Introduction

Health-risk behaviors cluster or co-occur among youth populations [1-3], leading to increased risk for overweight/obesity and related chronic illnesses [4]. However, evidence specific to middle-school aged youth remains limited. In the current study the prevalence of multiple risk behaviors among middle-school aged youth are described and examined for co-occurrence. Outcomes are expected to inform the development of future research and intervention efforts among similar youth populations.

Methodology

Youth were recruited from health classrooms through teacher partnerships. All study procedures were approved by the University Institutional Review Board. Participating youth were asked to complete a 10 to 15-minute paper-and-pencil questionnaire asking about their multiple health behavior, including their weekly physical activity, daily television viewing time, daily fruit and vegetable servings, alcohol use, cigarette use, and smokeless tobacco use. Youth also self-reported their age, gender, height and weight (calculated to body mass index (BMI), adjusting for age and gender). Classroom teachers reported class-level ethnicity and grade-level. Based on guidelines recommending youth perform at least 60 minutes of daily physical activity [5] youth were asked to report the number of days they perform 60 minutes of physical activity during a typical week. Those reporting less than 7 days a week of 60 minutes of physical activity were determined at-risk for physical inactivity. Daily television was also reported; youth reporting more than two hours per day were considered at-risk. Youth also reported their daily fruit and vegetable consumption, and those reporting less than 5 servings of fruit and vegetables were considered at-risk. Finally, youth who reported previously trying alcohol, cigarettes, and/or smokeless tobacco were considered at-risk.

Statistical Analysis

Risk for each health behaviors were described, as well as the prevalence of multiple health-risk behavior. Observed to expected ratio method (i.e., O/E > 1) was used to test significant clustering of behavioral risk factors with 95% confidence intervals. A larger observed value indicated that behavioral clustering among the examined risk behaviors was more likely to occur than any one singular risk behavior [1].

Results

Participating children were 7th (95%) and 8th (5%) grade middle school students (n=105) from two schools in Ohio (25%) and Indiana (75%). Children included in analyses were predominantly Caucasian (>95%), 50% female, and 39% were overweight/obese. Table 1 illustrates health risk percentages by gender. Physical inactivity was the most common risk behavior (61% of youth), followed by inadequate fruit/vegetable consumption (38%), excessive sedentary behavior (33%), having ever tried alcohol (28%), having ever tried smoking (20%) and having ever tried smokeless tobacco (6%). Relative to multiple health behavior; 15% of youth reported no risk behaviors, 28% reported one, 26% reported two, 21% reported three, 10% reported four, 1% reported five, and no youth reported all six risk behaviors. Table 1 contains multiple health risk with O/E ratios over 1, including 16 risk behavior clusters, and three statistically significant clusters.

Abbreviations: PA: Physical Inactivity; TV: Television; FVC: Fruit and Vegetable Consumption; SMK: Cigarette Smoking; SMKL: Smokeless Tobacco; ALC: Alcohol
Discussion

The current study investigated the prevalence multiple health risk behaviors among middle-school aged youth, examining risk behaviors singularly and clusters. To date, few studies have examined the prevalence of multiple risk behaviors among middle-school aged populations. Although direct research comparisons are limited, current results are similar to previous risk health behaviors examinations among similarly aged youth are limited to date. The unstandardized measurement of health behaviors across studies is a second limitation, preventing direct comparison of current outcomes. To further expand on current outcomes, additional research among middle school-aged children using larger, more representative sample is warranted. Additionally, future research should evaluate potential social and environmental interactions contributing to the occurrence and co-occurrence of multiple risk behaviors.

Table 1: Clustering patterns of multiple behavior risk.

| Risks | Behavioral Cluster | O/E Ratio | Confidence Interval  (95%) |
|-------|--------------------|-----------|---------------------------|
| 2     | PA_TV^             | 1.28      | 0.47, 2.08                |
| 2     | PA_FVC^            | 1.20      | 0.48, 1.92                |
| 3     | PA_FVC_ALC^        | 1.88      | 0.40, 3.36                |
| 3     | PA_SMK_SMKL        | 4.63      | -6.64, 14.06              |
| 3     | PA_SMK_ALC         | 1.51      | -0.60, 3.62               |
| 3     | TV_FVC_SMK         | 3.08      | -1.23, 7.41               |
| 3     | TV_SMK_ALC         | 4.74      | -1.87, 11.30              |
| 3     | TV_SMKL_ALC        | 9.22      | -8.86, 26.86              |
| 3     | FVC_SMK_ALC        | 2.01      | -1.99, 6.03               |
| 4     | PA_TV_FVC_ALC      | 1.88      | -0.25, 4.01               |
| 4     | PA_TV_SMK_ALC      | 4.55      | -0.61, 9.75               |
| 4     | PA_FVC_SMK_ALC     | 1.28      | -1.27, 3.83               |
| 4     | PA_SMK_SMKL_ALC    | 24.16     | -9.80, 59.30              |
| 4     | TV_SMKL_SMKL_ALC   | 37.84     | -32.47, 98.48             |
| 5     | PA_TV_FVC_SMK_ALC  | 2.57      | -2.50, 7.58               |

Conclusion

Certain limitations and strengths of the current study are notable. First, the current study included a relatively small sample size (n=105), limiting generalizability. On the other hand, multiple health behavior examinations among similarly aged youth are limited to date. The unstandardized measurement of health behaviors across studies is a second limitation, preventing direct comparison of current outcomes. To further expand on current outcomes, additional research among middle school-aged children using larger, more representative sample is warranted. Additionally, future research should evaluate potential social and environmental interactions contributing to the occurrence and co-occurrence of multiple risk behaviors.

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