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Review Article

Can dietary intake influence perception of and measured appearance? A Systematic Review

Kristine Pezdirc[a], *Melinda Hutchesson*[a], *Ross Whitehead*[b], *Gozde Ozakinci*[b], *David Perrett*[c], *Clare E. Collins*[a,*]

[a] *School of Health Sciences, Faculty of Health and Medicine, Priority Research Centre in Physical Activity and Nutrition, University of Newcastle, Australia*
[b] *School of Medicine, University of St Andrews, Fife, Scotland*
[c] *School of Psychology & Neuroscience, University of St Andrews, Fife, Scotland*

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ABSTRACT

Appearance-based interventions have had some success in reducing smoking and sun exposure. Appearance may also motivate dietary behavior change if it was established that dietary improvement had a positive impact on appearance. The aims of this review are to evaluate the current evidence examining the relationship between dietary intake and appearance and to determine the effectiveness of dietary interventions on perceived or actual appearance. An electronic search of English-language studies up to August 2012 was conducted using Cochrane, MEDLINE, Embase, CINAHL, Web of Science, SCOPUS, and PsycINFO databases. Studies that included participants aged at least 18 years, that observed or altered dietary intake from actual food or dietary supplement use, and assessed appearance-related outcomes were considered eligible. Data from 27 studies were extracted and assessed for quality using standardized tools. Nineteen studies were assessed as being of "positive" and 4 of "neutral" quality. All observational studies (n = 4741 participants) indicated that there was a significant association between various aspects of dietary intake and skin coloration and skin aging. The majority (16 studies, 769 participants) evaluated the effect of dietary supplements on skin appearance among women. Only 1 study examined the effect of actual food intake on appearance. Significant improvements in at least 1 actual or perceived appearance-related outcome (facial wrinkling, skin elasticity, roughness, and skin color) following dietary intervention were shown as a result of supplementation. Further studies are needed in representative populations that examine actual food intake on appearance, using validated tools in well-designed high-quality randomized control trials.

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1. Introduction

Poor dietary intake is one of the most important risk factors for preventable disease and premature mortality [1]. Poor nutrition is responsible for around 16% of the total burden of disease worldwide and is associated with excessive intake of energy-dense foods, saturated fat, and added refined sugar or salt [1]. Improving nutrient intake promotes good health and

Abbreviations: BMI, body mass index; DS, dietary supplement; FFQ, food frequency questionnaire; MED, minimal erythema dose; RCT, randomized control trial.

* *Corresponding author*. School of Health Sciences, The University of Newcastle, University Dr, Callaghan, NSW 2308. Australia. Tel.: +61 2 4921 5646; fax: +61 2 4921 7503.
E-mail address: Clare.Collins@newcastle.edu.au (C.E. Collins).

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well-being and reduces the risk of many chronic diseases [1]. For instance, consuming an adequate amount of fruit and vegetables in our diet has been shown to reduce the risk of excess weight gain, type 2 diabetes, cardiovascular disease, and specific cancers [1–3]. Despite the benefits of consuming adequate amounts of fruit and vegetables, intake of this food group is low among the adult population worldwide and is identified by the World Health Organization as among the top 10 risk factors for global mortality [4]. Only 2.2% of men and 3.5% of women [5] in the United States meet their caloric-specific MyPyramid fruit and vegetable recommendations. In the United Kingdom, 31% of adults meet their current combined fruit and vegetable intake recommendation of "5-a-day" [6]. In Australia, only 5.5% of adults meet guidelines (2 serves of fruit and 5 serves of vegetables), with 18- to 34-year-olds least likely to meet recommendations (3.4%) [7].

Current efforts to improve an individuals' diet often involve behavioral interventions that aim to improve fruit and vegetable intake. Several reviews have evaluated the efficacy of such interventions [8–10]. The most recent was conducted in 2011 by Thomson and Ravia [10] who evaluated behavioral interventions to improve fruit and vegetable intake among individuals without preexisting health conditions that were published between 2005 and 2010. Based on the 34 studies included, the mean increase in servings per day of fruit and vegetable postintervention was 1.13 in adults and 0.39 in children [10]. This review concluded that for individuals to achieve recommended fruit and vegetable intake targets, additional approaches are required because the best available evidence indicates that it cannot be achieved solely by existing behavioral interventions [10].

To consider other approaches to promote dietary behavior change, an understanding of what motivates individuals to change their health behaviors is required. A recent study conducted by LaRose et al [11] compared motivating factors for weight loss and weight loss behaviors of young adults (18-35 years) versus older adults (36-50 years) who had been successful in long-term weight loss [11]. Young adults rated "improving your appearance," "improving social life," and "wanting to feel better about yourself" more important than "health concerns," which was rated as most important among the older adults [11]. These findings are consistent with a recent survey of UK adults who were asked questions on both the importance of "looking good" and the importance of "health" in relation to their diet [12]. The results indicated that health was of highest importance among the older female age group, whereas younger women felt more motivated to eat healthily based on concerns about their appearance. The researchers concluded that interventions to promote healthy eating and improve diet quality among young women should focus on appearance rather than health [12]. Therefore, appearance-based interventions may be a potential new approach to promote dietary behavior change, particularly among younger adults.

Appearance-based interventions have had some success in motivating behavior change, predominantly for smoking [13] and sun exposure behaviors [14]. Photographs demonstrating the effects of ultraviolet light exposure on facial images have been shown to precipitate a sustained period of behavior change in sun-tanning practices [14]. Images visualizing the adverse effects of smoking on facial skin wrinkling and oral disfigurement have also motivated smoking cessation [13]. Before appearance-based interventions are developed for dietary behavior change, we must first establish that what we eat influences our appearance. There is some evidence to suggest a relationship between dietary intake and appearance, but existing evidence has not been systematically synthesized. Therefore, the primary objectives of this review are to evaluate recent evidence examining relationships between dietary intake and physical appearance and to determine the effectiveness of dietary interventions on perceived or actual physical appearance. For the purpose of this systematic review, Cochrane, Medline, Embase, CINAHL, Web of Science, Scopus, and PsycINFO databases were searched using specific keywords for relevant studies published until August 2012 and by also reviewing the reference lists from retrieved articles. Study quality was assessed and data extracted using standardized appraisal tools. Data were analyzed using narrative summary.

2. Methods for the selection of literature reviewed

This review followed all Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement (PRISMA) guidelines except for protocol publication.

2.1. *Eligibility criteria*

2.1.1. *Types of participants*

Studies that included individuals 18 years and older were included. Studies in which participants had a history of eating disorders or chronic medical conditions or were pregnant were excluded.

2.1.2. *Types of interventions/exposure*

Both experimental and observational studies that provided a dietary intervention or evaluated participants' exposure to dietary components respectively were included. Included studies had to report dietary intake from either actual foodstuffs/food groups or dietary supplement use or both. The definition of *dietary intake* for the review was necessarily broad because of the researchers' awareness that a low number of studies had specifically investigated the relationship between food intake and appearance.

2.1.3. *Outcome measures*

Studies that assessed physical appearance as the primary outcome were considered. For the purpose of this review, *appearance* is defined as either an individual's or observer's perception of physical appearance or an objective measure of an outward aspect of physical appearance, including skin color and tone and body shape.

Studies that examined the relationship between body mass index (BMI) and body image or shape were not included.

2.2. *Search strategy*

A 3-step search strategy was used for this review to identify published studies in the English language up to and including

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