

Assessment of Risk Factors for Truancy of Children in Grades K-12 Using Survival Analysis

Joseph R. Nolan, Tarah Cole, Jacqueline Wroughton, Kimberly P. Clayton-Code, and Holly A. Riffe

Abstract: Truancy is an important issue facing U.S. school systems as it is known that students who are truant are more likely to participate in criminal activity later in life (Baker, Sigmon & Nugent, 2001; Henry & Thornberry, 2010). This study examines recent data from students at 21 schools within a large mid-western school district. Survival analysis is used to quantitatively assess risk factors for truancy. Findings indicated that students having lower socioeconomic statuses are at greater risk for truancy. Both age and special education status also impact truancy risk. Students who transfer to a different school, even within the same district, show increased risk of truancy as well. Implications of these risk factors are discussed and suggestions for the direction of future research are offered.

Introduction

Although truancy is defined differently from state to state, it is nationally recognized as one of the most important issues facing schools today (Bye, 2010; Dougherty, 1999, Huck, 2011; Kronholz, 2011). Reid (2010) summarizes that students who do not attend school consistently perform lower on all academic measures and have lower self-esteem and career ambitions. These factors translate into lower “quality and economic status in adult life” (Reid, 2010, p. 3). Truancy is such a serious concern as it relates to risk for criminal activity that the Office of Juvenile Justice and Delinquency Prevention (OJJDP) named truancy prevention as a national priority in 2003. According to the U.S Department of Justice Bulletin, “truancy has been clearly identified as one of the early warnings signs that youth are headed for potential delinquent activity, social isolation, and/or educational failure” (Office of Juvenile Justice and Delinquency Prevention, 2005). Decades of research have also identified a link between truancy and later violence, job problems, and incarceration (Baker et al., 2001; Kearney, 2009; Skola & Williamson, 2012).

In most states the law requires all students to attend school daily; school districts record any absences as excused or unexcused (e.g., Kronholz, 2011; National Conference of State Legislatures, 2012). Individual state laws also determine the age at which a child is required to begin attending school, the age at which a child may legally drop out of school, and the number of unexcused absences at which a student is considered legally truant. Definitions for “excused absence,” “unexcused absence,” and “truancy” vary by state and even sometimes among school districts within the same state.

While truancy is defined in most states by law, it has not been so clearly defined by educators or researchers (Southwell, 2006). Epstein and Sheldon (2002) note much of the current literature focuses on students who leave school prior to graduation rather than focusing on daily student attendance. A focus on daily student attendance is important because the teaching and learning process builds upon itself. Each lesson presented to students is based on lessons that preceded it. Students who attend school regularly are more likely to be successful than those who do not (National Center for Education Statistics [NCES], 1996). For this study, the definition of truancy is taken from Kentucky School Law (KRS 159.150). Kentucky law states that:

Any child who has attained the age of six years but has not reached his or her eighteenth birthday, who has been absent without a valid excuse for three or more days, or [who has been] tardy without a valid excuse on three or more days is truant. Any student enrolled in a public school who has attained the age of eighteen years but has not reached his or her twenty-first birthday, who has been absent from school without a valid excuse for three or more days, or [who has been] tardy on three or more days is truant (Title XIII –Education, Ky. Rev. Stat. Ann., 2011, Chapter 159 Item .150).

Risk Factors for Truancy

The risk factors for truancy include multiple factors focused primarily on the student, the student’s family, community involvement, and the school (Dimmick, Correa, Liazis & McMichael, 2011; Gandy & Schultz, 2007, Gullat & Lemoine, 1997). Preliminary findings from OJJDP’s evaluation of the

Truancy Reduction Demonstration Program (TRDP) confirm that truancy is correlated to family and school factors, economic influences, and student variables such as mental health (OJJDP, 2005). Among the most significant predictors of truancy are parental education, availability of large amounts of unsupervised time after school, drug use, and school disengagement variables such as poor grades, low educational aspirations, daily attendance, and disinterest (Henry, 2007). Being the target of bullying has also been found to be associated with increased risk of frequent absence (Gastic, 2008). Shelley-Tremblay, O'Brien, and Langhinrichsen-Rohling (2007) argued that there are numerous reasons for truancy regardless of age or grade level.

Truancy may also be influenced by particular events such as changing schools, an atmosphere of dislike, an incident with a teacher, or suspension from school. It may also be influenced by events over time such as becoming increasingly disillusioned by the atmosphere of the school or by relationships with teachers. Some students may be particularly vulnerable due to family or social reasons or because of less positive attitudes towards schooling (Attwood & Croll, 2006; Skola & Williamson, 2012).

"Truants often perceive the world around them as unstable and confusing" with many truant students coming from dysfunctional, unstable, and insecure homes (Capps, 2003, p. 34). Students who are truant have fewer opportunities to learn and lower achievement potential. Student success has been shown to be directly related to the amount of time spent in the classroom (NCES, 1996). Older students are most likely to be truant than younger students (Henry & Thornberry, 2010). Truants often show little interest in schoolwork, have behavioral difficulties at school, associate with antisocial peers, and attempt to hide their truancy from their parents (Elliot, 1999). They are at risk for negative behaviors such as alcohol and drug abuse, teenage pregnancy, and delinquency. Truants can also have a negative effect on other students. They require extra time from teachers which takes away time from regularly attending students when they must focus on make-up work for the truants (Bye, 2010).

According to a study by Lehr, Sinclair, & Christenson (2004), students at risk of truancy can be identified retrospectively based on their attendance patterns, academic performance, and behavior. Their study also found the factor of special education status as a risk factor for truancy. This is supported by research from Spencer (2009). She found high frequencies of truancy beginning in elementary grades and continuing into the middle school years for students who were identified for retention, special education services, and those with limited English proficiency. Immigration status can be a risk factor for truancy because immigrant students are confronted with greater demands due to their different languages and culture (Ogden, Sorlie, & Hagen, 2007). Such difficulties with school are the major reasons for truancy (Epstein & Sheldon, 2002). Furthermore, school dropout is a major concern for students with disabilities. The U.S. Department of Education (2009) found that 31.1 % of students with disabilities drop out of school.

A student's socioeconomic status (SES) can also have an impact on their likelihood to be truant. Few students from high SES families are truant whereas substantially more students from low- and medium SES families are truant (Attwood & Croll, 2006). Parents of students from high-SES families tend to be more involved in their children's education and this involvement assists in reducing the probability of truancy (Epstein & Sheldon, 2002).

Few studies explore approaches schools can take to increase and maintain students' daily attendance or to educate how schools, communities, and families can build partnerships to reduce truancy (National Center for School Engagement, 2006). "Despite the long history of concern over student attendance, the issue has received relatively little attention from educational researchers" (Corville-Smith, Ryan, Adams, & Dalicandro, 1998, p. 629). Researchers have focused primarily on students who drop out of high school rather than focusing on daily attendance of all students. Through developing an understanding of these school, family, community, and student factors that affect students' risk of becoming truant, schools can more effectively allocate resources to high-risk groups, taking necessary measures to lessen truancy rates which may in turn improve later quality of life.

Purpose

This study seeks to quantitatively evaluate potential risk factors for truancy in an effort to identify those demographics that are at greatest risk. The primary research question is: What is the effect of socioeconomic status, as it is measurable via data typically collected by schools, on truancy? The impacts of age, special education status, Limited English Proficiency (LEP), and movement within the school system will also be assessed, with the ultimate goal of providing school administrators information that may assist in efficient allocation of funding for attendance-related interventions.

Method

Data Collection

This study examines 2009-2010 school year data from a large Midwestern school district. The sample consists of 16,418 eligible students from a total of 21 schools within that district including 12 elementary, five middle, and four high schools. Forty-eight students were excluded due to missing start dates and/or truancy dates. A summary of demographic information for students in the sampled district is found in Table 1.

Data were obtained from Infinite Campus (2012), the student information system used by the school district for both storage and retrieval of student data. This system is a "user-rights" based system, meaning that while many people throughout the district have access to this system; data entry and editing is restricted based upon the position and duties of the user. Only staff in appropriate positions have the ability to enter data. Data verification is performed at both district and state levels through queries and error checks.

Data entered into the Infinite Campus (2012) database are obtained from a variety of different sources. Demographic information is obtained via a survey typically filled out by the parent(s) or legal guardian(s) of each student. Student record information (e.g., attendance) is recorded by school employees. Both lunch status (i.e., free, reduced price, or fully paid) and special education status (i.e., active, inactive, or none) are based on parental application followed by district evaluation under appropriate law (Federal child nutrition programs, 2010). LEP status is based on parental survey followed by district evaluation. Homelessness may be self-reported or evaluated by the district based on an implementation of federal guidelines (National Center for Homeless Education, 2008). "Children and youth who 'lack a fixed, regular, and adequate nighttime residence' are

Table 1

Demographic Information for All Students in the Sample

Ethnicity	N	%
White/Caucasian	14,489	88.3 %
Black/African American	515	3.1 %
Hispanic	740	4.5 %
Asian	379	2.3 %
Other	294	1.8 %
Gender		
Male	8,587	52.3 %
Female	7,831	47.7 %
Socioeconomic Status		
Paid Lunch	11,150	67.9 %
Reduced Lunch	4,160	25.3 %
Free Lunch	935	5.7 %
Homeless	173	1.1 %
LEP Status	919	5.6 %
Special Education Status		
Active	2,720	16.6 %
Inactive	1,246	7.6 %
None	12,452	75.8 %

considered homeless” (Federal child nutrition programs, 2010). As some of the variables (e.g. special education status and LEP status) can change throughout the school year, for the purpose of this study all students were classified by their most extreme status within the school year. For example, if a student began the year having active special education status, they are classified as active for this study even though they may have switched to inactive at some point during the school year. Additionally, the number of school changes record only includes school changes within the district. A student moving outside the district results in censored data (loss of the ability to follow the student after that point in time).

Lunch status and homelessness were combined into single ordinal variable describing SES. We treated homelessness as the most extreme (lowest) SES so that homeless students were classified as homeless regardless of their lunch status. The remaining levels of this variable in order of increasing SES consisted of free lunch status, reduced lunch status, and paid lunch status based on federal definitions:

Children from families with incomes at or below 130 % of the poverty level [\$28,665 for a family of four]; are eligible for free meals. Those with incomes between 130 % and 185 % of the poverty level [\$40,793] are eligible for reduced-price meals, for which students can be charged no more than 40 cents (Federal child nutrition programs, 2010, p. 292).

Ultimately we defined SES as an ordinal variable having four levels: homeless, free, reduced, and paid.

Statistical Analysis

In this study, students are followed over time and numerous students are “censored,” meaning that at some point during the school year they are lost to follow-up. Primary reasons for censoring include relocation outside of the district, change to an alternative program such as home-schooling, and dropping out of school. The presence of time-to-event measurements and censoring makes survival analysis the appropriate statistical method for assessing risk in this study. While survival analysis is commonly associated to studies of terminal illness, it is widely applicable to behavioral studies as well. Examples range from studies of drug use (Henry & Huizinga, 2007; Perron et al., 2009) to violence (Yoshihama & Horrocks, 2003) to studies of child welfare (Lewandowski & Pierce, 2004). The approach allows for both identification of high-risk groups as well as comparison of associated risks with other groups. In particular, Cox’s Proportional Hazard models (Machin, Cheung, & Parmar, 2006) were used to examine differences in hazard rates while also accounting for covariates. All analyses were conducted using SAS/STAT software, version 9.2 (SAS Institute Inc., 2008).

The use of survival analysis requires definitions for *start date*, *end date*, and *censoring status*. For each student, the start date is defined as the student’s first day of school within the district. The end date is defined as the day the student either becomes truant or the day on which the student is censored. Students are considered censored if they move to another school district, begin an alternative program (e.g., home-schooling), drop out of school, or when they finish the school year without becoming truant. The survival time is measured as the total number of days from the start date to the end date.

The Cox model provides hazard ratios, which comprise the ratio of the comparative hazard to the reference hazard. Confidence intervals on the hazard ratios will be used to determine a specific group’s risk of truancy when compared to a reference group. While one may also consider *p*-values to assess statistical significance of differences, confidence intervals allow estimation of the size of effect, which is more useful for practical interpretation (Gardner & Altman, 1986). In particular, a hazard ratio equal to 1 means that the hazard for the comparative group does not differ from the reference group. Therefore if the confidence interval for a hazard ratio includes 1.00, there is no evidence of differences between the hazards being compared. Conversely, if the interval lies bigger than 1.00, the comparative hazard is concluded to be greater than the reference. If the entire interval lies smaller than 1.00, the comparative hazard may be concluded to be smaller than the reference.

Results

At the end of the 2009-2010 school year, there were 1,728 students (10.53 %) who became truant within the observed district. Single predictor models indicated that age of student, number of school changes, special education status, economic status, and school were significant at the $\alpha = 0.05$ level. Results are summarized in Table 2. LEP status did not test significant. The “unadjusted” column of Table 2 provides 95 % confidence intervals on the hazard ratios using separate models for each individual predictor.

As confounding is certainly possible, the Cox Proportional Hazards model was used to simultaneously consider all predictors. The proportional hazards assumption was examined using Schoenfeld residuals (Machin et al., 2006), which produced no evidence to suggest that any of the potential variables violated the proportional hazards assumption. Results for this model are found in the “adjusted” column of Table 2.

Table 2

Hazard Ratio Estimates for Single Factor (Unadjusted) and Multifactor (Adjusted) Models

Predictor	95% Confidence Estimate of Hazard Ratio (Unadjusted)	95% Confidence Estimate of Hazard Ratio (Adjusted)
Economic Status		
Paid	Reference Group	Reference Group
Reduced	1.51 to 2.23**	1.55 to 2.30**
Free	2.76 to 3.36**	3.11 to 3.82**
Homeless	3.71 to 6.72**	4.91 to 9.00**
School Change		
No	Reference Group	Reference Group
Yes	1.49 to 2.57**	1.04 to 1.81 *
Special Ed Status		
None	Reference Group	Reference Group
Inactive	0.87 to 1.24	0.84 to 1.20
Active	1.06 to 1.35**	1.04 to 1.33**
LEP Status		
No	Reference Group	Reference Group
Yes	0.89 to 1.33	0.75 to 1.13
Age		
Per annum*	1.14 to 1.78**	1.17 to 1.21**

*Significant at the 0.05 level; **Significant at the 0.01 level; †Age is considered a quantitative variable with yearly increments.

Results for economic status indicate that with 95% confidence, as compared to students paying for their lunch, students who have a reduced lunch status are 1.55 to 2.30 times as likely to become truant; students who have a free lunch status are 3.11 to 3.82 times as likely to become truant; and homeless students are 4.91 to 9.00 times as likely to become truant. Students who change schools are between 4% and 81% more likely to become truant; students having active special education status are between 4% and 33% more likely to become truant; and as age increases, the risk of truancy increases between 14% and 78% for every additional year.

Additionally, a statistically significant interaction between economic status and age was observed using the Cox model ($p < 0.0015$). To be clear, the interaction is quite small compared to the main effects. That is to say that we clearly note increased chance of truancy associated to increased age (independent of SES) as well as increased chance of truancy associated to lower SES (independent of age). The meaning of the interaction is this: there are slight differences in the constant of proportionality between SES groups based on age. These relationships are depicted visually in Figure 1; hazard rates over time are shown for each SES group by age.

It is of interest that the confidence intervals in Table 2 do not change all that much as one considers the differences between adjusted and unadjusted models. This suggests that confounding among the variables in the model is not a particular issue and lends some credence to the assertion that each factor may be used alone or in a combination to assess truancy risk for particular students, with SES and age appearing to be the factors of greatest importance.

Limitations

There are some known limitations of the economic status variable. First, lunch and homeless status was utilized as there is no available parent income data paired with each student. Second, in order to qualify for reduced or free lunch, a parent or guardian must apply in order for their child to receive it (Federal child nutrition programs, 2010). Shah (2011) reported that one third of students could fail to receive free or reduced lunch because their parents refused to report their income in the 2008-2009 school year, and additionally that 20% of the applications had errors that could change the status of lunch offering. There are also issues with accurate estimates of the extent of truancy because of inconsistent reporting and tracking practices of schools (Henry, 2007; Reid, 2002). Due to these issues it is likely some students belong in a different classification. For example, students who were categorized as paid lunch may have qualified for free lunch status. It is also probable that the homeless population is severely under-reported (Winship, 2001). There is a serious lack of population studies concerning the prevalence of child and family homelessness; consequently, there is no benchmarking data available for comparison (Coker et al., 2009; Larson & Meehan, 2011).

In addition, there may be limitations evolved from variability in data entry. While the Infinite Campus system is based on “user-rights,” there are still many different people across the school system that are entering and checking the data entered.

Discussion

It is easy to get lost in the numbers of the results section, or to gloss over those numbers and to quickly check the p -values and move on. However, quantifying the amount of risk is really what is important. Risk is essentially probability. Certain students will naturally be more (or less) likely to become truant than others.

It is quite clear that those of lower socioeconomic status (SES) are at a much greater risk for truancy. Based on the numbers this would seem to be the most important factor investigated in this study. Homeless students are at least five times more likely to become truant. Those who are not homeless, but receive free lunch are at

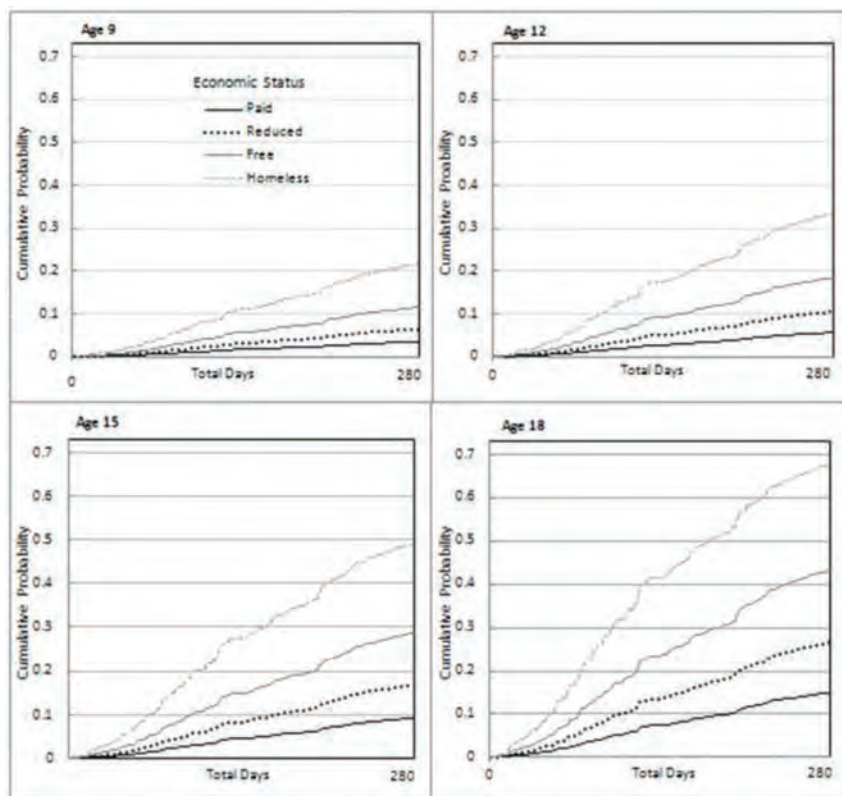


Figure 1. Probability of truancy over time grouped by SES and age.

least three times more likely to become truant. These students may be targeted with programs designed to promote attendance such as mentorships, incentive programs, increased family communication, personalized outreach, and tailored programmatic responses (e.g., Campbell-Whitley, Obiakor, & Algozzine, 1997; Harte, 1995; Sheldon, 2007). Additionally, one of the key provisions of the McKinney-Vento Act allows children who are homeless to retain the continuity of their home school (National Center for Homeless Education, 2008). Stabilizing the school even when the child may not have adequate housing is a huge step forward and may well assist in decreasing issues with attendance.

Another key finding confirms what one might expect—namely that as age increases, the risk of truancy increases between 14% and 78% for every additional year. Another way to look at this is a student is now 1.14 to 1.78 times as likely to become truant next year, as he or she would be this year. For example, consider a student who has 5% chance to be truant this year. Next year, it will be between 5.7% and 8.9% chance of truancy. Then the following year it would go up by an additional similar factor. Fully understanding this requires recognizing that this is a compounding yearly effect. Suppose the true amount of increased risk is really 40% (again we estimate that it is somewhere between 14% and 78%). Then in going from the fifth to tenth grade (five years), students would become more than five times as likely to become truant. Given this data, it is imperative

that educators continue to build and test models leading to truancy reduction that span the entire educational spectrum from P-12 (e.g., Marvul, 2012; Munoz, 2001; Thomas, Lemieux, Rhodes, & Vlosky, 2011)

The next key indicator is that if children change schools, even within the same district, their risk for truancy increases significantly. However it is unclear from this data whether the increased risk is substantial. It may be that there is minimal increased risk, or it may also be the case that students changing schools are nearly twice as likely to become truant. If children can remain in the same school, this may substantially lower their risk of truancy. A social worker within the school district noted that some parents and caregivers “beat the system” by simply calling the transportation hub and asking that their child be picked up from a different address for a short time (S. Lazenby, personal communication, March 20, 2012). This information is not necessarily communicated as an official address change to the school system, and in such a case the child is not forced to change schools due to arbitrary district lines.

Although we applaud the steps parents or caregivers are willing to go to provide stability for their children, it is time to begin to examine school policy in light of these truancy findings. Moving students definitely has an individual cost—that of increased truancy—however, it also

could be argued to have a cost within the individual schools. When a student misses class or “disappears” from the roster, that has an impact on the milieu of the individual classroom and, in terms of test scores, an impact on the entire school. It is not uncommon for schools in the examined district, particularly in lower SES areas, to have well under 50% of their students who begin in first grade to stay until fifth or sixth grade (K. Reutman, personal communication, April 23, 2012). Even elementary school principals having the best teachers and support available would still find it extraordinarily difficult to keep students at grade level and proficient in test results when the school composition changes dramatically each year.

Additional results indicated special education students having active status are at a slightly higher risk of becoming truant than students with no status. This risk is minimal; at worst they are 1.33 times as likely to become truant (and there was no evidence in a difference in risk for students having an inactive status). Southwell (2006) contends that the reason for truancy is that the educational institution does not meet the needs of the student, and instead blames the student and his or her family. This may be particularly relevant for students identified as needing “special education.” It is beyond the scope of this article to determine the myriad of factors that lead to this designation; however, educators should be particularly attuned to the challenges students may face.

Implications and Future Research

Truancy is a serious issue that goes beyond academic failure. Truancy has been identified as an early warning sign of negative and criminal behavior. If truancy rates are not lessened, how can society expect crime to lessen? It is imperative that children attend school daily and get the education that every child deserves. Good attendees are likely to have attributes that promote attainment such as motivation, self-discipline, and persistence (Sheppard, 2005). This research indicated that socioeconomic status and age are key predictors of risk for truancy. School administrators nationwide may be able to use this knowledge to help identify students at high risk for truancy and then provide differentiated programs and services for these students designed to mitigate the problem. Truancy, school dropout, unemployment, and underemployment are all correlated to failure in schools. It is critical to have educational facilities with competent, caring teachers working with parents and the community (Stephens, 2010). Furthermore, research by Attwood and Croll (2006) confirms that attention to personal relationships and an orderly environment in school may be more helpful in reducing truancy than changes in curriculum and other aspects of the academic practices of schooling.

Future research is needed to understand how and why special education status increases the risk for truancy. Specifically, researchers must consider specific special education classifications to determine if certain behavioral or learning issues put students at greater risk of truancy. Alternately, the researchers may find teaching methods or school policy concerning students with that classification need to be amended.

Policies that are most likely to keep students in the same school are in need of research. The McKinney Vento Act on the federal level allows children who are classified as homeless to remain in their school regardless of current living arrangement (see National Center for Homeless Education, 2008). Examination of the impact of this policy may have implications for children who are not homeless but are forced to change schools for a variety of reasons. Finally, the research and development of programs specially targeting students at risk for truancy should be tested, funded, and implemented.

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Authors

Joseph R. Nolan, PhD, is an Assistant Professor of Statistics at Northern Kentucky University, Highland Heights, KY. His research interests as an applied statistician include numerous collaborations into disciplines such as Education, Social Work, Nursing, Biology, and Sports.

Tarah Cole is a recent graduate of Northern Kentucky University with bachelor degrees in mathematics and statistics. Many of the statistical results in this paper were a direct result of Tarah's capstone project conducted under the direction of Dr. Nolan. She is currently pursuing her M.S. in statistics from Miami University, Oxford, OH.

Jacqueline Wroughton, PhD, is an Assistant Professor of Statistics at Northern Kentucky University. Her research interests focus on statistics education; more specifically developing an understanding of how students understand statistical concepts. In addition she also enjoys assisting those from other disciplines in analyzing and interpreting data.

Kimberly P. Clayton-Code, PhD, is an Associate Professor and Director of the Institute for Talent Development and Gifted Studies at Northern Kentucky University. Her research interests included gifted education, talent development, and social studies education.

Holly A. Riffe, PhD, is a Professor of Social Work and Director of the Master of Social and Social Justice Programs at Northern Kentucky University. Her research interests focus on children experiencing homelessness and other marginalized populations.
