



Fruit Juice Australia

Response to National Health and Medical Research Council

**Australian Guide to Healthy Eating – Draft
Australian Dietary Guidelines – Draft**

29th February 2012

Attention: National Health and Medical Research Council

At the invitation of the National Health and Medical Research Council (NHMRC), Fruit Juice Australia (FJA) would like to submit comments in regard to the following draft documents;

- Australian Guide to Healthy Eating – Draft
- Australian Dietary Guidelines - Draft

FJA appreciates the significance of the task to review these important documents in addition to the supporting documents that have been developed to inform the draft Australian Guide to Healthy Eating and draft Australian Dietary Guidelines, namely;

- A Modeling System to Inform the Revision of the Australian Guide to Healthy Eating
- A Review of the Evidence to Address Targeted Questions to Inform the Revision of the Australian Dietary Guidelines (Evidence Report)
- Pregnant and Breastfeeding Women Literature Review

While it is appreciated that comments are being sought on the draft Australian Guide to Healthy Eating and the draft Australian Dietary Guidelines, a number of comments have implications for the Evidence Report and studies contained in this report.

In the event that NHMRC concurs with the views put by FJA and in the interests of scientific rigor, it is anticipated that changes will also be made to the Evidence Report.

FJA's comments will initially be addressed in summary form via Key Recommendations that succinctly capture the essence of our submission followed by a detailed and referenced explanation in support of each recommendation.

Key Recommendations

Draft Australian Guide to Healthy Eating

Fruit Juice Australia recommends:

- 1. The removal of a 125mL serve of fruit juice as a fruit serve alternative and its replacement with a 200g (ml) serve of unsweetened fruit juice as a fruit serve alternative as indicated in the Modeling System report specifically developed to inform the revision of the Australian Guide to Healthy Eating.*
- 2. Defining Fruit Juice as “**Unsweetened Fruit Juice**”. Such a definition is not only consistent with current Department of Health and Aging advice (National Healthy School Canteens – “Guidelines for Healthy Foods and Drinks” 2010) but is also reflective of industry practice. “Unsweetened Fruit Juice” is $\geq 99\%$ juice which allows for the addition of nutrients that may be lost in processing. The term 100% fruit juice is an inappropriate descriptor for Australia and must be removed. Using the more accurate “Unsweetened Fruit Juice” will also help to eliminate public confusion between Unsweetened Fruit Juice and other sugar sweetened beverage categories – such as fruit drinks.*

Draft Australian Dietary Guidelines

Fruit Juice Australia recommends the NHMRC:

- 1. Accurately define fruit juice as “Unsweetened Fruit Juice” to eliminate confusion with other beverages and to ensure consistency with industry practice and Government advice.*
- 2. Adopt the 200ml unsweetened fruit juice serving as an alternative to a 150g piece of fruit in the section dealing with the Australian Guide to Healthy Eating*
- 3. Include specific reference to a serve of fruit juice (as a fruit serve alternative) to help meet fruit serve recommendations in the text of “Practical Considerations Eat plenty of vegetables, including different types and colours, legumes/beans, and fruit”*
- 4. Remove discussion of the evidence relating to fruit juice and weight gain in children on page 88 of the report as it:*
 - a) Appears in the section of the guidelines “Limit foods and drinks containing added sugars” which by definition does not include Unsweetened Fruit Juice.*
 - b) Includes papers that inaccurately include fruit juice with sugar sweetened beverages or have not adequately controlled for this possibility*
 - c) Is category D evidence and should not be associated with guideline statements and therefore should be limited to the Evidence report for Health Professional consultation.*
- 5. Remove the inaccurate definition of fruit juice currently contained in the glossary*

The recommendations will now be addressed in turn and in detail:

Draft Australian Guide to Healthy Eating

FJA AGTHE Recommendation:

1. *FJA requests the removal of a 125mL serve of fruit juice as a fruit serve alternative and its replacement with a 200g (ml) serve of unsweetened fruit juice as a fruit serve alternative as indicated in the Modeling System report specifically developed to inform the revision of the Australian Guide to Healthy Eating*

Supporting Material:

In approximate terms, Australians need to double their intake of fruit in order to meet recommended levels (page 42 draft Australian Dietary Guidelines) and recent reviews of Australian national dietary data for adults, adolescents and children have highlighted the important contribution fruit juice makes to achieving fruit serve recommendations^{1,2}.

In addition, the nutritional contribution of fruit juice has been recognized with the *USA 2005 Dietary Guidelines Advisory Committee Report, Appendix G-2*³, stating “Fruit juices provide substantial contributions of several vitamins and minerals in higher amounts than do whole fruit. These include vitamin C, folate and potassium.” The more recent 2010 United States Department of Agriculture (USDA) Dietary Guidelines reinforced the importance of the nutrients fruit juice provides “Other beverages however, such as fat free or low-fat milk and 100% fruit juice provide a substantial amount of nutrients with the calories they contain”⁴.

In light of this and other data on the nutritional contribution of fruit juice, it is appropriate that the draft Australian Guide to Healthy Eating retain a fruit juice serve as an alternative to a fruit serving. **FJA strongly supports such advice.**

However, the 125mL fruit juice serve suggested in the current draft, *for which there is no scientific rationale*, sits at odds with the data developed in the Modeling System report that was created to inform the Australian Guide to Healthy Eating. The Modeling System report shows a 200g (mL) serve of fruit juice is equivalent to a piece of fruit.

FJA refers the NHMRC to Chapter 10 Appendices page132-35 of the Modeling System report and section A7.2 which addresses:

Equivalents across foods within food groups based on nutrient and energy composition

The Modeling System report (page 132) noted the “main distinguishing nutritional features of fruit are dietary fibre, folic acid and vitamin C”.

In the section, “The role of fruit juice and dried fruit” (page 135) of the Modeling System report, the following statements can be found:

“The data from AUSNUT07, for an energy equivalent serve of 200g (non-fortified) fruit juice, confirms that there is a higher average content of both vitamin C and folate compared to the average for fresh fruit but that fibre is lower although the range for both forms is wide.”

And...

“The US recommended a 200ml serve as equivalent to a piece of fruit but because of the lower fibre level they still recommended that most serves should be whole fruit.”

The following table also appears on page 135 of the Modeling System report:

Table A7.3: Comparison of fresh fruit, fruit juice and dried fruit for key nutrients

Comparison/serve	Energy/serve	Fibre/serve	DFE/serve	Vit C/serve
Av. 150g fresh fruit serve	333	4.6	26	53
Av. 200g fruit juice serve	316	1.1	45	63
Av. 30g dried fruit serve	353	2.6	7.5	3

Based upon the above Australian modeling of key distinguishing nutrients for fruit and consistent with international dietary advice on fruit serve equivalents, FJA contends that a **200mL serve of fruit juice is equivalent to a 150g fresh fruit serve.**

As such, the 125mL fruit juice serve (currently in the draft as an alternative to a fruit serve) should be removed and replaced with a **200mL serve of Unsweetened Fruit Juice.**

FJA recommends the removal of the following qualifying comment regarding fruit juice as an alternative for a fruit serve that currently exists in the draft:

“Only to be used occasionally as a substitute for other foods in the group”.

The following qualifying comment is not only more specific to the fruit category but is also a more accurate reflection of the Modeling System findings - the recommended replacement is:

“Whole fruit is preferred due to its higher fibre content”

FJA AGTHE Recommendation:

2. Define fruit juice as **“Unsweetened Fruit Juice”**.

Supporting Material:

The Australian Guide to Healthy Eating is a very important document as it provides practical messages regarding the intake of various foods and beverages, including fruit juice.

As such, it is important that the guide reflect current industry practice in regard to fruit juice as well as the current advice of the Department of Health and Aging (as found in the National Healthy School Canteens – “Guidelines for Healthy Foods and Drinks” 2010) and define fruit juice specifically as **Unsweetened Fruit Juice**.

FJA strongly supports the specific identification of *Unsweetened Fruit Juice* as it reflects the nutrient density of unsweetened fruit juice and clearly differentiates unsweetened fruit juice from other beverages like fruit drinks.

A lack of clarity between fruit juice and other beverages like fruit drinks is a common problem with many research studies failing to adequately distinguish fruit juice from other sugar sweetened beverages⁵.

Indeed, studies cited in the draft Australian Dietary Guidelines that purport to investigate the issue of fruit juice and weight gain in children have either made such an error or failed to control for the possibility of such an error (addressed later in this submission).

FJA suggests the following definition for fruit juice be included in the Australian Guide to Healthy Eating:

“Unsweetened Fruit Juice” is $\geq 99\%$ fruit juice with the goodness of vitamins such as vitamin C and folate and also provides some fibre and carbohydrates, particularly natural sugars.

The above definition of Unsweetened Fruit Juice also allows for the addition of nutrients that may be lost in processing consistent with current food standards.

The term 100% fruit juice is an inappropriate descriptor for Australia and must be removed.

Using the more accurate “Unsweetened Fruit Juice” will also help to eliminate public confusion between Unsweetened Fruit Juice and other sugar sweetened beverage categories – such as fruit drinks.

It is noted that in the draft Australian Dietary Guidelines (page 87) sugar sweetened beverages have been defined as fruit juice drinks, soft drinks, flavoured mineral waters and sports drinks.

Draft Australian Dietary Guidelines

FJA ADG Recommendation:

1. *Accurately define fruit juice as “Unsweetened Fruit Juice” to eliminate confusion with other beverages and to ensure consistency with industry practice and Government advice.*

Supporting Material:

In Table 2.2 on page 43 of the draft Australian Dietary Guidelines, reference is made to 100% fruit juice. As previously described, the term 100% fruit juice is not appropriate for Australia and should be replaced with **Unsweetened Fruit Juice**.

Defining fruit juice as Unsweetened Fruit Juice is not only consistent with current Department of Health and Aging current advice (National Healthy School Canteens – “Guidelines for Healthy Foods and Drinks” 2010) but is also reflective of current industry practice.

“Unsweetened Fruit Juice” is $\geq 99\%$ juice which allows for the addition of nutrients that may be lost in processing consistent with current food standards in Australia.

Using the more accurate “**Unsweetened Fruit Juice**” will also help to eliminate public confusion between Unsweetened Fruit Juice and other sugar sweetened beverage categories – such as fruit drinks.

FJA ADG Recommendation:

2. *Adopt the 200ml unsweetened fruit juice serving as an alternative to a 150g piece of fruit in the section dealing with the Australian Guide to Healthy Eating*

Supporting Material:

Also in Table 2.2 on page 43 of the draft Australian Dietary Guidelines, reference is made to a 125 ml fruit juice serve as an alternative to a serve of fruit.

As presented earlier in the submission, Fruit Juice Australia recommends the removal of 125mL as a fruit juice serve alternative for a piece of fruit and its replacement with a 200mL serving of unsweetened fruit juice consistent with both the findings of the Modeling System report and international advice on fruit serve equivalents.

FJA ADG Recommendation:

3. *Include specific reference to a serve of fruit juice (as a fruit serve alternative) to help meet fruit serve recommendations in the text “Practical Considerations Eat plenty of vegetables, including different types and colours, legumes/beans, and fruit”*

Supporting Material:

In section 1.5 “Adherence to Dietary Advice in Australia” on page 18 of the draft Australian Dietary Guidelines, the most recent dietary data for children found that the intake of fruit was below recommended levels, and for adult’s poor dietary patterns with inadequate intakes of fruit were also reported.

The draft Australian Dietary Guidelines on page 42 also state:

“The most recent dietary surveys show that fruit consumption should approximately double to meet recommended intakes.” (References not shown).

In light of the fact so many Australians fail to meet fruit intake recommendations, Fruit Juice Australia urges the NHMRC to include;

Specific practical advice on the role fruit juice plays in helping Australian adults, adolescents and children meet their recommended number of fruit serves.

Analysis of Australian national dietary data provides compelling evidence of the practical impact a fruit juice serving has in terms of increasing the number of fruit serves achieved each day.

In the case of adults, if fruit juice is included as a serve of fruit the number of adults meeting their fruit serve recommendations increases from 49% to almost 70%¹.

The positive impact on the diets of children and adolescents in terms of those meeting their fruit serve recommendations is equally significant when fruit juice is included. The table below, based on an analysis of the 2007 Australian National Children’s Nutrition and Physical Activity Survey², reveals the significant contribution fruit juice makes to achieving fruit serve recommendations:

Percentage of children meeting fruit serves with and without fruit juice².

Age Segment of Children	Percentage of Children Meeting Fruit Serves	
	Without Fruit Juice	With Fruit Juice
2-3 years*	68	90
4-8 years	61	93
9-13 years	51	90
14-16 years	1	24

*As there is no recommended number of fruit serves for children 2–3 years, the data above includes the percentage of young children who consumed at least one serve of fruit.

The evidence above is compelling as it clearly demonstrates (a serve of) fruit juice plays a significant practical role in helping Australians meet their fruit serve recommendations. Fruit Juice Australia recommends specific reference to a 200mL serve of unsweetened fruit juice as a practical way to boost the number of fruit serves consumed each day as drafted below:

Page 42 of the draft Australian Dietary Guidelines:

Consuming at least two serves of fruit per day (150g per serve) is recommended for adults, while amounts recommended for children and adolescents depend on age and sex (see Table 2.1 and 2.2). The most recent dietary surveys [13, 44] show that fruit consumption should approximately double to meet recommended intakes [10]. **While whole fruit should be consumed more often, a 200ml serving of unsweetened fruit juice also contributes to the achievement of fruit serve recommendations.**

In considering the recommendation above, the NHMRC is also encouraged to take into account the Evidence Statements for Fruit (pg 37), which relate to reduced risk of:

Coronary heart disease – Evidence Grade B
Stroke – Evidence Grade B
Obesity and weight gain – Evidence Grade C
Oral and nasopharyngeal – Evidence Grade C

It is noteworthy that fruit juice was included in the fruit definition for a number of the studies cited in the scientific review.

For example, the meta-analysis of cohort studies considering fruit and vegetable intake and Coronary Heart Disease (Dauchet L et al 2006) contained studies that included fruit juice in the analysis.

FJA ADG Recommendation:

4. *Remove discussion of the evidence relating to fruit juice and weight gain in children on page 88 of the report as it:*

- a) *Appears in the section of the guidelines “Limit foods and drinks containing added sugars” which by definition does not include unsweetened fruit juice*

Supporting Material:

Fruit Juice Australia refers NHMRC to page 87 of the draft Australian Dietary Guidelines which includes the following:

3.3 Limit intake of foods and drinks containing added sugars

The introductory section “**Setting the scene**” establishes the parameters for this section of the Dietary Guidelines in terms of the foods and drinks that are to be the focus of discussion and includes the following statements:

“...the major source of sugar in the Australian diet is sucrose from sugar cane which is added to foods and is termed an extrinsic sugar.”

“Sugar-sweetened drinks (fruit juice drinks, soft drinks, flavoured mineral waters and sports drinks) are the largest source of sugars in the Australian diet...”

Unsweetened Fruit Juice, by definition, is not included in this category of beverages.

As such, the following statement which appears on page 88 of the draft Australian Dietary Guidelines should be removed:

“There is insufficient consistent evidence available to form an evidence statement about fruit juices and weight gain. Some studies found no association in children [392-394, 456] while two studies in children [449, 574] and one in adults [575] did find an association. Children drinking less fruit juice [192] and those who consume more fruit [457] had lower BMI Z-scores, and children at risk of becoming overweight had a higher risk of gaining fat if they consumed fruit juice [449].”

It is essential the Australian Dietary Guidelines are clear and consistent in regard to the food and beverage categories that are discussed. Including any discussion of Unsweetened Fruit Juice in this section of the guidelines is inaccurate and confusing.

FJA ADG Recommendation:

4. *Remove discussion of the evidence relating to fruit juice and weight gain in children on page 88 of the report as it:*

- b) *Includes papers that inaccurately include fruit juice with sugar sweetened beverages or have not adequately controlled for this possibility*

Supporting Material:

As previously discussed, a lack of clarity between fruit juice and other beverages like fruit drinks in research investigating fruit juice and weight gain is a common problem with many research studies failing to adequately distinguish fruit juice from other beverages⁵.

One of the studies cited, *Taylor et al 2007*, in both the draft Australian Dietary Guidelines and the Evidence report, is a clinical trial that purports to show that those children drinking less fruit juice had a lower BMI Z score.

However, this study is flawed as fruit drinks are included with fruit juice.

FJA refers NHMRC to Table 3 on page 740 of the paper by *Taylor et al 2007*. Below are the food and beverage categories included in the study (raw data from Table 3 not shown, only food or beverage categories shown):

TABLE 3: Three-day intakes of beverages, fruit, and vegetables and differences in intake at study end

Food or beverage

Carbonated beverages (servings)

Fruit drinks or juice (servings)

Flavored milk (servings)

Water (servings)

Total sweet drinks⁶ (servings)

Fruit (servings)

Vegetables (servings)

⁶ Includes soft drinks, fruit drinks or juice and flavoured milk

It is disappointing to find that both the draft Australian Dietary Guidelines and the Evidence Report included in the evidence relating to fruit juice and weight gain in children a study that did not consider fruit juice specifically but fruit juice in combination with fruit drinks.

The study by *Taylor et al 2007* **does not show that “drinking less fruit juice results in a lower BMI Z score in children”** and should be removed both from the draft Australian Dietary Guidelines and the Evidence Report.

The study by *Faith et al 2006* which is also cited in the draft Australian Dietary Guidelines and the Evidence report is equally problematic as it failed to adequately control for potential bias that may result from parental confusion in terms of reporting intakes of fruit juice and fruit drinks.

This is one of several limitations with this study, other limitations included:

- Participants were of a single socioeconomic group
- Dietary intake data were limited to fruits, juices, and some vegetables
- Total energy was not used as a covariate

Another concerning feature of the study by *Faith et al* was that mean fruit juice intake in the study was higher than that reported for most other studies investigating fruit juice and weight gain, with girls and boys consuming 3 servings/day which greatly exceeds the recommendations of the American Academy of Pediatrics. It appears that this was the mean intake for all participants – not just juice consumers.

Why the children in this study consumed such high levels of juice is not clear. It has been speculated⁶ that as the study group were WIC participants (WIC - Special Supplemental Nutrition Program for Women, Infants and Children), the vouchers received increased juice/drinks availability which impacted consumption.

Scientific rigor is fundamental to the development of evidence based dietary advice which in turn requires the application of the highest standards in terms of the studies which are included in the development of Evidence Statements.

FJA urges the NHMRC to remove the study by *Faith et al 2006* due to the serious limitations outlined above and in particular the lack of adequate controls to eliminate confusion between fruit juice and fruit drink intake reported in the research.

The study by *Bes-Rastrollo et al 2006* should also be removed from the evidence as it fails to define the category “sweetened fruit juices” which is included as a secondary item to the primary focus of the study, sugar sweetened soft drinks (SSSD) and hamburger, pizza and sausages (HPS - as an indicator of fast food consumption).

As with the flawed research design used in the study by *Faith et al 2006*, there exists a strong potential for inaccurate reporting by participants due to confusion between “sweetened fruit juice” and other beverage categories such as fruit drinks.

As such, **no conclusion can be drawn regarding Unsweetened Fruit Juice and bodyweight from this research.**

Further, the research from *Bes-Rastrollo et al 2006* and specifically the association between “Sweetened fruit juice” and weight gain was only weakly significant with **the odds ratio failing to reach statistical significance.**

FJA recommends the removal of the study by *Bes-Rastrollo et al 2006* due to the likelihood of misreporting by study participants confusing “sweetened fruit juice” with fruit drinks.

NOTE

An up-dated summary of the evidence, with removal of the flawed studies (Taylor et al 2007, Faith et al 2006 and Bes-Rastrollo et al 2006) can be found later in this submission under the section dealing with the Evidence report.

Flawed Studies to be removed

Taylor, R. W., McAuley, K. A., Barbezat, W., Strong, A., Williams, S. M. & Mann, J. I. 2007, "APPLE Project: 2-y findings of a community-based obesity prevention program in primary school age children", *American Journal of Clinical Nutrition*, vol. 86, no. 3, pp. 735-74

Faith, M. S., Dennison, B. A., Edmunds, L. S. & Stratton, H. H. 2006, "Fruit juice intake predicts increased adiposity gain in children from low-income families: weight status-by-environment interaction", *Pediatrics*, vol. 118, no. 5, pp. 2066-75

Bes-Rastrollo, M., Sánchez-Villegas, A., Gómez-Gracia, E., Alfredo Martínez J., Pajares, R. M. & Martínez-González, M. A. 2006, "Predictors of weight gain in a Mediterranean cohort: the Seguimiento Universidad de Navarra Study", *American Journal of Clinical Nutrition*, vol. 83, no. 2, pp. 362

FJA ADG Recommendation:

4. Remove discussion of the evidence relating to fruit juice and weight gain in children on page 88 of the report as it:

c) Is category D evidence and should not be associated with guideline statements and therefore should be limited to the Evidence report for Health Professional consultation.

Supporting Material:

FJA refers NHMRC to page 15 of the draft Australian Dietary Guidelines and the statement:

“Grade D evidence statements occur when the evidence for a food-diet-health relationship is limited, inconclusive or contradictory. These D-grade relationships were not used to inform the development of *Guidelines* statements, however can be useful to inform health professionals about the strength of evidence from recent research.”

The inconclusive “Grade D” nature of the evidence relating fruit juice intake and weight gain in children supports the removal of the following paragraph (see below) that appears on page 88 of the draft Australian Dietary Guidelines:

Remove:

“There is insufficient consistent evidence available to form an evidence statement about fruit juices and weight gain. Some studies found no association in children [392-394, 456] while two studies in children [449, 574] and one in adults [575] did find an association. Children drinking less fruit juice [192] and those who consume more fruit [457] had lower BMI Z-scores, and children at risk of becoming overweight had a higher risk of gaining fat if they consumed fruit juice [449].”

NOTE

There is also an error in the references used, reference 192 and 457 have been incorrectly interchanged. However, removal of the entire paragraph due to the reasons provided above will circumvent the problem.

FJA ADG Recommendation:

- 5. Remove the inaccurate definition of fruit juice currently contained in the glossary*

Supporting Material:

FJA refers NHMRC to page 196 of the draft Australian Dietary Guidelines and the section titled Glossary. The following definition is provided for fruit juice.

“Fruit juice

100% fruit juice, including pulp, is a good source of vitamins such as vitamin C and folate and also provides fibre and carbohydrates, particularly natural sugars. Whole fruit is preferable to fruit juice however the occasional use of fruit juice may assist with nutrient intake when fresh, frozen or tinned fruit supply is sub-optimal. Fruit juice is energy-dense and if consumed in excess, it can displace other nutritious foods from the diet and may lead to problems such as obesity.”

FJA urges the NHMRC to:

- Adopt the following definition of Unsweetened Fruit Juice
- Remove of the definition that currently appears in the draft.

Recommended fruit juice definition:

“Unsweetened Fruit Juice” is $\geq 99\%$ fruit juice with the goodness of vitamins such as vitamin C and folate and also provides some fibre and carbohydrates, particularly natural sugars.

FJA takes serious issue with the final sentence of the definition of fruit juice that currently appears in the draft Australian Dietary Guidelines. The inaccuracies of this sentence will be addressed specifically:

Fruit juice is energy dense:

The Modeling System report clearly showed that a 200mL serving of fruit juice provided 316 kilojoules per serve while in comparison a 150g piece of fruit provided 333 kilojoules per serve. These figures were then used to provide an average energy figure of 350kJ for fresh/juice/dried fruit which appeared in “additional serves of food”.

The Modeling System data clearly indicates fruit juice is not “energy dense”.

Fruit Juice can displace other nutrients:

No evidence has been provided in support of this statement and for this reason alone, it should be removed.

Indeed, there is a common misconception that fruit juice consumption by children has the potential to compromise fibre intake if fruit juice is consumed in place of fruit or calcium intake may be reduced due to the possible replacement of dairy milk by fruit juice.

An analysis of the 2007 Australian National Children’s Nutrition and Physical Activity Survey² revealed no significant difference in either fibre or calcium intake between children consuming fruit juice and those not consuming fruit juice on the day of the survey.

Fruit juice may lead to problems like obesity:

As outlined above, serious questions exist over the accuracy of the current Evidence Statement considering fruit juice and weight gain due to flaws in 3 of the studies cited.

Notwithstanding these concerns, the current Evidence report concluded that the association between fruit juice and weight gain in children was inconclusive – a Grade D Evidence Statement.

As such, suggesting such a link when the NHMRC’s review (albeit flawed) of the evidence has not found a link is clearly unacceptable.

The definition of Fruit Juice in the current draft should be removed.

Evidence Report

FJA strongly supports the principles of evidence based dietary advice and the importance of accessing quality research in the development of the Evidence Statements.

As previously outlined in our comments, Fruit Juice Australia has identified three studies cited in both the Evidence report and the draft Australian Dietary Guidelines that purport to investigate the issue of fruit juice and weight gain which have, in the case of one study, included fruit juice with other beverages (fruit drinks) or in the case of the other two studies, failed to control for the possibility of fruit juice and fruit drinks being reported together.

FJA has recommended the removal of all three studies from the draft Australian Dietary Guidelines as well as the removal of the summary of evidence relating to fruit juice and weight gain that appears on page 88 of the draft Australian Dietary Guidelines report.

It is equally important to ensure that the Evidence report, a very significant document which will be referred to extensively by health professionals, academics, Government and various other health related agencies, only include quality studies which accurately address specific research questions.

As such, FJA calls upon NHMRC to remove the flawed studies from the Evidence report and develop a revised summary of the evidence related to fruit juice and weight gain.

Key Comments from Fruit Juice Australia

Evidence Report

1) Rigorously apply the definition of unsweetened fruit juice to the selection of research studies investigating the issue of fruit juice and weight gain in children and remove studies that either inappropriately include fruit juice with other beverage categories (Taylor et al 2007) or do not adequately control for the inclusion of fruit juice with other beverage categories (Faith et al 2006).

2) Revise the summary discussion relating to the evidence between fruit juice and weight gain to accurately reflect the final set of studies cited

The above comments are addressed in detail below:

FJA Evidence Report Recommendation:

1) Rigorously apply the definition of unsweetened fruit juice to the selection of research studies investigating the issue of fruit juice and weight gain in children and remove studies that either inappropriately include fruit juice with other beverage categories (Taylor et al 2007) or do not adequately control for the inclusion of fruit juice with other beverage categories (Faith et al 2006).

Supporting Material:

One of the studies cited, *Taylor et al 2007*, in both the Evidence report as well as the draft Australian Dietary Guidelines, is a clinical trial that purports to show that those children drinking less fruit juice had a lower BMI Z score.

However, **this study is flawed as fruit drinks are included with fruit juice.**

FJA refers NHMRC to Table 3 on page 740 of the paper by *Taylor et al 2007*. Below are the food and beverage categories include in the study (raw data from Table 3 not shown, only food or beverage categories shown):

TABLE 3: Three-day intakes of beverages, fruit, and vegetables and differences in intake at study end

Food or beverage

Carbonated beverages (servings)

Fruit drinks or juice (servings)

Flavored milk (servings)

Water (servings)

Total sweet drinks⁶ (servings)

Fruit (servings)

Vegetables (servings)

⁶ Includes soft drinks, fruit drinks or juice and flavoured milk

It is disappointing to find that the Evidence Report as well as the draft Australian Dietary Guidelines included in the evidence relating fruit juice and weight gain in children a study that did not consider fruit juice specifically but fruit juice in combination with fruit drinks.

The study by Taylor et al 2007 does not show that “drinking less fruit juice results in a lower BMI Z score in children” and should be removed from the Evidence Report (as well as the draft Australian Dietary Guidelines).

The study by Faith et al 2006 which is also cited in the draft Australian Dietary Guidelines and the Evidence report is equally problematic as it failed to adequately control for potential bias that may result from parental confusion in terms of reporting intakes of fruit juice and fruit drinks.

This as one of several limitations with this study, other limitations included:

- Participants were of a single socioeconomic group
- Dietary intake data were limited to fruits, juices, and some vegetables
- Total energy was not used as a covariate

Another concerning feature of the study by Faith et al was that mean fruit juice intake in the study was higher than that reported for most other studies investigating fruit juice and weight gain, with girls and boys consuming 3 servings/day which greatly exceeds the recommendations of the American Academy of Pediatrics. It appears that this was the mean intake for all participants – not just juice consumers.

Why the children in this study consumed such high levels of juice is not clear. It has been speculated⁶ that as the study group were WIC participants (WIC - Special Supplemental Nutrition Program for Women, Infants and Children), the vouchers received increased juice/drinks availability which impacted consumption.

Scientific rigor is fundamental to the development of evidence based dietary advice which in turns requires the application of the highest standards in terms of the studies which are included in the development of Evidence Statements.

FJA urges the NHMRC to remove the study by Faith et al 2006 due to the serious limitations outlined above and in particular the lack of adequate controls to eliminate confusion between fruit juice and fruit drink intake reported in the research.

The study by Bes-Rastrollo et al 2006 should also be removed from the evidence as it fails to define the category “**sweetened fruit juices**” which is included as a secondary item to the primary focus of the study, sugar sweetened soft drinks (SSSD) and hamburger, pizza and sausages (HPS - as an indicator of fast food consumption).

As with the flawed research design used in the study by Faith et al 2006, there exists a strong potential for inaccurate reporting by participants due to confusion between “sweetened fruit juice” and other beverage categories such as fruit drinks.

As such, no conclusion can be drawn regarding Unsweetened Fruit Juice and bodyweight from this research.

Further, the research from *Bes-Rastrollo et al 2006* and specifically the association between “Sweetened fruit juice” and weight gain was only weakly significant with **the odds ratio failing to reach statistical significance.**

FJA recommends the removal of the study by *Bes-Rastrollo et al 2006* due to the likelihood of misreporting by study participants confusing fruit drinks with “sweetened fruit juice”

Flawed Studies to be removed

Taylor, R. W., McAuley, K. A., Barbezat, W., Strong, A., Williams, S. M. & Mann, J. I. 2007, "APPLE Project: 2-y findings of a community-based obesity prevention program in primary school age children", *American Journal of Clinical Nutrition*, vol. 86, no. 3, pp. 735-74

Faith, M. S., Dennison, B. A., Edmunds, L. S. & Stratton, H. H. 2006, "Fruit juice intake predicts increased adiposity gain in children from low-income families: weight status-by-environment interaction", *Pediatrics*, vol. 118, no. 5, pp. 2066-75

Bes-Rastrollo, M., Sánchez-Villegas, A., Gómez-Gracia, E., Alfredo Martínez J., Pajares, R. M. & Martínez-González, M. A. 2006, "Predictors of weight gain in a Mediterranean cohort: the Seguimiento Universidad de Navarra Study", *American Journal of Clinical Nutrition*, vol. 83, no. 2, pp. 362

FJA Evidence Report Recommendation:

2) Revise the summary discussion relating to the evidence between fruit juice and weight gain in children to accurately reflect the final set of studies cited

Supporting Material:

In light of the serious methodological flaws in three of the papers cited that considered fruit juice and weight gain, the removal of the three flawed studies fundamentally changes the summary of the evidence and impacts the overall evidence statement.

As such, the following statement which appears on page 537 of the Evidence report **should be removed:**

“The studies used to make the body of evidence statement are shown in Table 15.2. There were eight studies in total, seven studies in children (six cohort and one clinical trial) and one cohort study in adults. Overall, 4/8 studies found increased risk of weight gain. Four of seven studies in children found no association whilst two cohorts and one clinical trial found increased risk of weight gain in children. The single cohort study in adults found increased risk of weight gain. Intervention studies that reduce sugar sweetened beverages intake and

of RCT design were more likely than cohort studies to show increased risk of weight gain. There was only one such trial in children and it demonstrated that reduction in intake was protective of weight gain. The evidence statement can only be made for children as there is insufficient data in adults. It received a D grading because the consistency is poor and further evidence is required to be confident in the evidence statement.”

The following points should be included in a **revised summary statement of the evidence** considering fruit juice and weight gain:

- There were **five studies in children (all cohort studies)**
- Overall 1 of the 5 studies found increased risk of weight gain.
- **Four of five studies in children found no association.**

Remaining studies after the removal of three flawed studies from the Evidence Summary considering fruit juice and weight gain.

Study	Target Group	Link with weight gain
Johnson et al 2007	Children	No Link
Libuda et al 2008	Adolescents	Link (in girls only)
Newby et al 2004	Children	No Link
Striegel-Moore 2006	Adolescent Girls	No Link
Tam et al 2006	Early Adolescence	No Link

FJA urges NHMRC to re-draft the summary of the evidence considering the issue of fruit juice and weight gain. It follows that given four of five studies considering fruit juice and weight gain in children showed no association, that the overall Evidence Statement must be reviewed.

The following sentences contained in the summary of evidence statement considering fruit juice and weight gain (page 537 of the Evidence report) reinforces the need to remove the entire paragraph.

The following sentence **describes research related to sugar sweetened beverages and not fruit juice and includes the methodologically flawed paper of Taylor et al 2007:**

“Intervention studies that **reduce sugar sweetened beverages intake** and of RCT design were more likely than cohort studies to show increased risk of weight gain.”

As previously articulated, unsweetened fruit juice by definition is not included in “sugar sweetened beverages” and as such it is misleading and scientifically inaccurate to have such a statement contained in a summary of evidence considering the specific issue of fruit juice and weight gain.

In addition, the following sentence:

“There was only one such trial in children and it demonstrated that reduction in intake was protective of weight gain.”

This statement refers to the flawed study of *Taylor et al 2007* that inaccurately included fruit juice with fruit drinks, as previously stated.

FJA calls upon NHMRC to ensure scientific accuracy and remove the entire summary of evidence paragraph relating to fruit juice and weight gain that appears on page 537 and to produce a summary of evidence statement which accurately reflects the remaining five studies.

References

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http://www.health.gov/dietaryguidelines/dga2005/report/html/g2_analyses.htm#fruitjuice
4. Dietary Guidelines for Americans, 2010, Building Healthy Eating Patterns, Chapter 5 pg 48
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6. O’Neil CE and Nicklas, TA 2008 American Journal of Lifestyle Medicine published on April 23, as doi:10.1177/1559827608317277