The Role of the Comprehensive School Health Principal in Knowledge Sharing and Use

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Abstract

Comprehensive School Health (CSH) is an internationally recognized framework shown to be effective in improving health-enhancing behaviours and educational outcomes. The specific implementation strategies behind CSH, however, are vague. Knowledge exchange practices are essential to ensure that implementation is evidence-informed. The principal seemingly acts as a key player within knowledge exchange, yet this role remains to be examined within a CSH framework.

Through a cross-sectional examination of secondary survey data, this study set out to compare the extent of knowledge sharing and use of evaluation data by principals in both CSH schools (n=30) and other randomly selected schools throughout Alberta, Canada (n=73). Univariable logistic regression was performed and results showed that CSH principals had a statistically significant higher odds of: sharing the data overall; sharing the data outside of the school, particularly with parents; using the data in planning; as well as both sharing and using the data in general.

Key words: health promoting schools, knowledge exchange, obesity prevention, school based, school leadership.

Rôle des directions d'école responsables de la santé globale à l'école dans le partage et l'utilisation des connaissances

Résumé

L'approche internationalement reconnue de Santé globale à l'école (en anglais *Comprehensive School Health)* s'est révélée efficace pour encourager des comportements sains et améliorer les résultats scolaires. Par contre, les stratégies de mise en œuvre spécifiques qui la sous-tendent demeurent vagues. Les pratiques de partage des connaissances sont jugées essentielles pour garantir que la mise en œuvre repose sur des données probantes. Même si les directions d'école jouent un rôle clé dans le partage des connaissances, ce rôle n'a pas encore été examiné dans un contexte d'écoles qui appliquent cette approche de Santé globale.. Misant sur un examen transversal de données d'enquête secondaires, cette étude a tenté de comparer la portée du partage des connaissances et le recours aux données d'évaluation par les directions d'école, tant au niveau des écoles qui souscrivent à l'approche (n=30) que d'écoles choisies aléatoirement à travers l'Alberta, Canada (n=73). Les résultats d'une régression logistique univariable ont démontré que, sur le plan statistique, les directions des écoles souscrivant à l'approche avaient plus tendance à : partager l'ensemble des données, à partager les données à l'extérieur de l'école, surtout avec les parents; à utiliser les données dans le cadre de leur planification; ainsi qu'à partager et utiliser les données en général.

Mots clés: écoles en santé, partage de connaissance, obésité, prévention

Introduction

Childhood obesity is a major public health crisis. According to the 2009-2011 Canadian Health Measures Survey, 19.8% and 11.7% of children aged 5-17 years were classified as overweight and obese, respectively (Roberts, Shields, de Groh, Aziz, & Gilbert, 2012). Obesity contributes to a variety of co-morbidities (Schelbert, 2009), as well as to a number of negative psychological consequences (Williams, 2005).

Poor diets and inadequate physical activity are widely recognized as the primary drivers of the obesity epidemic (Sparling, Franklin, & Hill, 2013; Story, Nanney, & Schwartz, 2009). The increasing westernization and urbanization occurring in most countries around the world is associated with a sedentary lifestyle, along with changes in diet towards one of high fat, high energy-dense foods (Swinburn, Caterson, Seidell, & James, 2004). As a result, children are not meeting the recommended physical activity or nutrition guidelines (Colley, Garriguet, Janssen, Craig, Clarke, & Tremblay, 2011; Hallal et al., 2012; Roblin, 2007). Overall, the effects of poor diets and increasingly sedentary lifestyles on the worsening obesity trends emphasize the need for early intervention, through comprehensive health promotion and primary prevention strategies (Pelone et al., 2012).

Comprehensive School health and Knowledge Exchange

Several school-based health promotion initiatives have shown to be effective in addressing childhood obesity, especially those focused on physical activity, healthy eating and positive social behaviour (Fung et al., 2012; Veugelers & Fitzgerald, 2005). Informed by the Ottawa Charter for Health Promotion (Nutbeam 2000; WHO, 1986), in Canada, this approach is defined by the Joint Consortium for School Health (JCSH) as Comprehensive School Health (CSH) and is described as "an internationally recognized framework for supporting improvements in students' educational outcomes while addressing school health in a planned, integrated and holistic way" (JCSH, 2012). Although some research has been done on the effectiveness of CSH in achieving better health outcomes, further research is needed to understand the "how" and "why" behind the CSH implementation process (Veugelers & Schwartz, 2010).

Through their review of the literature, Samdal and Rowling (2011) uncovered several components hypothesized to be important for CSH implementation; one of these components is the school's leadership. Our group has also highlighted the importance of the principal in CSH implementation (Roberts, McLeod, Montemurro, Veugelers, Gleddie, & Storey, 2015). Additionally, sharing and use of school-specific evidence (knowledge exchange) has been deemed important as a means of supporting the implementation of CSH by creating awareness, informing action, and acting as an overall catalyst for change, helping to implement and embed CSH policy and practices within the school culture (Gleddie & Hobin, 2011). While knowledge exchange practices have been deemed important for CSH implementation, much remains to be examined in regards to the principal's role in facilitating these practices within a CSH framework. Knowledge exchange can be defined as "collaborative problem solving between researchers and decision makers" resulting in "mutual learning through the process of planning, producing, disseminating, and applying existing or new research in decision-making" (CFHI, 2014). Thus, knowledge exchange incorporates elements of knowledge sharing

(or brokering) as well as knowledge use (or data-driven decision-making (DDDM)) (Marsh, Pane, & Hamilton, 2006), two concepts that will be highlighted within this study.

Data-driven decision-making (DDDM) is a developing field of practice within school leadership (Streifer, 2002), yet little empirical research has been conducted in this area, especially in regards to the principal's role (Luo, 2008). This is surprising considering the number of recent studies that have noted the principal as a key player in DDDM (Ikemoto & Marsh, 2007; Mandinach & Honey, 2008; Wohlstetter, Datnow, & Park, 2008; Young, 2006). In regards to knowledge sharing, the literature is lacking examples of the school principal acting in a knowledge brokering capacity with respect to sharing data with other members of the school community. Knowledge brokers act as mediators in the process of knowledge exchange between the various participants in a network (Holzmann, 2012). Thus, they create links between individuals or organizational units (Goffin, Koners, Baxter, & Van der Hoven, 2010; Pawlowski & Robey, 2004; Ward, House, & Hamer, 2009), facilitating the identification and interpretation of research evidence (Kitson, Harvey, & McCormack, 1998). In their leadership role in a school, principals have a high degree of direct contact with school staff and therefore may have a substantial influence in communicating the importance and stimulation of data use (Wayman & Stringfield, 2006).

In Alberta, an example of a CSH project that promoted knowledge exchange through ongoing evaluation and report generation is the Alberta Project Promoting active Living and healthy Eating in Schools (APPLE Schools) (www.APPLESchools.ca). APPLE Schools aims to improve healthy eating and active living among school children through increasing the capacity of the school community to take ownership over the project (Schwartz, Karunamuni, & Veugelers, 2010). Between 2008 and 2013, School Reports generated from the analysis of annual evaluation data were sent to all participating school principals. These reports contained aggregated information on how each school's grade 5 students were faring in a number of different areas including physical activity and nutrition. This information provided an opportunity for schools to identify and assess their strengths and needs in each area, allowing for the intervention to be tailored as needed.

As the sole recipient of these reports in each school, the school principal was encouraged to use these data and share the information amongst the rest of the school community. School Reports used audience-tailored formatting, and included graphics and visuals to increase readability and promote uptake. To encourage report use and sharing, APPLE School principals received support from the project team (i.e., APPLE School Health Facilitators, principals, and education experts) in the form of ongoing professional development and training. Speculations within the literature have suggested that principals who are well informed and trained in data use are more likely to implement changes in their practice (Choppin, 2002; Datnow, Park, & Wohlstetter, 2007; Lashway, 2003; Mason, 2002). The principal's role within data use and sharing, however, has yet to be empirically examined, particularly within the context of CSH. For this reason, the main objective of this study was to assess whether principals who were part of a CSH project (APPLE Schools) were more likely to share and use School Reports when compared to a random sample of principals throughout the province of Alberta.

Methods

Study Design and Population

This cross-sectional study aimed to assess evaluation School Report sharing and use among principals in both APPLE Schools and a sample of control schools, representative of schools in Alberta, through secondary data analysis. Principals from both APPLE Schools and control schools were surveyed in 2012 based on the inclusion criteria of their school's participation in both the 2010 and 2012 evaluation years. These time points were important considerations based on the incorporation of questions within the 2012 Principal Survey inquiring into 2010 School Report use and sharing. Of note, the School Reports produced for both APPLE Schools and control schools only differed based on the comparison data that was provided. Within the reports, aggregated data was presented for a number of measured health outcomes; each APPLE School was compared to the average of all other APPLE Schools, and each control school was compared to the average of all other control schools in each of these measures.

APPLE Schools Recruitment

The APPLE Schools project was originally launched in ten schools in the Edmonton, Alberta area in January of 2008. As of September 2011, the project expanded to include an additional 30 schools in several locations throughout Alberta. In 2013, five new schools were added in Fort McMurray. Three additional schools signed on in January 2014, and another 3 in September 2014. In total, there currently exists 51 APPLE Schools located throughout Alberta.

Schools were selected in consultation with school jurisdictions mainly on the basis of being located in low socio-economic status neighborhoods, with a need for increased attention towards health promotion efforts within the school community (Schwartz et al., 2010). Additional inclusion criteria for becoming an APPLE School required that the schools have a configuration that included Grade 5, have no pre-existing involvement in another health promotion project, and be composed of a relatively stable population, with an annual attrition rate below 50% (Schwartz et al., 2010). APPLE Schools were evaluated on an annual basis, in the spring of each year up until and including 2013. Components of this evaluation included a variety of assessments directed towards school principals as well as grade 5 students and their parents.

Control Schools Recruitment

Raising healthy Eating and Active Living Kids in Alberta (REAL Kids Alberta) is a project led by Principal Investigator Dr. Veugelers of the University of Alberta. The REAL Kids Alberta Evaluation aims to evaluate Alberta Health's Healthy Weights Initiative and provide details on the impact of this initiative (as well as other provincial programs) in promoting healthy behaviours and weights among Alberta students (www.REALKidsAlberta.ca). Components of this evaluation include a variety of assessments directed towards school principals as well as grade 5 students and their parents.

The provincial schools evaluated by REAL Kids Alberta were selected using a one-stage stratified random design of all schools in Alberta. The sampling frame includes all elementary schools in Alberta with grade 5 students with the exception of private

schools, francophone schools, on-reserve federal schools, charter schools, and colony schools. Schools were stratified according to the following geographical areas: 1) metropolitan: Calgary and Edmonton, each with populations of about 1 million people; 2) city: other municipalities with more than 40,000 residents; and 3) rural-town: municipalities with less than 40,000 residents. Schools were randomly selected from each of these geographical strata to achieve a balanced number of students in each stratum (Fung et al., 2012). Thus, data collection from approximately 150 randomly selected schools has been occurring since 2008, and occurs in the spring of every even-numbered year. Within the present study, principals from these randomly selected schools acted as the control group.

Principal Survey Participants

As part of both REAL Kids Alberta and APPLE Schools project evaluations, principals were surveyed after receiving approval to participate at both the jurisdiction and school levels. Principal Surveys were dropped off at each participating principal's office by the evaluation team approximately one week prior to scheduled school visits. Surveys were completed through self-report wherein survey completion implied informed consent. When evaluation assistants returned to the school for student data collection the following week, they collected the completed Principal Surveys. Principals who did not complete the survey before these site visits were provided with a prepaid envelope to mail the survey back to the evaluation team once completed. Follow-up phone calls were made at the end of the data collection period in June to encourage survey completion and return. Data collection for the current study occurred between the months of March and June of 2012.

In spring 2012, 140 randomly selected provincial schools participated in the REAL Kids evaluation and 40 APPLE Schools participated in the APPLE Schools project evaluation. Principal Survey data was selected for inclusion within the present analysis based on a school's involvement in both 2010 and 2012 evaluations. This inclusion criterion was necessary based on the incorporation of questions within the 2012 Principal Survey inquiring into report usage. Because the REAL Kids evaluation occurs every even-numbered year, 2010 report usage was of interest within the 2012 survey. For consistency, the same comparison was examined within APPLE Schools. Based on this criterion, a resulting 108 control schools and 36 APPLE Schools were deemed eligible to be part of the present analysis. Of the control schools, 93 Principal Surveys were returned (86% response rate), of which, only 73 complete datasets were obtained (68% completion rate) [missing values (n=5); self-excluded (n=15)]. All 36 APPLE School Principal Surveys were returned (100% response rate), of which, only 30 were complete datasets (83% completion rate) [self-excluded (n=6)].

Measures

In order to examine the knowledge sharing and use of the 2010 School Reports, questions were added to the Principal Survey as part of the 2012 evaluation for both APPLE Schools and control schools. These questions were based on a previously validated knowledge utilization survey, developed for the understanding of the dissemination of the Youth Smoking Survey (YSS) results (University of Waterloo, 2009). Questions explored whether the principal reviewed the report data, if they shared

the data and with whom, and when they used these data. These survey questions and response options are provided below in Figure 1.

Q2-1 **Schools that participated in the REAL Kids Alberta evaluation [or APPLE Schools project evaluation] receive School Reports that summarize evaluation results. Did you review the School Report that we sent to you in 2010?**

○ No, my school did not participate in the evaluation in 2010.

○ No, I was not the principal of this school in 2010.

○ No.

○ Yes, I read the Report.

○ Yes, I read the Report and shared it with … (Check all that apply.)

　　○ Teachers.

　　○ Parents.

　　○ Students.

　　○ School board.

　　○ Others in the community (e.g. Alberta Health Services, other community partners) (Please specify.)_____

Q2-2 **If you answered the above question with 'yes', please indicate when you use the 2010 School Report? (Check all that apply.)**

○ When there is a health-related issue at my school.

○ When planning programs, curriculum or events

○ When support is being provided from outside groups (e.g. Alberta Health Services, other community partners).

○ Other (please specify): _____

Figure 1. *2012 Principal Survey Questions on Report Sharing and Use*

Data Analysis

　　Univariable logistic regression methods were used to assess whether APPLE School principals shared and used the knowledge from Schools Reports more so than control school principals. 2012 Principal Survey questions were examined as follows: 1) questions on *report sharing* were, a) examined overall, b) grouped to examine sharing within and outside the school, and c) examined in relation to each individual stakeholder; 2) questions on *report use* were, a) examined overall, and b) examined in relation to each individual scenario provided; and lastly, 3) report sharing *and* use was collectively examined. STATA v12 (StataCorp, College Station, TX, USA) was used to perform the statistical analyses. Approval for this study was obtained from the Health Research Ethics Board at the University of Alberta.

Results

School Report Reading and Sharing

Of those principals who received the 2010 School Report and who completed the questions of interest, 100% (30/30) of APPLE School and 92% (67/73) of control school principals indicated that they had read the School Report. Of those principals who read the report, APPLE School principals had 5.96 times the odds (95% CI: 1.29, 27.43) of sharing the report than control school principals (Table 1).

Table 1 *Comparisons of 2010 School Report sharing among APPLE School principals and a control sample of principals*

Of those who read the report, those that shared the report	School	x/n (%)	OR (95% CI)	p-value
	Control Schools	47/67 (70%)	1.00	--
	APPLE Schools	28/30 (93%)	5.96 (1.29, 27.43)	**0.022**

Of those who shared the report, most were sharing internally, whereby 96% of APPLE School principals and 94% of control school principals had shared with teachers or students. This sharing was not significantly different between APPLE School and control school principals. When examined in further detail, principals from both control and APPLE Schools reported sharing the report most frequently with teachers (96% APPLE School principals; 94% control school principals) (Table 1.2). Further, although 23% of control school principals shared the report with students and only 7% of APPLE School principals did, this difference was not statistically significant.

Differences were found between APPLE School and control school principals with respect to sharing the report externally (i.e., with parents, the school board, or others in the community), wherein APPLE School principals were significantly more likely to share with at least one of these stakeholders (OR: 3.41, 95% CI: 1.10, 10.51). Further, APPLE School principals had statistically significant higher odds of sharing the report with parents (OR: 4.41, 95% CI: 1.43, 13.55) (Table 1.2). Proportions of principals sharing the report with their school board were low and not significantly different (4% APPLE School principals; 6% control school principals). Lastly, although 17% of control school principals shared the report with others in the community and only 7% of APPLE School principals did, this difference was not statistically significant (Table 2).

Table 2 *Comparisons of 2010 School Report sharing amongst different groups by APPLE School principals and a control sample of principals*

Of those who shared the report, those that shared internally (teachers or students)	School	x/n (%)	OR (95% CI)	p-value
	Control Schools	44/47 (94%)	1.00	--
	APPLE Schools	27/28 (96%)	1.84 (0.18, 18.61)	0.605
Of those who shared the report, those that shared with teachers	School	x/n (%)	OR (95% CI)	p-value
	Control Schools	44/47 (94%)	1.00	--
	APPLE Schools	27/28 (96%)	1.84 (0.18, 18.61)	0.605
Of those who shared the report, those that shared with students	School	x/n (%)	OR (95% CI)	p-value
	Control Schools	11/47 (23%)	1.00	--
	APPLE Schools	2/28 (7%)	0.25 (0.05, 1.23)	0.089
Of those that shared the report, those that shared externally (parents or school board or others)	School	x/n (%)	OR (95% CI)	p-value
	Control Schools	27/47 (57%)	1.00	--
	APPLE Schools	23/28 (82%)	3.41 (1.10, 10.51)	**0.033**
Of those who shared the report, those that shared with parents	School	x/n (%)	OR (95% CI)	p-value
	Control Schools	24/47 (51%)	1.00	--
	APPLE Schools	23/28 (82%)	4.41 (1.43, 13.55)	**0.010**
Of those who shared the report, those that shared with the school board	School	x/n (%)	OR (95% CI)	p-value
	Control Schools	3/47 (6%)	1.00	--
	APPLE Schools	1/28 (4%)	0.54 (0.05, 5.49)	0.605
Of those who shared the report, those that shared with "others in the community" (i.e., Nurse)	School	x/n (%)	OR (95% CI)	p-value
	Control Schools	8/47 (17%)	1.00	--
	APPLE Schools	2/28 (7%)	0.38 (0.07, 1.91)	0.237

School Report use.

Ninety-three percent of APPLE School and 84% of control school principals reported using the report in some capacity. These overall proportions did not differ significantly between APPLE School and control school principals. Ninety percent of APPLE School principals reported using the School Report for planning purposes, while only 70% of control school principals reported using the report in this way. Thus, APPLE School principals were more likely to use the report for planning purposes (OR: 3.83, 95% CI: 1.04, 14.09) (Table 3).

Principals who used the School Report when there was a health-related issue (APPLE School principals, 17%; control school principals, 18%) as well as those using when support was provided by outside groups (APPLE School principals, 33%; control school principals 27%) were modest and not significantly different (Table 3).

Table 3 *Comparisons of 2010 School Report use among APPLE School principals and a provincial sample of principals*

Of those who read the report, those that used the report	School	x/n (%)	OR (95% CI)	p-value
	Control Schools	56/67 (84%)	1.00	--
	APPLE Schools	28/30 (93%)	2.75 (0.57, 13.26)	0.208
Of those who read the report, those that used the report when there was a health-related issue	School	x/n (%)	OR (95% CI)	p-value
	Control Schools	12/67 (18%)	1.00	--
	APPLE Schools	5/30 (17%)	0.92 (0.29, 2.88)	0.882
Of those who read the report, those that used the report when planning programs, curriculum, or events	School	x/n (%)	OR (95% CI)	p-value
	Control Schools	47/67 (70%)	1.00	--
	APPLE Schools	27/30 (90%)	3.83 (1.04, 14.09)	**0.043**
Of those who read the report, those that used the report when support was provided from outside groups	School	x/n (%)	OR (95% CI)	p-value
	Control Schools	18/67 (27%)	1.00	--
	APPLE Schools	10/30 (33%)	1.36 (0.54, 3.46)	0.517

School Report sharing and use.

Results showed that 87% of APPLE School principals and 66% of control school principals were both sharing and using the School Reports. In logistic regression, this translated to APPLE School principals having 3.40 times the odds of both sharing and using the report than control school principals (95% CI: 1.06, 10.92) (Table 4).

Table 4 *Comparisons of 2010 School Report overall sharing and use among APPLE School principals and a provincial sample of principals*

Overall, of those who read the report, those that shared **and** used the report	School	x/n (%)	OR (95% CI)	p-value
	Control Schools	44/67 (66%)	--	1.00
	APPLE Schools	26/30 (87%)	3.40 (1.06, 10.92)	**0.040**

Discussion

The present study demonstrates the potential impact of the APPLE Schools programming (CSH) on the likelihood that principals share and use evaluation reports. Results showed that APPLE School principals had a statistically significant higher odds of: sharing the report overall; sharing the report outside of the school, particularly with parents; using the report for planning purposes; as well as a higher odds of both sharing and using the report. Furthermore, based on high levels of report reading and use by principals in general, results suggest that the reports are important within the principals' practice. Overall, findings help to define the role of the principal within the knowledge exchange process, while adding to the CSH and school change literature.

On the whole, both APPLE School principals and control school principals demonstrated high proportions of reading the report, with proportions of 100% and 92% respectively. Within their study examining school principals' experience using the Youth Smoking Survey (YSS) school smoking profile, Tirilis (2011) found that 74% of principals had reported reading the report to some extent. This is interesting considering that principals receiving the YSS report pay for the service. Higher proportions of report reading within the present study may be attributed to the audience-tailored formatting and readability of the School Report. When compared to YSS school smoking profile reports, which are highly textual, School Reports provided to principals in this study included colored text, graphs, and pictures, and were visually spaced as to not overwhelm the reader with textual information (please refer to www.REALKidsAlberta.ca for an example of this report). It is believed that this formatting may be one factor contributing to high proportions of report reading amongst all principals involved in the current study, which is in alignment with knowledge exchange best practices (Cousins & Leithwood, 1993).

APPLE School principals were shown to have higher odds of sharing the report overall. However, when examining those who were sharing, similarities were seen between APPLE School and control school principals in terms of sharing of the report

within the school, particularly with teachers. Almost all principals who shared the report were doing so with teachers, which is a logical decision and a promising observation. The involvement of teachers has been shown to be essential to make school health initiatives succeed (Ridge, Northfield, St Leger, Marshall, Maher, & Sheehan, 2002; Ridge, Sheehan, Marshall, Maher, & Carlisle, 2003), thus, their intentional inclusion within the knowledge exchange process is not surprising. Research on teacher use of evidence by Louis, Marks, and Kruse (1996) suggests that adequate resources, such as time for teachers to meet with one another, is an important step in supporting productive use of evidence. Further, Levin and Datnow (2012) found that tight connections between the school principal and teachers helped to enable reform.

Interestingly, only a few principals shared the report content with students. Although statistically not significant, control schools had a higher proportion of principals sharing with students when compared to APPLE Schools. It is believed that there could be two potential explanations for these findings. Firstly, it is speculated that because a fair amount of capacity has been built within APPLE Schools, that the principal themselves may only share the report with one lead teacher or school health champion, who is then able to spread the message more widely amongst the rest of the school community. Thus, present findings may actually represent an under-reporting of the actual amount of report sharing that is taking place within APPLE Schools. The principal may entrust the report with others, knowing that they have built enough capacity to share the findings independently. In this scenario, the principal is acting as the gatekeeper to knowledge exchange, but isn't necessarily acting as the primary knowledge broker. In their study on data sharing, Levin and Datnow (2012) also found loose connections between the principal and the students, which seemed appropriate considering that teachers interacted with students more directly. These authors recommended that teachers should be made aware of this responsibility to ensure that data does not stop with them but rather influences students' actions as well.

The second possible explanation for a lower proportion of report sharing with students among APPLE School principals is that they may not want to burden their students with this information, particularly if these findings are not positive. Principals may not want to decrease the motivation of their students. Furthermore, because APPLE Schools is an environmental-level project that moves beyond the individual, it might not make sense for principals to share findings at an individual level. This may lead to victim blaming wherein students may feel reprehended for their inability to change their individual behaviours (O'Dea, 2005), which runs counter to the overall message of the intervention. Furthermore, information contained within the reports is often sensitive in nature and may contain personal details related socioeconomic status and food insecurity. Principals may deem this information inappropriate to share with students.

Other findings from this study found that APPLE School principals had higher odds of sharing the report outside of the school. It is believed that this is based on the nature of the CSH framework whereby "partnerships and services" is an important consideration for implementation (JCSH, 2012). As such, APPLE School principals may already be interacting with outside stakeholders more regularly, making data sharing a natural extension of these interactions. Parents in particular seemed to be the group external to the school that the APPLE School principals were more likely to share with. This emphasizes the role that the principal plays with regards to this group.

Results showed that very few principals shared reports with their school boards. It is hypothesized that because each school jurisdiction also receives a copy of the School Report, principals may have felt less compelled to share with this group. The incentive for principals to share this information with their school board would be to initiate a conversation about wellness. Within this conversation, principals could potentially use negative findings to draw attention to the problem, perhaps garnering increased resources and district support to positively influence changes within their school.

Rates of sharing the report with others in the community were also low overall. Potential explanations of this include lack of principal awareness as to which community groups would be receptive to the information provided in the reports, or alternatively, they had other staff members taking on this task of sharing. This delegation is likely within APPLE Schools, which helps to provide a potential explanation for the lower proportion of sharing the report within the community when compared to the control school principals.

Nonetheless, sharing the report outside of the school may be a more difficult task for someone who does not have the authority and respect that a principal embodies. As such, it is somewhat surprising that levels of sharing outside of the school, with the school board and others in the community, were low among principals. Levin and Datnow (2012) found that teacher connections to the district were loose whereby the principal served as mediator. Recommendations stemming from Levin and Datnow's (2012) study suggested that principals seek tight connections with district-level authorities as well as teachers in order to serve as a mediator between the two.

In terms of report use, it is positive to see both APPLE School and control school principals demonstrating high usage. Moderate proportions of principals were using the report in times when there was a health-related issue or when external support was provided. While it is positive to see this usage, this also speaks to the fact that these principals may be waiting for a health concern to arise or for outside support rather than instigating the use of the report on their own terms.

Using the report for planning purposes aligns more with proactive usage, and speaks towards the principal as an instigator of change rather than a passive recipient of the reports. It is believed that using the report for planning purposes is the best survey indicator to highlight the principal's role within DDDM. APPLE School principals had statistically significant higher odds of using the report in this way when compared to the control sample of principals. This suggests that APPLE School principals may be more inclined to make data-driven decisions with respect to these reports. It is hypothesized that APPLE School principals were more likely to use the report for planning purposes based on their involvement in ongoing professional development including regular meetings with APPLE School project staff. During these meetings, managers often discussed the importance of the School Reports and would ask the principal how they were using evidence to effect change in their school communities. This finding is in alignment with others who have suggested that principals who are well informed and trained in data use are more likely to implement changes in their practice (Choppin, 2002; Datnow et al., 2007; Lashway, 2003; Mason, 2002).

Lastly, APPLE School principals had statistically significant higher odds of collective use *and* sharing of the report, providing convincing evidence of the APPLE School principal's role within knowledge brokering and DDDM. Again, this finding

could suggest that the professional development training that the APPLE School principals receive and/or their involvement in a project geared at shifting the school culture may be impacting their desire and likelihood of using and sharing project-related data.

Strengths and Limitations

Strengths of the current study include the representative sample of control school principals, along with a high response-rate for school-based research (Esbensen, Melde, Taylor, & Peterson, 2008). A potential limitation of the current study includes the lack of demographic information collected from principals to allow for the examination of any other factors that may be influencing report sharing and use (i.e., number of years as a principal). Another limitation includes the small sample size of APPLE Schools whereby statistical analysis was limited and should be interpreted with caution. Further, APPLE Schools were selected by school jurisdictions rather than through random selection, which limits the generalizability of the results. Additionally, responses to survey questions remain subjective and are prone to reporting error. Because APPLE School principals received School Reports annually (as opposed to every other year like the control schools), reporting error could have occurred among APPLE School principals based on failure to accurately recall sharing/use of the 2010 School Report in the 2012 survey year. Lastly, little to no information is available on the principals who did not participate; as such, it is possible that the findings from this study are not representative of all principals in Alberta. It is unknown in which direction this possible selection bias may have affected the overall results.

Conclusion

In this study, principals' data use and sharing was investigated by comparing APPLE School principals, who received specific training in report usage and dissemination, to a provincial sample of principals. This study was the first to examine the role of the principal as a knowledge broker, one of the few to examine the role of the principal in data use and DDDM, as well as the first to examine these roles in relation to data founded on physical activity and nutrition. Results showed that APPLE School principals had statistically significant higher odds of sharing the report overall; sharing the report outside of the school, particularly with parents; using the report for planning purposes; as well as a higher odds of both sharing and using the report overall. This may suggest that the training and support that APPLE School principals received from the project team could have assisted them in these processes. Further, because principal support has been deemed important within the implementation of APPLE Schools (Roberts et al.2015; Storey, 2013; Storey, Spitters, Cunningham, Schwartz, & Veugelers, 2011), these principals may have been more likely to self-initiate report use and sharing behaviours, as per alignment with models of school improvement.

Despite these stated differences, report reading and use was relatively high among all principals, regardless of their affiliation. This is a promising finding, and could partially be attributed to the audience-tailored formatting and usability of the School Report. Similar results between the two groups were also seen in terms of high levels of report sharing, particularly with teachers. Lower proportions of principals sharing report

findings with students, the school board, and with others outside of the school suggest that more awareness be built in these areas to help increase these practices. These lower proportions could also suggest that the principal is acting more as a gatekeeper of report knowledge as opposed to actively disseminating results as a knowledge broker. Further investigation would be required to identify the exact mechanisms occurring behind this knowledge sharing.

Implications and Recommendations

Having data does not necessarily mean that they will be used to drive decisions (Marsh et al., 2006) or shared amongst the rest of the school community. As shown by the results of the current study, report sharing among some groups (i.e., students, the school board, and others in the community) was not very high. Further, report usage could have been higher, especially amongst the control sample of school principals. Because APPLE School principals received guidance and support in the form of training from the APPLE Schools project team, it would be recommended that all schools receiving School Reports be provided with the appropriate training in data use and dissemination. Many assert that the demands of DDDM have not been paired with adequate training for school leaders, and it is recommended that additional support be provided with regards to these practices (Englert, Fries, Goodwin, Martin-Glenn, & Michael, 2004; Herman & Gribbons, 2001). Without this technical assistance, data may become misinformation or perhaps lead to invalid inferences (Marsh et al., 2006).

In further facilitating principals' use and sharing of reports, it may be important to allocate adequate time for educators to study and think about the data, as well as for opportunities for school leaders to partner with outside organizations whose mission it is to support data use. Partners such as health promotion specialists or advisors in the local community may provide this crucial technical support (Boot, van Assema, Hesdahl, & de Vries, 2010; Leurs, Bessems, Schaalma, & De Vries, 2007). In the present study, all School Reports contained Health Promotion Coordinator (HPC) contact information. HPCs are employed by Alberta Health Services and act as a key resource to school communities in the area of CSH. Every school jurisdiction in Alberta has access to an HPC, and can contact this individual as a resource to assist with the interpretation and dissemination of School Reports and other health-related data.

As levels of sharing the report with teachers and parents were high amongst principals, it is hypothesized that the principal acts as the gatekeeper of knowledge within these groups. Their role as a knowledge broker in disseminating the findings more widely was limited as demonstrated by low levels of sharing with students, the school board, as well as with others within the community. It may be that other actors within the school (i.e., lead teachers or champions) were taking on this role. This, however, is only a speculation based on the limitations of the data produced herein. It would be recommended that principals negotiate these roles within their school to ensure that knowledge sharing is occurring on a wider scale.

The high levels of sharing with the parent group suggest that the principal may feel responsible for engaging with this group. As parental engagement has shown to be a pivotal aspect of school-based health promotion efforts (Taylor, Quinn, Littledyke, & Coll, 2012), this role should be encouraged, but also negotiated with others in the school

to ensure that role redundancy is avoided and that parents are not being bombarded with information.

References

Boot, N., van Assema, P., Hesdahl, B., & de Vries, N. (2010). Professional assistance in implementing school health policies. *Health Education*, *110*(4), 294-308.

Canadian Foundation for Healthcare Improvement. (2014). Glossary of knowledge exchange terms. Retrieved from: http://www.cfhi-fcass.ca/PublicationsAndResources/ResourcesAndTools/GlossaryKnowledgeExchange.aspx

Choppin, J. (2002). *Data use in practice: Examples from the school level.* Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.

Colley, R. C., Garriguet, D., Janssen, I., Craig, C. L., Clarke, J., & Tremblay, M. S. (2011). *Physical Activity of Canadian Children and Youth: Accelerometer Results from the 2007 to 2009 Canadian Health Measures Survey*. Statistics Canada.

Cousins, J. B., & Leithwood, K. A. (1993). Enhancing knowledge utilization as a strategy for school improvement. *Science Communication*, *14*(3), 305-333.

Datnow, A., Park, V., & Wohlstetter, P. (2007). Achieving with data: How high-performing school systems use data to improve instruction for elementary students. *Los Angeles: Center on Educational Governance, Rossier School of Education, University of Southern California*.

Englert, K., Fries, D., Goodwin, B., Martin-Glenn, M., & Michael, S. (2004). Understanding how principals use data in a new environment of accountability. *US Department of Education*.

Esbensen, F. A., Melde, C., Taylor, T. J., & Peterson, D. (2008). Active Parental Consent in School-Based Research How Much Is Enough and How Do We Get It?. *Evaluation Review*, *32*(4), 335-362.

Fung, C., Kuhle, S., Lu, C., Purcell, M., Schwartz, M., Storey, K., & Veugelers, P. J. (2012). From "best practice" to "next practice": The effectiveness of school-based health promotion in improving healthy eating and physical activity and preventing childhood obesity. *International Journal of Behavioural Nutrition and Physical Activity, 9*(1), 27.

Gleddie, D. L., & Hobin, E. P. (2011). The Battle River Project: School division implementation of the health-promoting schools approach assessment for learning: using student health and school capacity measures to inform action and direct policy in a local school district. *Global Health Promotion*, *18*(1), 39-42.

Goffin, K., Koners, U., Baxter, D., & Van der Hoven, C. (2010). Managing lessons learned and tacit knowledge in new product development. *Research-Technology Management*, *53*(4), 39-51.

Hallal, P. C., Andersen, L. B., Bull, F. C., Guthold, R., Haskell, W., Ekelund, U., & Lancet Physical Activity Series Working Group. (2012). Global physical activity levels: Surveillance progress, pitfalls, and prospects. *The Lancet*, *380*(9838), 247-257.

Herman, J. L. & Gribbons, B. (2001). Lessons learned in using data to support school inquiry and continuous improvement: Final report to the Stuart Foundation. Retrieved from: https://www.cse.ucla.edu/products/reports/TR535.pdf

Holzmann, V. (2012). Analyzing lessons learned to identify potential risks in new product development projects. In *6th European Conference on Information Management and Evaluation* (p. 127). Cork, Ireland: Academic Conferences Limited.

Ikemoto, G. S. & Marsh, J. A. (2007). Cutting through the "data-driven" mantra: Different conceptions of data-driven decision making. *Yearbook of the National Society for the Study of Education*, *106*(1), 105-131.

Joint Consortium for School Health. (2012). What is a comprehensive school health approach? Retrieved from: http://www.jcsh-cces.ca/index.php/about/comprehensive-school-health

Kitson, A., Harvey, G., & McCormack, B. (1998). Enabling the implementation of evidence based practice: A conceptual framework. *Quality in Healthcare*, *7*(3), 149-158.

Lashway, L. (2003). *Transforming principal preparation.* Washington DC: US Department of Education: Office of Educational Research and Improvement.

Leurs, M. T., Bessems, K., Schaalma, H. P., & De Vries, H. (2007). Focus points for school health promotion improvements in Dutch primary schools. *Health Education Research*, *22*(1), 58-69.

Levin, J. A., & Datnow, A. (2012). The principal role in data-driven decision making: Using case-study data to develop multi-mediator models of educational reform. *School Effectiveness and School Improvement*, *23*(2), 179-201.

Louis, K. S., Marks, H. M., & Kruse, S. (1996). Teachers' professional community in restructuring schools. *American Educational Research Journal*, *33*(4), 757-798.

Luo, M. (2008). Structural equation modeling for high school principals' data-driven decision making: An analysis of information use environments. *Educational Administration Quarterly*, *44*(5), 603-634.

Mandinach, E. B., & Honey, M. (2008). *Data-driven school improvement: Linking data and learning.* New York, NY: Teachers College Press.

Marsh, J. A., Pane, J. F., & Hamilton, S. (2006). *Making sense of data-driven decision making in education: Evidence from recent RAND research.* Santa Monica, CA: RAND Corporation.

Mason, S. (2002). *Turning data into knowledge: Lessons form six Milwaukee public schools* (Working paper No. 2002-3). Madison: University of Wisconsin, Wisconsin Centre for Education Research.

Nutbeam, D. (2000). Health literacy as a public health goal: A challenge for contemporary health education and communication strategies into the 21st century. *Health Promotion International*, *15*(3), 259-267.

O'Dea, J. A. (2005). Prevention of child obesity: First, do no harm. *Health Education Research*, *20*(2), 259-265.

Pawlowski, S. D., & Robey, D. (2004). Bridging user organizations: Knowledge brokering and the work of information technology professionals. *MIS quarterly*, 645-672.

Pelone, F. E., Specchia, M. L., Veneziano, M. A., Capizzi, S. I., Bucci, S., Mancuso, A., ... & de Belvis, A. G. (2012). Economic impact of childhood obesity on health systems: A systematic review. *Obesity Reviews, 13*(5), 431-440.

Ridge, D. T., Northfield, J., St Leger, L., Marshall, B., Maher, S., & Sheehan, M. (2002). Finding a place for health in the schooling process: A challenge for education. *Australian Journal of Education, 46*(1), 19-33.

Ridge, D., Sheehan, M., Marshall, B., Maher, S., & Carlisle, R. (2003). Being there: How teachers of students facing adversity promote positive relationships. *Qualitative Research Journal, 3*(2), 5-21.

Roberts, E., McLeod, N., Montemurro, G., Veugelers, P., Gleddie, D., & Storey, K. (2015). Implementing Comprehensive School Health in Alberta, Canada: The Principal's Role. Health Promotion International, doi: 10.1093/heapro/dav083

Roberts, K. C., Shields, M., de Groh, M., Aziz, A., & Gilbert, J. (2012). Overweight and obesity in children and adolescents: Results from the 2009 to 2011 Canadian Health Measures Survey. *Health Reports, 23*(3), 1-7.

Roblin, L. (2007). Childhood obesity: Food, nutrient, and eating-habit trends and influences. *Applied Physiology, Nutrition, and Metabolism*, *32*(4), 635-645.

Samdal, O., & Rowling, L. (2011). Theoretical and empirical base for implementation components of health-promoting schools. *Health Education*, *111*(5), 367-390.

Schwartz, M., Karunamuni, N. D., & Veugelers, P. J. (2010). Tailoring and implementing comprehensive school health: The Alberta project promoting active living and healthy eating in schools. *Physical and Health Education Academic Journal, 2*(1), 1-15.

Schelbert, K. B. (2009). Comorbidities of obesity. *Primary Care: Clinics in Office Practice*, *36*(2), 271-285.

Sparling, P. B., Franklin, B. A., & Hill, J. O. (2013). Energy balance: The key to a unified message on diet and physical activity. *Journal of Cardiopulmonary Rehabilitation and Prevention*, *33*(1), 12-15.

Storey, K. E. (2013, January). *Implementing comprehensive school health: From 'doing' to 'facilitating'.* Presented at the Ever Active Schools, 4th Annual Shaping the Future Conference, Kananaskis, Alberta, Canada.

Storey, K. E., Spitters, H., Cunningham, C., Schwartz, M., & Veugelers, P. J. (2011). Implementing comprehensive school health: Teachers' perceptions of the Alberta project promoting active living and healthy eating in schools-APPLE schools. *Revue phénEPS/PHEnex Journal*, *3*(2).

Story, M., Nanney, M. S., & Schwartz, M. B. (2009). Schools and obesity prevention: Creating school environments and policies to promote healthy eating and physical activity. *Milbank Quarterly*, *87*(1), 71-100.

Streifer, P.A. (2002). *Using data to make better educational decisions*. Lanham, MA: The Scarecrow Press.

Swinburn, B. A., Caterson, I., Seidel, J. C., & James, W. P. T. (2004). Diet, nutrition and the prevention of excess weight gain and obesity. *Public Health Nutrition, 7*(1a), 123-146.

Taylor, N., Quinn, F., Littledyke, M., & Coll, R. K. (2012). *Health education in context: An international perspective on health education in schools and local communities.* Netherlands: Springer.

Tirilis, D. (2011). *Improving the school health action, planning and evaluation system (shapes) school profile as a knowledge exchange strategy: The example of the youth smoking survey (YSS) profile.* (Unpublished masters thesis). University of Waterloo, Waterloo, ON.

Veugelers, P. & Fitzgerald, A. (2005). Effectiveness of school programs in preventing childhood obesity: A multilevel comparison. *American Journal of Public Health 95*(3), 432-435.

Veugelers, P. & Schwartz, M. (2010). Comprehensive school health in Canada. *Canadian Journal of Public Health, 101*(S2), S5-S8.

Ward, V., House, A., & Hamer, S. (2009). Knowledge brokering: The missing link in the evidence to action chain?. *Evidence & Policy: A Journal of Research, Debate and Practice*, *5*(3), 267.

Wayman, J. C., & Stringfield, S. (2006). Data use for school improvement: School practices and research perspectives. *American Journal of Education*, *112*(4), 463-468.

WHO (1986). *The Ottawa Charter for Health Promotion*. World Health Organization, Geneva.

Williams, C. L. (2005). Can childhood obesity be prevented?. *Preventive Nutrition*, 345-381.

Wohlstetter, P., Datnow, A., & Park, V. (2008). Creating a system for data-driven decision-making: Applying the principal-agent framework. *School Effectiveness and School Improvement*, *19*(3), 239-259.

Young, V. (2006). Teachers' use of data: Loose coupling, agenda setting, and team norms. *American Journal of Education, 112*(4), 521-548.