

DISCUSSION / DISCUSSION

Reply to the discussion of “Overweight and obese boys reduce food intake in response to a glucose drink but fail to increase intake in response to exercise of short duration”

Barkha P. Patel, Shlomi Tamam, Nick Bellissimo, and G. Harvey Anderson

We thank Thivel et al. for their interest in our work and for highlighting our recent publication (Tamam et al. 2012). We appreciate the opportunity to respond to some of the issues raised in their letter.

The aim of our study was to describe the effects of activity of short duration and low intensity and of a glucose drink on appetite, food intake, and energy balance for the duration of the study in normal weight, overweight, and obese boys. Our study provided a comparison of normal weight and overweight–obese, 9–14-year-old boys that were exposed to exercise of fixed duration (15 min) at the ventilation threshold, which can range from 45% and 65% of maximal oxygen consumption ($\dot{V}O_{2\max}$) depending on the fitness of the boy. Food intake was measured 30 min later and energy balance calculated for the duration of the 80-min study. In the paper (Thivel et al. 2012) discussed by Thivel et al., obese adolescent boys completed 2 isoenergetic exercises (~1400 KJ) at both 40% and 75% $\dot{V}O_{2\max}$. The durations of the exercise treatments were ~59 min at 40% $\dot{V}O_{2\max}$ and ~30 min at 75% $\dot{V}O_{2\max}$. Similar to Thivel et al. (2012), we did not find that overweight–obese boys compensated for energy expended at low intensity. However, we observed intake compensation in the normal weight boys.

The reason we focused on measuring food intake 30 min after an acute bout of exercise was to simulate physical activity programs recommended for application in schools. In Canada, physical activity guidelines recommend that children and youth accumulate 60 min of activity each day but do not specify the duration of each bout (Canadian Society for Exercise Physiology and the Public Health Agency of Canada 2011a, 2011b). In the United States, the Take 10! program encourages teachers to facilitate 10-min bouts of physical activity throughout the school day to accumulate a total of

30 min·day⁻¹ (Peregrin 2001; Stewart et al. 2004). However, it has not been determined how short acute bouts of low-intensity exercise impact food intake, appetite, and energy balance. Furthermore, although there are disagreements on the use of subjective appetite for predicting food intake, as pointed out by Thivel et al., we have previously shown that appetite increases in children after short duration physical activity (Bellissimo et al. 2007b; Bozinovski et al. 2009) and that subjective appetite does predict how much boys and girls eat at a meal (Bellissimo et al. 2007a, 2008a, 2008b; Bozinovski et al. 2009; Patel et al. 2011). Thus, our hypothesis was that exercise increases short-term appetite and food intake in normal weight and overweight–obese boys if food was freely accessible after completion of exercise. Clearly the hypothesis was supported for the normal weight but not the overweight–obese boys. In contrast, short-term mechanisms of energy intake were not compromised in obese–overweight boys as both groups responded similarly by decreasing food intake after the glucose drinks. Why the response to exercise was not also similar in the 2 groups cannot be explained at present.

Thivel et al. (2012) suggests that our use of an ad libitum pizza meal was a confounding factor in the study. We have used a pizza meal in many studies (Bellissimo et al. 2007a, 2007b, 2008a, 2008b; Bozinovski et al. 2009; Patel et al. 2011), as it leads to easy quantification of intake. As described in the paper, the pizzas are small, cut into 4 equal pieces of approximately 50 kcal before serving, and lack an outer crust, which gives them uniform energy content. Furthermore, palatability of the pizza meal was not correlated with food intake. Excess energy intake is more frequently associated with variety such as occurs in a buffet meal, perhaps because of less sensory specific satiety (Snoek et al. 2004; Brondel et al. 2009).

Received 6 July 2012. Accepted 11 July 2012. Published at www.nrcresearchpress.com/apnm on 24 July 2012.

B.P. Patel, S. Tamam, and G.H. Anderson. Department of Nutritional Sciences, Faculty of Medicine, University of Toronto, 150 College, Street, ON M5S 3E2, Canada.

N. Bellissimo. School of Nutrition, Faculty of Community Services, Ryerson University, 350 Victoria Street, Toronto, ON M5B 2K3, Canada.

Corresponding author: G. Harvey Anderson (harvey.anderson@utoronto.ca).

This is a reply to Thivel et al. (2012), published in this issue.

In summary, our study suggests that exercise at the ventilation threshold for 15 min may contribute to reduced body weight in overweight–obese but not in normal weight boys. Therefore, we agree with Thivel et al. that understanding the effect of exercise on energy balance and appetite regulation in obese children is an important area deserving further investigation.

References

- Bellissimo, N., Pencharz, P.B., Thomas, S.G., and Anderson, G.H. 2007a. Effect of television viewing at mealtime on food intake after a glucose preload in boys. *Pediatr. Res.* **61**(6): 745–749. doi:10.1203/pdr.0b013e3180536591. PMID:17426650.
- Bellissimo, N., Thomas, S.G., Goode, R.C., and Anderson, G.H. 2007b. Effect of short-duration physical activity and ventilation threshold on subjective appetite and short-term energy intake in boys. *Appetite*, **49**(3): 644–651. doi:10.1016/j.appet.2007.04.004. PMID:17537539.
- Bellissimo, N., Desantadina, M.V., Pencharz, P.B., Berall, G.B., Thomas, S.G., and Anderson, G.H. 2008a. A comparison of short-term appetite and energy intakes in normal weight and obese boys following glucose and whey-protein drinks. *Int. J. Obes.* **32**(2): 362–371. doi:10.1038/sj.ijo.0803709. PMID:17700578.
- Bellissimo, N., Thomas, S.G., Pencharz, P.B., Goode, R.C., and Anderson, G.H. 2008b. Reproducibility of short-term food intake and subjective appetite scores after a glucose preload, ventilation threshold, and body composition in boys. *Appl. Physiol. Nutr. Metab.* **33**(2): 326–337. doi:10.1139/H07-194. PMID:18347688.
- Bozinovski, N.C., Bellissimo, N., Thomas, S.G., Pencharz, P.B., Goode, R.C., and Anderson, G.H. 2009. The effect of duration of exercise at the ventilation threshold on subjective appetite and short-term food intake in 9 to 14 year old boys and girls. *Int. J. Behav. Nutr. Phys. Act.* **6**(1): 66. doi:10.1186/1479-5868-6-66. PMID:19818131.
- Brondel, L., Romer, M., Van Wymelbeke, V., Pineau, N., Jiang, T., Hanus, C., and Rigaud, D. 2009. Variety enhances food intake in humans: role of sensory-specific satiety. *Physiol. Behav.* **97**(1): 44–51. doi:10.1016/j.physbeh.2009.01.019. PMID:19419673.
- Canadian Society for Exercise Physiology and the Public Health Agency of Canada (PHAC). 2011a. 2011 CSEP Canadian physical activity guidelines for Children 5–11 years. CSEP and PHAC (Ministry of Health Promotion). Ottawa, Ont., Canada. Available from www.csep.ca/CMFiles/Guidelines/CSEP-InfoSheets-child-ENG.pdf. [Accessed 12 June 2012.]
- Canadian Society for Exercise Physiology and the Public Health Agency of Canada. 2011b. 2011 CSEP Canadian physical activity youth for Children 12–17 years. CSEP and PHAC (Ministry of Health Promotion). Ottawa, Ont. Canada. Available from www.csep.ca/CMFiles/Guidelines/CSEP-InfoSheets-youth-ENG.pdf. [Accessed 12 June 2012.]
- Patel, B.P., Bellissimo, N., Thomas, S.G., Hamilton, J.K., and Anderson, G.H. 2011. Television viewing at mealtime reduces caloric compensation in peri-pubertal, but not post-pubertal, girls. *Pediatr. Res.* **70**(5): 513–517. doi:10.1203/PDR.0b013e31822d783e. PMID:21772226.
- Peregrin, T. 2001. Take 10! Classroom-based program fights obesity by getting kids out of their seats. *J. Am. Diet. Assoc.* **101**(12): 1409. doi:10.1016/S0002-8223(01)00338-8. PMID:11762734.
- Snoek, H.M., Huntjens, L., Van Gemert, L.J., De Graaf, C., and Weenen, H. 2004. Sensory-specific satiety in obese and normal-weight women. *Am. J. Clin. Nutr.* **80**(4): 823–831. PMID:15447886.
- Stewart, J.A., Dennison, D.A., Kohl, H.W., III, and Doyle, J.A. 2004. Exercise level and energy expenditure in the TAKE 10! in-class physical activity program. *J. Sch. Health*, **74**(10): 397–400. doi:10.1111/j.1746-1561.2004.tb06605.x. PMID:15724566.
- Tamam, S., Bellissimo, N., Patel, B.P., Thomas, S.G., and Anderson, G.H. 2012. Overweight and obese boys reduce food intake in response to a glucose drink but fail to increase intake in response to exercise of short duration. *Appl. Physiol. Nutr. Metab.* **37**(3): 520–529. doi:10.1139/h2012-038. PMID:22530879.
- Thivel, D., Isacco, L., Montaurier, C., Boirie, Y., Duche, P., and Morio, B. 2012. The 24-h energy intake of obese adolescents is spontaneously reduced after intensive exercise: a randomized controlled trial in calorimetric chambers. *PLoS ONE*, **7**(1): e29840. doi:10.1371/journal.pone.0029840. PMID:22272251.