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Crossing guard presence: Impact on active transportation and injury prevention

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ABSTRACT

Evaluation of increased crossing guard presence on the likelihood children using safe active transportation (AT) was conducted during the simultaneous hiring of multiple crossing guards. The primary study aim was to determine if increased crossing guard presence was associated with (1) an increased number of children walking/biking to school, (2) diminished parental safety concerns, (3) an increased likelihood of parents allowing their child to walk/bike to school, and (4) an increased number of children utilizing supervised routes.

A quasi-experimental study design was conducted at study intersections in experimental and control schools (matched by neighborhood, rate for risk of pedestrian injury, and socio-economic status). Only experimental schools received awareness campaigns and a newly positioned crossing guard. Measurements taken pre/post-guard placement assessed trends of AT rates among the school's population, and Parent Surveys were utilized to determine if crossing guard presence changed parental attitudes toward AT and/or perceptions of safety.

Pre/post-program implementation evaluation did not reveal significant changes in trends of AT; parental safety concerns; parental attitudes towards AT. Though experimental schools showed fluctuations in travel trends, no indication of either improvement or worsening of attitudes was found. Significant (noticeable) differences in pre/post-program implementation were identified in the fourth study aim, the number of children utilizing supervised routes vs. unsupervised routes. Also the control school showed no discernible changes from pre to post-program implementation.

Study findings demonstrate that increased crossing guard presence is most likely to influence safe behavior as indicated by the increased numbers of children engaging in predictable pedestrian behaviors through their use of supervised routes. Results suggest a prioritization towards engaging in and acknowledging safety before physical activity in areas with existing high rates of AT to and from school. Future studies will include longer observation periods, longer interventions, and lower rates of existing AT.

1. Introduction

The relationship between health and safety has received a great deal of attention; particularly that of active transportation (AT; e.g. walking or bicycling) and prevention of injuries to people walking or bicycling. Most recently public health professionals acknowledged that transportation is a point of intervention that is generalizable to the entire community, and can easily address issues of wellbeing (APHA, SRTS 2012). In support of this concept, there is a growing body of evidence linking the built environment to the health of its residents (Carlson et al., 2012; Jackson et al., 2013; Renalds et al., 2010; Rodriguez, 2009). However, along with the physical infrastructural improvements which promote more walking or biking, there is a critical need for programs (public health and transportation alike) to not only design effective ways to keep communities healthy, but injury free. As indicated in a recent report by the Centers for Disease Control

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and Prevention (CDC), motor vehicle crash incidents continue to be the number one cause of unintentional injury/death in children with nearly one in five traffic deaths occurring among children ages 14 and under (CDC, NCIPC 2012). Statistics such as these justifiably discourage parents from allowing their children to walk or bike to school, and consequently result in the reduction of opportunities for children to engage in daily physical activity.

It is necessary, then, to identify a common theme between AT and injury prevention which will facilitate desirable outcomes in both. Recent studies focusing on this relationship have indicated the value of interventions which promote both injury prevention and physical activity through AT (Carver et al., 2008; Dimaggio, Li, 2013; Gropp et al., 2012; Litman, 2013; McDonald et al., 2013; Rothman et al., 2013). In the following study we aimed to determine the relationship between the presence of a crossing guard (a person trained and sometimes certified to help pedestrians, particularly schoolchildren, cross intersections safely), and children's rate of AT. Crossing guards are primarily associated with injury prevention discouraging negative behaviors in motorists' such as speeding, while promoting predictable, safe street crossing behaviors of children (Renalds et al., 2010). Exploring the potential role of crossing guards to address injury prevention and health promotion may offer valuable information towards an effective and efficient intervention to address both simultaneously.

The specific aims of the following study were to determine whether the increased number of crossing guards at targeted schools, would result in (1) an increased number of children walking/biking to school, (2) diminished parental safety concerns, (3) an increased likelihood of parents allowing their child to walk/bike to school, and (4) an increased number of children utilizing supervised routes. The study was conducted in Miami-Dade County, Florida which is considered one of the four most “dangerous metro areas for walking” in the United States (Ernst et al., 2011). Though specific causes for the high pedestrians-hit-by-car (PHBC) rates are unclear, transportation experts consider factors such as early infrastructural city planning tending towards auto-centrism due to urban sprawl (Ewing et al., 2003; Ewing and Dumbaugh, 2009), and the local climate (extended daylight and warmth encouraging outdoor activities) as potential culprits (Kourtellis et al., 2012). Moreover, Miami-Dade County's cultural and geographic diversity lends itself to social and environmental factors found to be closely associated with high PHBC injury rates (Cottrill and Thakuriah, 2010; Laflamme and Diderichsen, 2000; Loukaitou-Sideris et al., 2007; Morency et al. 2012; Zegeer and Bushell, 2012). The most palpable characteristic in Miami-Dade County is the persistent motor vehicle culture amongst the community, which despite current transportation perspectives to emphasize awareness of multi-modal transportation as well as pedestrian and bicycle safety, easily sustains the high rates of vulnerable road-user injury due to car crashes.

Within the City of Miami, where the current study was conducted, some of the highest PHBC rates have been documented (FDOH, 2012). The demographic and environmental characteristic of the City of Miami reflect a small geographic area that is densely populated with majority low to moderate income neighborhoods characterized by the predominance of the language spoken (Haitian-Creole, Spanish, or English; U.S. Census Bureau, 2010). Safe Routes to School (SRTS) Student Tallies reveal that within the City of Miami a high percentage of school aged children walk and bike to school predominantly not supervised by an adult (parent or guardian). Compounding the potential risk of pediatric injury due to high numbers of unsupervised children walking, is the number of crossing guards which on average is less than one per school within the City of Miami as compared to the rest of the county which is over four per school. (provided by Miami Dade County Police Department and the City of Miami Police Department). Furthermore, SRTS Parent Surveys obtained from parents of public school children throughout the City of Miami (these Parents Surveys were provided in Haitian-Creole, Spanish, and English to accommodate the community) revealed that parents are fearful and reluctant to allow their children to walk or bike to and from school because of concerns of the amount of traffic, the speed of traffic, crime, and insufficient crossing guard presence.

The opportunity to research the effectiveness of crossing guard presence on health and safety within a heavily public health burdened (high rates of injury, insufficient pedestrian/bicycle safety enforcement, high rates of unsupervised pedestrian ATs) area such as the City of Miami became possible through a CDC Communities Putting Prevention to Work grant obtained by the City of Miami Police Department (approximately $200,000). The grant secured one year of funding to hire, train, and equip 24 new crossing guards to be placed at multiple Miami-Dade Public elementary schools in the City of Miami during the 2011–12 school year. Research on the impact of newly and simultaneously placed crossing guards at various schools could help to determine if utilizing a simple, relatively low cost modification/ intervention (average wage for Florida crossing guards is $9.00 per hour) could influence two public health concerns, injury prevention and health promotion. Within a framework defined by Social Cognitive Theory (Bandura, 1998), the proposed intervention, the crossing guards, might positively influence the currently unsupervised children participating in active transportation to and from school to incorporate safe pedestrian behaviors role-modeled by the crossing guard. Furthermore, as way to increase the numbers of children walking to and from school, parental awareness of newly placed crossing guards might influence and increase a parent's sense of safety and level of confidence towards allowing their children to participate in active transportation. Children not participating in active transportation might also be influenced to walk more by their peers whom after placement of new crossing guards are walking in a safer environment.

Currently there is limited research on the benefits of utilizing crossing guards within the described theoretical framework, or any other. Therefore, findings from this study revealing the potential correlation between increased crossing guard presence and increased rates of AT may guide public health policy and practice debates regarding ways to successfully decrease the rates of pediatric pedestrian injury while supporting an increase in AT. Moreover, identification of simple interventions which can sustain existing high rates of AT while further increasing the numbers of safe walkers and cyclists, may provide insight towards “more eyes on the streets” strategies to deter crime and traffic related injury (Jacobsen, 2003; Leden, 2002; Robinson, 2005) issues which are relevant to the current study site, and which may be generalizable to other areas.

2. Methods

2.1. Study schools/intersections

Intervention schools were selected from a City of Miami Police Department prioritization list developed to systematically place a total of twenty-four grant funded crossing guards at fourteen Miami Dade County City of Miami elementary schools with the greatest urgency for crossing guard presence. Prioritization was based on documented high rates for pediatric pedestrian injury, presence of main traffic arteries, school population, local traffic volume, as well as the existence of a large number of unsupervised children walking to and from school.

Control schools were selected from municipalities adjacent to but outside of the City of Miami since these municipalities would not be included within the grant funding to hire new crossing guards. As a result, no new crossing guards would be added to the control schools. Control group schools were matched within-group intervention schools based upon selected demographic and injury rate criteria: (1) current rates of active transportation to/from school; (2) total student population; (3) socio-economic status, as approximated by the percentage of students eligible to receive free or reduced-price lunch; and (4) surrounding built environment (e.g., presence or absence of adjacent highways, medians, pedestrian infrastructure). Control schools exhibited identical crossing guard conditions (unchanging number of crossing guards and unchanging number of guarded intersections) during both the "pre" and "post" data collection periods while intervention schools received the intervention (new crossing guards and an awareness campaign; please see below for detailed description of the interventions).

2.2. *Experimental design*

A quasi-experimental design was utilized in which the intersection was the unit of analysis. Power analysis was conducted with G*Power 3.1.7 for Windows, for ANOVA Repeated Measures, within-between interaction. Effect size and Power were adjusted for a more stringent analysis to compute sample size, 0.01 and 0.99, respectively, and the sample size considered to be statistically significant for an F test was 44. Based on the power analysis, the final sample size utilized within the study totaled 58 intersections (34 intervention and 24 control study intersections sites) was adequate to test significance of the intervention. Positioning and quantity of new and existing crossing guard posts at each study intersection was confirmed through communication with the City of Miami Police and Miami-Dade County Police Department. Furthermore, study site intersections of both intervention and control intersections were characterized by the "absolute" presence of a crossing guard. Therefore, both intervention and control intersection sites were defined as either "supervised" (an intersection where a crossing guard was ALWAYS positioned and present throughout pre–post intervention) or as "unsupervised" (an intersection where a crossing guard was NEVER positioned or present throughout pre–post intervention). Contrary to an "absolutely" supervised or unsupervised intersection (control and intervention), a crossing guard may have been moved to another intersection, but this change would not have modified the number of crossing guards or the number of intersections guarded at a school. Only intervention schools consisted of the situation where a new crossing guard was added to an intersection. All study intersections were located adjacent to or within a block distance of the school entrance.

2.3. *Intervention*

The intervention schools received two components: (1) the positioning of the newly hired crossing guards and (2) the implementation of an awareness campaign. The awareness campaign consisted of an automated phone message (Connect Education Messaging System) provided by Miami-Dade County Public Schools notifying all school faculty, staff, and parents of the presence of the new guards and their location. The awareness campaign also included school administration announcements (to the student body, faculty, and parents) and handouts, customized for each school by the WalkSafe office, detailing school specific crossing guard location maps and safety information. The campaign was scheduled to occur at two different time points: February of 2012 (immediately after placement of 10 new crossing guards placed at the intervention schools) and April of 2012 (3 months following placement of new crossing guards). Control schools did not receive either of the two intervention components (placement of newly hired crossing guards or an awareness campaign).

2.4. *Data acquisition*

Prior to and post-intervention (crossing guard placement and awareness campaign), the following data were collected: (1) trends in AT rates (determined by a tally of street crossing by walking, biking, and skating) among the school's population were detected through headcount tallies gathered at study intersections, and (2) changes in parental attitudes/beliefs were assessed through survey data. Data collected through counts of child and adult intersection crossing was documented via the School Monitoring Tool which consisted of an Instructional Sheet, Head Count Sheet, and Infrastructural/Environmental Notes Sheet. The study research team underwent a standardized training session and a review of protocol and research measures prior to data collection to ensure inter-coder reliability. The Instructional Sheet provided observers the following guidelines: A child was considered any school-age subject (ages 0–17 [Note, the age range included children older than the elementary school intervention target group in order to account for all child pedestrians which may have included those from nearby middle or high schools]; all other persons would be counted as adults); individuals counted using any form of AT (walking, bicycling, or skating) must fully cross the intersection either from corner-to-corner, corner-to-mid street, mid street-to-corner, or diagonal-crossing (Fig. 1; see "check marks"); individuals crossing mid street-to-mid street crossing should not be counted (Fig. 1; see "X's"); individuals crossing the intersection regardless of direction (towards school, away from school, etc.) would be counted; individuals crossing the intersection more than once (in any of the manners described above) would be counted each time crossed. This data was documented in the Head Count Sheet. The Infrastructural/Environmental Notes Sheet provided a list of infrastructural and environmental characteristics (lighting, ped/bike signage, signals, traffic volume, visual screens, sidewalks, etc.) for observation and for notation of each (existing, lacking, or requiring maintenance). These observation counts and notations were collected by research staff at specific intersections at each school for a total of eight separate data collection periods (four data collection periods for pre-intervention and four data collection periods for post-intervention). Pre-intervention data collection occurred in May/June 2011, November/December 2011 while post-intervention data collection occurred in November/December 2011 and April/May 2012. Headcount tallies were analyzed statistically through Analysis of Variance Within/Between Groups as a way to provide an accurate method of detecting a potentially causal association between crossing guard presence and increased pedestrian/bicycle traffic at school intersections, while controlling for potential community-level effects on rates of active transportation occurring between pre- and post-data collection time points.

To measure parent's attitudes and beliefs towards their child's use of AT to and from school, Safe Routes to School (SRTS) Parent Surveys (http://www.saferoutesinfo.org/sites/default/files/resources/Parent_Survey_English.pdf) were utilized. The survey questions to parents centered around their child's transportation to and from school (how the child travels to and from school; the distance they live from the school; the appropriate age to walk or bike to school) and influential factors that might affect the parents decision to allow their child to walk or bike to school (distance, lack of crossing guards, crime, speed of traffic, etc.). The SRTS Parent Survey is a reliable (McDonald et al.,

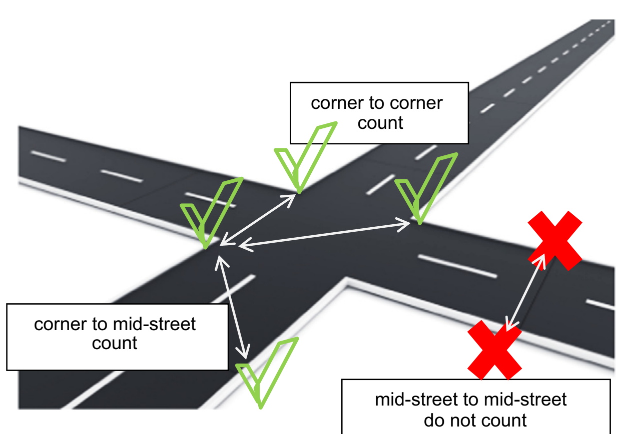

Fig. 1. Standardization for street crossing counts.

2011), national surveillance tool used to obtain parental attitudes and beliefs related to their child's use of AT to and from school. The WalkSafe program has utilized this tool for several years successfully obtaining parent feedback. In the following study, responses from a representative sample of the population at both intervention and control schools were obtained by providing the SRTS Parent Surveys in English, Spanish, and Haitian Creole. Determined by Miami Dade County Public Schools (MDCPS Statistical Highlights 2011–2012), as the top three languages most spoken at home by students, the return rate of these surveys in each of these languages was consistent during all testing periods (pre-intervention testing, May 2011 and December 2011, and March 2012 and May 2012 post-intervention testing). Therefore, surveys written in English provide the highest return rate (66%), and were followed by those in Spanish (30%) and in Haitian-Creole (4%). The average total number of parents surveyed during pre-testing was 692 and at post-testing 702. Overall response rates were 21.75% (pre-test) and 21.45% (post-test), and these response rates were found to closely approximate the 30% average response rate nationally for SRTS parent surveys (C. Gutierrez, personal communication, National Center for Safe Routes to School January 21, 2014).

3. Results

Data obtained at pre to post-intervention were analyzed and findings reported no changes for (1) the use of AT, (2) parental safety concerns, or (3) parental attitudes towards AT. Significant changes were detected in (4) the likelihood that children will be more likely to use supervised routes. Each of these findings are described below in further detail and in relation to their research question:

(1) Is there an impact of crossing guard presence on AT?

There was no change (increase or decrease) of AT after the placement of crossing guards. Analysis of the School Monitoring Tool containing data which reflected pre–post variables (crossing guard implementation; intervention vs. control schools; supervised vs. unsupervised intersections; number of guards at intersections; number of children or adults walking, cycling; environmental and infrastructural conditions) was utilized to address this question. The descriptive, mean information about pre–post variables are displayed in Table 1. This table provides the mean and standard deviation of child and adult pedestrian/cyclist types to pre and post-crossing guard implementation, and broken down by type of intersection (i.e., intervention versus control, supervised versus unsupervised). These descriptives show the average trends (walking and biking) which were tested to address what the impact of crossing guard presence would have on AT. Research question 1 was then examined with multiple mixed ANOVAs for child and adult AT average counts and walker average counts, and multiple descriptive analyses for child and adult cyclist average counts. Results of the mixed ANOVA show that none of the multivariate tests for main effects or interactions was statistically significant. In addition, no within-way effects (including interactions) or between-way effects were statistically significant. The descriptive information shows the means that were compared across these different factors in the ANOVA. The results of within- and between-way *F* tables indicated there was no significant change in child AT trends forms from pre to post-controlling for other variables. Similarly, *F* tables indicated no significant change in child AT trends from pre to post-across intervention intersections, control intersections, or supervised/unsupervised intersections. Furthermore, the number of crossing guards present did not result in changes in rates of active transportation pre to post-crossing guard placement.

(2) Does crossing guard presence resolve parental safety concerns? and (3) does crossing guard presence improve parental Attitudes Towards AT?

Crossing guard presence did not remove parental safety concerns or improve parental attitudes towards their child's participation in AT. These answers related to questions 2 and 3, respectively, were collected through the SRTS Parent Survey (delivered in Spanish, Haitian-Creole, and English). Aggregate results indicate that "parental attitudes" from any of the social groups tested did not change post-crossing guard and awareness campaign implementation either with regards to safety concerns or to the greater likelihood of encouraging their child to use AT to and from school. Upon the recommendation of the National SRTS Data Analyses Center, questions 6 and 8 of the SRTS Parent Survey were further analyzed since the relationship of parents responses to each question will shed further light on parent's attitude towards allowing their child to walk or bike to school. Question 6 asks, "On most days, how does your child arrive and leave for school". The bar graph in Fig. 2 shows parents' self-reported response percentages of modes of transportation used by their children to

Table 1
Descriptives of mean child and adult pedestrian trends by pre/post and type of intersection.

Intersection types	Child AT	Child walker	Child cyclist	Adult AT	Adult walker	Adult cyclist	Intersection types
All	Pre	38.95[a]	37.28	0.54	33.33	29.08	4.21
		(31.19)[b]	(29.61)	(1.02)	(38.28)	(34.09)	(6.70)
	Post	39.91	38.66	0.39	30.60	26.33	4.20
		(34.44)	(33.61)	(0.60)	(34.51)	(30.55)	(7.06)
Experimental	Pre	41.67	39.13	0.81	41.42	35.31	6.04
		(29.83)	(27.17)	(1.24)	(45.63)	(40.49)	(8.08)
	Post	43.15	41.26	0.54	38.59	32.10	6.39
		(33.22)	(31.82)	(0.70)	(40.56)	(35.79)	(8.50)
Control	Pre	34.81	34.48	0.13	21.04	19.61	1.41
		(33.41)	(33.42)	(0.20)	(17.83)	(17.96)	(1.40)
	Post	35.19	34.87	0.17	18.94	17.92	1.01
		(36.34)	(36.41)	(0.31)	(18.21)	(18.32)	(1.06)
Supervised	Pre	57.16	55.47	0.59	35.60	30.15	5.42
		(32.27)	(31.61)	(0.79)	(30.57)	(25.82)	(9.44)
	Post	60.63	59.40	0.48	32.86	28.21	4.57
		(35.56)	(35.21)	(0.73)	(28.77)	(24.79)	(9.22)
Unsupervised	Pre	29.37	27.71	0.52	32.14	28.52	3.57
		(26.28)	(23.77)	(1.14)	(42.12)	(38.05)	(4.72)
	Post	28.47	27.20	0.34	29.35	25.29	4.00
		(28.25)	(26.85)	(0.51)	(37.61)	(33.58)	(5.67)

[a] All numbers outside of parentheses are means.
[b] All numbers inside of parentheses are standard deviations.

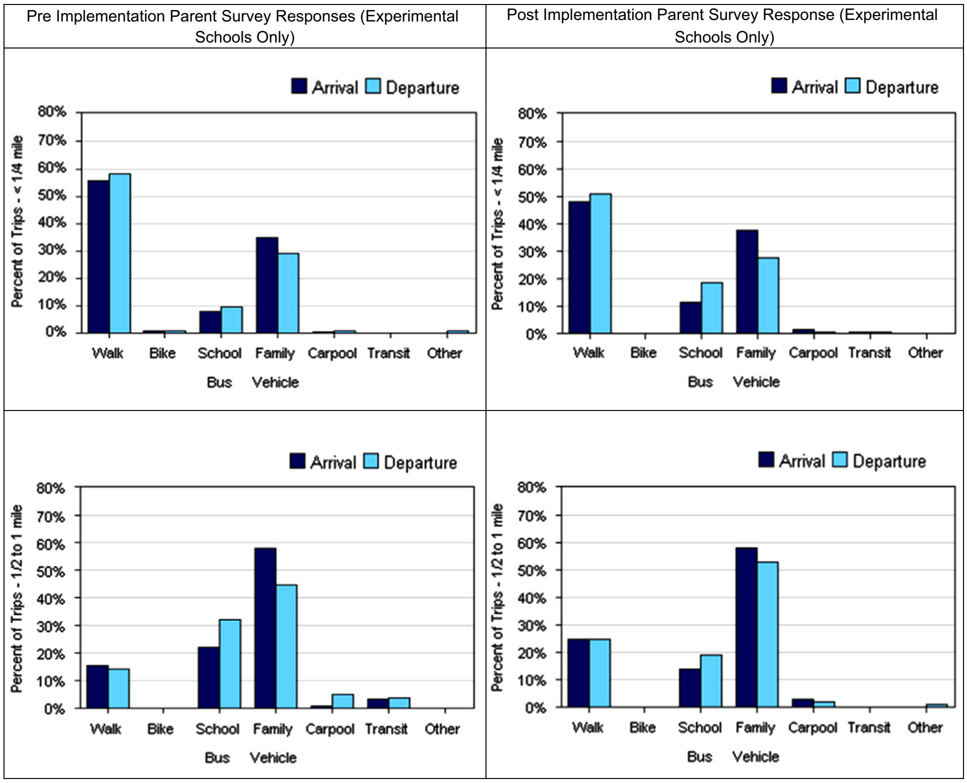

Fig. 2. Parent survey responses to modes of travel to school by distance from school.

Table 2
F table of between-intersection effects for child active transportation.

Factor	*MS*[a]	*F*	*p*	η_p^2
Number of guards	0.12	0.06	0.805	0.00
Experimental	0.11	0.06	0.816	0.00
Supervised	8.65	4.40	0.041[ǂ]	0.08
Interaction of experimental & supervised	0.61	0.31	0.580	0.01
Error	1.97	–	–	–

[a] MS = mean square.
[ǂ] = significant at the α=0.05 level.

travel to and from school. Overall, results did not show significant changes in parent survey responses post-guard implementation at intervention schools and fluctuations in travel trends were not indicative of either improvement or worsening of attitudes. The descriptive results of the parental survey data showed that when parent ratings from intervention schools differed from those of parents from control schools, it indicated that children in control schools were more likely than children in intervention schools to utilize active modes of transportation post-crossing guard intervention. Responses to question 8, "Has your child asked you to walk or to bike to school in the past year?" revealed that changes in the percent of children who asked for permission to walk or bike to or from school were not different across intervention and control schools. Rather, parents in both intervention and control reported their children as making these requests less often when, (a) children lived further from school, and (b) the survey was conducted post-crossing guard implementation. Ultimately, while there may have been a small increase in child AT crossings associated with the awareness campaign implementation, the increase was not sustained or of statistical significance. The awareness campaign had no effect on adult active transportation.

(4) Will crossing guard presence encourage the use of supervised routes?

A significant increase in the number of children using supervised pedestrian routes was detected in intervention intersections after the placement of crossing guards. There was a statistically significant difference in the number of children that used supervised as opposed to unsupervised routes for both intervention and control conditions. However, comparison of intervention versus control supervised routes revealed significantly more children walking in supervised intersections at intervention schools. Statistical analysis describing these results indicated that only the between-intersection effect of supervision was statistically significant and explained 8% of the variance in child AT crossings (all forms of active transportation including walking or biking; $\eta_p^2=0.08$, $F(1,53)=4.40$, $p=0.041$), with significantly more children crossing at supervised intersections as opposed to unsupervised intersections (Table 2). Further analysis of data representing child walkers only, indicated that the supervised variable was the only significant between-intersection effect ($\eta_p^2=0.08$, $F(1,53)=4.65$, $p=0.036$), and it explained 8% of the variance in child AT crossings and indicated that children crossed supervised intersections significantly more often than unsupervised intersections (Table 3).

Furthermore, utilizing repeated measures of ANOVA, changes over time were determined as a result of the addition of the crossing guards and/or the implementation of the awareness campaign at each intervention school. Results revealed that the effect of supervised

Table 3
F table of between-intersection effects for child walkers.

Factor	*MS*[a]	*F*	*p*	η_p^2
Number of guards	0.15	0.08	0.785	0.00
Experimental	0.04	0.02	0.892	0.00
Supervised	9.13	4.65	0.036[ǂ]	0.08
Interaction of experimental & supervised	0.70	0.35	0.555	0.01
Error	1.96	–	–	–

[a] MS = mean square.
[ǂ] = significant at the α=0.05 level.

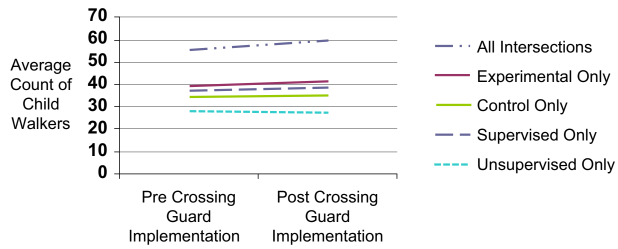

Fig. 3. Pre–post changes in average children active transportation counts.

versus unsupervised intersections varied across intervention schools where supervised intersections often had higher counts of child and adult AT crossings than unsupervised intersections both before and after the crossing guard and awareness campaign implementations. The data indicate an effect of supervised versus unsupervised intersections, with a noticeable difference in the number of children that utilize supervised routes vs. unsupervised routes pre and post-program implementation at intervention schools (Fig. 3). However, the same was not seen in adults.

4. Discussion

4.1. Statement of principal findings

In an effort to better understand how to maximize outcomes of interventions which may simultaneously address two related areas of public health, injury prevention and physical activity, the current study aimed to determine the association between the presence of a crossing guard and children's rate of AT. After placement of new crossing guards and the application of an awareness campaign, study results revealed no change in the numbers of children walking or biking to and from school, but an increase in the number of children (already participating in active transportation) utilizing supervised routes. In this study, crossing guard presence had no effect on adult's rate of active transportation or use of supervised routes.

4.2. Limitations and strengths of the study

Study site and intervention duration may have heavily contributed to the lack of detected change in AT rates. The defined study sites already consisted of high numbers of (unsupervised) children walking to and from school, and the resulting intervention and research time period was considerably shorter than originally intended. Both study duration and location of study sites were subject to our community partner, the local police department, which functions under constraints of bureaucratic procedure and protocol and is therefore outside of the control of the study design. Original scheduling for the duration of the newly positioned crossing guards was intended to last one year (beginning August of 2011 through June of 2012). However, police department internal administrative delays resulted in late hiring and placement of crossing guards, therefore shortening guard presence to less than one school year. Additionally, a decrease in the detectable difference in AT post-intervention may have occurred because of the existing high rates of unsupervised children walking and biking to school. As explained previously, intervention schools were selected from the City of Miami Police Departments' prioritization list which included schools demonstrating high rates of pedestrian injury along with high rates of unsupervised children walking and biking to school. The aims of the study also considered that the highly trafficked areas might provide an opportunity to determine if the presence of the crossing guard would encourage an increase in rates of child walkers and cyclists. New walkers and cyclists might be motivated by the existing, visible high numbers of walkers and bikers now accompanied by the presence of a new crossing guard. Concurrently therefore, the effect of increased crossing guard presence on the sustainability of existing high rates of children walking and biking would also be closely observed. This would be an important observation since the inverse relationship between the volume of pedestrians and cyclists with the rate of pedestrian injury and fatality has been demonstrated (Jacobsen, 2003; Leden, 2002; Robinson, 2005), but crossing guards have been included amongst the most "influential factors" for safe active transportation (Eyler et al., 2008). Therefore, findings demonstrating that the increased presence of crossing guards could help *sustain and*/or *increase* the number of people participating in AT within the neighborhood, would indicate that the intervention was an effective strategy to produce "more eyes on the streets". Though in this study an increase in overall AT was not detected, it is possible that with longer observation and intervention periods, significant changes in AT rates may have been found. It has been demonstrated in other studies implementing AT promoting interventions that post-program implementation follow up of at least three years is most effective to detect a statistically significant improvement of AT trends (National Center for Safe Routes to School, 2012).

Alternatively, the short intervention period did reveal a behavioral change in children when related to injury prevention and pedestrian safety. Previous studies on the decision making process towards use of safe pedestrian behavior suggest that different genders and ages process risk differently. Although varying in the degree of influence, each (male and female of different ages) is guided by the perception of the behavioral outcome rather than the potential risk which may result from unsafe pedestrian behavior (Yagil, 2000). Children, however, are most prone to following pedestrian safety rules (Yagil, 1998). The results of the current study reinforce the concept that children are more likely than adults to adhere to pedestrian safety behavior. An external influencing factor towards the safe pedestrian behavior exhibited may have been contributed through the annual implementation of the WalkSafe® evidence-based pedestrian safety curriculum which is mandated in all Miami-Dade County elementary schools. Though untested in the current study, it may be that the elementary children's pedestrian safety knowledge became reinforced or triggered after the presence of the new crossing guard. The WalkSafe pedestrian safety curriculum has been shown to increase knowledge in elementary aged children (Hotz et al., 2009) and is considered a noteworthy educational countermeasure to pedestrian injury (Hotz et al., 2004; Schwebel et al., 2012; Zegeer et al., 2008). As demonstrated in the study, only children revealed the increased use of supervised routes, not adults possibly reflecting the unfortunate perception that crossing guards are safety figures intended only for children and the continued need to promote pedestrian safety to adults.

4.3. Implications and meaning of the study

This study demonstrated that a short-term implementation of new crossing guards and a short-term awareness campaign (less than 1 school year) will not significantly impact AT trends of children traveling to-and-from school when existing high rates of AT are high. The duration of the intervention could potentially have been an important factor on a child's participation in AT in this study. Qualitative results from the comments section of the SRTS parental survey indicate that children in control schools (where no new crossing guards were being posted) were *more likely* than children in intervention schools to utilize active modes of transportation. Furthermore the SRTS parent surveys revealed that children from the control schools *more frequently* asked parents to participate in AT. These data indicate that the greater likelihood for children to use AT may be related to a continuous presence of and habituation to crossing guards as in the control schools where changes in crossing guard postings were not reduced or modified within the entire year during which observation occurred. In contrast, new crossing guards at intervention schools where present for only a short part of the school year and were positioned during the middle/end of the school year. This safety presence at intervention schools did not impact the participation rate of AT (neither increasing the number of participants nor increasing the frequency of requests to parents participate in AT). While no changes in AT were demonstrated, the short duration intervention did initiate a behavioral change reflecting safety, as seen in the increased rate of children at intervention schools utilizing supervised routes. Though no impact on AT was found in the current study, the benefit to child safety after the brief crossing guard presence is a valuable finding when informing policymakers and stakeholders on the need for funding to hire and maintain crossing guards (supervised routes), particularly since very little research exists on the topic. The safety behavior demonstrated by the children after the short period intervention supports further interest in assessing the impact of crossing guards on the safety and health decisions of children as well as their choice in route identification when traveling to-and-from school.

4.4. Future directions

To further understand how to improve sustainable trends of AT, our future study directions will include longer observation periods and longer intervention time points at sites with lower rates of existing AT. Since the current study observation sites occurred in areas with existing high rates of AT prior to implementation of the intervention, it will be useful to examine other sites where initial rates of child pedestrian activity are not as high and where there is a need for utilization of more supervised routes. A valuable comparison may also involve the interaction between interventions such as crossing guards and the WalkSafe pedestrian safety curriculum. Future study design will include greater sensitivity to detect the impact of the presence of the safety figure which will help to reveal if the current data represents a formative period for the intervention and if longer interventions (the presence of crossing guards) will cause children to comfortably participate in AT by feeling empowered by their implemented pedestrian safety skills.

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