Evidence-Based Pediatric Weight Management Nutrition Practice Guidelines: What works, how, for whom, and under what conditions?

Preliminaries

Disclosures

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  • The Academy of Nutrition and Dietetics has provided a speaker stipend for provision of this presentation.

• J. Scott Parrott, PhD; Rutgers, Department of Nutritional Sciences
  • The Academy of Nutrition and Dietetics has provided a speaker stipend for provision of this presentation.
  • Financial support was provided for work as a Project Leader for the duration of this project.
Learning Outcomes

• State the effectiveness of evidence-based recommendations for RDNs carried out in collaboration with other health care providers for pediatric weight management.
• Integrate evidence-based pediatric weight management recommendations into the nutrition care process.
• Understand that advanced practice requires asking a different type of question than “does it work”, and move to “what works, how, for whom, and under what conditions?”

Practice Applications

• Practitioners will be able to identify key components of pediatric weight management programs that result in positive outcomes.
• Practitioners will identify different paths to success relevant to their own particular situation.
• Practitioners will be able to assess their own pediatric weight management practice and find areas of intervention for improved outcomes.

What is Evidence-based Practice (EBP)?

• The use of systematically reviewed scientific evidence in making food and nutrition practice decisions
• Achieved by integrating best available evidence with professional expertise and client values to improve outcomes

Learn more at: www.andel.org

Source: The Academy Scope of Dietetics Framework Definition of Terms 2007
The Academy's Evidence Analysis Library: A Free Member Benefit

2 Components:

Systematic Reviews on various topics developed by Academy members for Academy members.

Evidence-based Nutrition Practice
Based on completed Systematic Reviews

Visit: www.andeal.org

What are Evidence-Based Nutrition Practice Guidelines?
• Evidence Summaries & Conclusion Statements = what the evidence says
• Guideline Recommendations = course of action for the practitioner based on the evidence

Learn more at www.andeal.org

Evidence Analysis Library
Evidence-based Practice leads to:

- Improved quality of care
- Increased patient safety
- Decreased variation in practice
- Efficient use of resources
- Increased likelihood of achieving desired patient outcomes
- Improved client, provider & payer satisfaction
- Increased credibility of the RDN within the healthcare team

The Substance

- Academy of Nutrition and Dietetics Pediatric Weight Management Evidence Analysis Project
- Controlled Trials from Cochrane Registry of Clinical Trials 2005-2012; Update of 2013-2015 research based on broader search
- Data extracted into AND EAL data platform
- Data on design, sample and intervention characteristics, weight status measures
Structure of the Presentation

What’s the Problem?

How can we understand the effectiveness of different Intervention Mixes

How can we understand what works in different situations?

The Problem

Finding Order in the Wicked Complexity of Pediatric Weight Management

In real life, a pediatric weight management intervention includes many components:

- Diet plan
- Target calorie deficit
- Nutrition education
- Nutrition counselling
- Physical activity education
- Games
- Team activities
- Gym membership
- Goal setting
- Incentives
- Motivational interviewing
- Diary keeping
- Cognitive behavioral therapy
So, let’s say that there are 16 different intervention characteristics that we gather information on.

Red indicates that the intervention component is absent.

Blue indicates that the intervention component (e.g., goal setting) is present.

We can think of the combination of specific intervention components as an “intervention mix.”

So, now imagine that we had 12 different interventions, and they all mixed and matched these 16 components in different ways.

Let’s say we wanted to combine this set of intervention mixes into groups that were alike.

Well, we could try matching intervention mixes on a single component. Let’s say whether component 16 was present or absent...

Now, we’d have two types of intervention mixes.
But, what would this really tell us?

The intervention mixes within each type are still very different!

In what sense can we really say that these two interventions are "the same"?

It wasn't the presence of any particular component we were interested in

An effect of a single component...

May be quite different when combined with other components.

Since pediatric weight management programs are, by design, multicomponent, isolating the unique effect of a single component wasn't going to tell us anything meaningful about how that particular component actually "worked".

We needed to look at the conjunction of components

Practice Implication

Thinking differently about how components "work"

• It doesn't make sense to ask "is adding a decrease sedentary behaviors component going to work?"
• Need to consider how a particular component will fit within the comprehensive MIX of components
• The important question: what are the patients' needs? How do components of the intervention work together to meet those needs? How do they work in the particular setting or context?
Practice Question

What weight management components does your practice utilize? Choose as many selections as needed.
1. Diet education / counseling
2. Behavioral interventions
4. Group sessions
5. Individual sessions
6. Family participations

As if that wasn’t complicated enough...

So, we needed to understand how context might influence the success of the intervention
In short, we needed a way to manage heterogeneity (understand the complexity) at two levels.

The complexity of the intervention

The complexity of the context

Intervention Components may not always have the same effect, but may change depending on the context or setting, the other components included in the program, or particular patient characteristics.

Complex Intervention
Outrageous Combinatorial Possibilities (made more friendly)
Methods

1. Reduce the number of possible combinations of intervention components to a reduced number of dimensions using multiple correspondence analysis. Identify an intervention space.
2. Identify groupings of intervention mixes within the intervention space using k-means cluster analysis and existing research.
3. Characterized groups by computing the risk that any given intervention component would be present within the alternative groups.
4. Computed weighted means across time periods and age groups to determine if the grouping provided meaningful differentiation in weight status outcomes (meta-analysis of weighted mean changes from baseline, meta-regression to examine between group differences)

The Data

- Number of studies: 99 controlled trials
- 209 separate treatment arms (many studies comparing alternative treatments rather than placebo controlled)
- No medication arms
- Studies published between 2005 and 2015
- Update of original AND Pediatric Weight Management Systematic Review, further update of trials published since 2013*

*Many thanks to Kyle Thompson for sharing the data from her Rutgers DCN doctoral research!

What We Were Not Interested In

We did not attempt to isolate “the effect” of particular characteristics (e.g., use of aerobics or motivational interviewing or breakfast skipping, etc.)

The reason: if the effect of a particular component depends on the other components in the intervention mix, then there really is no TRUE effect.
You are probably thinking:

“What on earth is an “intervention space”?

Think of it as a “map” of all the possible combinations of components that make up a pediatric intervention.

But why reduce all this detail and make a map?

You remember those 16 characteristics we talked about earlier?

That’s over a billion possible unique combinations

\[ 2^{30} = 1,073,741,824 \] ... just in case you were wondering

And here is what the map looks like.

Notice a couple of things:

First, intervention “mixes” are not evenly distributed across all possible configurations.

In other words, there are empty spaces.

So, even though there were over a billion possible configurations, in real life there are many fewer combinations.

Second, another important fact is that intervention mixes that fall close together on the map, tend to be more alike than intervention mixes that are far apart.

Here is what we found

There were three clusters or groups of intervention mixes that tended to be more alike based on the range of different intervention components we gathered data on.

But what did these different clusters mean?

In other words, what combinations of components tend to show up in these different types of intervention mixes?
In order to find this out we ran a series of bivariate analyses* to find out the likelihood that each intervention component would “show up” in the different clusters (which we called intervention mix types).

This helped us identify the main characteristics of the three intervention mix types:

**Medical**
- Type 1 tended to be delivered by RDN/Nutritionists and Physicians, report that dietary, behavioral and physical activity components were used, but not describe them.

**Behavioral**
- Type 2 tended to be delivered by behavioralists, be comprehensive and provide rich detail of intervention components.

**Missing Components**
- Type 3 were arms that were missing major components or were control arms

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* Chi square standardized residuals analysis

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Do the Three Types “Work” Differently?

- So now that we’ve identified three different types of pedes weight management interventions, we now have to ask whether the outcomes are different for the different intervention types.
- For this we carried out a series of meta-analyses subgrouped by intervention type for each outcome period:
  - 3-6 month outcomes
  - >6-12 month outcomes
  - 12-24 month outcomes
  - >24 month outcomes
BMIZ Change Compared to Baseline

BMI Change Compared to Baseline

Waist Circumference Change Compared to Baseline
Confidence in These Values?

• Heterogeneity was high for all time points and all outcome measures (often >90%)
• However, a substantial proportion (10%-20%) of that residual variance due to between-study differences could be explained by Intervention Type for both BMIZ and BMI for most time points.*

*Intervention Type did not provide any explanatory benefit for WC

Reporting Pediatric Weight Management Outcomes

• While we see some differences between the Medical Nutrition and the Behavioral intervention types, the real differences seem to be with the Missing Components type (more likely to see worsening measures than the other types).
• What we really don’t know, however, is whether the actual interventions included in the Medical Nutrition versus Behavioral types are different, or if the style of reporting is different.
• Medical Nutrition types of interventions need to be described in much more detail!

Practice Implications

• There is no perfect or ideal program mix...there are several paths to success
• You can have effective intensive intervention mixes that look quite different, but most tend to have a set of key components (from slide 32)
• What appears to be important is the fit between patient needs and clinician skills and context conditions.
• You need to figure out what will work for you, your situation (organization or setting) and your patients
The Key Is Not the Component, but the Fit

Practice Questions

- After listening to these results what might you be able to change in your weight management practice? Choose as many as you want.
  1. Type of diet education / counseling intervention
  2. Length of program
  3. Adding a physical activity component
  4. Adding a behavioral component
  5. Including family participation
  6. Adding group participation

Context Fit

Paths to Success?
Methods

Select the conditions from data extraction of arm characteristics*:
1. Multicomponent (combined both Medical Nutrition and Behavioral groups versus Missing Components)
2. Family involved (versus not)
3. Group sessions included (versus individual only)
4. In clinic (versus somewhere else)
5. ≥6 month intervention (versus <6 month)
6. Teens only (versus child only or child and teens)

fsQCA was used for the analysis

* Selection based on prior research, theory, and group interest

Configurations of context characteristics

If each context characteristic is binary coded, then there are 64 possible configurations with six characteristics.

Once we’ve defined the characteristics and set of possible configurations, the next step is figure out if the configuration is Consistent with the target outcome.

Consistency

Configuration perfectly Consistent with success

Set of all positive outcomes

Configuration not Consistent with success

Set of programs that have a particular configuration of context characteristics

Consistency gives us a measure of how RELIABLY a configuration can be counted on to be associated with the Outcome
Coverage

Set of all positive outcomes

Set of programs that have a particular configuration of context characteristics

High Coverage: Configuration covers many of the actual successes

Low Coverage: Many actual successes not in the configuration

Coverage gives us a sense of how important a configuration is for explaining when the outcome will occur.

Set our criteria:

Define the outcome*:

• BMI was coded as "positive" when the average arm change was ≤0 (indicating decrease or stabilization),
• BMI, waist circumference, and BMI percentile were coded as "positive" when the average outcome was <0,
• Arms in which the above information was not included were dropped from the contextual dependency analysis.

Set minimum level of Consistency: at least 80% of arms within a configuration must have the positive outcome

*We could have used more restrictive definitions of a "positive" outcome, but as this analysis was exploratory, the group decided to define "positive" very broadly.

Truth Table (partial)

Many configurations appeared only once

And some not at all (Remainders)

How often a configuration occurred

How often the configuration had positive results
Practice Implications

We identified different “success paths” for each time point (what works at one time point isn’t necessarily what works at a different time point)

In the following slides you’ll see alternative success paths with measures of:
Consistency (how reliable)
Coverage (how important)
Implications for Practitioners

**Tool Box rather than a prescription:** There were many different configurations of intervention components, and a handful of contexts that were associated with success. Provides different “paths” that program directors can use when designing pediatric weight management interventions.

Rather than there being one single formula, clinicians should tailor interventions to fit their local situation and clientele. This approach provides some guidelines for doing that.

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Possibilities for Further Research and Theoretical Refinement

Paths that are not perfectly consistent can then be examined in a more detailed way to explain why, given the configuration, some didn’t lead to positive outcomes.

So, lack of perfect consistency can lead to theoretical innovation and new insights.

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Caution: Results May Differ

The problem with everything we’ve told you so far? It may not be an accurate reflection of pediatric weight management “in the wild.”

Pedes WM programs that are described in research publications may differ systematically from real world programs.

And, as we can see by the funnel plot, there appears to be some publication bias. That is, unsuccessful results tend to not get published as often.

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Caution 2: Published Research Versus Real Life

Published Research | Real Life

So, interpret the findings as "the best you can do", not as "this is what is likely to happen in my practice".

Guideline Recommendations

How Did All This Inform the Pediatric Weight Management Guidelines?

Multicomponent Interventions

PWM: RDN in Multi-component Pediatric Weight Management Interventions
The registered dietitian nutritionist (RDN) should be an integral part of multi-component pediatric weight management interventions. A strong body of research indicates that short-term (six-month) and long-term (two-year) decreases in body mass index (BMI) and BMI Z-scores for all age categories were more likely to be achieved when an RDN or psychologist/menta health provider were involved in multi-component weight management interventions that included diet and nutrition (including medical nutrition therapy (MNT), physical activity and behavioral components.
Rating: Strong Imperative

PWM: Multicomponent Pediatric Weight Management Interventions
When providing pediatric weight management, the registered dietitian nutritionist (RDN) should ensure the multi-component interventions include diet/nutrition (medical nutrition therapy (MNT)), physical activity and behavioral components. A strong body of research indicates that short-term (six-month) and long-term (two-year) decreases in body mass index (BMI) and BMI Z-scores for all age categories were more likely to be achieved when an RDN or mental health professional were involved in the multi-component pediatric weight management interventions that included the above three major components.
Rating: Strong Imperative
Family Involvement and Length of Treatment

PWM: Family Participation in Multicomponent Pediatric Weight Management Interventions
The registered dietitian nutritionist (RDN) should encourage family participation as an integral part of a multi-component pediatric weight management intervention for children of all ages, including teens. A strong body of research indicates that family involvement as part of a multi-component pediatric weight management intervention is highly consistent with positive weight status outcomes at both six months and 12 months.
Rating: Strong

PWM: Length of Treatment in Multi-component Pediatric Weight Management Interventions
The registered dietitian nutritionist (RDN) should ensure the multi-component pediatric weight management intervention is at least six months in duration. Research indicates that shorter term (less than six months) interventions were not consistently associated with positive weight status at 12 months. At least six months of treatment was associated with longer-term positive weight status outcomes, especially when group pediatric weight management sessions were included and it occurred in a clinic.
Rating: Fair

Treatment Setting

PWM: Treatment Setting in Multi-component Pediatric Weight Management Interventions
The registered dietitian nutritionist (RDN) can provide multi-component pediatric weight management interventions either within the clinic or outside the clinic setting. Research indicates that positive weight status outcomes occur in either setting, especially when the interventions are multi-component, include group pediatric weight management sessions and have family involvement.
Rating: Fair

Group and Individual Sessions

PWM: Group Sessions in Multicomponent Pediatric Weight Management Interventions
The registered dietitian nutritionist (RDN) can include group sessions and family participation as part of the multi-component pediatric weight management interventions. Multi-component intensive interventions that included group pediatric weight management sessions and included family participation were consistently associated with shorter-term (six-month) and longer-term (12-month) positive weight status outcomes.
Rating: Fair

PWM: Individual Sessions in Multicomponent Pediatric Weight Management Interventions
The registered dietitian nutritionist (RDN) can include individual sessions as part of the multi-component pediatric weight management intervention. Treatment that relied exclusively on individual pediatric weight management sessions with or without family participation was associated with shorter-term positive weight status outcomes. Information about the longer-term impact on weight status are mixed.
Rating: Fair
Practice Questions

Based on your own practice, design a realistic option that may improve your pediatric weight management outcomes. “What path works for you?”
1. Is your program **Intensive** (does it contain most all of the key components of the Medical Nutrition or Behavioral types?)
2. Does it include **Family** involvement?
3. Are **Group** sessions included?
4. Do you focus primarily on **Teens**?
5. Is the **Length** of treatment >/= 6 months
6. Do you practice in a **Clinic**?

Questions?