

Health promotion in early childhood education settings

Rapid evidence review



Canterbury
District Health Board
Te Poari Hauora o Waitaha

Prepared for the Early Childhood Health
Promoter, Communities Team
by the Information Team
Community & Public Health
June 2018

The information contained in this document may be derived from a number of sources. Although the CDHB has taken reasonable steps to ensure that the information is accurate, it accepts no liability or responsibility for any acts or omissions, done or omitted in reliance in whole or in part, on the information. Further, the contents of the document should be considered in relation to the time of its publication, as new evidence may have become available since publication. The Canterbury District Health Board accepts no responsibility for the manner in which this information is subsequently used.

© Canterbury District Health Board, 2018

Executive summary

Background

Development during early childhood lays the foundation for health, education, social, employment and economic outcomes throughout the life course. Many young New Zealand children spend time in early childhood education (ECE) settings, making them an ideal location for health promotion. A settings-based approach to health promotion is also more promising in terms of addressing health inequities as it focuses on modifying the wider environmental aspects of a setting; not solely educating individuals within that setting.

Methods

This rapid evidence review presents evidence from recently-published reviews on the effectiveness of health promotion interventions in several areas - sun safety, physical activity, oral health, nutrition, social and emotional wellbeing, and hand hygiene - delivered in ECE settings. Literature from New Zealand is included where relevant.

Several limitations must be taken into account when interpreting the findings of this review. Firstly, the heterogeneity of health promotion interventions collated in the reviews means it is difficult to make conclusions about the overall effectiveness of the interventions as a group. Also, the extrapolation of findings to a New Zealand setting may be limited in some instances due to most of the interventions described being conducted overseas. Finally, this review has been carried out in a short timeframe and is not, and does not claim to be, comprehensive or systematic.

Findings

Evidence collated in this rapid review suggests that some health promotion interventions in ECE settings can positively influence health-related practices and outcomes among children (such as using sun protection, duration and intensity of physical activity, number of episodes of infectious illness, and healthy eating habits) and their educators to a modest degree. Among the most effective health promotion interventions there were several common characteristics, including:

- modifying the environment in ways to enable healthy choices
- producing written policies to embed health promoting activities in everyday practice
- integrating health and wellbeing activities into the curriculum
- providing ongoing, quality education and training opportunities to ECE setting staff
- ensuring ECE setting staff role model and reinforce healthy behaviours
- participating in structured health promotion programmes (such as the Healthy Heart Award), where available and/or collaborate with relevant community organisations
- using multicomponent interventions, with several complementary components, and
- engaging, involving, educating and empowering parents.

In conclusion, ECE settings are well positioned to play an important role in promoting and enabling the health of young children in Aotearoa New Zealand.

Table of contents

The importance of wellbeing in early life	1
The first 1000 days.....	1
Early life interventions are a good investment	3
The role of early childhood education settings in health promotion.....	3
Methods.....	5
Literature search.....	5
Limitations	5
Findings	7
Sun safety	7
Physical activity.....	8
Oral health.....	9
Tooth brushing	10
Water and milk as the first choice for beverages	11
Access to dental services.....	12
Nutrition	13
Breastfeeding	13
Healthy eating environments and behaviours	13
Edible gardens	17
Social and emotional wellbeing.....	18
Hand hygiene.....	20
Summary	22
References	23

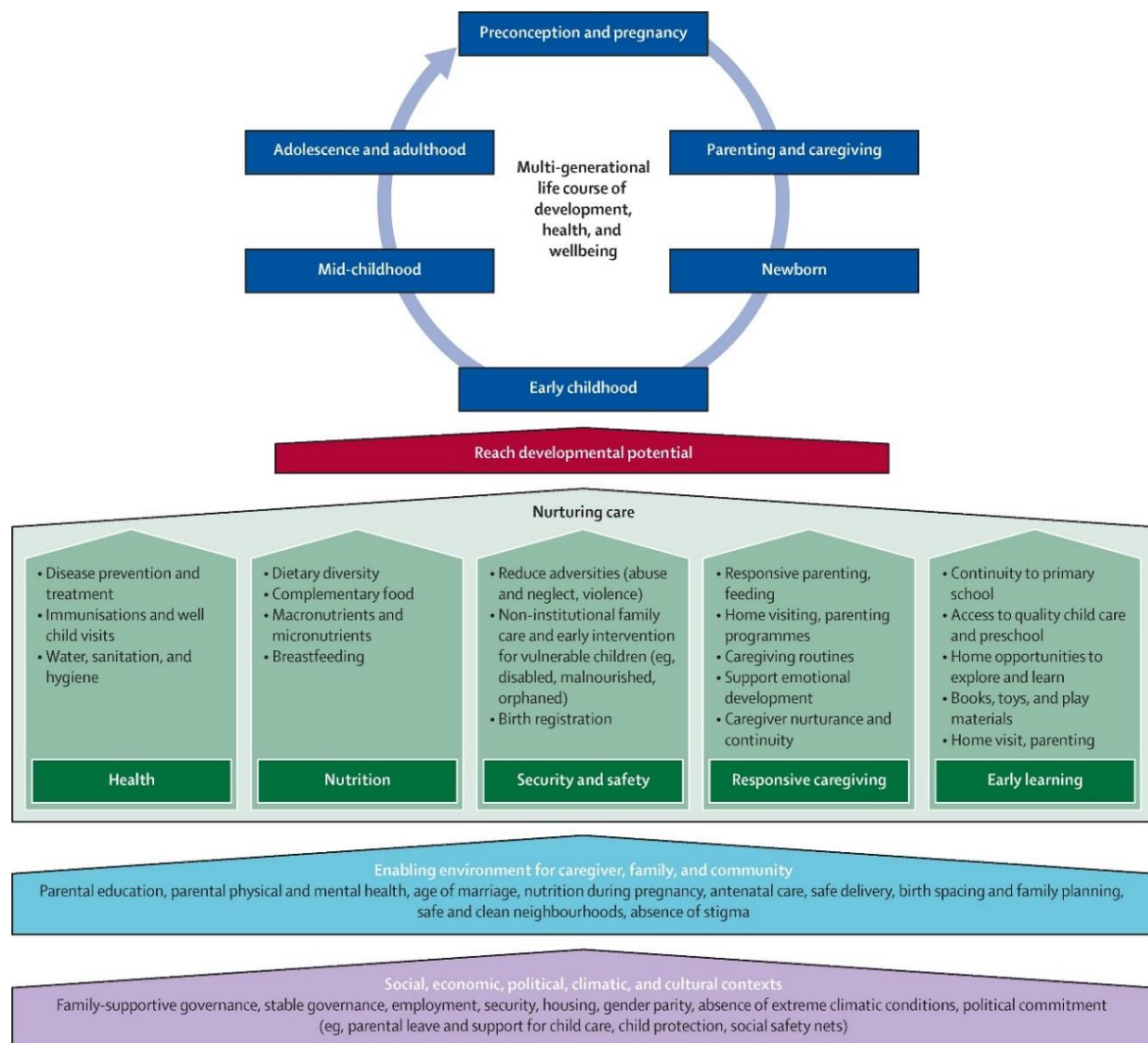
The importance of wellbeing in early life

The first 1000 days

Good health is a fundamental right of every child (Machel, 2017; Office of the Children's Commissioner, 2006; Office of the United Nations High Commissioner for Human Rights, 1990). Aotearoa New Zealand ranks poorly compared to other high-income countries against several measures of child health and wellbeing, including neonatal mortality and youth suicide (OECD, 2009a, 2016; Public Health Advisory Committee, 2010; UNICEF, 2017). In addition, significant inequities in health outcomes between Māori and non-Māori children exist (Hobbs et al., 2017; Simpson et al., 2017; Smylie, Crengle, Freemantle, & Taualii, 2010), and such health disparities are closely linked to poverty and socioeconomic deprivation.

There is a large body of evidence that development during childhood, in particular the first 1000 days, lays the foundation for health, education, social, employment and economic outcomes throughout the life course (Bruun Jensen, Currie, Dyson, Eisenstadt, & Melhuish, 2013; Center on the Developing Child, 2010; Children's Commissioner's Expert Advisory Group on Solutions to Child Poverty, 2012; Dodds, 2016; Gluckman, Hanson, Cooper, & Thornburg, 2008; Kvalsvig, D'Souza, Duncanson, & Simpson, 2016; Moore, Arefadib, Deery, & West, 2017; Public Health Advisory Committee, 2010). The impact of early life on health and development is observed throughout the life course, and to reach their full potential children require nurturing care sustained by an enabling environment (**Figure 1**) (Black et al., 2017). Nurturing care includes quality health care and disease prevention, a nutritious diet, a secure and safe environment, responsive and supportive caregiving, and opportunities for learning (Britto et al., 2017). These nurturing factors are enabled by aspects of the wider family environment (such as caregiver education and health, and access to reproductive health care), and the wider social, economic, political, climatic and cultural context (such as employment, poverty and housing) (Black et al., 2017).

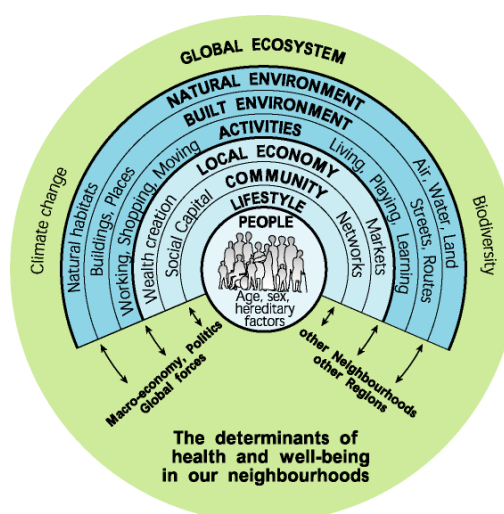
Figure 1. The effects of contexts, environments, and nurturing care through the multigenerational life course



Source: Black et al. (2017)

It is recommended that a life course approach is used to improve health and decrease inequities (Gluckman et al., 2008; World Health Organization & Calouste Gulbenkian Foundation, 2014). This approach acknowledges the different impacts of the social determinants of health throughout life (**Figure 2**), and suggests actions to improve the conditions in which people are born, grow, and live (World Health Organization & Calouste Gulbenkian Foundation, 2014). It is also recognised that many health determinants are closely interrelated and multiple adversities often co-exist (such as economic hardship, poor quality housing, precarious employment, stress, and food insecurity) (New Zealand Government, 2012). Actions to improve early childhood development require greater integration of the health sector with other non-health sectors (such as education and welfare) to deliver integrated, multisectoral evidence-based interventions (Machel, 2017).

Figure 2. Health map showing the relationships between the determinants of health and wellbeing



Source: Barton and Grant (2006)

Early life interventions are a good investment

Compared to other OECD countries, New Zealand has one of the lowest, and least effective, rates of public investment in young children (Infometrics, 2011; OECD, 2009b). This low rate of investment generates significant economic costs from potentially avoidable expenditure on public health, welfare, remedial education, low productivity, crime, and justice (Infometrics, 2011).

Investing in prevention and intervention strategies in the early childhood years provides greater savings over the life course as the need for remedial or punitive actions later in life are reduced (Health Committee, 2013; Office of the Children's Commissioner, 2014; Office of the Prime Minister's Science Advisory Committee, 2011). The economic benefits of early years investments are greater than the costs of the interventions themselves, and effective early interventions provide value for money as the multiple benefits influence many aspects of life and extend beyond the individual to the whānau, community and wider society (GLA Economics, 2011; New Zealand Government, 2012; Office of the Prime Minister's Science Advisory Committee, 2011).

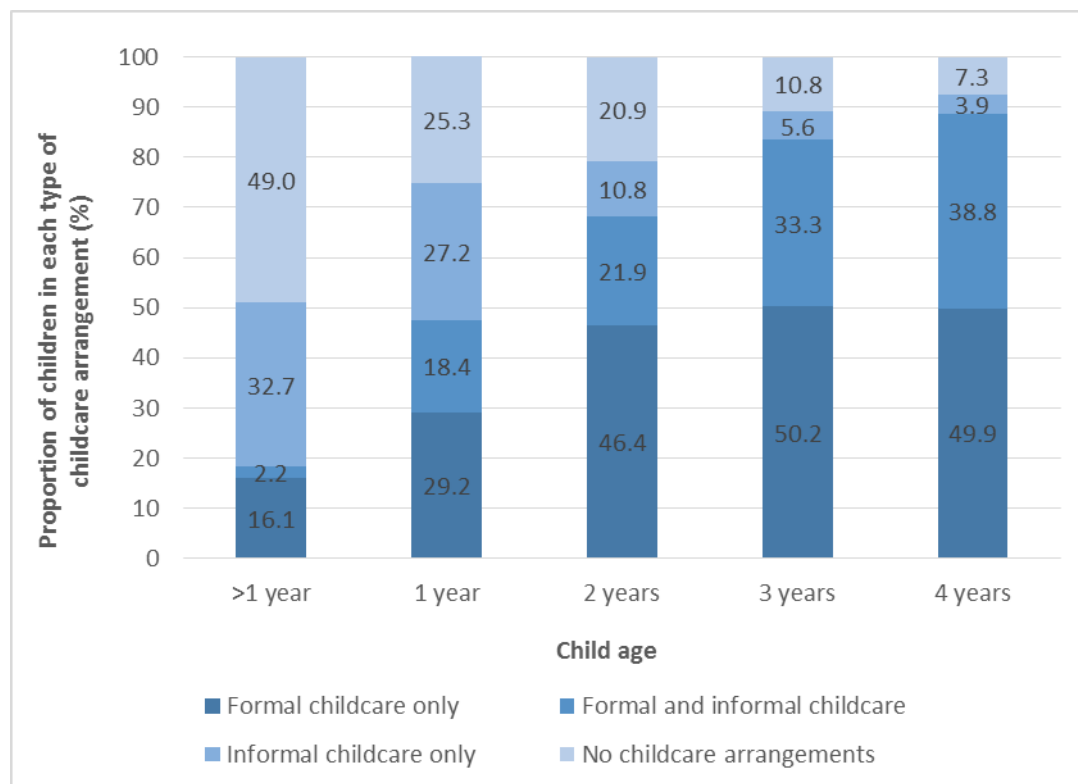
The role of early childhood education settings in health promotion

The first goal of the Mana Atua/Wellbeing strand of Te Whāriki, the New Zealand early childhood curriculum (Ministry of Education, 2017), states that "children experience an environment where their health is promoted" (page 24). Learning outcomes within this area of the curriculum include self-care skills relating to food preparation, healthy eating and drinking, hygiene, toileting, resting, sleeping, washing and dressing, an awareness of hauora and healthy lifestyles, the ability to make choices, a sense of responsibility for their own and others' wellbeing, and knowledge about keeping safe from harm.

The majority of young New Zealand children spend time in ECE settings at some point. Participation in ECE increases with increasing age (Statistics NZ, 2017; SUPERU, 2017), with 18.3 percent of infants under one year of age attending formal childcare in New Zealand, 68.3 percent attending at age two,

and 88.7 percent attending at age four (**Figure 3**). As well as attending formal childcare, some of these young children also have informal care arrangements.

Figure 3. Childcare arrangements for young children in New Zealand in 2017



Source: Statistics NZ (2017)

The time spent by many New Zealand children in formal ECE settings provides an ideal opportunity for health promotion. The Ottawa Charter for Health Promotion (World Health Organization, Health and Welfare Canada, & Canadian Public Health Association, 1986) states that "Health is created and lived by people within the settings of their everyday life; where they learn, work, play, and love." (page 4). A settings-based approach to health promotion includes coordinated interventions that modify the physical, social, and organisational aspects of a specific setting; not solely educating individuals within that setting. A focus on "upstream" environmental interventions in settings (particularly education settings) is also more promising in addressing health inequities (Bruun Jensen et al., 2013; Lorenc, Petticrew, Welch, & Tugwell, 2013; Newman, Baum, Javanparast, O'Rourke, & Carlon, 2015). Behavioural strategies targeted at educating individuals are more limited in their overall impact and cost-effectiveness as changes to an individual's behaviour requires support from health-promoting environments. Enhanced and longer-term effects of individual-level strategies are likely to occur when they are implemented in conjunction with environmental strategies (World Health Organization, 2012).

Methods

This summary was prepared in response to a request from the Early Childhood Health Promoter at Community and Public Health. It presents a rapid review of recent literature discussing the effectiveness of health promotion activities on several requested topic areas (sun safety, physical activity, oral health, nutrition, social and emotional wellbeing, and hand hygiene) delivered in ECE settings. Information summarised here will inform intersectoral work to improve outcomes for young children and their whānau.

For the purpose of this document, the term ECE setting refers to any place where young children receive education and care, and includes licensed and regulated ECE providers (e.g. education and care centres, kindergartens, playcentres, home-based education and care, hospital-based services, and certificated playgroups), kōhanga reo, and unlicensed and informal playgroups (Ministry of Education, 2017).

Literature search

This rapid review collates evidence from published reviews of health promotion programmes in ECE settings. A literature search to identify English-language peer-reviewed reviews published between January 2010 and April 2018, was conducted via Medline (OVID), using a combination of the title search terms:

- child care or child-care or childcare or early years or early childhood or preschool\$ or pre-school\$ AND
- program\$ or intervention\$ or study or studies or strategy\$ or polic\$

A broader search was also conducted using both Google Scholar and Google and topic-specific key words, to identify further published and grey literature, including relevant literature published in New Zealand. Titles and abstracts of publications extracted from the search strategies above were assessed for relevance. Further, the reference lists of relevant publications were hand-searched to identify further literature. Studies which specifically focused on low-income countries were not included in the evidence review due to the potentially limited applicability to a New Zealand setting.

Limitations

When considering the findings presented, it is important to keep in mind the limitations of this rapid evidence review. This review has been carried out in a short timeframe and has accessed literature using databases readily available to the Canterbury District Health Board. It is not, and does not claim to be, comprehensive or systematic.

In compiling and summarising diverse literature, it is also necessary to consider the findings in light of some of the limitations of the evidence base. There are many differences between the health promotion programmes identified in terms of setting, design, sample size, participant characteristics, intervention approach, duration, outcome measures used to assess the intervention effects, and

statistical analyses. This heterogeneity makes it difficult to make conclusions about the overall effectiveness of health promotion programmes on a particular topic (such as physical activity) as a group.

The individual programmes included in the reviews often have limitations which are inevitable due to the fact that the interventions were implemented in ECE settings. For example:

- blinded allocation and/or individual-level randomisation is not possible due to the nature of the intervention
- contamination may occur between the intervention and control groups (where those in the control group may become aware of elements of the intervention)
- compliance, attendance and/or level of participation of each individual will be variable
- implementation quality is difficult to assess
- use of self-reported data, which may be susceptible to recall bias (due to being reliant on memory) and concerns regarding social desirability (the tendency to respond to questions in a socially acceptable direction)
- short-term follow-up, making it difficult to ascertain whether any effects of the programme are maintained over a longer time period, and/or
- differential effect of interventions on sub-groups of participants (e.g. by ethnicity or socioeconomic position) was not often measured or analysed, therefore, it is difficult to determine whether programmes had equivalent effects for all participants.

These limitations in the study methodology may impact on the accuracy, precision and size of the effect of the programmes described; however, they do reflect the practical application of programmes in a real-world setting.

Most of the health promotion programmes described were conducted in the United States of America (USA), Canada, Europe, Australia and the United Kingdom (UK). It can be difficult to extrapolate the findings of these individual studies to ECE settings in New Zealand due to the educational, environmental, and sociocultural differences between countries. It is plausible that while the theories and principles used to create the programme content may be applicable to a New Zealand setting, the delivery of the programme (e.g. specific resources) may require adaptation. Therefore, the conclusions made must be interpreted acknowledging that the programme characteristics and effects may not be entirely comparable if undertaken in New Zealand.

Findings

Sun safety

New Zealand and Australia have the highest incidence rate of melanoma (the most serious type of skin cancer) in the world (Liang, Robinson, & Martin, 2010; Ministry of Health, 2018a). Melanoma incidence and mortality has increased in New Zealand over time (Sneyd & Cox, 2013; Whiteman, Green, & Olsen, 2016), and melanoma was the fourth most commonly registered cancer in New Zealand in 2013 (Ministry of Health, 2016a).

Ultraviolet radiation present in sunlight is the main modifiable cause of melanoma (Volkovova, Bilanicova, Bartonova, Letasiova, & Dusinska, 2012), and the risk of developing melanoma significantly increases with increasing number of sunburns (Dennis et al., 2008). Therefore, protecting young children from excessive sun exposure and sunburn is a vital component in preventing melanoma development later in life.

In New Zealand, skin cancer prevention and sun safety promotion are led by the Health Promotion Agency (HPA), in partnership with the Cancer Society of New Zealand, Melanoma NZ, and the Melanoma Network of New Zealand Incorporated. Since 1993, HPA sun safety activities have been promoted under the SunSmart¹ brand.

Sun safety-related health promotion includes targeting individuals' sun protection behaviours (e.g. wearing sunscreen, hats, protective clothing, and sunglasses, and avoiding prolonged sun exposure) and environmental interventions that support these behaviours (e.g. provision of built or natural shade). ECE centres are recommended as settings for implementing primary prevention strategies (Community Preventive Services Task Force, 2013; Greenwood, Soulos, & Thomas, 2000; HPA & MelNet, 2017). These strategies include:

- educational and behavioural interventions, which provide information about sun safety and the effects of ultraviolet radiation. Information may be directed to children, educators and/or caregivers. Messages can be reinforced by role-modelling.
- environmental changes, including increasing the availability of sun-protective personal items (e.g. sunscreen, protective clothing and hats), and providing sun-protective features in the physical environment (e.g. shade structures, planting).
- policy changes, such as clothing and sunscreen guidelines, and restrictions on outdoor activities during peak sunlight hours.

Little research has been conducted in New Zealand in relation to sun protection interventions in ECE settings. In one qualitative study, the sun protection policies and practices in New Zealand teacher-led ECE centres were investigated in 2009-2010 (Duignan, Signal, & Thomson, 2014). Interviews with 10 ECE centre professional development advisors and a review of provided sun protection policy documents found "a lack of comprehensive sun protection policies and practices". Action was

¹ www.sunsmart.org.nz/

greatest around sunscreen and hat use; however less emphasis was placed on sun-protective hats, role-modelling by adults, and protective clothing. To increase the importance placed on sun protection for young children, the study authors recommended the introduction of sun protection licensing criteria to ensure policies and practices are externally reviewed regularly along with other ECE centre licensing criteria.

An evaluation of the New Zealand SunSmart Schools Accreditation Programme,² which provides accreditation to primary and intermediate schools that meet best practice sun protection criteria, was conducted in 2009 (Reeder, Jopson, & Gray, 2012a, 2012b). It found that after four years, schools met a significantly higher number of sun protection criteria compared to baseline, with the greatest increases in sunscreen use, hat wearing, and a requirement to play in shade if not wearing a hat.

An international review of childcare centre-based sun protection interventions which included five studies in preschool settings found that interventions (most of which combined educational, environmental, and policy components) showed increased use of sunscreen, hats, clothing, and shade (Community Preventive Services Task Force, 2013). However, the review identified a lack of evidence on physiological outcomes such as sunburn. The authors provided some considerations for ECE settings to enhance the implementation of sun protection strategies:

- produce policies and practices that can be easily adopted and enforced, and require little staff time
- assess and formalise sun protection policies
- provide regular “booster” training sessions to sustain staff awareness and support, particularly if staff turnover is high, and
- educate and involve parents so they support the implementation of sun protection practices in ECE and other settings.

Physical activity

Moderate-to-vigorous physical activity in the early years is associated with health benefits, including greater bone and skeletal health, fitness, motor skill development, and cognitive development (Carson et al., 2017; Figueroa & An, 2017; Timmons et al., 2012). The Ministry of Health (2017b) recommends that sedentary time is limited for children under five years of age and “fun activities” are provided for at least three hours every day, spread throughout the day, including “plenty of opportunities for active play” (page 4). Active play aids the development of body awareness and motor competence skills, including stability and balance skills, locomotor skills, and manipulation skills (Ministry of Health, 2017b).

A review of 12 studies from the UK, Europe and the USA have found low levels of moderate-to-vigorous physical activity (<60 minutes per 8-hour childcare day) among children attending ECE centres (Reilly, 2010). Several reviews of the impacts of interventions in ECE settings to increase

² www.sunsmartschools.org.nz/schools/accreditation

physical activity levels among children have been conducted (Finch, Jones, Yoong, Wiggers, & Wolfenden, 2016; Gordon, Tucker, Burke, & Carron, 2013; Mehtälä, Sääkslahti, Inkinen, & Poskiparta, 2014; Temple & Robinson, 2014; Trost, Ward, & Senso, 2010; Ward, Vaughn, McWilliams, & Hales, 2010). The nature of the interventions collated in these reviews varied widely, and included structured activity sessions, teacher education, introduction of physical activity-related policies/guidelines, changes to the physical environment (such as additional fixed or portable play equipment), or a combination of these. While the findings of individual studies were mixed, and much of the evidence not of high quality, overall, physical activity interventions tended to have a small-to-moderate positive impact on the amount and intensity of physical activity of children attending childcare.

The interventions most often associated with positive outcomes included structured teacher-led physical activity sessions provided on a regular basis (most/all days of the week) for at least 30 minutes in duration. Incorporating these sessions into the curriculum and making them part of the daily routine enhanced the longer-term viability of the interventions. Providing physical activity-specific educator training, ensuring access to outdoor areas for play, and reinforcing positive activity behaviours by adults were also highlighted as enabling factors. In terms of unstructured (“free”) activity interventions for young children, evidence was less conclusive. The availability and quality of fixed and portable play equipment for free play may have some limited positive impact on physical activity levels, however the duration of free play time appeared to have no significant impact.

A cross-sectional survey of 237 managers/head teachers of licensed childcare services for 3- and 4-year olds in Auckland, Counties Manukau and Waikato regions in 2013 found that 35 percent of services had a written physical activity policy (Gerritsen, Morton, & Wall, 2016a). The 43 policies provided by services were reviewed and found to score low on measures of comprehensiveness and statement strength. No policies included guidance on screen time. The majority of ECE services reported that children had access to screens while at the service, with most children using screens occasionally, and one-third using screens at least weekly. Children were reported to be engaged in teacher-led active play for an average of 80 minutes per day, and child-led active play an average of five hours per day while at the service. ECE services reported using a wide range of strategies, spaces, and equipment to promote physical activity. Half of services reported having an adult that they “considered to be a ‘physical activity champion’, that is, someone who shares knowledge and skills about physical activity, raises awareness and promotes positive change regarding physical activity for children” (page 322). However, fewer than half of services surveyed participated in a health promotion programme (such as the Healthy Heart Award³ from the Heart Foundation) that has a physical activity component.

Oral health

Dental caries is the most common non-communicable disease globally (Marcenes et al., 2013), and is the most prevalent chronic and largely preventable disease in New Zealand (Ministry of Health, 2010). According to data from the 2016/2017 New Zealand Health Survey, approximately 96,000

³ www.learnbyheart.org.nz/index.php/ece/healthy-heart-award

New Zealand children (1-14 years of age) have had one or more teeth extracted due to decay, abscess, or infection (Ministry of Health, 2017a). Dental care is one of the most common reasons for children's admission to hospital, and for young children dental disease is a leading cause of potentially avoidable hospitalisations (Craig et al., 2013; Whyman, Mahoney, Morrison, & Stanley, 2014).

The primary oral health promotion messages for preschoolers from the Ministry of Health (2015) focus on:

1. oral hygiene (tooth brushing with fluoride toothpaste)
2. diet (choosing healthy snacks, and drinking water or milk), and
3. regular dental check-ups.

Tooth brushing

The Ministry of Health recommends infants' and toddlers' teeth are brushed twice a day with regular-strength fluoride toothpaste – after breakfast and before bed.⁴ Data from the 2009 New Zealand Oral Health Survey found that two-thirds of caregivers reported that their young children (2-4 years old) brushed their teeth at least twice a day, however only 15 percent reported brushing their teeth at least twice a day with regular-strength fluoride (≥ 1000 ppm) toothpaste (Ministry of Health, 2010).

An international review of interventions to prevent childhood caries (Albino & Tiwari, 2016) included only one intervention conducted in an ECE setting (which is not relevant to the current rapid review as the intervention was fluoride varnish application). A narrative literature review conducted by the HPA (2015) on oral health among preschoolers notes that "Numerous oral health interventions in preschoolers have been undertaken internationally" (page 36). However, none described in the review were delivered within ECE settings. Several studies included found that tooth brushing interventions (including the provision of toothpaste, toothbrushes, information leaflets, and/or trainer cups) showed positive impacts including a greater likelihood of regular tooth brushing, and fewer decayed, missing or filled teeth. Tooth brushing is a health promoting activity that can be encouraged in ECE settings – to normalise the practice, reinforce the skills, and increase the opportunity for those who may not be brushing regularly at home.

In 2015, an oral health sector stakeholder engagement process and stocktake of resources was undertaken at the request of the HPA. The purpose was to inform the development of a new initiative to promote and improve oral health preventive behaviours and practices, particularly tooth brushing, among preschool children. Stakeholders identified that in some regions, oral health is promoted through ECE centres, including tooth brushing programmes (Allen and Clarke Policy and Regulatory Specialists Limited, 2015). It was felt that supervised brushing programmes were "an effective way to educate children about brushing, contribute to development of positive oral health habits, and ensure that high needs pre-schoolers in these centres are brushing at least once per day" (page 14). Challenges identified included the need for adequate student-to-educator ratios, the

⁴ www.health.govt.nz/your-health/pregnancy-and-kids/under-fives/3-5-years/caring-your-preschoolers-teeth

supervision of tooth brushing to ensure effective practices and infection control, and gaining consent for children to participate in tooth brushing activities. The importance of providing toothbrushes to all members of the whānau, to both encourage role modelling and ensure toothbrushes are not shared, was emphasised by stakeholders.

Water and milk as the first choice for beverages

The Ministry of Health and New Zealand Dental Association recommend choosing healthy “tooth-friendly” snacks (e.g. fresh fruit, vegetables, cheese, sandwiches), and drinking water or plain (unflavoured, unsweetened) milk, to promote oral health (Ministry of Health, 2015; New Zealand Dental Association, 2018). This section will focus on beverages; see the Nutrition section of this report for discussion on food.

There is strong evidence that free sugar consumption is associated with dental caries (Moynihan & Kelly, 2014; World Health Organization, 2015), and more frequent consumption of sugar-sweetened beverages⁵ (SSBs) is significantly associated with increased risk of dental caries among children (Armfield, Spencer, Roberts-Thomson, & Plastow, 2013; Broffitt, Levy, Warren, & Cavanaugh, 2013; Evans et al., 2013; Kolker et al., 2007; Levy, Warren, Broffitt, Hillis, & Kanellis, 2003; Lim et al., 2008; Marshall et al., 2003; Park, Lin, Onufrak, & Li, 2015; Sohn, Burt, & Sowers, 2006; Vartanian, Schwartz, & Brownell, 2007; Warren et al., 2009). Sugary drinks are the largest contributors of free sugars to the diet of New Zealand children, providing 24 percent of the total sugar⁶ intake (Parnell, Scragg, Wilson, Schaaf, & Fitzgerald, 2003).

The New Zealand Ministry of Health recommends that children choose water or milk as beverages and limit their intake of sugary drinks because they are high in sugar and energy, and contain few (if any) beneficial nutrients (Ministry of Health, 2012). However, in New Zealand the consumption of sugary drinks is common among children (Clinical Trials Research Unit & Synovate, 2010; Ministry of Health, 2017a; Parnell et al., 2003). In the most recent 2016/2017 New Zealand Health Survey, 56 percent of children (2-14 years of age) reported having “fizzy drink” at least once in the past week, and 16 percent had it three or more times in the past week (Ministry of Health, 2017a). In addition, sugary drink intake is significantly higher among Māori and Pacific children, and those living in neighbourhoods with high deprivation scores (Kruse, 2014; Ministry of Health, 2017a; University of Otago & Ministry of Health, 2011).

The World Health Organization recommends public institutions (such as education and child-care facilities) create healthy food environments by not providing or selling unhealthy foods and beverages (World Health Organization, 2013a, 2016). The Ministry of Health is encouraging schools to adopt a healthy beverage policy of water and plain reduced-fat milk (Ministry of Health, 2016b),

⁵ Any beverage that contains added caloric sweetener, usually sugar. The main categories of sugary drinks include soft-drinks/fizzy-drinks, sachet mixes, fruit drinks, cordials, flavoured milks, cold teas/coffees, and energy/sports drinks (New Zealand Beverage Guidance Panel, 2014).

⁶ Total sugars include free sugars (see definition above), intrinsic sugars (those incorporated within the structure of intact fruit and vegetables), and milk sugars (lactose and galactose) (World Health Organization, 2015).

and the HPA provides a guide and specific resources for schools (HPA, 2016). There do not appear to be similar resources specifically targeted to ECE settings.

A systematic review of interventions to decrease SSB intake and/or increase water intake indicates that modest decreases in SSB intake and increases in water intake can be achieved among children (Vargas-Garcia et al., 2017). Interventions included in the review varied widely, and included nutrition education sessions and activities, motivational interviewing, goal-setting and behavioural counselling, and provision of water fountains/coolers and drink bottles, often in the school setting. However, this review did not include any interventions among preschool-age children or within ECE settings.

Since 2013, Under 5 Energize⁷ - a tailored healthy eating and physical activity initiative - has been implemented in 121 ECE centres in the Waikato region. A designated representative from each ECE centre works with an Under 5 Energize facilitator to identify the centre's nutrition and physical activity priorities and develop an action plan based on their specific needs. In a recently-published article, the authors report that the first activities selected by all ECE centres involved focused on promoting water and milk as the best beverage choices, and that fewer sugary drinks should be consumed (Rush, Obolonkin, Young, Kirk, & Tseng, 2017). Activities included notifying families that only water would be provided as a beverage at the centre, any sugary drinks brought from home would be returned, and reasons for this. Educators at many of the centres also adopted this policy to role model the behaviours for children and parents. Over three years, a significantly lower prevalence of visible dental decay (observed by a public health nurse at the child's B4 School Check) was reported among children attending centres participating in Under 5 Energize compared with children attending centres that were not participating.

Access to dental services

In New Zealand, children and adolescents are entitled to free basic oral health care, funded by district health boards (Ministry for Vulnerable Children Oranga Tamariki, Ministry of Health, & Ministry of Education, 2017). Preschool and primary school-aged children (from birth to school Year 8) receive care through the Community Oral Health Service⁸ via check-ups in schools, mobile clinics, and purpose-built community dental clinics. Adolescents (from school Year 9 until their 18th birthday) can receive free care from private dentists contracted by the district health board.

A need has been identified to increase New Zealand parents' knowledge around preschool oral health, including the availability of free dental care services (HPA, 2015). ECE settings could play a role in encouraging caregivers to enrol their child with an oral health service provider as early as possible using the nationwide 0800 TALK TEETH helpline.

⁷ www.sportwaikato.org.nz/programmes/under-5-energize.aspx

⁸ www.healthysmiles.org.nz/health-professionals/oral-health-contacts/child-oral-health-services

Nutrition

Good nutrition in early childhood is crucial to ensure children reach their growth and developmental potential. Furthermore, dietary behaviours and food preferences established in the early years continue through childhood, adolescence and into adulthood (Ashcroft, Semmler, Carnell, van Jaarsveld, & Wardle, 2008; Emmett, Jones, & Northstone, 2015; Lien, Lytle, & Klepp, 2001; Lioret et al., 2015; Lipsky et al., 2015; Luque et al., 2018; Mikkilä, Rasanen, Raitakari, Pietinen, & Viikari, 2005; Northstone & Emmett, 2008; Wall, Thompson, Robinson, & Mitchell, 2013).

Breastfeeding

The New Zealand Ministry of Health recommends exclusive breastfeeding until around six months of age, followed by breastfeeding in conjunction with appropriate complementary foods until at least one year of age (Ministry of Health, 2008). It was estimated by Plunket that in 2017, 21 percent of infants six months of age were exclusively breastfed (Plunket, 2018). Childcare attendance is associated with lower rates of breastfeeding (Benjamin et al., 2009; Kim & Peterson, 2008; Li, Darling, Maurice, Barker, & Grummer-Strawn, 2005; Pearce et al., 2012). However, ECE settings offer a potential location to promote breastfeeding, for example through offering safe storage of expressed breast milk for use during the infants' time in care, and encouraging mothers to continue to breastfeed (Pearce et al., 2012).

There is some evidence from a longitudinal study of 183 mothers in the USA that those with infants attending ECE centres with more supportive practices for breastfeeding (i.e. five practices: feed pumped (expressed) breast milk to infants, allow mothers to breastfeed on site before/after work, allow mothers to breastfeed on site during their breaks, thaw and prepare pumped breast milk if needed, and keep extra breast milk in freezer) were three times more likely to be breastfeeding at 6 months compared to those with infants attending ECE centres demonstrating fewer than three of those practices (Batan, Li, & Scanlon, 2013). The authors suggest that this "might indicate a need for a comprehensive breastfeeding policy and implementation strategies at the child care site" (no page number listed). The practices that had the greatest impact on maintaining breastfeeding rates at six months were feeding expressed breast milk and allowing mothers to breastfeed before or after work at the ECE centre.

Healthy eating environments and behaviours

The Ministry of Education (2009) has produced guidelines to support healthy eating environments in ECE services. These guidelines are designed to help ECE services develop food and nutrition policies and practices, and are supported by the Food and Beverage Classification System developed by the Ministry of Health.

A cross-sectional survey of 257 licensed childcare services for 3- and 4-year olds in Auckland, Counties Manukau and Waikato regions in 2013 found that most services (82.4%) had a written food, nutrition or wellness policy (Gerritsen, Wall, & Morton, 2016b). However, of the 131 services that provided a policy to the researchers, many did not refer to the national Ministry of Health Food and Nutrition Guidelines and lacked practical information relating to staff behaviours to promote healthy eating (e.g. adults sitting with children during meals, not using food as a reward). Two-thirds

of services had a written policy regarding food brought from home, and almost three-quarters of services reported that “most” families complied. Foods offered on “special occasions” (such as birthdays) and fundraisers tended to be those high in sugar, fat and salt. Most ECE services reported that they never used food as a reward or punishment, cooked regularly with children, sat with children while they eat, and promoted water consumption. Less than half of the ECE services followed recommendations for staff role modelling healthy eating, talking to children about food during meal times, checking with children if they are full before offering seconds, and not hurrying children to finish eating (Gerritsen et al., 2016b). Services in more economically deprived neighbourhoods were more likely to adhere to positive nutrition-related behaviours, and the authors suggest that this is due to the targeting of health and nutrition programmes in these areas (Gerritsen, Anderson, Morton, & Wall, 2018).

Of the 57 full menus provided to the researchers for analysis, most did not meet current nutrition guidelines for quantity, variety, and limiting “sometimes” and “occasional” foods (Gerritsen, Dean, Morton, & Wall, 2017). Services that had a Healthy Heart Award were more likely to have a healthier menu (Gerritsen et al., 2017). Barriers to promoting healthy food to children included lack of support from parents and whānau, concerns regarding food allergies and intolerances, lack of staff nutrition training, and insufficient funds (Gerritsen et al., 2016b). The authors suggest that one way to enable ECE services to promote healthy eating among children is to provide quality, consistent nutrition education for all ECE managers, educators and cooks, not just those involved in voluntary health promotion programmes (such as the Healthy Heart Award) (Gerritsen, 2016).

An evaluation of the Healthy Heart Award for ECE services in 2014 found that participating ECE service providers reported that the most common changes implemented were providing healthier food options, encouraging fruit and vegetable intake, discouraging “treat” food, introducing water-only policies, and limiting the number/frequency of birthday cakes brought to the ECE centre (Malatest International, 2014).

The Ministry of Health healthy eating guidelines for infants, toddlers and young children focus on both eating behaviours and diet (Ministry of Health, 2008, 2012). A review of 12 reviews of 101 individual studies investigating the effectiveness of interventions to promote healthy eating among children (aged 2–5 years) attending centre-based childcare has been recently published (Matwiejczyk, Mehta, Scott, Tonkin, & Coveney, 2018). The most common interventions⁹ focused on improving healthy eating habits such as increasing consumption of fruit, vegetables and water, and decreasing consumption of energy-dense nutrient-poor snacks and beverages (high in salt, fat and sugar). Intervention components included changes to centre policies regarding the foods and beverages offered to children, strategies used by centre staff around meal times, and nutrition-related sessions for educators, children and parents. The review concluded that while there was a

⁹ Many of the interventions focused on obesity prevention, and had outcomes related to body size and composition. Although this rapid review does not focus on obesity prevention, these types of interventions are still considered as the interventions include general “healthy eating” interventions that are relevant to all children (i.e. increasing fruit, vegetable, water, low-fat milk, and fibre intake, and decreasing sugary beverages and energy-dense nutrient-poor items).

wide variety in the content and delivery of the interventions, overall, interventions can be effective at enabling healthy food behaviours to some degree. Positive dietary outcomes included significantly increased intakes of fruit and vegetables, and decreased intakes of total fat, saturated fat, SSBs,¹⁰ and energy-dense nutrient-poor foods among children attending centre-based childcare.

The review also highlighted characteristics associated with more successful interventions (**Figure 4**). One characteristic was that they addressed multiple factors (i.e. they were multicomponent interventions) targeting both environmental- and individual-level determinants of healthy eating behaviours (Matwiejczyk et al., 2018). Individual-level interventions included nutrition-related education sessions for educators, children and/or parents. Environmental-level interventions included changes to the centre policies (e.g. types of foods on the centre menu, availability of drinking water, and food provision in lunchboxes brought from home), and the use of positive behavioural strategies by educators at meal times. These strategies included immediate positive verbal reinforcement, serving fruit and vegetables before other foods, using non-food rewards, encouraging children to “try one more bite”, and allowing children to select their own food. The strongest effects were observed from environmental changes.

Other characteristics of more successful interventions were role modelling by educators and other children, and actively involving and engaging parents. This included parents knowing what children were learning (e.g. by receiving updates and newsletters), completing nutrition-related homework tasks with children, and attending nutrition education sessions and interactive activities such as cooking or gardening (with or without their children).

It was noted that many of the interventions included in the reviews were delivered by researchers and/or trained experts and the interventions were less successful when delivered by educators. This highlights the need for quality advice, support and training for those working in the ECE sector to be able to effectively develop and deliver quality nutrition interventions. In addition, many of the interventions included in the reviews were implemented at centres in low socioeconomic neighbourhoods, and outcomes suggest that interventions supporting these populations could help reduce health inequalities.

Recommendations from Matwiejczyk and colleagues (2018) for ECE centre practice and policy included:

1. targeting both environmental- and individual-level determinants of eating behaviour with a multicomponent approach
2. designing interventions using theoretical frameworks and effective behavioural change theory (e.g. components of Social Cognitive Theory alongside a social-ecological framework)
3. involving and engaging parents in interventions, and
4. building the skills, knowledge and self-efficacy of educators, parents and children through training, role modelling, and observational learning.

¹⁰ Evidence specifically related to SSB consumption is discussed in the Oral health section of this report.

Figure 4. Key characteristics associated with successful outcomes of nutrition interventions in ECE settings

<i>Centre environment</i>	
- include healthy eating policy supporting environment changes	- make fresh water, fruits and vegetables easily available
- modify the menu for meals and snacks	- train food preparers, modify food preparation procedures
	- include family-style meal service with fruit and vegetables served in advance
<i>Educator component</i>	
- provide educator training	- provide professional development and training of cooks
- ensure educators': role model HE and positive behaviours, use non-food rewards, encourage children to 'try one bite', enthusiastically model healthy eating (not silent modeling), give immediate positive verbal reinforcement for quality behaviours, not quantity	- provide ongoing technical support and educational visits from external experts
- allow children to self-select foods	- include in the training: children's nutritional requirements, healthy foods, handling food safety, nutrition policy, parent communication skills, food service/menu modification, and nutrition in the curriculum. Add increased self-efficacy and self-regulation through feedback: role modeling and opportunities for observational learning
- mix younger and older age groups at mealtimes. Possibly larger group sizes	- ensure continual educator-parent communication
<i>Child component</i>	
- provide structured, 'hands-on', interactive and age-appropriate educational nutritional activities (e.g. games with food themes, 'no-pressure' food tasting)	- provide interactive skill development sessions in food preparation, cooking, growing vegetables
<i>Parental component</i>	
- ensure purposeful involvement and engagement in policy and/or curriculum planning and project management	- inform parents on what is in the curriculum or being programmed
- provide consistent educational information across both settings	- offer 'hands-on' interactive cooking classes or doing activities with the children
- provide written material such as menus, recipes, nutrition policy, posters and nutrition information	- include in parent education: child nutrition, positive food parenting, children's healthy food choices, menu and recipe suggestions, food safety, special diets, food to send to childcare from home, what to pack in lunchboxes. Include behavioural change strategies such as weekly homework, goal setting, social support, parenting skills and increased self-efficacy and self-regulation through feedback
- provide education through e.g. newsletters, pamphlets, posters, take-home bags, online education, family functions, workshops, sessions with health professionals, tailored advice from questionnaire results	- ensure active involvement eg: encouraging children to drink water and engaging parents from planning stage to implementation
	- train parents as peer educators
<i>Duration</i>	
- frequent, and long-term	- >1 year, ideally 2-4 years

Source: Matwiejczyk et al. (2018)

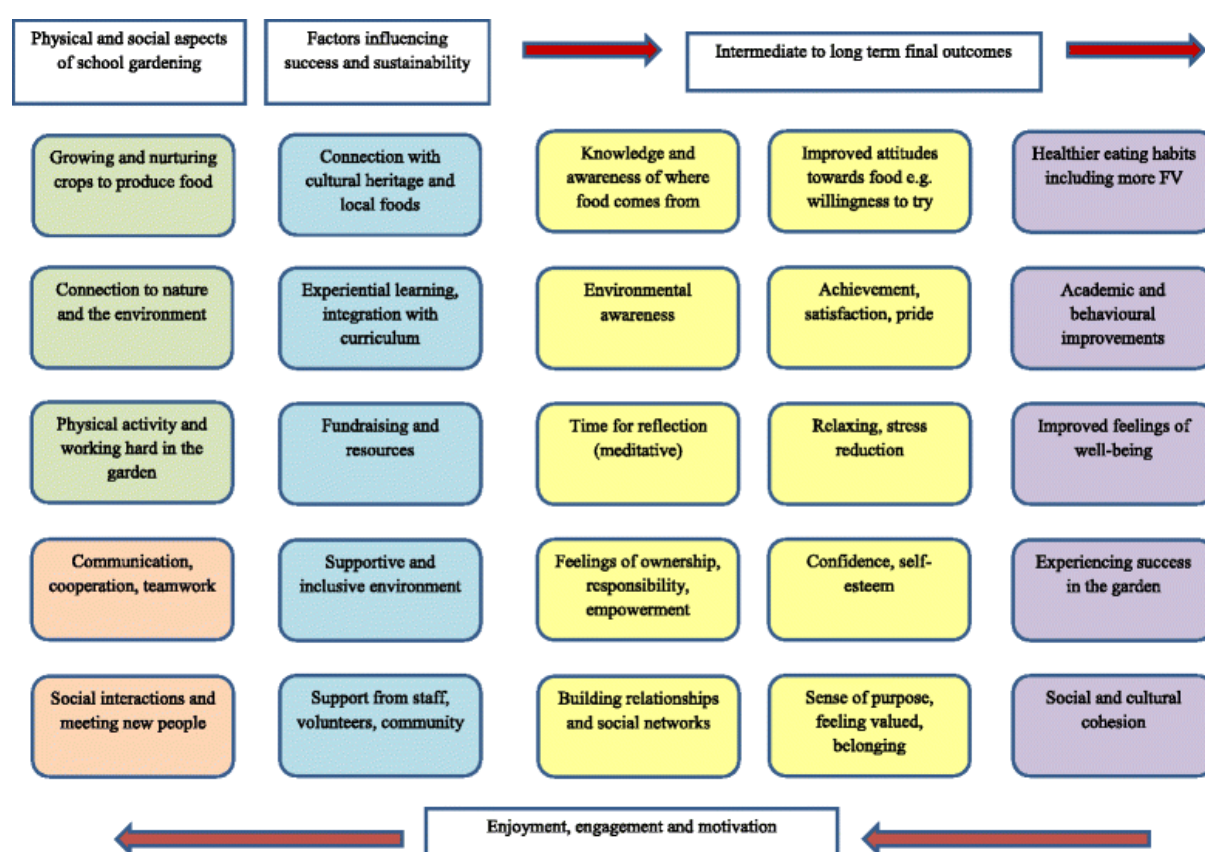
Edible gardens

The Ministry of Health (2012) recommends that children consume at least two servings of fruit and at least three servings of vegetables daily. However, the most recent New Zealand Health Survey findings indicate that only half (49.8%) of children (2-14 years of age) meet these guidelines (Ministry of Health, 2017a). Increasing fruit and vegetable consumption among young children under five is challenging, and there is a lack of quality evidence on the most effective methods (Hodder et al., 2018).

Edible gardens within the learning environment have been identified as a vehicle for health promotion, and are a feature of many ECE services in New Zealand (Dawson, Richards, Collins, Reeder, & Gray, 2013; Gerritsen et al., 2016b). In a survey of ECE services conducted in 2009, 71 percent of the 211 responding services had an edible garden (including vegetables, herbs, and/or fruit trees), gardening activities were linked with the ECE curriculum, and produce eaten by the children and whānau (Dawson et al., 2013). Barriers to implementing an edible garden included a lack of funding, space, time, and staff support.

Two recent systematic reviews of the impacts of gardening interventions among children and young people found some evidence of limited quality that edible gardens may improve fruit and vegetable intake to a small degree (Ohly et al., 2016; Savoie-Roskos, Wengreen, & Durward, 2017). Most of the interventions included in the reviews were in schools, and the one ECE-based intervention was a randomised controlled trial including four ECE centres in central North Carolina where all food consumed by the children during the day was provided by the centre (Namenek Brouwer & Benjamin Neelon, 2013). The intervention consisted of researchers providing raised beds, all gardening equipment, a structured curriculum, and support over four months in spring. At the end of the study, children in the gardening intervention received slightly fewer servings of fruit/vegetables as part of meals provided by the ECE centre and were observed to eat a quarter of a serving more fruit/vegetables than those in the control group. However, due to the small sample size, the statistical significance of any differences in the fruit/vegetable intakes of the intervention and control groups could not be analysed. While edible gardens in education settings may not have a large effect on fruit and vegetable consumption specifically, they may provide other opportunities to impact positively on wider wellbeing (**Figure 5**).

Figure 5. Conceptual model showing the potential health and wellbeing impacts of school gardening



Source: Ohly et al. (2016)

Social and emotional wellbeing

According to data from the 2016/2017 New Zealand Health Survey, approximately 39,000 New Zealand children (2-14 years of age) have been diagnosed with emotional and/or behavioural problems (depression, an anxiety disorder and/or an attention deficit and hyperactivity disorder) at some time (Ministry of Health, 2017a).

Children navigate numerous challenging social situations on a daily basis, and require a range of social, emotional, and problem-solving skills to successfully manage their social world. The ability to interact with other children and adults in a positive and productive way, practice healthy behaviours, and behave responsibly, is crucial for success in school and life (Zins, Bloodworth, Weissberg, & Walberg, 2007).

Effective personal interactions require more than just having knowledge of the many social and emotional skills, but includes being able to use them appropriately. Social and emotional competence reflects a person's capacity to integrate behavioural, cognitive and affective skills to adapt flexibly to diverse social contexts and demands (Bierman & Welsh, 2000). Mastery of social and emotional competencies is associated with greater wellbeing and school performance (Guerra & Bradshaw, 2008). Deficits in social and emotional skills and competencies play a significant role in

the development and maintenance of many emotional and behavioural disorders of childhood and adolescence (Spence, 2003).

Social and emotional skills education programmes (also called social and emotional learning, SEL) attempt to provide children with both the cognitive skills and the ability to perform key social behaviours that are important in achieving success in social situations. Commonly, skills related to listening, empathy, interpersonal problem-solving, and conflict and anger management are taught (World Health Organization, 2004). Improving social and emotional skills and competencies, and the quality of relationships, forms an important component of the prevention and treatment of many mental health problems, as well as promoting *emotional* wellbeing (including happiness, confidence), *psychological* wellbeing (including autonomy, resilience, problem-solving, attentiveness, involvement), and *social* wellbeing (including good relationships with others) (World Health Organization, 2004).

The World Health Organization (2013b) recommends the implementation of broad strategies for mental health promotion and the prevention of mental health disorders which focus on the nurturing of core individual attributes in childhood (such as life skills education and programmes to counter bullying and violence) and early evidence-based intervention through identification, prevention and treatment of emotional or behavioural problems.

There is a vast number of programmes which aim to enhance children's social and emotional wellbeing. These programmes vary greatly in their target population, content and delivery, but often include specific social skills training and/or cognitive-behavioural techniques to modify emotional and behavioural responses and cognitive processes. They often aim to help children acquire and develop at least some of the core interrelated social and emotional competencies: self-awareness, self-management, social awareness, relationship skills, and responsible decision-making (**Figure 6**) (Collaborative for Academic Social and Emotional Learning, 2012; Payton et al., 2000; Zins et al., 2007).

Figure 6. The five social and emotional learning core competencies



Source: Collaborative for Academic Social and Emotional Learning (2012)

Reviews of international, universal (delivered to all children in an ECE setting) social and emotional education programmes¹¹ suggest a modest positive impact on children's social and emotional wellbeing and behaviour (Bierman, Greenberg, & Abenavoli, 2016; Collaborative for Academic Social and Emotional Learning, 2012; O'Conner, De Feyter, Carr, Luo, & Romm, 2017; Schindler et al., 2015). Improved outcomes include the development of social and emotional skills, enhanced learning engagement, improved interpersonal relationships and positive social behaviour, reduced conduct problems, and reduced emotional distress. Benefits tend to be at least comparable, or greater, for children with delays in social and emotional skill development and/or those experiencing socioeconomic disadvantage. Characteristics of more effective social and emotional education programmes include:

- evidence-based programmes explicitly designed and implemented to impact specific aspects of social and emotional wellbeing
- a focus on multiple domains of social emotional wellbeing (social-behavioural, emotional, and cognitive self-regulatory skills and processes), rather than on a single domain
- the inclusion of skills-focused learning as well as environmental changes
- integration with academic programmes/curriculum
- professional development and support for educators, to promote high-quality programme implementation
- high quality teacher-student interactions, and
- involving parents.

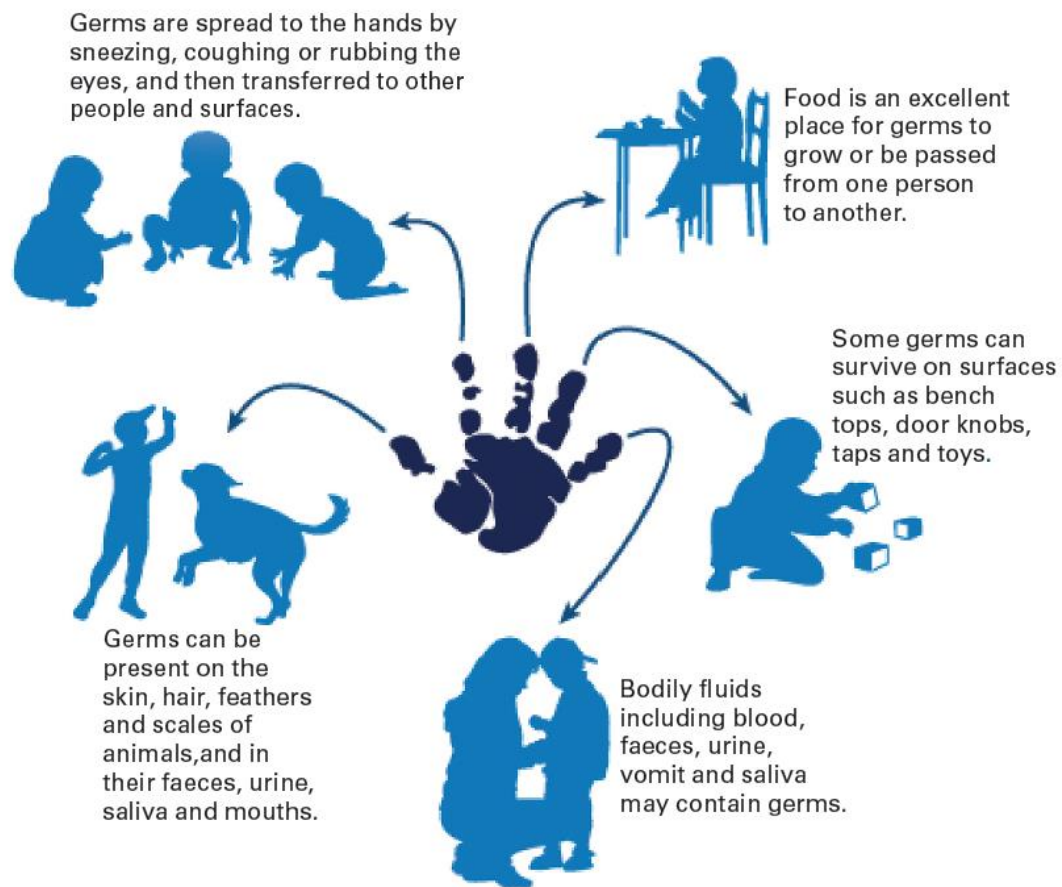
Hand hygiene

In New Zealand, infectious diseases persist as the leading cause of hospital admissions, particularly for children (Baker et al., 2012), and disease rates are significantly higher among Māori and Pacific peoples (Baker et al., 2012; Hobbs et al., 2017). Disease-causing pathogens on hands (such as bacteria, viruses and protozoa) play a significant role in the spread of infection (**Figure 7**) (NHMRC, 2012). One of the main ways to prevent the spread of infectious diseases (such as respiratory tract and gastrointestinal infections) within ECE settings is practising effective hand hygiene (Ministry of Health, 2018b; NHMRC, 2012). Hand hygiene includes washing hands¹² with soap and running water (and drying them), or using an alcohol-based hand sanitiser, to mechanically and/or chemically remove pathogens (Hugonnet & Pittet, 2000).

¹¹ Such as Incredible Years, Preschool PATHS, and Al's Pals.

¹² www.health.govt.nz/your-health/healthy-living/good-hygiene/hand-washing

Figure 7. The role of hands in the spread of infection

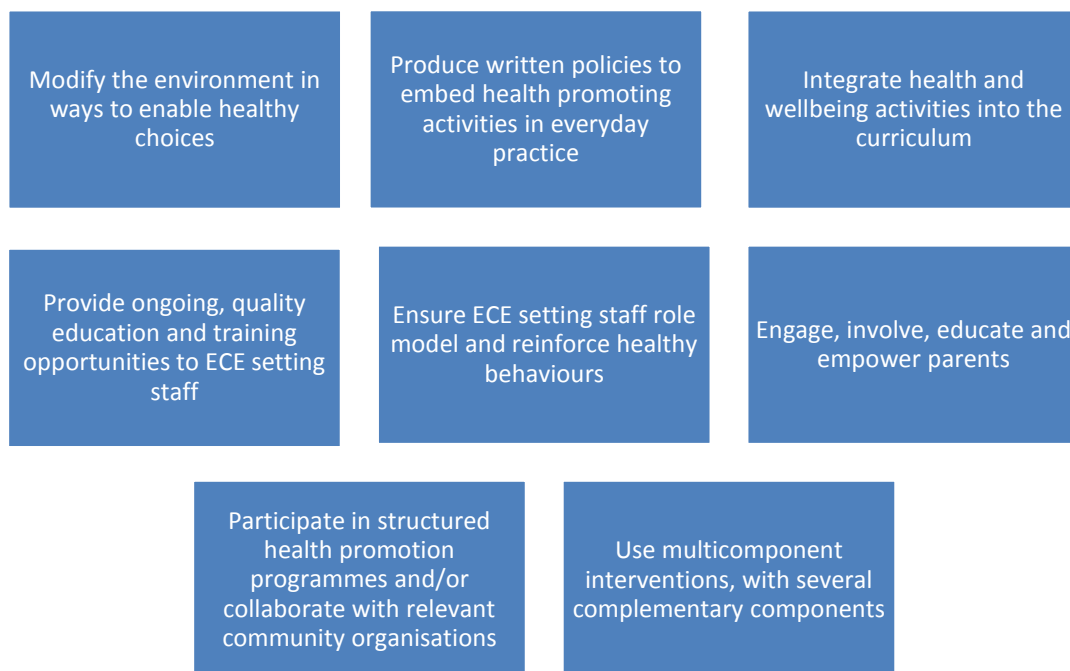


Source: National Health & Medical Research Council (2012)

Hand hygiene health promotion interventions in ECE settings include activities that promote hand washing with soap and running water and/or hand sanitiser use after toileting, and before eating or handling food, and/or hygiene education sessions for adults as well as children (e.g. with stories, songs and games). Systematic reviews have found that interventions with a hand hygiene component can be effective in reducing the number of gastrointestinal and respiratory illness episodes among children in ECE settings (Ejemot-Nwadiaro, Ehiri, Arikpo, Meremikwu, & Critchley, 2015; Willmott et al., 2016). However, the quality of the evidence for impacts in the one review investigating respiratory illness was low (Willmott et al., 2016).

Summary

The findings of evidence collated in this rapid review suggest that some health promotion interventions in ECE settings can positively influence health-related practices and outcomes (such as use of sun protection, duration and intensity of physical activity, number of episodes of infectious illness, and healthy eating habits) among children and their educators to a modest degree. Among interventions focused on areas such as sun safety, nutrition, oral health, physical activity, social and emotional wellbeing, and hand hygiene there were several common components that characterised more effective interventions:



In conclusion, ECE settings are well positioned to play an important role in promoting and enabling the health of young children in Aotearoa New Zealand.

References

- Albino, J., & Tiwari, T. (2016). Preventing childhood caries: A review of recent behavioral research. *Journal of Dental Research*, 95(1), 35-42.
- Allen and Clarke Policy and Regulatory Specialists Limited. (2015). *Child oral health promotion: Stakeholder engagement and resource stocktake*. Wellington: Health Promotion Agency. Retrieved from www.hpa.org.nz/sites/default/files/Child-oral-health-promotion-July2015.pdf
- Armfield, J. M., Spencer, A. J., Roberts-Thomson, K. F., & Plastow, K. (2013). Water fluoridation and the association of sugar-sweetened beverage consumption and dental caries in Australian children. *American Journal of Public Health*, 103(3), 494-500.
- Ashcroft, J., Semmler, C., Carnell, S., van Jaarsveld, C. H., & Wardle, J. (2008). Continuity and stability of eating behaviour traits in children. *European Journal of Clinical Nutrition*, 62(8), 985-990.
- Baker, M. G., Barnard, L. T., Kvalsvig, A., Verrall, A., Zhang, J., Keall, M., et al. (2012). Increasing incidence of serious infectious diseases and inequalities in New Zealand: A national epidemiological study. *Lancet*, 379(9821), 1112-1119.
- Barton, H., & Grant, M. (2006). A health map for the local human habitat. *Journal of the Royal Society for the Promotion of Health*, 126(6), 252-253.
- Batan, M., Li, R., & Scanlon, K. (2013). Association of child care providers breastfeeding support with breastfeeding duration at 6 months. *Maternal and Child Health Journal*, 17(4), 708-713.
- Benjamin, S. E., Rifas-Shiman, S. L., Taveras, E. M., Haines, J., Finkelstein, J., Kleinman, K., et al. (2009). Early child care and adiposity at ages 1 and 3 years. *Pediatrics*, 124(2), 555-562.
- Bierman, K. L., Greenberg, M. T., & Abenavoli, R. (2016). *Promoting social and emotional learning in preschool: Programs and practices that work*: Edna Bennet Pierce Prevention Research Center, Pennsylvania State University. Retrieved from www.rwjf.org/content/dam/farm/reports/issue_briefs/2017/rwjf437157
- Bierman, K. L., & Welsh, J. A. (2000). Assessing social dysfunction: The contributions of laboratory and performance-based measures. *Journal of Clinical Child Psychology*, 29(4), 526-539.
- Black, M. M., Walker, S. P., Fernald, L. C. H., Andersen, C. T., DiGirolamo, A. M., Lu, C., et al. (2017). Early childhood development coming of age: Science through the life course. *Lancet*, 389(10064), 77-90.
- Britto, P. R., Lye, S. J., Proulx, K., Yousafzai, A. K., Matthews, S. G., Vaivada, T., et al. (2017). Nurturing care: Promoting early childhood development. *Lancet*, 389(10064), 91-102.
- Broffitt, B., Levy, S. M., Warren, J., & Cavanaugh, J. E. (2013). Factors associated with surface-level caries incidence in children aged 9 to 13: The Iowa Fluoride Study. *Journal of Public Health Dentistry*, 73(4), 304-310.
- Bruun Jensen, B., Currie, C., Dyson, A., Eisenstadt, N., & Melhuish, E. (2013). *Early years, family and education task group: Report. European review of social determinants of health and the health divide in the WHO European Region*. Copenhagen: WHO regional office for Europe. Retrieved from www.euro.who.int/en/publications/abstracts/early-years,-family-and-education-task-group-report
- Carson, V., Lee, E. Y., Hewitt, L., Jennings, C., Hunter, S., Kuzik, N., et al. (2017). Systematic review of the relationships between physical activity and health indicators in the early years (0-4 years). *BMC Public Health*, 17(Suppl 5), 854.

Center on the Developing Child. (2010). *The foundations of lifelong health are built in early childhood*. Massachusetts: Harvard University. Retrieved from <http://developingchild.harvard.edu/wp-content/uploads/2010/05/Foundations-of-Lifelong-Health.pdf>

Children's Commissioner's Expert Advisory Group on Solutions to Child Poverty. (2012). *Solutions to child poverty in New Zealand: Evidence for action* Wellington: Office of the Children's Commissioner. Retrieved from www.occ.org.nz/assets/Uploads/EAG/Final-report/Final-report-Solutions-to-child-poverty-evidence-for-action.pdf

Clinical Trials Research Unit, & Synovate. (2010). *A national survey of children and young people's physical activity and dietary behaviours in New Zealand: 2008/09. Key findings*. Auckland: University of Auckland. Retrieved from www.health.govt.nz/system/files/documents/publications/cyp-physical-activity-dietary-behaviours-08-09-keyfindgs.pdf

Collaborative for Academic Social and Emotional Learning. (2012). *2013 CASEL guide: Effective social and emotional learning programs - preschool and elementary school edition*. Chicago, IL: CASEL. Retrieved from www.casel.org/library/2013-casel-guide

Community Preventive Services Task Force. (2013). *Skin cancer: Child care center-based interventions*: CPSTF. Retrieved from www.thecommunityguide.org/findings/skin-cancer-child-care-center-based-interventions

Craig, E., Adams, J., Oben, G., Reddington, A., Wicken, A., & Simpson, J. (2013). *The health status of children and young people in New Zealand (2011)*. Dunedin: New Zealand Child and Youth Epidemiology Service, University of Otago. Retrieved from <http://hdl.handle.net/10523/6129>

Dawson, A., Richards, R., Collins, C., Reeder, A. I., & Gray, A. (2013). Edible gardens in early childhood education settings in Aotearoa, New Zealand. *Health Promotion Journal of Australia*, 24(3), 214-218.

Dennis, L. K., Vanbeek, M. J., Beane Freeman, L. E., Smith, B. J., Dawson, D. V., & Coughlin, J. A. (2008). Sunburns and risk of cutaneous melanoma: Does age matter? A comprehensive meta-analysis. *Annals of Epidemiology*, 18(8), 614-627.

Dodds, S. (2016). *Health and early years, children and young people: A GCPH synthesis*. Glasgow: Glasgow Centre for Population Health. Retrieved from www.gcph.co.uk/assets/0000/5914/Health_and_Early_Years_web.pdf

Duignan, M., Signal, L., & Thomson, G. (2014). "Good intentions, but inadequate practices" - sun protection in early childhood centres, a qualitative study from New Zealand. *New Zealand Medical Journal*, 127(1389), 40-50.

Ejemot-Nwadiaro, R. I., Ehiri, J. E., Arikpo, D., Meremikwu, M. M., & Critchley, J. A. (2015). Hand washing promotion for preventing diarrhoea. *Cochrane Database of Systematic Reviews*, 9(CD004265).

Emmett, P. M., Jones, L. R., & Northstone, K. (2015). Dietary patterns in the Avon Longitudinal Study of Parents and Children. *Nutrition Reviews*, 73(Suppl 3), 207-230.

Evans, E. W., Hayes, C., Palmer, C. A., Bermudez, O. I., Cohen, S. A., & Must, A. (2013). Dietary intake and severe early childhood caries in low-income, young children. *Journal of the Academy of Nutrition and Dietetics*, 113(8), 1057-1061.

Figueroa, R., & An, R. (2017). Motor skill competence and physical activity in preschoolers: A review. *Maternal and Child Health Journal*, 21(1), 136-146.

Finch, M., Jones, J., Yoong, S., Wiggers, J., & Wolfenden, L. (2016). Effectiveness of centre-based childcare interventions in increasing child physical activity: A systematic review and meta-analysis for policymakers and practitioners. *Obesity Reviews*, 17(5), 412-428.

- Gerritsen, S. (2016). Nutrition education for early childhood managers, teachers and nursery cooks: A prerequisite for effective obesity prevention. *Public Health*, 140, 56-58.
- Gerritsen, S., Anderson, S. E., Morton, S. M., & Wall, C. R. (2018). Pre-school nutrition-related behaviours at home and early childhood education services: Findings from the Growing Up in New Zealand longitudinal study. *Public Health Nutrition*, 1-10.
- Gerritsen, S., Dean, B., Morton, S. M. B., & Wall, C. R. (2017). Do childcare menus meet nutrition guidelines? Quantity, variety and quality of food provided in New Zealand Early Childhood Education services. *Australian and New Zealand Journal of Public Health*, 41(4), 345-351.
- Gerritsen, S., Morton, S. M., & Wall, C. R. (2016a). Physical activity and screen use policy and practices in childcare: Results from a survey of early childhood education services in New Zealand. *Australian and New Zealand Journal of Public Health*, 40(4), 319-325.
- Gerritsen, S., Wall, C., & Morton, S. (2016b). Child-care nutrition environments: Results from a survey of policy and practice in New Zealand early childhood education services. *Public Health Nutrition*, 19(9), 1531-1542.
- GLA Economics. (2011). *Early years interventions to address health inequalities in London - the economic case*. London: Greater London Authority. Retrieved from www.london.gov.uk/sites/default/files/gla_migrate_files_destination/Early%20Years%20report%20OPT.pdf
- Gluckman, P. D., Hanson, M. A., Cooper, C., & Thornburg, K. L. (2008). Effect of in utero and early-life conditions on adult health and disease. *New England Journal of Medicine*, 359(1), 61-73.
- Gordon, E. S., Tucker, P., Burke, S. M., & Carron, A. V. (2013). Effectiveness of physical activity interventions for preschoolers: A meta-analysis. *Research Quarterly for Exercise and Sport*, 84(3), 287-294.
- Greenwood, J. S., Soulos, G. P., & Thomas, N. D. (2000). *Under cover: Guidelines for shade planning and design*: NSW Cancer Council and NSW Health Department Sydney, 1998. Adapted for New Zealand use by the Cancer Society of New Zealand, 2000. Retrieved from www.sunsmartschools.co.nz/Guidelines_Under_Cover.pdf
- Guerra, N. G., & Bradshaw, C. P. (2008). Linking the prevention of problem behaviors and positive youth development: Core competencies for positive youth development and risk prevention. *New Directions for Child and Adolescent Development*, 122, 1-17.
- Health Committee. (2013). *Inquiry into improving child health outcomes and preventing child abuse, with a focus on pre-conception until three years of age* Wellington: New Zealand House of Representatives. Retrieved from www.parliament.nz/resource/en-nz/50DBSCH_SCR6007_1/3fe7522067fdab6c601fb31fe0fd24eb6befae4a
- Hobbs, M. R., Morton, S. M., Atatoa-Carr, P., Ritchie, S. R., Thomas, M. G., Saraf, R., et al. (2017). Ethnic disparities in infectious disease hospitalisations in the first year of life in New Zealand. *Journal of Paediatrics and Child Health*, 53(3), 223-231.
- Hodder, R. K., Stacey, F. G., O'Brien, K. M., Wyse, R. J., Clinton-McHarg, T., Tzelepis, F., et al. (2018). Interventions for increasing fruit and vegetable consumption in children aged five years and under. *Cochrane Database of Systematic Reviews*, 1(CD008552).
- HPA. (2015). *A literature review on oral health in preschoolers*. Wellington: Health Promotion Agency. Retrieved from www.hpa.org.nz/sites/default/files/Literature%20review%20oral%20health.pdf
- HPA. (2016). *Guide to becoming a water and plain milk only school*. Wellington: Health Promotion Agency. Retrieved from www.nutritionandactivity.govt.nz/sites/default/files/3%200%20NPA158%20Water%20and%20plain%20milk%20only%20guide%20for%20Schools_FA_Online.pdf

HPA, & MelNet. (2017). *New Zealand Skin Cancer Primary Prevention and Early Detection Strategy 2017 to 2022*. Wellington: Health Promotion Agency. Retrieved from www.sunsmart.org.nz/sites/default/files/documents/FINAL-Strategy-28Mar2017.PDF

Hugonnet, S., & Pittet, D. (2000). Hand hygiene - beliefs or science? *Clinical Microbiology and Infection*, 6(7), 350-356.

Infometrics. (2011). *1000 days to get it right for every child: The effectiveness of public investment in New Zealand children*. Wellington: Every Child Counts. Retrieved from www.hauora.co.nz/assets/files/Children/1000-days-to-get-it-right-for-every-child.pdf

Kim, J., & Peterson, K. E. (2008). Association of infant child care with infant feeding practices and weight gain among US infants. *Archives of Pediatrics and Adolescent Medicine*, 162(7), 627-633.

Kolker, J. L., Yuan, Y., Burt, B. A., Sandretto, A. M., Sohn, W., Lang, S. W., et al. (2007). Dental caries and dietary patterns in low-income African American children. *Pediatric Dentistry*, 29(6), 457-464.

Kruse, K. (2014). *Consumption of sugary drinks among children and their parents or caregivers [In Fact]*. Wellington: Health Promotion Agency Research and Evaluation Unit. Retrieved from www.hpa.org.nz/sites/default/files/In%20Fact%20Consumption%20of%20Sugary%20Drinks.pdf

Kvalsvig, A., D'Souza, A., Duncanson, M., & Simpson, J. (2016). *Pathways to child health, development and wellbeing: Optimal environments for orchids and dandelions. An overview of the evidence*. Wellington: Ministry of Health. Retrieved from www.health.govt.nz/publication/pathways-child-health-development-and-wellbeing-optimal-environments-orchids-and-dandelions-overview

Levy, S. M., Warren, J. J., Broffitt, B., Hillis, S. L., & Kanellis, M. J. (2003). Fluoride, beverages and dental caries in the primary dentition. *Caries Research*, 37(3), 157-165.

Li, R., Darling, N., Maurice, E., Barker, L., & Grummer-Strawn, L. M. (2005). Breastfeeding rates in the United States by characteristics of the child, mother, or family: The 2002 National Immunization Survey. *Pediatrics*, 115(1), e31-37.

Liang, J. J., Robinson, E., & Martin, R. C. (2010). Cutaneous melanoma in New Zealand: 2000-2004. *ANZ Journal of Surgery*, 80(5), 312-316.

Lien, N., Lytle, L. A., & Klepp, K. I. (2001). Stability in consumption of fruit, vegetables, and sugary foods in a cohort from age 14 to age 21. *Preventive Medicine*, 33(3), 217-226.

Lim, S., Sohn, W., Burt, B. A., Sandretto, A. M., Kolker, J. L., Marshall, T. A., et al. (2008). Cariogenicity of soft drinks, milk and fruit juice in low-income African-American children: A longitudinal study. *Journal of the American Dental Association*, 139(7), 959-967.

LioRET, S., Betoko, A., Forhan, A., Charles, M. A., Heude, B., de Lauzon-Guillain, B., et al. (2015). Dietary patterns track from infancy to preschool age: Cross-sectional and longitudinal perspectives. *Journal of Nutrition*, 145(4), 775-782.

Lipsky, L. M., Haynie, D. L., Liu, D., Chaurasia, A., Gee, B., Li, K., et al. (2015). Trajectories of eating behaviors in a nationally representative cohort of U.S. adolescents during the transition to young adulthood. *International Journal of Behavioral Nutrition and Physical Activity*, 12, 138.

Lorenc, T., Petticrew, M., Welch, V., & Tugwell, P. (2013). What types of interventions generate inequalities? Evidence from systematic reviews. *Journal of Epidemiology and Community Health*, 67(2), 190-193.

Luque, V., Escribano, J., Closa-Monasterolo, R., Zaragoza-Jordana, M., Ferré, N., Grote, V., et al. (2018). Unhealthy dietary patterns established in infancy track to mid-childhood: The EU Childhood Obesity Project. *Journal of Nutrition*, 148(5), 752-759.

Machel, G. (2017). Good early development - the right of every child. *Lancet*, 389(10064), 13-14.

Malatest International. (2014). *Evaluation of Healthy Heart Award for Early Childhood Education: Tohu Manawa Ora – Kōhungahunga*. Wellington: Malatest International. Retrieved from www.learnbyheart.org.nz/files/HHA_Final_Report_20150212.pdf

Marcenes, W., Kassebaum, N. J., Bernabé, E., Flaxman, A., Naghavi, M., Lopez, A., et al. (2013). Global burden of oral conditions in 1990-2010: A systematic analysis. *Journal of Dental Research*, 92(7), 592-597.

Marshall, T. A., Levy, S. M., Broffitt, B., Warren, J. J., Eichenberger-Gilmore, J. M., Burns, T. L., et al. (2003). Dental caries and beverage consumption in young children. *Pediatrics*, 112(3), e184-191.

Matwiejczyk, L., Mehta, K., Scott, J., Tonkin, E., & Coveney, J. (2018). Characteristics of effective interventions promoting healthy eating for pre-schoolers in childcare settings: An umbrella review. *Nutrients*, 10(3).

Mehtälä, M. A. K., Sääkslahti, A. K., Inkinen, M. E., & Poskiparta, M. E. H. (2014). A socio-ecological approach to physical activity interventions in childcare: A systematic review. *International Journal of Behavioral Nutrition and Physical Activity*, 11, 22.

Mikkilä, V., Rasanen, L., Raitakari, O. T., Pietinen, P., & Viikari, J. (2005). Consistent dietary patterns identified from childhood to adulthood: The cardiovascular risk in Young Finns Study. *British Journal of Nutrition*, 93(6), 923-931.

Ministry for Vulnerable Children Oranga Tamariki, Ministry of Health, & Ministry of Education. (2017). *Hand in Hand Book: Information on health and education universal services for 0-18 year olds*. Wellington: Ministry for Vulnerable Children, Oranga Tamariki. Retrieved from www.mvcot.govt.nz/assets/Uploads/Caregiver-resources/Hand-in-Hand-Book-July17.pdf

Ministry of Education. (2009). Food and nutrition for healthy confident kids. Retrieved March 2018, from <http://health.tki.org.nz/Key-collections/Healthy-lifestyles/Food-and-nutrition-for-healthy-confident-kids>

Ministry of Education. (2017). *Te Whāriki - Early childhood curriculum*. Wellington. Retrieved from <http://tewhariki.tki.org.nz/en/early-childhood-curriculum-document/>

Ministry of Health. (2008). *Food and nutrition guidelines for healthy infants and toddlers (aged 0–2): A background paper (4th ed) – partially revised December 2012*. Wellington: Ministry of Health. Retrieved from www.health.govt.nz/system/files/documents/publications/food-and-nutrition-guidelines-healthy-infants-and-toddlers-revised-dec12.pdf

Ministry of Health. (2010). *Our oral health: Key findings of the 2009 New Zealand Oral Health Survey*. Wellington: Ministry of Health. Retrieved from www.health.govt.nz/system/files/documents/publications/our-oral-health-2010.pdf

Ministry of Health. (2012). *Food and nutrition guidelines for healthy children and young people (aged 2-18 years): A background paper. Partial revision February 2015*. Wellington: Ministry of Health. Retrieved from www.health.govt.nz/publication/food-and-nutrition-guidelines-healthy-children-and-young-people-aged-2-18-years-background-paper

Ministry of Health. (2015). Caring for your preschooler's teeth. Retrieved March 2018, from www.health.govt.nz/your-health/pregnancy-and-kids/under-fives/3-5-years/caring-your-preschoolers-teeth

Ministry of Health. (2016a). *Cancer: New registrations and deaths 2013*. Wellington: Ministry of Health. Retrieved from www.health.govt.nz/system/files/documents/publications/cancer-new-registrations-deaths-2013-nov16.pdf

Ministry of Health. (2016b). Ministry of Health encourages schools to adopt water only policies [Press release]. Retrieved from www.health.govt.nz/news-media/media-releases/ministry-health-encourages-schools-adopt-water-only-policies

Ministry of Health. (2017a). *New Zealand Health Survey Annual Data Explorer*. Wellington: Ministry of Health. Retrieved from <https://minhealthnz.shinyapps.io/nz-health-survey-2016-17-annual-data-explorer/>

Ministry of Health. (2017b). *Sit less, move more, sleep well: Active play guidelines for under-fives*. Wellington: Ministry of Health. Retrieved from www.health.govt.nz/system/files/documents/publications/active-play-guidelines-for-under-fives-may17.pdf

Ministry of Health. (2018a). Melanoma. Retrieved February 2018, from www.health.govt.nz/your-health/conditions-and-treatments/diseases-and-illnesses/melanoma

Ministry of Health. (2018b). Prevent the spread of infectious disease. Retrieved May 2018, from www.health.govt.nz/your-health/healthy-living/environmental-health/infectious-disease-prevention-and-control/prevent-spread-infectious-disease

Moore, T. G., Arefadib, N., Deery, A., & West, S. (2017). *The first thousand days: An evidence paper*. Parkville, Victoria: Centre for Community Child Health, Murdoch Children's Research Institute. Retrieved from www.rch.org.au/uploadedFiles/Main/Content/ccchdev/CCCH-The-First-Thousand-Days-An-Evidence-Paper-September-2017.pdf

Moynihan, P. J., & Kelly, S. A. (2014). Effect on caries of restricting sugars intake: Systematic review to inform WHO guidelines. *Journal of Dental Research*, 93(1), 8-18.

Namenek Brouwer, R. J., & Benjamin Neelon, S. E. (2013). Watch Me Grow: A garden-based pilot intervention to increase vegetable and fruit intake in preschoolers. *BMC Public Health*, 13(363).

New Zealand Beverage Guidance Panel. (2014). *Policy brief: Options to reduce sugar sweetened beverage (SSB) consumption in New Zealand*: NZBGP. Retrieved from www.fizz.org.nz/sites/fizz.org.nz/files/A4%20Policy%20Update%20Office%20print.pdf

New Zealand Dental Association. (2018). Your oral health: Infants and toddlers. Retrieved March 2018, from www.healthysmiles.org.nz/your-oral-health/infants-toddlers/

New Zealand Government. (2012). *The White Paper for vulnerable children. Volume II*. Wellington: New Zealand Government. Retrieved from www.mvcot.govt.nz/assets/Uploads/Documents/whitepaper-volume-ii-web.pdf

Newman, L., Baum, F., Javanparast, S., O'Rourke, K., & Carlon, L. (2015). Addressing social determinants of health inequities through settings: A rapid review. *Health Promotion International*, 30(Suppl 2), ii126-143.

NHMRC. (2012). *Staying healthy: Preventing infectious diseases in early childhood education and care services*. Canberra: National Health and Medical Research Council. Retrieved from www.nhmrc.gov.au/guidelines-publications/ch55

Northstone, K., & Emmett, P. M. (2008). Are dietary patterns stable throughout early and mid-childhood? A birth cohort study. *British Journal of Nutrition*, 100(5), 1069-1076.

O'Conner, R., De Feyter, J., Carr, A., Luo, J. L., & Romm, H. (2017). *A review of the literature on social and emotional learning for students ages 3–8: Characteristics of effective social and emotional learning programs*

(part 1 of 4) (REL 2017–245). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Mid-Atlantic. Retrieved from <http://ies.ed.gov/ncee/edlabs>

OECD. (2009a). *Doing better for children*: Organisation for Economic Co-operation and Development Publishing. Retrieved from www.oecd.org/els/family/doingbetterforchildren.htm

OECD. (2009b). *Doing better for children: New Zealand country highlights*: Organisation for Economic Co-operation and Development Publishing. Retrieved from www.oecd.org/newzealand/43589854.pdf

OECD. (2016). *OECD health statistics 2016*: Organisation for Economic Co-operation and Development Publishing. Retrieved from www.oecd.org/els/health-systems/health-data.htm

Office of the Children's Commissioner. (2006). *More than an apple a day: Children's right to good health*. Wellington: Office of the Children's Commissioner. Retrieved from www.occ.org.nz/assets/Uploads/Reports/Health/More-than-an-apple-a-day.pdf

Office of the Children's Commissioner. (2014). *Choose kids: Why investing in children benefits all New Zealanders*. Wellington: Office of the Children's Commissioner. Retrieved from www.occ.org.nz/assets/Publications/Choose-Kids-Why-investing-in-children-benefits-all-New-Zealanders-OCC-2.pdf

Office of the Prime Minister's Science Advisory Committee. (2011). *Improving the transition: Reducing social and psychological morbidity during adolescence. A report from the Prime Minister's Chief Science Advisor*. Auckland: Office of the Prime Minister's Science Advisory Committee. Retrieved from www.pmcsa.org.nz/wp-content/uploads/Improving-the-Transition-report.pdf

Office of the United Nations High Commissioner for Human Rights. (1990). *Convention on the rights of the child*. Geneva: OHCHR Retrieved from www.ohchr.org/Documents/ProfessionalInterest/crc.pdf

Ohly, H., Gentry, S., Wigglesworth, R., Bethel, A., Lovell, R., & Garside, R. (2016). A systematic review of the health and well-being impacts of school gardening: Synthesis of quantitative and qualitative evidence. *BMC Public Health*, 16, 286.

Park, S., Lin, M., Onufrak, S., & Li, R. (2015). Association of sugar-sweetened beverage intake during infancy with dental caries in 6-year-olds. *Clinical Nutrition Research*, 4(1), 9-17.

Parnell, W. R., Scragg, R., Wilson, N. C., Schaaf, D., & Fitzgerald, E. (2003). *NZ Food NZ Children: Key results of the 2002 National Children's Nutrition Survey*. Wellington: Ministry of Health. Retrieved from [www.moh.govt.nz/notebook/nbbooks.nsf/0/658d849a2bac7421cc256dd9006cc7ec/\\$FILE/nzfoodnzchildren.pdf](http://www.moh.govt.nz/notebook/nbbooks.nsf/0/658d849a2bac7421cc256dd9006cc7ec/$FILE/nzfoodnzchildren.pdf)

Payton, J. W., Wardlaw, D. M., Graczyk, P. A., Bloodworth, M. R., Tompsett, C. J., & Weissberg, R. P. (2000). Social and emotional learning: A framework for promoting mental health and reducing risk behavior in children and youth. *Journal of School Health*, 70(5), 179-185.

Pearce, A., Li, L., Abbas, J., Ferguson, B., Graham, H., Law, C., et al. (2012). Childcare use and inequalities in breastfeeding: Findings from the UK Millennium Cohort Study. *Archives of Disease in Childhood*, 97(1), 39-42.

Plunket. (2018). Annual breastfeeding statistics. Retrieved May 2018, from www.plunket.org.nz/news-and-research/research-from-plunket/plunket-breastfeeding-data-analysis/annual-breastfeeding-statistics/

Public Health Advisory Committee. (2010). *The best start in life: Achieving effective action on child health and wellbeing* Wellington: Ministry of Health. Retrieved from [www.moh.govt.nz/notebook/nbbooks.nsf/0/298D1D194D46C918CC2577370073D72C/\\$file/the-best-start-in-life-2010.pdf](http://www.moh.govt.nz/notebook/nbbooks.nsf/0/298D1D194D46C918CC2577370073D72C/$file/the-best-start-in-life-2010.pdf)

- Reeder, A. I., Jopson, J. A., & Gray, A. (2012a). Primary school sun protection policies and practices 4 years after baseline - a follow-up study. *Health Education Research*, 27(5), 844-856.
- Reeder, A. I., Jopson, J. A., & Gray, A. (2012b). Sun protection policies and practices in New Zealand primary schools. *New Zealand Medical Journal*, 125(1349), 70-82.
- Reilly, J. J. (2010). Low levels of objectively measured physical activity in preschoolers in child care. *Medicine and Science in Sports and Exercise*, 42(3), 502-507.
- Rush, E., Obolonkin, V., Young, L., Kirk, M., & Tseng, M. (2017). Under 5 Energize: Tracking progress of a preschool nutrition and physical activity programme with regional measures of body size and dental health at age of four years. *Nutrients*, 9(5).
- Savoie-Roskos, M. R., Wengreen, H., & Durward, C. (2017). Increasing fruit and vegetable intake among children and youth through gardening-based interventions: A systematic review. *Journal of the Academy of Nutrition and Dietetics*, 117(2), 240-250.
- Schindler, H. S., Kholoptseva, J., Oh, S. S., Yoshikawa, H., Duncan, G. J., Magnuson, K. A., et al. (2015). Maximizing the potential of early childhood education to prevent externalizing behavior problems: A meta-analysis. *Journal of School Psychology*, 53(3), 243-263.
- Simpson, J., Duncanson, M., Oben, G., Adams, J., Wicken, A., Pierson, M., et al. (2017). *Te Ohonga Ake: The health status of Māori children and young people in New Zealand. Series Two*. Dunedin: New Zealand Child and Youth Epidemiology Service, University of Otago Retrieved from <http://hdl.handle.net/10523/7390>
- Smylie, J., Crengle, S., Freemantle, J., & Taulii, M. (2010). Indigenous birth outcomes in Australia, Canada, New Zealand and the United States - an overview. *The Open Women's Health Journal*, 4, 7-17.
- Sneyd, M. J., & Cox, B. (2013). A comparison of trends in melanoma mortality in New Zealand and Australia: The two countries with the highest melanoma incidence and mortality in the world. *BMC Cancer*, 13, 372.
- Sohn, W., Burt, B. A., & Sowers, M. R. (2006). Carbonated soft drinks and dental caries in the primary dentition. *Journal of Dental Research*, 85(3), 262-266.
- Spence, S. H. (2003). Social skills training with children and young people: Theory, evidence and practice. *Child and Adolescent Mental Health*, 8(2), 84-96.
- Statistics NZ. (2017). *Childcare in New Zealand 2017: September 2017 quarter - tables*. Retrieved from: www.stats.govt.nz/news/more-toddlers-in-formal-early-childhood-care
- SUPERU. (2017). *At a glance. Early education participation: Getting New Zealand children ready for school*. Wellington: Social Policy Evaluation and Research Unit. Retrieved from www.superu.govt.nz/sites/default/files/Now%20we%20are%20four%20AAG%20FINAL.pdf
- Temple, M., & Robinson, J. C. (2014). A systematic review of interventions to promote physical activity in the preschool setting. *Journal for Specialists in Pediatric Nursing*, 19(4), 274-284.
- Timmons, B. W., Leblanc, A. G., Carson, V., Connor Gorber, S., Dillman, C., Janssen, I., et al. (2012). Systematic review of physical activity and health in the early years (aged 0-4 years). *Applied Physiology, Nutrition, and Metabolism*, 37(4), 773-792.
- Trost, S. G., Ward, D. S., & Senso, M. (2010). Effects of child care policy and environment on physical activity. *Medicine and Science in Sports and Exercise*, 42(3), 520-525.

- UNICEF. (2017). *Building the future: Children and the Sustainable Development Goals in rich countries. Innocenti Report Card 14*. Florence: UNICEF Office of Research. Retrieved from www.unicef-irc.org/publications/pdf/RC14_eng.pdf
- University of Otago, & Ministry of Health. (2011). *A focus on nutrition: Key findings of the 2008/09 New Zealand Adult Nutrition Survey*. Wellington: Ministry of Health. Retrieved from www.health.govt.nz/system/files/documents/publications/a-focus-on-nutrition-v2.pdf
- Vargas-Garcia, E. J., Evans, C. E. L., Prestwich, A., Sykes-Muskett, B. J., Hooson, J., & Cade, J. E. (2017). Interventions to reduce consumption of sugar-sweetened beverages or increase water intake: Evidence from a systematic review and meta-analysis. *Obesity Reviews*, 18(11), 1350-1363.
- Vartanian, L. R., Schwartz, M. B., & Brownell, K. D. (2007). Effects of soft drink consumption on nutrition and health: A systematic review and meta-analysis. *American Journal of Public Health*, 97(4), 667-675.
- Volkovova, K., Bilanicova, D., Bartonova, A., Letasiova, S., & Dusinska, M. (2012). Associations between environmental factors and incidence of cutaneous melanoma. Review. *Environmental Health*, 11(Suppl 1), S12.
- Wall, C. R., Thompson, J. M., Robinson, E., & Mitchell, E. A. (2013). Dietary patterns of children at 3.5 and 7 years of age: A New Zealand birth cohort study. *Acta Paediatrica*, 102(2), 137-142.
- Ward, D. S., Vaughn, A., McWilliams, C., & Hales, D. (2010). Interventions for increasing physical activity at child care. *Medicine and Science in Sports and Exercise*, 42(3), 526-534.
- Warren, J. J., Weber-Gasparoni, K., Marshall, T. A., Drake, D. R., Dehkordi-Vakil, F., Dawson, D. V., et al. (2009). A longitudinal study of dental caries risk among very young low SES children. *Community Dentistry and Oral Epidemiology*, 37(2), 116-122.
- Whiteman, D. C., Green, A. C., & Olsen, C. M. (2016). The growing burden of invasive melanoma: Projections of incidence rates and numbers of new cases in six susceptible populations through 2031. *Journal of Investigative Dermatology*, 136(6), 1161-1171.
- Whyman, R. A., Mahoney, E. K., Morrison, D., & Stanley, J. (2014). Potentially preventable admissions to New Zealand public hospitals for dental care: A 20-year review. *Community Dentistry and Oral Epidemiology*, 42(3), 234-244.
- Willmott, M., Nicholson, A., Busse, H., MacArthur, G. J., Brookes, S., & Campbell, R. (2016). Effectiveness of hand hygiene interventions in reducing illness absence among children in educational settings: A systematic review and meta-analysis. *Archives of Disease in Childhood*, 101(1), 42-50.
- World Health Organization. (2004). *Prevention of mental disorders: Effective interventions and policy options. Summary report*. Geneva: World Health Organization Department of Mental Health and Substance Abuse, Prevention Research Centre of the Universities of Nijmegen and Maastricht. Retrieved from www.who.int/mental_health/evidence/en/prevention_of_mental_disorders_sr.pdf
- World Health Organization. (2012). *Population-based approaches to childhood obesity prevention*. Geneva: WHO. Retrieved from http://apps.who.int/iris/bitstream/10665/80149/1/9789241504782_eng.pdf
- World Health Organization. (2013a). *Global action plan for the prevention and control of non-communicable diseases 2013–2020*. Geneva: WHO. Retrieved from www.who.int/nmh/events/ncd_action_plan/en/
- World Health Organization. (2013b). *Mental Health Action Plan 2013-2020*. Geneva: WHO. Retrieved from http://apps.who.int/iris/bitstream/10665/89966/1/9789241506021_eng.pdf
- World Health Organization. (2015). *Guideline: Sugars intake for adults and children*. Geneva: WHO. Retrieved from http://apps.who.int/iris/bitstream/10665/149782/1/9789241549028_eng.pdf

World Health Organization. (2016). *Report of the Commission on Ending Childhood Obesity*. Geneva: WHO. Retrieved from www.who.int/end-childhood-obesity/final-report/en/

World Health Organization, & Calouste Gulbenkian Foundation. (2014). *Social determinants of mental health*. Geneva: WHO. Retrieved from http://apps.who.int/iris/bitstream/10665/112828/1/9789241506809_eng.pdf?ua=1

World Health Organization, Health and Welfare Canada, & Canadian Public Health Association. (1986). *Ottawa Charter for Health Promotion*. Paper presented at the International Conference on Health Promotion, Ottawa, Ontario, Canada, 17-21 November 1986, Ottawa, Ontario. www.who.int/healthpromotion/conferences/previous/ottawa/en/

Zins, J. E., Bloodworth, M. R., Weissberg, R. P., & Walberg, H. J. (2007). The scientific base linking social and emotional learning to school success. *Journal of Educational and Psychological Consultation*, 17(2-3), 191-210.