



Effectiveness of Taste Lessons with and without additional experiential learning activities on children's psychosocial determinants of vegetables consumption



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ABSTRACT

Experiential learning methods seem to be promising to enhance healthy eating behaviour in children. Therefore, this study compared the effectiveness of the Dutch programme Taste Lessons with and without additional experiential learning activities on children's psychosocial determinants of vegetable consumption. In a quasi-experimental design, 800 children aged 8–11 years old from 34 elementary schools participated in a Taste Lessons (TL: 5 lessons) group, a Taste Lessons Vegetable Menu (TLVM: TL with 3 added experiential learning activities) group, and a control group. During a baseline and follow-up measurement, children completed a questionnaire on psychosocial determinants towards vegetables consumption. Multilevel regression analyses were conducted to compare changes in the determinants between the TLVM group and the TL group, and between the two intervention groups and the control group. The TLVM group showed a significantly higher increase in knowledge ($p < 0.001$), attitude and subjective norm of the teacher (both $p < 0.05$), whereas the TL group only showed a significantly higher increase in knowledge ($p < 0.001$) compared to the control group. Increases in knowledge ($p < 0.10$), subjective norm ($p < 0.10$) and cooking self-efficacy ($p < 0.05$) were higher in the TLVM group than in the TL group. Therefore, more and stronger effects were found in children who participated in the additional hands-on activities.

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1. Background

Over the last two decades, a wide array of school-based nutrition education programmes has been developed to enhance children's healthy eating behaviour (Pérez-Rodrigo & Aranceta, 2001). Evaluation studies show varying effects of these programmes, from changes in psychosocial determinants to changes in actual eating behaviour (Blanchette & Brug, 2005; Contento, Manning, & Shannon, 1992; Evans, Christian, Cleghorn, Greenwood, & Cade, 2012; Knai, Pomerleau, Lock, & McKee, 2006; Peters, Kok, Ten Dam, Buijs, & Paulussen, 2009; Pérez-Rodrigo & Aranceta, 2001).

Literature suggests that, to be more effective, school-based nutrition education programmes should not only provide information on healthy eating behaviour, but also enhance knowledge and skills regarding production, preparation and preservation of food (Contento et al., 1992; Pérez-Rodrigo & Aranceta, 2001). Furthermore, programmes may be more effective when they involve parents (Blanchette & Brug, 2005; Contento et al., 1992; Knai et al., 2006; Peters et al., 2009; Pérez-Rodrigo & Aranceta, 2001) and other community members in a multicomponent approach (Evans et al., 2012; Preliip, Kinsler, Thai, Erausquin, & Slusser, 2012; Pérez-Rodrigo & Aranceta, 2001). Finally, Peters et al (2009). suggest that programmes are more effective when they use varying teaching methods with an active, interactive, multimodal and multiple setting format. Hands-on activities such as tasting, cooking and gardening have become more popular (Bontrager Yoder et al., 2014; Jones et al., 2012; Knai et al., 2006; Morgan et al., 2010; Pérez-Rodrigo & Aranceta, 2001; Robinson-O'Brien, Story, & Heim, 2009; Wang et al., 2010). Such activities

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are highly liked by children and may enhance effectiveness by creating feelings of ownership and pride (Bevan, Vitale, & Wengreen, 2014; Heim, Stang, Ireland, 2009; Jones et al., 2012; Liquori, Koch, Ruth Contento, Castle, 1998; van der Horst, Ferrage, & Rytz, 2014). A review by Robinson-Brien et al (Robinson-O'Brien et al., 2009). shows that programmes including nutrition lessons, gardening activities and food preparation activities are in general more effective in increasing children's fruit and vegetable intake than nutrition lessons only.

The current study focuses on the Dutch nutrition education programme 'Taste Lessons' for elementary schools, which aims to interest children in taste, health and food quality (Battjes-Fries, Haveman-Nies, Renes, Meester, & van 't Veer, 2015). To improve effectiveness, the 'Taste Lessons Vegetables Menu' has been developed for the sixth and seventh grade of elementary schools, including the five lessons of Taste Lessons and four additional activities. These additional activities include repetition and deepening understanding of the lessons by involving the children in each step of the food chain with various hands-on activities and a more extensive involvement of parents and other community members. The purpose of this study was to compare the effectiveness of Taste Lessons with Taste Lessons with additional experiential learning activities (Taste Lessons Vegetable Menu) on children's psychosocial determinants of vegetable consumption.

2. Methods

2.1. Intervention design

Taste Lessons (*Smaaklessen*) is a national, school-based nutrition education programme, developed in 2006 by the Netherlands Nutrition Centre and Wageningen University for elementary school grades 1–8 (children aged 4–12 years) (Battjes-Fries et al., 2015). It was developed in practice, without using a particular theoretical framework. As the programme aims to increase children's interest in food and to increase their knowledge and skills regarding healthy and conscious eating behaviour, children exposed to Taste Lessons are expected to increase in psychosocial determinants of healthy and conscious eating behaviour. The schoolteacher implements the lessons. Teaching materials consist of a teacher guide, Smartboard activities, and an online catalogue with additional ideas for each lesson. In 2013, the programme materials were rearranged into five lessons per grade around the themes: taste development, eating healthily, food production, consumer skills and cooking. Each lesson takes on average 45 min and consists of several teaching methods, including an introductory group talk, a hands-on activity and an evaluation group talk (details shown in Table 1).

In 2013, a format was developed in which Taste Lessons (TL) is extended with additional hands-on activities for the five basic food groups. The Taste Lessons Vegetable Menu (TLVM) for grades 6 and 7 was developed as a pilot to assess appreciation, feasibility and the added effectiveness of this extended format. In addition to the five lessons of Taste Lessons, the Taste Lessons Vegetable Menu contains four activities: a vegetable quiz, an excursion to a vegetable grower, a homework assignment for the children to perform with their parents in the supermarket, and a cooking lesson with a dietician and the parents (Table 1). The excursion and cooking lesson were arranged for the schools by the research team. Also, teachers in the intervention groups were given the programme materials free of charge and received a small budget to finance necessary ingredients and materials. Before implementation of TL (VM), teachers received training during a kick-off meeting, in which they were informed about the content of the programme and how to implement the teaching materials.

2.2. Study design and procedure

A quasi-experimental design with three arms was used to assess the effectiveness of the Taste Lessons Vegetable Menu. The study was carried out among 1010 children in 34 elementary schools. Of this group, 11 schools implemented the Taste Lessons Vegetable Menu (TLVM), 11 schools implemented Taste Lessons (TL) and 12 schools took part in the study as a control group. In February–April 2014, the research team (the co-authors and seven research assistants) visited all schools twice, for the baseline and follow-up measurements. The research assistants were trained by the (co-) authors to ensure each member of the research team followed a similar protocol for collecting the data. The measurements were conducted in the week before and the week after the intervention period. The measurements in the control schools took place in the same period. Before the baseline measurement, children received a questionnaire on socio-demographic characteristics for their parents to complete at home (on paper or online). During the measurements, children were requested to complete a questionnaire in class, supervised by a research assistant. Furthermore, during the follow-up measurement, the teachers, children and parents in the TLVM and the TL group were asked to complete a process evaluation questionnaire. The IRB deemed this study exempt from IRB review. Children took part in the study whose parents did not object to their participation.

2.3. Study population

The study took part in Gelderland Province in the Netherlands. To recruit schools, a list of elementary schools in this province was consulted. From this list, 219 schools were randomly assigned to one of the three study groups (110 to the TLVM group, 54 to the TL group, and 56 to the control group) and invited by letter to take part in the study. Employees of the community health service reminded the schools by phone about recruitment for the study. Schools were included if they were not planning to participate in any other nutrition-related education programme and the children in grades 6 and 7 were not previously enrolled in TL. Eleven of the 110 schools (10%) participated in the TLVM group (417 children in 18 classes), eleven of the 54 schools (20%) in the TL group (285 children in 13 classes) and twelve of the 56 schools (21%) in the control group (308 children in 18 classes) met the inclusion criteria and were willing to participate. All recruited classes participated in the baseline measurement and 949 of the 1010 children completed the baseline questionnaire (94%). All but one class in the control group participated in the follow-up measurement, resulting in 888 completed questionnaires (88%). In total, 800 children (79%) filled out both questionnaires and were included in the analyses. For the process evaluation, 627 children (89% of 702 children in the TL (VM) group), 26 teachers (84% of the 31 teachers in the TL (VM) group) and the parents of 289 children (41% of the parents of 702 children in the TL (VM) group) filled out the process evaluation questionnaire.

2.4. Measures

2.4.1. Psychosocial determinants

A questionnaire was developed to measure the four determinants from Ajzen's Theory of Planned Behaviour (Ajzen, 1991): *self-efficacy*, *attitude*, *subjective norm* and *intention*, as well as *knowledge* and *awareness* across the themes: taste (tasting unfamiliar vegetables, one question), health (eating enough vegetables daily, one question), production (paying attention to the origin, production and processing of vegetables, three questions) and cooking (three questions on self-efficacy only). Children's

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