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Developing an Online Early Detection System for School Attendance Problems: Results From a Research-Community Partnership

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School refusal and other school attendance problems are vexing problems for school-aged youth, families, school personnel, and clinicians. However, few resources exist to detect problematic attendance. The current report describes three steps of a research-community partnership to develop an early identification program to detect youth at risk for problematic attendance. First, a survey was conducted to estimate the scope and cost of school refusal across grades K–12. School administrators estimated relatively few youth exhibiting significant school refusal (missing 5 or more days per year) but estimated the costs associated with services for these youth to be very high (mean cost of in-district programs: \$94,052; mean cost of out-of-district placements: \$496,657). Second, elementary school counselors were tasked with tracking absenteeism among at-risk youth using an online attendance tracking prototype. Counselors identified a high number of youth who showed elevated absences, lates, or early departures (17.2% of enrolled students), and counselor ratings were significantly related to whether the student (a) had received an individualized education plan or 504 plan, (b) had a sibling with similar attendance problems, (c) was older, or (d) had divorced or separated parents. In a final step, counselor feedback was sought and revisions were incorporated in the attendance tracker. Findings reinforce the prevalence and cost of school attendance problems, provide guidance for using technology to monitor attendance and related indices (tardies, early departures), and direct attention to youth factors that may be useful in identifying youth at risk for poor attendance.

SCHOOL absenteeism is a complex and pervasive problem that negatively impacts a significant amount of youth. Ten to 15% of American students missed 15 or more days of school in the 2013–2014 school year, corresponding to 5 to 7.5 million students (Balfanz & Byrnes, 2012; U.S. Department of Education, 2016). Monthly estimates suggest that 20% of fourth and eighth grade students miss at least 3 days of school in one month, and 7% miss at least 5 days of school in one month, suggesting that absenteeism is evident in shorter and longer time frames (Aud et al., 2012). Excluded from these already concerning statistics are rates of partial absences, tardiness, skipped classes, and early departure.

Youth with attendance problems are at risk for a variety of negative outcomes, including poor academic performance, increased family conflict, low social functioning, and potential maltreatment from lack of adult supervision (Kearney & Albano, 2007; King & Bernstein, 2001; King, et al., 2000; Last & Strauss, 1990). Attendance problems

are also a predictor for eventual school dropout (Alexander, Entwistle, & Horsey, 1997; Epstein & Sheldon, 2002) and can result in substantial long-term consequences, including increased high-risk behaviors (e.g., alcohol/drug use, risky sexual behavior) and future difficulties with sustaining employment and maintaining relationships (Kearney, 2008; King & Bernstein, 2001). Additionally, attendance problems often burden the school system, which often lacks the necessary resources to manage the problem effectively. School personnel report that addressing this issue can require inordinate amounts of time from professional staff (e.g., guidance counselors, teachers, principals) and drain financial resources (Chu, Rizvi, Zendegui, & Bonavitacola, 2015).

Child-motivated attendance problems typically take the form of truancy or school refusal (Egger, Costello, & Angold, 2003). Truancy behaviors include failure to attend school or leaving school early without parent awareness, and often involve engaging in risky or illegal behaviors (shoplifting, drug/alcohol use; Kearney, 2008). In contrast, school refusal (SR) is defined as a pattern of severe difficulty attending school due to elevated levels of anxiety, emotional distress, and/or somatic complaints (Berg, Nichols, & Pritchard, 1969; Berg, 1997; Bools, Foster, Brown, & Berg, 1990). Parents are typically aware of these absences and are unsuccessful in securing their child's

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attendance. SR is typified by protesting attendance as early as the night before school, disruptions in morning routine, increased family conflict, significant youth somatic complaints, frequent visits to the nurse and counselor during the school day, frequent calls to parents, and multiple attempts at early departures (Kearney, 2008). While truancy is a pervasive and complex problem, this paper will primarily focus on investigating the early identification and tracking of attendance problems associated with SR.

Tracking Patterns of Absenteeism

Unfortunately, most information on SR has been generated from clinical samples of youth whose attendance problems have already escalated (Lyon & Colter, 2007). One clinical sample in Australia documented that 80% of families seeking treatment for SR waited 2 years or more between first onset of problems and seeking help (McShane, Walter, & Rey, 2001). Naturally, early identification and intervention is critical to successful outcomes, supported by the finding that better outcomes occurred among SR youth who received treatment earlier in the SR episode (Okuyama, Okada, Kurabayashi, & Kaneko, 1999). Epidemiological research shows that SR develops earlier (mean onset age of 11 years), whereas truancy and mixed profiles develop later (mean onset age of 13 years; Egger et al., 2003). Thus, early intervention is particularly relevant for youth with SR, given the younger age of onset. The transition from elementary to middle school appears to be a particular period of vulnerability for absenteeism. Kieffer, Marinell, and Neugebauer (2014) conducted secondary analysis of attendance data from 169,000 New York City students and found the steepest declines in attendance during eighth grade, indicating that identification is critical before this proverbial attendance “cliff.” Further, declines in attendance between fourth and eighth grades accurately predicted a ninth-grade index of how “on track” a student was to successfully graduate high school. Tracking attendance trends in this critical period appears essential for preventing later absenteeism and dropout.

Multitiered Systems of Support frameworks (MTSS; <https://www.pbis.org/school/mtss>) encourage the early identification of problems and provision of appropriately tiered responsive interventions based on the severity and nature of a youth’s concerns. In the context of SR, distinguishing transient or Tier 1 absenteeism (e.g., doctor’s visits, vacations) from emerging attendance problems (Tier 2) is critical to providing early intervention and preventing more severe and enduring Tier 3 absenteeism and possible school dropout (Kearney & Graczyk, 2014). Evidence-based MTSS systems begin with a valid and reliable identification system.

In the U.S., states are beginning to acknowledge the importance of attendance tracking, but standardized approaches are rare. For example, in New Jersey (NJ),

each school district is mandated to define and implement an attendance tracking and intervention policy ([NJ Administrative Code 6A:16-7.6](#)). To accommodate this, many schools implement a computerized system (e.g., PowerSchool, Infinite Campus) to collect and monitor attendance data. However, not all districts contract with an outside vendor to manage attendance data, attendance definitions vary across districts, and few districts track peri-attendance data like tardiness, partial class attendance, or trips to the nurse or counselor. Further, few districts and states actively report data to a central source to help make sense of aggregated information, leaving individual districts to determine how to use attendance data (Balfanz & Byrnes, 2012). In turn, few districts actively analyze attendance data, provide attendance feedback to key stakeholders (students, parents, teachers, counselors) to inform individualized intervention plans for students, or use data as part of comprehensive school interventions.

Experts recommend that schools set a standardized absence threshold (e.g., missing 25% of total school time across 2 weeks; missing 10 days in any 15-week period; Kearney, 2008) and then discuss at-risk students in regular school staff meetings. Pilot programs that follow such recommendations have demonstrated significant reductions in absenteeism (Mac Iver & Mac Iver, 2010), but comprehensive detection and intervention programs remain rare (Stickney & Miltenberger, 1998).

Any detection system should allow for the detection of factors known to be associated with absenteeism. A number of socio-emotional variables have been useful in predicting emerging and severe SR, including peer relations and bullying, family environment and parenting practices, and the presence of learning disabilities (Kearney, 2008). Havik, Bru, and Ertesvåg (2015) found that incidents of bullying, experiences of social isolation, and teachers’ classroom management were associated with SR. Other studies have also shown that victims of bullying are more likely to experience low academic achievement (e.g., Baly, Cornell, & Lovegrove, 2014; Glew, Fan, Katon, Rivara, & Kernic, 2005). Youth who are raised in families with high conflict, have withdrawn parents (e.g., low parental supervision), or who are isolated (e.g., abuse) have also been found to demonstrate more SR and other attendance problems (e.g., Kearney, 2008; Kearney & Silverman, 1995). Integrating youth and family functioning in a detection system can help identify youth most at risk for attendance problems, distinguish tiers of SR, and provide direction in developing responsive interventions to match student needs.

A Community Participatory Research Approach to Address Absenteeism

The current report describes an iterative process to develop an early detection system for identifying elementary school students at risk for problematic school attendance,

particularly SR. The study reflects a community-based participatory process in which clinical researchers from a university partnered with a local school district to collectively address the district's attendance concerns. Partnerships between community members and research investigators are essential to designing solutions that reflect stakeholder concerns and minimizing barriers to sustained implementation (Beidas, Koerner, Weingardt, & Kendall, 2011). Such approaches tend to involve key stakeholders (e.g., teachers, school counselors) in the initial problem definition and solution generation stages and then assess and integrate feedback from stakeholders throughout the design and implementation stages. School-based academic and mental health outcome monitoring programs have also benefitted from research-community collaborations (Deno et al., 2009; Nadeem, Cappella, Holland, Coccaro, & Crisonino, 2016).

We conducted a three-step process that describes joint problem-identification, development and piloting of an early detection system, and solicitation of feedback from prospective end-users. All procedures described hereafter were approved by the University's Institutional Review Board and by each school district's Board of Education. In Step 1, we conducted a survey of three local school districts to capture administrator concerns about school attendance, including the prevalence and cost estimates of SR. In Step 2, we worked collaboratively with one of our partner districts to develop a proof-of-concept early detection system (tracker) for attendance problems in four elementary schools in one district. In this step, we developed a pilot online attendance tracking system that would identify youth at elevated risk for attendance problems (particularly SR) and incorporate school counselor ratings of academic, social, and family factors commonly associated with absenteeism (e.g., Kearney, 2008; McShane et al., 2001). We collaboratively chose a focus on distress-related SR because this was the primary concern of the school district. We report rates of problematic school attendance and also provide preliminary analysis that highlights socio-emotional variables that predict problematic attendance, including youth sex, age, grade, newness to the school, receipt of an individual education plan, having divorced/separated parents, having a sibling with a history of poor attendance, or having at least one quality friend. We expected that youth who reported lower frequency and quality of friendships, coming from high-conflict households, and having a history of siblings with a similar problem would significantly predict greater absences, late arrivals, and early departures. In Step 3, we solicited feedback from district personnel who completed Step 2 to gain recommendations for further development of the online tracker.

Step 1: Estimating the Scope of the Problem Setting and Participants

Directors of Student or Special Services (administrators overseeing special education programming) for three

participating school districts were asked to complete a survey to estimate the yearly cost of SR-related absenteeism and cost of out-of-district placements (e.g., enrollment in alternative therapeutic schools) and in-district programming (e.g., group interventions, school task forces). The three school districts (grades K–12; total enrollment = 9,900) were suburban public school districts reflecting broad socioeconomic and racial/ethnic diversity. Percentage of students who qualified for free or reduced lunch ranged from 2% to 38% and ethnic diversity varied substantially across the three schools, where students identified as White/European American (66%, 72%, 38%), Black/African-American (1%, 1%, 9%), Hispanic (5%, 10%, 21%), Asian (25%, 13%, 24%), and other races/ethnicities (3%, 4%, 8%), respectively.

Survey and Procedure

Directors ($N = 3$) completed the District-Level School Refusal Survey, which was created for this study. This survey asked the respondent to estimate past-year prevalence and cost of attendance problems in his/her school district at three educational levels (elementary, middle school, high school). Respondents were asked to estimate the following: (a) number of students with greater than 5 absences related to anxiety or mood problems (to distinguish from cases of truancy); (b) number of students receiving home instruction due to SR; (c) number of students who were placed out-of-district due to SR; (d) estimate of dollars that out-of-district placements cost the district due to SR; (e) number of students who received in-district services due to SR; (f) estimate of dollars that in-district services cost the district due to SR.

Survey Results

Survey results from the three districts are reported in Table 1. Using the threshold of students who missed 5 or more days of school over the past year, directors of student services identified relatively few students ($M = 6.67$, $SD = 9.2$, range: 1–25 per district) who exhibited anxiety/mood-related SR compared to total enrollment numbers. However, intervening with these students appeared to require disproportionately substantial financial resources. Overall, directors estimated yearly average cost of anxiety/mood-related absenteeism at \$94,052 (range: \$0–\$277,587) for in-district programming (e.g., personnel for attendance task forces; school-based counseling groups) and \$496,657 (range: \$0–\$1,934,984) for out-of-district placements (e.g., paying for students to enroll in out-of-district therapeutic schools).

Step 2: Developing an Early Identification Tracker Overview

In Step 2, the university research team and the department of special services at one of the partner

Table 1

Prevalence and Cost Estimates of Anxiety/Mood Related School Refusal Across Three School Districts

School District	Level	Num of Schools	Enrollment	Greater than Five Absences (N)	Home Instruction (N)	In-District Services (N)	Cost of In-District Programs	Placed Out-of-District (N)	Cost of Out-of-District Placements (\$)
A	Elementary	4	1032	1	0	1	\$0	0	\$0
A	Middle School	1	592	4	3	10	\$5,000	1	\$100,000
A	High School	1	1018	6	3	20	\$5,000	2	\$110,000
B	Elementary	4	2372	25	0	-	\$62,416	0	\$304,899
B	Middle School	1	1391	NR	3	-	\$62,416	1	\$1,403,376
B	High School	1	1895	NR	7	6	\$62,416	4	\$1,934,984
C	Middle School	1	348	1	1	1	\$277,587	1	\$60,000
C	High School	1	496	3	0	4	\$277,587	3	\$60,000
<i>Mean (SD)</i>				6.67 (9.2)	2.13 (2.4)	7 (7.2)	\$94,052 (\$116,544)	1.5 (1.4)	\$496,657 (\$742,826)

Note. NR=not reported.

school districts collaborated to build a proof-of-concept online early attendance monitoring system to help identify youth with problematic absences, monitor trends, and to explore potential psychosocial correlates that might help identify students at greatest risk. Researchers and school-based administrators and counselors met regularly over the course of a school year to develop the online tracking system, to select items that counselors would monitor, to problem-solve issues that arose during data collection, and to interpret results. Results of this study were intended to provide pilot data to develop a formal automated identification system that could interact with current school student information systems and identify emerging attendance problems before acute episodes developed. Currently, most schools collect attendance data but do not analyze it routinely. The current pilot aimed to demonstrate that having data easily available could facilitate early detection of emerging attendance problems. The setting was limited to elementary schools due to an interest in identifying early instances of attendance problems which can predict later, more acute episodes of attendance problems (Kieffer et al., 2014).

Setting and Participants

Four school counselors (master's or certificate-level counselors) and an administrative assistant from a mid-sized, suburban school district in a mid-Atlantic state served as reporters of student attendance. The current study focused on the four elementary schools in the district, consisting of a total enrollment of 2372, 2.2% of whom were eligible for free or reduced lunch. Eligible students were enrolled in grades K–5 (ages 5–11), and 63% of students identified as White, 28% as Asian, 7% as Hispanic, 1% as Black/African American, and 1% as other/not identified. There were no exclusion criteria. Of the 409 students who breached the five absence criterion (see Procedures), 175 (42.8%) were girls. Mean student

grade ($M = 2.6$, $SD = 1.75$, range: K–5) reflected an even distribution across grades.

Measures

School counselors completed the Attendance and Critical Factors Survey (ACFS), which was created for this study (copies can be obtained by contacting the first author). This survey is a 31-item counselor-report questionnaire where counselors tracked student attendance at the end of each quarterly marking period and also rated the following common correlates of school attendance problems once the student first crossed the absence threshold (5 absences): student demographics (grade, gender), absence frequency (absences, lates, early departures), school history (new to school), academic supports (receipt of Individualized Education Plan [IEP] or 504 plan, individualized academic or behavioral plans offering student accommodations to address academic, behavioral or emotional impairment), family functioning (parent marital status; quality of parent response to SR problems; history of sibling with similar problem), friendships (presence of at least one good friend; friendship quality), and engagement with school (participation in extracurricular activities). Quality of friendships and participation in extracurricular activities were rated on a 0 (*Poorly connected/No activities*) to 10 (*Extremely integrated/Extremely active*) scale. All other items were rated *yes* or *no*. Counselors rated items based on interactions or familiarity with parents and students. In this school district, counselors were required to reach out to students (via email or phone) who crossed the five absence threshold.

Procedures: Development and Implementation of the Online Tracking System

Tracking occurred over the period of one academic school year. Teachers marked attendance for all students

in a centralized student management system. An administrative assistant monitored attendance and notified counselors if any students breached the five absence threshold. Counselors then added those students to a Google Tables spreadsheet, rated the ACFS, and then tracked attendance at the end of each quarterly marking period until the end of the year (180 days). Five absences was a natural threshold for this school district as five absences traditionally triggered an alert to be sent to counselors and parents of the student. Compared to the survey conducted in Step 1, the tracking criteria were expanded to include *all forms of absence* because, at this pilot stage, it would have been impossible for administrative staff and counselors to determine if student absences were due to distress (and not truancy). We did not want counselors or administrators making a priori decisions to “screen out” absences that appeared related to legitimate reasons (e.g., sickness) without formal assessment. Thus, non-SR absences were included in this sample. Students were added to the spreadsheet using a nonidentifying student ID and counselors would use this to track student absences. Counselors also rated each psychosocial correlate one time when the student was first identified. Google Tables was used because it was easy to use and because it met district operating/privacy standards. At this pilot stage of the online attendance tracker, it was also more feasible to use a freely available system than to program an add-on to the school’s current student management system (PowerSchool). If we had contracted to embed the detection system within one student management system, it could have limited later scalability; it was also considered premature at this early stage when the district was looking for initial proof of utility.

Analyses and Results

First, descriptives (mean, SD , range) were computed for absences, lates, and early departures across the four marking periods of the school year. Second, all predictors with sufficient range/variance (grade, student sex, whether the child was new to the school, receipt of an IEP or 504 plan, whether the student’s parents were

Table 3
Age, Absences, Lates, and Early Departures of Boy and Girl Students Identified as Missing Five or More Days ($N = 409$)

	Boys	Girls	Total
Age	8.26 (1.9)	8.05 (1.8)	8.18 (1.9)
Absences	7.73 (5.9)	8.22 (6.6)	7.94 (6.2)
Lates	7.95 (9.8)	9.42 (13.3)	8.58 (11.5)
Early Departures	1.70 (3.4)	1.22 (1.7)	1.49 (2.8)

divorced or separated, presence of sibling with attendance problem, presence of at least one good friend at school) were regressed on total absences, lates, and early departures in three hierarchical multiple regressions.

Of the 2,372 enrolled elementary school students, counselors/attendance data indicated that 409 (17.2%) breached the threshold of 5 or more missed days or lates during the year. Table 2 indicates that total absences, lates, and early departures were substantial and consistent across marking periods. The average student who crossed the threshold of 5 absences missed almost 8 full days a year (range: 0–49 absences), was late/tardy an additional 8.5 days (range: 0–117 lates), and had 1.5 early departures (i.e., left school early or was dismissed). Thus, a large proportion of students breached the school’s customary threshold of 5 absences which results in parents receiving early warning letters. Moreover, for a large proportion of students, absenteeism was observed throughout the year. Thus, attendance problems were not restricted to periods after school breaks (i.e., September after summer break, January after winter break). Lates and early departures were also common amongst these students.

Student age, grade (K–5), age ($M = 8.18$, $SD = 1.89$; range: 5–12 years), and sex were equally represented among students reaching threshold, and nonsignificant differences were found across yearly absences, lates, and early departures (Table 3). More boys ($n = 234$; 57%) were represented in the sample than girls ($n = 175$; 43%). However, boys and girls were nonsignificantly different in number of total absences ($M_{\text{boys}} = 7.73$ [5.96], $M_{\text{girls}} = 8.22$ [6.61]), lates ($M_{\text{boys}} = 7.95$ [9.8], $M_{\text{girls}} = 9.42$ [13.3]), and early dismissals ($M_{\text{boys}} = 1.70$ [3.37], $M_{\text{girls}} = 1.22$ [1.73] (all ANOVA p ’s = ns).

Table 2
Mean (SD) and Range of Absences, Lates, and Early Departures Across Marking Periods (MP) for One School District (Four Elementary Schools)

	Absences			Lates			Early Departures		
	M	SD	range	M	SD	range	M	SD	range
MP1	3.9	4.61	(0-31)	4.03	4.07	(0-30)	0.96	1.23	(0-6)
MP2	4.57	3.67	(0-18)	4.51	4.64	(0-32)	1.12	1.48	(0-7)
MP3	4.25	3.17	(0-18)	2.96	3.54	(0-24)	1.58	1.63	(0-9)
MP4	3.01	2.89	(0-14)	5.81	5.29	(0-31)	1.99	2.35	(0-18)
Total	7.94	6.24	(0-49)	8.58	11.47	(0-117)	1.49	2.79	(0-25)

Table 4
Characteristics of Students Who Missed Five or More Days Based on the Attendance and Critical Factors Survey ($N = 409$)

	<i>n</i> (%)
New to school	27 (6.6)
Individual Education Plan	51 (12.5)
504 Plan	15 (3.7)
Divorced Separated parents	36 (8.8)
At least one good friend	397 (97.1)
Sibling with problematic attendance history	193 (47.2)

Table 4 reports the characteristics of students who missed 5 or more days based on counselor report on the ACFS. Nearly half of these students had a sibling with a similar attendance problem, about 16% qualified for an IEP or 504 plan, only 9% came from family situations involving parent separation or divorce, and most had at least one good friend. **Table 5** reports results from three separate simultaneous regression analyses predicting

Table 5
Simultaneous Regression Analyses Predicting Yearly Absences, Lates, and Early Departures in Three Separate Models

Yearly Absences	Std β	<i>t</i>	<i>p</i>
Constant		4.62	0.00
Grade	0.02	0.30	0.76
Female	0.01	0.17	0.87
New to School	-0.05	-0.85	0.39
Individual Education Plan	0.01	0.19	0.85
504 Plan	0.16	2.90	0.00
Divorced/Separated Parents	-0.01	-0.25	0.80
Sibling with Poor Attendance	0.10	1.85	0.06
Presence of good friend	-0.06	-1.06	0.29
Yearly Lates	Std β	<i>t</i>	<i>p</i>
Constant		1.09	0.28
Grade	0.11	2.05	0.04
Female	0.06	1.16	0.25
New to School	0.02	0.35	0.73
Individual Education Plan	0.06	1.13	0.26
504 Plan	-0.01	-0.20	0.84
Divorced/Separated Parents	0.14	2.78	0.01
Sibling with Poor Attendance	0.29	5.56	0.00
Presence of good friend	-0.04	-0.77	0.44
Yearly Early Departures	Std β	<i>t</i>	<i>p</i>
Constant		1.33	0.19
Grade	0.08	1.50	0.14
Female	-0.11	-1.93	0.05
New to School	0.09	1.68	0.09
Individual Education Plan	-0.04	-0.67	0.51
504 Plan	-0.03	-0.62	0.54
Divorced/Separated Parents	-0.05	-0.84	0.40
Sibling with Poor Attendance	0.12	2.23	0.03
Presence of good friend	-0.02	-0.31	0.76

yearly absences, lates, and early departures from ACFS predictors. Total yearly absences were associated with having a 504 plan and having a sibling with a similar attendance history (at the trend level). Number of lates was associated with higher grade level, having divorced or separated parents, and having a sibling with a similar history. Early departures was associated with male sex, having a sibling with a similar history, and, at the trend level, being new to the school.

Step 3: Revising the Monitoring System Based on Feedback

After using the ACFS to monitor attendance issues over a school year, participating counselors were asked to provide feedback about (a) their experience tracking attendance problems and predictors, (b) helpful aspects of the attendance tracker they used, (c) barriers they experienced when tracking attendance problems, and (d) recommendations for improving the tracking system, including additional factors to track. Qualitative feedback from counselors indicated four common themes. First, counselors noted several helpful aspects of tracking attendance, including that the system supported their job objectives in identifying the students in greatest need of services. For example, one counselor commented that tracking regularly, “Increased my awareness of which students in the school I should be monitoring and supporting.” Another noted that “I began to notice patterns of attendance, especially the frequency at which students are late in the morning.” Second, rating each student on a series of psychosocial correlates helped them consider each student in a more comprehensive way. One counselor noted that “It helped me realize that each student has different factors that might play into attendance problems—for some it was family issues, for others it was social or peer issues.” A third theme counselors noted was how tracking attendance and psychosocial variables provided a useful launching pad from which to have a conversation with parents. One counselor noted that the information she had gathered to complete the survey helped “start conversations with parents/families about helpful morning routines and factors that might be contributing to attendance issues.”

Finally, counselors identified barriers to regular tracking and suggested changes for future iterations. The frequency of tracking (originally once a month and then modified to once a marking period) was burdensome: “Tracking on a monthly basis was taxing; prefer to do it quarterly at end of each marking period.” The number of psychosocial correlates also appeared taxing: “Currently there seems to be too many variables to track. I believe if we modify our form it would be easier to use.” These comments suggest, unsurprisingly, that perceived usability (ease and appeal) and feasibility (fit within time and resource constraints) of the system will dictate

acceptability and sustainability of the system even though it helps counselors perform their duties better.

After reviewing this feedback among the team (researchers, administrators, counselors), modifications were made to the system to increase feasibility and usability in the upcoming school year. First, tracking and rating tasks were split between school staff such that department secretaries could complete attendance tracking and counselors would rate psychosocial correlates. School secretaries had access and familiarity with the schools' computer-based attendance database, making it easier to scan large numbers of attendance records. As they downloaded this data, they would identify students at risk (≥ 5 absences, lates, or early departures). Counselors could then focus on rating psychosocial correlates for the students identified at risk. This division of labor helped optimize each team member's skill set and focus counselor efforts on rating academic, social, and family functioning. Beyond this, the school team devised a color-coded scheme (green, yellow, red) to rank level of concern in student attendance. The school team based this ranking system on number of absences and family situation, which left many judgement calls. An empirically based socio-emotional risk system is warranted. In the end, counselors, administrators, and researchers recommended the system would be enhanced if the online system automatically synced and communicated with the district's local student management system. This would decrease administrative tasks (tracking attendance, lates, and early departures) and permit staff to focus on outreach and intervention.

Discussion

This paper described the iterative development of an attendance tracking and early detection system through a research-community partnership. Partnership outcomes included survey data that estimated the scope of SR-related attendance problems across three diverse school districts together with pilot testing of an attendance monitoring system over the course of one school year.

Scope of Attendance Problems

Results from the counselor-reported monitoring system (Step 2) provided evidence that attendance problems are a substantial issue, as school counselors reported that 17.2% of elementary aged students missed or were late to school for at least 5 days over the course of an academic year. Counselor-tracked absences tracked absences of all kinds, including those due to anxiety and mood problems. In the district-wide surveys focusing exclusively on anxiety/mood-related absences (Step 1), directors of student services estimated a smaller number of students met this threshold, but they also estimated that addressing absenteeism is a costly proposition. Average yearly district expenditures reached \$94,052 for in-district programming

and \$496,657 for out-of-district placements for anxiety and mood-based attendance problems. These estimated costs highlight the substantial impact that providing responsive intervention can be for students who require it.

The differential absence rates reported by counselors and directors are likely related to the different inclusion criteria used by each group. Directors were asked to estimate frequency and cost of attendance problems related to anxiety or mood/depression (SR) problems. This represents a potentially smaller set of students than were identified by the counselors who were asked to track students who had accumulated five absences or lates, regardless of the reason. The larger percentage of students (17%) identified by the counselors included students who were likely absent for truancy, medical absences/leaves, family vacations, and planned absences (e.g., sporting events, doctor's appointments); however, anecdotally, counselors reported that the majority of anxiety/mood-related absences accounted for the majority of absences they reported. Consistent with recommendations in the literature (e.g., Kearney, 2008), we wanted to include all reasons for absences as evidence shows that the early stages of attendance problems are difficult to distinguish from normative, transient absences. Not all of these students will go on to develop problematic absenteeism. Nevertheless, accumulating even five absences or lates for any reason is useful as an early-warning sign given that the Department of Education sets its definition of chronic absenteeism at 10 missed school days for any reason in a given school year (Lynch, Burwell, Castro, & Duncan, 2015).

It is important to consider the value of local school observation conducted by personnel who have closer relations with students. School counselors were familiar with the students they were monitoring, had established prior contact with most, and had greater opportunity to interact with students (and parents) on a regular basis than Directors. Local school counselors are likely to detect emerging attendance problems that may never be reported to district administrators. As schools build systematized attendance systems, it will be important to retain the participation of local stakeholders (counselors, teachers) who will be most familiar with the student body and can detect and respond to emerging difficulties (Mac Iver & Mac Iver, 2010).

Predictors of Absenteeism

Regression analysis using school counselor reports (Step 2) indicated that students who qualified for section 504 plan/IEP were more likely to have a higher number of absences over the course of the school year. This finding was consistent with past research that has linked absenteeism with academic achievement (Last & Strauss, 1990; McShane, Walter, & Rey, 2004), academic self-

concept (Corville-Smith, Ryan, Adams, Dalicandro, T. & 1998), and academic disengagement (Kearney, 2008). The current finding could suggest that youth who have been diagnosed with specific psychosocial disorders or who require academic supports are more vulnerable to extended absences. If this were true, any automated attendance tracking system would want to include academic problems as a risk factor for problematic attendance. Alternatively, these findings could be capturing an effective response intervention on the part of the school. Our findings (which are bidirectional) could be indicating that youth who had been previously identified with school attendance problems were also identified by school staff as eligible for an IEP or 504 plan. This would suggest that these students were appropriately receiving remediation services, perhaps, in part, because of their poor attendance.

Results showed that having a sibling with a similar attendance history was positively associated with greater absences over the course of the school year. While not directly explored here, co-occurrence of attendance problems among siblings has the potential to suggest factors related to parenting, household environment, family resources, or broader community factors. From a parenting perspective, parents who feel ill equipped to handle oppositional behavior or who have difficulty tolerating the distress shown by a school-refusing youth may have difficulty promoting full school attendance across siblings (e.g., Corville-Smith et al., 1998; Kearney, 2008). Likewise, when siblings see their parents modeling acceptance of poor school attendance with older siblings, poor attendance may generalize to younger siblings. Chaotic or disorganized family environments where little morning structure or routine is established have also been connected with poor school attendance (e.g., Carless, Melvin, Tonge, & Newman, 2015; Kearney, 2008; Kearney & Silverman, 1995). Limited family resources may also serve as a barrier to child attendance. For example, single-parent households and households where parents work multiple jobs may limit the time, energy, or tangible resources to consistently promote good attendance (e.g., Egger et al., 2003; Kearney, 2008; Lyon & Colter, 2007). In the current study, having divorced/separated parents was associated with increased lates. Age was also associated with higher frequency of lates. This is consistent with findings that attendance problems are associated with older ages (e.g., Hansen, Sanders, Massaro, & Last, 1998; Heyne et al., 2015; Last et al., 1998) and reinforces proposals that earlier interventions may help prevent more intractable absenteeism later in adolescence (e.g., Kearney, 2008; King & Bernstein, 2001; McShane et al., 2001; Okuyama et al., 1999). Including these factors (sibling history, family factors, age) in any early identification system may help pinpoint youth at greatest risk for chronic absenteeism. Information about

these factors also provides targets for psychosocial intervention.

Implementation Feedback

Assessing the usability, feasibility, and overall effectiveness of the tracking system from the lens of school staff (Step 3) provided us with helpful feedback concerning future directions of attendance monitoring systems. School personnel consistently reported that they found that tracking attendance helped them identify students at highest risk for chronic issues, consider psychosocial factors that could be associated with a student's absenteeism, and develop collaborative relationships with families. An unforeseen positive outcome of this study was the response towards intervention shown by school personnel once they became aware of students' negative attendance patterns. Counselors found that the process of actively monitoring attendance naturally led them to intervene actively, even without specific instruction to do so. Their experience supports the notion that providing schools with feedback on a regular basis is a critical step in an early detection model, and can be the difference in moving schools towards action before SR escalates.

School counselors also reported that the tracking process required a significant amount of time to complete effectively. Future iterations of an attendance monitoring system could involve improved usability and sustainability by automating attendance tracking and providing ongoing feedback to stakeholders (e.g., counselors, parents). Naturalistic, real-time feedback has the power to correct early attendance problems as research has shown that behavioral monitoring can alter behavior even without the benefit of intentional intervention (e.g., Nadeem et al., 2016). Current student management systems, or third-party add-on extensions, could be programmed to interact with the school's local attendance data base and provide regular reports and feedback to parents and school staff (teachers, counselors, administrators). Feedback could be as simple as a colored dot (green, yellow, red) to alert parents to unproblematic, emerging, or severe absenteeism or it could include graphs or figures to highlight trajectories and patterns of absences (e.g., missing each Monday). Empirical data is still required to inform such a system (i.e., to determine designation as unproblematic, emerging, or severe). Future research will want to use large databases to empirically determine the threshold for varying levels of concern and tiered responses (Kearney & Graczyk, 2014).

The current study suggests that student/family variables (age, sibling history, IEP status) can help predict absenteeism. Incorporating the assessment of known socio-emotional risk factors into a system that includes absences, lates, and early departures may produce a

powerful multifactorial algorithm that could make early detection more robust and guide triage decisions to appropriate interventions. This initiative to establish an attendance monitoring system dovetails other efforts to incorporate progress monitoring into health care (e.g., Steinfeld, Franklin, Mercer, Fraynt, & Simon, 2016) and schools. For example, Deno et al. (2009) described efforts to develop a screening and progress-monitoring system to track reading progress of at-risk students (i.e., students who performed in the bottom 20% on selected reading measures). Nadeem et al. (2016) developed a classroom-focused measurement feedback system, which enabled teachers to implement evidence-based techniques to target student emotional and behavioral difficulties. Data collection using a dashboard tracking system and involving key stakeholders (e.g., classroom teachers, social workers, district leaders) was pivotal in helping teachers to incorporate these strategies in their classrooms effectively.

Limitations and Future Directions

Several limitations of this pilot must be considered. First, the initial survey of directors (Step 1) relied on self-report data from three school districts, and the early detection prototype (Step 2) was implemented in four schools of one school district. The limited sample was chosen to explore the need for, and feasibility of, an online early detection system, but all generalizability is limited to this small set of schools. Second, two sets of criteria (all absences vs. anxiety/depression-related absences) were used for the Director's survey (Step 1) and attendance tracker (Step 2), making comparisons across assessments difficult. Third, teachers, parents, and students did not participate in the study and so did not contribute to ratings of hypothesized predictors. Future iterations should incorporate the additional perspectives of these stakeholders in early detection and intervention. Fourth, standardized assessments of predictors were not used because available assessments were considered too long to be practical. Thus, results should be viewed tentatively due to lack of established measure reliability.

This proof-of-concept demonstration suggests feasibility. Future iterations would benefit from including a more diverse school/student population, compare the current assessments to standardized assessments, refine/standardize definitions of attendance thresholds at which to conduct further assessment, and include multiple sources (youth, parent, teacher report) of student behavior. Further, additional predictors that have been linked to attendance problems, such as bullying (Havik et al., 2015), could be added to the predictor battery. By setting up a database that includes a larger set of attendance and predictor variables, future iterations of the detection system can make use of machine learning to develop computer-based algorithms to

predict which youth are at greatest risk of attendance problems (and different types of attendance problems) based on a multidimensional socio-emotional-scholastic profile. Future software/technological development should aim to optimize communication between the early detection tracker described herein and current student information systems. This could be accomplished by developing independent software extensions that connect with current student management systems or by building off of publically available platforms. Using publically available platforms may enhance scalability both nationally and internationally, but they may not meet the privacy or legal regulations of all districts. The goal would be to automate the tracking process, produce attendance patterns and early alerts, and enhance communication across the diverse software platforms that exist on the market. Developing such tools can ease the administrative and technical burden that schools face in tracking absenteeism as a critical early indicator of academic problems and socio-emotional concerns. It also provides a system that can improve communication between school and parents in alerting families to early concerns.

Conclusion

Establishing a research-community partnership, we developed the basis for an early absenteeism identification system that actively incorporated key stakeholder input and pilot tested functionality in real-world community settings. Developing the system in a community that would be a potential end-user and incorporating stakeholder feedback maximizes the potential for long-term implementation and sustainability (Beidas et al., 2011). The attendance monitoring system was experienced as potentially useful in identifying students at risk for SR and other attendance problems and helped counselors initiate personalized interventions. Collecting youth demographic, family, and educational factors revealed that several psychosocial variables may correlate with attendance problems and may be useful in developing an empirically based algorithm that helps identify youth most at risk for problematic absenteeism. Counselor feedback indicated the clear need to enhance automaticity of the system. In sum, this report provides the basis for a potentially useful and acceptable tool to identify and address serious attendance issues, such as school refusal.

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