($SD = 0.60$). The average rating for how often medications were taken as prescribed was 3.60 ($SD = 0.63$), midway between *usually* and *all of the time*. The sample was comprised of mostly Caucasian teens, although roughly one quarter of the participants was African American. The most common primary psychiatric diagnoses reported were bipolar disorder, major depressive disorder, and attention-deficit hyperactivity disorder (ADHD). Table 1 summarizes the demographic characteristics of the quantitative and qualitative samples.

Confirmatory Factor Analysis

Results of the CFA revealed a “fair” degree of fit between the 7-factor adult DAI model and the adolescent data (Browne & Cudeck, 1993), but with room for improvement. Absolute fit indices (chi-square and RMSEA) suggested a fair degree of fit using the adult model, $\chi^2(258) = 420.38$, $p = .0966$, RMSEA = .061; however, the RMSEA value did not meet the gold standard of “close fit” (indicated by an RMSEA value of .05 or lower). Relative fit indices (CFI, NNFI) were both lower than the recommended standard of .95, falling at .925 and .913, respectively.

These findings suggest that although the factor structure of the DAI in adults provides a reasonable degree of fit to the adolescent data, fit is not optimal, indicating that the factor structure model employed with adults cannot be applied unchanged to adolescent data. For example, one might use the factor “relapse prevention” as a predictor in a regression model for adult adherence based on its performance within the factor structure of the adult DAI instrument; our findings suggest that one cannot use the adult factor structure to create variables for use with adolescents given the lack of optimal model fit.

Exploratory Analyses

Results of the initial 30-item exploratory factor analysis were not interpretable because of the presence of two Heywood cases, which are items with structure matrix factor loadings greater than or approaching 1.0 (Little, 2006). Items 8 (“I take medication on my own free choice”) and 13 (“I take medication only when I am sick”) demonstrated factor loadings of 1.033 (on Factor 1) and 0.996 (on Factor 2) and were the first two factors to emerge. Interestingly, these items were among those with the lowest factor loadings in the CFA analysis, suggesting that they are unique from the other items.

The presence of Heywood cases made further interpretation of the factor structure difficult. Given these conditions, a second exploratory factor analysis was conducted, using the same specifications as the first exploratory factor analysis, omitting Items 8 and 13. Items with loadings of .30 or greater were considered to relate significantly to a factor. Seven factors emerged; Table 2 presents the pattern matrix and factor loadings from the 28-item analysis.

As Table 2 shows, the first factor to emerge corresponded in content to the “Positive Feelings toward Medication” factor used in the structural equation model. Items 21 (“My thoughts are clearer on medication” [.789]) and 29 (“I am in better control of myself on medication” [.598]) had the strongest loadings on this factor. Items 2 (“For me the good things about medication outweigh the bad” [.474]) and 26 (“I am happier, feel better, when taking medications” [.487]) loaded less strongly, yet differentiated well from the other factors. This factor appears to be robust in the adolescent data, as suggested by its strong cohesion in the CFA and its emergence as an initial factor in the EFA.

The second factor to emerge consisted of six items referring to negative aspects of medication, such as medication acting as poison (Item 14, .714), the preference for being sick rather than taking medication (Item 19, .658), and feeling more normal (Item 18, .502). Items referencing controlling behavior at the request of others (Items 5 and 27) loaded less strongly (.315 and .347, respectively). This factor was labeled “Negative Feelings Toward Medication” and was supported by CFA and EFA analyses.

Examination of the remaining factor structure revealed that beyond the first two factors, subsequent factors failed to group cohesively. Some factors (e.g., Factor 3) contained only two items with variable factor loadings ($16R = -.359$, $28R = -.817$). Other factors lacked conceptual similarity (Factor 5—“I am more relaxed on medication” and “It’s up to the doctor when I go off medication”; Factor 7—“Medication will do me no harm” and “I get along better with others on medication”). These findings led to our decision to examine the factor structure of the DAI using parallel analysis.

Parallel Analysis

To compensate for the tendency of EFA to overextract factors and to clarify interpretation of the EFA, parallel analysis was conducted to identify the most robust factors that emerged from the data. This method of factor analysis employs factor extraction from random data sets as

Table 2. Pattern Matrix Factor Loadings for 28-Item Analysis

Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
Positive feelings							
2: Good outweighs bad	.474	.230	-.083	-.023	.214	.078	.011
21: Thoughts are clearer	.789	.015	-.048	.125	.081	-.068	-.164
26: Happier on meds	.487	-.027	-.249	.217	.150	-.209	-.013
29: In better control	.598	.324	-.066	.143	-.026	.006	-.131
Negative feelings							
5R: Take better control of pressure from others	.074	.315	-.201	.015	.132	-.137	.113
14R: Slow acting poison	.034	.714	.106	-.010	-.020	-.036	-.079
17R: Know better than doctor when to go off	-.080	.485	.047	.194	.269	.096	.036
18: Feel more normal	.268	.502	-.214	.217	-.076	.114	-.359
19R: Rather be sick	.170	.658	-.097	.031	-.116	-.124	.003
27R: Control behavior others don't like	-.269	.347	-.230	-.127	.105	-.054	.342
Factor 3							
16R: Can't concentrate when on meds	.138	.061	-.359	-.231	.053	-.217	.016
28R: Can't relax on meds	.048	-.133	-.817	.062	-.058	-.179	-.149
Factor 4							
1R: Don't need once better	.077	.080	.133	.593	-.053	-.224	.058
4: Need med even when not in hospital	.368	-.051	-.130	.377	.056	.116	.127
22: Should stay on even if feeling well	-.038	.075	.014	.674	.302	-.003	-.078
23: Prevents breakdown	.135	-.027	-.283	.554	.001	.002	-.100
Factor 5							
6: More aware on meds	.319	.149	.172	-.135	.482	-.234	-.288
9: Feel more relaxed	.142	-.144	-.291	.039	.408	-.031	-.177
24: Up to doctor when to go off	.001	-.035	-.099	.195	.589	.093	-.044
Factor 6							
3R: Feel like zombie	.029	.277	-.117	.224	-.286	-.496	-.079
12R: Tired and sluggish	-.108	-.059	-.071	-.016	.014	-.738	-.086
25R: Things more difficult on meds	.225	.022	-.067	.188	.105	-.434	.344
Factor 7							
7: Meds will do me no harm	-.012	.078	-.132	-.037	.073	-.092	-.372
15: Get along better with others	.327	-.064	.026	.261	.294	.080	-.376
No substantial loadings							
10R: No different on or off	.287	.165	-.249	-.012	.084	.049	.129
11R: Unpleasant effects always present	-.287	.145	-.067	.178	.190	-.253	.011
20R: Meds are unnatural	.062	.315	.082	-.045	.399	-.110	.146
30: Prevent getting sick	-.082	.193	-.291	.244	.106	.140	-.124

Table 3. Results of Parallel Analyses

Factors From 28-Item DAI	Actual Eigenvalues	Parallel Eigenvalues (2,000 Random Data Sets)
1	7.722	2.027
2	2.530	1.861
3	1.758	1.740
4	1.553	1.639
5	1.421	1.549
6	1.260	1.467
7	1.190	1.389

Note: DAI = Drug Attitude Inventory.

a comparator to extraction from actual data to ensure that results are based on common variance due to conceptual structure rather than artifact. Parallel analysis offers the benefit that factors are not mathematically forced as in EFA; thus, it serves to separate factors that are robust from factors that are the result of compulsory groupings based on residual common variance that are not conceptually meaningful. As can be seen in Table 3, parallel analysis indicated that two factors should be retained. The first two eigenvalues from the actual data set were distinctly larger than the random eigenvalues; the third value was similar in magnitude to the random data eigenvalue, making it a less robust factor than the first two. The eigenvalues of Factors 4 to 7 were clearly smaller than the random eigenvalues and were not retained.

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

Qualitative Data Analysis

Thematic analysis (Braun & Clarke, 2006) was conducted to identify adolescent perceptions of medication measured by (or absent from) the DAI and to elucidate potential differences in meaning assigned to DAI constructs. Two qualitative data analytic strategies were employed. An initial step assigned in vivo (line-by-line) codes to all respondent perceptions of their illness and medication treatment. Subsequently, the constant comparative method was used to group similar in vivo codes under axial codes reflecting aspects of youths' medication experience. Results were then divided into two categories: (a) themes that were conceptually similar to the seven factors found in the original DAI study (labeled "DAI-related themes") and (b) emergent themes that were conceptually dissimilar to the original DAI factors (labeled "non-DAI-related themes").

Qualitative Results

A subset of 20 qualitative interviews with youth was randomly selected from a group of 46 adolescent participants in a simultaneous qualitative study regarding youth experiences with psychotropic treatment. The 20 respondents were selected using the "random case selection" function in SPSS version 14.0. Caucasian and African American youth were evenly represented. Similar proportions of youth with bipolar disorder, major depression, and ADHD were reflected in this subsample in comparison with the overall sample. Table 1 provides demographic characteristics for youth included in the qualitative sample.

Univariate analysis of variance revealed a statistically significant difference, $F(1,40) = 4.331, p < .05$, between the interviewees whose data were randomly selected for qualitative analysis and those who were not selected in the number of psychiatric medications they were taking. The average number of medications taken by interviewees not included in the qualitative analysis was 2.59 ($SD = 1.53$). The average number of medications for interviewees included in the qualitative analysis was 1.80 ($SD = 0.77$). Although statistically significant, the magnitude of this difference amounts to less than one medication, making it unlikely that this difference would have impacted the qualitative findings. However, further research is needed to address whether polypharmacy (taking more than one medication) affects attitudes toward medication. There were no other significant differences between the groups in age, years of education, or average DAI scores. Chi-square tests revealed no significant differences between the groups relating to psychiatric diagnosis or gender.

The data analytic strategy led to three major findings: (a) medication perception themes similar to the seven factors in the adult DAI, (b) medication perception themes unlike the adult DAI factors, and (c) possible differences between adolescents and adults in perception of item meanings.

DAI-Related Themes

Qualitative data were analyzed for their conceptual relationship to factors found in the adult DAI instrument: positive and negative subjective feelings toward medication, health/illness model, internal and external loci of control, harm/toxicity, and relapse prevention. Results demonstrated that these factors are indeed salient to teens as evidenced by their presence in the qualitative responses. Table 4 provides examples of the qualitative findings, including medication themes, selected axial codes, and quotation exemplars for concepts related to the DAI factors.

Table 5 provides a numerical count of references to DAI-related themes in the qualitative data. Positive and negative subjective feelings (which included concerns about harm/toxicity) toward medications were the most frequently endorsed DAI-related themes across respondents. Particularly salient for this analysis, the “positive subjective feeling” category contained the most quotations (103) out of all seven DAI factors. The next most populated category was the combination of “harm/toxicity” (containing 48 quotations) and “negative subjective feelings” (containing 31 quotations) for a total of 79 references to negative experiences with medication. (“Harm/toxicity” and “negative feelings” were combined based on the assumption that fears of harm and side effects are part of a negative medication experience.) This totals 182 quotations falling along the dimension of positive versus negative and a total of 85 additional quotations distributed among the remaining four DAI-related categories. This lends support to the EFA/parallel analyses, suggesting that positive and negative feelings toward medication are robust components of the DAI’s factor structure for youth.

The following sections analyze the *in vivo* codes linked to positive and negative feelings toward medication. When speaking about medications, youth linked a positive or negative perception to each of five dimensions of the overall medication experience (Floersch, et al., 2009): physical effects, emotional effects, changes in cognition, effects on relationships, and “other effects”, which is a category of statements relating to medication experiences that did not share a common theme.

Positive subjective feelings toward medication. When referring to positive feelings toward medications, youth responses frequently reflected emotional, cognitive, and relationship-oriented domains. Fewer responses referenced the physical effects of medication. In the emotional domain, adolescents discussed feeling better about themselves, having fewer mood swings, and feeling calmer/less angry with medication. In the cognitive domain, they noted improved focus and attention, which resulted in improved schoolwork and grades. Relationship-oriented

Table 4. DAI-Related Themes With Selected Axial Codes and Quotations

	Positive	Negative/ Toxicity	Illness Model	Internal LOC	External LOC	Relapse Prevention
Factor: "Positive Subjective Feelings Toward Medication"						
Axial codes						
Emotional		"I can either not take it and be a grouch, or take it and be happy. So I would much rather take it and be happy." (Caucasian female, age 17, major depression)				
Cognitive		"Sitting down, paying attention to the teacher, not talking. Just paying attention and doing what I need to do." (African American male, age 13, ADHD)				
Intersubjective		"... it improves my social life, cause it makes friends, makes friends wanna be around me cause I don't have, I don't have a bad attitude." (Hispanic male, age 16, bipolar disorder)				
Physical		"I gain energy to want to do my work and listening and focus and try to do my best and give 110%."(African American male, age 12, ADHD)				
Other		"... it's giving me benefits for my life so I don't get locked up or stuff like that. Like go to a foster home or somewhere that I don't want to be ... Can't support yourself, got to live with somebody. Ain't got no money . . ." (African American female, age 13, ADHD)				
Factor: "Negative Subjective Feelings Toward Medication/Harm or Toxicity"						
Axial codes						
Emotional		"I don't like sometimes I feel like out of my body or just like not myself, more anxious sometimes." (Caucasian female, age 15, major depression)				
Cognitive		"Well I had it told me the Topamax or whatever causes short-term memory loss, so I assume it's the Topamax or whatever." (Caucasian male, age 14, bipolar disorder)				
Intersubjective		"Well actually my mom won't stop bugging me, then my peers and then my P.O. It's like I need to go so I won't get into any more trouble. You know, it's like "Fine, I'll just go." (African American male, age 16, bipolar disorder)				
Physical		"Make me sick. Make me get the bubble guts and stuff. And I wish that there was a medicine that didn't have side effects." (African American male, age 12, ADHD)				
Other		"Yeah, it does, but then I'm hesitant, because I feel really strongly about I do not want to be like I can't do work without Adderall because I don't have power over myself." (Caucasian female, age 15, major depression)				
Factor: "Health and Illness Model"						
Axial codes						
Disease		"At first I thought it was a disease and I kind of got scared." (African American male, age 12, ADHD)				
Genetics		"... as long as it wasn't like a disease or something it just, it's just that, it was genetic I guess." (Hispanic male, age 16, bipolar disorder)				
Transient sickness		"Ability is basically just like taking your medicine to get you, to get your from having, being sick to being better like having the flu to being normal." (Hispanic male, age 16, bipolar disorder)				
Nonproblem		"It really don't matter if it goes away or not, 'cause I don't even look at it as a problem anymore." (African American male, age 12, ADHD)				
Behavior or attitude		"Well I actually at first I mean I didn't really know, and then I felt "Well maybe because of my behavior . . ." (African American male, age 13, ADHD)				

Note: DAI = Drug Attitude Inventory; LOC = locus of control; ADHD = attention-deficit hyperactivity disorder.

Table 5. Summary of Quotation Frequencies

Positive Subjective Feelings	Negative Subjective Feelings	Health/Illness Model	External Locus of Control	Internal Locus of Control	Harm/Toxicity	Relapse Prevention
103	31	21	20	10	48	34

references included medication's role in helping youth to have better relationships with their families and friends, making new friends, and exhibiting better social behavior. Youth also noted that important people in their lives became proud of them once their behaviors improved.

In the "other" category, youth discussed a diverse array of benefits, including perceptions that the positive effects of medication outweighed its disadvantages. Youth endorsed feeling that medication can prevent a host of negative outcomes, including poverty and homelessness. Youth also talked about disorder-specific improvements, such as "decreased flashbacks" noted by one youth diagnosed with posttraumatic-stress disorder. Other youth referenced feelings of "stability" and "sanity," which did not fit solely in a cognitive or emotional domain.

Negative subjective feelings toward medication. When discussing negative experiences with medication, youth referenced undesirable physical effects. These were categorized thematically as medication side effects. Within the qualitative analysis, side effect representations were seen as similar to the DAI "harm/toxicity" construct, but they were also subsumed under the broader theme "negative feelings toward medication." This dual grouping was done given that side effects were clearly deemed as undesirable effects. For example, youth reported stomach upset, weight gain, appetite changes, and feeling "spaced out."

In addition to side effects, youth referred to potential future harm from taking medication. They talked about "messing up brain cells", getting diabetes, memory loss, and fears of seizures, strokes, heart attacks, and accidental overdoses. Although references to physical side effects were the most frequent quotations subsumed under negative feelings toward medication, youth also spoke of negative emotional experiences; these ranged from annoyance at the inconvenience of the medication regimen to psychological side effects such as sadness, nervousness, and anger.

The thematic category "other" was used to group diverse negative references, such as "not being able to be myself" and references to active nonadherence. Relating to the latter theme, youth engaged in a cognitive process that summed the advantages and disadvantages of medication and, for some youth, the disadvantages were greater than the benefits.

Next, we describe the data analytic results that were subsumed under the remaining DAI-related themes. Adolescents created explanatory models of their mental health problems and evaluated their level of personal control (or lack thereof) over symptoms. Particularly noteworthy is the finding that adolescents' views of long-term medication use may not be consistent with the relapse prevention language in the adult DAI.

DAI Health/Illness Model

Youth presented a variety of illness models to explain why they took medication. Five distinct models emerged: disease, genetic traits, symptoms as transient sickness, symptoms as nonproblematic, and behavior/attitude problem. In the disease model, youth appeared to believe that mental health disorders are considered to be diseases like diabetes or other physical illnesses. These youth tended to view their problems as long-standing, if not lifelong, and more often than not indicated a plan to adhere to their medication long-term.

Youth who endorsed a genetic nondisease model acknowledged that mental health problems were prevalent in their families and referenced specific relatives who were diagnosed with the same difficulties they faced. However, these youth did not view their “genetic problems” as a disease or sickness, but more as personality traits that were not debilitating.

Some youth endorsed a “transient sickness” model, comparing their mental health issues to a cold or the flu. These youth tended to view the use of medication as temporary, for as long as they remained symptomatic. They stated that they would discontinue medications when they “became stable” or were “feeling better.”

Some youth referred to their mental health diagnoses as “nonproblematic.” These youth did not consider mental illnesses to be serious because they are not “fatal.” Others referred to themselves as having a behavioral or attitude problem and did not consider their diagnoses to be illnesses at all. They viewed medications as enabling them to have better behaviors rather than correcting a physical or biochemical problem.

Internal locus of control. Youth responses did reflect stark self/other demarcations regarding responsibility for symptom control. Some endorsed that it was their idea to seek treatment for their mental health problems (e.g., “I evolved that in my head”), whereas others rejected the efforts of significant others and professionals (e.g., “Their opinions are worthless”). Youth referred to their own efforts and recovery (e.g., “You have to change your own life” and “I want to handle my behavior problems myself”). Moreover, in worrying about becoming dependent on medication or immune to it, they were referring to parts of the self they controlled and to parts the medication controls.

An important “loci of control” theme refers to a “loss of self.” Here, youth reported fears that they no longer controlled their personalities and that their emotional responses were determined by medication. For example, youth reported “emotional numbness,” feeling “robotic,” or wondering if they were still themselves. When probed regarding what these experiences meant, youth were unable to offer detailed descriptions. A typical response was that “it’s something you have to experience; it’s hard for me to describe.”

External locus of control. External control was linked to physician authority in the adult DAI. Although youth in this sample often endorsed the belief that their doctors knew best about how to prescribe and manage medications, they also referenced significant others such as mothers, fathers, and other relatives. When asked who has the best knowledge about medication, youth often indicated that their parents had the most knowledge (e.g., “Dad knows best about medications,” “Mom and the doctor know best about medications”). Others appeared to relinquish their control of recovery to medication; (e.g., “I need someone to fix me,” “I don’t have the willpower to fix myself,” “I can’t function without pills”).

DAI relapse prevention. The relapse prevention construct shared few similarities to how youth spoke of their medication experience. The adult DAI items referenced the degree to which patients acknowledged having a chronic mental illness that required medication to remain stable (Item 23: “Taking medication will prevent me from having a breakdown” or Item 22: “I should stay on medication even if I feel all right”). Youth did not appear to view “relapse prevention” in the context of chronic illness; rather, they used specific time markers (“I will take the medicine for another month”), event markers (“I will stop medication in high school”), and symptom markers (“I’ll stop medication when my symptoms go away”) for deciding when to stop taking medication. Teens who used specific time references for discontinuing medication tended to believe their treatment would be short in duration, measured in terms of months or, at most, through the high school years. Those who used event markers referenced school milestones such as grade levels; those who used symptom markers thought that they would discontinue medications when their symptoms remitted.

A small number of youth articulated the belief that their mental illnesses would be chronic, requiring a lifetime of medication treatment (“I will take medication for the rest of my life”). Others acknowledged that the absence of symptoms did not always mean recovery from the illness (“I will still take medicine even if I’m doing good”). Some believed they would need medication for a long time, but hoped that later in life they would become medication-free (“If I can control myself when I’m older, I’ll stop taking medicine”).

Non-DAI-Related Themes

Teen responses reflected eight additional themes not found in the factor structure of the adult DAI: balanced responsibility for behavior, ambivalent feelings about medications, change in attitudes toward medications over time, adherence if medications are effective, expectations of medications, inclusion in medication decisions, personal autonomy, and stigma. Themes of stigma and autonomy were common. Table 6 summarizes medication themes that were not related to DAI factors and includes selected axial codes and quotations.

Balanced responsibility for behavior. Youth who described a balance of responsibility between their own efforts and medication appeared to believe that recovery is achieved through both avenues. These youth acknowledged that medications helped with symptom reduction but that they also had to make behavioral efforts (e.g., “Medications help me to make changes,” “Recovery is half my effort, half medication”). Reflecting a change of mind, one respondent thought “I could recover by myself but decided I needed medication.”

Ambivalence about medications. This theme reflected uncertainty about the benefits of medication. A few reported that medication helps with symptoms but that they did not perceive a substantial benefit (“it helps, but not much”). Others stated that medications worked at times, but not reliably (“medicine doesn’t always work”). Other adolescents talked about a “wait and see” approach (“I hope for the best but expect the worst”).

Change in attitude toward medication over time. One teen articulated having a change of mind regarding medication, noting that although he initially disagreed with having to take medications, he now sees the benefits of adherence. Although no others described a similar process, this one finding suggests that it may be beneficial in future studies to assess how attitudes toward medication fluctuate over time.

Adherence if effective. Several youth described adhering to medications as a result of seeing positive benefits from taking them; they typically referenced some kind of emotional relief (“I’d rather take medication than be a demon,” “I’m grouchy if not taking medication,” “I’d rather take medication and be happy”). Some respondents discussed the positive consequences of being adherent rather than perceiving direct symptom relief (“I have a choice to take it, a choice not to take it, but my choice is if I take it, some positive things will come out of it. But then if I don’t take it, if I choose not to take it, some negative things will come out of it”).

Expectations of medication. A range of expectations was evident. Some youth had no initial expectations of medications, saying that they did not know what the medications would do. Others talked about the things that medication cannot do for them, such as shielding them from disappointment, preventing all anger, giving them immunity from grief, or bringing them new friends. Some acknowledged that medication cannot change their core selves or their views (“It doesn’t change my feelings about things”). Youth did expect that medication would help them to feel better, to help them regain control of their behavior, and help them achieve positive outcomes (“Medication will help me become something in life”).

Inclusion in medication decisions. An inclusion theme appeared in responses regarding medication decisions. Youth wanted to be included in discussions about medication and expressed frustration when the rationales for treatment decisions were not explained to them. One expressed the

Table 6. Non-DAI-Related Themes With Selected Axial Codes and Quotations

Balanced Responsibility	Ambivalence	Change in Attitudes	Effectiveness	Expectations	Inclusion in Decisions	Autonomy	Stigma
Factor: "Inclusion in Treatment Decisions"							
Axial codes							
Need for information	"I was never told nothing about, except what my mom told me, but I was never really told nothing medical wise about . . . Anything I was diagnosed with, I was never really told nothing medical about it. I always had to go to my mom. They never came out and explained it to me." (African American female, age 16, bipolar disorder)						
Shared decision making	"One where the opinions are split three ways: me, my parents and the doctor; not 50-50 or 75-25, three-way, 33.33% for everyone."(Caucasian female, age 13, bipolar disorder)						
The doctor listens	The other doctor, I liked her better because she listens and knows what I want and took it as advice and strong advice and used it and tried to help me . . ." (African American female, age 14, schizophrenia)						
Factor: "Stigma"							
Axial codes							
Crazy identity	"It's like, 'I'm psycho now?' I'm like, 'Whatever.' Like I was strapped in a white jacket for coming up to somebody." (African American male, age 16, bipolar disorder) Interviewer: "What does being on medication mean to you?" Adolescent: "That I'm just going to be a bad person, wind up doing bad things." (African male, age 13, ADHD)						
Social acceptance	"I felt like an outsider, like I wasn't the same as anyone else in the world and I was just like no one else could understand what I was feeling, 'cause I was the only one like that." (Caucasian female, age 15, depression) "I hide it 'cause some people think it's for stupid people, something like that, like bullies, and if it's a rumor, if it gets spread around and the next thing you know the bullies got something to pick with you on." (African American male, age 13, ADHD)						
Desire for normality	"I give up feeling normal. I don't feel like a normal person. In the back of my head I know there's a lot of people take that medication, what is normal, and there's probably a ton of other kids that I see every day that take it, but in my immediate friends and things, no one takes as much as I do, and everyone's always like 'Another doctor appointment? Why do you go to the doctor so much?'"(African American male, age 12, ADHD)						
Factor: "Autonomy"							
Axial codes							
Independence from illness	"I'm afraid that I'm going to have to take it forever. I don't want to take it the rest of my life. I don't want to always have to see a doctor about things like that. I want to be independent of that." (Caucasian female, age 15, depression)						
Responsibility for medication management	"Yeah, it's a struggle, because my parents . . . there's constant like power struggle, and I want more responsibility. They want to give it to me, but they don't trust me yet. Like they're always telling me I need to be more responsible before I can get my driver's license, but they don't want to give me the responsibilities in case I mess up. So I'm always like I want to take my medications by myself because I don't like to have to rely on mom and dad 'cause some day I'm not going to be able to and I need to start being more independent." (Caucasian female, age 15, depression)						

Note: DAI = Drug Attitude Inventory, ADHD = attention-deficit hyperactivity disorder.

wish that others would have talked more with her about the diagnosis (“They never explained the diagnosis to me,” “The doctor doesn’t understand what I’m going through”). In contrast, appreciation was expressed when parents and doctors actively included them in medication decisions (“I like the doctor because she listens”).

Autonomy. Some adolescents wanted others to relinquish the everyday control of medication and spoke of the desire to take responsibility for their own medication management (“I want to be responsible for my medications,” “I have no influence”). They wanted the freedom to feel their own thoughts and feelings and viewed medication as making them artificial (“medications rule how I think”). Such quotations reflected a concern that one’s thought processes are not natural or spontaneous while on medication. Others struggled more with the perception that they were under the control of medications than with the idea that they were monitored or controlled by parents or doctors (“I don’t want to not have power over myself,” “Medications have control instead of me”). In contrast, but still underscoring a concern with autonomy, some feared medication nonadherence (“I don’t know what would happen if I didn’t take my medication”).

Feelings of stigma. Concerns about the stigma of taking medications were evident. Teens worried that medication would cause peers to view them in a derogatory manner and they hoped for social acceptance. Some spoke of medication as interfering with their ability to be accepted by peers. Peers expressed their negative attitudes toward the adolescents’ illnesses and/or medications by teasing, bullying, or excluding them from social interactions. Youth feared being labeled “psycho” or “stupid.” Teens expressed concern about being viewed as “bad” or “crazy,” stating that “taking medication means I’m a bad person.” They spoke of their desire to be viewed as *normal*, representing medication as a barrier to normalcy. Others feared peers’ inability to distinguish emotional problems from deficits in intelligence.

Adolescents used a variety of strategies to hide medications by keeping them secret and arranging to take medication at home and not at school. For those whose regimens required that medications be taken away from home, they would fabricate alternate explanations regarding the purpose of their medications, typically telling friends that the medications were for asthma, allergies, or other physical ailments. In contrast, a few openly discussed their mental health problems and medications with friends; one even educated her health class by presenting a slideshow about her bipolar disorder.

Synthesis of Quantitative and Qualitative Results

What did a mixed method design reveal about the factor structure of a medication attitude instrument designed for adults and applied to adolescents? What conclusions would we have missed had either the qualitative or quantitative methods not been used? Confirmatory factor analysis helped to determine if the factor structure of the adult DAI provided an adequate reflection of the dimensions comprising youth attitudes toward psychotropic medications. Results showed that the adult factor structure provided a relatively good fit for the adolescent data but the model was not optimal. Subsequent exploratory and parallel factor analyses evaluated the factor structure of the instrument in adolescents without applying an a priori model and suggested that there are two robust factors underlying the adolescent DAI: positive and negative feelings toward medication. Moreover, thematic analysis revealed that some adolescent medication perceptions were similar to the adult factor structure, demonstrated the presence of additional factors not measured by the adult DAI, and highlighted areas in which beliefs about illness duration differ between adults and adolescents. The additional concepts uncovered by qualitative techniques suggest important dimensions of adolescent medication experience that are not reflected in the original DAI. These themes may be relevant to medication adherence and their incorporation into the DAI may improve measurement of attitudes toward medication.

Overall, the adolescent DAI was significantly correlated with youth adherence to medications, although the association was low. Of note, the adolescent DAI was the only significant correlate of youth self-reported adherence; other clinical and demographic variables were not associated with adherence. This suggests that the DAI holds promise as a useful indicator of whether or not teens are likely to take their medication; however, not without significant modifications that can be guided by results of the qualitative inquiry conducted herein. These modifications include rewording items that are of low conceptual salience to adolescents and including constructs that reflect dimensions of medication experience (listed below) that are not assessed by the current DAI. Such proposed alterations may improve the ability of the DAI to predict adherence and have potential for developing a useful clinical tool for engaging adolescents in discussions about their treatment.

Suggestions for Instrument Modification

Altering locus of control items and reflecting ambivalence. New DAI items that reflect internal and medication control as separate constructs may improve measurement of how youth actually experience medication. A related ambivalence theme emerged in which youth perceived a tension between side effects and potential benefits of medication. They were unsure how medication might fit into their self-definition, and although they reported positive effects, many also resented medication. An ambivalent attitude toward medication may represent a less polarized (positive/negative) medication experience that incorporates both the advantages and disadvantages of taking medicine. Alternatively, it may contain conceptually independent components, justifying its incorporation as an independent construct. Future research can evaluate if this aspect of medication experience might be represented most appropriately using a continuum versus distinct conceptual categories (positive, ambivalent, and negative).

Changes in attitudes over time. Although only one youth reported that his attitude toward medication had changed over time, it seems likely that this attitudinal shift may occur for many adolescents. Youth who take medication throughout their teenage years may find themselves confronting issues about whether or not to continue their medications once they become adults. Of course, any measurement instrument is a static, cross-sectional measure, and must be administered over time to detect attitude change. However, the mixed methods analysis suggests that DAI items should be devised that address attitude change as a construct in itself.

Medication expectations. When teens thought medication was effective, thematic analysis uncovered personal interpretations of how medication met a particular need/expectation or solved a specific problem. Thus, a DAI construct that ties adherence to perceived personal benefit may be important for predicting attitudes toward medication. For example, items exploring the process of weighing the advantages and disadvantages of medication could be added; indeed, one item ("For me, the good things about medication outweigh the bad") currently exists and was among the items contained in the first and most robust factor to emerge from the factor analyses.

Information about treatment decisions. Adolescents discussed the importance of being informed about medication and medication management. Some perceived that medication treatment was difficult when they felt excluded from diagnostic and medication follow-up conversations between prescribers and parents. Insufficient information may interfere with treatment, as reflected by one respondent who feared a stroke if he discontinued his medication. Youth wanted a say in decisions about medication and expressed wishes to know how medications might affect them. Lacking information about the treatment process, youth may form conclusions or seek information from sources other than parents or doctors (Timlin-Scalera, Ponterotto, Blumberg, & Jackson, 2003). Studies show that youth value trusting relationships with mental health providers and prefer to be included in treatment decisions (Buston, 2002). Thus, the utility of the

DAI may be improved substantially if item content reflected the degree to which youth feel included in treatment decisions.

Autonomy. Adolescents referred to autonomy in several ways: independence from monitoring by physicians and parents, assumption of responsibility for taking medications, and maintaining personal control over feelings and thoughts. Of particular clinical interest, autonomy and control also represented concern over the personal control of feelings and thoughts. For example, adolescents expressed the desire to know that feelings were under personal control, not medicinally manipulated. They perceived psychiatric medications as making feelings “not their own.” The item content in the existing DAI distinguishes between self-control, physician control, and medication management knowledge. It does not address concerns regarding “loss of self” or a related feeling that emotions are artificially created by medication. Furthermore, the DAI does not reflect the presence of multiple caregivers and self-other relationships, a developmental difference from adults that situates many teenagers in a context where anyone (e.g., prescribers, social workers, teachers, counselors, siblings, parents, and other relatives) associated with emancipation strivings could become identified with medication autonomy. Item content, therefore, would become more relevant if it is altered to reflect youth concerns about “loss of self” as well as their multiple-caregiver context.

Stigma. Adolescents’ concerns about stigma in this study replicate prior research; in a study measuring preadolescents’ attitudes toward peers with ADHD, more than half of the youths described a hypothetical peer with ADHD as “crazy” and “stupid” (Scott, Lore, & Owen, 1992). The authors noted that at least half of the youths with ADHD thought they did not need medications and the same proportion revealed that they had not told their friends about their psychiatric diagnoses for fear of being labeled “weird” or “psycho.” It is likely, then, that the negative attitudes held by some peers regarding mental illness or medication are communicated to medicated youth.

Concerns about stigma prompted some respondents to adopt secretive medication management strategies, sometimes obscuring the purpose of the medication (“I tell them it’s an allergy pill”) or skipping the medications altogether. Here, the qualitative findings are of particular significance given that the DAI contains no stigma items; attitudes toward medication are likely to be affected by stigma in many domains of daily life and medication experience.

Altering relapse prevention language. Finally, the DAI construct “relapse prevention” was shown to be inadequate for adolescents. Most did not perceive their illness as chronic, preferring instead to stop medication using personally-derived markers characterized by time, symptoms, or events. A few youth thought medication would always be a part of life. Youths’ references to stopping medication are consistent with the findings of Conrad (1994), who found that many individuals with seizure disorders periodically stopped their medication to “test” whether they still had an illness (p. 156). The DAI would be improved with items measuring adolescents’ illness perceptions rather than using constructs such as “relapse prevention.”

Conclusion

The mixed methods approach to assessing instrument validity allowed for the elucidation of robust components of the factor structure of the DAI in adolescents as well as analysis of whether the instrument is comprehensive for measuring adolescent attitudes toward psychotropic medication. Results indicate that two factors are robust components of adolescent attitudes toward medication: positive and negative feelings toward medication. However, our synthesis of quantitative and qualitative results also suggests that (a) additional items are needed to measure constructs relevant to adolescents and (b) existing items may need to be altered because adolescents interpret them differently than adults. The DAI instrument may have increased utility and

a stronger association with adherence if these changes are incorporated. This study also contributes to the mixed methods literature by demonstrating that quantitative and qualitative methods can be used as parallel data reduction strategies.

Declaration of Conflicting Interests

The third author (RLF) receives or has received research support, acted as a consultant, and/or served on a speaker's bureau for Abbott, Addrenex, AstraZeneca, Biovail, Bristol-Myers Squibb, Forest, GlaxoSmithKline, Johnson & Johnson, KemPharm Lilly, Lundbeck, Neuropharm, Novartis, Organon, Otsuka, Pfizer, Sanofi-Aventis, Sepracore, Shire, Solvay, Supernus Pharmaceuticals, Validus, and Wyeth. The other authors have no relationships to disclose.

Funding

The authors disclosed receipt of the following financial support for the research and/or authorship of this article:

National Institute of Mental Health, KMH068584A1

Columbia University Center for the Study of Social Work Practice/Jewish Board of Family and Children's Services

References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179-211.
- Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Upper Saddle River, NJ: Prentice Hall.
- Albarracin, D., Johnson, B. T., Fishbein, M., & Muellerleile, P. A. (2001). Theories of reasoned action and planned behavior as models of condom use: A meta-analysis. *Psychological Bulletin*, 127, 142-161.
- Axelson, D., Birmaher, B., Strober, M., Gill, M. K., Valeri, S., Chiapetta, L., et al. (2006). Phenomenology of children and adolescents with bipolar spectrum disorders. *Archives of General Psychiatry*, 63, 1139-1148.
- Banaschewski, T., Roessner, V., Dittmann, R. W., Santosh, P. J., & Rothenberger, A. (2004). Non-stimulant medications in the treatment of ADHD. *European Journal of Child and Adolescent Psychiatry*, 13(Suppl. 1), 102-116.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3, 77-101.
- Brook, O., van Hout, H., Nieuwenhuyse, H., & Heerdink, E. (2003). Impact of coaching by community pharmacists on drug attitude of depressive primary care patients and acceptability to patients: A randomized controlled trial. *European Neuropsychopharmacology*, 13, 1-9.
- Brown, R. T., Borden, K. A., & Clingerman, S. R. (1985). Adherence to methylphenidate therapy in a pediatric population: A preliminary investigation. *Psychopharmacology Bulletin*, 21, 28-36.
- Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen & J. S. Long (Eds.), *Testing structural equation models* (pp. 136-162). Newbury Park, CA: SAGE.
- Buston, K. (2002). Adolescents with mental health problems: What do they say about health services? *Journal of Adolescence*, 25, 231-242.
- Buston, K. M., & Wood, S. F. (1999). Non-adherence amongst adolescents with asthma: Listening to what they tell us about. *Family Practice*, 17, 134-138.
- Byrd, T. L., Peterson, S. K., Chavez, R., & Heckert, A. (2004). Cervical cancer screening beliefs among young Hispanic women. *Preventive Medicine*, 38, 192-197.
- Chen, E. Y. H., Tam, D. K. P., Wong, J. W. S., Law, C. W., & Chiu, C. P. Y. (2005). Self administered instrument to measure the patient's experience of recovery after first episode psychosis: Development

- and validation of the Psychosis Recovery Inventory. *Australian and New Zealand Journal of Psychiatry*, 39, 493-499.
- Cronrad, P. (1994). *The medicalization of society: On the transformation of human conditions into treatable disorders*. Baltimore: Johns Hopkins University Press.
- Creswell, J. W., Fetters, M. D., & Ivankova, N. V. (2004). Designing a mixed methods study in primary care. *Annals of Family Medicine*, 2, 7-12.
- Cromer, B. A., & Tarnowski, K. J. (1989). Non-adherence in adolescents: A review. *Journal of Developmental & Behavioral Pediatrics*, 10, 207-215.
- DeVellis, R. (2003). *Scale development: Theory and applications* (2nd ed.). Thousand Oaks, CA: SAGE.
- Emslie, G. J., Rush, A. J., Weinberg, W. A., Kowatch, R. A., Carmody, T., & Mayes, T. L. (1998). Fluoxetine in child and adolescent depression: Acute and maintenance treatment. *Depression and Anxiety*, 7, 32-39.
- Fenton, W. S., Blyler, C. R., & Heinssen, R. K. (1997). Determinants of medication compliance in schizophrenia: Empirical and clinical findings. *Schizophrenia Bulletin*, 23, 637-651.
- Findling, R. L., McNamara, N. K., Gracious, B. L., Youngstrom, E. A., Stansbrey, R. J., Reed, M. D., et al. (2003). Combination lithium and divalproex sodium in pediatric bipolarity. *Journal of the American Academy of Child & Adolescent Psychiatry*, 42, 895-901.
- Findling, R. L., McNamara, N. K., Youngstrom, E. A., Stansbrey, R., Gracious, B. L., Reed, M. D., et al. (2005). Double-blind 18-month trial of lithium versus divalproex maintenance treatment in pediatric bipolar disorder. *Journal of the American Academy of Child & Adolescent Psychiatry*, 44, 409-417.
- Floersch, J., Townsend, L., Longhofer, J., Munson, M., Winbush, V., Kranke, D., et al. (2009). Adolescent experience of psychotropic treatment. *Transcultural Psychiatry*, 46, 157-179.
- Ford, C. A., Jaccard, J., Millstein, S. G., Viadro, C. I., Eaton, J. L., & Miller, W. C. (2004). Young adults' attitudes, beliefs, and feelings about testing for curable STDs outside of clinic settings. *Journal of Adolescent Health*, 34, 266-269.
- Fortney, J., Rost, K., Zhang, M., & Pyne, J. (2001). The relationship between quality and outcome in routine depression care. *Psychiatric Services*, 52, 56-62.
- Gearing, R. E., Mian, I., Sholonsky, A., Barber, J., Nicholas, D., Lewis, R., et al. (2009). Developing a risk-model of time to first-relapse for children and adolescents with a psychotic disorder. *Journal of Nervous and Mental Disease*, 197, 6-14.
- Geller, B., Tillman, R., Craney, J. L., & Bolhofner, K. (2004). Four-year prospective outcome and natural history of mania in children with a prepubertal and early adolescent bipolar disorder phenotype. *Archives of General Psychiatry*, 61, 459-467.
- Gervin, M., Browne, S., Garavan, J., Roe, M., Larkin, C., & O'Callaghan, E. (1999). Dysphoric subjective response to neuroleptics in schizophrenia: Relationship to extrapyramidal side effects and symptomatology. *European Psychiatry*, 14, 405-409.
- Hack, S., & Chow, B. (2001). Pediatric psychotropic medication adherence: A literature review and research-based suggestions for improving treatment adherence. *Journal of Child and Adolescent Psychopharmacology*, 11, 59-67.
- Harpaz-Rotem, I., & Rosenheck, R. A. (2004). Changes in outpatient psychiatric diagnosis in privately insured children and adolescents from 1995 to 2000. *Child Psychiatry & Human Development*, 34, 329-340.
- Hogan, T. P., Awad, A. G., & Eastwood, R. (1983). A self-report scale predictive of drug compliance in schizophrenics: Reliability and discriminative validity. *Psychological Medicine*, 13, 177-183.
- Jeste, S. D., Patterson, T. L., Palmer, B. W., Dolder, C. R., Goldman, S., & Jeste, D. V. (2003). Cognitive predictors of medication adherence among middle-aged and older outpatients with schizophrenia. *Schizophrenia Research*, 63, 49-58.
- Kampman, O., Lehtinen, K., Lassila, V., Leinonen, E., Poutanen, O., & Koivisto, A. M. (2000). Attitudes towards neuroleptic treatment: Reliability and validity of the Attitudes towards Neuroleptic Treatment (ANT) questionnaire. *Schizophrenia Research*, 45, 223-234.
- Kaplan, D. (2000). *Structural equation modeling: Foundations and extensions*. Thousand Oaks, CA: SAGE.

- Klein, R. G., Mannuzza, S., Koplewicz, H. S., Tancer, N. K., Shah, M., Liang, V., & Davies, M. (1998). Adolescent depression: Controlled desipramine treatment and atypical features. *Depression and Anxiety*, 7, 15-31.
- Little, T. (2006, June 4-8). *Structural equation modeling: Foundations and extended applications*. Quantitative Training Program, University of Kansas.
- Lloyd, A., Horan, W., Borgaro, S. R., Stokes, J.M., Pogge, D. L., & Harvey, P. D. (1998). Predictors of medication adherence after hospital discharge in adolescent psychiatric patients. *Journal of the American Academy of Child & Adolescent Psychiatry*, 8, 133-141.
- Muller-Oerlinghausen, B., Muser-Causemann, B., & Volk, J. (1992). Suicides and parasuicides in a high risk patient group on and off lithium long-term treatment. *Journal of Affective Disorders*, 25, 261-269.
- O'Connor, B. (2000). SPSS and SAS programs for determining the number of components using parallel analysis and Velicer's MAP test. *Behavioral Research Methods, Instruments, & Computers*, 32, 396-402.
- Pae, C. U., Lee, K. U., Kim, J. J., Lee, C. U., Bahk, W. M., Lee, S. J., et al. (2004). Switching to quetiapine in patients with acute mania who were intolerant to risperidone. *Human Psychopharmacology and Clinical Experiments*, 19, 47-51.
- Pelham, W. E., Hoza, B., Pillow, D. R., Gnagy, E. M., Kipp, H. L., Greiner, A. R., et al. (2002). Effects of methylphenidate and expectancy on children with ADHD: Behavior, academic performance, and attributions in a summer treatment program and regular classroom settings. *Journal of Consulting and Clinical Psychology*, 70, 320-335.
- Riekert, K. A., & Drotar, D. (2002). The Beliefs about Medications Scale: Development, reliability, and validity. *Journal of Clinical Psychology in Medical Settings*, 9, 177-184.
- Rossi, A., Arduini, L., Stratta, P., & Pallanti, S. (2000). Subjective experience and subjective response to neuroleptics in schizophrenia. *Comprehensive Psychiatry*, 41, 446-449.
- Ryan, N. D., & Varma, D. (1998). Child and adolescent mood disorders: Experience with serotonin-based therapies. *Biological Psychiatry*, 44, 336-340.
- Safer, D. J., Zito, J. M., & dos Reis. (2003). Concomitant psychotropic medication for youths. *American Journal of Psychiatry*, 160, 438-449.
- Sajatovic, M., Rosch, D. S., Sivec, H. J., Sultana, D., Smith, D. A., Alamir, S., et al. (2002). Insight into illness and attitudes toward medications among inpatients with schizophrenia. *Psychiatric Services*, 53, 1319-1321.
- Scott, C. S., Lore, C., & Owen, R. G. (1992). Increasing medication compliance and peer support among psychiatrically diagnosed students. *Journal of School Health*, 62, 478-480.
- Skinner, T. C., & Hampson, S. E. (2001). Personal models of diabetes in relation to self-care, well-being, and glycemic control. *Diabetes Care*, 24, 828-833.
- Sleator, E. K. (1985). Measurement of adherence. *Psychopharmacology Bulletin*, 21, 1089-1093.
- Spector, P. (1992). *Summated rating scale construction: An introduction*. Newbury Park, CA: SAGE.
- Swanson, J. (2003). Adherence with stimulants for attention deficit/hyperactivity disorder: Issues and approaches for improvement. *CNS Drugs*, 17, 117-131.
- Swanson, J., Wigal, S., Greenhill, S., Browne, R., Waslick, B., Lerner, M., et al. (1998). Objective and subjective measures of the pharmacodynamic effects of Adderall in the treatment of children with ADHD in a controlled laboratory setting. *Psychopharmacology Bulletin*, 34, 55-60.
- Thomas, C. P., Conrad, P., Casler, R., & Goodman, E. (2006). Trends in the use of psychotropic medications among adolescents, 1994 to 2001. *Psychiatric Services*, 56, 63-69.
- Timlin-Scalera, R. M., Ponterotto, J. G., Blumberg, F. C., & Jackson, M. A. (2003). A grounded theory study of help-seeking behaviors among white male high school students. *Journal of Consulting Psychology*, 50, 339-350.
- Townsend, L. (in press). How effective are interventions to enhance adherence to psychotropic medications? Practice implications for social workers working with adults diagnosed with severe mental illness. *Journal of Evidence-Based Social Work*.
- Townsend, L., Demeter, C. A., Wilson, M., & Findling, R. L., (2007). Update on pediatric bipolar disorder. *Current Psychiatry Reports*, 9, 529-534.

- Townsend, L.D. (2009) How effective are interventions to enhance adherence to psychotropic medications? Practice implications for social workers working with adults diagnosed with severe mental illness. *Journal of Human Behavior in the Social Environment*, 19(5), 512-530.
- Weiden, P., & Glazer, W. (1997). Assessment and treatment selection for "revolving door" inpatients with schizophrenia. *Psychiatric Quarterly*, 68, 377-392.
- Weiden, P. J., & Olfson, M. (1995). Cost of relapse in schizophrenia. *Schizophrenia Bulletin*, 23, 419-429.
- Wigal, T., Swanson, J. M., Regino, R., Lerner, M. A., Soliman, I., Steinhoff, K., Gurbani, S., & Wigal, S. (1999). Stimulant medications for the treatment of ADHD: Efficacy and limitations. *Mental Retardation and Developmental Disabilities Research Reviews*, 5, 215-224.
- Wozniak, J., Biederman, J., Kiely, K., Ablon, J. S., Faraone, S. V., Mundy, E., & Mennin, D. (1995). Mania-like symptoms suggestive of childhood-onset bipolar disorder in clinically referred children. *Journal of the American Academy of Child & Adolescent Psychiatry*, 34, 867-876.

Bios

Dr. Townsend is an assistant professor at the Rutgers University School of Social Work and a core member of the Center for Education and Research on Mental Health Therapeutics at the Institute for Health, Health Policy, and Aging. She is currently studying long-term youth and family engagement with pharmacological and psychosocial interventions and the prescription of psychotropic medications among youth in the child welfare system. She is also submitting a proposal for funding to re-design the Drug Attitude Inventory for use with adolescents.

Dr. Floersch is an associate professor at the Rutgers University School of Social Work. He is currently examining how knowledge about the youth subjective experience of medication can be translated into psychosocial interventions to help youth cope with the effects of receiving a mental health diagnosis and being treated with psychotropic medications. He is also studying college students' attitudes toward mental health services and medication and how these variables relate to their service use.

Dr. Findling is a Professor of Psychiatry and Pediatrics at Case Western Reserve University School of Medicine, and he is the Director of Child & Adolescent Psychiatry at University Hospitals Case Medical Center. He is a pediatrician, general psychiatrist and a child & adolescent psychiatrist. He is utilizing longitudinal methods to examine the emergence of mental health symptoms over time from early childhood through adolescence with the aim of improving early recognition of mental health disorders in youth and increasing providers' ability to provide accurate diagnoses of emotional and behavioral problems in children and adolescents.