FACTOR ANALYSIS OF COMMUNITY ADJUSTMENT OUTCOME MEASURES FOR YOUNG ADULTS WITH MILD TO SEVERE DISABILITIES

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This investigation was designed to refine, extend, and cross-validate a multidimensional community adjustment measurement system. A sample of 173 young adults with mild to severe disabilities, located 1 to 6 years after leaving school, was administered 21 measures of community adjustment. Using exploratory and confirmatory factor analyses, six different factors of community adjustment were identified: Personal Satisfaction, Employment Stability, Employment-Economic Integration, Recreation-Leisure Integration, Social Network Integration, and Residential Integration. When combined with similar research, evidence appears to support the identification of at least eight factors of community adaptation.

Extensive research with a variety of outcome measures has focused on the post-school integration and adjustment of individuals with disabilities in the community. Although this research has provided descriptions of the characteristics and adjustment of individuals with disabilities in the community, it has been criticized as predominantly descriptive and as suffering from a lack of agreement over what constitutes community adjustment (Halpern, Nave, Close, & Nelson, 1986; Heal, 1985; McGrew & Bruininks, 1991; McGrew, Bruininks, Thurlow, & Lewis, 1992; Zetlin, 1988). These criticisms are due in part to the reliance on unidimensional measurement systems and univariate statistical analyses.

In much of this research investigators have defined success across several outcome domains mostly in dichotomous terms (e.g., employed vs. unemployed; remaining in the community vs. being returned to an institutional setting) (Zetlin, 1988). Single outcome variables tend to oversimplify a complex process of adaptation that involves the interaction of many variables (Heal, 1985; Zetlin, 1988). As

noted by Heal (1985), community integration research questions are "multivariate in complexity . . . studies with single outcomes are guilty of oversimplifying reality" (p. 215).

A number of investigations have been designed to improve upon the measurement of community adjustment through the development and validation of multidimensional outcome measures. In a sample of 257 adults with mild to moderate mental retardation, Halpern et al. (1986) used confirmatory factor analysis methods to analyze 12 outcome variables that were derived from a number of individual items. They found support for the factors of Occupation, Residential Environment, Social Support/Safety, and Client Satisfaction.

Bruininks, Chen, Lakin, and McGrew (1992) used exploratory factor analysis with 65 personal competence and community adjustment variables in a sample of 336 individuals with mental retardation who were living in small residential facilities. These investigators found support for the community adjustment factors of Recreation/Leisure Activity, Family Contact/Relationships, and Community Assimilation and Acceptance. In a confirmatory factor analysis of community adjustment variables in separate model development ($n = 119$) and cross-validation samples ($n = 120$) of persons with mental retardation, as well as analysis in separate samples of individuals with mild to moderate ($n = 135$) and severe ($n = 104$) disabilities, McGrew et al. (1992) found support for four broad factors. These factors were social network/integration, recreation-leisure integration, community-economic integration, and need for support services.

These multivariate studies suggest that up to seven different dimensions may characterize the adaptation and experiences of persons with disabilities who are living in community settings: community-economic integration, social network/integration (including family contacts), recreation-leisure integration, need for support services, residential environment, personal satisfaction, and community acceptance/assimilation (McGrew & Bruininks, 1991). The further development and validation of multidimensional community adjustment outcome indicators may contribute to research by more accurately capturing the complexity of community adjustment for individuals with disabilities. Ultimately, the validation of multidimensional outcome measures may contribute to the development and empirical evaluation of comprehensive theories and models of community adjustment for individuals with disabilities (McGrew & Bruininks, 1991; McGrew et al., 1992).

The current investigation was designed to refine, extend, and cross-validate the multidimensional community adjustment measurement system reported by McGrew et al. (1992). Two social network/integration variables that were problematic in prior research (McGrew et al., 1992) were replaced with four new variables extracted from a social network mapping methodology. Four new personal satisfaction variables and five new employment-economic variables also were added. These new variables are consistent with outcome domains suggested by recent efforts to develop conceptual models of outcome indicators for individuals with disabilities (McGrew & Bruininks, 1994; Parmenter, in press). This study also provided the opportunity to cross-validate these multivariate outcome dimensions in a new sample. Exploratory and confirmatory factor analyses were used to identify dimensions and a possible model of community participation and performance.

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METHOD

Sample

The sample included 173 former students with mild to severe disabilities who were located 1 to 6 years (M = 2.5 years SD = 1.3 years) after they had exited secondary public school programs. The 173 subjects were selected as part of a retrospective follow-up study of all special education students who had exited a single large Midwest metropolitan school system between 1984 and 1988. From a total population of 468 special education students, accurate information for establishing follow-up contacts was found for 275 subjects. An original total of 175 subjects were selected randomly to provide sufficiently large subsamples that varied as a function of a number of stratification variables (e.g., degree of disability; drop-outs vs. completers). Two of the 175 selected subjects could not be located for the study.

The subjects ranged in age from 19 to 29 years (M = 22.0 years, SD = 2.0 years). The total sample of 173 subjects consisted of 58 females (33.5%) and 113 males (65.3%). Gender information was not available for 2 of the subjects (1.2%). Additional descriptive information with regard to the school exit and follow-up status of the sample is presented in Table 1.

Table 1

Characteristics of Sample (N = 173)

Variable	n	%
Disability category at exit		
Learning disability	89	51.4
Trainable mentally retarded	54	31.2
Emotional/behavior disordered	15	8.7
Educable mentally retarded	11	6.4
No information available	4	2.3
School exit status		
School completer	120	69.4
School dropout	53	30.6
Grade at school exit		
Nine	1	.6
Ten	14	8.1
Eleven	22	12.7
Twelve	136	78.6
Number of years since school exit		
1	41	23.7
2	55	31.8
3	44	25.4
4	17	9.8
5	12	6.9
6	4	2.3

The level of adaptive behavior of the subjects was assessed at the time of the follow-up with either the Short Form Scale of the Scales of Independent Behavior (SIB; Bruininks, Woodcock, Weatherman, & Hill, 1984) for those classified as mild (LD, EBD, EMR) or the adaptive behavior section of the Inventory for Client and Agency Planning (ICAP; Bruininks, Hill, Weatherman, & Woodcock, 1986) for

those classified as moderate or severe (TMR). The adapative behavior scores for these related scales (both draw items from the complete SIB) are reported on the W scale, a special transformation of the Rasch ability scale where a W score of 500 equals the performance of an average person of fifth-grade age (Bruininks et al., 1984; Woodcock & Dahl, 1971). The mild group displayed adaptive behavior much higher ($M = 549.5$; $SD = 18.0$; age equivalent = 20 years) than the moderate to severe group ($M = 478.8$; $SD = 40.1$; age equivalent = 7 years, 3 months.

Measures

In addition to the measures of adaptive behavior, a 126-question interview protocol was used to gather detailed information with regard to each subject's community adjustment in six broad areas (demographics; employment activities; education, job training, or day activities; living arrangements, family and friends; community involvement; financial independence). Although no formal psychometric informa- tion was available for the interview protocol, it was the result of more than 10 years of systematic follow-up research conducted by researchers at the University of Minnesota.

For subjects with moderate to severe disabilities, both the interview protocol and the ICAP were administered to an informed third-party respondent. The SIB Short Form Scale and interview protocol were administered directly to the subjects with mild disabilities. Twenty-one composite variables were constructed from the follow-up interview protocol. Eight of the 21 composite variables were similar to those used by McGrew et al. (1992). The 21 variables are listed in Table 2.[1]

Procedure

The primary data analyses procedure was exploratory factor analysis. Exploratory factor analysis was deemed appropriate because 13 of the 21 variables had not been used in previous multivariate studies. Prior to the completion of the factor analysis, the distributions of the 21 variables were examined for departures from normality. Based on the guidelines provided by Tabachnick and Fidell (1989), either logarithmic or square root transformations were applied to 12 variables. Prior to the calculation of the correlation matrix, the scales for three variables (number of jobs, length of unemployment, and income support) were reversed so that high values indicated positive functioning in the community and better adjustment for all 21 variables.

Principal-factoring of the intercorrelation matrix (with iterations and squared multiple correlations as initial community estimates) was completed. Complete in- formation was not obtained for all subjects for all variables due to subject nonresponse or refusals to selected items. Therefore, the correlation matrix to be factored was based on the pairwise deletion of missing data. The resulting sample size for the correlations ranged from 140 to 171, with a mean sample size of 157.7. The deter- mination of the number of factors to retain was based on the relative size of the eigenvalues derived from a principal-component solution (scree plot) and the inter- pretability of the varimax-rotated factors.

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[1] A description of the 21 variables can be obtained by contacting the first author.

Inspection of the salient factor loadings from the final exploratory solution, plus logical content analysis of the 21 variables, was used to specify an initial confirmatory model. Although confirmatory factor analytic procedures were not the cornerstone of this investigation, these procedures were used in a model-generating mode (Jöreskog & Sörbom, 1993) to "fine tune" the results of the exploratory analysis. The confirmatory procedures were used after the exploratory analyses because confirmatory methods allow for the identification of overlooked relations among measures and factors and allow the investigator to control the specification of how measures relate to one another in terms of factor loadings, correlation among factors, and correlated errors.

The initial confirmatory model was estimated with the maximum likelihood fitting function in the LISREL-7 program (Jöreskog & Sörbom, 1986). The LISREL modification indices and estimated parameter change values were inspected to identify possible relations between and among the measures and the factors that were not specified in the initial model. If the suggested changes made logical or theoretical sense, the new parameters were added to the model that then was reestimated. This process was repeated until the suggested modifications were not highly significant or did not make logical or theoretical sense.

It is important to note that the confirmatory factor analysis procedure *was not used to assess the goodness-of-fit of the factor models*. This would be inappropriate because the initial confirmatory factor model was guided by exploratory analyses in the same data set, and the post hoc readjustment modeling steps were based on the same sample data. The unique parameter modification features of confirmatory factor analysis were used in an "exploratory" mode to understand better the characteristics of the 21 measures used in the study. Although LISREL is most useful in confirmatory studies, it can be used in an exploratory model generating mode "by means of a sequence of confirmatory analyses" (Jöreskog & Sörbom, 1993, p. 115).

RESULTS

Exploratory Analyses

The exploratory factor analysis identified six eigenvalues that were greater than 1.0 (4.91, 2.40, 1.62, 1.57, 1.39, 1.02). The scree plot suggested the possibility of six to seven factors. The six-factor varimax rotated solution was determined to be the most interpretable solution. The varimax-rotated solution, plus the descriptive statistics for all 21 variables, is presented in Table 2.

Factor 1 (Employment-Economic Integration) was defined by variables that measured the extent to which an individual is involved in stable and integrated daily work or related activities. The three highest positive loading variables were earned income (.98), hours worked per week (.87), and daytime activities (.86). The remaining variables with positive factor loadings measured aspects of an individual's financial independence and employment longevity and advancement. The one negative loading for length of current employment (- .66) suggests that individuals with the shortest job tenure were among those who were the highest functioning on all other employment-economic variables. This may be due to a variety of factors, including job advancement, inappropriate initial placements, lack of adequate training and follow-along services, or because the individuals with more severe disabilities stayed in lower status jobs for longer periods of time due to fewer employment options.

Table 2

Descriptive Statistics and Rotated Factor Loadings for 21 Variables

Variable	n	M	SD	Varimax rotated factor loadings[a]					
				1	2	3	4	5	6
Earned income (per month)	151	479.92	566.17	.98	—	—	—	—	—
Hours worked (per week)	170	22.16	18.59	.87	—	—	—	—	—
Daytime activities (degree of independence)	161	4.52	1.89	.86	—	—	—	—	—
Length of current employment	173	3.94	2.57	-.66	—	—	—	—	.45
Number of employment benefits received	169	1.17	1.57	.63	—	—	—	—	—
Economic independence	164	2.91	1.72	.56	—	—	—	—	—
Income support received (per month)	173	12.72	5.44	.45	—	—	—	—	—
Length of unemployment (since high school)	161	6.24	10.94	.37	-.49	—	—	—	—
Number of jobs (since high school)	169	2.96	2.99	—	—	—	—	—	.47
Living arrangements (degree of independence)	165	3.90	.80	—	.53	—	—	—	—
Social network: # of staff & professionals	167	.60	1.64	—	-.51	—	—	—	—
Recreation-leisure activity: Social	151	2.52	1.21	.31	—	.72	—	—	—
Recreation-leisure activity: Informal & home	153	5.64	1.65	—	—	.58	—	—	—
Recreation-leisure activity: Formal & community	153	1.30	1.06	—	—	.43	—	—	—
Social network: # of extended family	167	1.13	1.98	—	—	—	-.56	—	—
Social network: # of immediate family	167	2.90	2.24	—	—	—	-.43	—	—
Social network: # of friends	167	2.86	2.72	—	—	—	.32	—	—
Social network satisfaction	167	3.56	0.61	—	—	—	—	.69	—
Recreation-leisure satisfaction	170	3.25	0.72	—	—	—	—	.62	—
Daytime activity satisfaction	159	3.17	0.87	—	-.36	—	—	.35	.33
Living arrangement satisfaction	171	3.36	0.84	—	—	—	—	.32	—

Note.—Descriptive statistics are for original variables prior to any transformations.

[a]Factor loadings less than .30 are omitted from table.

Factor 2 (Residential Integration) appeared to define a dimension that represents a person's degree of independent living and integration into the community. The high positive loading for living arrangements (.53) and negative loading for number of staff and professionals in their social network (-.51) suggest that as people's living arrangements become more independent, they have fewer professional staff in their social network. The -.49 and -.36 loadings for length of unemployment and daytime activity satisfaction are not consistent with the residential integration interpretation and are not explained easily.

Factor 3 (Recreation-Leisure Integration) represents the extent to which individuals are actively involved in recreation-leisure activities. The factor was defined exclusively by the three recreation-leisure variables. Factor 4 (Social Network/Integration) was a bipolar factor that reflects the extent to which individuals have developed a social support network inclusive of friends and family members. High negative loadings

for the number of immediate family (- .43) and extended family members (- .56) in a social network, coupled with a high positive loading for number of friends in a social network (.32), indicates that as an individual's social network becomes more centered on family members it tends to consist of relatively fewer non-family members (or vice versa).

Factor 5 (Personal Satisfaction) was defined by all four satisfaction variables. The highest factor loadings for social network (.69) and recreation-leisure (.62) satisfaction suggest that this factor was defined by the social and non-work-related aspects of an individual's life. Finally, Factor 6 (Employment Stability) was defined by three variables related to an individual's employment stabililty and satisfaction with their daytime activities. Recalling that the number of jobs scale (.47) had been rescaled so that fewer job changes meant better adjustment, when combined with the length of current employment (.45) and daytime activities scale (.33), this factor suggests that individuals who are more stable in their employment also report higher satisfaction.

Confirmatory Analyses

The pattern of factor loading specified in the initial confirmatory model mirrored the pattern of salient factor loadings presented in Table 2 with three exceptions. The daytime activity and length of unemployment scale loadings were removed from the Residential Integration factor because they were not consistent with the two highest loadings that defined this factor in prior research. The recreation-leisure: social scale loading was removed from Employment-Economic Integration factor because it was the lowest loading variable and was not consistent with the other eight variables that defined the factor. Content analysis of the length of unemployment scale resulted in the addition of this parameter to the Employment Stability factor. Also added to the initial model was a correlated error term between the hours worked per week and earned income scales. (Hours worked per week was used in the calculation of each individual's earned income.) Finally, the initial confirmatory factor model included correlation parameters between all latent factors.

A review of the LISREL modification indices, estimated parameter change values, and t-values for the parameters from the initial confirmatory model and three subsequent respecified models resulted in the final model, which is represented by the path diagram in Figure 1.[2]

All parameters included in Figure 1 were significantly different from zero ($p < .05$). The pattern of factor loadings presented in Figure 1 is generally consistent with the prior interpretation and description offered in the discussion of the exploratory results. The final model (Figure 1) differed from the initially specified confirmatory model in five areas. First, there were six non-zero latent factor correlations, three with the Employment-Economic Integration factor. The positive direction of four of the latent factor correlations indicates that as individuals in the sample showed

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[2]The key to understanding Figure 1 is: The ovals represent the latent factors; the rectangles represent the measures or manifest variables; the arrows from the ovals to the rectangles represent factor loadings; the double-headed arrows between ovals represent the latent factor correlations; the single-headed arrows on the rectangles represent the residuals (combination of error and unique variance) for the variables.
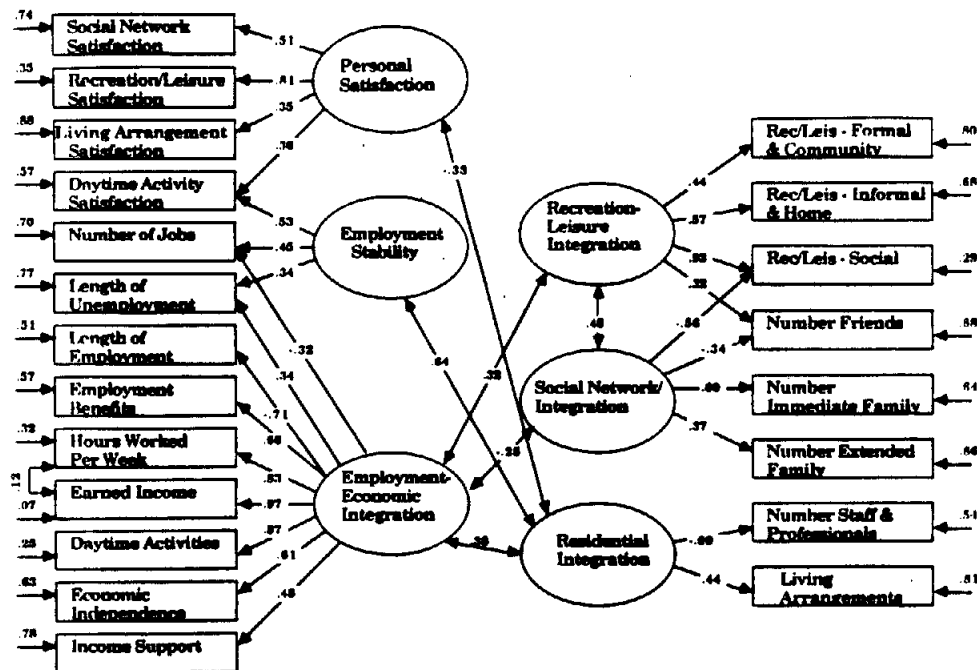
FIGURE 1. Results of confirmatory factor analysis of 21 community adjustment outcome measures (using exploratory results as initial model).

higher functioning and more positive community adjustment on the measures on one factor, they showed a similar trend on the correlated factors.

The bipolar nature of the Social Network/Integration factor makes interpretation of its latent correlations more difficult. The $-.25$ correlation with Employment-Economic Integration suggests a slight relationship between positive employment and economic outcomes for individuals who have a social network comprised of a greater number of non-family members. The positive .45 Social Network/Integration and Recreation-Leisure Integration correlation indicates that individuals who are more involved in recreation-leisure activities are those who have a social network comprised of more non-family members.

The negative Personal Satisfaction and Residential Integration correlation ($-.33$) suggests that individuals who were more independent in their living arrangements tended to report *lower* personal satisfaction. This finding may be related to the higher-functioning subjects (and thus more independent in living arrangements) providing their own satisfaction responses, while the satisfaction questions for the lower-functioning subjects (and thus more dependent in living arrangements) were answered most frequently by a third-party proxy. Gathering personal satisfaction information via third party informants may be problematic because the proxies must infer how the subject actually feels. Moreover, more able persons who are living independently or with support may experience and express less satisfaction due to physical conditions more typical of housing for low income persons.

The second change from the initially specified confirmatory model was the deletion of the length of current employment variable from the Employment Stability factor. Although this loading was salient in the exploratory results, the confirmatory results found that this variable was not significantly related to employment stability. The length of unemployment variable replaced length of current employment as a significant indicator of the employment stability factor.

The remaining changes were the addition of secondary factor loadings for three measures. The number of jobs scale was found to be related negatively (factor loading = −.32) to the Employment-Economic Integration factor. This finding suggests that individuals with higher employment and economic functioning were those who have had *more* jobs since leaving high school. This finding may suggest that some degree of job change is positive, particularly if new jobs represent advancements or improvements in status. It also may reflect the effects of additional postsecondary training and later entry into the labor force. The addition of the recreation-leisure: social scale to the Social Network/Integration factor (factor loading = −.56) is logical because the items that comprise this scale reflect an individual's involvement in social activities. The addition of the number of friends variable to the Recreation-Leisure Integration factor (.32) is consistent with the Recreation-Leisure Integration factor, which is defined primarily by social activities (.93 loading for recreation-leisure: social scale).

DISCUSSION

The results of this study demonstrate the potential benefits of developing and using multivariate outcome measures and statistical procedures to explore the quality of community adjustment for individuals with disabilities. The combined exploratory and confirmatory factor analyses of 21 outcome measures supported the validity of the multidimensional constructs of personal satisfaction, employment stability, employment-economic integration, recreation-leisure integration, social network/integration, and residential integration. The results cross-validate five factors identified in previous studies.

The current investigation provides support for a dimension (Employment-Economic Integration) defined by an individual's daily activities, occupational or employment characteristics, income, and degree of self-sufficiency. This factor is similar to Halpern et al.'s (1986) Occupation factor and McGrew et al.'s (1992) Community/Economic Integration factor. The Employment-Economic factor differs from McGrew et al.'s Community/Economic Integration factor by the splitting-off of the living arrangements scale so that it helped to define a Residential Integration factor similar to Halpern et al.'s Residential Environment factor. The Recreation-Leisure Integration factor was identical in composition to a similar factor in the McGrew et al. (1992) study. This factor is also similar to the recreation-leisure factor reported by Bruininks et al. (1992).

The Social Network/Integration factor validated in the current investigation is conceptually similar to McGrew et al.'s (1992) Social Network/Integration factor, Halpern et al.'s (1986) Social Support/Safety factor, and Bruininks et al.'s (1992) Family Contact/Relationships factor. All of these factors represent aspects of an individual's social network and social support system. The bipolar nature of the Social Network/Integration factor is a finding that suggests an inverse relationship

between the number of family and non-family members in the social networks of young adults with disabilities.

The broad Personal Satisfaction factor found in this study is similar to the Client Satisfaction factor reported by Halpern et al. (1986), which was defined by the person's overall satisfaction and satisfaction with self and his or her daytime program. Finally, the emergence of a second employment-related factor was not anticipated based on a review of prior research. The emergence of the Employment Stability factor was due to the inclusion of five new employment-related variables. The Employment Stability factor represents an individual's stability in employment and resultant satisfaction with daytime activities.

Two factors reported in other studies that were not present in the current investigation were a factor that defines the extent to which an individual needs a variety of services and supports to function within the community (need for social support services) (McGrew et al., 1992) and the degree of acceptance and assimilation of individuals with disabilities in the community (community assimilation/acceptance) (Bruininks et al., 1992). These factors were not present in the current investigation primarily because there were no appropriate indicators to define these factors.

When the current results are combined with prior factor-analytic results, a possible conclusion is that there may be up to eight different multivariate dimensions that can be measured in community adjustment research: employment-economic integration, social network/integration, recreation-leisure integration, need for support services, residential environment/integration, personal satisfaction, employment stability, and community acceptance/assimilation. An important finding is that the correlations between community adjustment factors are either nonexistent or moderate at best. The largest latent factor correlation (.64) suggests that the Employment Stability and Residential Integration factors share approximately 40% common variance (.64 squared). Because most factor correlations are lower or do not differ significantly from zero, this indicates that each of these factors represents a unique aspect of community adjustment. To capture adequately the complexity of community adjustment, indicators are needed from all eight dimensions that have been documented in the research literature.

The conclusions of this study are tempered by a number of study limitations. First, the use of different respondents for different portions of the sample as a function of degree of disability may introduce an unknown methodological artifact into the data. Second, studies are needed that use the measures validated in the current study in different samples that vary by degree of disability. McGrew et al. (1992) found that one of their four factors (viz., Community-Economic Integration) was defined differently as a function of degree of mental retardation. The relatively small size of the moderate to severe group ($n = 54$) made separate analyses and comparisons by level of disability in the current study inappropriate. Furthermore, the small size of the female group ($n = 58$) made analysis by gender inappropriate.

Finally, additional studies are needed to answer questions about the usefulness of a multivariate approach to the measurement of community adjustment for individuals with disabilities. Is it more informative and powerful to compare groups on the best indicators of each factor, compare groups on a factor-based composite, or use multivariate statistical procedures (e.g., MANOVA)? Should different types of research (e.g., policy, applied, theoretical) organized around the same dimensions of community adjustment utilize different data analytic approaches? Does this data

reduction strategy provide results that are more easily understood and utilized by practitioners and policy makers?

A variety of research paradigms and methods probably are needed to capture the diversity of experiences associated with the constructs of community adjustment and community living (Fujiura, 1994; Parmenter, in press; Schalock, 1990). These research perspectives should embrace a continuum of strategies that involve normative descriptions and multivariate, qualitative, and even experimental perspectives. Of critical importance to the multivariate perspective are studies that utilize the indicators of validated dimensions in attempts to develop and empirically test theoretical models of the community adjustment process. It is hoped that studies that utilize a multidimensional approach can augment descriptive, qualitative, and intervention studies and lead to a greater understanding of the community adjustment process and ultimately to improved experiences and quality of life for individuals with disabilities.

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