Factors associated with early childhood education and care service implementation of healthy eating and physical activity policies and practices in Australia: a cross-sectional study

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Abstract

Many early childhood education and care (ECEC) services fail to implement recommended policies and practices supportive of healthy eating and physical activity. The purpose of this study was to assess whether certain theoretically-based factors are associated with implementation of healthy eating and physical activity policies and practices in a sample of ECEC services. A cross-sectional survey was conducted with Service Managers of ECEC services. The survey assessed the operational characteristics, policy, and practice implementation, and 13 factors were suggested by Damschroder's Consolidated Framework for Implementation Research to impede or promote implementation. Logistic regression analyses found a significant association between implementation factor score and full implementation (OR 1.38; 95% CI 1.18–1.61; $p<0.01$), indicating that for every one point increase in implementation score, ECEC services were 38 % more likely to be fully implementing the policies and practices. The findings highlight the opportunities for improving implementation of obesity prevention interventions in this setting by developing interventions that address such factors.

Keywords

Healthy eating, Physical activity, Obesity, Early childhood education and care, Implementation

INTRODUCTION

Globally, in 2010, 43 million preschool aged children (<5 years) were overweight and obese representing 7 % of children of this age [1]. This is expected to increase to 9 % by 2020 [1]. Early childhood represents a critical period in the development of children's dietary and activity habits, and a valuable opportunity to prevent unhealthy weight gain [2–4]. Interventions to improve the diet and physical activity of preschool aged children have been recommended to prevent the onset of obesity, the tracking of obesity into adulthood, and the development of future chronic disease [5–7].

Implications

Practice: Securing the support of early childhood education and care (ECEC) service managers, management committees, and parents is important in assisting services to implement obesity prevention policies and practices.

Policy: Policies to support obesity prevention initiatives in the ECEC setting require support if they are to be implemented.

Research: Further research should test interventions to facilitate the implementation of ECEC service healthy eating and physical activity policies and practices that target service managers, management committees, and parents.

Early childhood education and care (ECEC) services provide access to a large number of children for prolonged periods of time. A number of ECEC service policies and practices can improve child nutritional intake and fundamental movement skill proficiency, time spent in moderate to vigorous physical activity, and prevent excessive weight gain [8–11]. As such, physical activity and nutrition best practice guidelines for this setting recommend that services have written policies, deliver fundamental movement skills' programs, limit screen time opportunities (such as television), and have guidelines for foods brought from home or provided by the service [12–14].

Population-based surveys, however, suggest that current healthy eating and physical activity policies and practices in ECEC services are not consistent with such guidelines [15–17]. For example, a recent survey found that only 48–50 % of Australian center-based ECEC services had a written physical activity policy and 46–60 % programed time each day for fundamental movement

skill activities, while 25–28 % allowed children to participate in sedentary screen time daily (such as television viewing) [17]. A review of comparable international literature also suggests that there is considerable scope to improve the nutritional quality of food provided to children and the time children spend in physical activity while in care [16].

The impact of health promotion initiatives on population weight status is dependent on the degree to which healthy eating and physical activity practices are implemented in the community. Without adequate implementation, programs to prevent childhood obesity in center-based ECEC services cannot benefit public health. To facilitate the development of strategies to translate health promoting initiatives into usual practice in ECEC services, a thorough understanding of factors which promote or impede implementation is required. Past research has identified that a lack of knowledge and appropriate resources are barriers to the implementation of obesity prevention programs in ECEC services [18]. Similarly, a small number of studies have identified that the socioeconomic and geographic location of ECEC services is associated with implementation of obesity prevention initiatives, as is the level of implementation support provided to services [17, 19]. However, past research which has focused on a relatively narrow set of implementation factors provides limited data to inform strategies to maximise implementation of health promoting policies and practices in ECEC services. Theoretical frameworks and reviews of empirical evidence from other settings suggest that a range of factors may facilitate the implementation of evidence-based programs by organisations [20–22]. For example, Damschroder's Consolidated Framework for Implementation Research is composed of constructs theorised to be associated with implementation across five major domains: intervention characteristics (such as cost and perceived complexity); outer setting factors (such as external policies and peer behavior); inner setting factors (such as alignment with organisational values and access to information and support); characteristics of the individuals involved (such as self-efficacy); and the process of implementation (such as planning) [21]. Furthermore, systematic reviews suggest that organisational environments are complex, and to achieve practice change, a comprehensive understanding of the multi-factorial determinants of organisational policy or practice implementation is needed [20, 22].

Given the limited scope of implementation research in the ECEC setting, the aim of this study was to assess whether a comprehensive set of theoretically-based factors, as reported by ECEC Service Managers, are associated with implementation of healthy eating and physical activity policies and practices in a sample of center-based ECEC services in Australia.

METHODS

The study was approved and procedures monitored by the Hunter New England Human Research Ethics Committee.

Design and setting

The study employed a cross-sectional survey design. All service managers of center-based ECEC services (preschools or long day care centers) located in the Hunter New England region of New South Wales (NSW), Australia, were invited to complete a 25-min telephone survey. In NSW, both preschools and long day care services provide center-based programs for children 3–5 years of age to help children prepare for school [23]. The healthy eating and physical activity policies and practices of both service types are similar [15, 17]. The Hunter New England region covers more than 130,000 km^2 and encompasses regional cities, rural, and remote communities, with a population of 60,970 children aged 0–5 years and over 350 center-based ECEC services.

Participants and recruitment

The lists of preschools and long day care centers (hereafter 'services') provided by the government licensing authority were used to identify all services in the Hunter New England region. Study information was mailed to the managers of services 2 weeks before a telephone call from a research assistant to assess eligibility and invite study participation. Services catering exclusively for children requiring specialist care or on-site provision of meals to children were excluded as guideline adherence to food service provision could not easily be assessed via telephone interview. In all participating services, meals for children were supplied by parents in a 'lunchbox'. Services that provided snacks to children, but not meals, were included. Government funded, Department of Education services (representing 3 % of services in the region), was also excluded as ethics approval had not been obtained from the relevant Government department.

Implementation support

At the time of the study, services in the region had been offered support to implement obesity prevention policies and practices by local government funded health promotion staff as part of a program known in the region as 'Good for Kids, Good for Life' [24]. Broadly, to improve child nutrition, the 'Good for Kids, Good For Life' program recommended services provide food, and encourage parents to pack food in line with dietary guidelines for the sector [25] and to provide an environment and child learning experience to support the development of healthy dietary habits. To support child physical activity, the program did not make specific recommendations regarding the time children should spend being physically active or in screen time, but instead, sought to increase opportunities for children to be physically active throughout the day, and reduce opportunities for sedentary screen time. Specifically, during 2011–2012, the focus of local health promotion efforts was supporting services (i) to implement a written nutrition and physical activity policy; (ii) to implement lunchbox guidelines and monitor foods packed for children to ensure that foods

and beverage brought into services were not of poor nutritional quality ('discretionary foods' such as confectionary, salty snacks, or sugar sweetened drinks) as defined by the Australian Dietary Guidelines [26]; (iii) ensuring services did not provide sweetened drinks to children; (iv) the provision of daily structured fundamental movement skills activities for children; and (v) limiting sedentary screen time opportunities to less than a week. The implementation of such policies and practices by the program was recommended on the basis of best practice guidelines for the sector and empirical research suggesting that they improve child diet, physical activity, or fundamental movement skills [8–11, 16, 27].

Free implementation support was offered to services and included training of childcare service staff, telephone support and resources such as example policy templates, teaching resources, and newsletters. Services were also provided with information pamphlets regarding how to pack a healthy lunchbox for children and were encouraged to distribute these to families during enrolment each year. The support, however, was not provided to all services uniformly and was guided by service interest and limited by health promotion staff availability. Approximately three full time equivalent staff provided support to over 350 services in the region.

Data collection and measures

Service managers completed telephone interviews, conducted by trained research assistants, using computer-assisted telephone interviewing technology to ensure item standardisation. The survey was conducted with service managers in August to November 2012. The survey collected data regarding service operational characteristics, current healthy eating and physical activity policies and practices and service manager perceptions of innovation characteristics, outer setting factors, inner setting factors, process and engagement factors or individual factor, based on Damschroder's Consolidated Framework for Implementation Research [21] that may facilitate policy and practice implementation.

Service characteristics

Service managers were asked to report the age groups of children that they cater for, the number of children enrolled in the service, the number of days the service is open, the service type (preschool or long day care service), and if the service has any Aboriginal or Torres Strait Islander children enrolled. These items were based on those previously reported in the literature to describe service operational characteristics [15, 17].

Healthy eating and physical activity policies and practices

Service managers were asked to report the presence of a number of healthy eating and physical activity policies and practices at their service. The policies and practices assessed were in line with best practice

recommendations for the setting and those addressed by the 'Good for Kids, Good for Life' program.

The items used to assess such policies and practices in were developed by the research team and were based on those previously used in the description of the obesity prevention environments of Australian ECEC services [15, 17] and items from the U.S. Nutrition and Physical Activity Self-Assessment for Child Care (NAPSACC) instrument and the Child Care Nutrition and Physical Activity Survey [28–30]. The items were pilot tested with ECEC service staff, and health promotion practitioners for comprehension and understanding and have been validated against direct observation of service policies and practice [31]. The included items assessed:

1. Policies. Service managers were asked if their service has a written nutrition policy and a written physical activity policy. Policies that may have existed within services but were not written were not assessed.
2. Lunchbox guidelines and daily monitoring. Service managers were asked if their service had written guidelines for families regarding recommended foods and drinks that can be packed in children's lunchboxes for meals and snacks; if their service monitored the content of children's lunchboxes (e.g., by identifying foods packed for children that are not compliant with service guidelines at meal and snack times) and if so, how often they monitored lunchboxes.
3. Provision of sweetened drinks. Service managers were asked if their service provided sweetened drinks to children (including cordial, flavored milk, fruit juice/drink, or soft drink).
4. Daily fundamental movement skill activities. Service managers were asked how many days per week their service provided structured activities to develop fundamental movement skills for children 3–5 years. The participants were informed that fundamental movement skills were defined as basic gross motor movement skills such as running, catching, jumping, and kicking and that structured fundamental movement skill activities involved educators providing explaining, demonstrating and providing skill feedback to children.
5. Opportunities to engage in screen time. Service managers were asked how many days per week children 3–5 years could spend watching TV, videos, or DVDs at their service.

Factors associated with full implementation of healthy eating and activity policies and practices

Service managers were read the following:

'"Good for Kids" is a Government funded initiative operating in the Hunter New England region. Over the past few years childcare services have been encouraged to implement Good for Kids healthy eating & physical activity initiatives. Services are encouraged to implement healthy eating and physical activity policies; to implement lunchbox guidelines & monitor lunchboxes; to provide only plain milk or water; to

implement fundamental movement skill programs and structured physical activity and to limit sedentary activities like TV & DVDs'.

The participants were then read a series of statements. For each statement, the participants were asked to indicate the extent to which they agreed or disagreed on a scale of 0–10, where '0' would represent '*completely disagree*', '5' would represent '*neither agree nor disagree*', and '10' would represent '*completely agree*'.

Single items were developed to examine relevant factors which may be associated with implementation of healthy eating and physical activity policies and practices targeted by the program based on Damshroder's Consolidated Framework for Implementation Research. While the Consolidated Framework for Implementation Research includes a comprehensive taxonomy of 37 implementation constructs across five domains, it is recommended that only those constructs relevant to the study context, intervention, and setting be used in implementation research [21]. Items were therefore developed for constructs considered relevant to the implementation of healthy eating and physical activity policies and practices in ECEC services targeted by the 'Good for Kids, Good for Life' program. The specific items, the Consolidated Framework for Implementation Research construct and domains for which they relate are described in full in Table 3.

ANALYSIS

Data management and analysis were performed in SAS version 9.2 statistical software. Descriptive statistics were used to describe the study sample. Service postcode was used to define services as located in urban (regional cities and inner regional classifications) or rural areas based on the Australian Standard Geographical Classification [32]. Similarly, service postcodes ranked in the top 50 % of NSW according to the Socioeconomic Indices for Areas [32] were defined as being located in high socioeconomic areas.

To assess association between implementation of healthy eating and physical activity policies and practices targeted by the 'Good for Kids, Good for Life' program, a variable was created dichotomising services that implemented all five policies and practices (full implementation) and those that implemented four or less (less than full implementation). Specifically, services were classified as implementing the program if they reported all of the following: (i) having a physical activity and healthy eating policy; (ii) having lunchbox guidelines and monitoring lunchboxes each day; (iii) not providing sweetened drinks to children; (iv) conducting fundamental movement skill activities daily; and (v) limiting time children spent watching TV, videos, or DVDs to less than once per week.

A variable 'implementation factor score' was created ranging from 0 to 13 by summing the number of items (implementation factors) that service managers responded in 'agreement' with (three items were reversed scored). To assess if full implementation is more likely when service managers are in agreement with a greater number of implementation factors, a simple logistic regression was used to examine bivariate associations between implementation factor score and full implementation.

The associations between each implementation factor (as well as implementation factor score) and full implementation of physical activity policies and practices by services were also examined separately using simple logistic regression and then using multivariable logistic regression models to examine independent associations between each implementation factor and full implementation. All implementation factors were included in multivariate models as was the geographic and socioeconomic location of services given evidence to suggest that such factors are associated with ECEC service implementation of physical activity policies and practices [17]. An alpha of 0.05 was used for all statistical tests.

RESULTS

All 365 ECEC services in the Hunter New England region were attempted to be contacted to assess eligibility. Of these, nine could not be contacted, 30 declined to participate, and 111 were ineligible, primarily because the service provided meals to children (n=83). The remaining 215 service managers participated in the study and completed the telephone survey. The operational characteristics of participating services are described in Table 1. All services enrolled children 3–5 years of age, 57 % were preschools, (the reminder were long day care centers) 45 % were located in high socioeconomic areas, and 34 % were located in a major city (see Table 1).

Healthy eating and physical activity policies and practices

Over 90 % of service managers reported that their service had nutrition guidelines, monitored food packed by parents in children's lunchboxes and provided only non-sweetened drinks to children. Fifty-eight percent had a written nutrition and written physical activity policy while 41 % of services were

Table 1 | Participating service operational characteristics

Question	Number (%)
Age of children service has enrolled	
Children 1 year of age	64 (30 %)
Children 2 years of age	112 (52 %)
Children 3 to 5 years of age	214 (100 %)
Service type	
Preschool	122 (57 %)
Service size	
Number of children enrolled; mean (SD)	85 (97)
Number of Aboriginal or Torres Strait Islander childre; mean (SD)	13 (76)
Days of operation; mean (SD)	5 (1)
Service location	
High socioeconomic area	96 (45 %)
Major cities	72 (34 %)
Inner regional area	63 (30 %)
Outer regional area	70 (33 %)
Remote area	7 (3 %)

implementing all five practices (full implementation) (see Table 2).

Factors associated with full implementation of healthy eating and physical activity policies and practices

The overall mean implementation score was 8.6 (sd 1.6; range 3–13). Logistic regression analyses found a significant association between implementation factor score and full implementation (OR 1.38; 95 % CI=1.18–1.61; p=<0.01) indicating that for every one point increase in implementation score, ECEC services were 38 % more likely to fully implement healthy eating and physical activity policies and practices. Of the 13 implementation factors examined, five were significantly associated with implementation at the bivariate level (see Table 3). Specifically, logistic regression analyses revealed that the odds of reporting full implementation of healthy eating and physical activity policies and practices were significantly less likely among service managers who agreed that the implementation of the program was less important than other service priorities (Table 3). This was also true among service managers who agreed that the program initiatives were difficult to implement. The odds of reporting full implementation were significantly higher for service managers who agreed that their management committee and parents were supportive of program implementation and that perceived the external resources to implement the program initiatives were accessible.

Multivariable logistic regression analyses revealed four of the 13 implementation factors were independently associated with full implementation. Specifically, service managers who agreed the physical activity policies and practices of their service needed to be improved were significantly more likely to report full implementation (OR=2.3; 95 % CI=1.2–4.3; p=0.01), as were those that agreed that their management committee (OR=3.2; 95 % CI=1.2–8.4; p=0.02) or parents (OR=3.1; 95 % CI=1.3–7.4; p=0.01) were supportive of implementing program initiatives, or that agreed that external resources to help implement the program initiatives were accessible (OR=2.4; 95% CI=1.0–6.3; p=0.04). No other implementation factors were found to be significantly independently associated

Table 2 | Healthy eating and physical activity policies and practices implemented by ECEC services

Service policies and practices	Number (%)
Service has written nutrition and physical activity policies	124 (58 %)
Service has nutritional guidelines and monitors content of child lunchboxes	201 (93 %)
Service provides only non-sweetened drinks to children	213 (99 %)
Service provides daily structured fundamental movement skill activities	174 (81 %)
Opportunities for children to watch TV, videos, DVDs are less than weekly	191 (88 %)
Service fully implementing all practices	88 (41 %)

with implementation in multivariable analyses (see Table 3).

CONCLUSIONS

To our knowledge, the current study represents the most comprehensive examination of factors associated with implementation of healthy eating and physical activity policies and practices in ECEC services. The study found that 41 % of surveyed services were fully implementing healthy eating and physical activity policies and practices targeted by a region-wide obesity prevention program. The study identified a number of factors that were associated with full implementation. Furthermore, a higher implementation score was found to be significantly associated with full implementation, suggesting that adoption of healthy eating and physical activity policies and practices by ECEC services may be more likely when consideration is given to a greater number of factors that promote or impede implementation. Such findings provide important insights for researchers, policy makers, and practitioners interested in facilitating population wide implementation of obesity prevention initiatives in this setting.

Specifically, the study highlights the importance of engagement in achieving practice improvement in ECEC services. The Consolidated Framework for Implementation Research [21] suggests that implementation is more likely to occur if appropriate individuals or groups with influence are engaged in the change process. Consistent with research conducted in schools [33], the findings of this study suggest that parents represent a particularly important group to garner support to achieve change in ECEC services. The perceived support of management committees was also associated with full implementation. Previous interventions to encourage population wide implementation of healthy eating and physical activity policies and practices in this setting have failed to include strategies to engage these groups (parents and management committees) and have had little impact on service improvement [10, 15, 19, 34]. Further studies examining the factors that may pre-dispose parents and management committees to supporting implementation of healthy eating and physical activity promoting practices could inform social marketing, communication and consensus strategies to secure the endorsement of these key stakeholder groups and improve the effectiveness of future implementation efforts [20–22].

Consistent with literature in other settings [35, 36], the perceived availability of external support was associated with implementation, underscoring the need for governments and other organisations to ensure initiatives to improve uptake of evidence-based guidelines or recommendations are sufficiently resourced. Research suggests that multi-component support strategies which address multiple implementation barriers are most likely to be effective in producing organisational practice improvement [20, 22]. Research with

Table 3 | Factors associated with full implementation of healthy eating and physical activity policies and practices

CFIR Domain	CFIR Construct	Implementation factor survey item	Response category	Less than full implementation	Full Implementation	Unadjusted OR	p value
Outer setting	External policies	The program initiatives are consistent with the National Quality Framework	Agree Disagree[a]	119 (94 %) 8 (6 %)	84 (95 %) 4 (5 %)	1.41 (0.41, 4.84) 1	0.58
Outer setting	Peer pressure	Most other services in my region would be supportive of the program initiatives	Agree Disagree[a]	90 (71 %) 37 (29 %)	72 (82 %) 16 (18 %)	1.85 (0.95, 3.59) 1	0.07
Inner setting	Readiness for implementation—available resources	External resources to help implement the program initiatives are accessible to my service	Agree Disagree[a]	93 (73 %) 34 (27 %)	77 (88 %) 11 (13 %)	2.56 (1.22, 5.38) 1	0.01*
Inner setting	Implementation climate—compatibility	The program initiatives are consistent with the philosophy of my service	Agree Disagree[a]	113 (89 %) 14 (11 %)	84 (95 %) 4 (5 %)	2.6 (0.83, 8.19) 1	0.10
Inner setting	Implementation climate—relative priority	Relative to other priorities and initiatives that my service provides, the program initiatives are less important	Agree Disagree[b]	39 (31 %) 88 (69 %)	16 (18 %) 72 (82 %)	0.5 (0.26, 0.97) 1	0.04*
Inner setting	Implementation climate—tension for change	The physical activity and healthy eating policies and practices of my service need to be improved	Agree Disagree[a]	58 (46 %) 69 (54 %)	46 (52 %) 42 (48 %)	1.3 (0.76, 2.25) 1	0.34
Innovation characteristics	Source	The Early Childhood Education and Care sector was involved in developing the program initiatives	Agree Disagree[a]	86 (68 %) 41 (32 %)	66 (75 %) 22 (25 %)	1.43 (0.78, 2.63) 1	0.23
Innovation characteristics	Complexity	The program initiatives are difficult to implement in services	Agree Disagree[b]	44 (35 %) 83 (65 %)	15 (17 %) 73 (83 %)	0.39 (0.2, 0.75) 1	<.01*
Innovation characteristics	Cost	Implementing the program initiatives is costly for services	Agree Disagree[b]	16 (13 %) 111 (87 %)	7 (8 %) 81 (92 %)	0.6 (0.24, 1.52) 1	0.28
Process	Engaging	I support implementing the program initiatives in my service	Agree Disagree[a]	121 (95 %) 6 (5 %)	87 (99 %) 1 (1 %)	4.31 (0.51, 36.4) 1	0.18
Process	Engaging	Our management committee is supportive of implementing the program initiatives	Agree Disagree[a]	89 (70 %) 38 (30 %)	79 (90 %) 9 (10 %)	3.75 (1.71, 8.23) 1	<.01*
Process	Engaging	Parents are supportive of implementing the program initiatives	Agree Disagree[a]	74 (58 %) 53 (42 %)	75 (85 %) 13 (15 %)	4.13 (2.08, 8.21) 1	<.01*
Characteristics of individuals	Personal attributes (motivation)	Staff at my service are motivated to implement the program initiatives	Agree Disagree[a]	108 (85 %) 19 (15 %)	82 (93 %) 6 (7 %)	2.4 (0.92, 6.29) 1	0.07

CFIR Consolidated Framework for Implementation Research

[a] Disagree=less than or equal to 5

[b] Disagree=less than 5

*p<0.05

Australian ECEC service staff suggests that the provision of staff training; resources such as early childhood activity promoting games and songs; information for families; guidance on optimal service policies; and access to health professionals would be particularly useful for services to facilitate the adoption of practices more supportive of child physical activity and healthy eating [18]. In the USA, it has been suggested that the implementation of the 'Let's Move Child Care' recommendations to improve healthy eating and physical activity would be facilitated through greater alignment of the recommendations with state regulations [37]. External support of policy makers to ensure a supportive regulation environment may represent an effective implementation strategy.

Furthermore, the finding of an inverse relationship between perceived difficulty of implementing policies and practices and full implementation suggest that both researchers and policy makers need to be mindful of the complexity of the initiatives that services are encouraged to implement. Overly complex, intensive or costly policies or practices have little chance of being taken up by organisations [21]. The development of simple evidence-based strategies which are congruent with the existing staff skill and capacity constraints may enhance the likelihood of implementation and in improving community health.

The primary limitation of the study was the use of items to assess ECEC service implementation of healthy eating and physical activity policies and practices and implementation factors, which have not been validated. The lack of available validated instruments to assess Australian ECEC environments and to assess theoretical constructs of the Consolidated Framework for Implementation Research represents a considerable impediment to implementation research in this setting. Encouragingly, however, the development and validation of measures that assess some constructs in the ECEC setting, including organisational readiness to change, are currently underway [38]. The items used to assess written policies and practices of services and the self report nature of assessment may have introduced bias and observational data or practice implementation, and document review of written policies would have provided more valid estimates of implementation and should be considered for future studies. Relatedly, many services have informal policies that are well understood and adhered to by staff. Assessment of only policies that are written therefore is unlikely to reflect the policy environment of services. The study also did not assess practices and associations with their implementation among services providing meals to children. The extent to which the study findings generalise to such services is therefore unknown.

Notwithstanding these limitations, the study represents an important contribution to implementation science in ECEC services, providing researchers, policy makers, and practitioners with formative data to support the development of interventions to support

ECEC services implement evidence-based obesity prevention initiatives.

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