



Ohio Mental Health Consumer Outcomes System Report 8: A Preliminary Analysis of the Trajectories of Changes in the Functioning Subscale of the Ohio Scales

The purpose of this report is to provide an exploratory analysis of the trajectories of changes of children and youth consumers in their Functioning Subscales of the Ohio Scales over their first year of service after admission in the Ohio Mental Health Consumer Outcomes System.

All three instruments of the Ohio Mental Health Consumer Outcomes System, which are Youth Rating, Parent Rating, and Agency Worker Rating, include assessments for the functioning level of youth consumers. The Functioning Subscale is the sum of the last 20 items on the Ohio Scales Parent, Youth and Agency Worker forms. The scale ranges from 0 to 80, with higher scores indicating higher functioning¹.

In the present analysis we try to explore the underlying heterogeneous subpopulations with varying trajectories of changes in the Functioning Subscale over the first year of service. A usual approach to longitudinal data analysis treats data as if collected from a single population. There is an assumption that the population follows the same pathway of change over time. In the present analysis, in order to have a better understanding of the complexity of trajectories of changes over time, we explored instead the heterogeneity of pathways of changes within our sample.

We employed Latent Class Growth Analysis (LCGA) to assess the changes of the Functioning Subscale scores at multiple time points during the first year of service after admission. Individual growth or changes can be perceived as a “within-person” regression line that represents an individual’s change over time. Outcomes of each individual can be plotted as a curve with their Functioning scores against the time period of assessment. From all these individual curves we derived the latent classes in LCGA that correspond to different growth curve shapes. The purpose of the analysis is to identify the optimal latent classes and the corresponding probabilities of each individual falling into these classes². We employed the statistical program *Mplus*® to run the LCGA in our present analysis.

Data

As of November 14, 2005, the statewide Outcomes database contained 202,034 parent ratings from 102,049 individuals, 210,129 agency worker ratings from 96,956 individuals, and 128,401 youth ratings from 65,418 individuals. Among them, 22.1% of individuals with parent ratings, 25.9% of individuals with agency worker ratings, and 21.7% of individuals with youth rating had three or more assessments in the Ohio Mental Health Consumer Outcomes System.

Among these records, all individuals with valid Functioning scores in the Initial assessment, the six-month assessment, and the one-year assessment³ were selected for this analysis. There were a total of 2,568 individuals from parents’ ratings, 3,951 individuals from the agency workers’ ratings, and 1,229 individuals from youths’ ratings with valid results for all three time periods from the three instruments. About one-fourth to one-third of the sample also had assessments during the 90-day period⁴. The assessment results at the

¹ Details regarding the computation and psychometric properties of this subscale can be obtained in the most updated version of the *Ohio Mental Health Consumer Outcomes System: Procedural Manual* at www.mh.state.oh.us/oper/outcomes/instruments/procedural_manual.pdf

² We use various statistics to determine the optimal number of classes derived from the data, like Bayesian Information Criterion (BIC) and the Lo-Mendell-Rubin likelihood ratio test of model fit.

³ The Initial Assessment period includes all assessments administered within 44 days from the date of admission to service. The 6-month period includes all assessments administered within 136 to 227 days from the date of admission. The one-year period includes all assessments administered within 320 days to 410 days from the date of admission to service. If more than one assessment was completed within a time period, the earlier valid assessment was used for that time period.

⁴ For the 90-day period, it includes all assessments administered within 45 days to 135 days from the date of admission to service, however, missing data are allowed for the 90-day assessment period in this analysis.

90-day period were also included in this analysis. When the selected subjects did not have a valid 90-day assessment, their 90-day assessment scores were treated as missing⁵ for that time point. Table 1 shows the number of valid assessments for all three versions of the Ohio Scales at each time period.

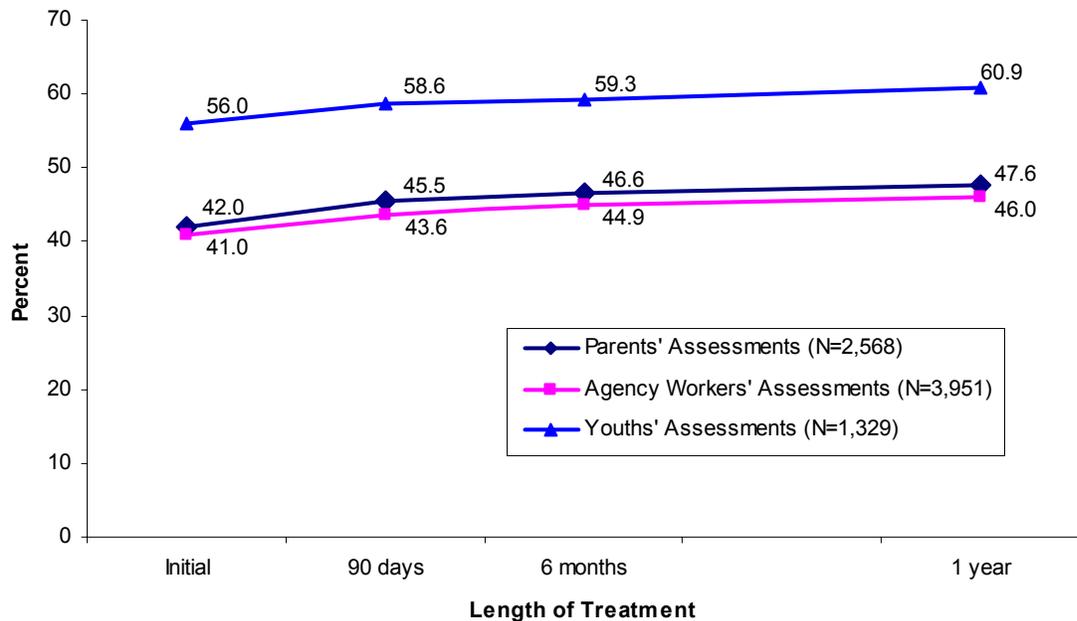
Table 1. Number of valid assessments at various time periods.

	Initial Assessment	90 Days	6 months	One year
Parents' Assessments	2,568	791	2,568	2,568
Agency Workers' Assessments	3,951	1,468	3,951	3,951
Youths' Assessments	1,229	301	1,229	1,229

Results

On the average, the Functioning Subscale scores from all three versions of Ohio Scales showed gradual improvement in the overall Functioning during the first year in service. The Youth rating showed significantly higher averages at all time points while the ratings from parents and agency workers followed a closer path (See Figure 1).

Figure 1. Average Functioning score over time from three instruments of the Ohio Scales



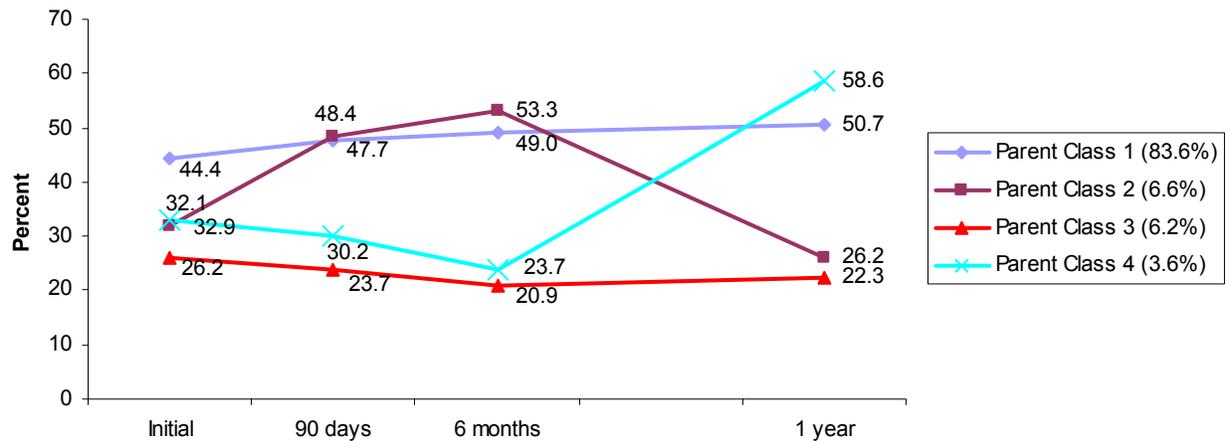
Note: Parents' and agency workers' assessments are for children and youth aged 5 to 18, and youths' assessments are for youth 12 to 18.

⁵ Mplus® provides maximum likelihood (ML) estimation under MAR (missing at random) for incomplete longitudinal data.

Trajectory classes from Parents' Assessments

For the parents' assessments, the results from our analysis showed that there were four distinct groups of young clients that had four different trajectories of Functioning scores over the course of treatment⁶. The majority of the group (83.6%) fell into a pattern of scores with gradual improvement over time that is listed as Parent Class 1 (see Figure 2.1). Parent Class 2 is a group (6.6%) that showed a significant improvement at the beginning but somehow their Functioning scores dropped after 6 months. A small percentage of the sample (6.2%), identified as Parent Class 3, showed a slight decline and remained at a low level of functioning over time. On the contrary, 3.6% of the sample, identified as Parent Class 4, did not show improvement at the beginning but their Functioning scores picked up significantly after 6 months.

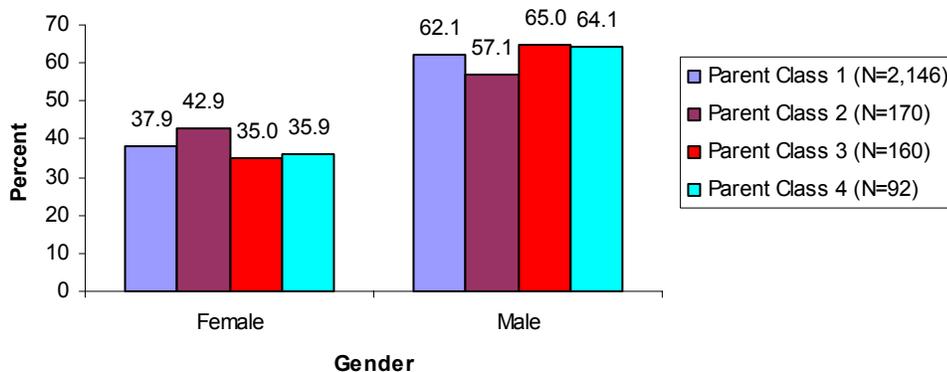
Figure 2.1. Average Functioning scores by trajectory class classification of individuals based on their most likely latent class membership from parents' assessments (N=2,568).



Gender and the Functioning Trajectory Classification of Parents' Assessments

We further explored the trajectory classes with reference to some basic demographic information such as gender, primary diagnosis, and the age of the consumer at the initial assessment stage. Figure 2.2 shows that there is no significant difference in the gender distribution among the four classes, though there is a slightly higher percentage of female consumers in Parent Class 2.

Figure 2.2. Gender and the Functioning trajectory classification of parents' assessments

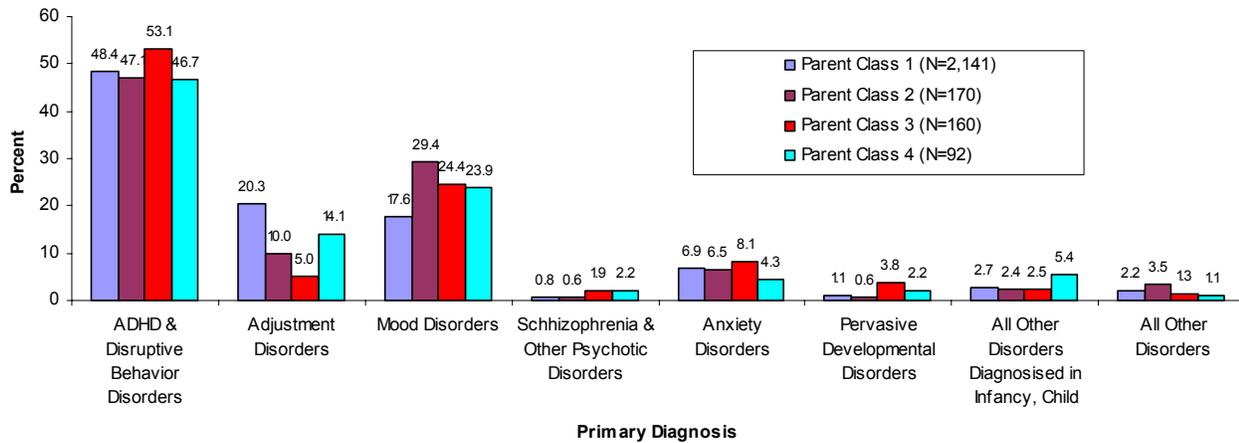


⁶ Although in Figure 1 the mean of all three instruments showed a linear improvement over time, testing for the linearity of the Functioning trajectory classes showed quadratic curves for some classes fit the data better.

Primary Diagnosis and the Functioning Trajectory Classification of Parents' Assessments

Figure 2.3 shows the results for primary diagnosis with the Functioning trajectory classification of parents' assessments. The ADHD and Disruptive Behavior Disorders group showed a higher percentage in following the pathway of Parent Class 3, while consumers with Mood Disorders showed a higher probability to follow the trajectory of Parent Class 2. On the other hand, consumers with Adjustment Disorders are more likely to fall in Parent Class 1, with a more gradual improvement patterns than the other three classes.

Figure 2.3. Primary diagnosis and the Functioning trajectory classification of parents' assessments

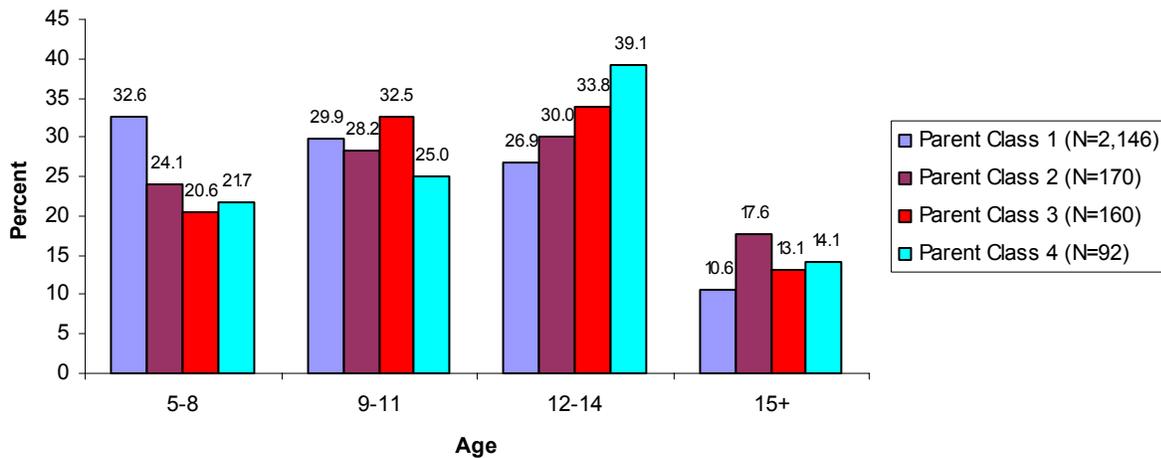


Note: 5 cases were excluded due to missing information in primary diagnosis.

Age and the Functioning Trajectory Classification of Parents' Assessments

Results from Figure 2.4 shows that the youngest age group, i.e. age 5-8, have a higher probability to have a gradual improvement pathway such as in Parent Class 1 than the other three classes. On the other hand, those in Parent Class 4 showed a higher percentage of being in the age group of 12-14.

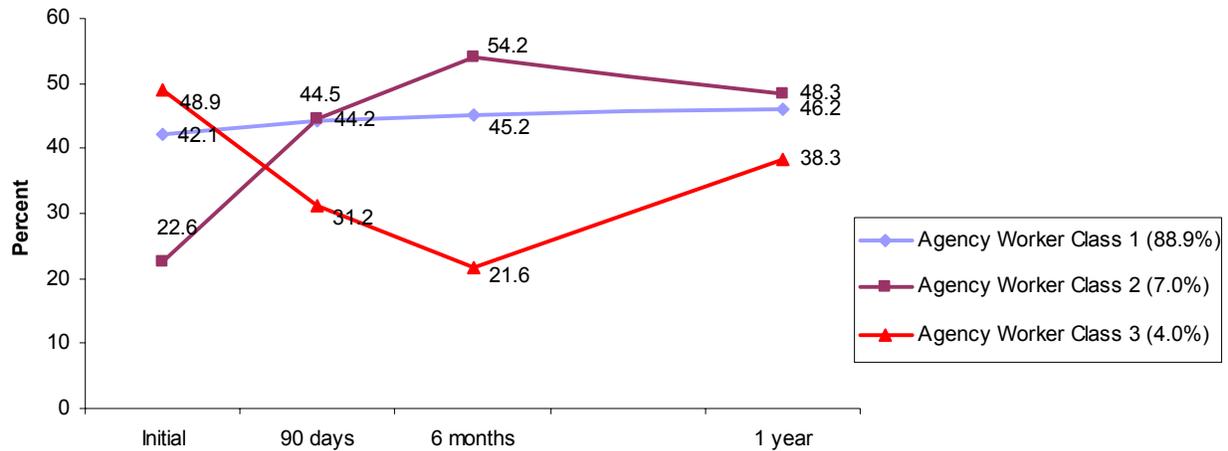
Figure 2.4. Age and the Functioning trajectory classification of parents' assessments



Trajectory classes from Agency Workers' Assessments

For assessments from agency workers, results showed that there were three different Functioning trajectory patterns for young clients. The majority of the group (88.9%) were in Agency Worker Class 1 with gradual improvement over time. Seven percent of the consumers fell into Agency Worker Class 2 with a significant improvement at the beginning but then a decline to converge with Agency Worker Class 1 at the one-year point. A small percentage (4.0%) of the sample clustered into Agency Worker Class 3 that have a drop in their Functioning scores in the first 6 months but improved at the later half of the year.

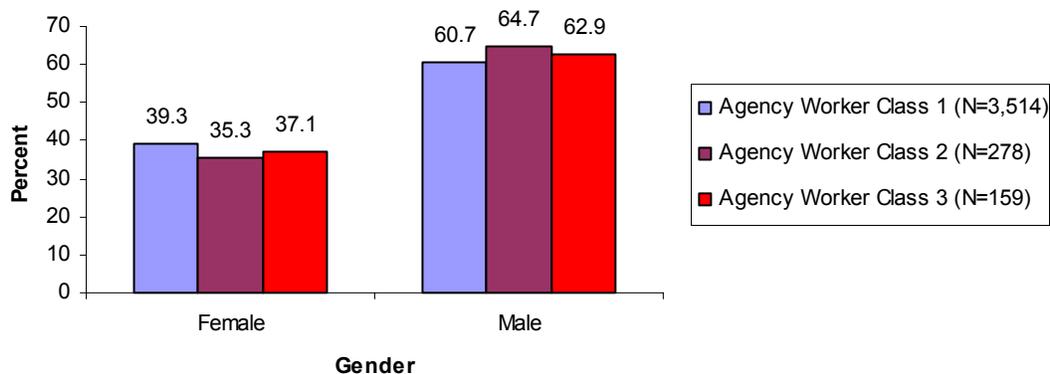
Figure 3.1. Average Functioning scores by trajectory class classification of individuals based on their most likely latent class membership from agency workers' assessments (N=3,951).



Gender and the Functioning Trajectory Classification of Agency Workers' Assessments

We further explored the trajectory classes with reference to some basic demographic information such as gender, primary diagnosis, and age of the consumer at the initial assessment stage. As Figure 3.2 shows, there is no significant difference in the gender distribution among the three trajectory classes.

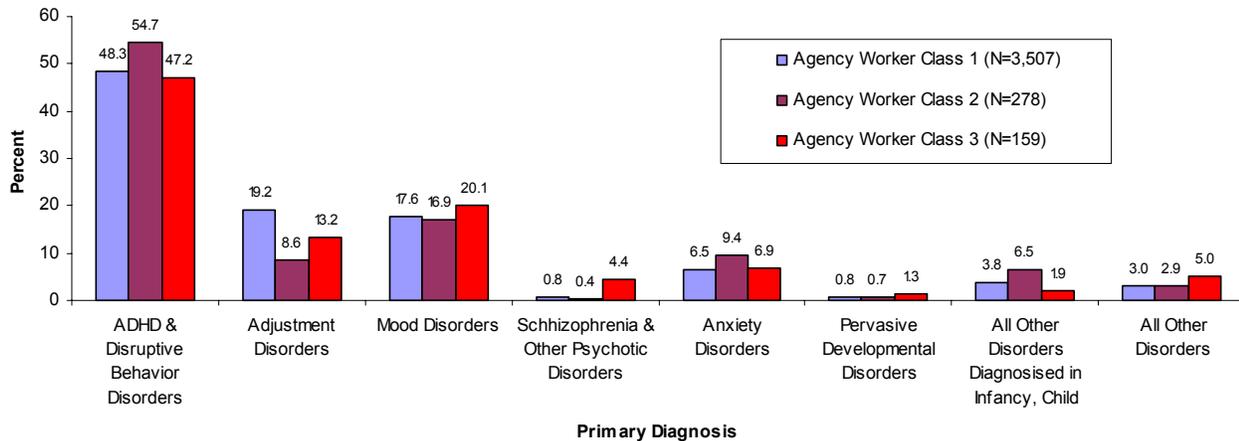
Figure 3.2. Gender and the Functioning trajectory classification of agency workers' assessments



Primary Diagnosis and the Functioning Trajectory Classification of Agency Workers' Assessments

Figure 3.3 shows the result of analyzing primary diagnosis data with the Functioning trajectory classification of agency workers' assessments. There is a higher percentage of the ADHD and Disruptive Behavior Disorders group in Agency Worker Class 2. Similar to results from parents' assessments, consumers with Adjustment Disorders are more likely to fall in Agency Worker Class 1, with a gradual improvement pattern, than the other two classes. There is also a higher percentage of individuals with Schizophrenia and Other Psychotic Disorders following the trajectory identified as Agency Worker Class 3. However, the result should not be seen as conclusive as the size of this group is rather small.

Figure 3.3. Primary Diagnosis and the Functioning Trajectory Classification of Agency Workers' Assessment

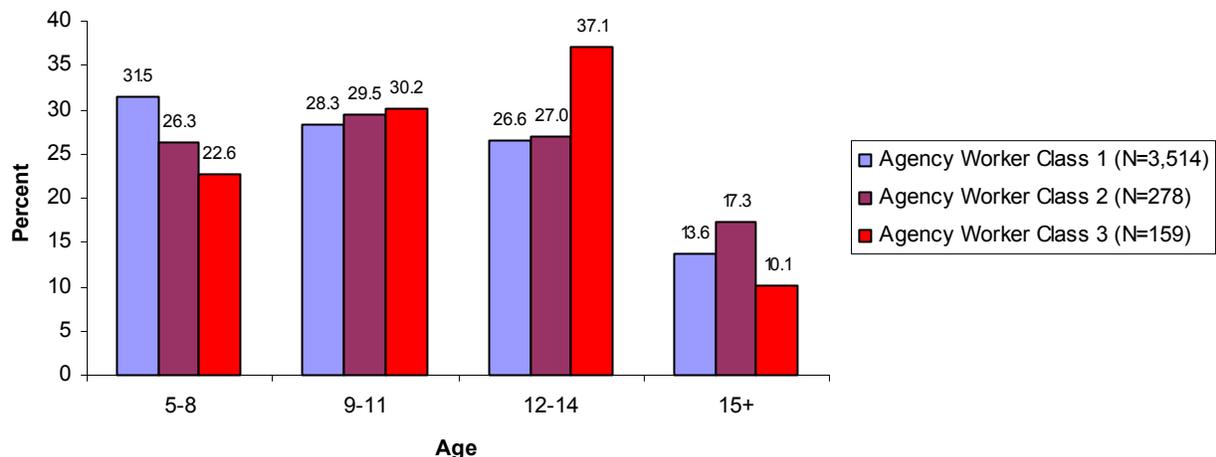


Note: 7 cases were excluded due to missing information in primary diagnosis

Age and the Functioning Trajectory Classification of Agency Workers' Assessments

The distribution of age groups in the three trajectory classes had similar patterns to the assessments from parents. The youngest group, with consumers aged 5-8, has a higher percentage to show a steady improvement pathway. Results from Figure 2.4 show that the youngest age group, i.e. age 5-8, has a higher probability to show the path of gradual improvement in Agency Worker Class 1 than the other two classes. On the other hand, those in Agency Worker Class 3 showed a higher percentage of being in the age group of 12-14.

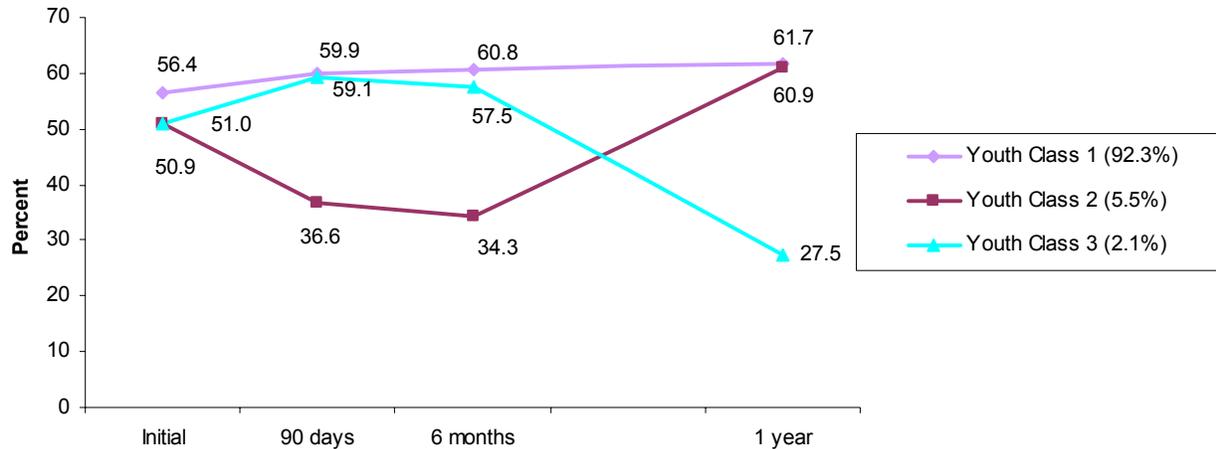
Figure 3.4. Age and the Functioning Trajectory Classification of Agency Workers' Assessment



Trajectory classes from Youths' Assessments

For the Youths' assessments, the data analysis showed three groups with different trajectories on Functioning. The majority of the group (92.3%) fell into a group listed as Youth Class 1, with steady improvement over time. Youth Class 2 is a small percent of the sample (5.5%) that revealed a U-shaped trajectory for their improvement in their first year of service. There was also a small percentage of youth respondents (2.1%) listed as class 3 who showed some improvement at the beginning but dropped significantly in the one-year period.

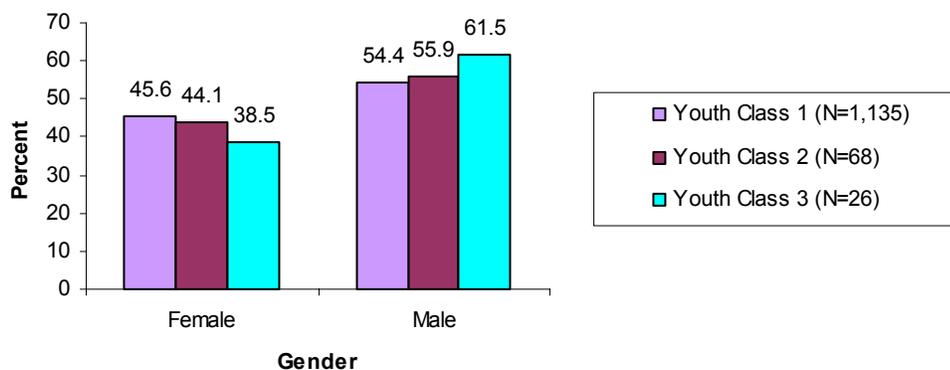
Figure 4.1. Average Functioning scores by trajectory class classification of individuals based on their most likely latent class membership from youths' assessments (N=1,229).



Gender and the Functioning Trajectory Classification of Youths' Assessments

We further explored the trajectory classes with reference to gender, primary diagnosis, and age of the consumer at the initial assessment stage. Results from Figure 4.2 shows that there is no significant difference in the gender distribution among the three classes, though there is a slightly higher percentage of male consumers classified as Youth Class 3.

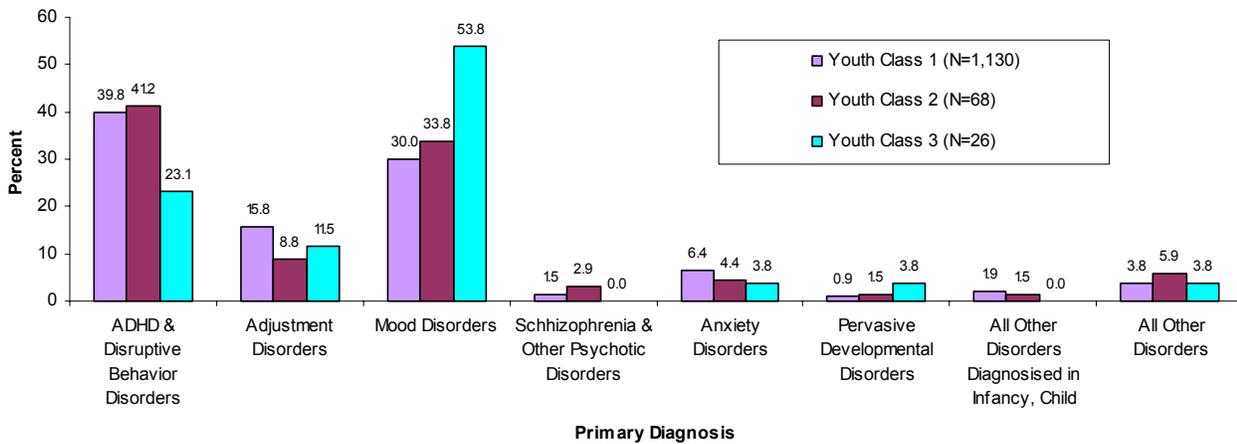
Figure 4.2. Gender and the Functioning trajectory classification of youths' assessments



Primary Diagnosis and the Functioning Trajectory Classification of Youths' Assessments

Figure 4.3 shows the results for primary diagnosis with the Functioning trajectory classification of assessments from Youth. Similar to results from the previous two instruments, there is a higher percentage of consumers with Adjustment Disorders in Youth Class 1, which showed a steady improvement pathway. Consumers in Youth Class 3 which shows a drop in the Functioning Subscale score in the one-year assessment, have a significantly higher percentage in the diagnosis of Mood Disorders. At the same time there is also a lower percentage of ADHD & Disruptive Behavior Disorders consumers in Youth Class 3.

Figure 4.3. Primary diagnosis and the Functioning trajectory classification of youths' assessments

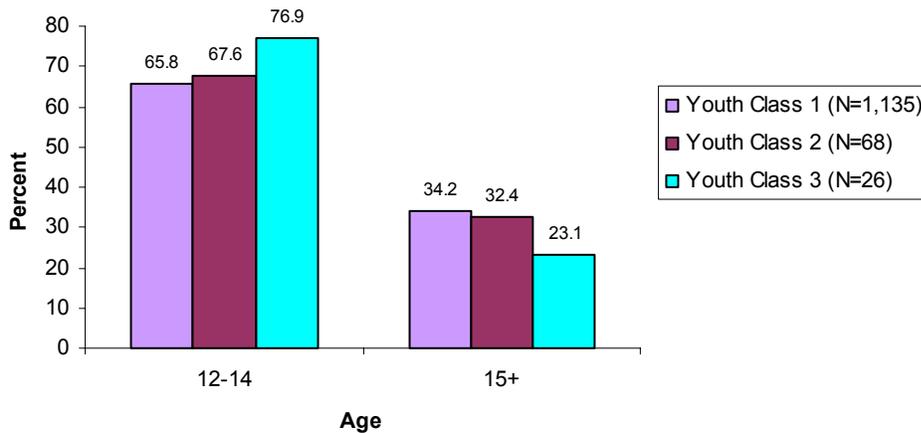


Note: 5 cases were excluded due to missing information in primary diagnosis

Age and the Functioning Trajectory Classification of Youths' Assessments

The age distribution in the three trajectory classes posed similar patterns as the previous two instruments. There is no significant difference between consumers from Youth Class 1 and Youth Class 2 in terms of their ages. However, consumers in Youth Class 3 showed a higher percentage in the age group 12-14.

Figure 4.4. Age and the Functioning trajectory classification of youths' assessments



Summary

The present report is an exploratory analysis of the trajectory of changes in the Functioning Subscale for children and adolescents with ratings on the Ohio Scales in the Ohio Mental Health Consumer Outcomes System. In this analysis, we reported our exploratory findings on trajectories of changes in the Functioning Subscale scores from the perspectives contained in all three instruments, and for only those individuals who had ratings at three measurement points.

Generally speaking, the majority of consumers in this analysis, i.e. over 80% in all three instruments, fall into a path of steady improvement over their first year of service. The analysis also revealed some other subgroups within the sample that follow some rather different pathways of changes. Results from all three instruments showed subgroups of U-shaped and inverted U-shaped curves pathways, indicating some ups and downs in the functioning of consumers in these subgroups. These subgroups with fluctuating pathways accounted for 10% or less in the present sample. There is also a subgroup from the Parent Ratings that showed a consistently low functioning over time.

The trajectory groups were further analyzed in terms of basic demographic information such as gender, primary diagnosis, and age in this analysis. There was no significant difference in the gender distribution from various trajectory classes.

Results of analyses of the primary diagnosis from parents' and agency workers' ratings show that consumers with adjustment disorders are more likely to follow a steady path of gradual improvement over time. On the other hand, parents' ratings show that individuals in the ADHD and Disruptive Behavior Disorders group have a higher chance to show consistent lower Functioning scores over time. In addition, there is a higher percentage of the Mood Disorders group that shows an inverted U-shaped pathway, though this group only accounts for a very small percentage of the consumers in our sample.

Results from parents' and agency workers' ratings also showed that the group aged 5 - 8 has a higher percentage in the trajectory showing steady improvement over time. Consumers aged 12-14 showed a higher chance to fall in a group with U-shaped improvement pathway which comprised about 4% of the sample.

One limitation for the present analysis is the selection bias for the sample. The present analysis involved data from consumers with valid Functioning assessments at three time periods, i.e. Initial Assessment, 6-month Assessment, and 1-year Assessment. Consumers who did not have assessments in all three time periods were excluded. The lack of assessments may be attributed to various reasons like termination of service before one year from admission, missing data collection at any one of the above time periods, invalid Functioning scores due to missing items in the assessment package, etc. The present results reflect only a small portion of the data for children and adolescents within the Ohio Mental Health Consumer Outcomes System. Results from this analysis should be used with caution.

Comparisons among the three instruments from the present results are not recommended for the present analysis since the data for the three instruments may come from different samples. Furthermore, youth assessments involved a significantly smaller sample, as the instrument is applicable to consumers age 12 - 18 only. Further data selection is needed before any comparison is plausible.

This report is a preliminary analysis of the longitudinal Ohio Scales data from the Ohio Mental Health Consumer Outcomes System. Factors that may affect the outcomes improvement process for our consumers will be explored in future analyses.