

The impact of coaches providing healthy snacks at junior sport training

Regina Belski,^{1,2} Kiera Staley,² Stephen Keenan,² Anne Skiadopoulos,² Erica Randle,² Alex Donaldson,² Paul O'Halloran,² Pam Kappelides,² Stacey O'Neil,³ Matthew Nicholson²

In Australia, 18% of children aged 2–17 years are overweight and a further 7% are obese,¹ and the persistent negative health consequences of childhood obesity are well established.² Therefore, it is important to identify opportunities to help instil healthy eating behaviours in children.

Annually, 60% of Australian children participate in at least one sport outside of school hours.³ While children who participate in sport may already have less adiposity than their inactive counterparts,⁴ rates of overweight and obesity are predicted to rise to 33% by 2025.⁵ The opportunity to have an impact on the diet, and therefore the health, of the 1.7 million Australian children who currently participate in sport should not be overlooked.

Most Australian community sports clubs do not have a healthy eating policy. A study of 108 sports clubs in NSW, Australia, found that only three clubs had a written policy on healthy eating and 39% recommended what food and beverages to consume during sport, mostly relating to water consumption.⁶ The same study found that, of the 28% of coaches who provided food and drinks to participants, 40% provided chocolate and confectionery and 33% provided fruit.⁶ Interestingly, only four clubs recommended the types of food and beverages that coaches should provide to participants. This suggests that having coaches provide snacks without supporting them with education or guidelines does not ensure healthy options are provided.

There are many barriers to developing and implementing policies about providing

Abstract

Objective: Sports clubs provide an opportunity to tackle childhood obesity rates through targeted interventions. Our study aimed to investigate if coaches providing healthy snacks to participants before junior netball sessions at five clubs in Melbourne, Australia, increased consumption of healthy foods and influenced coach perceptions of participants' attention/participation levels.

Methods: Coaches provided healthy snacks to participants before each netball session for one school term. Children's food consumption was observed at one session before, during and after the intervention. Parents attending the observed session completed pre- and post-intervention questionnaires. Coaches rated participants' attention/participation at the observed sessions before and during the intervention, and completed a questionnaire post-intervention.

Results: Baseline: Ice cream and cake were the most frequently consumed snacks. During intervention: Fruit, cheese and crackers and vegetables were the most frequently consumed snacks. Coaches ratings of participants' attention/participation increased significantly (baseline: 6.4 ± 0.17 , intervention: 7.5 ± 0.36 ; $p=0.02$) where the same coach undertook ratings at both time points.

Conclusions: Coaches providing healthy snacks before sessions at sports clubs increased consumption of nutrient-dense foods at the session, and may have positively affected participants' attention/participation.

Implications for public health: This study highlights how a simple intervention could improve the diet of Australian children.

Key words: snacks, healthy diet, child, sports, coach, netball

snacks in sports clubs, including a lack of support and training, and limited support from state-wide sporting organisations.^{7,8} While the long-term efficacy of these policies on weight and overall health has not been widely studied, sports clubs do offer an attractive setting to promote health.⁹ The use of social modelling¹⁰ by children to inform their food choices, based on peer behaviour, and role modelling by coaches¹¹ may lead to improved healthy eating practices in sports clubs if healthy options

are promoted. Availability and accessibility are the most consistently and positively related determinants of fruit and vegetable consumption among children.¹² Coaches providing healthy snacks may influence this availability directly in sports clubs, offering an avenue to influence parents, which might in turn indirectly increase availability concomitantly outside the club setting. Coaches providing healthy snacks at sports clubs may have benefits beyond nutrition consumption and education for children

1. Department of Health Professions, Swinburne University of Technology, Victoria

2. Centre for Sport and Social Impact, La Trobe University, Victoria

3. Netball Victoria

Correspondence to: Dr Regina Belski, Swinburne University of Technology, PO Box 218, Hawthorn, Victoria 3122; e-mail: rbelski@swin.edu.au

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and parents. Although the influence of certain meals, such as breakfast, on cognitive performance in children has been studied extensively, the acute effect of snacking on attention and participation during physical activity has not. While the evidence for the former is equivocal, there appears to be some benefit to providing breakfast over fasting for cognitive function in children.¹³ Whether this positive effect extends to improved attention and participation levels during physical activity, and how this relates to the nutritional composition of the meal or snack provided, requires further study.

The primary aim of this study was to investigate whether coaches providing a healthy snack to participants prior to a junior netball training session would increase consumption of nutritious snacks in this setting. A secondary aim was to identify whether coaches providing a healthy snack before a netball session would improve coaches' perceptions of the attention/participation levels among participants during the session.

Hypotheses

1. Children will consume more healthy snacks at a netball session when coaches provide healthy snacks before the session, compared to when coaches do not provide healthy snacks.
2. Coaches will perceive that children's attention/participation levels are higher when healthy snacks are provided before a netball session compared to when healthy snacks are not provided.

Methods

Study/program design

This intervention study was part of a larger Victorian Health Promotion Foundation (VicHealth) project to promote healthy eating through community sport in Victoria. Netball Victoria, in partnership with VicHealth, funded five community netball clubs across metropolitan Melbourne to promote healthy eating among junior netball participants. Data was collected at three time points: Baseline (Term 1: Summer), Intervention (Term 2: Autumn) and Post-intervention (Term 3: Winter). All data were collected between March and August 2016 and all observations at each time point were undertaken within a two-week period across

the five participating clubs. The setting was Netball Australia's junior entry netball program (NetSetGO <http://netsetgo.asn.au/>) designed to provide children aged 5–10 years with a positive introduction to netball, incorporating skill activities, minor games, music, dance and modified matches.

Baseline (Term 1)

Prior to the intervention, researchers attended one NetSetGO session at each of the five participating clubs to collect baseline data on:

1. Participant snacking at the session.
2. Coaches' perceptions of participant attention/participation during the session.
3. Parental feedback on their child's usual netball session snacking practices, and their opinion of the importance of healthy snacking at netball sessions.

Intervention (Term 2)

Each participating coach (n=5) received a budget (\$40 per week, about \$2–\$4 per participant) and shopping list of suitable snacks (including fruit; cheese and crackers; air-popped corn; and vegetables, such as carrot sticks and cherry tomatoes) based on guidelines from the Victorian Government's Department of Health and Human Services.¹⁴ Coaches were also instructed to ensure a healthy snack was available to all participants at every NetSetGO session during the intervention term (11 netball sessions over 11 weeks). Prior to the intervention, parents were informed that healthy snacks would be provided. Researchers attended one NetSetGO session (between week 6 and week 8) during the intervention period to collect data on:

1. Participant snacking at the session.
2. Coaches' perceptions of participant attention/participation during the session.

Post-intervention (Term 3)

No snacks were provided to participants in Term 3. Researchers attended a NetSetGO session at each of the five participating clubs and collected data on:

1. Participant snacking at the session.
2. Parental opinions on the importance of healthy snacking and views on the intervention.
3. Coach feedback on the intervention.

Participants

Children (aged 5–10 years old) participating in a NetSetGO netball program at five netball clubs across metropolitan Melbourne, Victoria, Australia, participated in this study. Netball sessions were held after school on a weeknight. Any parents attending the observed netball sessions and the coaches leading the observed sessions (who were often parents of participants) were also invited to participate.

Study tools

Observation of snacking

Trained researchers unobtrusively observed¹⁵ all participants at one session at each participating club at each of the three time points. Information on the number of times any child collected a snack and what the snack consisted of was recorded at the session (i.e. from the time they arrived at the club until the time they left the club) on a standardised recording form. No data were collected on the volume of food consumed by each participant.

Parental questionnaire

Baseline

An investigator-designed 16-item questionnaire was used to survey parents to gain insight into the usual snacking habits/preferences of their children before a netball session. Questions were predominantly dichotomous (e.g. Does your child usually have anything to eat before [netball]? YES/NO) and open-ended (e.g. If yes, what?) Parental views and attitudes about the importance of snacking (using a scale from 1–11 with 1 being 'not important at all' and 11 being 'extremely important'), and the challenges or barriers faced when providing snacks were also investigated. All parents attending an observed pre-intervention session were invited to complete a survey via iSurvey, using ipads.

Post-intervention

An investigator-designed 23-item questionnaire with a mix of dichotomous, open-ended and 11-point scale questions was used to survey parents to ascertain their awareness and opinion of the healthy snack intervention that had taken place the previous term. Data gathered included the parents' thoughts about: the suitability of the snacks provided; their child's enjoyment and consumption of the snacks; whether they had made any changes in the snacks their child

eats when snacks were no longer provided; and whether they would be willing to pay extra for snacks to continue to be provided or to provide snacks to the whole team once per term. All parents attending an observed post-intervention training session were invited to complete a survey via iSurvey, using ipads.

Coach rating scale and questionnaire

A simple visual analogue scale was designed to enable coaches to rate their perception of the attention/participation levels of each participant at each session, on a scale from 1 to 10 (1 = 'very poor' attention/participation, 10 = 'exceptional' attention/participation). The same scale was used by all coaches to rate their perception of the attention/participation of all participants at all baseline and intervention observed sessions.

A 21-item paper questionnaire with a mix of dichotomous, open-ended and 11-point scale questions was also completed by coaches at the observed post-intervention session to obtain their views on the healthy snack intervention conducted in the previous term.

Statistics

Statistical analysis was conducted using IBM SPSS Statistics for Windows, Version 22.0 (IBM Corp, Armonk, New York, USA, 2013) with significance set at $p \leq 0.05$. Statistics are presented as proportions, means and standard deviations unless otherwise specified. Baseline and intervention session coach ratings of participant assessment/participation were compared via paired-samples t-tests. All questionnaire items were analysed, open-ended and qualitative responses were analysed through grouping by theme/category and the number of comparable responses within a theme/category were summed and reported.

Ethics approval

The La Trobe University Human Research ethics committee approved this study (E15-081).

Results

Club characteristics

Five netball clubs across metropolitan Melbourne participated in the study, with 232 child participants in total across the 15 observed NetSetGO sessions (one baseline, intervention and post-intervention session at each of the five clubs), see Table 1.

Table 1: Club characteristics.

	Number of child participants			Nature of venue
	Baseline (n=78)	Intervention (n=88)	Post-intervention (n=66)	
Club 1	10	8	10	Outdoor
Club 2	16	24	8	Outdoor
Club 3 ^a	18	21	13	Indoor
Club 4 ^a	20	25	22	Indoor
Club 5 ^a	14	10	13	Indoor

a: Indicates clubs had canteen that the participants were able to access

Parental questionnaire: baseline

Fifty-seven parents completed a parental questionnaire at baseline. The main results are presented in Table 2. Although 28 respondents did not think it would be useful if snacks were provided before the session, when asked to rate the importance of their child having a healthy snack before netball, the mean score was 8.7 ± 2.4 , indicating a high level of perceived importance.

When asked to identify any challenges/barriers to their child having a healthy snack before a netball session, 45 of the 57 parents either reported that there were no challenges/barriers (n=14), or did not respond to this question (n=31). Twelve parents identified challenges/barriers, including: concerns over transporting and storing fresh/healthy foods (e.g. no refrigeration for cheese and yoghurt); children getting a 'stitch' or vomiting during the session due to eating immediately prior to it; allergies; and eating causing an interruption to the session.

Observed participant snacking

Ice cream (n=15), cake (n=13) and rice/corn thins (n=7) were the most commonly observed snacks consumed by the children at baseline. Fruit (n=6) was the fourth most commonly observed food (see Table 3). Children were observed to consume mainly fruit (n=107), cheese (n=69), crackers (n=63) and vegetables (n=45) during the intervention. No children were observed

consuming ice cream or cake during the intervention. The only discretionary item observed to be consumed during the intervention was crisps (n=1). All children were observed to eat something during the intervention. Twenty-seven children were observed to not eat anything at baseline and 41 at the post-intervention session. There was a notable drop in the number of children observed eating fruit (n=4), crackers (n=3) and cheese (n=1) at the post-intervention session compared to during the intervention.

Perceived attention/participation in netball sessions

There was no difference in mean coach ratings of participant attention/participation at the baseline (6.8 ± 1.0) and intervention (7.1 ± 0.9 ; $p=0.68$) sessions across all five clubs. At three of the five clubs, the same coach completed the rating of participant attention/participation at both baseline and intervention. For these three clubs, there was a statistically significant increase in the mean rating of participant attention/participation between the baseline (6.4 ± 0.17) and intervention (7.5 ± 0.36 ; $p=0.02$) sessions. At the two remaining clubs, different coaches rated the attention/participation of participants at baseline and intervention. In these cases, there was no difference in mean ratings of participant attention/participation at baseline (7.5 ± 1.6) and intervention (6.4 ± 1.1 ; $p=0.2$).

Table 2: Selected responses to baseline parental questionnaire.

Question	Response		Question	Response Food (number of respondents) ^b
	Yes	No		
Does your child usually have anything to eat before NetSetGO? (n=57)	46	11	If yes, what does your child eat? ^a (n=47)	Fruit (27), Sandwich (9), Crackers (7), Cheese and Biscuits (6), Biscuits (Sweet) (6), Biscuits (Savoury) (3), Cake (3), Yoghurt (3), Chips (3), Sushi (2), Chocolate Shake (1), Bacon Roll (1), Chocolate (1), Pork Buns (1), Nuts (1), Protein Bar (1), Cereal (1), Ice Cream (1), Muesli Bar (1)
Do you think it would be useful if snacks were provided before the session? (n=57)	29	28	If so, what do you think would be good snacks to provide? ^a (n=32)	Fruit (29), Crackers (5), Muesli Bars (4), Cheese (4), Vegetables (2), Dried Biscuits (1), Nuts (1), Banana Bread (1), Plain Biscuits (1), Sandwiches (1)

a: Some parents who selected "No" to the previous question responded to this question

b: Multiple responses allowed

Parental questionnaire: post-intervention

Forty-three parents completed a post-intervention parental questionnaire. Twenty-eight parents (68%) reported that they would prefer snacks continued to be provided prior to the NetSetGO sessions. The majority of the parents were happy to either pay up to \$2 extra per session (n=23) for the snacks or to provide snacks for all children once per term (n=26). Only one parent thought the snacks provided during the intervention were unsuitable. They indicated they would have preferred it if only fruit were provided. All parents who indicated that their child consumed the provided snacks (n=36) reported that their child enjoyed them. When asked "Now that snacks are no longer provided, have you made any changes to

what snacks your child has before [netball]?", 21% (n=9) replied "Yes". Of the parents who provided details on the changes made, 67% (n=6) directly referenced either healthier snacks provided or referred to including snacks similar to those provided during intervention (e.g. air-popped corn and fruit).

Coach questionnaire: post-intervention

Five coaches completed a post-intervention coach questionnaire. All rated the pre-session snack as important to extremely important (mean rating 9.8± 0.75). Four of the five coaches thought that the children were more attentive when snacks were provided compared to when snacks were not provided. The coach who did not report that children were more attentive was not directly involved in providing the snack intervention in Term 2. Four of the five coaches wanted to continue to provide snacks, with one indicating that they were "happy for parents to be responsible for them". All four of the coaches who wanted to continue providing snacks thought it would be appropriate to charge parents up to \$2 (n=3) or \$3 (n=1) per week for this to occur, and also indicated that they would be happy if parents took turns bringing snacks once per term each.

Discussion

Approximately 1.7 million Australian children participate in organised sport outside of school hours each year.³ Sports clubs therefore offer a unique and efficient setting to improve the long-term health and development of children, including addressing the proportion who are overweight and obese.^{5,16,17} The present study explored whether coaches providing healthy snacks to children before sessions at community netball clubs increased consumption of healthy snacks in this setting. Given that 35% of the total energy consumed by Australians comes from 'discretionary foods',¹⁸ and 'extra' foods contribute 41% of the daily energy intake of Australian children and adolescents,¹⁹ and most traditional snacks are high in energy, fat, sugar and sodium, improving the snacking habits of children could have a large impact on their overall diet quality.

Coaches providing children with healthy snacks before their netball session increased the consumption of nutrient-dense foods at children's netball sessions. This is not

surprising, as availability and accessibility are major determinants of fruit and vegetable consumption in children, and other studies have found an increase in consumption of healthy snacks when they are provided.^{12,20} Coach and peer modelling have also been shown to have an impact on the dietary behaviour of children,^{10,11} hence the combination of availability and social modelling together may be the ideal combination. Furthermore, the taste acquisition theory suggests that repeatedly tasting foods may lead to an acquired taste for them.^{21,22} Therefore, simply increasing children's exposure to healthy foods through programs such as the one outlined in this study may help facilitate improved long-term consumption.

The intervention also had an impact on the number of children observed consuming 'junk' foods at netball sessions. Only one child was observed consuming a 'junk' food item during the intervention compared to 35 at baseline. This change may have been because parents were aware that coaches would provide a snack for all children, so parents did not provide a snack for their child, and children did not visit the canteen to purchase a snack prior to the session.

Previous research and the post-intervention findings of this study suggest that the long-term impact of interventions that aim to increase fruit and vegetable consumption at the expense of less healthy snacks among children is unclear.⁹ It was encouraging to see that most parents and coaches involved in the intervention supported continuing provision of healthy snacks. Parents were willing to pay a small fee or to take turns to provide snacks to the group for this to continue, and coaches supported continuing the program, demonstrating that both groups valued the program. Interestingly, one of the five clubs involved in this study decided to continue providing healthy snacks as a regular part of their future netball sessions.

The observed snacking habits of children at baseline were substantially different from those reported by parents. Parents reported that fruit was the most commonly consumed snack for their child prior to netball. Fruit was also most commonly cited by parents as an appropriate pre-session snack. However, observation of children's snacking before their netball session showed limited fruit consumption, with a preference for ice cream and cake. It is important to note that the children were only observed at the sports

Table 3: Observed participant snacking.

Time point (number of participants)	No. of children observed consuming snacks at a NetSetGO session (n) ^a	No. of children observed not eating at a NetSetGO session (n)
Baseline (n=78)	Ice cream* (15) Cake* (13) Rice and Corn Thins (7) Fruit (6) Crisps* (3) Chocolate* (2) Yoghurt (2) Nuts (2) Lollies* (1) Muesli/Granola bar (1) Bread (1) Biscuits* (1)	27
Intervention ^a (n=88)	Fruit (107) Cheese (69) Crackers (63) Vegetables (45) Yoghurt (8) Air-popped corn (6) Rice and Corn thins (2) Dried Fruit/nuts (3) Crisps* (1)	0
Post-intervention (n=66)	Popcorn (7) Fruit (4) Lollies* (4) Crackers (3) Crisps* (2) Cake* (2) Croissant* (2) Doughnut* (1) Cheese (1) Yoghurt (1) Bread roll (1)	41

a: Children could eat as many snacks as they wanted; *Considered high energy/sugar/fat ('junk') food

clubs and, depending on the time the netball session started, some children may have had a snack in between finishing school and arriving at the club. Nevertheless, previous research has shown a weak correlation between parent- and child-reported fruit and vegetable intake.^{23,24} Furthermore, parents tend to rate child accessibility and availability of fruit and vegetables higher than their children.^{23,24} Therefore, although the observations in the current study did not take into account everything the child ate before the netball session, the potential for bias in parental reporting is an important consideration. Parents' perceptions of the food environment may also limit their motivation to improve access to healthy food options for children.²⁵ This highlights the importance of programs that provide children with access to healthy food options, independent of the food that parents provide.

A secondary aim of this study was to identify whether coaches providing a healthy snack before netball sessions would improve the coaches' perceptions of attention/participation among participants during the session. Across the three clubs where the same coach rated the attention/participation of the participants at both baseline and intervention using a simple and easy to use visual analogue scale, perceptions of participants' attention/participation improved significantly. Although these ratings were subjective and the measurement tool was not validated, these improvements may be practically valuable and relevant for coaches. If coaches perceive that children are more attentive and have higher levels of participation when they have consumed a healthy snack, and that providing healthy snacks is not a distraction and does not lead to children being unwilling to participate in the session because they have consumed too much food, coaches are likely to be willing to continue to provide or, alternatively, encourage parents to provide, healthy snacks for children prior to their participation in sports training.

While the effect of snacking on cognitive performance and, specifically, attention has not been widely studied, when compared to fasting, breakfast consumption appears to improve cognitive performance.¹³ Although the effect of different types of food (healthy versus unhealthy) in this scenario is less well established, given that many children were observed to not consume a

snack at the netball session at baseline, the fact that they had something (rather than nothing) to eat during the intervention may help explain some of the attention/participation improvement when healthy snacks were consumed. Unfortunately, since observations were made only at the sports clubs, it is not known when the participants last ate something, although the majority of parents reported that their child usually ate something before a netball session. Also, the food intake of individual children was not recorded, so it is not possible to correlate individual improvements in attention/participation with healthy snack consumption.

From a policy perspective, this study suggests that providing simple guidance to coaches, such as a shopping list of suitable snacks, may be a useful and practically valuable starting point to improving healthy snack consumption in children's sport. Detailed policy development and implementation may not be required to make effective change, although, given the challenges associated with recruiting and retaining volunteer coaches and administrators in community sports clubs,²⁶ policy development and implementation may be important to maintain health promotion practices within sports clubs settings.²⁷

There were some limitations with this study. The sample for this study was small and was made up of netball clubs and coaches who agreed to participate in the Netball Victoria/VicHealth initiative to promote healthy eating in community sports clubs. Therefore, any generalisations to the broader sporting community should be made with caution. While consumption of healthy snacks increased during the intervention and there appeared to be fewer children consuming unhealthy snacks post-intervention, the longer-term impact of the intervention on snacking practices is unclear. Similarly, the impact of the intervention on snacking practices in other settings such as school and home remains unknown. Given that the snack consumption of individual children was not recorded (i.e. individual children were not identified), it was not possible to determine whether all children's consumption improved or only a proportion of the children. In addition, snack consumption was observed at one baseline, intervention and post-intervention netball session at each club, and no data were collected on snack consumption

by participants immediately before arriving at the netball venue. Therefore, it is uncertain whether what was observed during this study represents usual snacking practice in this setting. It should also be noted that the baseline observations were undertaken in the summer while the intervention and post-intervention observations were conducted in the autumn and the winter, respectively. Therefore, it is possible that the snacking practices of children at each observation time point were influenced by differences in the weather and the seasonal availability of foods. The perceived improvements in participants' attention/participation in this study also requires further exploration. Despite theoretical plausibility, the fact that a subjective, non-validated tool was used to rate attention/participation and the majority of coaches rating children's attention/participation levels were directly involved in the intervention (i.e. the coaches purchased the food for the pre-training snacks) raise the possibility that these findings are positively biased. However, any bias would have been ameliorated by the fact that coaches conducted baseline and intervention ratings of attention/participation at least 10 weeks apart, and they did not have access to the baseline ratings they had given when conducting intervention ratings. Future studies could also explore whether the effect on attention/participation is greater in those who generally do not eat before training.

Conclusion

Given the importance of good nutrition during childhood, and the correlation of childhood overweight and obesity with adult morbidity, it is important to explore efficient and effective ways to improve the diet quality of Australian children. This study shows that a simple, inexpensive intervention, such as coaches providing healthy snacks before a netball training session, may both increase consumption of nutrient dense foods, and reduce consumption of less healthy snacks in this setting. It may also help improve attention/participation of children during physical activity. However, further research using validated measurement instruments is needed to strengthen the evidence for this association. Further research should also be conducted into the long-term effectiveness of such programs.

Implications for public health

- Providing healthy snacks before children's sport increased consumption of healthy snacks.
- Providing healthy snacks before children's sport reduced consumption of unhealthy snacks.
- Providing healthy snacks before children's sport may improve attention/participation levels in this setting.

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