

Service Use Patterns of Youth with, and at High Risk for, HIV: A Care Typology

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ABSTRACT

This paper uses confirmatory structural equation models to develop and test a theoretical model for understanding the service utilization history of 4679 youth who received services from 10 national HIV/AIDS demonstration models of youth-appropriate and youth-attractive services funded by the Special Projects of National Significance (SPNS) Program, HIV/AIDS Bureau, Health Resources and Services Administration. Although the projects differ from one another in the areas of emphasis in their service models, each is targeted to youth at high risk for HIV, or those youth who have already contracted HIV. Collectively, the projects represent a comprehensive adolescent HIV service model. This paper examines the characteristics of the services provided to young people ranging from outreach to intensive participation in medical treatment. Major typologies of service utilization are derived empirically through exploratory factor and cluster analysis methods. Confirmatory structural equation modeling methods are used to refine the exploratory results using a derivation and replication strategy and methods of statistical estimation appropriate for non-normally distributed service utilization indicators. The model hypothesizes that youth enter the service system through a gen-

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Data presented in this report were collected and processed by March 1, 1998. At the Measurement Group, staff assisting with data processing included Ruth Betru and Diana E. Brief, Ph.D., with manuscript production assistance from Kimberly K. Ishihara, Chermeen A. Elavia, Viji Sathy, Ariane K. Kawata, and Jacqueline Gelfand, M.A.

eral construct of connectedness to a comprehensive service model and through service-specific methods, primarily of outreach or emergency services. Estimates are made of the degree to which a comprehensive service model drives the services as opposed to specific service entry points.

AIDS HAS BECOME an important public health issue for adolescents and young adults. The Centers for Disease Control and Prevention (CDC) reports that as of December 1997 there were 633,000 reported cases of AIDS among adolescents and adults in the United States, with 3130 of those cases among people in the 13 to 19-year-old age group, and 22,953 cases in the 20 to 24-year-old-age group.¹ Within the context of the rates of HIV infection among youth, adolescents represent one of the most medically underserved populations in the United States.² Even when physician-adolescent encounters occur, communication is frequently limited about HIV risk behaviors.^{3,4} Adolescents' concerns about privacy and confidentiality minimize their willingness to seek healthcare for sensitive problems and tend to inhibit their communication with physicians.⁵⁻⁷ In one study, less than half of adolescents with histories of survival sex, injection drug use (IDU), same gender sexual behavior, or a (non-HIV) sexually transmitted disease (STD) had sought or received help for these HIV-related issues.⁸ Moreover, young people lacking a usual source of care and insurance are less likely to receive needed care than youth that have a stable source of care and health insurance.^{9,10}

When young people seek needed services, they typically access care through a wide variety of healthcare settings,⁸ including community health centers, drop-in centers, emergency/ambulatory care departments, and doctors' offices.^{6,10,11} However, most young people—particularly poor urban youth of color, uninsured youth, and youth living on the streets—do not receive the medical care they need or do not receive services until very late in the progression of their illness or health problem.^{9,11-12} One study, conducted on more than 3600 urban middle and high school students, found that awareness and use of healthcare (e.g., clinics specifically for teenagers) remained

low for a large number of at-risk urban youth, particularly younger and male teenagers who had little intention of seeking care if they needed it within the next year.¹³ Most young people with HIV are unaware of their serostatus. Among those youth who know that they are HIV-positive, only a small percentage are currently receiving care and services in youth-sensitive, age-specific programs.¹⁴ Unmet treatment needs among adolescents are significantly associated with indicators of economic disadvantage, such as receiving public assistance and not being covered by health insurance; opinions of the parents and youth that the youth had poor mental health; parental psychopathology; poor school grades; and parent-reported access barriers.¹⁵ Needs in the area of counseling services, services related to sexuality, and interpersonal relationships have also been demonstrated to be priorities for high-risk minority students.¹⁶

The lack of youth-sensitive, age-specific programs is one of the barriers to service utilization by young people at high risk and can be decreased with improvements in the provision of care and services for this population.^{5,6,9,17,18} Developmentally appropriate and culturally competent services, such as HIV testing and counseling, are particularly important for youth with, or at high risk for, HIV infection. The provision of youth-appropriate, youth-sensitive outreach activities and service programs is extremely vital for encouraging young people living with, or at high risk for, HIV infection to utilize needed medical care and social services. This continuum of care has proven to be useful in working with a wide variety of youth, including homeless youth.^{4,18-21} Effective interventions for today's adolescents require an integrative approach that selectively draws from the more traditional therapies but which focuses primarily on system interventions and problem-solving.²² A service delivery system that integrates services, emphasizes interagency coordination, and ad-

dresses the full range of service needs for youth appears to be an effective model.

A national demonstration program for adolescent HIV care

Through its Special Projects of National Significance (SPNS) Program, the Health Resources and Services Administration (HRSA) HIV/AIDS Bureau funds national demonstration projects for HIV/AIDS services. In 1993, HRSA awarded 10 grants to projects targeting HIV/AIDS services to adolescents and youth. These projects were somewhat heterogeneous in that their programs ranged greatly in scope and planned outcomes. Nonetheless, the projects shared target populations, specifically adolescents and youths who are either already infected with HIV or at high risk to become so. Their aim is to build programs with the potential for replication throughout the United States. In this paper, we examine the cross-cutting adolescent services models developed by these projects.

As would be expected for a national services demonstration program, the HRSA SPNS Program Adolescent Care Grantees differ greatly from one another. Descriptions of the service models for the 10 projects are given in a special issue of the *Journal of Adolescent Health*.^{23,24} The programs described in the special issue include those at: Bay Area Young Positives, a San Francisco peer-run, peer-based program providing psychosocial services by youth with HIV for youth with HIV²⁵; Boston HAPPENS,²⁶ a comprehensive health services continuum from street outreach to counseling and testing to primary care led by Children's Hospital of Boston; Childrens Hospital Los Angeles,²⁷ a comprehensive health services continuum with a special emphasis on linking high-risk youth to testing, HIV risk/harm reduction and healthcare; the Greater Bridgeport Adolescent Pregnancy Project,²⁸ a Connecticut street outreach project designed to move youth into HIV testing services and to link them to care; Health Initiatives for Youth,²⁹ a San Francisco, youth empowerment, advocacy and leadership development program; the Indiana Department of Health,³⁰ a program providing outreach and

social support services to gay and lesbian youth in Indiana; the University of Alabama at Birmingham,³¹ an outreach, education, and adolescent testing center for at-risk young women outside Birmingham, Alabama; the University of Minnesota Youth and AIDS Projects,³² a hybrid university and community-based organization whose mission is to prevent HIV infection in youth at risk and to care for youth living with HIV in Minnesota through services, research, and teaching; Walden House,³³ a residential substance abuse facility in San Francisco that provides enhanced treatment services to adolescents with HIV in a therapeutic community setting; and YouthCare,³⁴ a Seattle program bringing outreach, referral, and case management services to runaway, homeless and sexual minority youth in venues where they congregate. Whether or not the projects are directly providing tightly linked systems of medical and psychosocial care, each is seeking to direct youth into such service models.²³

While the projects differ from one another, an essential element of each is its attempt to enroll high-need youth in services. Another key element in each project is the development of innovative interventions and other programmatic elements. The interventions are provided by sources that range from street outreach workers conducting acute crisis intervention to peer counselors who themselves are youth living with HIV to primary and HIV-specialist physicians. The interventions are supplemented with referrals to ancillary services such as social services that provide food and shelter, substance abuse programs, mental health therapy, and self-help or support groups. In most cases the programs offer a continuum of services that have been designed to be linked, cooperative, complementary, and easy for youth to access in ways that are sensitive and appropriate.

The projects participated in a cooperative cross-cutting evaluation in which certain data collection elements were standardized. Information is available on the characteristics of the youth contacted and enrolled, the services they received, and the patterns of various service history events. In this paper, we examine the

characteristics of the services provided to youth enrolled in these national demonstration projects and ask about the major ways that services may be classified. Earlier reports³⁵⁻³⁷ provide basic descriptive analyses on the early portions of these data. Huba, et al. examined the major characteristics of the youth served.³⁸ This study determines the major typologies that describe the services provided to HIV-positive and at-risk youth. Because in aggregate, these projects tend to define a consensus service model that is youth-focused, youth-attractive, and comprehensive, the analyses serve to illustrate the range of services likely to be required for the young people served by comprehensive service organizations targeting youth with HIV, or those at high risk for HIV infection.

METHODS

Cross-cutting evaluation instruments and design

As part of their involvement as grantees, the 10 projects participated in a cross-cutting evaluation of their activities.* The cross-cutting evaluation includes a number of single-page forms. These forms utilize a fax-in system.^{39,40} The data for this paper were collected using the *Contact Form*⁴¹ and the *Intervention Form*.⁴² Contact Forms document characteristics of individuals reached by the adolescent care projects, including demographic characteristics and patterns of HIV risk behaviors. The analyses used to form the client characteristics indicators utilized here are presented in detail elsewhere.³⁸ Intervention Forms record services provided to a youth formally enrolled in care. The form codes the type of services provided during the encounter, who provided the services, referrals made, and topics discussed. The actual interventions coded by the 10 projects were developed through a fairly extensive evaluation consensus process so that there would be a full range of services. The services coded ranged

from those associated with HIV testing (such as pretest counseling, post-test counseling, risk assessments) to medical services (such as exams, labs, medical appointments, family planning) to support and information-referral activities (such as HIV support groups, peer support groups, individual counseling, information and referral services, crisis interventions, family counseling), and activities directly related to HIV transmission prevention. The variables analyzed were coded 0 or 1 depending on whether the client received the services or not at any time during a service episode. Note that case management was not included in this analysis, as it was coded in a way conceptually distinct from the other variables, and it is conceptually important to keep this type of service distinct from the others because it can be provided concurrently with most other types of services. Thus, the analysis of service session type examines the relationships among the kinds of services likely to be provided in combination to youthful clients at one time or another during their involvement with the programs. For topics discussed, a set of 19 issues are listed on the Intervention Form. The variables analyzed were coded 0 or 1 depending on whether the client discussed the topic at some point during the service episode. Items provided during the service episode were coded as 1 if they were made available and 0 if they were not. Similarly, referrals to various services were coded 0 or 1 depending if each of a number of referrals to medical, psychosocial, or ancillary services were made at any time during the service episode.

Although each project has its own service delivery model, the cross-cutting evaluation has been designed for implementation across the ten projects. In general, the single-page fax-in data collection forms are completed at the time of each contact or service encounter, or shortly afterwards. Because service episodes are tracked across time, the utilization of various services provided by the adolescent care projects and referrals made within and outside of

*The cross-cutting evaluation is coordinated by the Measurement Group and was developed in collaboration with the 10 adolescent care projects and HRSA. These forms are available in various reports on these projects³⁵⁻³⁷ and are also available on the Internet (www.TheMeasurementGroup.com/adolspns/adolspns.htm) along with full instructions for their use.

those networks are tracked for as long as the youth is seen by the program.[†]

Participants

The data used for these analyses were collected between December 1993 and March 1998. The analyses presented in this paper are based on data collected from 2166 young men and 2508 young women who received services from the projects.[‡] There were 423 young men known to be HIV-positive and 1743 young men for whom HIV status was not identified. There were 155 young women known to be HIV-positive and 2353 young women for whom HIV status was not identified. Among those with valid age data, the men were an average of 20.3 years of age (*SD* = 3.3 years) and the women were an average of 19.0 years of age (*SD* = 3.1 years) [*t* (4654) = 13.95, *p* < 0.001]. Of the young men, 18.5% were African-American, 3.7% were Asian-American, 50.4% were Caucasian, 17.3% were Hispanic/Latino, 1.4% were Native American, 4.4% were multiracial, and 4.3% had an other or unknown ethnicity. Among the young women, 22.8% were African-American, 4.1% were Asian-American, 47.1% were Caucasian, 16.7% were Hispanic/Latina, 1.2% were Native American, 4.4% were multiracial, and 3.7% had another or unknown ethnicity. The criteria for inclusion in these analyses were that the youth had received at least one service intervention from the project and had data from a matched contact-demographic form.[§] Table 1 shows the total number of youth included from each project site, summarized by gender and whether their HIV status was known to be positive or not.

Exploratory statistical methods

In the following sections, exploratory factor analysis is used to categorize major patterns in variables. Exploratory factor analysis was con-

ducted on product-moment correlations using maximum likelihood extraction followed by oblique direct oblimin factor rotation. Factor analysis is a way of determining empirically the major patterns in a set of variables. The exploratory procedures determine the best model for the data using minimal assumptions. The rotation method used produces correlated (oblique) factors unless it is empirically determined from the data that uncorrelated (orthogonal) factors are appropriate. Cluster analysis differentiates types of individuals. Ward's method of clustering is a commonly used method of generating groupings of individuals in large datasets where clusters are found that maximize the differences among the groups. All analyses were conducted in SPSS for Windows Version, 8.0.⁴³

Because the results from the exploratory factor analyses are later used to confirm statistical models, and it is not generally appropriate to use the same data to explore for major trends and then test whether the model fits the data, we used a "split sample" strategy for the exploratory and confirmatory factor analyses. Specifically, for the second-order factor analyses, the overall sample of 4679 cases was randomly split into a derivation sample of 2301 cases and a cross-validation sample of 2378 cases. Consistent with the typical practice, the derivation sample was used for the exploratory factor analyses and initial restricted factor analysis solutions. Final confirmation of the models was done in the independent cross-validation sample. Note that the split sample strategy was only used in the analyses of the "second-order" factors.

Confirmatory statistical methods

Supplementing the exploratory factor analysis methods, more advanced methods of "confirmatory" or "restricted" factor analysis were

[†]Human Subjects Protection Committees at each site determined if informed consent for participation in the evaluation was required or if the data were collected as part of the usual quality improvement process, and hence exempt. All data collection at all sites was voluntary for clients and providers; thus, these data do have certain non-random patterns of missing observations.

[‡]Gender was unknown for 5 individuals who received at least on service intervention. The effective sample size is 4,674 for analyses including gender.

[§]Note that the sample reported here may differ slightly from that reported elsewhere using these data due to patterns of missing data on certain indicators.

TABLE 1. MALE AND FEMALE CLIENTS PER PROJECT

Project	Total unique clients	Young men				Young women			
		Number of HIV-positive males	Mean (SD) of intervention forms per HIV-positive males	Number of HIV-unknown males	Mean (SD) of intervention forms per HIV-unknown males	Number of HIV-positive females	Mean (SD) of intervention forms per HIV-positive females	Number of HIV-unknown females	Mean (SD) of intervention forms per HIV-unknown females
A	1730	18	26.1 (28.6)	597	2.6 (3.6)	17	27.5 (33.0)	1096	2.4 (2.8)
B	970	33	49.4 (41.8)	474	3.0 (11.0)	7	63.0 (47.7)	455	2.0 (3.7)
C	503	47	14.3 (13.4)	203	2.4 (5.3)	23	18.4 (10.3)	229	3.7 (5.8)
D	333	69	8.2 (17.7)	66	5.6 (11.6)	34	5.3 (9.8)	163	7.6 (13.1)
E	319	0	— (—)	173	8.0 (16.1)	0	— (—)	146	6.0 (12.9)
F	225	0	— (—)	46	1.7 (0.5)	1	1.0 (—)	178	2.4 (1.6)
G	225	188	16.2 (18.5)	0	— (—)	37	19.4 (26.3)	0	— (—)
H	202	2	14.0 (1.4)	133	2.8 (6.0)	5	34.2 (31.3)	62	5.8 (8.5)
I	122	44	11.9 (13.6)	51	9.9 (6.2)	3	3.7 (2.5)	24	8.1 (6.2)
J	50	22	30.6 (55.0)	0	— (—)	28	27.0 (37.8)	0	— (—)
Total	4679	423	18.0 (25.8)	1743	3.5 (8.9)	155	20.4 (28.9)	2353	3.2 (6.1)

Note: Gender was unknown for a total of five clients.

performed to extend results on the major typologies of risk behavior. Specifically, the LISREL 8.20 program^{44,45} was used to perform confirmatory factor analyses of the patterns of service utilization. The confirmatory factor analysis methods implemented in LISREL allow one to specify in advance the major patterns of relationships among indicators expected and, therefore, the factors that should be obtained. One specifies a model by stating what indicators are expected to load on each factor, how interrelated the factors are expected to be (if at all), and then tests to see if this proposed structure is statistically plausible for the observed empirical data. The LISREL computer program also permits one to make more appropriate assumptions about the data than does traditional exploratory factor analysis on product-moment correlations. The 12 major service utilization variables modeled are generally not normally distributed. The methods used in the confirmatory factor analyses of this paper correct the data for non-normal data distributions. We use these statistically appropriate approaches when modeling confirmatory data structures.

Technically, the confirmatory factor analyses use the asymptotic covariance matrix estimated from the PRELIS 2.20 computer program⁴⁶ as input to the LISREL 8.20 computer program for

analysis using weighted least-squares estimation. Goodness-of-fit, evaluating the match between the proposed factor structure and the observed data, was assessed in multiple ways according to standard recommendations in the literature⁴⁷ including the Chi-square goodness-of-fit test, the Comparative Fit Index,⁴⁸ and the root mean square of the discrepancy between the actual and estimated correlation coefficients.⁴⁹ An extended discussion on the use of such methods to obtain more precise and statistically correct models is provided by Huba and Harlow.^{50,51} Technically this method is equivalent to one developed by Browne⁵² called the asymptotically distribution-free (ADF) method; the method explicitly corrects for non-normal distributions in the observed variables.

RESULTS

Sessions attended

The first analyses investigated the types of sessions attended by the youth. Table 2 gives the results from the factor analysis of service session type. As can be seen, the types of services tend to fall mainly into a single factor each. The three factors can be labeled *HIV Testing Services*, *Medical Services*, and *Psychosocial*

TABLE 2. TYPES OF SESSION: PATTERN COEFFICIENTS FOR ANALYSIS FOR THREE FACTOR SOLUTION

	Factor 1	Factor 2	Factor 3
Medical—physical exam	0.10	0.84	-0.02
Medical—lab (not HIV)	0.10	0.81	-0.04
Medical—emergency	-0.04	0.19	0.15
Medical—appointment	-0.14	0.45	-0.06
Medical—walk-in	0.04	0.51	-0.10
Family planning	0.01	0.22	0.04
Mental health screen	0.00	0.24	0.19
HIV risk assessment	0.81	0.03	0.00
HIV pretest counseling	0.91	0.02	-0.11
HIV posttest counseling	0.58	0.00	-0.02
HIV test	0.88	0.03	-0.09
HIV prevention	0.63	0.00	0.05
Other prevention	0.42	-0.05	0.07
Individual counseling/therapy	-0.05	-0.04	0.50
Group counseling	-0.12	-0.18	0.36
Family counseling	0.01	0.08	0.27
Crisis	-0.03	0.11	0.33
Alternate therapy	0.05	0.02	0.47
Practical support	-0.09	0.27	0.46
12-Step group	0.06	0.01	0.29
Peer support group	-0.06	-0.21	0.60
HIV support group	-0.03	-0.08	0.53
Information and referral	0.06	0.10	0.38
Recreation	-0.06	-0.16	0.65
Correlations among factors			
Factor 1	1.00		
Factor 2	0.08	1.00	
Factor 3	-0.17	0.13	1.00

Note: Method is maximum likelihood factor analyses with a direct oblimin rotation.

and Peer Support. The three factors are correlated from $r = -0.17$ to $r = 0.13$. *HIV Testing Services* includes loadings for services such as HIV risk assessment, HIV testing and counseling, HIV prevention, and other prevention activities. The *Medical Services* factor includes sessions involving physical examinations, lab work, medical emergency visits, scheduled or unscheduled medical appointments, family planning, and mental health/substance abuse screenings. *Psychosocial and Peer Supports* include sessions devoted to various types of counseling services, support groups, and ancillary services.

Topics discussed

This section examines the topics that are discussed with a client at the time that services are provided. For males and females, there are three major cluster groups of topics discussed in the context of service provision, as deter-

mined for factor analysis. The three major factors of topics discussed are: (1) *Psychosocial Issues*, which include discussion of assertiveness, youth empowerment, emotional problems, self-identity, substance abuse, hassles, housing/jobs, living with HIV, alternative therapy, and public assistance; (2) *HIV-Related Issues*, which include discussion of HIV risk factors, safer sex, HIV testing, risk-reduction barriers, dating/sex, and HIV services, and (3) *Medical Service Issues*, which include discussion of medical services, health status, family planning, and enrollment into the project. Table 3 shows the results from the factor analysis. The factors are moderately correlated with one another, ranging from $r = -0.43$ to $r = 0.29$.

Items distributed

Various items are distributed to clients at the time that services are provided. These items range from condoms and bleach to transporta-

TABLE 3. TOPICS DISCUSSED: PATTERN COEFFICIENTS FOR ANALYSIS FOR THREE FACTOR SOLUTION

	Factor 1	Factor 2	Factor 3
HIV risk factors	0.07	0.64	-0.20
Safer sex	-0.05	0.69	-0.20
Housing/jobs	0.68	-0.07	-0.14
HIV testing	-0.03	0.73	0.10
HIV services	0.05	0.70	0.12
Medical services	0.03	-0.08	-0.85
Public assistance	0.52	-0.09	-0.05
Alternative therapies	0.49	-0.03	-0.02
Substance abuse	0.58	0.16	-0.11
Hassles	0.67	-0.01	-0.10
Assertiveness	0.73	0.11	0.01
Self identity	0.72	0.09	0.10
Youth empowerment	0.81	-0.03	0.18
Family planning	0.22	0.17	-0.26
Living with HIV	0.65	0.01	0.01
Health status	0.01	0.05	-0.80
Dating/sex	0.27	0.51	-0.08
Risk reduction barriers	-0.11	0.84	0.09
Emotional problems	0.76	-0.01	-0.07
Correlations among factors			
Factor 1	1.00		
Factor 2	-0.29	1.00	
Factor 3	-0.43	-0.17	1.00

Note: Method is maximum likelihood factor analyses with a direct oblimin rotation.

tion vouchers and food coupons. Again, as an initial step in categorizing these services, using factor analysis, it was determined that there are two major factors of items distributed to males and females. As shown in Table 4, the two groups of items provided to program clients include: (1) *Educational Materials and Supplies*, including brochures, condoms, referrals lists, wallet cards, dental dams, and bleach; and (2) *Basic Medical Support Needs*, including bus tokens, food vouchers, immunizations, and medications. The two factors were correlated $r = 0.29$. Youth who were provided written materials such as brochures and referral lists also tended to receive risk-reduction materials such as condoms and bleach kits. Basic medical support needs, on the other hand, appear to have been provided to assist the youth in participating in clinic activities, whether in the form of transportation (bus tokens) or actual medications received as part of their medical care.

Referrals

The next set of initial analyses present descriptions of the types of referrals projects

made to clients. A total of 12 types of referrals could be noted. Using factor analysis, it was determined that there are three major groups of referrals made. The typology of items provided is as follows: (1) *Collateral Service Referrals*, which include referrals to case management; (2) *Psychosocial Service Referrals*, which include

TABLE 4. ITEMS DISTRIBUTED: PATTERN COEFFICIENTS FOR ANALYSIS FOR TWO FACTOR SOLUTION

	Factor 1	Factor 2
Brochures	0.87	-0.28
Referral lists	0.40	0.22
Wallet cards	0.36	0.10
Medications	-0.06	0.40
Condoms	0.58	0.04
Dental dams	0.31	0.07
Bus tokens	0.13	0.79
Food vouchers	0.21	0.62
Bleach	0.19	0.04
Educational materials	0.81	-0.18
Immunizations	-0.02	0.47
Correlations among factors		
Factor 1	1.00	
Factor 2	0.29	1.00

Note: Method is maximum likelihood factor analyses with a direct oblimin rotation.

referrals to social services, food/drop-in centers, or housing/shelter programs, educational/vocational services, mental health services, substance abuse treatment, and self-help groups; and (3) *Medical Service Referrals*, which include referrals to STD clinics, HIV testing, medical and family planning services. Table 5 shows the exploratory factor analysis that supports this conclusion. The referral factors were intercorrelated $r = -0.50$ to $r = -0.16$. Note that collateral service referrals appear to be relatively independent of psychosocial and medical service referrals, and that psychosocial, medical, and collateral service referrals tend *not* to occur.

Factor analysis of service factors

Given the analyses just conducted (type of session, topics discussed, referrals, items provided), one should next ask how these properties relate to one another. These characteristics—substantiated by empirical analysis and statistical modeling summarized in Tables 2, 3, 4, and 5—are:

1. Type of Session (3): *HIV Testing Services, Medical Services, and Psychosocial and Peer Support Services; Case Management* is included as a fourth category;
2. Topics Discussed (3): *Psychosocial Issues, HIV-Related Issues, and Medical Service Issues;*

3. Referrals (3): *Psychosocial Services, Medical Services, and Collateral Services;*
4. Items Provided (2): *Educational Materials and Supplies, and Basic Medical Support Needs*

This initial set of variables has been generated empirically from the service histories of the 4679 youth. The second step is to ask how these 12 types of service variables interrelate in a composite continuum of care.

Table 6 shows two sets of factor analyses based on these treatment episode characteristics. The analyses presented in Table 6 are based on the derivation sample of 2301 randomly selected cases. Parallel factor analyses are presented for two alternate sets of indices. The first set (presented on the left side of the table) analyzes the relationships among service day composites formed as the total number of times elements in a given category occurred per day of services (e.g., how many times were *Psychosocial Topics* discussed overall, divided by the number of days the youth participated in services?). The analyses summarize *Service Utilization Rates*. Service utilization rates are the more complete indicator of the service episode, as they take into account the number of services provided throughout the youth’s involvement with the program. These indices also account for the fact that youth are served for different numbers of days. The second set

TABLE 5. TYPES OF REFERRALS: PATTERN COEFFICIENTS FOR ANALYSIS FOR THREE-FACTOR SOLUTION

	Factor 1	Factor 2	Factor 3
HIV testing	0.14	-0.05	-0.74
STD clinic	-0.02	-0.05	-0.96
Medical services	0.10	0.24	-0.54
Social services	0.06	0.66	0.06
Food/drop-in center	-0.04	0.73	-0.15
Shelter/housing	-0.02	0.76	-0.09
Educational/vocational training	-0.11	0.72	-0.01
Self-help group	0.17	0.65	0.12
Case management	0.82	0.18	-0.30
Mental health services	0.09	0.70	0.03
Substance abuse treatment	-0.03	0.77	-0.05
Family planning	-0.18	0.40	-0.39
Correlations among factors			
Factor 1	1.00		
Factor 2	-0.27	1.00	
Factor 3	-0.16	-0.50	1.00

Note: Method is maximum likelihood factor analyses with a direct oblimin rotation.

TABLE 6. UNDERLYING FACTORS OF SERVICE PROVISION: PATTERN COEFFICIENTS FOR ANALYSIS FOR FOUR-FACTOR SOLUTIONS

	<i>Service utilization rate</i>							
	<i>Total services per day of any type in category</i>				<i>Service type saturation Number of services of type</i>			
	<i>Factor 1</i>	<i>Factor 2</i>	<i>Factor 3</i>	<i>Factor 4</i>	<i>Factor 1</i>	<i>Factor 2</i>	<i>Factor 3</i>	<i>Factor 4</i>
Psychosocial issues discussed	0.06	0.80	-0.05	0.05	-0.06	0.90	0.07	-0.05
Medical issues discussed	0.04	0.19	-0.80	-0.27	-0.12	0.14	0.47	-0.39
HIV-related issues discussed	0.98	0.09	-0.02	-0.04	0.68	0.12	-0.01	-0.24
Educational items distributed	0.47	0.37	0.04	-0.09	0.23	0.28	-0.03	-0.31
Medical support items distributed	0.09	0.16	-0.43	0.20	0.09	0.19	0.49	-0.03
Psychosocial referrals	0.01	0.72	-0.05	-0.10	-0.06	0.52	-0.02	-0.41
Medical referrals	0.29	0.42	-0.40	-0.02	0.16	0.03	0.14	-0.83
Collateral service referrals	-0.02	0.59	-0.17	0.45	0.13	0.44	0.12	-0.26
HIV testing services	0.72	-0.31	-0.07	0.27	0.93	-0.30	0.05	-0.02
Medical services	-0.05	-0.19	-0.90	0.05	-0.02	-0.17	1.05	0.08
Psychosocial and peer support services	-0.04	0.86	0.07	0.08	-0.15	0.81	0.02	-0.06
Case management services	0.07	0.05	0.04	0.65	0.31	0.33	0.04	0.17
Factor correlations								
Factor 1	1.00				1.00			
Factor 2	0.28	1.00			0.21	1.00		
Factor 3	-0.28	-0.30	1.00		0.17	0.26	1.00	
Factor 4	0.26	0.06	-0.13	1.00	-0.12	-0.42	-0.31	1.00

Note: N = 2301. Method is maximum likelihood factor analyses with a direct oblimin rotation.

analyzes the relationships among service day composites in which each element in a category is unit-weighted. For example, how many of the 10 specific topics under *Psychosocial Issues* were ever discussed during the entire service episode? These analyses summarize *Service Type Saturation*. As shown in Table 6, both ways of characterizing the service system yield about the same empirical description of the service system.

Based on service-type saturation as well as principally upon service utilization rates, the 12 service delivery properties can be reduced to four major groupings or clusters. The first group (or factor) is *HIV Interventions*. In these interventions, HIV-related topics of risk and harm reduction, testing, and behavior change are discussed. The specific services provided include risk assessment, HIV testing, and related pre-test and post-test counseling. These services tend to be coupled with various other types of primary and secondary prevention sessions. The second grouping (or factor) is *Support Services*. In these types of interventions, psychosocial issues are discussed, psychosocial support sessions are provided, and referrals are made to medical, psychosocial, and collateral

services. Basic educational materials and risk-reduction supplies (condoms, bleach) are distributed. The third grouping (or factor) is *Medical Services*. These services include medical interventions both primarily related to HIV and to more basic medical issues. Supplies, such as transportation and food vouchers, are used to support these services. The factor also includes a loading for medical referrals. The fourth group (or factor) is *Case Management Services*. These services include direct case management interventions as well as collateral service referrals. The solutions based on service utilization rates and service-type saturation differ slightly, but generally follow the same pattern. The result of this analysis is to have a service history categorization based empirically upon service records studied using exploratory methods that characterize major patterns.

Restricted or confirmatory factors or service utilization rates

As just noted, we first explored the data for the major themes among the service use rates using a derivation sample of one half of the

data. In this section we further refine the dimensional analyses just presented and then use a complete statistical confirmation of the patterns using a confirmatory factor analysis model. The outcome of these analyses will be to present a statistically validated model of major themes in the continuum of services for young men and women. This is the third step in the analysis sequence. Accordingly, as a follow-up to the exploratory factor analyses of the rates of delivering services of various kinds, we also conducted a series of confirmatory (or restricted) factor analyses on the same data. As noted earlier, these analyses depart from traditional exploratory factor analysis in that we start with a hypothesized model and determine how well it fits the observed data using such methods. Also, the analyses in this section use a fairly sophisticated method of statistical modeling, which takes into account the fact that the distribution of service use rates by young men and young women do not follow a normal, "bell-shaped" distribution, but rather are skewed in that most youth consume services at low rates, but a few youth use the services at very high rates.

To develop an initial model for the data on service use rates, we started with the four-factor solution of Table 6 derived in the exploratory sample, and hypothesized factors of HIV Services, Support Services, Medical Services, and Case Management Services, from the exploratory analyses of Table 6. Supplementing these four factors or theoretical system elements, we thought that there would be a general availability of services or Connectedness to Services dimension for the youth. Some youth are relatively well-connected to, and use, services while other do not. This general Connectedness dimension was hypothesized to affect all kinds of services in a positive and general way.

In developing this statistical model, we hypothesized that the general factor of Connectedness to Services or general availability of services would directly be manifested in the four specific service-system elements of HIV Services, Support Services, Medical Services, and Case Management Services. We also hypothesized that there would be specific influences for the four systems—independent from general

connectedness to the service system—that were different from the general availability of services. Hence, in our theoretical model, we believed that there are four main systems of services (HIV Services, Support Services, Medical Services, and Case Management). We hypothesized that the rate that a client used each system was related to both how generally connected the youth was to the overall continuum of services and to some unique influence, quite possibly the effects of the specific project conducting targeted services outreach to youth who were not already part of the general services system.

Because we wish to explore the data and confirm a model in the same dataset, we used a strategy of data exploration and cross-validation in the following way. We started with the model just described and fit it to the exploratory sample of one half of the data ($N = 2301$). These are the same data we had previously explored using traditional exploratory factor analysis methods and for whom results are presented in Table 6. We then used various strategies of model fitting^{49,50,53} to add a few additional parameters to the hypothesized factor analysis model and to eliminate statistically nonsignificant parameters. The final model has a high degree of fit to the data as indicated by the small value of the goodness-of-fit statistical test [$\chi^2(30, N = 2301) = 287.26$], the small value of the RMSEA index of fit of 0.061, and the large value near its maximum of 1 of the comparative fit index (here estimated at 0.974). All of the parameters in the final statistical model *in the derivation sample* are statistically significant. The raw coefficients and their standard errors are given in Table 7. In the second half of the data (or the cross-validation sample) in which the model was not originally fit, we validated the pattern of significant and nonsignificant parameters using what might be termed a "loose cross-validation" strategy.⁵³ The model fit the data very well as indicated by the small value of the goodness-of-fit index [$\chi^2(30, N = 2378) = 316.76$], the small value of the RMSEA index of fit (of 0.063), and the large value of the comparative fit index of 0.973. Note that this second test is a truer assessment of the fit of the model as it is tested in an independent part of the data that had not been previously explored.

TABLE 7. CONFIRMATORY FACTOR ANALYSIS SOLUTIONS FOR HIGHER ORDER PROVISION MODEL FOR DERIVATION AND CROSS-VALIDATION SAMPLES

<i>Model paths</i>	<i>Derivation sample (N = 2301)</i>			<i>Validation sample (N = 2378)</i>		
	<i>WLS estimate</i>	<i>Standard error</i>	<i>Test value</i>	<i>WLS estimate</i>	<i>Standard error</i>	<i>Test value</i>
Factor 1 (HIV services) to						
HIV-related issues discussed	1.85	0.06	32.80***	1.71	0.05	31.78***
Educational items distributed	0.63	0.03	19.15***	0.58	0.03	17.23***
Medical support items distributed	0.07	0.01	6.35***	0.06	0.01	5.53***
Medical referrals	0.38	0.02	21.75***	0.37	0.02	20.94***
HIV testing services	1.00	—	—	1.00	—	—
Psychosocial and peer support services	-0.07	0.01	-5.32***	-0.10	0.01	-7.42***
Factor 2 (support services) to						
Psychosocial issues discussed	2.10	0.06	35.95***	2.12	0.05	39.28***
Educational items distributed	0.78	0.04	22.07***	0.80	0.04	22.41***
Medical support items distributed	0.11	0.02	5.46***	0.06	0.02	2.72***
Psychosocial referrals	0.62	0.03	20.39***	0.59	0.03	22.76***
Medical service referrals	0.27	0.03	9.26***	0.24	0.03	7.53***
Collateral service referrals	0.17	0.01	16.13***	0.14	0.01	12.58***
HIV testing services	-0.97	0.05	-21.57***	-0.92	0.04	-21.64***
Medical services	-0.34	0.03	-11.26***	-0.41	0.03	-12.87***
Psychosocial and peer support services	1.00	—	—	1.00	—	—
Factor 3 (medical services) to						
Medical issues discussed	1.12	0.05	22.01***	1.12	0.05	21.85***
Medical support items distributed	0.49	0.03	15.43***	0.49	0.03	14.54***
Medical service referrals	0.56	0.03	22.60***	0.59	0.03	23.67***
Collateral service referrals	0.11	0.01	11.21***	0.10	0.01	11.05***
Medical services	1.00	—	—	1.00	—	—
Factor 4 (case management services) to						
Medical issues discussed	-0.43	0.05	-7.99***	0.55	0.07	-7.66***
HIV-related issues discussed	1.08	0.15	7.41***	1.30	0.18	7.19***
Collateral service referrals	0.38	0.02	15.43***	0.49	0.03	13.92***
HIV testing services	2.05	0.16	12.94***	2.13	0.18	11.85***
Case management services	1.00	—	—	1.00	—	—
Factor 5 (general service connectedness) to						
Factor 1 (HIV services)	0.39	0.04	10.35***	0.39	0.04	9.47***
Factor 2 (support services)	0.46	0.05	9.19***	0.54	0.06	9.41***
Factor 3 (medical services)	0.45	0.04	11.42***	0.52	0.04	12.84***
Factor 4 (case management services)	0.14	0.02	7.47***	0.17	0.02	9.52***
Factor 4 (case management services) to						
Factor 2 (support services)	0.35	0.11	3.21***	0.35	0.15	2.38*
Residual (unique) variance						
Factor 1 (HIV services)	0.98	0.05	21.73***	1.05	0.05	21.13***
Factor 2 (support services)	0.36	0.03	12.57***	0.31	0.03	9.91***
Factor 3 (medical services)	0.48	0.03	13.92***	0.44	0.04	12.14***
Factor 4 (case management services)	0.13	0.01	12.50***	0.10	0.01	9.94***
Factor 5 (general service connectedness)	1.00	—	—	1.00	—	—
Error Variances						
1. Psychosocial issues discussed	1.05	0.06	16.75***	1.06	0.07	15.42***
2. Medical issues discussed	0.12	0.03	4.10***	0.12	0.03	4.16***
3. HIV-related issues discussed	0.14	0.10	1.48	0.40	0.09	4.66***
4. Educational items distributed	0.97	0.06	17.67***	0.83	0.05	15.79***
5. Medical support items distributed	0.27	0.02	16.25***	0.28	0.02	15.92***
6. Psychosocial service referrals	0.36	0.03	13.35***	0.39	0.03	12.63***
7. Medical service referrals	0.47	0.02	25.43***	0.48	0.02	25.73***
8. Collateral service referrals	0.06	0.001	21.60***	0.05	<0.01	19.79***

continued

TABLE 7. CONTINUED

Model paths	Derivation sample (N = 2301)			Validation sample (N = 2378)		
	WLS estimate	Standard error	Test value	WLS estimate	Standard error	Test value
Error Variances						
9. HIV testing services	0.54	0.05	11.57***	0.53	0.04	12.05***
10. Medical services	0.36	0.03	12.71***	0.36	0.03	12.28***
11. Psychosocial and peer support services	0.31	0.02	14.75***	0.31	0.02	15.97***
12. Case management services	0.06	0.01	7.16***	0.09	0.01	11.52***
Error covariances						
1 and 4	-0.46	0.04	-12.24***	-0.52	0.04	-13.37***
2 and 3	0.09	0.02	5.65***	0.09	0.02	5.52***
2 and 5	-0.15	0.02	-9.00***	-0.13	0.02	-8.39***
2 and 8	-0.04	0.01	-7.31***	-0.03	<0.01	-5.41***
2 and 11	-0.09	0.01	-8.42***	-0.09	0.01	-9.40***
7 and 8	0.02	<0.01	4.72***	0.04	<0.01	7.33***

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Figure 1 contains the completely standardized parameter values for the cross-validation sample; the values in the derivation sample are virtually identical and it would be redundant to also present them.

As a result of the statistical modeling, we have a statistically plausible, confirmed model of the services continuum as experienced by young men and young women in these 10 national demonstration projects. That model, shown in Fig. 1 has the characteristic that there is a general dimension of connectedness to services and correlated specific service systems. In this model, high-risk youth and those with HIV can be differentiated by their overall level of connectedness to the general service system, and then by four specific subsystems of HIV Services, Support Services, Medical Services, and Case Management Services.

To understand the general services model fit to the data here, consider again Fig. 1. At the beginning of the projects, youth differ in how well connected they are to a general services continuum. Examining Fig. 1, if a client is connected to a general continuum of services (as symbolized by the circle in the left-most part of the diagram), he or she will tend to progress to receive services from the four major systems of HIV Services, Support Services, Medical Services, and Case Management, depending upon need levels. General connection to the continuum helps the youth access all of these systems of services. For each of the systems, cer-

tain specific services are implied by entering the system as symbolized by the arrows that go from the system to the boxes at the right of the diagram which are actual measures of service utilization rates derived from the service histories of the more than 4600 youth in the 10 projects. For instance, the arrows from the circle labeled HIV Services indicates that youth who enter this system will talk to providers about HIV-related issues, will receive educational materials, will receive referrals to medical services, will be offered HIV testing services (risk assessment, pre- and post-test counseling, testing), but may not be offered psychosocial and peer support services. Similar patterns can be traced through the diagram. Notice that there are arrows going to the four main service systems (HIV Services, Support Services, Medical Services, Case Management Services). These arrows represent alternate entry points to these services for youth who are not generally linked into a comprehensive model. Among the specific systems, there may be a path from Case Management to receiving Support Services as youth are linked to these services.

How much of the service history of a given individual can be predicted from the degree of immersion in a general comprehensive services continuum? We can estimate the degree to which the immersion is operative from the squared multiple correlations for predicting Factors 1 through 4 (or the general services sys-

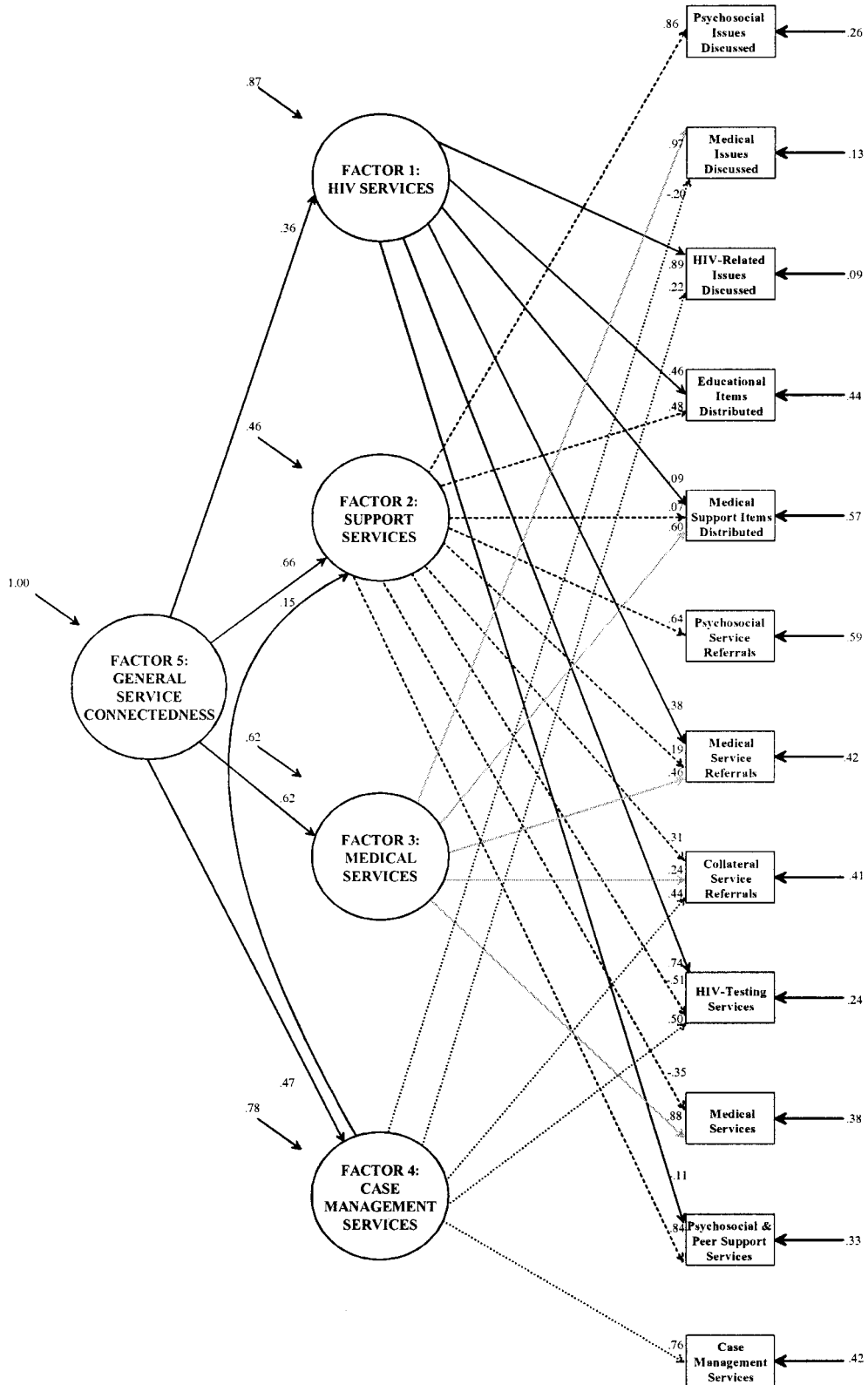


FIG. 1. Confirmatory factor analysis of service provision: Cross-validation sample. Note: Weighted Least Squares Estimation, $\chi^2(36, N = 2,378) = 316.76$, $CFI = 0.973$, $RMSEA = 0.063$.

tems) as portrayed in Fig. 1. The squared multiple correlation for predicting Factor 1 (HIV Services) is 0.128, which means that about 13% of the between-person differences in the utilization of HIV Services comes about because of immersion in a general services continuum while about 87% comes about because of specific testing programs. Similarly, 54% of Factor 2 (Support Services) is dependent upon immersion in the general continuum and case management and about 46% is due to support-specific programs offered by providers. About 38% of the differences between youth in the utilization of medical services derive from immersion in the general services continuum, while about 62% comes about from medical-specific services. Finally, about 22% of the differences between individuals in the use of case management services come about because of immersion level in the general services system. Note that these estimates are derived from the cross-validation sample data, but that virtually identical estimates are also made from the derivation sample.

In understanding this model, it is also valuable to examine the correlations of the service utilization rates modeled here. Table 8 shows

the product-moment correlations for the 12 services utilization rate variables.

Typology of service users

Finally, in order to examine whether the service interventions provided by the 10 adolescent-targeted programs would allow people to be classified in an interpretable way, typologies were derived by cluster analysis using Ward's method. Based on profile analyses of several alternate solutions (three, four, five, and six clusters), a four-cluster solution was judged to provide the best fit to the data. Service utilization rates were analyzed for this typology.

Figure 2 shows the profiles of the four service intervention clusters of people. Cluster 1 ($n = 1199$) is a group of people with relatively high rates of discussing HIV-related and psychosocial issues, and receiving high rates of medical and support service referrals. This cluster may represent users of *Medical Support Interventions*. Cluster 2 ($n = 868$) is a group of people with high rates of discussing all types of issues, receiving referrals, and support services. This cluster may represent users of the *High-Intensity Psychosocial Interventions*. Cluster

TABLE 8. PRODUCT-MOMENT CORRELATIONS AMONG MEASURES OF THE NUMBER OF SERVICES RECEIVED PER DAY

	1	2	3	4	5	6	7	8	9	10	11	12
1. Number of psychosocial issues discussed	—											
2. Number of medical service issues discussed	0.40*	—										
3. Number of HIV-related issues discussed	0.38*	0.30*	—									
4. Number of educational items distributed	0.32*	0.26*	0.57*	—								
5. Number of basic medical support needs distributed	0.39*	0.36*	0.31*	0.21*	—							
6. Number of psychosocial service referrals	0.61*	0.37*	0.27*	0.33*	0.09*	—						
7. Number of medical service referrals	0.50*	0.61*	0.57*	0.47*	0.44*	0.55	—					
8. Number of collateral service referrals	0.59*	0.33*	0.35*	0.35*	0.39*	0.50*	0.57*	—				
9. Number of HIV testing services	0.01	0.05*	0.69*	0.20*	0.21*	0.02	0.32*	0.19*	—			
10. Number of medical services	0.11*	0.65*	0.17*	0.06*	0.48*	0.04*	0.38*	0.23*	0.19*	—		
11. Number of psychosocial support and counseling services	0.73*	0.27*	0.26*	0.42*	0.25*	0.56*	0.47*	0.55*	-0.09*	0.04*	—	
12. Number of case management sessions	0.16*	-0.03*	0.22*	0.14*	0.20*	0.06*	0.10*	0.39*	0.30*	0.07*	0.18*	—

Note: $N = 4674$.

*Correlation is significant at the 0.01 level (2-tailed).

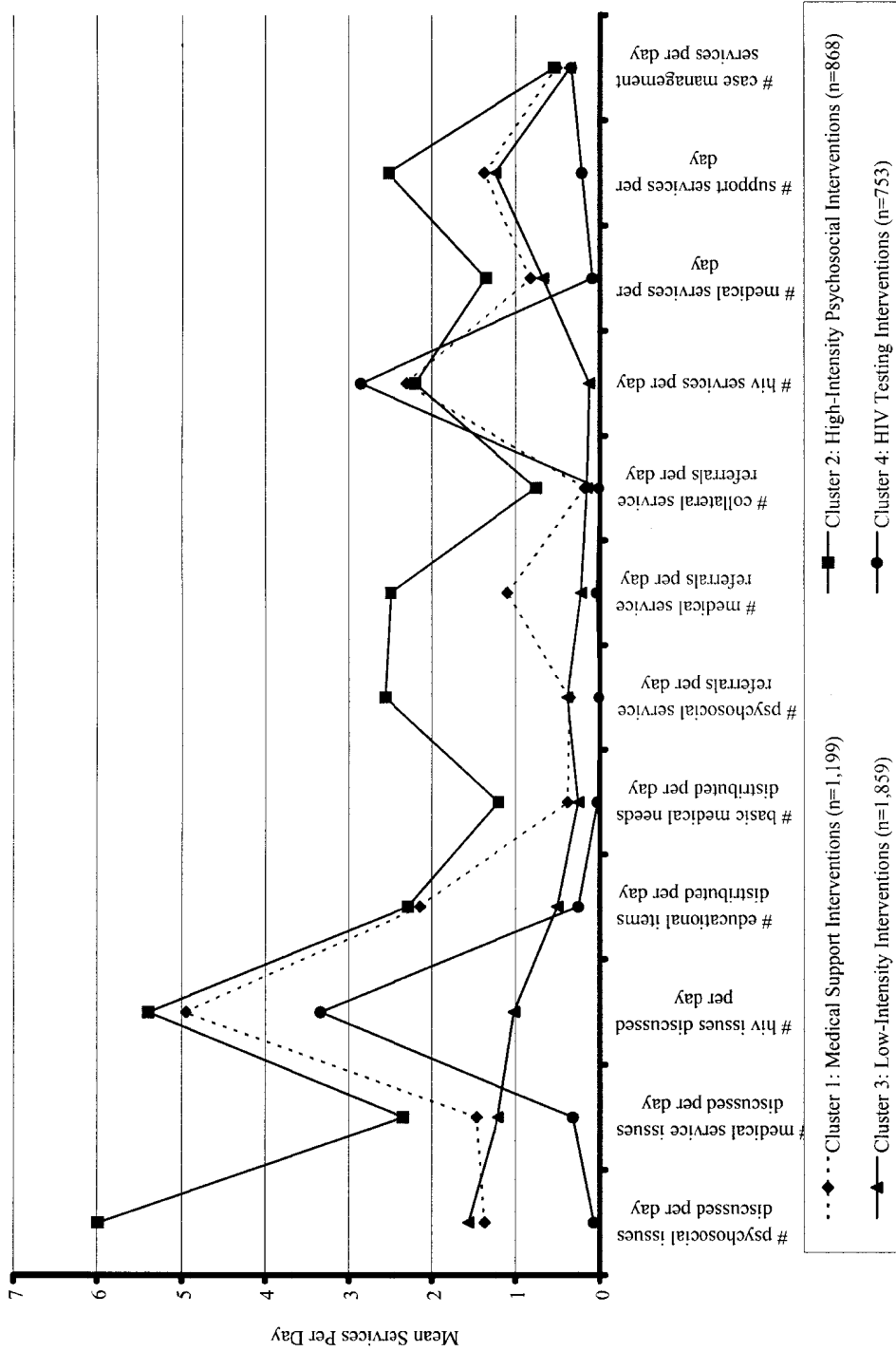


FIG. 2. Four-cluster solution for service utilization intervention rates.

3 ($n = 1859$) is a group of people with relatively low rates on most service utilization indicators. This cluster may represent users of *Low-Intensity Interventions*. Cluster 4 ($n = 753$) is a group of people with relatively high rates per day for discussing HIV-related topics and receiving HIV services. This cluster may represent users of *HIV Testing Interventions*.

Relationship of usage rates to risk behavior typology

A similar typology was developed to classify youth HIV risk behaviors among clients in these 10 adolescent-focused projects and yielded five (nonidentical) clusters for males and females. These typologies, which were derived by cluster analysis using Ward's method, used eight behavioral indices of HIV risk to group program clients: Risky Sex with Men, Risky Sex with Women, Sex with Injection Drug User, Survival Sex, Sex with HIV-Positive Partner, Sexually Transmitted Diseases, Substance Abuse, and Injection Drug Risk. Separate cluster solutions were derived for males and females. For males, the five clusters formed represented men who have sex with women, men who have sex with men and women, men with very high current risk, men who have sex with men, and men presenting prior risk behaviors. For females, five clusters were formed independently from those formed for males. The risk clusters for females included women who have sex with men, women who present prior risk behaviors, women who have sex with men and women, women with very high current risk, and women who have sex with women. For both genders, the risk behavior clusters significantly differentiated between youth known to be HIV-positive and those with unknown HIV status,³⁸ as well as homeless, runaway, mental health system involved, and criminal justice system involved youth.

The risk behavior clusters represent a way to group clients in the adolescent care projects based on their *relative* level of risk on the eight indicators. The clusters group clients by their level of risk on these measures *compared with the other individuals in the sample*. The names assigned to the risk behavior clusters are intended to illustrate the major features of the

group of people represented by the cluster, but do not imply that individuals in the other clusters do not have that risk present. For example, among males, the Sex with Women cluster (Cluster M1) includes the young men in the sample who appear to be most likely to have current high levels of risk for sex with women. However, individuals in the other clusters may also have risk present for sex with women, although probably to a lesser degree. For instance, young men in the Very High Current Risk cluster (Cluster M4) may also have current risk for sex with women—but they also present extremely high levels of risk on other indicators such as survival sex, substance abuse, injection drug use, and sex with an injection drug user—which sets them apart from the young men in Cluster M1. In summary, the clusters represent an overall configuration of risk factors for given sets of individuals that can be useful in predicting the types of service utilization patterns by those groups.

How are the client typologies related to indicators of service interventions? A multivariate analysis of variance (MANOVA) was used to examine the effect of cluster membership based on client risk behavior level on the receipt of various types of service sessions, referrals, topics discussed, and items provided during interventions. These service issues were operationalized in the following way. Each of the 12 indicators of service utilization rates was examined in terms of the risk behavior profiles. Table 9 presents the mean number of service sessions per service day for each of the five risk behavior clusters separately for males and females. For males and females, MANOVA results indicated that risk behavior cluster membership was related to service utilization rates as indicated by the 13 service intervention measures. For males, Wilks $\lambda = 0.77$ [$F(48,6527) = 9.37, p < 0.001$]. For females, Wilks $\lambda = 0.76$ [$F(48,7729) = 11.89, p < 0.001$].

DISCUSSION

This paper examined the aggregate service records from 10 national demonstration projects funded to develop comprehensive, youth-

TABLE 9. MANOVA OF RISK BEHAVIOR CLUSTER MEMBERSHIP AND SERVICE UTILIZATION RATES

Service variable	Cluster means and standard deviations					F (4,1705)
	Cluster M1 (N = 365)	Cluster M2 (N = 595)	Cluster M3 (N = 243)	Cluster M4 (N = 148)	Cluster M5 (N = 359)	
Males						
Psychosocial issues discussed per day	2.3 (2.7)	2.4 (2.6)	2.8 (2.4)	3.8 (2.4)	2.7 (2.3)	10.83***
Medical services issues discussed per day	1.5 (1.1)	1.2 (1.0)	1.2 (0.9)	1.2 (0.8)	1.2 (0.9)	7.67***
HIV issues discussed per day	4.3 (1.9)	3.0 (2.1)	3.8 (2.0)	3.2 (2.1)	3.0 (2.4)	27.93***
Educational items provided per day	1.8 (1.6)	1.2 (1.4)	1.6 (1.7)	1.1 (1.6)	1.2 (1.5)	11.83***
Basic medical needs provided per day	0.7 (1.1)	0.4 (0.8)	0.5 (1.0)	0.6 (1.1)	0.3 (0.7)	9.19***
Psychosocial referrals per day	1.0 (1.9)	0.8 (1.5)	1.1 (1.8)	0.9 (1.3)	1.0 (1.5)	1.93
Medical service referrals per day	1.4 (1.4)	0.7 (1.1)	0.9 (1.3)	0.7 (1.1)	0.6 (1.1)	26.96***
Collateral service referrals per day	0.5 (0.5)	0.3 (0.4)	0.3 (0.4)	0.3 (0.4)	0.2 (0.4)	18.54***
HIV services per day	2.2 (1.4)	1.3 (1.5)	1.8 (1.5)	1.4 (1.6)	1.2 (1.5)	32.84***
Medical services per day	0.9 (1.1)	0.6 (1.0)	0.6 (0.9)	0.6 (1.1)	0.3 (0.6)	20.63***
Support services per day	1.6 (1.0)	1.5 (1.0)	1.6 (1.0)	1.7 (0.8)	1.6 (1.0)	1.49
Case management services per day	0.6 (0.5)	0.5 (0.5)	0.6 (0.5)	0.7 (0.4)	0.5 (0.4)	3.71**
Service variable	Cluster W1 (N = 829)	Cluster W2 (N = 113)	Cluster W3 (N = 775)	Cluster W4 (N = 95)	Cluster W5 (N = 210)	F (4,20)
Females						
Psychosocial issues discussed per day	1.8 (2.3)	3.4 (2.6)	2.0 (2.4)	2.2 (1.9)	3.0 (2.6)	21.50***
Medical services issues discussed per day	1.8 (1.1)	1.5 (1.0)	1.3 (1.1)	0.9 (0.9)	1.5 (1.0)	32.95***
HIV issues discussed per day	4.0 (1.9)	4.2 (2.0)	3.3 (2.0)	2.7 (2.2)	4.1 (2.1)	21.85***
Educational items provided per day	1.6 (1.5)	1.4 (1.7)	1.3 (1.4)	1.5 (1.6)	1.7 (1.6)	6.03***
Basic medical needs provided per day	0.5 (0.8)	1.0 (1.3)	0.4 (0.8)	0.4 (0.7)	0.7 (1.2)	15.42***
Psychosocial referrals per day	0.7 (1.6)	0.8 (1.1)	0.7 (1.5)	1.0 (1.5)	1.3 (2.1)	6.31***
Medical service referrals per day	1.4 (1.5)	1.3 (1.3)	0.8 (1.2)	0.7 (1.1)	1.3 (1.5)	23.51***
Collateral service referrals per day	0.3 (0.4)	0.5 (0.5)	0.2 (0.4)	0.2 (0.4)	0.4 (0.5)	19.36***
HIV services per day	2.1 (1.3)	2.3 (1.5)	1.5 (1.4)	1.0 (1.3)	2.0 (1.5)	31.94***
Medical services per day	1.2 (1.2)	1.4 (1.4)	0.7 (1.0)	0.3 (0.7)	0.9 (1.2)	35.29***
Support services per day	1.4 (1.0)	1.6 (1.0)	1.4 (1.1)	1.6 (1.1)	1.7 (1.1)	4.88**
Case management services per day	0.4 (0.5)	0.7 (0.4)	0.4 (0.5)	0.5 (0.4)	0.6 (0.5)	16.07***

Note: ***p* < 0.01, ****p* < 0.001.

relevant and youth-attractive services for young people with HIV and at high risk to become infected with HIV. Over a period of more than 4 years, records for 4679 youth could be abstracted to determine what services they had received, whether referrals had been made to other services at the time services were provided, what issues were discussed, and what other materials were provided to the youth at the time of service delivery. The services coded ranged from medical visits of various kinds to peer support sessions, counseling visits, mental health screening, 12-step groups, information and referral sessions, and HIV counseling and testing services.

In the initial analyses presented in this paper, exploratory factor analysis was used to examine the major clusters of services. Major types of services were identified, major themes

in the referral patterns were identified, types of support items provided were coded, and a typology was developed for the issues that tend to be discussed in service sessions.

At the next step, a general theoretical model of the service system for youth, as embodied in aggregate by these 10 national demonstration projects, was developed. Confirmatory statistical modeling methods were used to first develop and then cross-validate (in an independent sample) an overall theoretical framework for the services. That model, as shown in Fig. 1, is plausible for the data collected from the approximately 4600 youth.

The overall theoretical framework developed contains five major theoretical constructs for the service system, which themselves are reflected in 12 composite service variables themselves reflective of several dozen specific ser-

VICES, issues discussed, referral types made, and items distributed to the youth. The theoretical model contains a construct of General Service Connectedness. Being generally connected to a continuum of youth services can help a youth get connected to specific service modalities of HIV Services, Support Services, Medical Services, and Case Management Services. Being connected to these specific modalities then has the implication that the youth will receive specific exemplars of HIV Services (such as pre- and post-test counseling, risk assessments, and HIV testing as well as discussions about HIV issues, risk-reduction aids like condoms and bleach, and referrals to other needed services), Support Services, Medical Services, and Case Management Services. Within the model we have fit, Case Management can also lead the individual to be directed toward support services. Young people follow different service paths within care networks that are determined by their needs and preferences. Youth may change paths over time as they develop new needs and areas of care that they are willing to access.

It is important to note in the overall theoretical model of services that, while linkage to a continuum is a starting point for some youth in services, starting in the continuum predicts, at most, 50% of the variation among individuals in the use of support services. Only about 22% of the between-individual differences in the use of case management services is related to general services connectedness, with < 40% of medical service use coming from connectedness, and < 15% of the differences among youth in their use of HIV testing services. In general, while the model of these projects clearly is to have interconnected comprehensive services, it should be realized that at the present time the connected comprehensive service model does predict only part of the variations among youth in their service utilization patterns. Young people need to have a variety of entry points and paths within service delivery networks. Programs with comprehensive, accessible services are needed to optimally engage youth in care.

One of the uses of the present findings is to build upon the data reduction of the service uti-

lization indicators and link such indices to information about individual differences among the youth. Further work is underway to examine the relationships among the characteristics of youth who access these services and the specific patterns of care demonstrated in these data. In addition to determining general models of health and psychosocial service use, the indicators derived in the present study will be useful for demonstrating patterns of access to specific services for HIV-positive and at-risk youth.

It should be noted that the present study is not intended to summarize services utilization for all HIV-positive and at-risk youth. The participants were not selected to be a representative sample of all youth; rather, they represent a group of adolescents and young adults with high identified need for HIV-related care. Likewise, as national demonstration projects, the programs represented here are not representative of the service system for youth in general, but in fact, were funded because they had an innovative service model to meet the needs of this population. Thus the service utilization patterns modeled here are likely to represent an ideal typology that should be considered for replication and adaptation to local needs in serving HIV-positive and at-risk youth.

ACKNOWLEDGMENTS

This publication was supported in part by Grant Number BRH 970153-05-0 from the Health Resources and Services Administration (HRSA) Special Projects of National Significance (SPNS) Program for the work of the Evaluation and Dissemination Center and by grants to the 10 individual projects. The publication's contents are solely the responsibility of the authors and do not necessarily represent the official view of HRSA or the SPNS Program.

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