

Title: Why 10th Graders Drop Out of High School: A Latent Class Analysis of Dropout Typologies

Abstract:

A large percentage of the students who drop out of U.S. K-12 schools do so at the end of high school, at some point after grade 10. Yet, we know little about students who persist in school for so long but then drop out at “the last minute”, since to date the majority of studies on dropouts have focused on earlier grade levels. The purpose of this study is to examine the different typologies of late high school dropouts from a large nationally representative dataset (ELS:2002) using latent class analysis (LCA). We found three significantly different typologies of dropouts; Quiets, Jaded and Involved. Based on these three typologies, we discuss implications for future dropout intervention research, policy and practice.

Purpose:

In the United States, students who drop out of high school have lower overall life outcomes, such as decreased lifetime earnings and health and increased rates of incarceration and unemployment (Berkold & Carroll, 1998; Jemal, Ward, Anderson, Murray, & Thun, 2008; Moretti, 2007; Muenning, 2007; Rouse, 2007; Swanson, 2009; Waldfogel, Garfinkel, & Kelly, 2007). In the vast majority of research on dropping out of school, drop out has been considered as a single monolithic category. Either students drop out or they do not drop out. Interventions are then designed around addressing the most significant predictors of this category (Balfanz, Herzog, & MacIver, 2007; Dynarski et al., 2008; Dynarski, 2004; Rumberger, 2004) such as reconnecting students to school after they become disengaged (Finn, 1989). However, an emerging line of research suggests that there are multiple typologies of dropouts (Bowers, 2010; Fortin, Marcotte, Potvin, Royer, & Joly, 2006; Lessard et al., 2008). Rather than considering dropouts as a single category, the findings from dropout typology research suggests that there are distinct subgroups of students who drop out for similar reasons, but are very different from other subgroups of dropouts. For instance, some students may be disengaged or bored with the process of schooling because school is not challenging or they have found other interests outside of school, such as work and family life, while others may be overly challenged with school and find themselves further and further behind each year (Fortin et al., 2006; Janosz, LeBlanc, Boulerice, & Tremblay, 2000). While both groups drop out at high rates, this research has indicated that they drop out for different reasons, and thus, interventions to help prevent dropping out that focus only on a single aspect, such as re-engaging students with school, may not be effective for the majority of students. Indeed, to date few dropout intervention studies have shown significant effects (Dynarski et al., 2008; Dynarski, 2004; Dynarski & Gleason, 2002; Rumberger, 2004).

The purpose of this study is to examine the different dropout typologies of students who drop out of the last years of high school, specifically after grade 10. These students are so called “lost at the last minute” (Menzer & Hampel, 2009), in that while they had persisted in the system for ten or more years, they ultimately drop out only a year or two before graduation. This is problematic because these students were very close to graduation and their communities had invested heavily in their education over those years. However, while an extensive amount of research has detailed the problematic transition from middle school to high school (Balfanz et al., 2007; Belcher & Hatley, 1994; Rumberger, 1995), as well as the large number of students who drop out at or around grade 9 (Allensworth & Easton, 2005; Barrington & Hendricks, 1989; Battin-Pearson et al., 2000; Benner & Graham, 2009; Neild, 2009), little is known about students

who drop out of the last two years of high school. In the present study, as will be detailed in the full paper, we used the past dropout typology literature to initially guide our model of dropout typologies. We then used latent class analysis (LCA) to analyze a large nationally representative dataset of U.S. students who dropped out of the end of high school (ELS:2002). We found three different typologies of dropouts who reported very different reasons for dropping out when asked in a follow-up survey four years later. We conclude the study with descriptions of each of the typologies.

Methods and Data Sources:

This study is a secondary analysis of the Education Longitudinal Study of 2002 (ELS:2002). ELS:2002 is a nationally representative survey of United States high school students across 750 schools who were in grade 10 in the spring of 2002 (Ingles et al., 2004; Ingles et al., 2007; NCES, n.d.). In the 2002, NCES surveyed the students on a multitude of survey questions pertaining to the student's perceptions of their schools, their experiences, background and demographics, students were tested in mathematics and reading and their grade point average (GPA) was collected. These students were surveyed again in 2004 as well as in 2006, four years after grade 10. The ELS:2002 dataset provides a unique opportunity to examine the final years of high school using a large nationally representative sample, with a rare follow-up data collection cycle for all students in the sample, whether they graduated or not. We analyzed a subset of the full sample, namely students who had evidence of a dropout episode prior to high school graduation between 2002 (when they were in grade 10) and 2006 (two years after a traditional four-year high school completion schedule), with complete data across the variables, $n=1470$.

We assessed an iterative set of LCA models, beginning with a four-class solution based on the prior dropout typology literature (described at length in the full paper), and moving to a three-class model when the four-class model did not fit the data (detailed in this proposal). MPLUS 5.21 was used to conduct the latent class analysis (Muthén & Muthén, 2007). Using the recommended nomenclature of the mixture modeling literature (Jung & Wickrama, 2008; Nylund, Asparouhov, & Muthén, 2007), Figure 1 details the components of the LCA model used here (*see Figure 1*). The dependent variables fit to the three-class model included 23 dichotomously scaled survey items from the 2002 survey year, nine continuous scaled survey items and assessments, and the model controlled for seven background and demographic variables.

Finally, to assess the interpretation of each of the three typologies identified in the final three-class LCA model, as well as to explore the reasons that students reported why they dropped out, survey responses from the second follow-up ELS:2002 "dropout survey" from 2006 were analyzed. In 2006, four years after the grade 10 survey and two years after on-time grade 12 graduation, students who had dropped out at any time after grade 10 were surveyed again and asked a variety of yes/no questions about why they dropped out. We disaggregated and analyzed these 2006 dropout survey responses by each of the latent class typology groups identified from the 2002 survey response LCA model using Pearson's chi-square.

Results:

The three-class LCA model fit the data well. For the LMR LRT, $p=0.001$, indicating that a three class model is the appropriate number of classes to model the mixture distributions. The three-class model gave a high entropy value of 0.839 with AIC=80367.345 and BIC=81007.470

and probabilities all exceeding 0.9 for the most likely membership in each class indicating a good model fit and separation of individuals across the three latent class model. Thus, as the first application of LCA to the dropout typology research domain, and based on the responses to the survey items below, we named the three dropout typologies as *Quiet*, *Jaded* and *Involved*. These typologies represented 53.0%, 37.5% and 9.5% of the dropouts respectively. Figure 2 details the response patterns of each of the three identified typologies to the 23 dichotomously scaled 2002 survey items. The x-axis provides each of the items, while the y-axis presents the proportion of each group that responded “yes”, “agree” or “strongly agree” (see Figure 2). While the approximately 14,000 students in the ELS:2002 sample who graduated from high school were not included in the model, their proportion of “yes” responses are also plotted in Figure 2 (grey line) to provide a comparison to help interpret the dropout subgroups identified in the LCA model.

As demonstrated in Figure 2, the LCA model identified two broad groups of students who dropped out after grade 10. One is the Jaded group (Figure 2, solid line). While a little over a third of the dropouts, the Jaded students indicated overall that they did not like school, that teachers were not as interested in them, that school rules were neither fair nor equally applied, that they found their courses somewhat uninteresting and unchallenging, and that about 45% of the Jaded group worked for pay. In contrast, the Quiet (Figure 2, dashed-line) and Involved groups (Figure 2, dotted line) appeared to be much more similar to graduates, responding similarly to the same questions in that about 70% or more of these two groups agreed that they thought that teachers were interested in them, that rules are equally enforced, that they like school, with less than 20% agreeing that they were put down by teachers and students. However, the Involved group diverged from the Quiet pattern when it came to their overall dislike of school, needing to support their family, and working for pay (Figure 2, far right, dotted line), demonstrating a pattern more similar to the Jaded group.

Table 1 details the means and standard errors for each of the continuous variables included in the LCA model, disaggregated by each of the three subgroup typologies identified. In addition, because the LCA identifies latent classes based on the distributions of the variables included in the model, histograms of each of the continuous variables are provided in Figure 3 and Figure 4, disaggregated by each of the typologies. While graduates were not included in the LCA model, their distributions for each of the continuous variables are included in Figures 3 and 4 to provide a comparison group. In comparison to the graduates, students in each of the three identified typologies appeared to have overall lower test scores on average, lower GPA, a greater percentage of students who read little outside of school, and except for the Involved group, less time devoted per week to extracurricular activities (see Figure 3). Furthermore, in comparison to the graduates, the students in all three dropout typologies reported on average somewhat higher number of times that they went to class without their homework done, that “some” of their close friends dropped out, that they were absent more often, that they got in trouble more often, and were suspended or put on probation more often (see Figure 4). Overall, these findings extend past research that has indicated that these variables are important when it comes to students dropping out (Dynarski et al., 2008; Gleason & Dynarski, 2002; Rumberger, 2001; Rumberger & Palardy, 2005), however we describe important differences between the three different dropout typologies identified from the LCA model in the figures and tables and at further length in the full paper.

We then examined the pattern of responses of each of the three typologies on the ELS:2002 dropout survey, administered in 2006 (see Table 2). As a survey conducted four years

after the original grade 10 survey, the 2006 survey of these same students provides a unique longitudinal description of the reasons why these students dropped out. In addition, it captures students who returned to schooling and finished their high school degrees, data that is rarely examined in the dropout literature. Overall, Table 2 reflects many of the differences in the three typologies identified from the LCA model and due to space limitations of this proposal, will be detailed at length in the full paper.

Significance:

These findings are novel and significant extensions of the past dropout typology research domain for three main reasons. First, our findings overlap with the past dropout typology research, but for the first time examine exclusively students dropping out at the end of high school. Second, these results provide not only a rich description of each of the three typologies of students in grade 10, but also their opinions of why they left school and their completion status four years later. Third, the use of LCA with a nationally representative U.S. dataset allowed us to model appropriately the responses of the students to the survey and identify three significant typologies as the best model fit, as well as control for background and demographic variables. This is the first time this type of analysis has been performed in the dropout typology domain, and the first to describe the involved dropout typology. The full paper will discuss the implications for interventions, policy and practice, especially from the perspective that the traditional conception of a dropout for whom the majority of interventions are designed, represented by here by the Jaded group, was only 37% of all of the dropouts.

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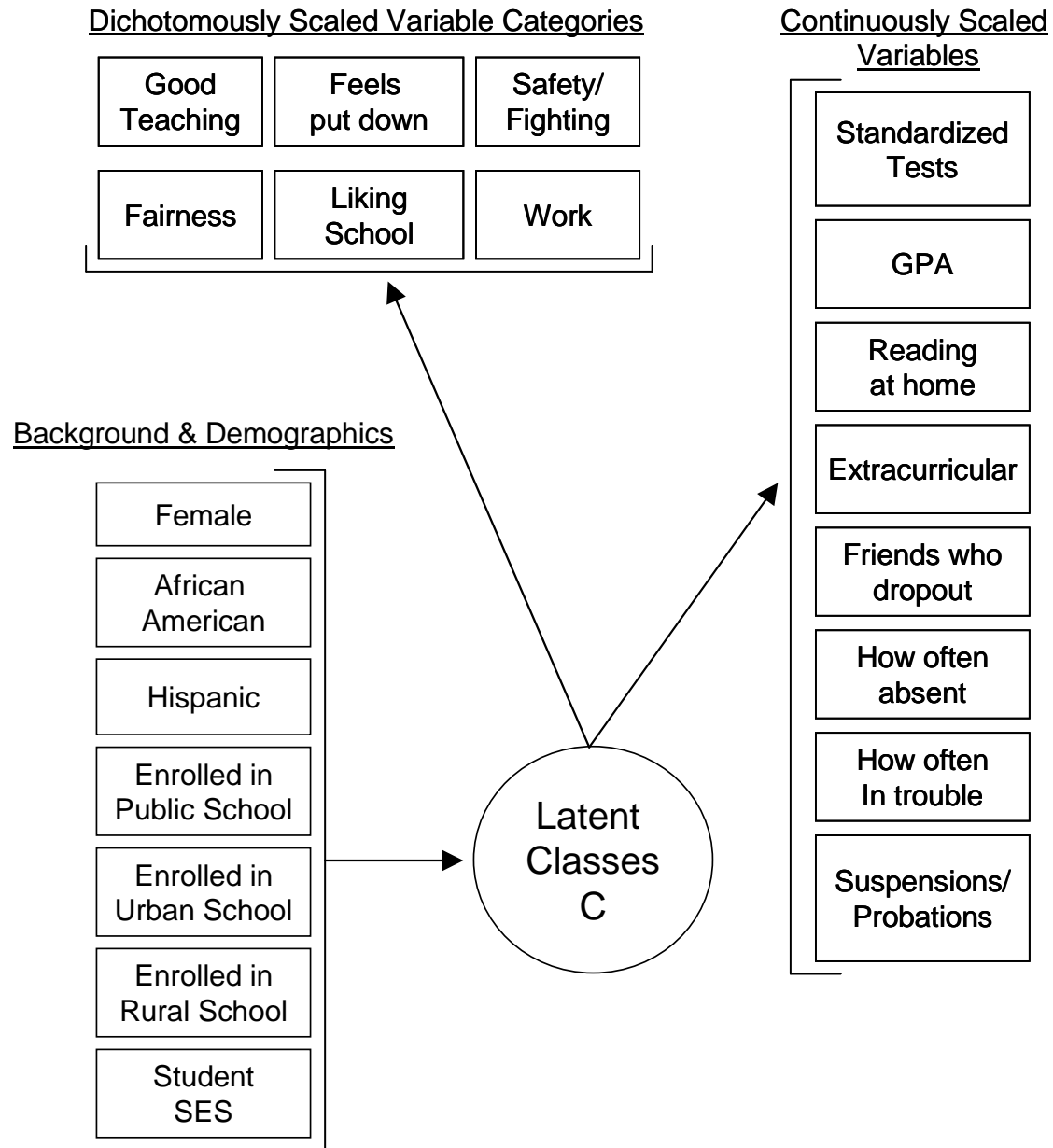


Figure 1: Latent Class Analysis (LCA) model for dropout typologies.

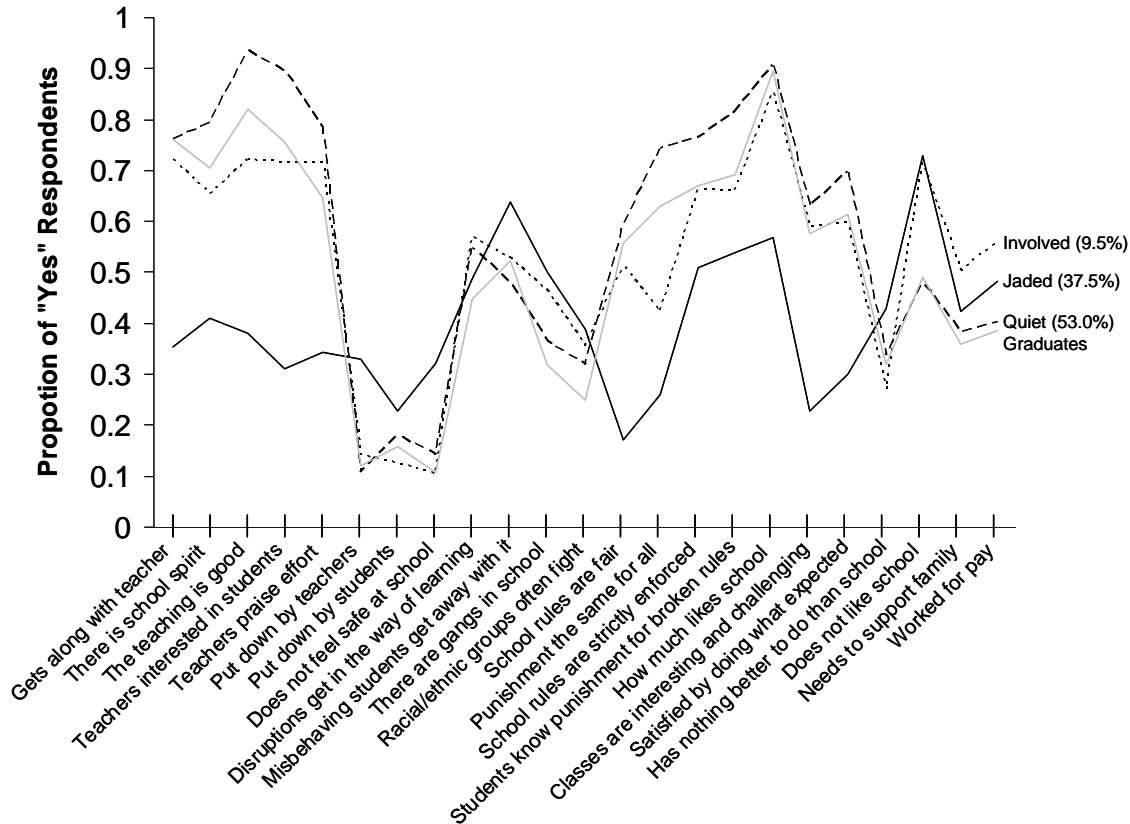


Figure 2: Responses of three typologies of high school dropouts identified through LCA to dichotomously scaled survey items. Respondents answered yes/no or agree/disagree to each of the survey items listed on the x-axis in the spring of 2002 when they were in grade 10. The y-axis represents the proportion of respondents who answered yes to each question. Latent class analysis identified three typologies of dropouts, Quiet (dashed line), Jaded (solid black line), Involved (dotted line). Graduates (grey line) were not included in the LCA model but are provided here from the full sample as a comparison group. Overall, while the Jaded students represented a little over one third of the dropouts, were disaffected by schooling, and appeared to attend schools with discipline issues, Quiet students are very similar to Graduates on these questions and represented over half of the dropouts. As the smallest group, Involved students are similar to Quiets and Graduates, except for the last three items on the far right, in which they respond more similarly to the Jaded group.

Table 1: Means of LCA continuous variables for the three identified dropout typologies.

Variable	Quiet	Jaded	Involved
Standardized test score composite math/reading	43.512 (0.485)	43.353 (0.527)	46.296 (1.240)
GPA for all grade 10 courses	1.695 (0.047)	1.438 (0.046)	1.974 (0.106)
How often goes to class without homework done	1.296 (0.043)	1.532 (0.051)	1.376 (0.091)
Hours per week spent on extracurricular activities	0.987 (0.095)	0.644 (0.109)	13.814 (0.686)
Hours per week spent reading outside of school	3.339 (0.228)	2.386 (0.256)	3.677 (0.537)
Number of close friends who dropped out	0.497 (0.039)	0.684 (0.047)	0.401 (0.073)
How many times absent from school during the first semester of grade 10	2.050 (0.062)	2.466 (0.073)	1.745 (0.137)
How many times got in trouble during the first semester of grade 10	0.689 (0.049)	1.599 (0.103)	1.010 (0.111)
How many times suspended/put on probation during the first semester of grade 10	0.221 (0.030)	0.545 (0.062)	0.216 (0.055)

Note: Standard errors are in parentheses.

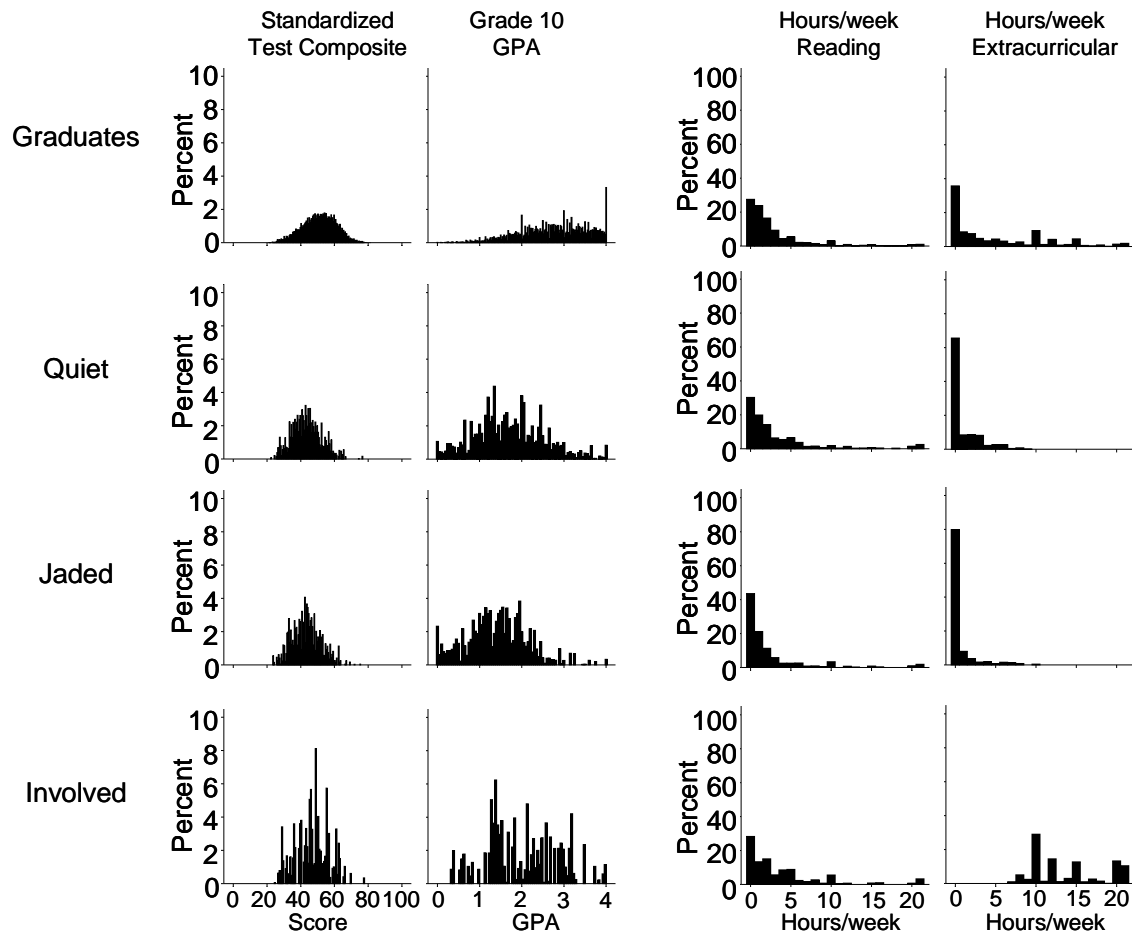


Figure 3: Distributions of continuous variables from the LCA with graduates as a comparison group.

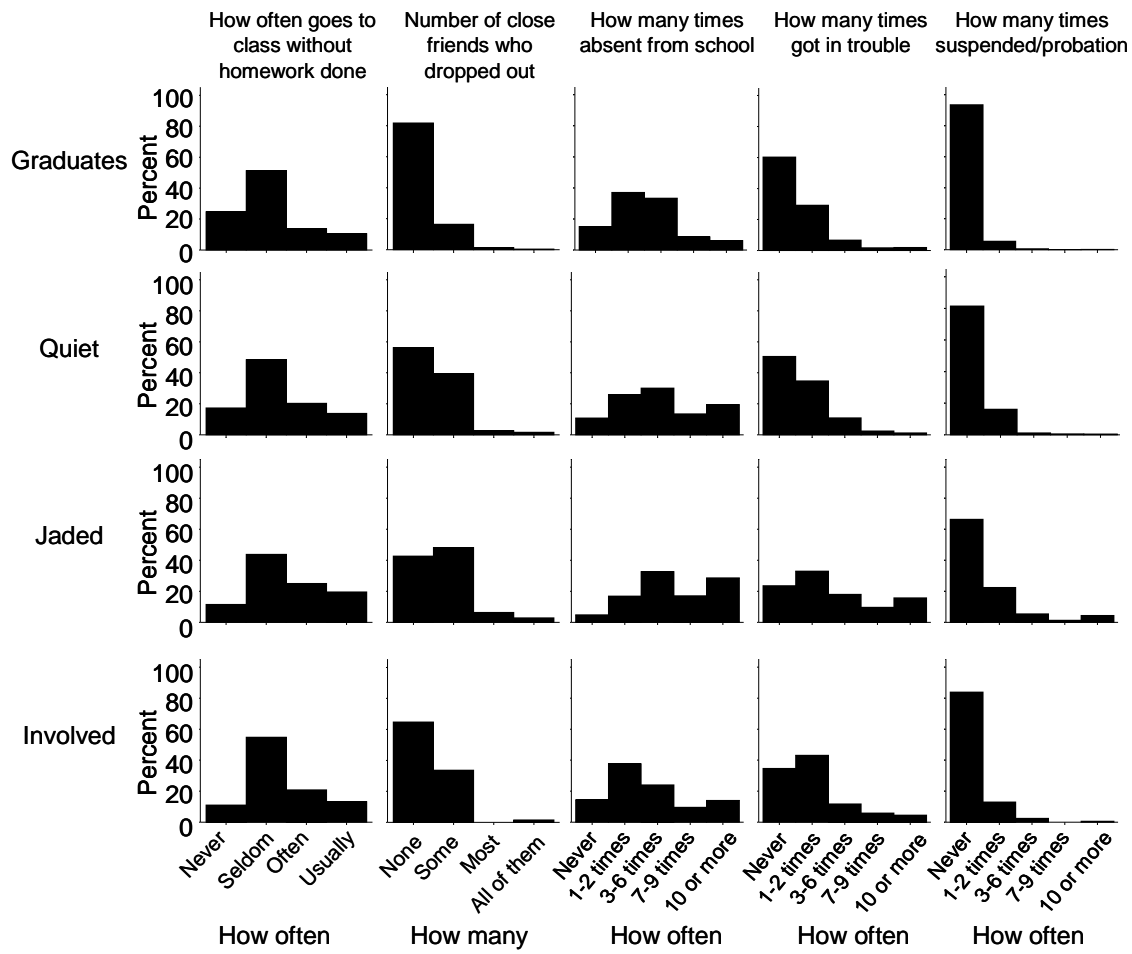


Figure 4: Distributions of continuous variables from the LCA with graduates as a comparison group.

Table 2: Percent responses to survey questions in 2006 about why the student dropped out of school, disaggregated by typology.

<i>Variable</i>	<i>Quiet</i>	<i>Jaded</i>	<i>Involved</i>
Left school because (<i>n</i> =800)			
Got a job	25.6	24.2	18.3
Did not like school	32.3	42.4	24.4 **
Could not get along with teachers/students	23.8	37.8	22.5 ***
Pregnant/became parent	17.2	13.9	15.5
Had to support or care for family	24.3	20.9	21.1
Was suspended/expelled	13.1	24.1	22.5 ***
Did not feel safe	6.8	9.6	8.5
Did not feel belonged there	17.2	26.3	15.5 **
Could not keep up with schoolwork	29.7	30.8	22.5
Was getting poor grades/failing school	34.8	43.2	25.4 **
Could not work at the same time	22.2	20.7	19.7
Thought couldn't complete courses/pass test to graduate	24.4	29.8	12.7 *
Thought it would be easier to get a GED	40.3	43.8	31.0
Missed too many school days	41.2	43.0	25.4 *
School completion/plans			
High school completion status in 2006 – full diploma, <i>n</i> =1470	18.8	12.6	21.8 **
Ever earned a GED, <i>n</i> =1470	28.3	35.7	42.9 ***
Ever applied to postsecondary school, <i>n</i> =1210	39.1	35.7	58.3 ***
Has or expects to graduate H.S. or obtain a GED, <i>n</i> =1240	89.3	88.5	87.3
Expects to graduate from 4yr college or graduate degree program at some point in the future, <i>n</i> =1240	37.6	32.1	46.6 **

Note: Significant tests are Pearson chi-square: * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$