Behaviour and feeding: influencing the development of of healthy eating habits

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Why do we eat what we eat?

We live in different climates in which different foods are available so :-

- **Food preferences have to be learned**
- **Children have to learn which foods are safe and culturally appropriate to eat.**
- **Food preferences cannot be innate.**

We learn which foods to eat by:-

- **Exposure**
- **Imitation (modelled exposure)**
  - **of other adults**
  - **of other children**

Exposure occurs:-

- **In utero,**
- **During breast feeding – foods eaten by the mother**

And predominantly by :-

- **Tastes, fed during the weaning process**
- **Textures, given during the late weaning process**

We learn when to eat :-

- Because we learn to be hungry at a specific time for a specific calorie load.
- We also learn the energy consequences of the foods that we eat

We learn how much to eat :-

- **By attention to intrinsic cues in the early years (regulation and compensation)**
- **By attention to extrinsic cues in later years**

(These cues can effect portion size.)

We also learn what to eat/when according to :-

- **our internal reward systems (emotional eating)**
- **cognitions about food**

Regulation of appetite

Infants can begin to regulate their intake and energy needs from birth.

This regulation is only partial until about six weeks of age, after this infants can take the number of calories that they need to meet growth and energy requirements.

Fomon, (1976)

- **Children gradually learn the energy load of the foods that they eat.**

- **They learn how many calories they usually eat at each mealtime.**

- **They get hungry for that calorie load at the time that they usually eat it.**

Up until 4 or 5 years children's appetite is determined mainly by their energy and growth needs, after this time they, like adults, begin to modify their eating according to social rules and will learn to :-

- ***Finish what is on the plate.***
- ***Eat when others are eating, even if they are not hungry.***
- ***Comfort eat.***

The role of parental practices in how much is eaten-

via pressure to eat:-

- **Focus attention on extrinsic vs. intrinsic cues**
- **Instil a reduced preference for pressured foods (Galloway et al., 2006)**

And of course parental obesity is linked to child obesity .

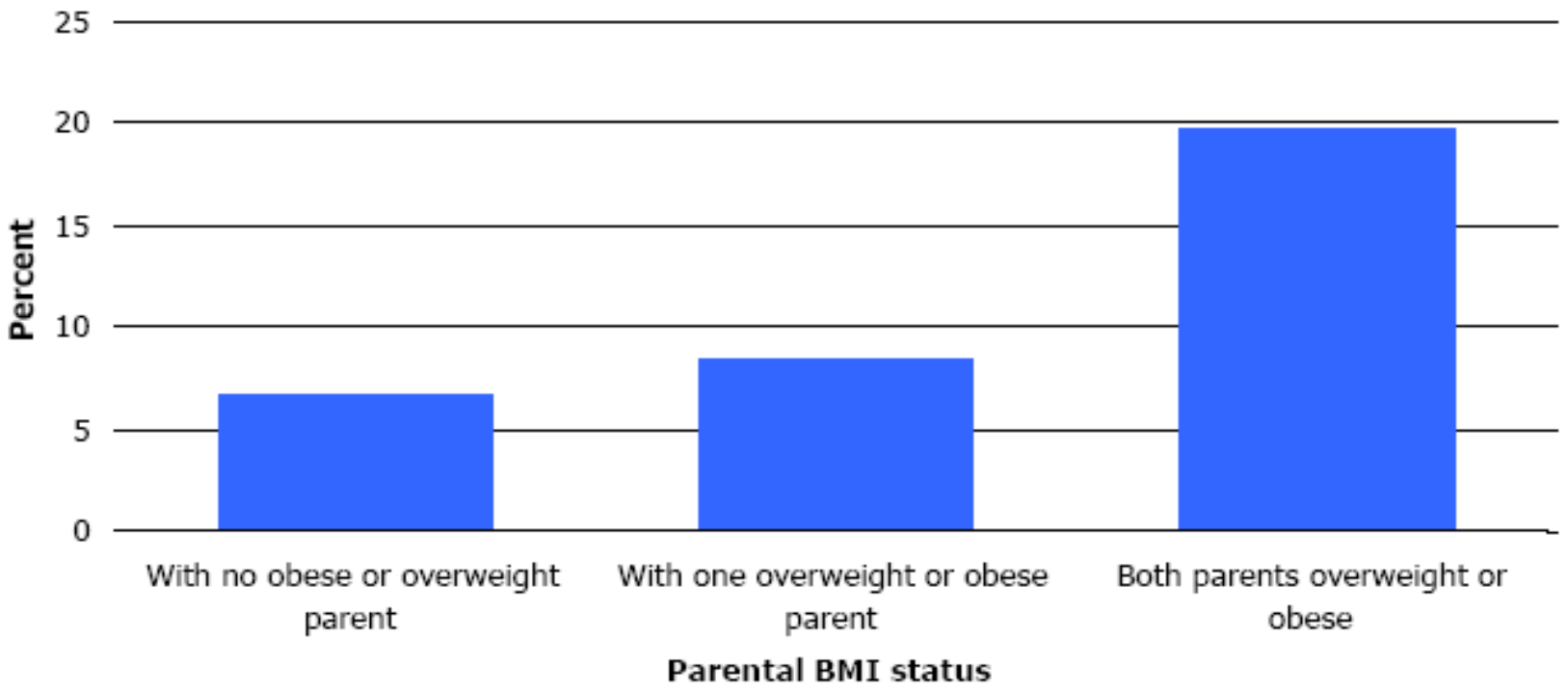
Overweight & Obesity by Parental BMI

Health Survey for England

Figure 9

Obesity prevalence among children aged 2-10, by parental BMI status, 2001-2002

Base: Children aged 2-10 with valid BMI



The acquisition of food preferences.

At birth there is a preference for a
sweet taste,
(all other tastes are neutral or aversive - with the possible exception of Umami)

And there seems to be a preference for fat.

The neonate can clearly signal likes and dislikes.

Sweet

Bitter

Weaning on to solids
4-6 months

- Only needs small amounts of food to induce a preference

- Few exposures are necessary
- Bitter tastes more difficult
- Parents should be giving the foods they want their children to eat when they are toddlers and are eating family meals.

Preferences is entirely a function of exposure
(Except for sweet taste preference)

Exposure in the 4-6 month period can give quite taste specific preferences.

Peter is 5 months old he was introduced to solid foods at 4 months old.

He accepts a mixture of fruit that he is used to having, but shows a disgust response to a new food – broccoli - which has a bitter taste.

New foods do not have to be given one by one, a generalised effect is found if many foods are introduced.

At weaning infants were exposed to 'no variety' vegetable, 'variety with daily change', 'variety with change every three days', for 9 days. Frequency of change rather than number of vegetables predicted new food acceptance.

Meyer et al (2008)

This generalised effect is long term.

In an analysis of data provided by parents from the ALSPAC data base, it was found that early fruit and vegetable consumption - prior to six months - predicted fruit and vegetable consumption at 7 years.

Parents were asked to record consumption of home-cooked, raw or ready prepared (baby food jar, tin or packet) fed to their infant by six months.

(Coulthard, Harris, Emmett, 2010.)

Children who ate home-cooked and raw fruit or vegetables at six months were more likely to be eating a higher proportion of fruit and vegetables at 7 years than children given ready prepared fruit and vegetables.

Early consumption of raw or home cooked fruit and vegetables predicted consumption at 7 years, but consumption of fruit and vegetable from jar, packet or tin did not predict later consumption.

(The analysis controlled for exposure to fruit and vegetables at a later age point (15 months), and was adjusted to take into account demographic variables.)

Pearson product moment correlations between exposure at six months and frequency of consumption across the different categories of fruit and vegetables at 7 years.

	Frequency of consumption at six months			
Frequency of consumption at seven years	Ready-prepared vegetables	Ready-prepared fruits	Home-cooked vegetables	Home-cooked fruits
Salad	-0.011	-0.043	**0.098****	**0.094****
Tomatoes	-0.013	**-0.045****	**0.097****	**0.111****
Peas	**-0.026***	-0.015	**0.060****	**0.057****
Sweet corn	-0.004	-0.019	**0.090****	**0.074****
Carrots	-0.019	**-0.028***	**0.128****	**0.086****
Other root vegetables	-0.019	-0.018	**0.089****	**0.054****
Dark green leafy vegetables	**-0.025***	**-0.043****	**0.097****	**0.082****
Other green vegetables	**-0.024***	**-0.03***	**0.088****	**0.056****
Citrus fruits	0.001	-0.016	**0.083****	**0.052****
Other fresh fruit	0.022	**-0.037***	**0.128****	**0.127****

Texture exposure
6 to 12 months-

- **The tongue learns to move solid food around mouth in preparation for swallow.**
- **Infant learns to recognise food by sight.**
- **Infant needs to be exposed to tactile stimulation i.e. messy food/ messy play.**

Infants' chewing skills develop most markedly between the ages of 6 to 10 months, but only if the infant has experience of food in the mouth

Gisel (1991)

At this age oral motor skills may not be good enough to separate out lumps that are big enough to trigger the gag reflex, from those that can be swallowed using a liquid swallow.

Northstone et al (2001) looked at the effect of the timing of the introduction of lumpy solid foods on subsequent feeding difficulties.

Age of intro.	Feeding difficulties at 15 months.
<6mths	29.1%
6-9mths	38.6%
>10mths.	52.3%

We have looked to see whether this effect is still present in children of 7 years of age – using the ALSPAC data-base.

Children introduced to lumpy solids after the age of 9 months were reported as having more feeding problems at 7 years (food refusal and food 'fussiness').

(Coulthard, Harris, Emmett & Northstone.2009)

The end of mere exposure
12 to 18 months –

the start of the neophobic response
When new foods,-
and some previously accepted foods-
will be rejected.

Foods are rejected on sight.


15:24:23

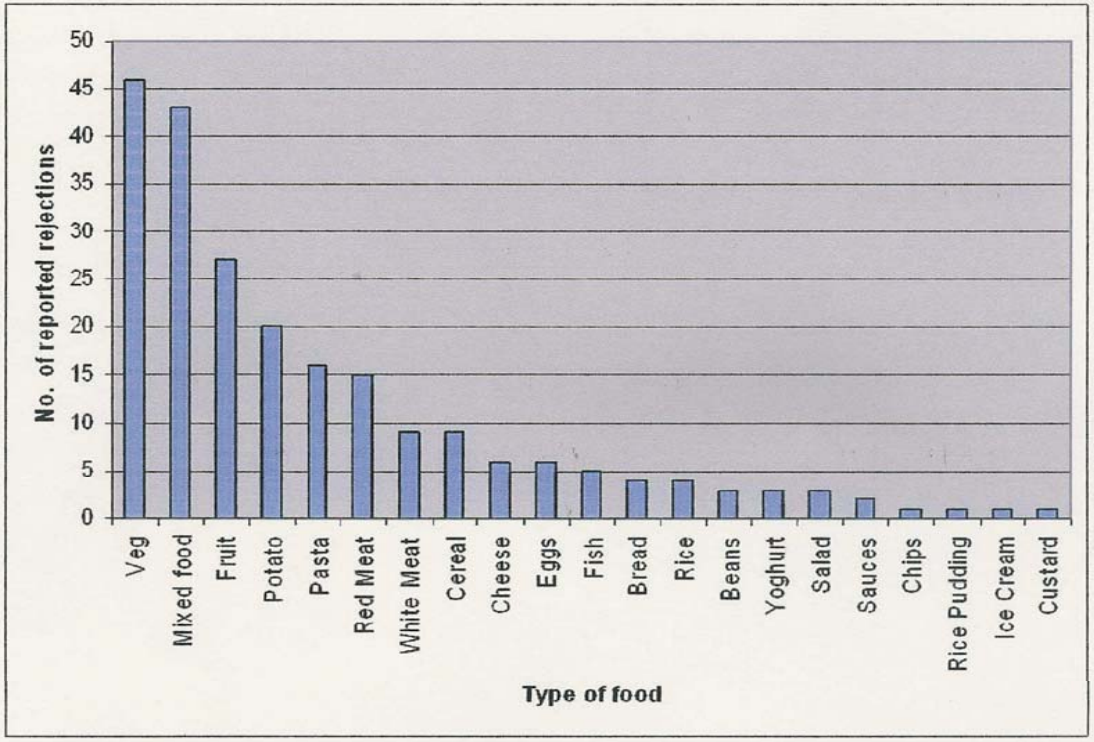
Toddlers become increasingly reluctant to try new foods during the second year of life – the neophobic stage.

They also stop eating foods that they used to eat.
Brown & Harris (2006)

During this process, infants become more aware of the 'local' details of food, and refuse to eat food that doesn't look 'right'.

Toddlers are more likely to refuse a food if it differs at subsequent presentations.

Fig. 4.1.3: Previously accepted foods reported to have been rejected, in categories



Furthermore, the highest frequency of colour reported as being rejected was "mixed" and these data are reported in figure 4.4.

Children move out of the neophobic stage because of :-

- **imitation of other's behaviours.**
- **development of food categories**

And

- **exposure to new foods in other contexts.**
- **less emphasis on local features of foods and objects.**

Children imitate other adults – and their parents' eating behaviour, and will try new foods that they see their parents eat.

Harper & Sanders (1975)

Children of nursery school age will model the eating habits and food preferences of other children.

Birch (1980)

- **In Birch's study, pre- school age children were assessed for their vegetable preferences.**
- **Target children were then seated at lunchtime with children who liked vegetables that the target child did not like**
- **The target child was likely to change their vegetable choice.**

In a study by Birch et al (1987)

69% of 2 year olds refused a novel food
but only
29% of 3 year olds
1% of 5 year olds

So neophobia decreases with age,
but the number of exposures required to induce a preference increases with age, from one or two of certain tastes in the first 6 months, to 14 or so in later childhood.

How parents influence their children's eating

- Uterine Environment & breastfeeding
- Weaning
  - Exposure
  - Innate preferences
- Provision & consumption of
- appropriate foods
- Role of own eating concerns & eating patterns
  - Modelling (e.g. Fisher et al., 2003)
- Parental mealtime management

Parental role in prevention and treatment of weight problems

- **Golan & Crow, 2004:**
  - **Parents influence children's:-**
    - **Dietary practices**
    - **Physical activity**
    - **Sedentary habits**
    - **Body satisfaction**
  - **Via**
    - **Controlling availability and accessibility of food**
    - **Food socialisation practices including mealtime structure**
    - **Food related parenting style**
    - **Nutritional knowledge**
    - **Modelling of behaviours and attitudes**

- **Golan, M; Crow, S (2004) Parents are key players in the prevention and treatment of weight-related problems. NUTRITION REVIEWS 62 (1):39-50.**

Mealtime management – parenting style:-

- *Authoritarian*
- *Authoratative*
- *Permissive*

Parental style and parental practices are linked to childhood eating behaviour.

Parenting style

- **Parenting style (authoritarian, permissive) has been related to:**
  - **Fruit and vegetable intake (Kremers et al. 2003)**
  - **child BMI (Rhee et al., 2006)**
  - **controlling feeding practices (Blissett & Haycraft, 2008).**

Anxiety and depression

Mothers followed from the birth of their infant: - 56% reported a period of food refusal in their infants, that lasted for at least one month.

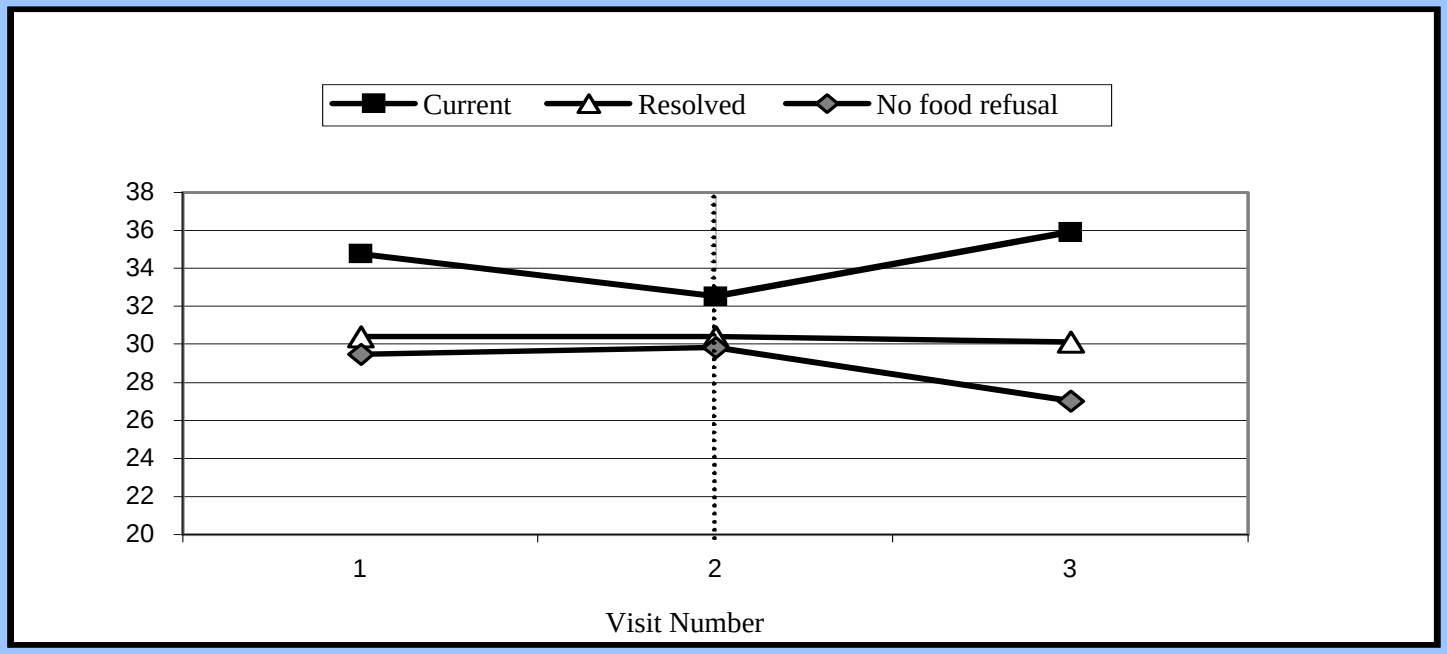
At 11 months: in 57% of the infants in this group, the period of food refusal had been resolved.

However, for 43% (21% of the entire sample), the period of food refusal was not yet resolved. Those mothers for whom the period of food refusal did not resolve were more likely to:-

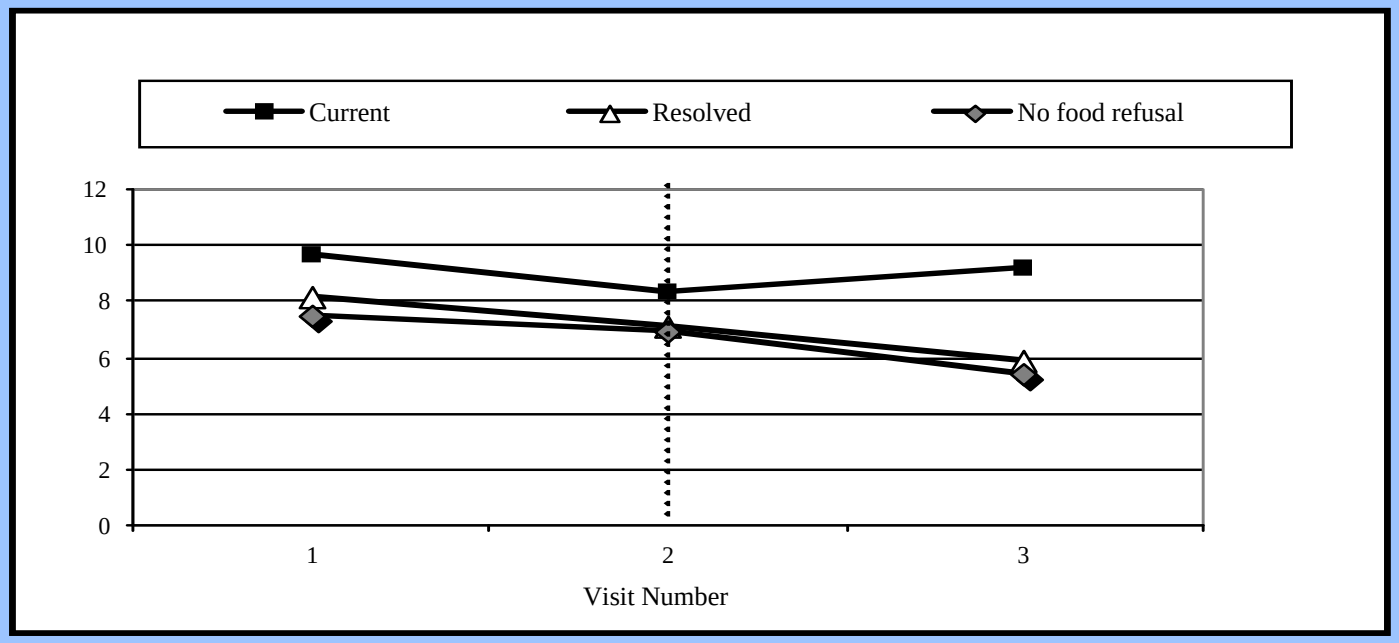
- **be depressed and**
- **show higher state anxiety**

than were those mothers for whom the period of food refusal did resolve, and mothers who did not experience a period of food refusal.

Coulthard & Harris (2003)



Mean state anxiety scores for mothers in the resolved and ongoing food refusal groups compared to the rest of the sample



Mean EPDS scores for mothers in the resolved and ongoing food refusal groups compared to the rest of the sample

Parental practices

- **Restriction of preferred foods**
  - **Increases preference for restricted food in 3-5 year old girls (Fisher & Birch, 1999)**
  - **Increases eating in the absence of hunger (Birch, Fisher & Davison, 2003; Fisher & Birch, 2005)**
  - **Is associated with negative self evaluations of eating in 5 year old girls (Fisher & Birch, 2000).**

Children's cognitions about food - restriction and reward

- *Do we reward eating?*
- *Do we use food as a reward?*
- *What happens if we restrict food?*

Exposure v. reward.

Does rewarding eating with a non-food work?
It is may not be as effective as exposure.

Wardle et al (2003) compared prompted exposure, with reward and exposure, to a new food, with 5 to 7 year old children.

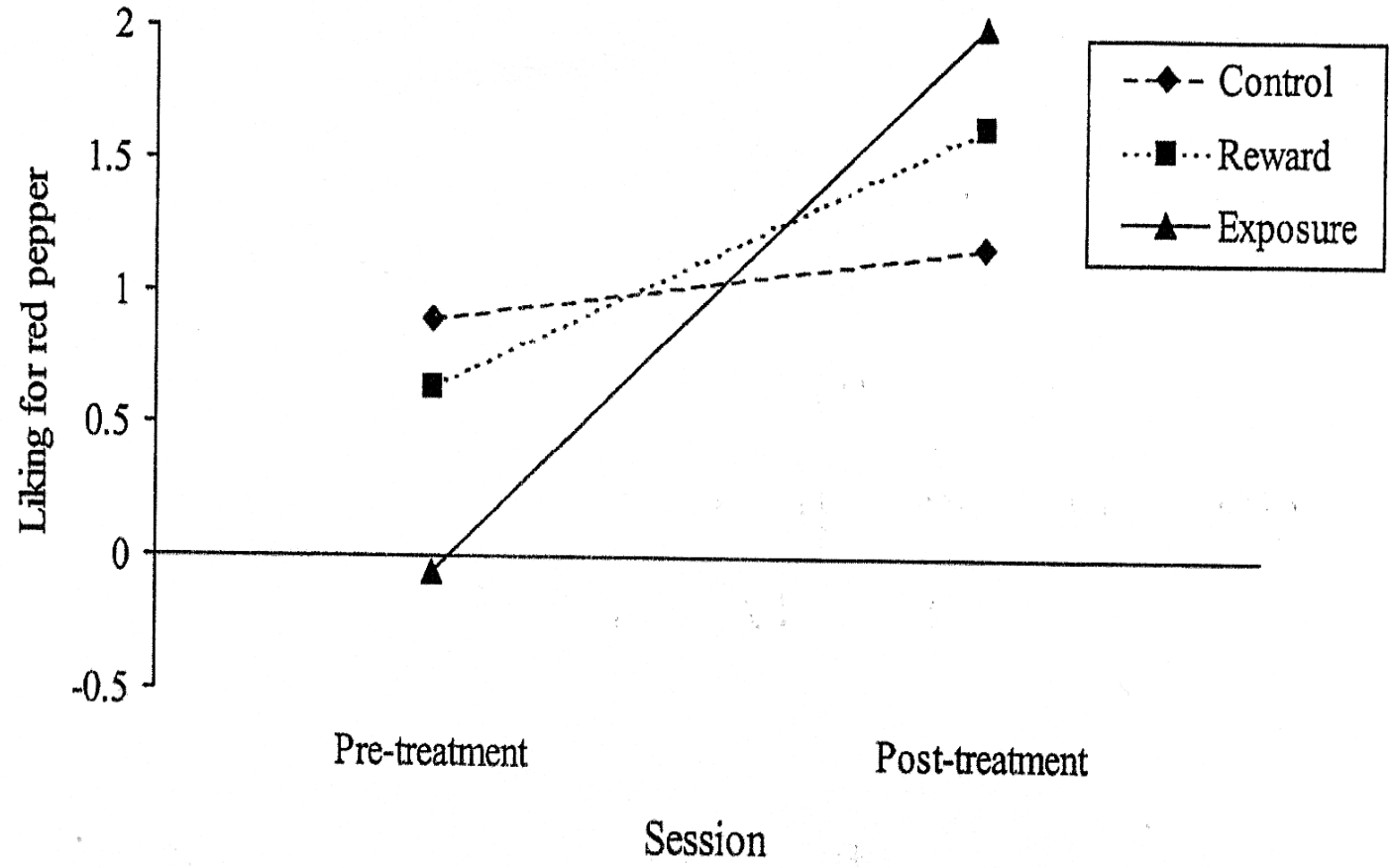


Figure 1 Change in liking from pre-test to post-test.

Wardle et al (2003)

There is also a ‘discounting effect’ which is activated when we reward a child for doing something that they might normally do. “Eat up your vegetables and then you can have some pudding” – devalues the vegetables and enhances the pudding.

Sweet or fatty foods are usually given as rewards.

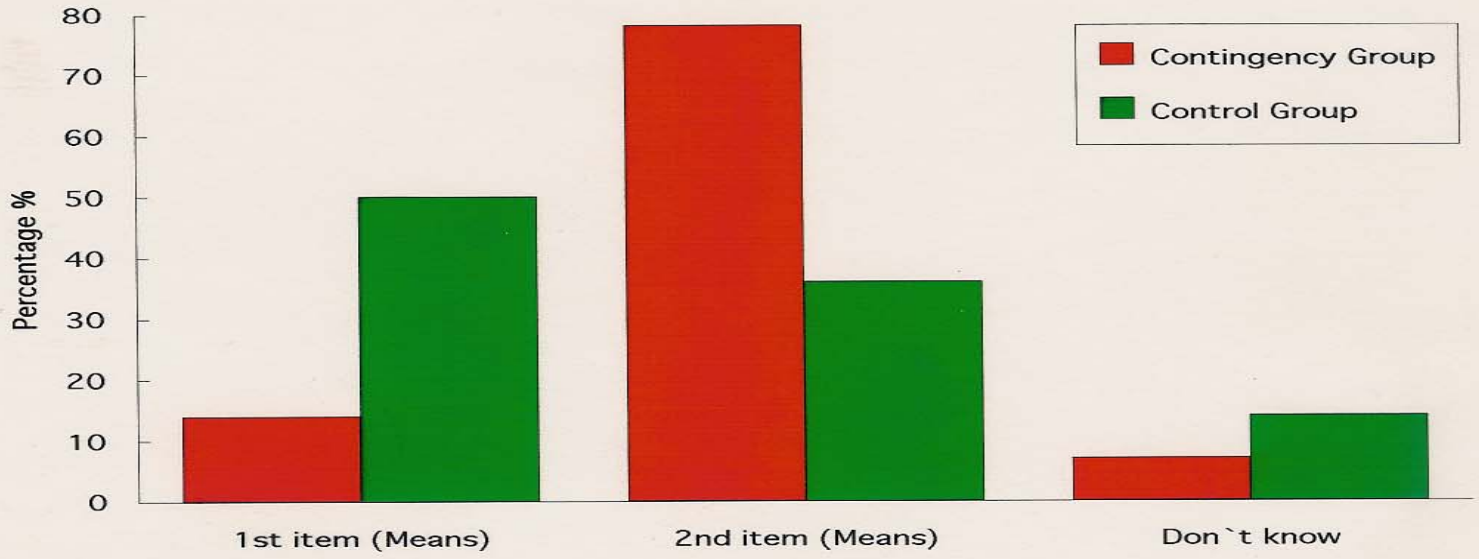
Study 1

Replication of Lepper, Sagotsky, Dafoe and Greene (1982)
Consequences of superfluous social constraints : Effects on young children`s social inferences and subsequent intrinsic interest.

Results

Choice of item	First item (Means)	Second item (Means)	Don`t know
Contingency Group	14%(2)	78%(11)	7%(1)
Control Group	50%(7)	36%(5)	14%(2)

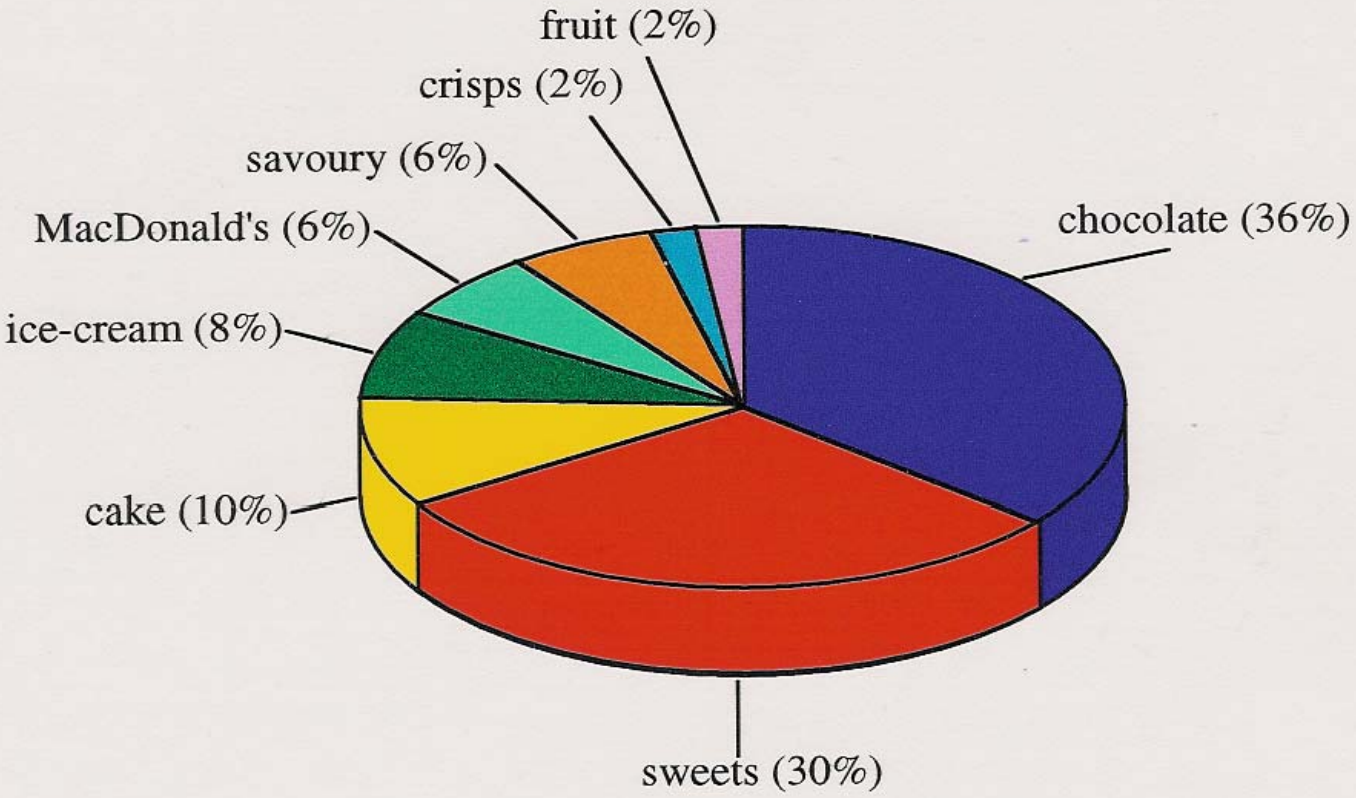
$p<0.05$



Mean Age = 4yrs 6mths Age Range 4 - 5 yrs n=28

Figure 11:

Q15: Reward foods



Newman & Taylor (1992) suggested that this discounting effect is dependent upon 'scriptal knowledge' - based upon children's experience in the real world-

"something given as a reward is going to be nice, something that you have to do to get a reward will not usually be nice".

The more valuable the reward is seen to be, the less valuable the instrumental task is seen to be.

This is similar to the effect found with restriction.

The role of nurseries and day care

- *Expose* to a wider range of foods
- *Model* good eating behaviour
- Expose to *other children's* eating behaviour
- Set up *good mealtime practice*
- Think about children's *cognitions* about foods

Summary – what can the family do:-

- **Introduce healthy family foods at the weaning stage - including foods of different texture**
- **Model appropriate eating behaviour and attitudes**
- **Adopt an authoritative feeding style**
- **Division of responsibility in feeding**
  - **Parent decides what is available/what goes on the plate,**
  - **child decides what and how much to eat**
- ***Should not* promote emotional eating**
- ***Should not* restrict and use food as a reward.**