public health research&practice
A JOURNAL OF THE SAX INSTITUTE

October 2024; Vol. 34(3):e34232408
https://doi.org/10.17061/phrp34232408
www.phrp.com.au

Research

Effectiveness of the Go4Fun program: a comparison of face-to-face and digital delivery

Bronwyn McGill[a,b,d], Christian Young[c], NSW Health, Centre for Population Health Team[†], Prevention Research Collaboration Team[‡] and Margaret Thomas[a,b]

[a] Prevention Research Collaboration, Sydney School of Public Health, Faculty of Medicine and Health, University of Sydney, NSW, Australia
[b] Charles Perkins Centre, University of Sydney, NSW, Australia
[c] NSW Biostatistics Training Program, NSW Ministry of Health, Sydney, Australia
[d] Corresponding author: bronwyn.mcgill@sydney.edu.au

Article history

Publication date: 23 October 2024
Citation: McGill B, Young C, NSW Health, Centre for Population Health Team, Prevention Research Collaboration Team, Thomas M. Effectiveness of the Go4Fun program: a comparison of face-to-face and digital delivery. Public Health Res Pract. 2024;34(3):e34232408. First published 14 August 2024. https://doi.org/10.17061/phrp34232408

Key points

- Go4Fun, a secondary prevention healthy lifestyle program for children above a healthy weight, shows improvements in health behaviour and weight outcomes when delivered either face-to-face or digitally, but children accessing the digital mode showed greater improvements
- Ongoing delivery of both modes of Go4Fun would ensure the program reaches children from disadvantaged areas and non-English speaking backgrounds

Abstract

Objectives and importance of study: Despite an increasing trend in digitally delivered health promotion programs, evidence of their effectiveness compared to face-to-face approaches is limited. Go4Fun is a 10-week, scaled-up healthy lifestyle program in New South Wales (NSW) for children 7–13 years who are above a healthy weight and their families, delivered either face-to-face or digitally. We compared the impact of Standard Go4Fun (face-to-face) and Go4Fun Online (digital) on children's weight and health behaviour outcomes and whether attendance levels influenced outcomes.

Study type: Pre-post study.

Methods: We conducted a secondary analysis of Go4Fun cohort data from 1893 face-to-face and 1283 digital participants (January 2018 to May 2022). Outcomes of interest were body mass index z-score (zBMI), physical activity, sedentary behaviour, and fruit, vegetable, sugary drink and takeaway food consumption.

Results: A higher proportion of Standard Go4Fun children lived in major cities, in areas of greatest disadvantage and spoke a language other than English at home than in Go4Fun Online. Children in both Standard Go4Fun and Go4Fun Online demonstrated improvements in all outcomes; however, children in Go4Fun Online showed significantly larger improvements. On average, digital participants had a reduction in zBMI of 0.11 more than the reduction seen in face-to-face participants (95% Confidence Interval [CI] –0.12, –0.09), increased the days/week of moderate-to-vigorous-physical-activity by 30% more (95% CI 24%, 36%), were more likely to eat ≥ 2 serves of fruit/day (compared to < 2, Odds Ratio [OR] 1.85; 95% CI: 1.36, 2.52) or eat ≥ 3 serves of vegetables/day (compared to < 3, OR 1.96; CI: 1.58,

Key points (continued)

- To our knowledge, this is the first Australian evaluation comparing digital and face-to-face delivery of a scaled-up healthy lifestyle program for children, with important policy and funding implications

2.42). Across both modes, with each additional session attended, the odds of eating ≥ 3 serves of vegetables/day increased by 10% (95% CI 1.02, 1.19). There were no significant differences for other health outcomes.

Conclusions: Our evaluation demonstrated that both face-to-face and digital program delivery helped children above a healthy weight to improve their weight and health behaviour outcomes. Go4Fun Online achieved significantly greater improvements in outcomes, which is encouraging for the future of digital interventions. Participation in Standard Go4Fun by more children with obesity from disadvantaged areas and non-English speaking backgrounds suggests that ongoing delivery of both modes of Go4Fun could facilitate program reach among all children above a healthy weight.

Introduction

Childhood overweight and obesity frequently persists into adulthood, increases the likelihood of developing chronic disease, is associated with decreased life expectancy and poses a significant burden on the Australian health system and economy.[1,2] Risk factors for overweight and obesity in children are complex, with physical inactivity and unhealthy eating recognised as key health behaviours to address.[3] In New South Wales (NSW), 23.3% of children aged 5–16 years are above a healthy weight, only 5.4% eat the recommended serves of vegetables per day, and 17.8% achieve adequate physical activity levels.[4] Research suggests that interventions using strategies to improve healthy behaviours, such as physical activity and eating a healthy diet, can be effective among children and adolescents with overweight and obesity.[3,5]

The majority of childhood overweight and obesity interventions have been delivered in person. However, there is an increasing trend in digital delivery.[6] Emerging systematic review and meta-analysis evidence for the efficacy and effectiveness of digital interventions for managing overweight and obesity in children shows they have positive effects on post-intervention weight[6-9] and diet and physical activity outcomes.[9] Although it has been shown that parental involvement may be important when developing effective digital interventions for children[8,10], a meta-analysis of digital interventions in which parents were the agent of change found no significant reduction in weight outcomes.[11] While more research is needed to investigate the different modes of digital interventions[7], there is some evidence that the type of technological component does not necessarily influence weight-related outcomes.[8] Current evidence indicates that interventions combining face-to-face and digital components are likely to be effective in positively influencing weight and health behaviour outcomes and may be better than conventional (without any type of technology) interventions alone.[8]

Go4Fun is an evidence-based secondary prevention healthy lifestyle program that addresses childhood obesity in NSW.[12,13] Currently delivered both face-to-face (Standard Go4Fun) and digitally (Go4Fun Online), the program is designed to support healthy lifestyle changes in families of children aged 7–13 years who are above a healthy weight. Go4Fun targets weight-related behaviours and aims to improve participants' health, fitness and self-esteem.

Given limited evidence of the effectiveness of healthy eating and physical activity interventions for children above a healthy weight that are digitally delivered, compared to face-to-face or combined approaches, this evaluation aimed to investigate the outcomes of two modes of delivery of the Go4Fun program. We compared Go4Fun Online and Standard Go4Fun in relation to: a) effectiveness in improving children's zBMI and health behaviour outcomes; b) association between the number of sessions attended and improvements in zBMI and health behaviour outcomes; and c) understanding the profile of participants who do not complete Go4Fun programs.

Methods

The program

Go4Fun is a free, community-based 10-week program offered in English during school terms. It is delivered face-to-face or digitally by qualified health professionals, including exercise physiologists and dietitians. Recruitment uses locally targeted approaches (Standard Go4Fun) or social media advertising (Go4Fun Online). Participants enrol by self-registration or health professional referral.

Standard Go4Fun was adapted from the UK Mind Exercise Nutrition Do it (MEND) program for the Australian context.[14] Piloted in 2009 and scaled-up in 2011[15], Standard Go4Fun retained core elements of MEND and showed good program fidelity. It comprises 10 weekly, 2 hour group face-to-face sessions with children and their parents/caregivers. Group sessions enable parents/caregivers to participate with their children in a 1 hour theory session covering goal setting and nutrition and health behaviour change, followed by a parent/caregiver-only facilitated 1 hour discussion while children participate in supervised physical activity-based games. Children are awarded stickers for attendance, and parent-child self-prescribed and self-reported goals are

monitored by program leaders. At program completion, there is a group celebration, such as a party or sports activity.

Go4Fun Online, developed in 2016, was piloted and delivered statewide from 2018 to increase program reach. It incorporates content from Standard Go4Fun and evidence on effective non-face-to-face child obesity programs.[16] Participating families receive resources, including program handouts and recipes, before each session. Ten weekly sessions consist of online learning modules for children and parents and individualised telephone coaching calls with parents/caregivers, in which children are invited to participate where appropriate. Additional support includes emails, texts and access to private, moderated online discussion forums for parents. Go4Fun Online offers children a gift card to use to celebrate completing the program according to their level of goal achievement: bronze ($25), silver ($50), and gold ($75).

Study design and participant sample

We conducted a secondary analysis of observational cohort data from January 2018 to May 2022 using a pre-post-study design. Data for Go4Fun participants (children 7–13 years with a body mass index (BMI) ≥ 85th percentile) with a pre-program (week 1) and post-program (week 10) zBMI score were included. This study was approved by the NSW Population and Health Services Research Ethics Committee (2022/ETH02160), and the analysis plan was pre-registered with OSF Registries (doi.org/10.17605/OSF.IO/K8UTN).

Data collection and measures

The following sociodemographic measures were collected pre-program: age, sex, postcode, language spoken at home, mother's highest level of education (Year 12/lower, diploma/certificate, degree/higher) and household arrangement (couple, sole parent/caregiver, other). Postcode was used to determine socioeconomic disadvantage (Index of Relative Socio-economic Disadvantage for Areas, SEIFA IRSD[17], categorised into five quintiles: most- [quintile 1] to least-disadvantaged [quintile 5]) and geographical remoteness (Accessibility and Remoteness Index of Australia[18], ARIA+ categorised as: major cities, inner regional, outer regional, remote and very remote areas).

For both delivery modes. the program defines completion as attending ≥ 3 sessions. For Go4Fun Online, a session was recorded as complete if parents/carers completed both the module and the accompanying phone coaching call. For this analysis, only children with a post-program zBMI score were included; those without a post-program zBMI score were excluded, and non-completers were defined as participants who did not have a post-program zBMI score.

Pre- and post-program height (cm) and weight (kg) were objectively measured by trained facilitators for Standard Go4Fun participants and were self-reported by parents/carers with instructional video support for Online Go4Fun participants. BMI (kg/m2) was compared to population average scores to determine a BMI z-score (zBMI), and classified as 'overweight' (85th to <95th percentile) or 'obese' (class 1: 95th percentile to <120% of 95th percentile; obese class 2: 120% of 95th percentile to140% of 95th percentile).[19]

Children's health-related behaviours were self-reported by parents/carers using a pre-and post-program survey based on the NSW Population Health Survey.[20] Measures were physical activity (days/week of moderate-to-vigorous physical activity for ≥ 60 minutes/day), sedentary behaviour (time/day sitting and using a mobile phone, iPad, tablet, computer, gaming or watching television: < 2 hours/day, ≥ 2 hours/day) and fruit (< 2, ≥ 2 serves/day), vegetable intake (< 3, ≥ 3 serves/day), sugary drink intake (none, < 1 cup/day, ≥ 1 cup/day), and takeaway food intake (times/week: never/rarely, < 1/week, 1-2/week, ≥ 3/week).

Statistical analysis

Multivariable regression was used to model pre-post intervention health outcome changes, controlling for baseline scores, with each outcome modelled separately. Continuous outcomes were modelled using linear regression and count variables using Poisson/negative binomial regression. Categorical health outcomes were assessed using logistic (binary outcomes) or multinomial (categories with > 2 outcomes) models. Preliminary analysis showed < 5% missing data in each independent or dependent variable. Therefore, we conducted all analyses using available case analysis. All models included sociodemographic variables as covariates and were carried out in R software (version 4.1.0).

Results

Sociodemographic and risk factor profile

At baseline, there were 1893 children enrolled in Standard Go4Fun and 1283 in Go4Fun Online (Table 1). There were differences in some baseline characteristics across delivery modes (all $p < 0.001$, unless otherwise stated). More Standard Go4Fun participants than Online participants were in obese BMI categories (78% vs 72%, respectively), spoke a language other than English at home (46.4% vs 23.7%), were living in major cities (88.2% vs 60.6%) and were living in areas of greatest disadvantage (quintile 1: 24.7% vs 19%). More Go4Fun Online participants than Standard participants had mothers with a university degree (48.9% vs 45.1%, $p = 0.035$).

Table 1. Characteristics of Go4Fun participants at baseline

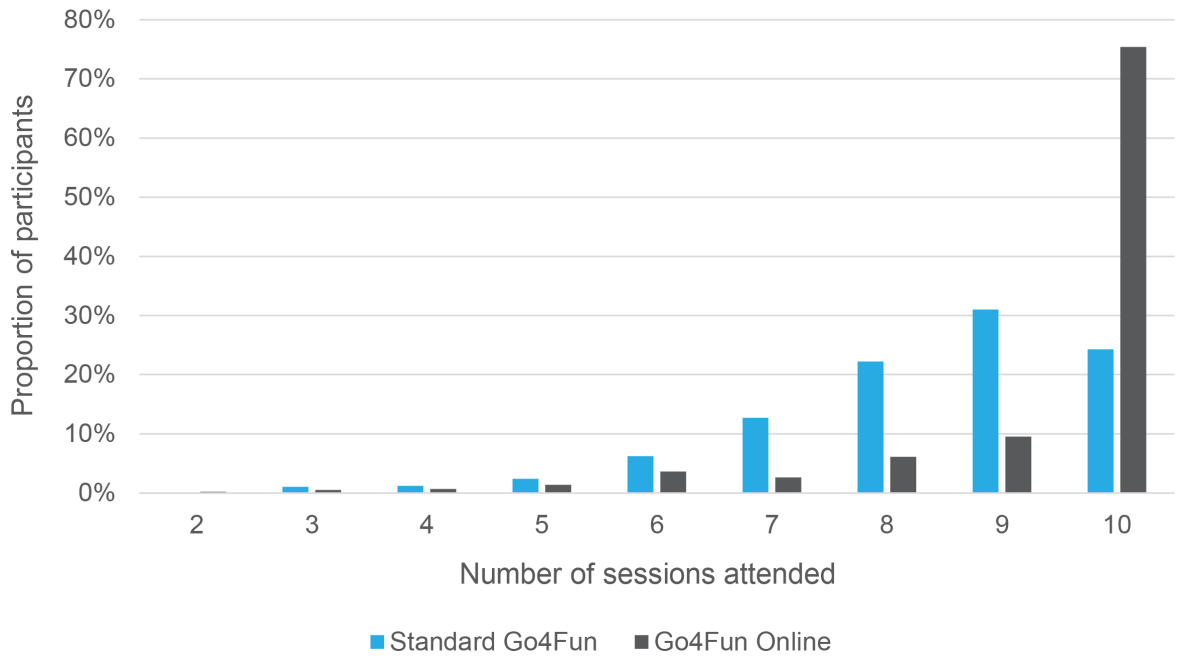
		Standard Go4Fun *N* = 1893		Go4Fun Online *N* = 1283		*p*-value
		mean	SD	mean	SD	
Age (years)		9.64	1.52	9.83	1.55	< 0.001
zBMI (pre-intervention)		2.03	0.43	1.97	0.44	< 0.001
		n	%	*n*	%	
BMI category[a]	Overweight	411	21.7	350	27.3	< 0.001
	Obese class 1	840	44.4	556	43.3	
	Obese class 2	453	23.9	258	20.1	
	>Obese class 2	189	10.0	119	9.3	
Sex	Male	1016	53.7	654	51.0	0.145
	Female	877	46.3	629	49.0	
Household arrangement	Couple	1362	73.3	914	72.5	0.804
	Sole	388	20.9	266	21.1	
	Other	108	5.8	80	6.3	
Language spoken at home	English	1001	53.6	975	76.3	< 0.001
	Other	865	46.4	303	23.7	
ARIA+[b]	Major cities	1666	88.2	778	60.6	<0.001
	Inner regional	200	10.6	381	29.7	
	Outer regional	23	1.2	110	8.6	
	Remote	0	0.0	13	1.0	
	Very remote	0	0.0	1	0.1	
SEIFA[c]	1–quintile	466	24.7	244	19.0	<0.001
	2–quintile	325	17.2	303	23.6	
	3–quintile	396	21.0	321	25.0	
	4–quintile	294	15.6	177	13.8	
	5–quintile	408	21.6	238	18.6	
Highest qualification (mother)	Degree/higher	819	45.1	612	48.9	0.035
	Diploma/ certificate	568	31.3	390	31.2	
	Year 12 or lower	427	23.5	249	19.9	

Note: categories may not sum to totals due to missing data.
SD = standard deviation
a Obese class 1: 95th percentile to <120% of 95th percentile; obese class 2: 120% of 95th percentile to 140% of 95th percentile.
b ARIA+ Accessibility and Remoteness Index of Australia) is calculated and based on the road distance from a locality to the closest service centre.
c SEIFA IRSD (Socio-Economic Indexes, Index of Relative Socio-economic Disadvantage for Areas) provides a summary of people living in an area representing the general level of socioeconomic disadvantage of all people in that area. Quintile 1 = most disadvantaged; Quintile 5 = least disadvantaged.

Participant engagement

In Standard Go4Fun, 77.5% of participants (*n* = 1467/1893) attended eight (22.2%), nine (31.0%) or 10 (24.3%) sessions, while in Go4Fun Online, 91% (*n* = 1168/1283) attended eight (6.1%), nine (9.5%) or 10 (75.4%) sessions (Figure 1). In Standard Go4Fun, 56.0% (1893/3383) and in Go4Fun Online, 84.6% (1283/1517) of children who originally enrolled completed the program.

Figure 1. Sessions attended by Standard Go4Fun (*n* = 1893) and Go4Fun Online (*n* = 1283) participants



Lifestyle behaviours and weight-related impact

Participants of both delivery modes showed improvements in all health outcomes (unadjusted, Table S1, available from: doi.org/10.6084/m9.figshare.26132671.v1). The impact of Go4Fun Online compared to Standard Go4Fun is presented in Table 2. Controlling for sociodemographic factors and pre-intervention scores, Go4Fun Online participants showed statistically significant greater improvements in zBMI and all health behaviour outcomes than those in Standard Go4Fun. For example, children in Go4Fun Online were 30% more likely to engage in moderate to vigorous physical activity than those in Standard Go4Fun (Incidence Rate Ratio [IRR] 1.30, 95% Confidence Interval [CI] 1.24, 1.36), were 96% more likely to consume ≥ 3 serves of vegetables/day (Odds Ratio [OR] 1.96, 95% CI 1.58, 2.42) and 74% less likely to consume takeaway foods 1–2 times a week (Multinomial Odds Ratio [MOR] 0.26, 95% CI 0.19, 0.37).

Table 2. Effect of Go4Fun Online compared to Standard Go4Fun on pre- to post-health outcomes

		Raw change pre-post		Adjusted difference between online vs standard	
Outcome		Go4Fun Online	Standard Go4Fun	Estimate (95% CI)[a]	*p*-value
zBMI (mean)[b]		–0.18	–0.07	–0.11 (–0.12, –0.09)	< 0.001
Moderate to vigorous physical activity (days/ week, mean)[c]		2.17	1.34	1.30 (1.24, 1.36)	< 0.001
Sedentary behaviour (weekdays %)	< 2 hours/ day			*ref*	
	≥ 2 hours/ day	–28.4	–20.2	0.40 (0.30, 0.53)	< 0.001
Sedentary behaviour (Saturday %)	< 2 hours/ day			*ref*	
	≥ 2 hours/ day	–36.0	–18.9	0.46 (0.37, 0.57)	< 0.001
Sedentary behaviour (Sunday %)	< 2 hours/ day			*ref*	
	≥ 2 hours/ day	–37.9	–19.4	0.48 (0.39, 0.60)	< 0.001
Fruit consumption (%)	< 2 serves/ day			*ref*	
	≥ 2 serves/ day	29.5	21.6	1.85 (1.36, 2.52)	< 0.001
Vegetable consumption (%)	< 3 serves/ day			*ref*	
	≥ 3 serves/ day	40.0	20.9	1.96 (1.58, 2.42)	< 0.001
Sugary drinks (%)[d]	None			*ref*	
	< 1 cup/day	–-9.2	–3.8	0.51 (0.40, 0.65)	< 0.001
	≥ 1 cup/day	–7.3	–5.7	0.25 (0.10, 0.64)	0.003
Takeaway food (%)[d]	Never/rarely			*ref*	
	< once/week	17.5	13.4	0.63 (0.49, 0.82)	0.001
	1–2 times/ week	–27.9	–15.5	0.26 (0.19, 0.37)	< 0.001
	≥ 3 times/ week	-5.9	–5.4	0.18 (0.07, 0.45)	< 0.001

a Estimates compare outcomes post-intervention in Go4Fun Online versus Standard Go4Fun, adjusting for sociodemographic factors and baseline (pre-intervention) scores, and are reported as odds ratios (OR) except where indicated. For binary variables, the adjusted estimates can be interpreted as the adjusted odds of reporting higher levels of the variable versus the reference level, reported for each variable in the table as '*ref*'.
b Estimates are mean differences.
c Estimate is an incidence rate ratio (IRR).
d Estimate is multinomial odds ratio (MOR).

Association between participant engagement and outcomes

The number of sessions attended (of a possible 10) did not have a statistically significant impact on zBMI, physical activity, fruit, sugary drink and takeaway food intake, or sedentary behaviour from baseline to post-program across both delivery groups (Table S2, available from: doi.org/10.6084/m9.figshare.26132671.v1). For each additional session attended, the odds of eating 3+ serves of vegetables per day increased by 10% (OR 1.10; 95% CI 1.02, 1.19, Figure S1, available from: doi.org/10.6084/m9.figshare.26132671.v1).

Children who did not complete the Go4Fun program were more likely to be participants of Standard Go4Fun (vs Go4Fun Online), live in major cities, live in areas of moderate/high socioeconomic disadvantage, live in a sole parent/caregiver household, and have a mother whose highest level of education was Year 12 or lower (Table 3). Sex and language spoken at home were not associated with completing the program.

Table 3. Participant characteristics associated with not completing[a] the Go4Fun program

Characteristic		Odds Ratio (95% CI)[b]	*p*-value
Delivery mode	Face-to-face	*ref*	
	Digital	0.13 (0.10, 0.16)	< 0.001
Age		1.05 (1.00, 1.09)	0.040
Sex	Female	*ref*	
	Male	1.07 (0.93, 1.22)	0.339
ARIA+[c]	Major cities	*ref*	
	Inner regional	0.70 (0.56, 0.88)	0.002
	Other	1.24 (0.83, 1.86)	0.292
Socioeconomic disadvantage[d]	Moderate/high	*ref*	
	Low	0.78 (0.67, 0.90)	0.001
Child's household arrangement	Parents/carers are a couple	*ref*	
	Sole parent/caregiver/other	1.37 (1.18, 1.60)	< 0.001
Mother's highest qualification	University degree	*ref*	
	Diploma/certificate	1.12 (0.95, 1.32)	0.161
	Year 12 or lower	1.36 (1.14, 1.62)	0.001
Language spoken at home	English	*ref*	
	Other	0.88 (0.76, 1.03)	0.109

a Non-completers = did not complete three sessions and did not have post-program zBMI.
b For binary variables, the adjusted estimates can be interpreted as the adjusted odds of reporting higher levels of the variable versus the reference level, reported for each variable in the table as 'ref', except for age, which is a continuous variable and can be interpreted as the adjusted odds of increasing age by one year.
c Other = outer regional, remote and very remote areas.
d Moderate/high = three most disadvantaged quintiles; low = two most advantaged quintiles.

Standard Go4Fun participants not living with two parents/caregivers were less likely to attend 7–9 sessions, compared to 0–3 sessions (OR 0.59: 95% CI 0.39, 0.91, p –0.016, Table S3, available from: doi.org/10.6084/m9.figshare.26132671.v1). Those living in moderate-high areas of socioeconomic disadvantage were less likely to attend 4–6 sessions (OR 0.61; 95% CI 0.46, 0.79, $p < 0.001$) and 7-9 sessions (OR 0.42; 95% CI 0.29, 0.61, $p < 0.001$). Age, sex, ARIA, mother's highest qualification and language spoken at home were not associated with the number of sessions non-completers in the Standard Go4Fun delivery group attended. Go4Fun Online participants from areas outside major cities were more likely to attend 4–6 compared to 0–3 sessions (OR 2.61; 95% CI 1.05, 6.50, $p = 0.038$). Age, sex, household arrangement, mother's highest qualification and socioeconomic disadvantage were not associated with the number of sessions Go4Fun Online non-completers attended.

Discussion

Our study found that both face-to-face and digital delivery of Go4Fun improved zBMI and health behaviour outcomes in children above a healthy weight. Our findings confirm previous improvements among Standard Go4Fun participants[12], demonstrating that children in Go4Fun Online had significantly larger improvements than those in Standard Go4Fun. This study contributes to the limited existing evidence for digital interventions for children for chronic disease[10] and obesity prevention[11], and to our knowledge, is the first comparison of face-to-face and digital delivery of a scaled-up program to manage childhood overweight and obesity in Australia.

The effectiveness of Go4Fun Online has not previously been evaluated, and there is limited published evidence internationally comparing the adaptation of similar programs to a digital delivery mode. A family-focused 10-week Canadian program for children aged 8–12 years above a healthy weight, delivered in hybrid face-to-face/digital and digital-only formats, is a rare example with evaluated effectiveness of adapting a similar program to a digital-only format. Their findings partly aligned with ours, identifying improvements in physical activity and screen time use across both modes[21], while our study also found increases in fruit intake as well as reductions in sedentary time, and sugary drink and take-away food consumption. Unlike our study findings, the Canadian study reported greater improvement in vegetable intake for the digital mode as the only difference between modes.[21]

Participation data for Go4Fun Online appears to align with factors that increase the risk of digital exclusion in Australia, such as living outside major cities and in areas of greatest disadvantage.[22] Higher education among Go4Fun Online mothers, however, may have mitigated this digital disadvantage. Conversely, Standard Go4Fun attracted more children who spoke a language other than English at home, possibly influenced by locally targeted recruitment approaches and the possibility that face-to-face delivery may be more acceptable, overcoming barriers associated with digital material and telephone coaching provided in the English language for these participants. Although challenging, offering Go4Fun Online in the most commonly spoken non-English languages may further increase the reach of the digital program. Previous research has highlighted the potential value of using hybrid face-to-face/digital delivery among children above a healthy weight.[8] While our evaluation did not investigate a combination of delivery modes, Go4Fun Online incorporates personalised health coaching, which may provide benefits found in other hybrid models. Despite the larger benefits of Go4Fun Online, Standard Go4Fun had higher participation by children with obesity, those living in disadvantaged areas and those from non-English speaking backgrounds, so our findings support offering both modes of Go4Fun delivery to reach more children and families.

Attendance across both modes was generally strong, but Go4Fun Online participation may have been inflated compared to Standard Go4Fun due to the study period, including the COVID-19 pandemic when no face-to-face programs were offered. While a previous Standard Go4Fun analysis found that attending five or more sessions improved outcomes significantly[23], when comparing face-to-face and digitally delivered Go4Fun, we found the number of sessions attended had no impact on most outcomes other than for vegetable consumption. It is possible that the lack of variability in the number of sessions attended (most attended 7–10 sessions) made it difficult to gauge the effect of additional sessions. This homogeneity may be partly due to only including data from children with anthropometric measures at both baseline and week 10, likely including more who completed more sessions, including the later sessions.

For ongoing quality improvement, it is important that Go4Fun data collection systems are robust and provide complete post-program participant data. Go4Fun does not currently collect data on parent or family behaviour change outcomes (as opposed to the child/participant behaviours as reported in this study), which improved across both delivery modes of the similar Canadian study.[21] Future Go4Fun evaluations should investigate the program's impact on improvements due to positive changes in family healthy eating and physical activity practices, as well as maintenance of behaviour and zBMI changes over time. A qualitative investigation of the facilitators and barriers to program engagement and completion by delivery mode, including disengagement due to poor digital literacy, affordability and/or inadequate device and internet access, as well as reasons for preferring one mode of delivery over the other, is recommended. Although a hard-to-reach group, including non-completers in qualitative research, would provide valuable insights for program planning. Additionally, a qualitative exploration of weight stigmatisation, often felt by children and families in weight management programs, would align with current research.[24]

Limitations

The pre-post evaluation design is a limitation; however, as a secondary analysis of a real-world program, a comparison group was not feasible. Differences in measuring height and weight between modes are also a limitation with Standard Go4Fun anthropometric data objectively measured by trained professionals, whereas, for Go4Fun Online, this was self-reported by parents/carers using tools and instructions provided to facilitate accurate measurement. Self-reported measures were not validated specifically for Go4Fun or by objective measurement and may include social desirability biases and general inaccuracies. Participant incentives to complete the program also differed, with Standard Go4Fun offering a celebratory party and Go4Fun Online offering a gift card linked to achieving goals. These

incentives may have impacted self-reported health behaviour data, particularly among Go4Fun Online participants. However, previous research found that standardised goal-based behavioural incentives for Standard Go4Fun had no significant impact on health outcomes but increased program attendance compared to a control group not receiving incentives.[25]

Conclusion

Go4Fun is the only free, statewide healthy lifestyle program in NSW available to parents of children above a healthy weight that is delivered both face-to-face and digitally. Go4Fun Online demonstrated significantly larger improvements in participant outcomes than Standard Go4Fun, which is encouraging for future digital interventions. However, participation by more children with obesity from disadvantaged areas and non-English speaking backgrounds in Standard Go4Fun suggests that ongoing delivery of both Go4Fun modes could facilitate program reach among all children above a healthy weight. As health program providers and communities grapple with the changing nature of program delivery post-COVID-19, Go4Fun provides a national and international exemplar of adapting a face-to-face program to a digital delivery mode that achieves greater health behaviour and zBMI improvements. These findings have important policy and funding implications for future Go4Fun programs, as well as for secondary prevention programs attempting to achieve similar success in improving weight and health behaviour outcomes in children above a healthy weight.

† NSW Health, Centre for Population Health Team (consortium authorship) includes:
Helen Trevena – Centre for Population Health, NSW Ministry of Health; Menzies Centre for Health Policy and Economics, Sydney School of Public Health, Faculty of Medicine and Health, University of Sydney
Alexander Hennock – Centre for Population Health, NSW Ministry of Health
Kurt Morton – Centre for Population Health, NSW Ministry of Health
Danielle Loggie- Centre for Population Health, NSW Ministry of Health.

‡ Prevention Research Collaboration Team (consortium authorship) includes:
Philip Clare – Prevention Research Collaboration, Sydney School of Public Health, Faculty of Medicine and Health, the University of Sydney; Charles Perkins Centre, University of Sydney; National Drug and Alcohol Research Centre, UNSW Sydney.
Zoe Szewczyk – Prevention Research Collaboration, Sydney School of Public Health, Faculty of Medicine and Health, University of Sydney; Charles Perkins Centre, University of Sydney.
Binh Nguyen – Prevention Research Collaboration, Sydney School of Public Health, Faculty of Medicine and Health, University of Sydney; Charles Perkins Centre, University of Sydney.

Acknowledgements

This work was supported by the Physical Activity Nutrition and Obesity Research Group and the Prevention Research Support Program, both funded by the NSW Ministry of Health. This study was completed while CY was employed as a trainee in the NSW Biostatistics Training Program funded by the NSW Ministry of Health and based at the Prevention Research Collaboration, University of Sydney.

We acknowledge the NSW Ministry of Health, which provided the data for this study. We also thank Simone Sullivan for her contributions to the planning of this analysis.

Peer review and provenance

Externally peer reviewed, not commissioned.

Competing interests

HT undertook work with NSW Health as Manager, Child and Family Programs, Prevention Programs, and Centre for Population Health. AH undertook work with NSW Health as a project officer on the Go4Fun program. DL undertook work with NSW Health as a senior analyst in the Centre for Population Health.

Author contributions

BM was responsible for study design, overseeing data analysis, and drafting and editing the manuscript. CY was responsible for the analysis of data, and drafting and reviewing the manuscript. HT was responsible for overseeing the study design, reviewing and editing the manuscript. AH was responsible for reviewing and editing the manuscript. KM was responsible for reviewing and editing the manuscript. DL was responsible for reviewing and editing the manuscript. ZS was responsible for drafting, editing and reviewing the manuscript. PC was responsible for overseeing the data analysis, reviewing and editing the manuscript. BN was responsible for reviewing and editing the manuscript. MT was responsible for overseeing the drafting, reviewing and editing of the manuscript.

References

1. Marcus C, Danielsson P, Hagman E. Pediatric obesity – long-term consequences and effect of weight loss. J Intern Med. 2022;292(6):870–91.
2. Black N, Hughes R, Jones AM. The health care costs of childhood obesity in Australia: an instrumental variables approach. Econ Hum Biol. 2018;31:1–13.
3. Jebeile H, Kelly AS, O'Malley G, Baur LA. Obesity in children and adolescents: epidemiology, causes, assessment, and management. Lancet Diabetes Endocrinol. 2022;10(5):351–65.
4. NSW Government Centre for Epidemiology and Evidence. HealthStats NSW. Sydney: NSW Ministry of Health;2023 [cited 2023 Sep 22]. Available from: www.healthstats.nsw.gov.au/home
5. Psaltopoulou T, Tzanninis S, Ntanasis-Stathopoulos I, Panotopoulos G, Kostopoulou M, Tzanninis I-G, et al. Prevention and treatment of childhood and adolescent obesity: a systematic review of meta-analyses. World J Pediatr. 2019;15:350–81.
6. Fowler LA, Grammer AC, Staian AE, Fitzsimmons-Craft EE, Chen L, Yaeger LH, et al. Harnessing technological solutions for childhood obesity prevention and treatment: a systematic review and meta-analysis of current applications. Int J Obes (Lond). 2021;45(5):957–81.
7. Azevedo LB, Stephenson J, Ells L, Adu-Ntiamoah S, DeSmet A, Giles EL, et al. The effectiveness of e-health interventions for the treatment of overweight or obesity in children and adolescents: a systematic review and meta-analysis. Obes Rev. 2022;23(2):e13373.
8. Kouvari M, Karipidou M, Tsiampalis T, Mamalaki E, Poulimeneas D, Bathrellou E, et al. Digital health interventions for weight management in children and adolescents: Systematic review and meta-analysis. J Med Internet Res. 2022;24(2):e30675.
9. Chai LK, Farletti R, Fathi L, Littlewood R. A rapid review of the impact of family-based digital interventions for obesity prevention and treatment on obesity-related outcomes in primary school-aged children. Nutrients. 2022;14(22):4837.
10. Brigden A, Anderson E, Linney C, Morris R, Parslow R, Serafimova T, et al. Digital behavior change interventions for younger children with chronic health conditions: systematic review. J Med Internet Res. 2020;22(7):e16924.
11. Hammersley ML, Jones RA, Okely AD. Parent-focused childhood and adolescent overweight and obesity eHealth interventions: a systematic review and meta-analysis. J Medl Internet Res. 2016;18(7):39–51.
12. Hardy LL, Mihrshahi S, Gale J, Nguyen B, Baur LA, O'Hara BJ. Translational research: are community-based child obesity treatment programs scalable? BMC Public Health. 2015;15(1):1–8.
13. Welsby D, Nguyen B, O'Hara BJ, Innes-Hughes C, Bauman A, Hardy LL. Process evaluation of an up-scaled community based child obesity treatment program: NSW Go4Fun®. BMC Public Health. 2014;14:140.
14. Sacher PM, Kolotourou M, Chadwick PM, Cole TJ, Lawson MS, Lucas A, et al. Randomized controlled trial of the MEND program: a family-based community intervention for childhood obesity. Obesity. 2010;18(S1):S62–S8.
15. Innes-Hughes C, Rissel C, Thomas M, Wolfenden L. Reflections on the NSW Healthy Children Initiative: a comprehensive, state-delivered childhood obesity prevention initiative. Public Health Res Prac. 2019;29(1):e2911908.
16. Lombard C, Barber E, Bowles K-A, Clarke R, Collins J, Dordevic A, Huggins C, et al. The effectiveness of non-face-to-face healthy lifestyle programs in reducing childhood obesity. Australia: The Sax Institute; 2016 [cited 2023 Sep 6]. Available from: research.monash.edu/en/publications/the-effectiveness-of-non-face-to-face-healthy-lifestyle-programs-
17. Australian Bureau of Statistics. Technical Paper Socio-Economic Indexes for Areas (SEIFA) Canberra: ABS; 2016 [cited 2024 Jun 25]. Available from: www.abs.gov.au/ausstats/abs@.nsf/mf/2033.0.55.001
18. Australian Bureau of Statistics. Remoteness Structure Canberra: ABS; July 2021 – June 2026 [cited 2023 Sep 6]. Available from: www.abs.gov.au/statistics/standards/australian-statistical-geography-standard-asgs-edition-3/jul2021-jun2026/remoteness-structure
19. Centres for Disease Control and Prevention. Defining Child BMI Categories. US: CDC; 2023 [cited 2023 Sep 6]. Available from: www.cdc.gov/healthyweight/assessing/bmi/childrens_bmi/about_childrens_bmi.html
20. NSW Health. NSW population health surveys. Sydney, NSW: NSW Government; 2017 [cited 2024 Jun 25]. Available from: www.health.nsw.gov.au/surveys/Pages/nsw-population-health-survey.aspx
21. Nuss K, Coulter R, DeSilva B, Buenafe J, Sheikhi R, Naylor PJ, et al. Evaluating the effectiveness of a family-based virtual childhood obesity management program delivered during the COVID-19 pandemic in Canada: prospective study. JMIR Pediatr Parent. 2022;5(4):e40431.
22. Thomas J, McCosker A, Parkinson S, Hegarty K, Featherstone D, Kennedy J, et al. Measuring Australia's Digital Divide: Australian Digital Inclusion Index: 2023. Melbourne: ARC Centre of Excellence for Automated Decision-Making and Society, RMIT University, Swinburne University of Technology, and Telstra.; 2023 [cited 2024 Jun 25]. Available from: www.digitalinclusionindex.org.au/wp-content/uploads/2023/07/ADII-2023-Summary_FINAL-Remediated.pdf

23. Khanal S, Choi L, Innes-Hughes C, Rissel C. Dose response relationship between program attendance and children's outcomes in a community based weight management program for children and their families. BMC Public Health. 2019;19:716.

24. Saunders LA, Dimmock JA, Jackson B, Gibson LY, Doust J, Davis EA, et al. The right advice, from the right person, in the right way: non-engaged consumer families' preferences for lifestyle intervention design relating to severe obesity in childhood. Behavioral Medicine. 2023:1–14.

25. Redfern J, Enright G, Hyun K, Raadsma S, Allman-Farinelli M, Innes-Hughes C, et al. Effectiveness of a behavioural incentive scheme linked to goal achievement in overweight children: a cluster randomized controlled trial. J Obes Diabetes. 2019;3:1–9.