UNIVERSIDAD LOYOLA ANDALUCÍA

TESIS DOCTORAL

"Influencia de los medios de entretenimiento en los comportamientos alimentarios de los niños: un análisis de los emplazamientos de comida centrado en los dibujos animados"

Doctoranda: María Victoria Villegas Navas

Directores: María José Montero Simó

Rafael Ángel Araque Padilla

UNIVERSIDAD LOYOLA ANDALUCÍA

TESIS DOCTORAL

"Influencia de los medios de entretenimiento en los comportamientos alimentarios de los niños: un análisis de los emplazamientos de comida centrado en los dibujos animados"

Tesis defendida en el de de 2020

DOCTORADO EN DESARROLLO INCLUSIVO Y SOSTENIBLE

Doctoranda: María Victoria Villegas Navas

Directores: María José Montero Simó

Rafael Ángel Araque Padilla

Córdoba, 2020

Agradecimientos

Quisiera empezar dando las gracias a mis directores de tesis por el camino que hemos ido recorriendo juntos. A ti, María José, por ayudarme a mantenerme en modo *focused* cuando lo necesitaba y por tu atención y dedicación continua. A ti, Rafa, por todas las ideas que compartes y que sirven de inspiración para generar nuevas ideas.

A Inma, por esa alegría que irradias, es contagiosa. A Antonio, porque a tu lado cada día se aprende algo nuevo. Y a Pablo, Laura y Puri, por los buenos momentos que hemos vivido todos durante los maravillosos *breakfasts*. A Beatriz, por ser mi compi de apoyo y entendimiento. A Javi, Jesús y el resto de los compañeros de sala por compartir, además del espacio de trabajo, las inquietudes y motivaciones de los investigadores.

También quiero dar las gracias a todos los profesores que han dedicado su tiempo y sus habilidades para enseñar: Clara, Isabel, Mariano, Mercedes y muchos más. Gracias a Inma Carpio, Cristina Villén y todos los alumnos que han colaborado en las distintas tareas en las que se compone esta tesis. También quiero agradecer el haber formado parte del grupo de investigación MkforSociety. Rosa, Belén, Pilar, Morteza; me ha encantado conoceros.

Gracias a todos los que hacéis más fácil y confortable el día a día en el campus: Luis y Vidal, Nani, Maica, Rafael, Mercedes y todos los que conformáis los servicios de la Universidad.

También, quiero dar las gracias por el acogimiento que el Departamento de Comunicación de la Universidad de Viena me dio. Gracias a todos y, en especial, a los profesores Jörg Matthes y Brigitte Naderer por todo lo que pude aprender durante mi estancia allí. *Many thanks to the Department of Communication of University of Vienna for the calid welcome that you gave me. I would specially like to thank professors Jörg Matthes and Brigitte Naderer for everything I learnt during my visit to Vienna.*

Finalmente, quisiera dar las gracias a mis amigos y amigas por todos esos ratitos de recarga de energía: por las charlas, los bailes, por estar ahí. A mi familia

por ser mi apoyo incondicional: a mis hermanos por lo afortunada que soy al teneros cerca, a mis padres por todo el cariño y ternura.

Por último, querría agradecer a todos y cada uno de los revisores de las revistas por sus recomendaciones y sugerencias a la hora de mejorar la calidad de los artículos. *Lastly, I would like to thank all the reviewers from the Journals for their recommendations and suggestions when improving the quality of the articles.*

Índice

Lista de imágenes y tablas

Resumen general

Introducción y justificación. El sobrepeso y la obesidad infantil representan problemas de salud pública. Los niños con sobrepeso tienen más probabilidades de convertirse en adultos con sobrepeso y desarrollar enfermedades cardiovasculares, pulmonares y ciertos cánceres. Son múltiples los factores implicados en los comportamientos alimentarios asociados a los problemas de sobrepeso y obesidad infantil. Esta tesis se centra en la influencia potencial de uno de ellos: las representaciones de alimentos que aparecen en los medios de entretenimiento, en concreto, los emplazamientos de comida sin marca representados en las series de dibujos animados, dado que la legislación existente prohíbe emplazar marcas en este formato infantil. Esta clase de emplazamientos ha sido menos estudiada en la literatura respecto de los emplazamientos con marca, es por eso, que esta tesis pretende ampliar el conocimiento de estas representaciones de comida sobre los comportamientos alimentarios de los niños.

Objetivos. El objetivo general es el de conocer la naturaleza y prevalencia de los emplazamientos de comida sin marca en los dibujos animados y analizar qué efectos tienen sobre la elección posterior que realizan los niños.

Metodología y resultados. Esta tesis se presenta como un compendio de tres artículos. El **Artículo I** investiga, a partir de un análisis de contenido, con qué frecuencia y de qué forma aparecen los emplazamientos de comida sin marca representados en los dibujos animados actuales. Los resultados de este primer estudio arrojan que este tipo de emplazamientos son frecuentes y prominentes, existiendo un equilibrio entre mensajes poco recomendables y recomendables en cuanto a su naturaleza educativa. El **Artículo II** realiza una revisión de los estudios que han investigado los efectos de los alimentos embebidos en medios de entretenimiento sobre la elección y el consumo calórico en los niños a partir de una revisión sistemática y metaanálisis, hallándose efectos significativos en ambas variables comportamentales. El **Artículo III** presenta un estudio experimental que investiga los efectos de los emplazamientos de comida sin marca representados en los dibujos animados sobre la elección que realizan posteriormente los niños, analizando el tipo de comida, la modalidad y la edad de los participantes. Los resultados de este tercer estudio indican que estas representaciones tienen efectos cuando los alimentos emplazados son de bajo valor nutricional y los participantes son menores de 9 años.

Conclusiones. Los alimentos representados en las series de dibujos animados, especialmente aquéllos de bajo contenido nutricional son una fuente de comunicación que tiene efectos en los comportamientos alimentarios de los niños de manera negativa. De ahí que sea necesario tomar medidas encaminadas a reducir los efectos de estas representaciones por parte de los diversos agentes implicados: diseñadores de medios de entretenimiento, industrias alimentarias, organismos públicos, familias y la sociedad en general.

Palabras clave: emplazamientos de comida sin marca, dibujos animados, obesidad infantil.

General abstract

Background. Overweight and childhood obesity represent public health problems. Overweight children are more likely to become overweight adults and develop cardiovascular, lung, and certain cancers. There are multiple factors involved in childhood overweight and obesity problems. This thesis focuses on the potential influence of one of them: the food portrayals that appear in entertainment media, specifically, non-branded food placements depicted in cartoons, given the fact that the current legislation does not allow to place brands in this entertainment media. This type of placements has been less studied in the previous literature compared to branded placements, that is the reason why this thesis aims to extend the knowledge of these food portrayals on children`s food behaviours.

Objectives. The general objective is to investigate the nature and prevalence of non-branded food placements depicted in cartoons and to analyze the effects that these portrayals have on children food choices.

Methodology and results. This thesis is presented as a compendium of three articles. **Article I** investigates, based on a content analysis, how often and in what form non-branded food placements are depicted in current cartoons. The results of this first study show that this type of placements are frequent and prominent and that there is a balance between educational and non-educational food messages. **Article II** reviews the studies that have investigated the effects of foods embedded in entertainment media on children´s food choice and intake through a systematic review and meta-analysis. This second article finds significant effects in both behavioral variables. **Article III** presents an experimental study that investigates the effects of non-branded food placements depicted in cartoons on children's subsequent choice, analyzing type of food, modality, and age of the participants. The results from this third study indicates that these portrayals have effects on children´s choice when foods are low in nutritional value and participants are under the age of 9 years.

Conclusions. Foods represented in the cartoon series, especially those that are low in nutritional value, are communication tools that have negative effects on children's eating behaviors. Hence, it is necessary to take measures aimed at reducing the effects of these

representations by the various agents involved: entertainment media designers, food industries, public bodies, families and society in general.

Key words: non-branded food placements, cartoons, childhood obesity.

Capítulo 1 Introducción y objetivos

1.1. El sobrepeso y la obesidad

Seguir una dieta sana y equilibrada, combinada con ejercicio físico, forma parte de los ingredientes esenciales para promover estilos de vida saludables. Así, uno de los temas principales en los que hace hincapié la Organización Mundial de la Salud (OMS, 2020a) es la nutrición: no solo aportando recomendaciones para alcanzar una alimentación sana, sino también incidiendo en el problema de la malnutrición (OMS, 2020b), algo que supone un problema de salud polifacético y global (OMS, 2018b).

Entre las formas de malnutrición contempladas por la OMS (2018b) están el sobrepeso y la obesidad. Según datos de la OMS (2020b): *"desde 1975, la obesidad se ha casi triplicado"*, lo que pone de manifiesto la importancia del problema. En 2016, el 39% de los adultos (más de 1900 millones) tenían sobrepeso, y, de éstos, 650 millones eran obesos (un 13% de la población adulta). En el caso de los niños y adolescentes de 5 a 19 años, las cifras de sobrepeso y obesidad también han experimentado un aumento elevado pasando de un 4% en 1975 a aproximadamente un 18% en 2016. Además, en 2016, fueron 41 millones los niños menores de 5 años que presentaron sobrepeso u obesidad.

El sobrepeso y la obesidad infantil están extendidos globalmente afectando tanto a países desarrollados como aquellos que están en vías de desarrollo (Dinsa et al., 2012; OMS, 2016). En lo que respecta a los países desarrollados, son las familias con menor poder adquisitivo (menor estatus socioeconómico) los que presentan mayores porcentajes de sobrepeso y obesidad (Wang y Beydoun, 2007). En cuanto a los países en vías de desarrollo, la obesidad infantil además de ser prevalente – en 2016, cerca de la mitad de los niños menores de cinco años con sobrepeso u obesidad vivían en Asia y una cuarta parte vivían en África (OMS, 2016)- coexiste con otros problemas de malnutrición como sería la desnutrición (OMS, 2018b). Por un lado, los niños que viven en países de ingresos medios y bajos son más vulnerables a una nutrición inadecuada mientras que, al mismo tiempo, están expuestos a alimentos con alto contenido en grasas azúcares y sal, es decir, a alimentos de baja calidad nutritiva.

Esta tendencia creciente de las cifras, así como el problema de salud pública que representan, hacen de la prevención del sobrepeso y la obesidad infantil una necesidad prioritaria. Si, desde la infancia, se abordan estos problemas, resultará más fácil que las generaciones futuras gocen de mayor salud: no sólo porque lleguen a presentar un peso saludable sino porque se estará también logrando reducir las enfermedades no transmisibles (ENT) relacionadas con la mala alimentación como la diabetes tipo 2, las enfermedades cardiovasculares, la hipertensión y algunos cánceres (OMS, 2018b).

Para abordar los problemas de sobrepeso y obesidad infantil, es necesario incidir en los factores que los originan. Al tratarse de un problema complejo, son múltiples los factores implicados. No obstante, se pueden agrupar en torno a dos categorías:

- Factores que influyen sobre los comportamientos alimentarios poco saludables de los niños (ingesta excesiva de calorías).
- Factores que influyen sobre la actual disminución de la actividad física (insuficiente gasto calórico).

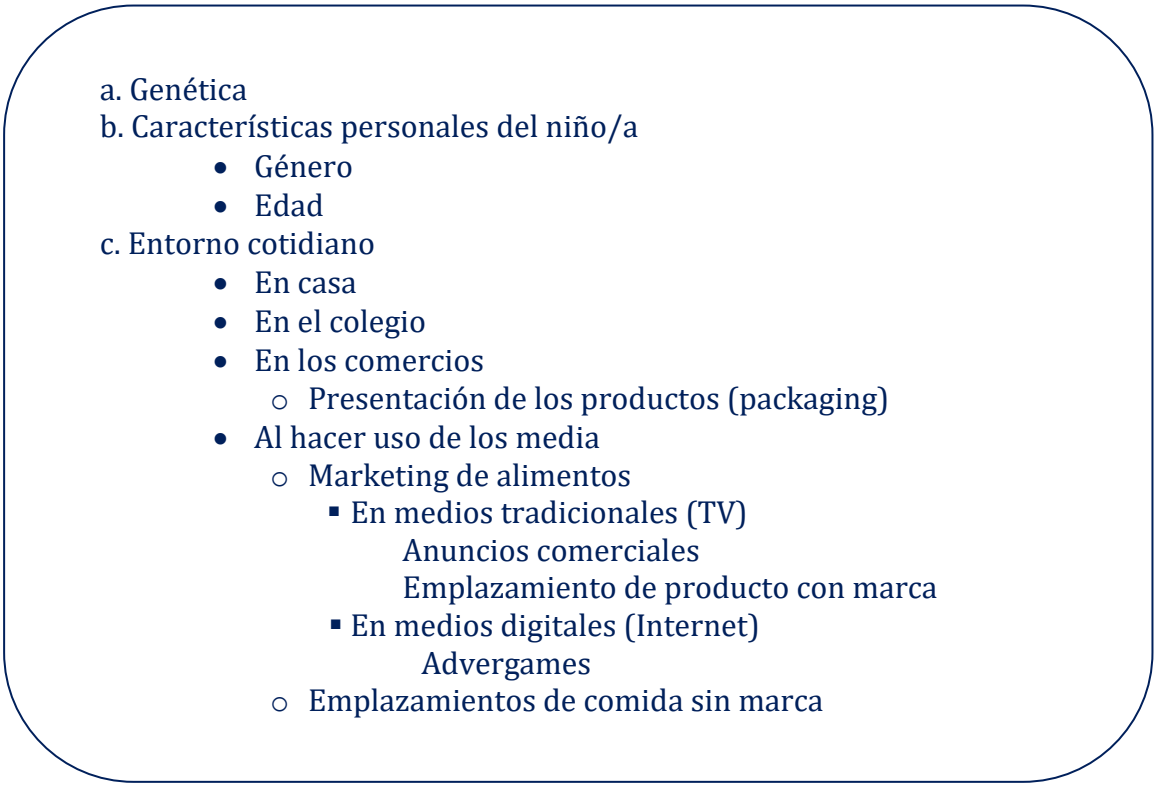
La siguiente sección, dada la naturaleza de la presente tesis, realiza un recorrido por el primer grupo de factores (los relacionados con los comportamientos alimentarios de los niños) para desembocar finalmente en los emplazamientos de comida sin marca representados en los dibujos animados, objeto de estudio del presente trabajo.

1.2. Factores que influyen en los comportamientos alimentarios de los niños

A nivel global, los hábitos alimentarios de los niños están cambiando (OMS, 2016): tanto la calidad nutritiva (alimentos hipercalóricos con alto contenido en grasas, azúcares y sal) como la cantidad ingerida (en exceso), están siguiendo una tendencia que se aleja de los patrones necesarios para un desarrollo adecuado del niño/a (OMS, 2020a).

En la Imagen 1, aparecen detallados los principales factores que inciden sobre los hábitos y comportamientos alimentarios de los niños. Estos factores interactúan unos con otros; de tal forma que, para entender cómo se desarrollan finalmente los comportamientos alimentarios del niño es necesario adoptar un enfoque sistémico, es decir, un enfoque que considere las relaciones de los factores en su conjunto.

Imagen 1. Principales factores que influyen o están asociados a los hábitos y comportamientos alimentarios desarrollados por los niños (lista no exhaustiva)



Nota: elaboración propia.

a. Factores genéticos

En cuanto a los factores genéticos, existe una amplia variedad de genes que afectan a los comportamientos alimentarios (Chesi y Grant, 2015), como el gen LEPR (que modula los niveles de saciedad) o el gen MC4R (implicado en la homeostasis energética). Estos genes interactúan con el ambiente, de forma que, de la interacción genes-ambiente surge la expresión de los comportamientos alimentarios (pudiendo ser más o menos saludables).

b. Características personales del niño

También, existen estudios que muestran cómo algunas características personales del niño/a pueden estar asociadas a ciertos comportamientos alimentarios (Scaglioni et al., 2018). Por ejemplo, en lo relativo al género, diversos estudios indican que las niñas tienden a consumir más frutas y verduras que los niños (Bere et al., 2008; Rasmussen et al., 2006). En lo que respecta a la edad, estudios previos muestran cómo los niños más pequeños presentan mayor reactividad (mayores niveles de rechazo y menores niveles de aceptación) a comer frutas y verduras poco familiares que los más mayores (Dovey et al., 2008).

c. Entorno cotidiano

Por otra parte, el entorno cotidiano del niño también va dando forma a los diferentes comportamientos alimentarios desarrollados por el menor. En su día a día, los niños reciben influencias en lo que se refiere a la alimentación y la nutrición en distintos contextos: en casa y colegios, cuando acuden a los comercios (acompañados o no por sus padres o tutores) o cuando hacen uso de los medios de comunicación o se exponen a ellos. A continuación, se comentan brevemente cada uno de ellos.

En casa, los niños reciben influencias tanto de padres como de hermanos. El estilo parental, la responsabilidad percibida respecto de la alimentación del niño, la estructura familiar, la frecuencia de comidas compartidas en familia o las interacciones con los hermanos son algunos de los factores ambientales relativos al entorno familiar que influyen sobre los comportamientos alimentarios del niño (De Cosmi et al., 2017). En la revisión acerca de los distintos factores que influyen en los comportamientos alimentarios de los niños de Scaglioni et al (2018), se encontró que los hábitos alimentarios de los padres y la estrategias que emplean éstos son uno de los pilares clave a la hora de entender cómo se desarrollan los comportamientos alimentarios de los niños. Los menores imitan el comportamiento de los padres a partir del aprendizaje por observación, por eso, los hábitos alimentarios de los padres son una fuente de modelado relevante en lo relativo al estilo de alimentación desarrollado por el menor (Zarychta et al., 2016). Por otro lado, las acciones realizadas por los padres para influir en las preferencias y el consumo de alimentos de los pequeños se traducen en estrategias que pueden ser efectivas o inefectivas y que incluyen la adopción de estrategias de control visibles (como sería la restricción y presión para comer determinados alimentos) o encubiertas (como sería comprar sólo alimentos de contenido nutricional o evitar establecimientos de comida rápida) (Scaglioni et al., 2018).

El colegio es también otro lugar donde los niños pasan buena parte de su tiempo. Ya sea en el recreo, durante el almuerzo o en la hora de la merienda, los niños reciben influencias que afectan a sus hábitos alimentarios. También, las actividades realizadas en el entorno escolar de tipo aprendizaje experiencial como “cuidar el jardín del colegio o de la comunidad” y “cocinar y preparar la comida” influyen cuando se trata de reducir el consumo calórico de alimentos, aumentar el consumo de frutas y verduras e incrementar el conocimiento nutricional (Dudley et al., 2015). Además, dicho estudio encontró que, para reducir tanto el consumo como las preferencias de los alimentos azucarados, la estrategias más efectivas se basaban en actividades extracurriculares, como serían los programas de

educación en nutrición o los programas que involucran a profesores y padres en materia de alimentación. Por otro lado, el contexto social en el que se desenvuelven los niños también resulta ser un foco de influencia importante. Los amigos del colegio pertenecen a la categoría de *peers*, son sus *iguales* en tanto en cuanto tienen más o menos la misma edad, comparten intereses, aficiones… Los *peers* suelen incrementar el consumo calórico en los niños y adolescentes exceptuando aquellas situaciones en las que existen preocupaciones acerca de la evaluación social o cuando los *peers* muestran comportamientos de alimentación saludables (Salvy et al., 2012).

Por otra parte, cuando los niños van a los comercios (como supermercados, tiendas de barrio o grandes superficies), son varios los productos alimentarios que captan su atención: ya sea por sus colores, formas u otras características de presentación. Estas características de presentación forman parte de la estrategia de packaging desarrollada por las empresas para hacer más atractivo el producto.

La estrategia de *packaging* emplea distintas técnicas que se pueden agrupar en torno a diferentes categorías (Mehta et al., 2012): el uso de la semiótica, las promociones cruzadas, las formas de presentación, los premios y las promociones de precio. El uso de la semiótica, a su vez, integra otras subcategorías: gráficas dirigidas a niños (colores, formas…), imágenes de personajes y celebridades (personajes de dibujos animados, deportistas…) y afirmaciones (*claims*) sobre salud y nutrición.

Las estrategias más activas de *packaging* de alimentos específicamente dirigido a niños suelen corresponderse con alimentos de bajo valor nutricional (Mehta et al., 2012), es por eso que; en diversos países se han tomado medidas conducentes a reducir los efectos que esta estrategia tiene sobre los hábitos alimentarios de los menores. Por ejemplo, la legislación sobre el *packaging* de alimentos en Chile establece que todos los alimentos que excedan los límites críticos de nutrientes (ya sea de azúcares, sal, calorías o grasas saturadas, entre otros) han de etiquetarse con un octágono negro (a modo de señal de stop), indicando "ALTO EN" seguido del nutriente correspondiente (LLorente & Cuenca, 2016). En otros países latinoamericanos se ha implementado el etiquetado llamado "Luz de Tráfico Nutricional", impulsado por Organizaciones No Gubernamentales (ONG), el cual usa los colores rojo, amarillo o verde para mostrar la calidad nutritiva del alimento (LLorente & Cuenca, 2016). En algunos países de Europa, como en el caso de Francia, Bélgica o España, se está adoptando una medida denominada Nutri-Score la cual muestra, a través de un logo impreso en el producto (que varía en colores y letras), la calidad nutritiva del alimento (Delhomme, 2020; Open Food Facts, 2020). Además, también existen aplicaciones móviles

que permiten identificar cómo de saludable es un determinado producto bien introduciendo los nutrientes e ingredientes, bien escaneando el código de barras (Open Food Facts, 2020). Sin embargo, aún queda un largo camino por recorrer en lo que se refiere a la implementación de medidas de *packaging* dirigido a niños, ya que, como indica la OMS (2018c), son muchos los países que presentan una escasa regulación de esta técnica tan persuasiva para los menores.

Otro entorno al que los niños están expuestos diariamente es el de los *media* (medios de comunicación), ya sea en medios de comunicación tradicionales, como la televisión (TV), o en medios de comunicación digitales (aquellos que hacen uso de Internet). En ambos casos, el Marketing de alimentos está presente.

En la TV, son diversas las estrategias de Marketing utilizadas para comunicar los productos alimentarios, entre las que se encuentran los anuncios comerciales (*commercials*) y los emplazamientos de producto con marca.

Los *commercials* representan la estrategia de Marketing tradicional por idiosincrasia: anuncios de breve duración que se insertan durante los descansos publicitarios (*advertising break*) para comunicar y promocionar un producto o servicio. Son numerosos los estudios que han investigado la cantidad de productos alimentarios anunciados vía *commercials* dirigidos a niños (Folta et al., 2006; Kelly et al., 2010). En el estudio de Kelly et al. (2010), grupos de investigación de diferentes países analizaron los anuncios que aparecían en los canales de televisión más vistos por los niños en horario infantil: los autores encontraron que la mayoría de *commercials* de comida anunciados eran de bajo contenido nutricional. Además, estudios que han investigado cómo influyen los anuncios de comida en las preferencias, elecciones y consumo calórico de los niños han hallado efectos significativos sobre dichas variables comportamentales (Borzekowski y Robinson, 2001; Harris et al., 2010).

Por otro lado, los emplazamientos de producto con marca (*branded product placement*) representan otra estrategia de Marketing que se define como la incorporación intencionada de contenido comercial en medios de entretenimiento (Williams et al., 2011). En la TV, los emplazamientos de producto con marca aparecen en contenidos audiovisuales propios de este medio tradicional como serían los programas de TV, las series o las películas. Al igual que los *commercials* de alimentación, los *branded product placement* de comida suelen ser de bajo contenido nutricional (Sutherland et al., 2010).

En cuanto a los medios digitales, el Marketing de alimentos hace uso también de los anuncios comerciales y los emplazamientos de producto con marca, esta vez, en plataformas

digitales. Por ejemplo, anuncios comerciales insertados en aplicaciones propias de los medios sociales (*social media*) o emplazamientos de producto con marca que aparecen en plataformas de vídeo, videojuegos y contenidos audiovisuales en *streaming*. También, en esta categoría de Marketing de alimentación en medios digitales, están incluidos los *advergames*: videojuegos diseñados para comunicar una marca a través de logos, mensajes o personajes comerciales (Mallinckrodt y Mizerski, 2007). En los últimos años, el uso de estas plataformas digitales es cada vez mayor (Saura et al., 2020), de ahí que las empresas alimentarias usen también estas vías para comunicar sus productos.

Debido a los potenciales efectos que el Marketing de alimentos, especialmente de aquellos con alto contenido en grasas, azúcares o sal (*High in Fat, Sugar or Salt foods*), tiene sobre la población infantil; diferentes organismos como la OMS (2013) o la Organización Panamericana de Salud (OPAS, *PAHO*) han establecido políticas regulatorias encaminadas a reducir el impacto de estas estrategias comerciales (Davó-Blanes et al., 2013; Rincón-Gallardo Patiño et al., 2020). En el informe de la Oficina Regional Europea de la OMS (2013), se identifican algunas de las técnicas emergentes a la hora de comercializar productos y bebidas para niños: los ya comentados emplazamientos de producto con marca y los advergames o el Marketing viral y el interactivo, entre otros. El informe persigue, además de mostrar las cifras que el Marketing de alimentos alcanza en Europa, servir de iniciativa y referencia para que los gobiernos de los diferentes países tomen medidas y las implementen. En el caso de España, desde el Ministerio de Sanidad y Consumo (2012) se estableció el código de corregulación de la publicidad de alimentos y bebidas dirigidas a menores, el código PAOS, que contempla una serie de pautas para proteger a los menores del impacto del Marketing de alimentación.

Además del Marketing de alimentos, los comportamientos alimentarios de los niños podrían verse influidos por las imágenes o representaciones de alimentos – sin estar asociados a una marca- que se muestran en los medios de entretenimiento. Estas representaciones constituyen el foco de la presente tesis. De ahí que sean abordadas en la siguiente sección.

1.3. Emplazamientos de comida sin marca

Cuando los niños hacen uso de los diferentes medios de entretenimiento, ya sea al ver películas y series o al jugar a videojuegos, se exponen a escenas que, pudiendo ser más o menos ficticias, reflejan contextos cotidianos de la vida de los pequeños: ir al parque o al colegio, jugar con los amigos, celebraciones…En estos contextos, los emplazamientos de

comida sin marca *(non-branded food placements*) pueden aparecer como parte de las escenas, pudiendo ocupar un papel central o secundario.

Los emplazamientos de comida sin marca son representaciones de alimentos que aparecen embebidos en los medios de entretenimiento. A diferencia de los emplazamientos de comida con marca dirigidos a niños, cuyos efectos han sido objeto de análisis en numerosos estudios (Auty y Lewis, 2004; Hudson y Elliott, 2013; Matthes y Naderer, 2015; Naderer et al., 2016; Uribe y Fuentes-García, 2015), los emplazamientos de comida sin marca han sido menos explorados en la literatura previa (Charry, 2014; Dias y Agante, 2011; Naderer et al., 2018). Precisamente son estos últimos emplazamientos los que constituyen el objeto de estudio de la presente tesis. Estas representaciones de alimentos desreferenciadas de marcas concretas son especialmente habituales en un producto de entretenimiento de elevado consumo entre los niños: los dibujos animados o *cartoons* (Habib y Soliman, 2015). Este tipo de medio de entretenimiento presenta un rasgo particular: la comida emplazada es sin marca porque la regulación establece que está prohibido emplazar marcas de productos de todo tipo como medida de protección de la infancia (Campbell, 2005; Federal Communications Commission, 2020).

Los emplazamientos de comida sin marca, al formar parte de la escenas, se caracterizan por presentarse en contextos espontáneos y naturales y son, por lo tanto, poco intrusivos. Esto hace que las habilidades persuasivas de los niños, no tan desarrolladas como las de los adultos (De Jans et al., 2016), estén menos activadas al estar expuestos a estos emplazamientos.

En general, en los niños, el desarrollo de las habilidades para entender los mensajes persuasivos (como los que se transmiten a través de los medios) va asociado a su desarrollo cognitivo, el cual, a su vez está ligado a la edad (Rozendaal et al., 2009). Así, la Teoría del Desarrollo Cognitivo de Piaget (1964) establece una serie de etapas o estadios en los que se divide el desarrollo de los niños: periodo sensoriomotor (desde el nacimiento hasta los 2 años), preoperacional (entre los 2 y los 6 años), de operaciones concretas (entre los 6 y los 12 años) y de operaciones formales (desde los 12 años en adelante). Estos estadios contemplan edades aproximadas por lo que pueden variar según las diferencias individuales de cada niño (Feldman, 2004).

Los niños que se hallan en el periodo preoperacional y en el de operaciones concretas se caracterizan, entre otros aspectos, por "fundir" o "fusionar" fantasía con realidad, principalmente los más pequeños. Es por eso que muestran dificultades a la hora detectar los intentos persuasivos comerciales, especialmente cuando aparecen personajes o eventos

imaginarios (Calvert, 2008). En la presente tesis, el rango de edad que se ha considerado comprende desde los 2 hasta los 12 años dado que es alrededor de estos años cuando los niños ven habitualmente los dibujos animados infantiles y porque los dibujos analizados tienen como público objetivo niños en torno a estas edades (Common Sense Media (CSM), 2018).

Son varias las teorías que en los estudios de los emplazamientos de comida se indican como base para entender los procesos que se desencadenan a nivel cognitivo, afectivo y comportamental en los niños. Una de las más recurrentes (Charry, 2014; Esmaeilpour et al., 2018; Naderer et al., 2016, 2017) es la Teoría Cognitiva Social (TCS) de Bandura (1966).

La TCS (Bandura, 2009; Bandura et al., 1966) establece una relación bidireccional y de influencia recíproca entre las conductas de la personas y su ambiente. Trasladando la teoría al enfoque de esta tesis, los comportamientos alimentarios de naturaleza observable desarrollados por los niños (como elegir un alimento concreto, o consumir una cantidad determinada de comida), estarían incluidos en la categoría de conductas mientras que los mensajes emitidos por los medios de comunicación (entre los que se encuentran los asociados a los emplazamientos de comida) formarían parte del ambiente. También, de la TCS se deprende que durante la visualización de las series infantiles tendría lugar un aprendizaje vicario (por observación): serían los personajes de dibujos animados los "modelos" a imitar para los niños, especialmente aquellos que poseen cualidades valoradas por los pequeños.

Al igual que los emplazamientos de comida con marca, los *non-branded food placements* pueden clasificarse en función de distintas variables o características.

Tipo de comida

Por una parte, se pueden clasificar en función del tipo de comida que aparece representado. El tipo de comida es una variable fundamental en el análisis de los emplazamientos de comida sin marca ya que dependiendo del valor nutricional del alimento, los efectos sobre los comportamientos alimentarios pueden variar (Dias y Agante, 2011; Naderer et al., 2018), al igual que también variarían los efectos finales sobre el sobrepeso y la obesidad infantil. Los alimentos emplazados pueden caer dentro de tres categorías según el tipo de comida: de bajo, medio o alto contenido nutritivo (*low, medium or high nutritional value foods*). La categoría de alimentos de bajo contenido nutritivo incluye aquellos alimentos catalogados como altos en azúcares, grasas o sal (dulces, bebidas azucaradas, *snacks*, comida rápida, entre otros). Entre los alimentos de contenido nutricional medio están los productos lácteos, los huevos, el pescado y la carne blanca mientras que el agua, las

frutas y las verduras entran dentro de la categoría de alimentos de alto contenido nutricional. Esta clasificación responde a las recomendaciones que la OMS (2015) establece para cada tipo de comida: a mayor valor nutricional recomienda mayor frecuencia de consumo.

Valencia del mensaje

También, los emplazamientos de comida se pueden clasificar atendiendo a la valencia del mensaje en el que se transmiten dichas representaciones: positiva, neutra o negativa (Russell et al., 2009). Si la valencia es positiva, el alimento emplazado aparece en contextos de celebración, alegría y satisfacción; si es neutra no se da evaluación del alimento, mientras que si es negativa aparece asociada a contextos desagradables.

Naturaleza educativa del mensaje

De la interacción de las variables valencia y tipo de comida surge lo que se ha denominado "naturaleza educativa" del mensaje. Esta nueva variable, creada expresamente para uno de los estudios que componen la presente tesis, toma 5 valores que varían desde mensajes menos hasta más recomendables en materia de nutrición (Tabla 1).

Tabla 1. Naturaleza educativa de las representaciones de los emplazamientos de comida

Valores	Valencia	Tipo de comida (valor nutricional)	Ejemplos
1	Positiva	Bajo	*¡Me encantan las patatas fritas!, ¡sobre todo con extra de kétchup!*
	Negativa	Alto	*¡Puaj! ¿Brócoli para almorzar? ¿No hay nada mejor?*
2	Neutra	Bajo	*¿Por qué no pedimos unas pizzas?*
	Negativa	Medio	*No me gusta el lenguado, no tiene sabor.*
3	Neutra	Medio	Un vaso de leche representado en la mesa de la cocina a la hora del desayuno.
4	Positiva	Medio	*Hay yogures en el frigo, ¡Deliciosos!*
	Neutra	Alto	Un personaje animado se come una manzana.
5	Positiva	Alto	*¡Ensalada! ¡Rica ensalada para cenar!*
	Negativa	Bajo	*No quiero chuches que luego se me pican los dientes.*

Variables de ejecución

Los emplazamientos de comida sin marca pueden variar también según diferentes variables de ejecución (*execution variables*). Las variables de ejecución se refieren al grado de prominencia con el que los emplazamientos aparecen representados (Balasubramanian et al., 2006). En esta tesis, las variables de ejecución que se han analizado han sido: la modalidad, la conexión con la trama y la posición en pantalla.

La modalidad es una variable recurrente en la literatura sobre emplazamientos (Balasubramanian et al., 2006), ya sean con (Law y Braun, 2000) o sin marca (Charry, 2014). Permite diferenciar entre emplazamientos unimodales o bimodales: los primeros (unimodales) son aquellos que se presentan o bien visualmente, o bien verbalmente, mientras que los segundos (bimodales) se presentan simultáneamente de forma visual y verbal.

La variable conexión con la trama hace referencia al grado en el que el emplazamiento contribuye al hilo argumental del medio de entretenimiento (Russell, 2002). Si la contribución es esencial, el emplazamiento tiene una alta conexión con la trama. De lo contrario el emplazamiento sería de baja conexión con la trama.

Por otra parte, la variable posición en pantalla se limita a aquellas representaciones de alimentos que son visuales (Russell et al., 2009). Son dos las categorías posibles de clasificación: emplazamientos en primer plano (*foreground*) o en segundo plano (*background*).

1.4. Objetivo general y preguntas de investigación

El objetivo general de la presente tesis es el de estudiar los efectos de los alimentos representados en los medios de entretenimiento infantiles, más específicamente, en los dibujos animados, analizando la naturaleza y prevalencia de este tipo de emplazamientos, así como su impacto sobre los comportamientos alimentarios de los niños. A su vez, este objetivo general se descompone en tres preguntas de investigación.

Pregunta de investigación 1

En primer lugar, para investigar si los emplazamientos de comida sin marca representados en los dibujos animados pueden ser factores potenciales que influyan en los comportamientos alimentarios de los niños, es necesario estudiar la frecuencia y la forma en la que aparecen.

Son varios los estudios que han indagado hasta la fecha de qué manera aparecen los alimentos sin marca representados en medios de entretenimiento infantiles. Por ejemplo,

hace más de una década, Radnitz et al. (2008) estudiaron las denominadas "señales de comida" (*food cues*), equivalentes a los emplazamientos de comida sin marca, en programas infantiles dirigidos a niños menores de 5 años. También en ese año, se publicó el estudio de Korr & Jeremy (2008) que se centró en analizar las referencias de comida (*food references*) en programas animados infantiles. Por otro lado, Hahn & Aubrey (2018) investigaron las representaciones de alimentos que aparecían en programas de televisión (emitidos en canales infantiles entre las temporadas de 2004 y 2013) cuyo público objetivo (*target public*) eran preadolescentes (*tweens*) entre 9 y 14 años. Más recientemente, Matthes & Naderer (2019) analizaron cómo aparecían las referencias de comida en una muestra amplia de películas dirigidas específicamente a menores de 12 años o aptas para todos los públicos.

El elemento diferenciador del primer estudio incluido en la presente tesis respecto de los estudios ya realizados es que éste incorpora la variable naturaleza educativa. Es decir, no sólo se analiza el tipo de comida (de mayor o menor valor nutricional) al que aparece asociado el emplazamiento, sino que se indaga en el mensaje global que se transmite: que aparezca un alimento de alto contenido nutricional no necesariamente significa que el mensaje sea "saludable", podría ser un mensaje "poco saludable" si, lo que se está representado es desagrado por el alimento. Además, el primer estudio de esta tesis actualiza los resultados a fechas más recientes y da opción a analizar la evolución de cómo aparecen los emplazamientos de comida sin marca representados en medios de entretenimiento infantiles. Adicionalmente, este primer estudio también indaga en las posibles diferencias que pueden darse en la representación de los emplazamientos de comida sin marca según la edad del público objetivo y el origen geográfico de las series de dibujos animados.

La primera pregunta de investigación quedaría formulada de la siguiente forma:

¿De qué manera y en qué medida aparecen los emplazamientos de comida sin marca representados en los dibujos animados?

De esta primera pregunta de investigación se desprenden los siguientes objetivos específicos:

- Analizar la frecuencia, prominencia y naturaleza educativa de los emplazamientos de comida sin marca representados en los dibujos animados.
- Examinar las diferencias de los emplazamientos de comida sin marca representados en los dibujos animados según la edad del público al que van dirigidos y el origen geográfico de las distintas series.

Pregunta de investigación 2

Los análisis de contenido constituyen uno de los pilares clave a la hora de investigar los emplazamientos de comida de forma sistémica. Muestran cómo aparecen las representaciones de alimentos: su frecuencia, su saliencia o prominencia, la proporción de mensajes educativos respectos de los menos educativos, etc. Sin embargo, para completar la investigación, se requiere de otro pilar, es decir, hacen falta estudios que indaguen sobre los potenciales efectos que estos emplazamientos tienen sobre los comportamientos alimentarios de los niños: se necesitan estudios experimentales.

A su vez, el diseño de un estudio experimental enmarcado dentro del objeto de esta tesis requiere de una investigación previa que indague en los experimentos similares que se han realizado hasta la fecha. Así, las revisiones de la literatura sobre experimentos que analicen los efectos de los emplazamientos de comida serían un buen punto de partida para diseñar nuestro experimento. Sin embargo, hasta la fecha y hasta nuestro conocimiento, no se han realizado revisiones, específicamente sistemáticas, que se hayan centrado en los emplazamientos de comida dirigidos a niños. Sí que existen revisiones sistemáticas y meta-análisis previos cuyo objeto de estudio fueron alimentos que aparecían en otros formatos de entretenimiento como *advergames* (Folkvord y van 't Riet, 2018) o videojuegos (DeSmet et al., 2014), al igual que encontramos revisiones sobre los efectos de la publicidad (Boyland et al., 2016) o sobre el Marketing en general (Sadeghirad et al., 2016). De esta forma, la presente tesis pretende cubrir este *gap* en la literatura sobre las revisiones sistemáticas acerca de los efectos de los emplazamientos de comida a través de uno de los estudios incluidos en la misma.

De la revisión sistematizada de la literatura, se obtiene una aproximación de las variables que podrían estar más implicadas en la efectividad de los emplazamientos de comida. También, desde una lectura global, se pueden observar aquellos formatos o características que han sido menos explorados. Por ejemplo, se podría analizar cuántos de los estudios incluidos han utilizado como formato de entretenimiento dibujos animados retransmitidos en la actualidad.

Por lo tanto, previo al estudio experimental, en el presente trabajo se propone, a modo de transición, una revisión de la literatura que incluya aquellos estudios que hayan investigado los efectos de los alimentos embebidos –en diferentes formatos (entre los que se incluyen los emplazamientos de comida)- en medios de entretenimientos infantiles sobre los comportamientos alimentarios (elección y consumo calórico) de los niños. Esta revisión

comprende una síntesis cualitativa, cuantitativa, así como un análisis de las características que podrían moderar los potenciales efectos.

La segunda pregunta de investigación se formula del siguiente modo:

> Atendiendo a los estudios publicados hasta la fecha, ¿Tienen efectos los alimentos embebidos en medios de entretenimiento sobre la elección y el consumo calórico que realizan posteriormente los niños?

La pregunta de investigación 2, se descompone, a su vez, en los siguientes objetivos:

- Sintetizar la evidencia de los experimentos que estudian los efectos de los alimentos embebidos en medios de entrenamiento infantiles.
- Resumir, de manera cuantitativa, los efectos de los alimentos embebidos en medios de entretenimiento en la elección de comida y el consumo calórico.
- Examinar de qué forma los efectos de los emplazamientos embebidos en medios de entretenimiento infantiles varían según diferentes variables y características.

Pregunta de investigación 3

Finalmente, descendiendo al formato de entretenimiento objeto de la presente tesis, esto es, los dibujos animados, la tercera pregunta de investigación quedaría formulada de la siguiente manera:

> ¿Tienen efectos los emplazamientos de comida sin marca que aparecen en los dibujos animados sobre la elección de alimentos que realizan los niños?

Esta tercera pregunta de investigación se descompone, a su vez, en los siguientes objetivos específicos:

- Aportar evidencias sobre los efectos de los emplazamientos de comida sin marca presentes en las series de dibujos animados sobre la elección de alimentos de los niños.
- Explorar si el tipo de comida emplazada y la modalidad del emplazamiento influyen sobre los efectos de dichos emplazamientos.
- Estudiar si la edad de los niños tiene un rol moderador sobre los efectos de los emplazamientos de comida.

Capítulo 2 Metodología y resultados

Para responder a las tres preguntas de investigación, y, de esta forma, abordar el objetivo general, se emplearon los siguientes tres métodos:

El análisis de contenido fue el empleado para responder a la pregunta de investigación 1. Se analizaron los emplazamientos de comida sin marca que aparecieron en las series de dibujos animados más vistas a nivel internacional. Los detalles sobre la metodología empleada y los resultados del estudio están disponibles en el artículo I.

Para responder a la pregunta de investigación 2, se llevó a cabo una revisión sistemática junto con dos metaanálisis. La estrategia de búsqueda, los criterios de elegibilidad, la selección de los estudios, la extracción de datos y evaluación de la calidad, la síntesis de datos y el análisis estadístico, así como los resultados del estudio están disponibles en el artículo II.

Por último, para responder a la pregunta de investigación 3, se llevó a cabo un experimento. Los detalles sobre los participantes, el procedimiento, los estímulos experimentales, las medidas, el análisis de los datos, así como los resultados están disponibles en el artículo III.

Artículo I

Araque-Padilla, R., Villegas-Navas, V., y Montero-Simo, M. J. (2019). Non-branded food placements in children's entertainment programs: A content analysis. *Health Communication*, *34*(10), 1222–1229. doi:10.1080/10410236.2019.1587690

Artículo II

Villegas-Navas, V., Montero-Simo, M.-J., y Araque-Padilla, R.A. (2020) The effects of foods embedded in entertainment media on children's food choices and food intake: A systematic review and meta-analyses. *Nutrients*, *12*, 964. doi:10.3390/nu12040964

nutrients

MDPI

Review

The Effects of Foods Embedded in Entertainment Media on Children's Food Choices and Food Intake: A Systematic Review and Meta-Analyses

Victoria Villegas-Navas *, Maria-Jose Montero-Simo and Rafael A. Araque-Padilla

Department of Management, Universidad Loyola Andalucía, Escritor Castilla Aguayo St., 4, 14004 Cordoba, Spain; jmontero@uloyola.es (M.-J.M.-S.); raraque@uloyola.es (R.A.A.-P.)
* Correspondence: vvillegas@uloyola.es

Received: 12 February 2020; Accepted: 29 March 2020; Published: 31 March 2020

check for updates

Abstract: While watching or playing with media, children are often confronted with food appearances. These food portrayals might be a potential factor that affects a child's dietary behaviors. We aimed to comprehensively expound the effects of these types of food appearances on dietary outcomes of children. Our objectives were to synthetize the evidence of the experiments that study the effects of foods embedded in children's entertainment media throughout a systematic review, to conduct two meta-analyses (food choice and intake) in order to quantify the effects, and to examine to what extent the effects of foods embedded in entertainment media varies across different moderating variables. We conducted a systematic search of five databases for studies published up to July 2018 regarding terms related to children and foods embedded in entertainment media. We identified 26 eligible articles, of which 13 (20 effect sizes) and 7 (13 effect sizes) were considered for a meta-analysis on food choice and intake, respectively. Most of the studies were assessed as having a middle risk of bias. Overall, food being embedded in entertainment media is a strategy that affects the eating behaviors of children. As most of the embedded foods in the included studies had low nutritional values, urgent measures are needed to address the problem of childhood obesity.

Keywords: foods embedded; entertainment media; meta-analysis; children; choice; intake

1. Introduction

"Ensuring healthy lives and promote well-being for all at all ages" is the third Sustainable Development Goal (SDG) of the 2030 agenda, which was established by the United Nations. Healthy lives include the acquisition of healthy habits. The World Health Organization (WHO) [1] points out several steps to develop a healthy lifestyle: the first step emphasizes the need to eat a nutritious and varied diet. Eating healthy foods helps to maintain a balanced weight and helps to prevent obesity. However, obesity represents a global issue [2] and its prevention starts in childhood. The prevalence of childhood obesity is rising worldwide [3]. Longitudinal studies show that childhood obesity is associated with non-communicable diseases (NCDs), such as cardiovascular, metabolic or pulmonary diseases [4], and with a lower life expectancy [5].

The eating habits of children are not easily influenced; there are multiple factors involved [6]. Regarding the environmental factors, children are surrounded by different food messages that affect their dietary patterns. These food messages come from different sources [6], such as parents [7], schools [8], peers [9] or media [10]. The media environment plays a key role in shaping eating habits, as children spend much of their time in front of a screen—including TV, Desktops, Laptops, Mobile phones, or Handheld Game Consoles [11,12]. The technological revolution has been favoring the exposure of children to food portrayals that do not interrupt the storyline of the corresponding entertainment

media or that cannot be skipped by audiences. This current environment leads us to study what we have labeled "foods embedded in entertainment media".

When foods are embedded in entertainment media, they appear in a natural and spontaneous atmosphere, in comparison to, for example, commercials. Due to its authenticity, children are less aware of the potential persuasiveness of these food portrayals, as compared to ads [13]. Additionally, enjoyment is usually present as children choose and search for the entertainment media they like. Children are exposed to foods that are embedded in entertainment media from a variety of circumstances: while watching TV (in cartoons, sitcoms or TV shows), going to cinema (in movies) or using different digital platforms, playing online or non-online games, visiting brands websites and playing advergames, among others.

Previous studies, based on content analyses, have found that the prevalence and prominence of foods embedded in entertainment media, such as movies [14], advergames [15] or cartoons [16] are high, and a substantial portion of these foods have low nutritional values. Content analyses are highly relevant, when combined with studies that explore the potential effects of foods embedded in entertainment media, to the dietary outcomes of children.

Published systematic reviews and meta-analyses have provided insight about those potential effects. As far as we know, those reviews have focused on whether some specific entertainment formats, such as videogames [17] and advergames [18,19], and whether marketing products in general (food embedded with a clear persuasive intention) [20,21], are impactful tools to modify the eating behaviors of children. However, we have not found systematic reviews or meta-analyses that include a more ample vision of foods embedded in entertainment media. The present study will lead us to have a more global perspective on these food portrayals, not only by measuring their effects, but also by studying different moderating variables that might influence the impact of the embedded foods on the dietary behaviour of children.

There are certain aspects that are recurrent in the literature, as these constitute key elements when measuring the effects of foods embedded in entertainment media. First, as the present study is concerned with a specific type of product, that is, foods, it is essential to differentiate between the types of food according to their health benefits. Sadeghirad and colleagues [21] made that distinction, in their meta-analysis of food marketing, and found that the marketing strategies of low nutritional value foods were associated with higher caloric intake, in contrast to high nutritional value foods (which were not significantly associated with intake). Exploring whether low or high nutritional value foods have similar or different effects is highly relevant to establish policy measures that are aimed at addressing the problem of childhood obesity.

Second, foods embedded in entertainment media might appear, whether associated with a determined brand (branded) or not (non-branded). In branded foods studies, children are usually confronted with foods that belong to the same food category (sweets, chocolates, snacks or soft drinks). For example, in Naderer, Matthes and Zeller [22], children had to choose between three different chocolates: M&M's (target brand), Maltesers, or Dragee Keksi. However, in studies that analyzed non-branded foods, children were confronted with different types of foods. For instance, in Folkvord, Anastasiadou and Anschütz [23] found that children that were presented pieces of mandarins, apples, bananas, and grapes. While the type of food, according to the appearance of brands (branded or non-branded), has not been studied previously in the literature, and we consider that this distinction is relevant as there is a qualitative leap between both types of foods (branded and non-branded) when exploring the effects of foods embedded in media.

Third, other characteristics are intrinsically associated with how embedded foods appear; these are the integration characteristics [14] (also known as execution factors [24] or composition characteristics [25]). The integration characteristics that the present meta-analysis will consider are two of the most studied integration characteristics: modality and plot connection [26–28]. Regarding modality, previous studies suggest that foods that are embedded bimodally (that is, portrayed both visually and verbally) are more likely to have effects in terms of recall, recognition and behavioral outcomes, such as increasing choice [26],

than unimodal foods (that is, those that are portrayed whether visually or verbally). However, plot connection refers to the degree in which the food appearance is connected to the storyline. A food portrayal is connected to the plot when the food appearance is essential, that is, in the case where the food was removed, the storyline would be senseless [16]. Similar to bimodal embedded foods, it is assumed that foods connected with the plot are associated with greater food effects, as children pay more attention to these portrayals, which integrate them in a deeper way [22].

Fourth, watching (for example, movies, cartoons, and sitcoms) and playing (for example, videogames or advergames) entertainment media constitute different activities: the second requires active interaction, while the first does not (passive interaction); previous meta-analyses have explored this distinction [21], and the present review will take this aspect into account.

Fifth, the age of children is another variable that has been extensively studied in the literature [13,22,29,30]. Whereas some studies did not find moderating effects of children's age [13,22], others did [29,30]. In general, it is assumed that the cognitive abilities of children, as well as persuasion knowledge, improve as children age [31,32].

Therefore, given the influence that foods embedded in entertainment media have on the eating behaviors of children, we aimed to systematically review the studies that measure the effects of the food portrayals that target children. Our objectives were to: (1) synthetize the evidence of the experiments that study the effects of foods embedded in entertainment media; (2) conduct meta-analyses to determine the effects of these portrayals on food choice and food intake; and (3) examine to what extent the effects of the aforementioned foods embedded in entertainment media vary across the moderating variables.

2. Materials and Methods

The current systematic review was reported in accordance with the Preferred Reported Items for Systematic Review and Meta-analysis (PRISMA) statement [33] (Table S1). The protocol of this review was retrospectively registered with PROSPERO in July 2019 (ID CRD42019125907) [34].

2.1. Search Strategy

The following five electronic databases were searched during July 2018: Academic Search Ultimate, Business Source Ultimate, MEDLINE, PsycINFO and PubMed. The language of the search was limited to English. No date restriction was placed on the search. The search strategy is available in Table S2 (keywords had a unique domain: foods). Additionally, we undertook forward and backward citation tracking from the identified papers in order to collect articles that use different terminology. The database search results were imported into Mendeley Desktop software and duplicates were removed.

2.2. Eligibility Criteria

Studies were eligible for inclusion in the systematic review if (i) participants were children aged under 12 years (as children aged above 12 years are considered adolescents [35] and they were not the focus of the present study); (ii) interventions included foods exposure in entertainment media targeted at children (the media considered in the inclusion criteria were both watching and playing entertainment media, excluding social media); (iii) they included parallel comparison groups that were not exposed to embedded foods or that were exposed to different embedded foods to the intervention condition; and (iv) reported outcomes included either food choice or food intake.

Eligibility criteria for the meta-analyses were more restrictive—not only did the studies need to fulfil the criteria for the systematic review, they also had to include a suitable comparison group (participants who were not exposed to the object of the embedded foods study).

2.3. Study Selection

Double independent searching for eligible studies, by viewing titles and abstracts, was conducted by two researchers (IC and VV). The full texts of all potentially relevant studies were obtained and

assessed against the inclusion criteria by IC and VV. Disagreements about the eligibility of a study was resolved by discussion and consensus by a third author (MM).

2.4. Data Extraction and Quality Assessment

Relevant information was extracted: general study information (authors' names, publication year, journal, and study location), study population details (sample size, age, and ratio of female vs. male), name of the embedded target food(s), entertainment media used to embed the food, intervention components, behavioral outcomes (differentiating between choice and intake) and information to assess the risk of bias.

Additionally, data was codified independently by IC and VV for the type of food, according to its healthiness, type of food according to the appearance of brands, plot connection, modality, type of entertainment media and quality assessment. When codifying the type of food according to its healthiness, three categories were considered, following the World Health Organization (WHO) [36] criteria: low nutritional value foods (those that are high in fats, sugars or salts such as snacks, sweets or soft drinks), mixed nutritional value foods (such as dairy products, white meat, fish, eggs, and legumes) and high nutritional value foods (such as fruits and vegetables). When codifying the type of food according to the appearance of brands, two categories were considered (branded and non-branded foods). If one of the variables could not be encoded (because there was not enough information in the article or because we could not contact the respective authors of the included studies), they were not categorized. To codify the plot connection, the contribution that the embedded food made to the storyline was differentiated between essential (plot connected) or not essential (plot disconnected). Modality was codified by differentiating between unimodal (the food is only seen or only mentioned) or bimodal (the food is both seen and mentioned). The type of entertainment media codification showed the difference between those media that require only watching and those media that combine watching and playing. Age was codified according to the major cutoff points in terms of child knowledge of advertising [31,37]: up to 5 years, from 6 to 7 years and from 8 to 12 years. When further information about a study was required, the corresponding authors were contacted.

We used the Cochrane risk of bias tool [38] to assess the quality of the studies. The quality assessment was codified according to the risk of bias of each: low (risk of bias punctuation up to 3), middle (risk of bias punctuation from 4 to 5) and high (risk of bias punctuation higher than 5).

2.5. Data Synthesis and Statistical Analysis

To assess the effects of foods embedded in entertainment media on the food behavioral outcomes of children, we used two effect measures: risk ratio (RR) and mean difference (MD). The food choice of children was reported as the percentage of children who preferred the object of the target food study. We treated this as a dichotomous variable (yes/no) and pooled eligible trials using the RR and the corresponding 95% confidence intervals (CIs). We calculated the MD, and its corresponding 95% CIs, for dietary intake, which were reported as kilocalories (kcal) of foods/beverages consumed during or immediately after the experiment. As the MD can only be used when all the outcomes are measured on the same scale, we transformed the data from the results that were not reported in kcal [39] (e.g., grams). Data analysis was conducted using the random effects models with RevMan and Comprehensive Meta-Analysis software. An a priori assumption guided this choice. As the studies were not identical, we assumed that a true effect size was not possible. Statistical heterogeneity was evaluated using the I^2 statistic. In addition, we calculated the Q statistic and its p value.

Moderator analyses were conducted based on the codified data. We did not conduct the moderator analysis on the type of food according to its healthiness on food intake, because kcal might not be a sensible outcome measure, given that low and high nutritional value foods tend to be different in kcal [36]. It is relevant to highlight that a different trial within the study was considered when the experimental group was composed of children from different regions, or when the experimental exposure varied between conditions, either for the embedded food or for the execution variables used.

Additionally, we considered that, to compare the categories within a moderator analysis, each category had to be composed of at least two trials. We tested for interaction using a chi-square significance test [40] for moderator analyses. Publication bias was examined throughout funnel plots in order to detect possible reporting biases in the meta-analysis via visual inspection, and by using both Egger's regression method [41] and a trim-and-fill analysis [42].

3. Results

In total, 1624 unique studies were identified through database searches, of which, 26 [13,22,23,26,29,30,39,43–61] were deemed eligible for inclusion. Compared to the studies included in similar, previous systematic reviews [62] and meta-analyses [17–21], the present meta-analysis contained 12 extra studies [22,23,26,29,30,49,51,52,55,56,58,60]. The PRISMA flow diagram is provided in Figure 1.

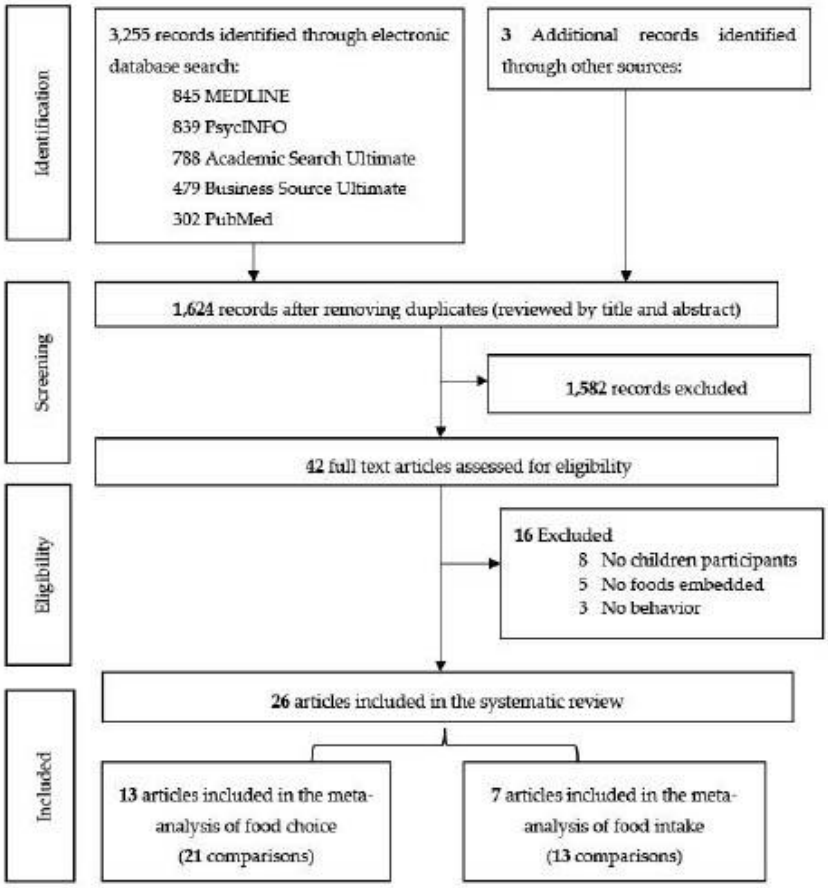


Figure 1. PRISMA diagram of search strategy.

The inter-coder agreement reached during the eligibility phase was substantial (kappa = 0.79, 95% CI 0.59–0.97). The observed agreement was 90.2% (37/41 decisions). While the reasons for exclusion were not mutually exclusive, when deciding whether the article had to be included or not, we considered three reasons, which are shown in order in Figure 2. The inter-coder agreements reached during codification varied, ranging from the lowest kappa obtained (kappa for modality = 0.52, 95%

CI 0.13–0.92) to the highest kappa obtained (kappa for branding = 1, 95% CI 1–1). A summary of the studies is provided in Table S3.

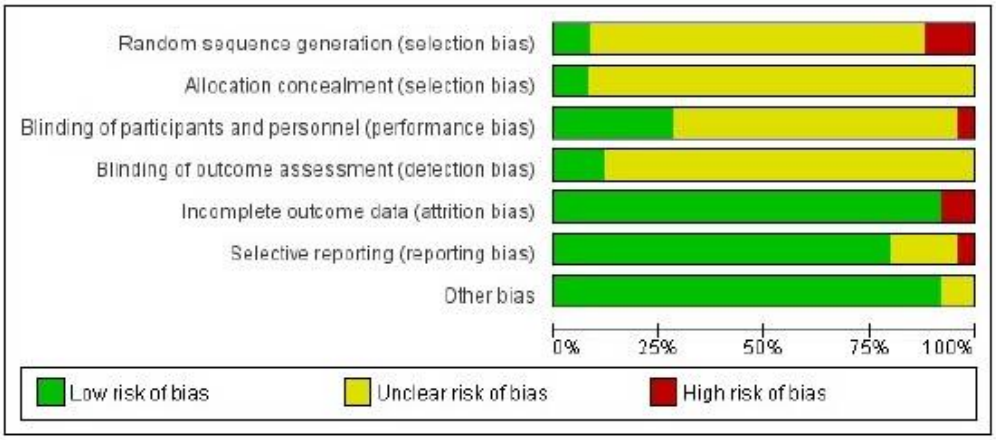


Figure 2. Risk of bias graph.

3.1. Results of the Systematic Review

Table 1 presents a synthesis of the characteristics of the included studies in the systematic review and also separately shows a summary of the characteristics of the included comparisons for both the meta-analyses on food choice and food intake. A quality assessment summary is represented in Figure 2 (Table S4).

Overall, and according to Table S3, foods embedded in entertainment media reported significant effects on food choice [13,22,26,30,43,50–52,55,59–61]. However, six studies did not find significant effects of foods embedded in entertainment media on food choice [49,53,54,56–58]. Two of these studies inserted foods digitally (that is, subtly) [49,56], and there was another study where the mean age of the participants was approximately 12 years (that is, the older children group) [58]. Additionally, one study reported significant effects when there was an interaction between the type of food and the childrens age: low nutritional value foods embedded in cartoons were more likely to present effects when children were younger than 9 [29].

Most of the studies about foods embedded in entertainment media in the systematic review were also likely to present effects on food intake [23,44–46,48]. However, there were two studies that did not report significant effects on food intake [47,60]. While Brown and colleagues [60] found significant food choice effects of foods embedded in the analyzed movie, they did not find effects of the same embedded foods on intake. In addition, in Folkvord and colleagues' study [47], the foods embedded (advergames) did not influence the later intake. However, the intake measures were not taken immediately after advergame exposure [47]. However, in Harris and colleagues' study [39], significant effects were found when comparing low and high nutritional value advergames, but not when comparing each type of advergame condition with the control group.

Table 1. Synthesis of characteristics of the included studies.

Characteristics	Included in The Systematic Review (26 Studies)	Included in The Meta-Analysis for Food Choice (13 Studies, 21 Comparisons)	Included in The Meta-Analysis for Food Intake (7 Studies, 13 Comparisons)
Number of children	5747	2516	1621
Median mean age [1] (years)	9.2	9	8.9
Median sample size	139	79	127
Study's region performance			
Europe	17	13	10
North America	6	5	3
South America	1	2	0
Asia	1	0	0
Australia	1	1	0
Quality assessment			
Low risk of bias	7	9	6
Middle risk of bias	16	10	6
High risk of bias	3	2	1
Type of foods			
Exclusively low nutritional value foods	14	18	10
Mixed (low and high nutritional value foods)	10	2	0
Exclusively high nutritional value foods	2	1	3
Branding			
Branded	17	16	12
Non-branded	8	5	1
Combined (branded and non-branded)	1	0	0
Plot connection			
Connected	13	15	0
Disconnected	7	6	13
No categorized	6	0	0
Modality			
Unimodal	8	8	0
Bimodal	10	11	1
No categorized	8	2	12
Entertainment media used to embed the foods			
Media that requires only watching			
Movies	5	8	1
TV shows	2	0	0
Cartoons (designed for the experiment)	2	6	0
Cartoons (real)	2	3	0
Sitcoms	0	1	0
Media that combines watching and playing			
Videogames (designed for the experiment)	4	0	0
Videogames (real)	0	0	0
Advergames (designed for the experiment)	5	0	10
Advergames (real)	5	3	2

[1] Median was calculated once the mean age of the included studies was extracted.

3.2. Results of the Meta-Analyses

Of the 26 articles included in the systematic review, 13 and 7 articles were considered for meta-analysis on food choice and food intake, respectively (which resulted in 20 and 13 comparisons, respectively).

3.2.1. Food Choice

Considering the 21 comparisons of food choice, children exposed to foods embedded in entertainment media had a greater risk of choosing the foods embedded, as compared to children who were not exposed to such foods (RR = 1.41, 95% CI 1.14 to 1.75, $p < 0.001$, $I^2 = 74\%$; Figure 3; Table 2).

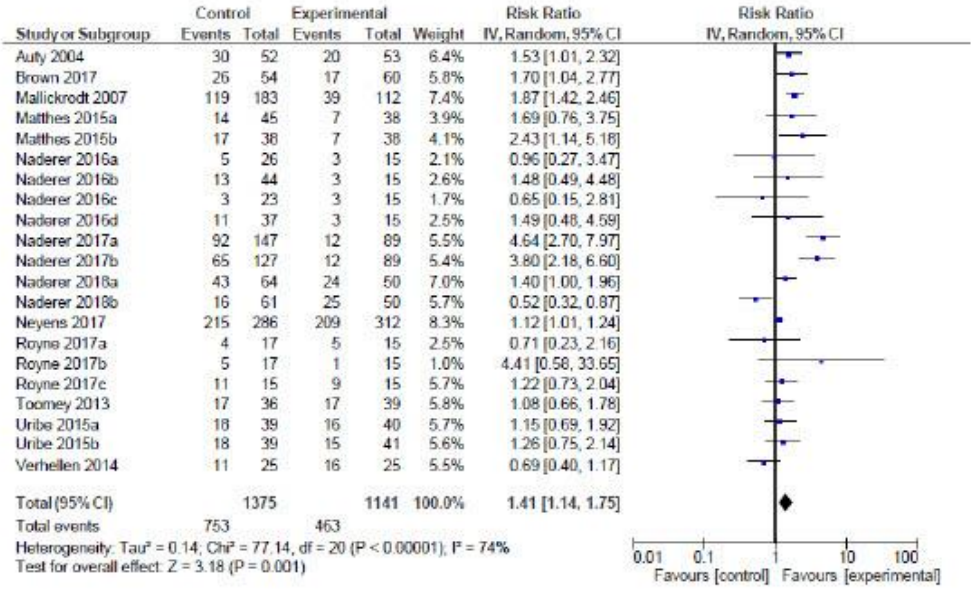


Figure 3. Forest plot of effect sizes on food choice.

Table 2 reports the moderator analyses of foods embedded in entertainment media on choice. Considering the *p*-value interaction of the moderator analyses on choice, only the modality shows a statistically significant moderator effect ($p = 0.039$). The effects of foods embedded in entertainment media are greater for bimodal, rather than for unimodal portrayals. However, there is a substantial, unexplained heterogeneity between the trials within the bimodal moderator category ($I^2 = 79.74\%$). Therefore, the validity of the effect estimate for modality is uncertain, as individual trial results are inconsistent.

However, Table 2 shows the moderator analyses with non-significant *p*-values for interaction, but significant *p*-values for one of the included categories within the moderator analyses. Those are the cases of the moderator analyses of the type of foods (significant *p*-value for low nutritional value foods), branding (significant *p*-value for branded foods), plot connection (significant *p*-value for foods connected with the plot), entertainment media activity (significant *p*-value for the watching activity) and quality assessment (significant *p*-value for middle risk of bias studies). In all of these cases, there were a predominant number of trials within the specific category, as compared to the contrasting one (for example: 18 trials of low nutritional value foods against 2 trials of mixed nutritional value foods). Additionally, according to the I^2 value, those categories showed important, unexplained heterogeneity.

Lastly, when analyzing age, the *p*-value for interaction was also non-significant. However, children aged from 6 to 7 years and from 8 to 12 years showed a significantly increased risk of choosing the embedded foods.

Table 2. Results of the moderator analyses of studies investigating the effects of foods embedded in children's entertainment media on choice.

	Trials	RR	95% LL	95% UL	Exp. (N)	Cont. (N)	*p*-Value	*p*-Value for Interaction	I^2
Type of foods									
Low nutritional value foods	18	1.52	1.23	1.87	1280	1061	0.000	0.954	72.88
Mixed nutritional value foods	2	1.44	0.25	8.28	34	30	0.684		58.34
High nutritional value foods	1	–	–	–	–	–	–		–
Branding									
Branded	16	1.55	1.21	1.99	1,201	996	0.000	0.150	68.76
Non-branded	5	1.02	0.61	1.71	174	145	0.939		
Plot connection									
Disconnected	6	1.10	0.80	1.51	134	114	0.559	0.124	0.000
Connected	15	1.51	1.17	1.94	1241	1027	0.001		
Modality									
Unimodal	8	0.99	0.74	1.34	204	130	0.961	0.039	0.000
Bimodal	11	1.61	1.14	2.26	702	587	0.007		79.74
No categorized	2	–	–	–	–	–	–		
Activity									
Watching	18	1.48	1.13	1.95	881	692	0.005	0.734	68.82
Playing	3	1.19	0.77	1.83	494	449	0.444		87.19
Age									
Up to 5 years	–	–	–	–	–	–	–		
From 6 to 7 years	5	1.73	1.34	2.22	313	172	0.000	0.266	0.000
From 8 to 12 years	16	1.41	1.11	1.81	1062	969	0.005		77.79
Quality assessment									
Low risk of bias	9	1.26	0.89	1.78	390	289	0.197	0.692	53.86
Middle risk of bias	10	1.55	1.10	2.19	895	753	0.012		84.48
High risk of bias	2	1.36	0.88	2.11	90	99	0.172		37.67

Abbreviations: Risk Ratio (RR), Lower Limit (LL), Upper Limit (UL), Experimental (Exp.), Control (Cont.).

3.2.2. Food Intake

According to the 13 comparisons included in the meta-analysis of food intake, children exposed to foods embedded in entertainment media significantly increased the kcal consumed during or shortly after the experiment, as compared to children who were not exposed to the embedded foods (MD = 25.51, 95% CI 14.37 to 36.66, $p < 0.000001$, $I^2 = 88\%$; Figure 4).

We could only assess the planned moderator analyses for age and quality assessment, as we had insufficient data to assess the rest of the moderators (we determined that one trial was not enough to compare within the moderator category), as shown in Table 3.

The test for age moderator differences suggests that there is a statistically significant moderating effect ($p = 0.016$). While both age groups reported significant effects in terms of MD, the effects of foods embedded in entertainment media on intake are greater for children aged from 6 to 7 years than for children over 8 years. However, there is a substantial, unexplained heterogeneity (I^2) between the trials of children aged from 8 to 12 years.

Lastly, the test for the moderator quality assessment indicates that there is no statistically significant moderator effect ($p = 0.259$), suggesting that the study risk of bias does not modify the effects of foods embedded in entertainment media. However, significant *p*-values were found for the categories considered in this moderator analysis: low and middle risk of bias (the low category being the one which reported the highest MD).

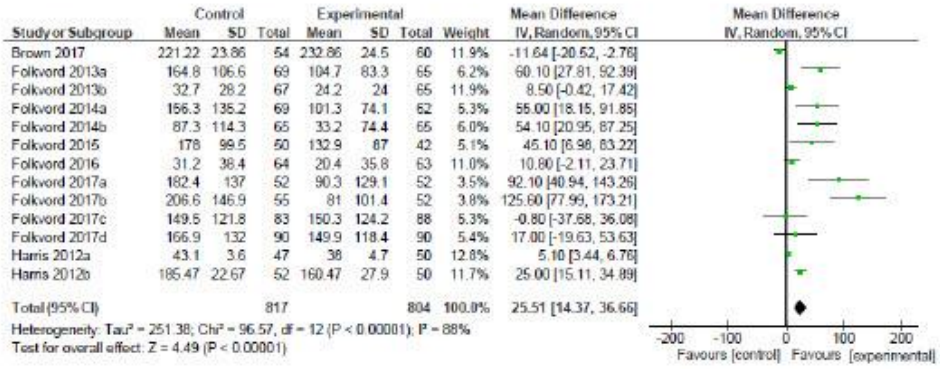


Figure 4. Forest plot of effect sizes on food intake.

Table 3. Results of the moderator analyses of studies investigating the effects of foods embedded in children's entertainment media on intake.

	Trials	MD	95% LL	95% UL	Exp. (N)	Cont. (N)	*p*-Value	*p*-Value for Interaction	I^2
Age									
Up to 5 years	–	–	–	–	–	–	–		–
From 6 to 7 years	2	54.49	29.53	79.45	134	127	0.000	0.016	0
From 8 to 12 years	10	20.89	9.64	32.14	683	677	0.000		87.64
Quality assessment									
Low risk of bias	6	46.55	11.52	81.58	416	412	0.009	0.259	87.17
Middle risk of bias	6	24.70	10.14	39.25	347	332	0.001		85.46
High risk of bias	1	–	–	–	–	–	–	–	–

Abbreviations: Mean Difference (MD), Lower Limit (LL), Upper Limit (UL), Experimental (Exp.), Control (Cont.).

3.3. *Publication Bias*

Funnel plots are a primary visual tool to explore publication bias in meta-analyses and they show the distribution of effect sizes [63]. These graphs are named funnel plots because of the symmetric shape they are expected to have. At the bottom of the funnel plot, we can find those studies that are smaller (larger standard error), and while we are approximating to the top, we find those studies that have a larger sample size. Additionally, it is expected that each study (represented by the effect size) on one side of the funnel plot has "its equivalent" on the other side. However, when funnel plots are not symmetric, it might be possible that publication bias exists. Publication bias is frequent when it is not possible to find published studies with small sample sizes that simultaneously found no or only small measure effects [64]. Taking these considerations into account, a visual inspection of funnel plots was performed for both food choice and food intake (Figures 5 and 6).

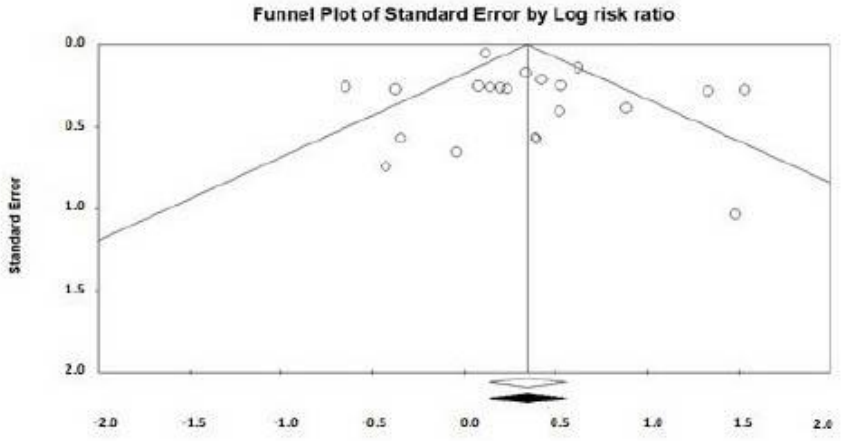


Figure 5. Funnel plot based on food choice.

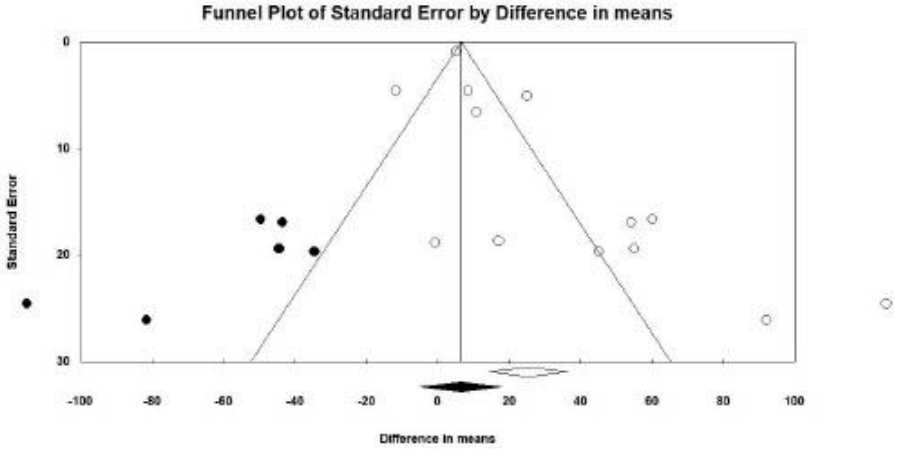


Figure 6. Funnel plot based on food intake.

Both figures represent funnel plots with imputed studies (in this study, with imputed comparisons) after adjusting for publication bias. The included studies are illustrated as white dots, while the imputed studies are the dots colored in black. Imputed studies try to provide symmetry to the graph [42]. While the funnel plot, based on food choice, did not present imputed studies (Figure 5), the funnel plot based on food intake did (Figure 6). Specifically, six studies were imputed, which suggests that there is evidence of asymmetry. In addition, the white diamonds represent the overall effect of the included studies, while the black diamond represents the effect once imputed studies have been considered. There was no variation in the diamonds (black and white) of the funnel plot, based on food choice (Figure 5), but there was a variation in the diamonds of the funnel plot, based on food intake (Figure 6): the new diamond (black) includes the null value (which would mean a weakening or even disappearance of the overall effect).

Lastly, we formally examined publication bias with the use of Egger's test [41]. The Egger's test p value was 0.252 for food choice and 0.02 for food intake, which suggested that there is evidence of asymmetry in the case of studies that measure food intake but could be attributed to publication bias.

4. Discussion

In the present systematic review, 26 articles from studies that experimentally manipulated the exposure of foods embedded in children's entertainment media and measured behavioral outcomes were identified. We conducted two meta-analyses, according to the behavioral outcomes measured: food choice (13 articles, which contributed 21 effect sizes) and food intake (7 articles, which contributed 13 effect sizes). Overall, most of the studies focused on embedded foods that had low nutritional values, and were branded, connected with the plot and bimodal.

The results of the present systematic review on food choice suggest that foods that are embedded subtly, such as those inserted digitally [49,56], are less likely to present effects than those embedded more prominently, such as those that are connected with the plot [65] or that show interactions with the character(s) [22]. The results also show that, as children grow up, they might be less persuaded by foods embedded in entertainment media [58]. In addition, it might be possible that it is the interaction of several variables that makes foods embedded in entertainment media more impactful: the combination of low nutritional value foods targeted to children younger than 9 years old [29].

The direction of the results of foods embedded in entertainment media on food choice or intake might differ, as Brown and colleagues [60] found effects of the embedded foods on food choice, but not on food intake. Additionally, most of the outcomes measured in the included studies were taken immediately after exposure of the embedded foods. However, when measuring with a more ample timeframe, the effects were not found [47]. This is highly relevant as children might refrain from their impulses to eat the embedded foods if they do not have direct access to those foods.

Regarding the meta-analyses, we found that the exposure of children to foods embedded in entertainment media increased the likelihood of choosing the embedded foods (food choice). Moreover, children were more likely to increase their consumption of the foods (food intake), either during or shortly after exposure to the embedded foods. Therefore, embedding foods in children's entertainment media seems to be a strategy that influences the food behaviors of children.

As indicated beforehand, previous literature (individual studies) has explored what makes foods embedded in children's entertainment media more impactful in regards to affecting children's food behavior. In the present study, moderator analyses were performed to explore those characteristics that might affect the effects of foods embedded in children's media.

In the present meta-analysis, when measuring food choice, the moderator type of food did not reveal significant differences in terms of interaction. However, when analyzed separately, low nutritional value foods were associated with an increase in the risk of choosing the embedded foods. These results are in consonance with previous meta-analyses that focused on low nutritional value foods exposure targeted to children in regards to behavioral outcomes [18,20,21]. For example, in Folkvord and Van't Riet's [18] study, it was found that advergames that promote low nutritional value foods induced unhealthy eating behavior among children. In addition, Boyland and colleagues [20] found that exposure to unhealthy food advertising was associated with higher food intake. Sadeghirad and colleagues' meta-analysis [21] showed that unhealthy food marketing leads to an increased risk of children selecting the commercial's products. Overall, our study provides another contribution to the effects of low nutritional value food portrayals targeted at children. There are several reasons why low nutritional value foods are impactful: they are enjoyed while eating [66], they elicit implicit affective evaluation [67], they elicit high attention [68], among others.

However, branding did not moderate the effects of foods embedded in entertainment media. However, when considered separately, branded embedded foods were significantly associated with greater risks of choosing the foods, as compared to non-branded foods. These results might be due to the higher engagement that branded foods included in the studies had in the meta-analysis on food choice, as compared to non-branded foods. The marketing food industry spends large amounts of money in communicating their products and this is translated into appealing and child-oriented food messages [69].

As far as we know, plot connection has not been explored in previous meta-analyses. While significant differences were not found in terms of interaction, embedded foods connected to the plot were associated with increased risks of selecting the foods, as compared to those that were disconnected. Embedded foods connected to the plot might work as prominent stimuli that facilitate recognition and lead to increased positive evaluations [28].

Regarding modality, our results showed significant differences in terms of interaction: bimodal embedded foods were associated with greater risks of choosing the foods than the unimodal ones. While studies on adults showed that bimodal embedded foods might be self-defeating when changing food preferences [27], it seems that, in the case of children, bimodal portrayals constitute an impactful tool. According to Dual Coding Theory (DCT) [70], modality might work as a hierarchical sequential structure where bimodal embedded foods are more extended than the unimodal ones, making bimodal embedded foods more salient.

We found a previous meta-analysis that explored the distinction between advergames and TV advertising [21] that found non-significant differences in terms of effects. In the present meta-analysis, we explored the moderator type of entertainment media (confronted watching vs. playing activity) and we non-significant results in terms of interaction. However, when analyzed separately, watching activity showed significant effects (as compared to playing activity). These results are in consonance with previous literature that suggests that the activity of playing (active reception and high interactivity) might present equal effects with the activity of watching (passive reception and low interactivity) [71].

Finally, the age of the participants was explored in previous meta-analyses on food marketing [20,21]. A study by Boyland and colleagues [20] examined the differences between children and adults, and found that, in the short term, food advertisements were associated with increases in food intake in the case of children, but not in adults. Similarly, in a study by Sadeghirad and colleagues [21], children under 8 years of age were influenced by food marketing strategies at a conative level (preferences). Our findings suggest that a child's age might act as a moderating variable; younger children (aged 6–7) were the ones associated with increases in both the measured behavioral outcomes during and after exposure to foods embedded, as compared to older children (aged 8–12). These results are in line with previous studies concerning the influence of age on the persuasive skills developed during childhood, i.e., the younger the child, the less persuasive skills they have [37], and therefore, their strategies to defend against the effects of foods embedded in entertainment media are less developed.

Regarding quality assessment, none of the behavioral measures were significant in terms of their moderator interaction. A previous meta-analysis [21] by Sadeghirad and colleagues found similarly nonsignificant results for food choice, although significant differences were found for dietary intake (low risk of bias studies were associated with greater increases in caloric intake than high risk of bias studies). However, we found significant effects in studies rated with a middle risk of bias on food choice (in contrast to the non-significant effects of studies rated with a high and low risk of bias). Unexpectedly, studies rated with middle quality assessment were more likely to have an effect than those rated with high quality assessment (low risk of bias) on food choice. However, when it comes to food intake, studies rated with low risk of bias reported higher caloric intake than those rated as middle risk of bias, which is consonance with previous meta-analyses [21]. Lastly, it is important to highlight that the outcomes of food choice are more robust than those related to food intake: we did not detect publication bias for food choice but did for food intake. A possible explanation might be that, according to Cruwys, Bevelander and Hermans' review [9], modeling of food choice is less prominent than modeling of food intake. When it comes to modeling food choice (in contrast with modeling food intake), the pre-existing preferences of people might act as a mediator for the effects of foods embedded in entertainment media. That is, the effects of foods embedded in entertainment media on food choice might decrease or even disappear when the pre-existing preferences of children emerge. That might be the reason why we found more published studies with small sample sizes with no or small measure effects on food choice, as compared to food intake.

As the protocol was not prospectively registered, this constitutes a limitation. Additionally, we did not use a generalist research platform (such as Google Scholar), which might have provided more studies not included in the present systematic review, and we did not include unpublished material. As important, unexplained heterogeneity was obtained for both food choice and food intake, moderator analyses were conducted to explore it. Overall, although moderator analyses did not reveal a unique key characteristic that explained the heterogeneity found, the results of the meta-analyses show a draft about what aspects (characteristics) might be more relevant when measuring the effects of foods embedded in entertainment media. Additionally, it might be possible that some of the moderator analyses were not able to detect differences: a small number of trials and participants in the case of foods that were high in nutritional value, which were non-branded, not connected with the plot and that were associated with the playing activity might be the reason for the undetected differences. Additionally, as the moderator analysis age was calculated according to the mean age of the participants, the results might be affected by the age the standard deviation of some of the included studies. In addition, the meta-analysis included experiments conducted at a specific moment in time, and as Sadeghirad and colleagues [21] noted in their meta-analysis about food marketing, we could not assess the cumulative effects that exposure to the embedded food had on children over their lifetime.

Most of the studies included in the present systematic review have been conducted in recent years and might reflect the relevance that the study of foods embedded in entertainment media is acquiring currently and the increasing concern about how this strategy affects the food behaviors of children and eventually childhood obesity.

The problem of childhood obesity has acquired the label of an 'epidemic' in the last decades [72,73]. As previous research indicates, it is widely accepted that food marketing acts as a contributing factor to the problem [18,20,21]. Foods embedded in entertainment media might constitute another marketing strategy (in the case of branded foods) or it might not (non-branded foods). In any case, food portrayals represent a powerful communication tool that affects the eating habits of children. In 2010, the WHO established a set of recommendations on the marketing of foods and non-alcoholic beverages to children [2], and foods embedded in entertainment media was considered to be one of the marketing techniques involved in the problem of childhood obesity. As low recommended foods are prevalent in entertainment media [14–16], combined with the results of this present meta-analysis, urgent action is needed to address the problem of childhood obesity. We recommend that policymakers pay special attention to the target age of the entertainment media (as younger children are more vulnerable to the influence of foods embedded in entertainment media) when designing public policies. We also recommend, to the bodies involved, that non-branded foods embedded in media are not forgotten, as the regulation of the embedded foods have focused more on branded foods [74]. Additionally, we suggest to the relevant bodies focusing on the regulation of specifically, low nutritional value foods, as the overconsumption of these foods lead children to gain excessive weight. Lastly, execution variables (particularly modality) should also be considered by the corresponding bodies because they might be associated with the effects of foods embedded in entertainment media.

We believe that not only public bodies should take these results into account, but also media designers (such as cartoons designers), as they are the first implicated in the creation of the foods that appear as embedded in children's entertainment media.

5. Conclusions

Considering the present systematic review and meta-analyses, foods embedded in children's entertainment media are communication tools that influence the eating behaviors of children (both food choice and food intake). As the included studies focused on low nutritional value foods, the contribution to the main effects was mostly due to these types of foods. Unfortunately, children are frequently exposed to low nutritional foods embedded in media [14–16]. On the whole, the present study demonstrates the need for greater legislation regarding the foods embedded in entertainment media (cartoons, movies, TV shows, sitcoms, videogames, advergames, etc.) by policymakers,

especially considering that those foods are low in nutritional value, as this is one of the main variables that will largely affect the problem of childhood obesity. Addressing the problem of childhood obesity requires a holistic approach that combines not only the present focus of this study, but also school-based interventions, parental practices, and other environmental factors [6], which are aimed at reducing the current obesogenic environment.

Supplementary Materials: The following are available online at http://www.mdpi.com/2072-6643/12/4/964/s1, Table S1: PRISMA checklist, Table S2: Search strategy, Table S3: Summary of the studies, Table S4: Qualitative assessment.

Author Contributions: All review authors (V.V.-N., M.-J.M.-S. and R.A.A.-P.) contributed to the development of the review. V.V.-N., M.-J.M.-S. and R.A.A.-P. contributed to the conceptualization and methodology of this research. V.V.-N. contributed to the data analysis and to the writing of the original draft preparation. V.V.-N., M.-J.M.-S. and R.A.A.-P. contributed to the writing review and editing. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Acknowledgments: The authors wish to thank Inmaculada Carpio (IC) for her assistance when assessing the agreements and codifying the categories of the variables studied. Additionally, we would like to thank the scholars that provide the required information of their studies.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. WHO. A Healthy Lifestyle. 2020. Available online: http://www.euro.who.int/en/health-topics/disease-prevention/nutrition/a-healthy-lifestyle (accessed on 24 February 2020).
2. WHO. *Set of Recommendations on the Marketing of Foods and Non-Alcoholic Beverages to Childern*; World Health Organization: Geneva, Switzerland, 2010; Available online: https://apps.who.int/iris/bitstream/handle/10665/44416/9789241500210_eng.pdf;jsessionid=B17DA467FA1103A88E3C34FDB4490E3F?sequence=1 (accessed on 27 July 2019).
3. Bhadoria, A.; Sahoo, K.; Sahoo, B.; Choudhury, A.; Sufi, N.; Kumar, R. Childhood obesity: Causes and consequences. *J. Fam. Med. Prim. Care* **2015**, *4*, 187. [CrossRef] [PubMed]
4. Daniels, S.R. Consequences obesity childhood. *Future Child.* **2006**, *16*, 47–67. [CrossRef] [PubMed]
5. Swinburn, B.A.; Sacks, G.; Hall, K.D.; McPherson, K.; Finegood, D.T.; Moodie, M.L.; Gortmaker, S.L. The global obesity pandemic: Shaped by global drivers and local environments. *Lancet* **2011**, *378*, 804–814. [CrossRef]
6. Scaglioni, S.; De Cosmi, V.; Ciappolino, V.; Parazzini, F.; Brambilla, P.; Agostoni, C. Factors influencing children's eating behaviours. *Nutrients* **2018**, *10*, 706. [CrossRef] [PubMed]
7. Yee, A.Z.H.; Lwin, M.O.; Ho, S.S. The influence of parental practices on child promotive and preventive food consumption behaviors: A systematic review and meta-analysis. *Int. J. Behav. Nutr. Phys. Act.* **2017**, *14*, 47. [CrossRef] [PubMed]
8. Safan, M.; Murillo, A.L.; Wadhera, D.; Castillo-Chavez, C. Modeling the diet dynamics of children: The roles of socialization and the school environment. *Lett. Biomath.* **2018**, *5*, 275–306. [CrossRef]
9. Cruwys, T.; Bevelander, K.E.; Hermans, R.C.J. Social modeling of eating: A review of when and why social influence affects food intake and choice. *Appetite* **2015**, *86*, 3–18. [CrossRef]
10. Calvert, S.L. Children as consumers: Advertising and marketing. *Future Child.* **2008**, *18*, 205–234. [CrossRef]
11. Stiglic, N.; Viner, R.M. Effects of screentime on the health and well-being of children and adolescents: A systematic review of reviews. *BMJ Open* **2019**, *9*, e023191. [CrossRef]
12. Robinson, T.N.; Banda, J.A.; Hale, L.; Lu, A.S.; Fleming-Milici, F.; Calvert, S.L.; Wartella, E. Screen media exposure and obesity in children and adolescents. *Pediatrics* **2017**, *140*, S97–S101. [CrossRef]
13. Matthes, J.; Naderer, B. Children's consumption behavior in response to food product placements in movies. *J. Consum. Behav.* **2015**, *14*, 127–136. [CrossRef]
14. Matthes, J.; Naderer, B. Sugary, fatty, and prominent: Food and beverage appearances in children's movies from 1991 to 2015. *Pediatr. Obes.* **2019**, *14*, e12488. [CrossRef] [PubMed]
15. Lee, M.; Choi, Y.; Quilliam, E.T.; Cole, R.T. Playing with food: Content analysis of food advergames. *J. Consum. Aff.* **2009**, *43*, 129–154. [CrossRef]

16. Araque-Padilla, R.; Villegas-Navas, V.; Montero-Simo, M.J. Non-branded food placements in children's entertainment programs: A content analysis. *Health Commun.* **2019**, *34*, 1222–1229. [CrossRef] [PubMed]
17. DeSmet, A.; Van Ryckeghem, D.; Compernolle, S.; Baranowski, T.; Thompson, D.; Crombez, G.; Poels, K.; van Lippevelde, W.; Bastiaensens, S.; van Cleempu, K.; et al. A meta-analysis of serious digital games for healthy lifestyle promotion. *Prev. Med. (Baltim.)* **2014**, *69*, 95–107. [CrossRef]
18. Folkvord, F.; van't Riet, J. The persuasive effect of advergames promoting unhealthy foods among children: A meta-analysis. *Appetite* **2018**, *129*, 245–251. [CrossRef]
19. Russell, S.J.; Croker, H.; Viner, R.M. The effect of screen advertising on children's dietary intake: A systematic review and meta-analysis. *Obes. Rev.* **2019**, *20*, 554–568. [CrossRef]
20. Boyland, E.J.; Nolan, S.; Kelly, B.; Tudur-Smith, C.; Jones, A.; Halford, J.C.; Robinson, E. Advertising as a cue to consume: A systematic review and meta-analysis of the effects of acute exposure to unhealthy food and nonalcoholic beverage advertising on intake in children and adults. *Am. J. Clin. Nutr.* **2016**, *103*, 519–533. [CrossRef]
21. Sadeghirad, B.; Duhaney, T.; Motaghipisheh, S.; Campbell, N.R.C.; Johnston, B.C. Influence of unhealthy food and beverage marketing on children's dietary intake and preference: A systematic review and meta-analysis of randomized trials. *Obes. Rev.* **2016**, *17*, 945–959. [CrossRef]
22. Naderer, B.; Matthes, J.; Zeller, P. Placing snacks in children's movies: Cognitive, evaluative, and conative effects of product placements with character product interaction. *Int. J. Advert.* **2017**. [CrossRef]
23. Folkvord, F.; Anastasiadou, D.T.; Anschütz, D. Memorizing fruit: The effect of a fruit memory-game on children's fruit intake. *Prev. Med. Rep.* **2017**, *5*, 106–111. [CrossRef] [PubMed]
24. Balasubramanian, S.K.; Karrh, J.A.; Patwardhan, H. Audience response to product placements: An integrative framework and future research agenda. *J. Advert.* **2006**, *35*, 115–141. [CrossRef]
25. Naderer, B.; Matthes, J.; Spielvogel, I. How brands appear in children's movies. A systematic content analysis of the past 25 Years. *Int. J. Advert.* **2017**, *487*, 1–21. [CrossRef]
26. Charry, K.M. Product placement and the promotion of healthy food to pre-adolescents. *Int. J. Advert.* **2014**, *33*, 599–616. [CrossRef]
27. Law, S.; Braun, K.A. I'll have what she's having: Gauging the impact of product placements on viewers. *Psychol. Mark.* **2000**, *17*, 1059–1075. [CrossRef]
28. Dens, N.; Pelsmacker, P.; De Wouters, M.; Purnawirawan, N. Do you like what you recognize? The effects of brand placement prominence and movie plot connection on brand attitude as mediated by recognition. *J. Advert.* **2012**, *41*, 35–53.
29. Villegas-Navas, V.; Montero-Simo, M.J.; Araque-Padilla, R.A. Investigating the effects of non-branded foods placed in cartoons on children's food choices through type of food, modality and age. *Int. J. Environ. Res. Public Health* **2019**, *16*, 5032. [CrossRef]
30. Uribe, R.; Fuentes-García, A. The effects of TV unhealthy food brand placement on children. Its separate and joint effect with advertising. *Appetite* **2015**, *91*, 165–172. [CrossRef]
31. Oates, C.; Blades, M.; Gunter, B. Children and television advertising: When do they understand persuasive intent? *J. Consum. Behav.* **2002**, *1*, 238–245. [CrossRef]
32. van Reijmersdal, E.A.; Rozendaal, E.; Buijzen, M. Effects of prominence, involvement, and persuasion knowledge on children's cognitive and affective responses to advergames. *J. Interact. Mark.* **2012**, *26*, 33–42. [CrossRef]
33. Moher, D.; Liberati, A.; Tetzlaff, J.; Altman, D.G. Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *BMJ* **2009**, *339*, b2535. [CrossRef] [PubMed]
34. Villegas-Navas, V.; Montero-Simo, M.J.; Araque-Padilla, R. Effects of foods placed in entertainment media on children's food choices and intake: A systematic review and meta-analysis. *Int. Prospect. Regist. Syst. Rev.* Available online: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42019125907 (accessed on 30 March 2020).
35. WHO. Recognizing Adolescence. 2014. Available online: https://apps.who.int/adolescent/second-decade/section2/page1/recognizing-adolescence.html (accessed on 11 March 2020).
36. WHO. Healthy Diet. Healthy Diet Fact Sheet N394. 2015. Available online: https://www.who.int/nutrition/publications/nutrientrequirements/healthydiet_factsheet394.pdf (accessed on 7 January 2019).
37. Rozendaal, E.; Buijzen, M.; Valkenburg, P. Do children's cognitive advertising defenses reduce their desire for advertised products? *Communications* **2009**, *34*, 287–303. [CrossRef]

38. Higgins, J.P.T.; Altman, D.G.; Gotzsche, P.C.; Juni, P.; Moher, D.; Oxman, A.D.; Savović, J.; Schulz, K.F.; Weeks, L.; Sterne, J.A.C.; et al. The Cochrane Collaboration's tool for assessing risk of bias in randomised trials. *BMJ* **2011**, *343*, d5928. [CrossRef]
39. Harris, J.L.; Speers, S.E.; Schwartz, M.B.; Brownell, K.D. US Food Company branded advergames on the internet: Children's exposure and effects on snack consumption. *J. Child. Media* **2012**, *6*, 51–68. [CrossRef]
40. Altman, D.G.; Bland, J.M. Statistics notes: Interaction revisited: The difference between two estimates. *BMJ* **2003**, *326*, 219. [CrossRef] [PubMed]
41. Egger, M.; Davey Smith, G.; Schneider, M.; Minder, C. Bias in meta-analysis detected by a simple, graphical test. *BMJ* **1997**, *315*, 629–634. [CrossRef]
42. Duval, S.; Tweedie, R. Trim and fill: A simple funnel-plot-based method of testing and adjusting for publication bias in meta-analysis. *Biometrics* **2000**, *56*, 455–463. [CrossRef]
43. Esmaeilpour, F.; Heidarzadeh Hanzaee, K.; Mansourian, Y.; Khounsiavash, M. Children's food choice: Advertised food type, health knowledge and entertainment. *J. Food Prod. Mark.* **2018**, *24*, 476–494. [CrossRef]
44. Folkvord, F.; Anschütz, D.J.; Buijzen, M.; Valkenburg, P.M. The effect of playing advergames that promote energy-dense snacks or fruit on actual food intake among children. *Am. J. Clin. Nutr.* **2013**, *97*, 239–245. [CrossRef]
45. Folkvord, F.; Anschutz, D.J.; Nederkoorn, C.; Westerik, H.; Buijzen, M. Impulsivity, "advergames," and food intake. *Pediatrics* **2014**, *133*, 1007–1012. [CrossRef]
46. Folkvord, F.; Anschütz, D.J.; Wiers, R.W.; Buijzen, M. The role of attentional bias in the effect of food advertising on actual food intake among children. *Appetite* **2015**, *84*, 251–258. [CrossRef]
47. Folkvord, F.; Veling, H.; Hoeken, H. Targeting implicit approach reactions to snack food in children: Effects on intake. *Health Psychol.* **2016**, *35*, 919–922. [CrossRef] [PubMed]
48. Folkvord, F.; Lupiáñez-Villanueva, F.; Codagnone, C.; Bogliacino, F.; Veltri, G.; Gaskell, G. Does a 'protective' message reduce the impact of an advergame promoting unhealthy foods to children? An experimental study in Spain and The Netherlands. *Appetite* **2017**, *112*, 117–123. [CrossRef] [PubMed]
49. Hudson, S.; Elliott, C. Measuring the impact of product placement on children using digital brand integration. *J. Food Prod. Mark.* **2013**, *19*, 176–200. [CrossRef]
50. Mallinckrodt, V.; Mizerski, D. The effects of playing an advergame on young children's perceptions, preferences, and requests. *J. Advert.* **2007**, *36*, 87–100. [CrossRef]
51. Naderer, B.; Matthes, J.; Marquart, F.; Mayrhofer, M. Children's attitudinal and behavioral reactions to product placements: Investigating the role of placement frequency, placement integration, and parental mediation. *Int. J. Advert.* **2016**. [CrossRef]
52. Naderer, B.; Matthes, J.; Binder, A.; Marquart, F.; Mayrhofer, M.; Obereder, A.; Spielvogel, I. Shaping children's healthy eating habits with food placements? Food placements of high and low nutritional value in cartoons, Children's BMI, food-related parental mediation strategies, and food choice. *Appetite* **2018**, *120*, 644–653. [CrossRef]
53. Neyens, E.; Smits, T. Seeing is doing. The implicit effect of TV cooking shows on children's use of ingredients. *Appetite* **2017**, *116*, 559–567. [CrossRef]
54. Pempek, T.A.; Calvert, S.L. Tipping the balance: Use of advergames to promote consumption of nutritious foods and beverages by low-income African American children. *Arch. Pediatr. Adolesc. Med.* **2009**, *163*, 633–637. [CrossRef]
55. Rosado, R.; Agante, L. The effectiveness of advergames in enhancing children's brand recall, image, and preference. *Rev. Port Mark.* **2011**, *14*, 34–46.
56. Royne, M.B.; Kowalczyk, C.M.; Levy, M.; Fox, A.K. Milk, juice, or cola? Exploring the effect of product placement on children's attitudes and behavior. *Health Mark. Q.* **2017**, *34*, 128–141. [CrossRef]
57. Toomey, D.A.; Francis, A.L. Branded product placement and pre-teenaged consumers: Influence on brand preference and choice. *Young Consum.* **2013**, *14*, 180–192. [CrossRef]
58. Verhellen, Y.; Oates, C.; Pelsmacker, P.; Dens, N.; De Pelsmacker, P.; Dens, N. Children's responses to traditional versus hybrid advertising formats: The moderating role of persuasion knowledge. *J Consum. Policy* **2014**, *37*, 235–255. [CrossRef]
59. Auty, S.; Lewis, C. Exploring children's choice: The reminder effect of product placement. *Psychol. Mark.* **2004**, *21*, 697–713. [CrossRef]

60. Brown, C.L.; Matherne, C.E.; Bulik, C.M.; Howard, J.B.; Ravanbakht, S.N.; Skinner, A.C.; Wood, C.T.; Bardone-Cone, A.M.; Brown, J.D.; Perrin, A.J.; et al. Influence of product placement in children's movies on children's snack choices. *Appetite* **2017**, *114*, 118–124. [CrossRef]
61. Dias, M.; Agante, L. Can advergames boost children's healthier eating habits? A comparison between healthy and non-healthy food. *J. Consum. Behav.* **2011**, *10*, 152–160. [CrossRef]
62. Smith, R.; Kelly, B.; Yeatman, H.; Boyland, E. Food marketing influences children's attitudes, preferences and consumption: A systematic critical review. *Nutrients* **2019**, *11*, 875. [CrossRef]
63. Rothstein, H.R.; Sutton, A.J.; Borenstein, M. Publication bias in meta-analysis: Prevention, assessment and adjustments. In *Publication Bias in Meta-Analysis: Prevention, Assessment and Adjustments*; Wiley: Hoboken, NJ, USA, 2006; pp. 1–356.
64. Cuijpers, P. *Meta-Analyses in Mental Health Research. A Practical Guide*; Vrije Universiteit: Amsterdam, The Nehterlands, 2016; pp. 95–113.
65. Matthes, J.; Naderer, B. Product placement disclosures: Exploring the moderating effect of placement frequency on brand responses via persuasion knowledge. *Int. J. Advert.* **2016**, *35*, 185–199. [CrossRef]
66. Raghunathan, R.; Naylor, R.W.; Hoyer, W.D. The unhealthy = tasty intuition and its effects on taste inferences, enjoyment, and choice of food products. *J. Mark.* **2006**, *70*, 170–184. [CrossRef]
67. Woodward, H.E.; Treat, T.A. Unhealthy how? Implicit and explicit affective evaluations of different types of unhealthy foods. *Eat Behav.* **2015**, *17*, 27–32. [CrossRef]
68. Spielvogel, I.; Matthes, J.; Naderer, B.; Karsay, K. A treat for the eyes. An eye-tracking study on children's attention to unhealthy and healthy food cues in media content. *Appetite* **2018**, *125*, 63–71. [CrossRef] [PubMed]
69. Food Advertising—Statistics & Facts. Available online: https://www.statista.com/topics/2223/food-advertising/ (accessed on 30 March 2020).
70. Paivio, A. Intelligence, dual coding theory, and the brain. *Intelligence* **2014**, *47*, 141–158. [CrossRef]
71. Bellman, S.; Kemp, A.; Haddad, H.; Varan, D. The effectiveness of advergames compared to television commercials and interactive commercials featuring advergames. *Comput. Hum. Behav.* **2014**, *32*, 276–283. [CrossRef]
72. Must, A.; Hollander, S.A.; Economos, C.D. Childhood obesity: A growing public health concern. *Expert Rev. Endocrinol. Metab.* **2006**, *1*, 233–254. [CrossRef] [PubMed]
73. Perry, C.L.; Hoelscher, D.M.; Kohl, H.W., III. Research contributions on childhood obesity from a public-private partnership. *Int. J. Behav. Nutr. Phys. Act.* **2015**, *12*, S1. [CrossRef] [PubMed]
74. Campbell, A.J. Restricting the marketing of junk food to children by product placement and character selling. *Loyola Los Angel Law Rev.* **2006**, *39*, 447–506.

Table S1. PRISMA checklist

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	1-3
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	3
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	3
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	3
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	3
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	3
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	3-4
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	3-4
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	3
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	4
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	4
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	4

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	4
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	4
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	5
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	Table S3
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	Table S4
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	8-9
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	8-9
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	6
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	8-10
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	11-13
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	13
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	13-14
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	14

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

For more information, visit: www.prisma-statement.org.

Page 2 of 2

Table S2. Search strategy

Effects of foods placed in entertainment media on children´s food choices and intake: a systematic review and meta-analyses

SEARCH STRATEGY → 18th July 2018

Academic Search Ultimate: 1794 records (788 academic journals)

AB "product placement*" OR "food placement*" OR "food cue*" OR "brand placement" OR "placed product" OR "product placed" OR "food modeling" OR "adverg*"

Business Source Ultimate: 2494 records (479 academic journals)

AB "product placement*" OR "food placement*" OR "food cue*" OR "brand placement" OR "placed product" OR "product placed" OR "food modeling" OR "adverg*"

PyscINFO: 951 records (839 academic publications)

AB "product placement*" OR "food placement*" OR "food cue*" OR "brand placement" OR "placed product" OR "product placed" OR "food modeling" OR "adverg*"

MEDLINE: 847 records (845 academic journals)

AB "product placement*" OR "food placement*" OR "food cue*" OR "brand placement" OR "placed product" OR "product placed" OR "food modeling" OR "adverg*"

PubMed: 302

("product placement*"[Title/Abstract] OR "food placement*"[Title/Abstract] OR "food cue*"[Title/Abstract] OR "brand placement"[Title/Abstract] OR "placed product"[Title/Abstract] OR "product placed"[Title/Abstract] OR "food modeling"[Title/Abstract] OR "adverg*"[Title/Abstract])

Table S3. Summary of the studies

Table S3. Characteristics of studies included in the systematic review.

Authors (Year) Journal	N	Mean age (SD) [range] % female	Placed target food(s)	Media	Manipulation	Behavioral outcomes	Risk of bias
Auty (2004) *Psychology & Marketing* United Kingdom [59]	105	NR[1] (NR) [6-7] 54% [11-12] 46%	Pepsi (brand)	Movie *(Home Alone)*	Experimental group was exposed to a scene of the movie with Pepsi placements. Comparison group was exposed to another scene of the movie without Pepsi placements.	Choice: Significant brand choice effects. Greater effect when movie was previously seen.	Low
Brown (2017) *Appetite* USA [60]	114	9.82 (NR) [9-11] NR	Utz Cheese Balls (brand) Lindor Chocolate Truffles (brand) Banana Snyder's Pretzel Rods (brand)	Movie *(Alvin and the Chipmunks)*	Experimental group was exposed to a movie that had 4 target foods placed. Target food placements were categorized by prominence according to the time the snack was featured. Comparison group was exposed to another movie (Stuart Little) and no target food placements appeared.	Choice: Significant effects of the most prominent snack (Utz Cheese Balls) Intake No significant effects on brand intake. No significant effects when movie was previously seen.	High
Charry (2014) *International Journal of Advertising* France[24]	72	9.4 (1.17) [8-11] 52.8%	Fruit Fruit salad	TV show *(Plus Belle la Vie)*	Experimental group was exposed to a scene of the TV show with bimodal food placements. Comparison group was exposed to a scene of the TV show with unimodal food placements (only visual).	Choice: Significant effects of bimodal placements on food choice.	Middle
Dias (2011) *Journal of Consumer Behavior* Portugal [44]	231	7.47 (0.49) [7-8] 49.4%	Potato chips Cookies Lollipop Hamburger Chocolate mousse Banana Milk Strawberries Fruit salad Bread	Videogame[2] *(designed for the experiment: grabbing foods)*	Experimental group 1 played a game where unhealthy snacks were placed. Experimental group 2 played a game where healthy snacks were placed. In both groups, participants get points when grabbing the foods.	Choice Significant effects of type of game on food choice.	Middle

Authors (Year) Journal	N	Mean age (SD) [range] % female	Placed target food(s)	Media	Manipulation	Behavioral outcomes	Risk of bias
Esmaeilpour (2017) *Journal of Food Products Marketing* Iran [45]	330	8.9 (NR) [6-11] 69%	Potato chips Biscuit Sausage Hamburger Soda Bread Boiled egg Milk Pistachio	Videogame *(designed for the experiment: grabbing foods)*	2x2x2 factorial design between subjects design [Type of food (healthy vs. unhealthy), health knowledge (inactive vs. active) and entertainment experience (TV commercial vs. advergame)].	Choice Significant effects of type of food on food choice. Greater effects for advergames (compared to advertising). Greater effects when health knowledge was not activated.	Middle
Folkvord (2013) *The American Journal of Clinical Nutrition* Holland [46]	270	8.9 (NR) [8-10] 49.5%	Jelly cola bottle (brand) Milk chocolate candy shell (brand) Banana (brand) Apple (brand)	Advergame *(designed for the experiment: memory game)*	Experimental group 1 was exposed to a memory-game containing cards with unhealthy branded foods. Experimental group 2 was exposed to a memory-game containing cards with healthy branded foods. Comparison group 1 was exposed to a memory-game containing cards with toys. Comparison group 2 was not exposed to the memory-game.	Intake Significant effects of food advergames (both healthy and unhealthy memory-game) on unhealthy food intake No significant differences between unhealthy and healthy food advergames on food intake.	Low
Folkvord (2014) *Pediatrics* Holland [47]	261	7.7 (0.7) [7-10] 48.8%	Jelly cola bottle (brand) Milk chocolate candy shell (brand)	Advergame *(designed for the experiment: memory game)*	2x2x2 factorial design between subjects design [type of advergame (unhealthy vs. non-food), inhibition task (reward from refrain from eating vs. no reward) and impulsivity (low vs. high)].	Intake Significant effects of type of advergame on food intake. No interaction effects neither of inhibition task nor impulsivity with type of advergame on food intake.	Middle

Authors (Year) Journal	N	Mean age (SD) [range] % female	Placed target food(s)	Media	Manipulation	Behavioral outcomes	Risk of bias
Folkvord (2015) *Appetite* Holland [48]	92	8.42 (NR) [7-10]	Candy (brand)	Advergame *(designed for the experiment: brands placed as banners)*	2x2 factorial design between subjects design [type of advergame (unhealthy vs. non-food) and attentional bias (high vs. low)].	Intake Significant effects of type of advergame on food intake. No interaction effects between type of advergame and attentional bias.	Middle
Folkvord (2016) *Preventive Medicine Reports* Holland [35]	127	9.3 (1.5) [8-11] 53%	Mandarin Apple Banana Grapes	Videogame *(designed for the experiment: memory game)*	Experimental group played a memory-game containing cards with fruits. Comparison group played a memory-game containing cards with toys.	Intake Significant effects on total fruit intake. Significant effects for banana and mandarin, not for apple and grapes. Sex, game attitude, hunger and BMI did not moderate the effects.	Middle
Folkvord (2016) *Health Psychology* NR [49]	133	8.9 (1.0) [7-10] 52.6%	Jelly cola bottle (brand) Milk chocolate candy shell (brand)	Advergame *(designed for the experiment: memory game)*	2x2 factorial design between subjects design [type of advergame (unhealthy vs. non-food), go/no go task (no go food trials vs. no go control trials)].	Intake Significant effects of go/no go task (no go food trials) on unhealthy food intake. Type of advergame did not influence the later intake (note: the intake was not while or immediately after the advergame).	Low

Authors (Year) Journal	N	Mean age (SD) [range] % female	Placed target food(s)	Media	Manipulation	Behavioral outcomes	Risk of bias
Folkvord (2017) *Appetite* Holland and Spain [50]	562	9 (1.43) [6-12] 51.1%	Jelly cola bottle (brand)	Advergame *(designed for the experiment: memory game)*	2x2 factorial design between subjects design [type of advergame (unhealthy vs. non-food), protective message (present vs. absent)].	Intake Significant effects among Dutch children sample on unhealthy food intake (no effects among Spanish children). No significant interaction between type of advergame and protective message.	Low
Harris (2012) *Journal of Children and Media* USA [40]	152	9.4 (NR) [7-12] 47.4%	Dole Foods fruits and vegetables (brand) Oreo cookies (brand) and Pop Tarts	Advergame *(use a catapult to shoot foods into a barrel. encourage a maneuver snack man to eat healthy, dunk the cookies, catch falling Pop Tarts.)*	Experimental group 1 was exposed to a game containing unhealthy branded foods. Experimental group 2 was exposed to a game containing healthy branded foods. Comparison group was exposed to a game that did not contain foods (control group).	Intake No significant effects (comparing with control group) either on healthy or unhealthy food intake. Significant effects between unhealthy and healthy advergames conditions on unhealthy and healthy food intake respectively. No significant age effects.	Middle
Hudson (2013) *Journal of Food Products Marketing* USA [51]	225	NR (NR) [7-12] 47.6%	Milk 2 go (brand) Black diamonds Cheese rings (Brand) Yoplait tubes (brand) Dole fruit caps (brand) Pepsi (brand) Betty Crocker's Fruit (brand) Gushers (brand) Reese's Pieces (brand) Frito-Lay Cheetos (brand)	TV show *(Pop Idol)*	Experimental group 1 was exposed to a 20-min segment where 4 branded healthy foods were digitally inserted. Experimental group 2 was exposed to a 20-min segment where 4 branded unhealthy foods were digitally inserted. Comparison group was exposed to a 20-min segment without product placements.	Choice: No significant effects of food placements on brand choice. The majority of the children chose the same branded products. No significant age differences.	Middle

Authors (Year) Journal	N	Mean age (SD) [range] % female	Placed target food(s)	Media	Manipulation	Behavioral outcomes	Risk of bias
Mallinckrodt (2007) *Journal of Advertising* Australia [52]	295	NR (NR) [5-8] 60%	Froot Loops cereal (brand)	Advergame *(Throw a Froot Loop into the monster mouth and get more points and more mmm satisfaction than throwing pieces of fruits)*	Experimental group played 5-min game with a branded food placement before collecting data. Comparison group did not play 5-min game with a branded food placement before collecting data.	Choice Significant effects of food placement on brand and product category choice. Greater effects for children aged 7-8 years. Persuasive knowledge did not influence.	Middle
Matthes (2015) *Journal of Consumer Behavior* Austria [14]	121	9.58 (2.49) [6-14] 55%	Utz Cheese Balls (brand)	Movie *(Alvin and the Chipmunks)*	Experimental group 1 was exposed to a scene of the movie where the product was placed frequently. Experimental group 2 was exposed to a scene of the movie where the product was placed moderately. Comparison group was exposed to a scene of the movie were no product placement appeared.	Choice Significant effects of high frequency product placement on brand choice (no effects in the case of moderate frequency). No significant interaction effects between age or prior view of the movie and exposure.	Low
Naderer (2016) *International Journal of Advertising* Austria [25]	145	7.99 (1.17) [6-11] 45.4%	Fritos (brand)	Cartoons *(Designed for the experiment with Powtoon software)*	2x2 factorial design between subjects design [placement frequency (low vs. high), plot connection (present vs. absent)] Control group (no food placement) was used but its data was not reported in this article.	Choice Significant effects of high plot connection on brand choice. No significant effects of placement frequency.	Low

Authors (Year) Journal	N	Mean age (SD) [range] % female	Placed target food(s)	Media	Manipulation	Behavioral outcomes	Risk of bias
Naderer (2017) *International Journal of Advertising* Austria [32]	363	10.55 (1.97) [6-15] 52.9%	M&M´s (brand)	Movie *(The Smurfs)*	Experimental group 1 (CPI condition) was exposed to a scene of a movie where the product is placed frequently and interacting with the character (food consumed). Experimental group 2 (static condition) was exposed to another scene of the same movie where the product is placed frequently but the food is not consumed. Comparison group was exposed to a scene of the movie where the target product placement did not appear.	Choice Significant effects of product placements on brand choice. Significant higher effects for CPI placements than for static placements. No moderating effects neither of age nor movie familiarity.	Middle
Naderer (2018) *Appetite* Austria [26]	175	8.41 (1.16) [6-11] 51.4%	Mandarin Gummy	Cartoons *(Designed for the experiment with Powtoon software)*	Experimental group 1 was exposed to a scene of a created cartoon where a healthy food (mandarin) was mentioned and placed frequently and interacting with the character. Experimental group 2 was exposed to a scene of a created cartoon where an unhealthy food (gummy) was mentioned and placed frequently and interacting with the character. Comparison group was exposed to a scene of the created cartoon were no food placements appeared.	Choice Significant effects of unhealthy and healthy food placements on unhealthy food choice. Healthy food placements did not trigger healthy food choices, on the contrary, healthy food placements triggered unhealthy food choices.	Low
Neyens (2017) *Appetite* Belgium [53]	940	9.8 (2.4) [6-14] 53.5%	Kellogg´s Coco Pops (brand)	Advergame *(Collecting Coco-Pops playing the Mission Jungle 2)*	Experimental group 1 was exposed to watch a TV ad. Experimental group 2 was exposed to play an advergame. Comparison group was not exposed to any advertisement (control).	Choice No significant effects of advergames on brand choice.	Middle

Authors (Year) Journal	N	Mean age (SD) [range] % female	Placed target food(s)	Media	Manipulation	Behavioral outcomes	Risk of bias
Pempek (2009) *Archives of Pediatrics & Adolescent Medicine* USA [54]	30	9.5 (0.9) [9-10] 50%	Orange juice Banana Apple Carrots Soda Potato chips Chocolate cookie Chocolate candy bar	Videogame[a] *(Designed for the experiment: Pac Man game)*	Experimental group 1 was exposed to a healthy advergame (participants gained points when the character ate healthy food and lost points when the character ate unhealthy food). Experimental group 2 was exposed to an unhealthy advergame (participants gained points when the character ate unhealthy food and lost points when the character ate healthy food). Comparison group was exposed to the advergame after selecting the snack (control).	Choice No significant effects neither of healthy nor unhealthy food advergames (compared to control condition) on food choice. Significant effects of unhealthy food compared to healthy food condition.	High
Rosado (2011) *Revista Portuguesa de Marketing* Portugal [55]	133	NR (NR) [7-11] NR	Nesquik's Chocolate Powder (brand)	Advergames *(kart race in which the player gets points by collecting Nesquik powder)*	Experimental group played the food advergame. Comparison group did not play any videogame (control).	Choice Significant effects of the food advergame on brand choice.	Middle
Royne (2017) *Health Marketing Quarterly* USA [56]	64	NR (NR) [6-11] 42%	Milk Juice Cola	Cartoon *(SpongeBob SquarePants)*	Experimental group 1,2 and 3 were exposed to an episode of SpongeBob SquarePants where milk, juice or cola, respectively, was digitally inserted. Comparison group was exposed to an episode of SpongeBob SquarePants where no drink appeared.	Choice No significant effects of any drink condition on drink choice.	Middle
Toomey (2013) *Young Consumers* USA [57]	75	9.8 (1.29) [8-12] 51.7%	Coca Cola zero (brand)	Sitcom *(Designed for the experiment)*	Experimental group was exposed to a video where the actors drank Coca cola zero. Comparison group was exposed to a video where the actors drank a non-branded drink.	Choice No significant effects on brand choice.	High

Authors (Year) Journal	N	Mean age (SD) [range] % female	Placed target food(s)	Media	Manipulation	Behavioral outcomes	Risk of bias
Uribe (2015) *Appetite* Chile [34]	483	NR (NR) [9-15] 54.9%	McDonald's hamburger (brand)	Movie	Experimental group 1 was exposed to a part of the movie where McDonald's audiovisual placements appeared. There were 2 breaks that did not include McDonald's ads. Experimental group 2 was exposed to a part of the movie where no McDonald's placements appeared. There were 2 breaks that include McDonald's ads. Experimental group 3 was exposed to a part of the movie where McDonald's audiovisual placements appeared. There were 2 breaks that include McDonald's ads. Comparison group was exposed to a part of the movie where no McDonald's placements appeared. There were 2 breaks that did not include McDonald's ads.	Choice Significant effects of product placements, commercial ads and the combination of both on food category choice and brand choice. Greater effects for the youngest group (children aged 9).	Middle
Verhellen (2014) *Journal of Consumer Policy* Belgium [58]	125	11.98 (0.43) [11-14] NR	Ola ice cream (brand)	Advergame (get the character collects as many Ola popsicles as possible)	Experimental group 1 was exposed to a 30-s trailer of Ola website. Experimental group 2 played the Ola advergame. Experimental group 3 was exposed to a 30-s trailer of Ola website and later the group played the Ola advergame. Experimental group 4 was exposed to a traditional TV ad of Ola. Comparison group was not exposed to any form of advertising messages.	Choice No significant effects of treatments on brand choice.	Middle

Authors (Year) Journal	N	Mean age (SD) [range] % female	Placed target food(s)	Media	Manipulation	Behavioral outcomes	Risk of bias
Villegas-Navas (2019) *International Journal of Environmental Research and Public Health*	124	9.24 (1.19) [7-11] 51.6%	Bacon Burrito Cookies Gummy bears Hot dog Nachos Mayonnaise Pizza Grapes Asparagus Lettuce Coconut Pineapple Corn Toast Water	Cartoons (*Adventure Time, All Hail King Julien, Fanboy and Chumchum, George of the Jungle, Gravity Falls, Pokemon, Phineas and Ferb, SpongeBob, The Amazing World of Gumball, The Jungle Book and The Ninja Turtles*)	Experimental group: Exposed to 16 scenes that contained 16 food placements (previously chosen randomly from a content analysis database) Comparison group: Exposed to 16 scenes without food placements	Choice Significant interaction effects between type of foods (low nutritional value foods) and age (children under age 9)	Middle

Abbreviations: Not reported (NR)

Table S4. Qualitative assessment

Effects of foods placed in entertainment media on children's food choices and intake: a systematic review and meta-analyses.

Risk of bias assessment

Authors (Year)	Selection bias		Performance bias	Detection bias	Attrition bias	Reporting bias	Other bias	Overall punctuation
	Random sequence generation	Allocation concealment	Blinding of participants and personnel	Blinding of outcome assessment	Incomplete outcome data	Selective reporting	Any conflict of interests declared?	
Auty (2004)	Yes (0) Participants were randomly assigned by their teachers to groups alphabetically by last name.	Unclear (1)	Unclear (1) The researchers were careful to look elsewhere while each child was making his/her choice	Unclear (1)	Complete outcome data (0)	No (0)	No (0)	3
Brown (2017)	No (2) Children were assigned to groups based on convenience (mostly by child availability) and were not randomized	Unclear (1)	Unclear (1)	Unclear (1)	Complete outcome data (0)	No (0)	Unclear (1) Dr. Bulik is a grant recipient from Shire and a consultant for Ironshore	6
Charry (2014)	Unclear (1) Children were randomly assigned to either the unimodal (visual placement) or the bimodal (audio-visual placement)	Unclear (1)	Unclear (1)	Unclear (1)	Complete outcome data (0)	No (0)	No (0)	4

1

Authors (Year)	Selection bias		Performance bias	Detection bias	Attrition bias	Reporting bias	Other bias	Overall punctuation
	Random sequence generation	Allocation concealment	Blinding of participants and personnel	Blinding of outcome assessment	Incomplete outcome data	Selective reporting	Any conflict of interests declared?	
	condition.							
Dias (2011)	Unclear (1)	Unclear (1)	Unclear (1)	Unclear (1)	Complete outcome data (0)	Unclear (1)	No (0)	5
Esmaeilpour (2017)	Unclear (1) Randomization not described	Unclear (1)	Unclear (1)	Unclear (1)	Complete outcome data (0)	Unclear (1)	No (0)	5
Folkvord (2013)	Yes (0) The teacher assigned the children (in alphabetical order) to the experimenter.	Unclear (1)	Yes (0) The experimenter then left the room.	Unclear (1)	Complete outcome data (0)	No (0)	No (0)	2
Folkvord (2014)	Unclear (1)	Unclear (1)	Unclear (1)	Unclear (1)	Complete outcome data (0)	No (0)	No (0)	4

2

Authors (Year)	Selection bias		Performance bias	Detection bias	Attrition bias	Reporting bias	Other bias	Overall punctuation
	Random sequence generation	Allocation concealment	Blinding of participants and personnel	Blinding of outcome assessment	Incomplete outcome data	Selective reporting	Any conflict of interests declared?	
Folkvord (2015)	Unclear (1)	Unclear (1)	Unclear (1)	Unclear (1)	Complete outcome data (0)	No (0)	No (0)	4
Folkvord (2016a)	Unclear (1)	Unclear (1)	Unclear (1)	Unclear (1)	Complete outcome data (0)	No (0)	No (0)	4
Folkvord (2016b)	Yes (0) The experimenter collected one child at a time from the classroom (in alphabetical order).	Unclear (1)	Unclear (1)	Unclear (1)	Complete outcome data (0)	No (0)	No (0)	3
Folkvord (2017)	Yes (0) The experimenter collected one child at a time from the classroom listed in alphabetical name order	Unclear (1)	Yes (0) The experimenter left the room	Unclear (1)	Complete outcome data (0)	No (0)	Unclear (1)	3

3

Authors (Year)	Selection bias		Performance bias	Detection bias	Attrition bias	Reporting bias	Other bias	Overall punctuation
	Random sequence generation	Allocation concealment	Blinding of participants and personnel	Blinding of outcome assessment	Incomplete outcome data	Selective reporting	Any conflict of interests declared?	
Harris (2012)	Unclear (1) Children participated alone in one of three randomly assigned conditions	Unclear (1)	Unclear (1)	Unclear (1)	Complete outcome data (0)	No (0)	No (0)	4
Hudson (2013)	Unclear (1)	Unclear (1)	Unclear (1)	Unclear (1)	Complete outcome data (0)	No (0)	No (0)	4
Mallinckrodt (2007)	Unclear (1)	Unclear (1)	Unclear (1)	Unclear (1)	Complete outcome data (0)	No (0)	No (0)	4
Matthes (2015)	Unclear (1)	Unclear (1)	Yes (0) We used three different research assistants in order to prevent demand effects	Unclear (1)	Complete outcome data (0)	No (0)	No (0)	3
Naderer (2016)	Unclear (1) They randomly watched one of four versions of the stimulus	Unclear (1)	Yes (0) After stimulus presentation, three children were led to	Unclear (1)	Complete outcome data (0)	No (0)	No (0) No potential conflict of interest was reported by the authors	3

4

Authors (Year)	Selection bias		Performance bias	Detection bias	Attrition bias	Reporting bias	Other bias	Overall punctuation
	Random sequence generation	Allocation concealment	Blinding of participants and personnel	Blinding of outcome assessment	Incomplete outcome data	Selective reporting	Any conflict of interests declared?	
	movie with one experimenter supervising the screening.		separate interview rooms by three researchers, while the fourth researcher stayed in the screening room with the remaining children and engaged them in a ball game.					
Naderer (2017)	Unclear (1) Children in groups of three to four were randomly assigned to one of the three stimulus conditions	Unclear (1)	Unclear (1)	Unclear (1)	Complete outcome data (0)	No (0)	No (0) No potential conflict of interest was reported by the authors.	4
Naderer (2018)	Unclear (1) The children were randomly exposed to one of three versions of the stimulus cartoon, with one experimenter	Unclear (1)	Yes (0) As there were four experimenters, three children were simultaneously interviewed in	Unclear (1)	Complete outcome data (0)	No (0)	No (0)	3

5

Authors (Year)	Selection bias		Performance bias	Detection bias	Attrition bias	Reporting bias	Other bias	Overall punctuation
	Random sequence generation	Allocation concealment	Blinding of participants and personnel	Blinding of outcome assessment	Incomplete outcome data	Selective reporting	Any conflict of interests declared?	
	supervising the screening.		separate interview rooms, while the experimenter supervising the screening stayed in the screening room with the remaining children entertaining them with a ball game					
Neyens (2017)	Unclear (1)	Unclear (1)	Unclear (1)	Unclear (1)	Complete outcome data (0)	No (0)	No (0) No potential conflict of interest was reported by the authors.	4
Pempek (2009)	Unclear (1) each child was randomly assigned to 1 of the following 3 conditions (30 children)	Unclear (1)	No (2) Participants worked individually with an experimenter	Unclear (1)	Complete outcome data (0)	Yes (2)	No (0)	7

Authors (Year)	Selection bias		Performance bias	Detection bias	Attrition bias	Reporting bias	Other bias	Overall punctuation
	Random sequence generation	Allocation concealment	Blinding of participants and personnel	Blinding of outcome assessment	Incomplete outcome data	Selective reporting	Any conflict of interests declared?	
Rosado (2011)	No (2)	Unclear (1)	Unclear (1)	Unclear (1)	Complete outcome data (0)	No (0)	No (0)	5
Royne (2017)	Unclear (1)	Unclear (1)	Unclear (1)	Unclear (1)	Complete outcome data (0)	No (0)	No (0) No potential conflict of interest was reported by the authors.	4
Toomey (2013)	No (2) not totally random: After pairs were established, one participant in each pair was randomly assigned to the treatment group	Unclear (1)	Unclear (1)	Unclear (1)	(2) Incomplete outcome data	No (0)	No (0)	7
Uribe (2015)	Unclear (1)	Unclear (1)	Unclear (1)	Unclear (1)	Complete outcome data (0)	No (0)	No (0)	4
Verhellen (2014)	Unclear (1)	Unclear (1)	Unclear (1)	Unclear (1)	Complete outcome data (0)	No (0)	No (0)	4

Authors (Year)	Selection bias		Performance bias	Detection bias	Attrition bias	Reporting bias	Other bias	Overall punctuation
	Random sequence generation	Allocation concealment	Blinding of participants and personnel	Blinding of outcome assessment	Incomplete outcome data	Selective reporting	Any conflict of interests declared?	
Villegas-Navas (2019)	Unclear (1)	Unclear (1)	Unclear (1)	Unclear (1)	Complete outcome data (0)	No (0)	No (0)	4

Artículo III

Villegas-Navas, V., Montero-Simo, M.-J., y Araque-Padilla, R.A. (2019). Investigating the effects of non-branded foods placed in cartoons on children's food choices through type of food, modality and age. *International Journal of Environmental Research and Public Health*, *16*(24), 5032. doi:10.3390/ijerph16245032

International Journal of
Environmental Research and Public Health

MDPI

Article

Investigating the Effects of Non-Branded Foods Placed in Cartoons on Children's Food Choices through Type of Food, Modality and Age

Victoria Villegas-Navas *, Maria-Jose Montero-Simo and Rafael A. Araque-Padilla

Department of Management; Universidad Loyola Andalucia, Escritor Castilla Aguayo St., 4, 14004 Cordoba, Spain; jmontero@uloyola.es (M.-J.M.-S.), raraque@uloyola.es (R.A.A.-P.)
* Correspondence: vvillegas@uloyola.es

Received: 4 November 2019; Accepted: 9 December 2019; Published: 10 December 2019

Abstract: Cartoons are among the most consumed media products by children, especially those at a young age. While branded food placements are not allowed in animated series, non-branded food placements are prevalent. However, little is known about the effects that these food placements might have on children's eating preferences. In an experimental study with 124 children (51.6% girls, age range: 7–11, M_{age} = 9.24, and SD = 1.19), 62 children in the experimental condition were exposed to 16 food placements in cartoons, whereas children in the control condition were exposed to cartoon scenes without foods. The healthiness of the placed foods (low nutritional value foods versus high nutritional value foods) as well as the modality of food placements (unimodal versus bimodal) were manipulated. After watching the cartoon scenes, children completed a choice task where each placed food appeared on a separate choice card. Our results indicate that non-branded low nutritional value foods placed in cartoons are an effective strategy in modifying children's food choices when children are under age 9. We suggest that policy makers, particularly those involved in the content design of cartoons, take these results into account when placing low nutritional value foods in cartoons, especially for an animated series that targets young child audiences.

Keywords: non-branded food placements; children; low nutritional value foods; cartoons; age differences

1. Introduction

At present, children spend a large portion of their leisure time in front of screens [1]. Watching television, playing videogames and surfing the net are part of children's daily activities. Previous content analyses have shown that while they are consuming different media, children receive a variety of food messages that appear in various formats. Advertisements [2], advergames [3] and food placements [4–6] are some of the communication tools that children are exposed to in the media environment. Regarding the latter, the study of food placements targeting children has acquired major relevance in the last decade since Auty and Lewis (2004) [7] found the short-term effectiveness of these portrayals on children's behavior.

Food placements are typically portrayed within the scenes of entertainment media as product placements [8]. This communication tool is considered to cause less interference than food commercial ads because food placements do not interrupt the storyline of the corresponding entertainment media. In the digital era, where food ads can be skipped by audiences, food placements constitute a key communication strategy when transmitting messages about food patterns.

Food placements might be associated with the problem of childhood overweight and obesity. Since previous studies found that low nutritional value food placements are effective in changing children's behavior towards foods high in fat, sugar or salt [8–11], special attention must be paid to

this strategy when addressing the problem of childhood obesity. Overweight and obese children are increasingly reaching higher figures worldwide [12,13]. The problem compromises not only today's children but also tomorrow's adults, as overweight children are more likely to become overweight adults [14] who experience a greater propensity to develop cardiovascular diseases as well as diabetes at a young age [13]. Children's self-esteem and confidence are also affected by this problem [15]. These are some of the reasons why The World Health Organization (WHO, 2019) [13] poses the problem of childhood obesity as among the most serious public health challenges of the 21st century.

To date, most of the studies about food placements directed at children have focused on branded foods [7,9–11]. While branded food placements are frequent in movies [4] and advergames [3] targeting children, non-branded food placements are the type of products found in cartoons [5], as branded food placements are prohibited in these animated series [16]. This prohibition aims to protect infants against the persuasive effects of branded product placements as children constitute a vulnerable target group [17].

Additionally, although the studies that analyze the effects of food placements are mostly about branded foods, several studies about non-branded food placements can also be found. To our knowledge, approximately half of the studies about the effectiveness of non-branded food placements have focused on foods placed in videogames [18–21], whereas the other half have focused on video format, such as cartoons or TV shows [8,22–24]. Regarding the studies that analyze non-branded foods placed in cartoons, we only found one study that investigated the influence of type of food on children's behavior [8]. However, that study [8] used Powtoon software to create the animated cartoons, while, in the present study, the animated cartoons were those broadcasted in contemporary children's TV channels.

In recent decades, despite the large number of studies that have analyzed the effects of branded food placements portrayed in video format [7,9–11,25–28], it is necessary to inquire whether there are also effects in the case of non-branded food placements, which is the objective of the present study. In studies about branded food placement effectiveness, generally, children have to choose between competitors' brands—that is, products that belong to the same food category, such as soft drinks [7], snacks [10,11] or chocolates [26]. However, in studies about non-branded food placements, the options are not limited to a single food category; in contrast, the range of options is more diverse. This intrinsic difference between the nature of branded and non-branded food placement studies that measure choice leads us to question whether the effects of branded food placements might be extrapolated to non-branded food placements. Additionally, children might see branded foods as a combination of attributes, benefits and perceptions [29] in a different manner than non-branded foods. Overall, marketing campaigns are usually more focused on reinforcing and extending the image of branded foods compared to non-branded foods and this difference might result in distinct affective evaluations by the consumers [30]. Last, persuasive knowledge about non-branded foods might not be activated with the same intensity as with branded foods, especially among young children [31].

Cartoons are among the most consumed media products by children [32]. Children spend a large amount of time watching these animated series [33]. It is not surprising that cartoon characters might constitute a powerful source of influence with regard to eating patterns. Dora the Explorer and fruits, SpongeBob SquarePants and hamburgers (Krabby Patty) or Michelangelo (from Teenage Mutant Ninja Turtles) and pizzas are some of the long line of examples of cartoon characters associated with specific food placements. Each day, children watch the cartoons they are interested in (provided that parents agree, and cartoons are available for watching), and each day, children develop parasocial relationships with cartoon characters [34].

Animated cartoons are part of the long list of examples of environmental determinants that might influence children's food behavior [35]. Cartoon characters might be perceived as models, and food placements might represent objects with meaning. In this context, vicarious learning might occur for children while they are watching their selected cartoon series, or afterwards. According to social cognitive theory (SCT) [35], three main determinants interact reciprocally and influence each other: personal, behavioral and environmental determinants. Thus, children might have certain

personal determinants (cognitive, affective and biological factors) that are translated into a major or minor preference for a certain type of food. On the other hand, children might act (behavioral determinants) in a specific way with regard to that type of food (selecting or not selecting the food or consuming the food in a major or minor quantity). Last, children might receive external influences from the environment (foods placed in cartoons) that might produce an acceptance or rejection of that type of food. It is important to highlight that SCT [35] establishes that children's behavior is not only shaped by personal and environmental factors but also shaped by people's capability of acting in a way that is self-organized, proactive, self-reflected and self-regulated. Therefore, despite the factors that might affect children's eating patterns, children might have the possibility of redirecting those influences.

1.1. Objectives and Hypotheses

This study aims to analyze the effects of non-branded foods placed in scenes of real cartoons on choice, as this behavioral variable constitutes the first step prior to consuming a product [36]. For that purpose, this study intends to explore how the type of food and placement modality influence non-branded food placement effectiveness. Additionally, children's age is studied as a potential moderating factor.

1.1.1. Type of Food and Modality

When studying non-branded food placements, the healthiness of the food needs to be considered, as previous experimental studies show that this distinction makes a difference in the effectiveness of non-branded foods placed in entertainment media [8,18,19,21]. For example, in a study by Dias and Agante (2011) [18], significant effects were found of the type of food game on choice (children who played the "less healthy game" chose significantly more "unhealthy foods" than those children who played the "healthy" game). Similar results were found in the experimental designs of Esmaeilpour (2017) [19] and Pempek (2009) [21] that used videogames. However, the aforementioned studies did not use a game condition without foods; therefore, we were unable to determine the true effect that placing foods in games has on children's food choices.

Overall, evidence suggests that low nutritional value food placements have effects on children's behavior, both in the case of branded [9–11,37] and non-branded [8] placements. However, we did not find previous studies of branded high nutritional value foods placed in video format, as this type of food is usually presented as non-branded. Findings about non-branded high nutritional value food placements are not conclusive: although some studies found effects on children's choices [24] and intake [20], most of the previous literature did not [8,21,23]. In a recent study by Binder, Naderer, and Matthes (2019) [38], it was found that a non-branded high nutritional value food (raspberries) did not trigger effects on behavioral responses in children aged 6–10 years. Similarly, in another study that used mandarins as a prominent non-branded high nutritional value food placement [8], negative results were found: the placement of mandarins elicited an adverse effect (the significant choice effects of low nutritional value foods) among children aged 6–11 years. Therefore, it seems that no immediate behavioral responses can be triggered when using high nutritional value food placements. Therefore, the first hypothesis of the present study considers type of food as a potential factor that influences children's food choices:

H1: *Low nutritional value as opposed to high nutritional value food placements will lead to an increase in food choice.*

The effectiveness of the food placement strategy is affected not only by the type of food but also by the execution factors, which are considered in the literature as variables involved in the effectiveness of product placement [39]. These factors refer to information about how products appear, including modality, level of plot connection [11,40], frequency of product appearance [10], level of character-product interaction [26], and others.

In the literature about product placements, modality is among the most studied execution factors [22,41–43]. According to the sensory channel that is used to receive the placement message, three types of product placement can be distinguished: visual or only-seen placements, verbal or only-heard placements and audiovisual placements [44]. Whereas both visual and verbal placements belong to the unimodal category, audiovisual placements are considered bimodal placements. As animated cartoons constitute a passive entertainment media (in contrast with videogames that are active entertainment media) and non-branded food placements do not trigger children's persuasive knowledge with the same intensity as branded food placements, non-branded bimodal placements might be more effective in changing eating behaviors (choice, willingness to buy or consumption) than unimodal placements [22]. Further, bimodal placements are considered as more salient (in terms of prominence) than unimodal placements [5,22] and SCT [35] establishes that salience plays a key role in the first stage (attentional processes) of the observational learning. As this difference in salience might make a difference in the effectiveness of non-branded food placements, the second hypothesis of the present study considers modality as a potential factor that influence children's food choices:

H2: *Bimodal as opposed to unimodal food placements will lead to an increase in food choice.*

As far as we know, most of the previous literature about food placements in general (branded and non-branded) has focused on low nutritional value bimodal food placements. Effects have been found when foods belonged to the less healthy category and when they were audiovisually presented [8–10,26], whether non-branded [8] or branded [9,10,26]. However, none of the previous literature has used real cartoons to study food placement effects. Our study aimed to extend the knowledge about non-branded foods placed in cartoons by considering two categories that have been scarcely studied in the literature: high nutritional value foods and the unimodal presentation. As previous studies that compare high and low nutritional food placements [8,37] show a higher effect for low nutritional food messages and as studies that compare bimodal and unimodal modality [22,41] show a higher effect for bimodal placements, the third hypothesis considers the interaction between type of food and modality as potential factors that influence food choice.

H3: *Bimodal low nutritional value as opposed to unimodal low nutritional value: bimodal high nutritional value and unimodal high nutritional value food placements will lead to an increase in food choice.*

1.1.2. Moderating Effects of Children's Ages

Cartoons are watched daily by children [32]. However, as children grow up, their media preferences change: they become gradually less interested in children's cartoons targeted at infants and modify their preferences to other media content such as TV series or sitcoms [45]. Older children might see cartoons (especially those targeted to early age audiences) as a type of media aimed at "babies". Therefore, parasocial relationships with cartoon characters might weaken at a certain age when children stop watching their favorite animated characters [34].

Children's age has been extensively considered as a moderator variable in the literature about product placement effectiveness [7,10,26,28]. No consistent findings have been found: some studies found significant moderating effects of children's age [28], but other studies did not [10]. However, as we commented previously, most of the studies used branded food placements, and it might be possible that the results found in branded foods do not apply to non-branded foods. Children's defenses (associated with age) against the persuasive messages of branded foods might not occur in non-branded food portrayals [46].

In any case, younger children might differ with regard to older children when selecting foods as the latter have a longer learning history and might therefore incorporate more factors to base their preference on [47]. We hypothesize that younger children will be more influenced by food placements not only because they have less established food preferences but also because they might see cartoon characters as objects to later emulate in a greater way than older children. It follows that:

H4: *Children's age will moderate the effects of food placements on food choice regarding the type of food.*

H5: *Children's age will moderate the effects of food placements on food choice regarding the modality.*

H6: *Children's age will moderate the effects of food placements on food choice regarding the interaction between the type of food and modality.*

2. Materials and Methods

2.1. Participants

The participants were recruited from a school in Córdoba (Spain). Prior to conducting the experiment, approval was obtained from the Ethics Committee of the University to carry out the study. Information sheets were distributed to the children's parents, and the signed consent forms were collected. There were 124 children (51.61% girls), and their ages ranged from 7 to 11 years (M = 9.24, SD = 1.19), Table 1.

Table 1. Age distribution of participants.

Age, y	Total Sample (N = 124), N (%)	Control Group (N = 62), N (%)	Experimental Group (N = 62), N (%)
7	11 (8.9%)	6 (9.7%)	5 (8.1%)
8	24 (19.4%)	11 (17.7%)	13 821%)
9	33 (26.6%)	17 (27.4%)	16 (25.8%)
10	36 (29%)	18 (29%)	18 (29%)
11	20 (16.1%)	10 (16.1%)	10 (16.1%)

2.2. Procedure

An experimental design was used with two conditions: an experimental condition (visualization of cartoons with food placements) and a control condition (visualization of cartoons without food placements). The participants were assigned to one of the two conditions according to their surname. Each participant in the experimental condition was exposed to 16 scenes of cartoons. Each cartoon scene included a different food placement. Unlike previous experimental studies that manipulate one single food placement per condition, we included an ample sample of foods to analyze how the whole category of foods placed (low and high nutritional value foods) or the modality (unimodal and bimodal) influence food choice. In contrast with previous studies that used animated scenes created exclusively for the experiment, we selected cartoon scenes from fragments of 11 popular real cartoon series: Adventure Time, All Hail King Julien, Fanboy and Chumchum, George of the Jungle, Gravity Falls, Pokemon, Phineas and Ferb, SpongeBob, The Amazing World of Gumball, The Jungle Book and The Ninja Turtles. The decision to use real cartoons was made to improve the external validity—that is, by simulating the natural environment in which children watch cartoons.

Only in the experimental condition did the scenes contain non-branded food placements. The 16 foods placed were equally grouped into high and low nutritional value foods, following the food criteria of the WHO (2015) [48]. Fast food, sweets, salty snacks, soft and energy drinks were considered as low nutritional value foods, whereas fruits, vegetables, water, cereals, potatoes and pasta were considered as high nutritional value foods. Additionally, food placements were classified in unimodal and bimodal placements, Table 2.

Table 2. Placed foods according to food type and modality

	Bimodal	Unimodal
	Bacon	Cookies

Low nutritional value foods	Burrito	Hot dog
	Gummy bears	Nachos
	Mayonnaise	Pizza
High nutritional value foods	Grapes	Asparagus
	Lettuce	Coconut
	Pineapple	Corn
	Toast	Water

Scenes of cartoons aimed at children over 7 were randomly selected from the database of a published content analysis [5]—that is, once bimodal low nutritional value food placements were filtered, four scenes were randomly chosen. The same procedure was followed with the other types of food placements.

2.3. Randomization Check

The randomization checks for gender, χ^2 (1, N = 124) = 0, p = 1, and age, χ^2 (4, N = 124) = 0.288, p = .991, were successful.

2.4. Experimental Stimuli

The 16 food placement scenes were grouped into 4 types. Each type contained 4 scenes. The 4 bimodal low nutritional value foods were portrayed in the following described scenes. In bacon placement scenes (The Amazing World of Gumball), the bacon is portrayed as a character who sings: "Baconman! I am made of bacon; I am the only who can transform a vegetarian in bacon lover because I am made of bacon!" In burrito placement (Fanboy and Chumchum), the main characters are singing a song about working in the freezing-shop and preparing burritos. Fanboy is placed inside a burrito who is moving inside a microwave. In gummy bears placement (Gravity Falls), Lil Gideon uses gummy bears as a strategy to bribe Marbel, and when she sees these sweets, she exclaims, "Gummy bears!" and she starts to eat them. In mayonnaise placement (Adventure Time), Jake (the dog) says to Finn (the human): "I have everything that I could desire: Infinity mayonnaise (and mayonnaise appears), new attractive hairstyle and I have learnt the best magic power: sleep whenever I want".

The 4 unimodal low nutritional value foods were portrayed in the following described scenes. In cookies placement (SpongeBob), Sandy Cheeks is eating some cookies with Spongebob while they are talking about life in the sea world. In hot dog placement (Fanboy and Chumchum), Fanboy and Chumchum speak like robots. Chumchum asks Fanboy: "Bip, bip, what is this strange object (a fire hydrant)" and Fanboy replies: "bip, bip, I do not know, it seems like a giant hot dog". In nachos placement (Gravity Falls), Deeper and Soos are celebrating that they have taken pictures of a strange creature. Soos exclaims: "I am going to prepare some victory's nachos!" and then they high five. In pizza placement (The Amazing World of Gumball), the Gumball family talk to each other while eating pizza.

The 4 bimodal high nutritional value foods were portrayed in the following described scenes. In grapes placement (Adventure Time), Finn and Jake are taking care of a mini robot. Finn says: "Let's feed the mini robot with these purple things!" Jake interrupt and says: "Do you mean grapes? "And Finn replies: "Yes…whatever these things are" And the mini robot eats the grapes. In lettuce placement (The Ninja Turtles), Splinter master says to Rafael: "Let me tell you a story", to which Rafael replies: "Sensei, I am not in good mood for stories". In that moment, Splinter master speaks with Spike (a little turtle) and says: "Spike bits the lettuce if you are in good mood for stories", and Spike bits the lettuce. In pineapple placement (All Hail King Julien), Julien is looking at the sky, he is worried because he has been arguing with Moris. Suddenly, a shining pineapple character speaks from the night sky and says: It is me, Pineapple! And pineapple character makes Julien reflect about his friendship with Moris. In toast placement (Pokemom), Phanphy is following the smell of something. It is Meowth who is preparing toasts. Meowth says to his friends: "I want to offer you these toasts".

The 4 unimodal high nutritional value foods were portrayed in the following described scenes. In asparagus placement (Phineas and Ferb), Phineas and Ferb are eating asparagus folks in the kitchen while they are talking. In coconut placement (George of the Jungle), Ursula and Magnolia ask Shep (the elephant), "Are you hungry? Do you want a coconut?" In corn placement (Gravity Falls), Marbel and dipper go to a theme park, they stop in a place where there is a corn stand. Lastly, in water placement (The Jungle Book), Mowgli says to a bird that he is going on an adventure, to which the bird says: Are you prepared? Have you taken enough water?

The animated scenes with food placements had an average duration of 12.63 sec (SD: 5.5 sec), appeared randomly and were presented by inserting a white image between the scenes. The entire video lasted 4 min and 15 sec. The control group watched scenes from the same animated cartoons without food placements.

2.5. Measures

After viewing the animated scenes, all children had to complete 16 different decision tasks. Each choice task consisted of selecting, according to their preferences at that time, a food from the four to choose from. Before starting with the choice tasks, instructions were given to children, asking them if they had any doubt. A keyboard was prepared for the experiment and it contained numbers from 1 to 4. Each child had to press the corresponding number in the keyboard according to the question: Which food of the 4 would you like to try at this time?

The software E-prime 2.0 (Psychology Software Tools, Pittsburgh, PA, USA) [49] was used, and it provided the child's response. The position of the target food was randomly changed in each card to avoid this aspect influencing the choice made.

As shown in Supplementary materials Figure S1, food cards contained numbers, words and images. Each food card included 3 novel foods and 1 target food. Images were pictures similar to the target foods portrayed in the cartoon scenes. The foods that appeared on each card belonged mostly to foods of the same category, whether fruits, vegetables or sweets, etc. (Supplementary materials Figure S1).

2.6. Data Analysis

We conducted a repeated measures ANOVA with food choice as the dependent variable. We inserted food type (low vs. high nutritional value foods) and modality (unimodal vs. bimodal) as within-participant factors. Group (experimental vs. control) and age were inserted as between-participant factors. In cases where Maulchy's test of sphericity indicated a violation, we applied GreenhouseGeisser corrections. We tested our hypotheses examining the interaction effects of group with the rest of the factors.

Additionally, in order to test the age differences, we conducted a moderated mediation analysis using Hayes' PROCESS macro for SPSS [50] (model 1, using 5000 bootstrapping samples). We inserted group as an independent variable and age as moderator variable. To define a threshold for age, we used the Johnson-Neyman technique. Analyses were performed with SPSS statistical software, version 24.

3. Results

We expected (H1) that low nutritional value food placements will significantly increase food choice compared to high nutritional value food placements. We did not find main effects of food type on children's food choices, $F(1, 120) = 1.877$, $\eta_p^2 = 0.016$, $p = 0.173$. Similarly, no significant effects were found for bimodal placements compared to unimodal placements (H2), $F(1, 120) = 0.581$, $\eta_p^2 = 0.005$, $p = 0.448$. When considering the interaction effects between food type and modality (H3), no significant effects were found, $F(1, 120) = 0.248$, $\eta_p^2 = 0.002$, $p = 0.619$. Thus, H1, H2 and H3 were not supported (Table 3).

In contrast, when introducing age as a moderator factor, main effects emerged when considering type of food (H4), $F(1, 120) = 2.717$, $\eta_p^2 = 0.087$, $p = 0.033$. However, age did not moderate the effects

neither for placement modality (H5), $F(1, 120) = 1.007$, $\eta_p^2 = 0.034$, $p = 0.407$ nor for the interaction between food type and modality (H6), $F(1, 120) = 1.139$, $\eta_p^2 = 0.038$, $p = 0.342$. Thus, H4 was supported, but H5 and H6 were not supported.

Table 3. Interaction effects of food placements explaining food choice.

Between Subjects	df	*F*	η_p^2	*p*
Group × Food type	1	1.877	0.016	0.173
Group × Modality	1	0.581	0.005	0.448
Group × Food type × Modality	1	0.248	0.002	0.619
Group × Food type × Age	1	2.717	0.087	0.033
Group × Modality × Age	1	1.007	0.034	0.407
Group × Food type × Modality × Age	1	1.139	0.038	0.342

Once we conducted the moderated mediation analysis [50] considering food type (low and high nutritional value food choice), we looked for the definition of Johnson-Neyman age significance region for low nutritional value food choice, which reached a value of 8.95 (age). As indicated in Figure 1, Children under 9 were more likely to choose the low nutritional value foods (compared to high nutritional value foods, Figure 2) placed in the cartoons than the rest of the groups (children in the control group under 9 and children aged over 9, both control and experimental groups).

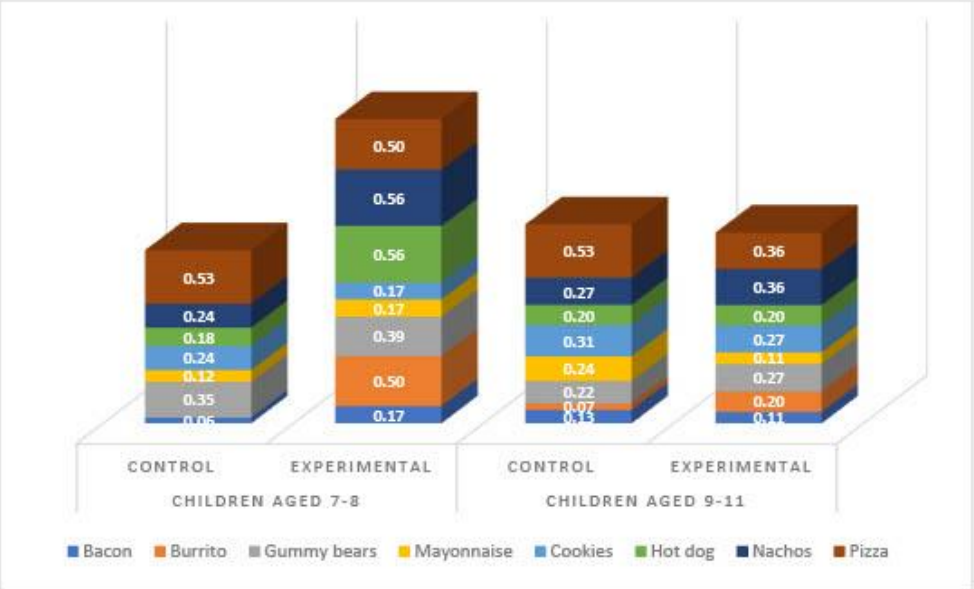


Figure 1. Low nutritional value foods chosen (%) by children according to condition and age group.

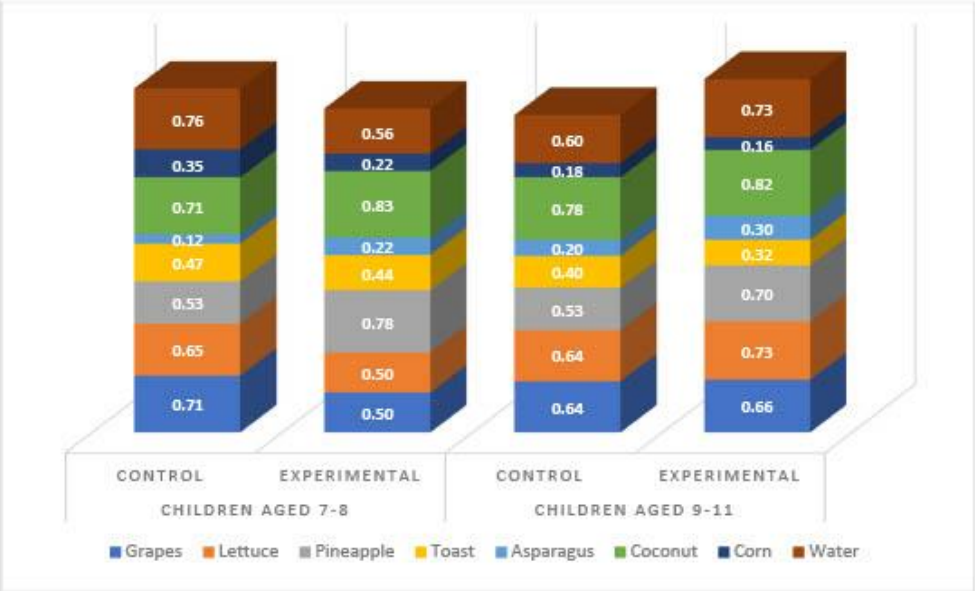


Figure 2. High nutritional value foods chosen (%) by children according to condition and age group

4. Discussion

There is limited knowledge as to whether non-branded food placements can shape children's food behavior. In this study, we examined the effects of non-branded food portrayals placed in most broadcasted animated cartoons on children's conative outcomes (choice behavior). We found that low nutritional value food placements were more effective in increasing food choice in younger children (aged 7–8 years) than high nutritional value food placements. Therefore, our results indicate that age moderated the effects of low nutritional value food placements.

Our results might be explained by several reasons. The first reason is described regarding the type of food. Low nutritional value foods are more appealing than high nutritional value foods, not only for children but also for people in general. According to Raghunathan et al. (2006) [51], the taste of low nutritional value foods is inferred to be better than the taste of high nutritional value foods. Additionally, low nutritional value foods are enjoyed more during actual consumption and are preferred in choice tasks [51]. Furthermore, neuroimagery studies, such as one conducted by Meer et al. (2016) [52], found that low nutritional value foods elicit more attention than high nutritional value foods, and for children, they have a higher level of activation in the areas involving reward, motivation and memory while viewing low nutritional value foods. Visual attention studies with eye-tracking cameras [53,54] showed that children pay more attention to low nutritional value foods compared to high nutritional value foods. Implicit affective evaluation studies, such as one by Woodward and Treat (2015) [55], indicated that both added fat and added sugar are associated with more positive affective evaluations. This inherent attraction to low nutritional value foods might be the reason why children are more influenced by these food portrayals placed within media content. Children's minds might be more activated to messages associated with low nutritional value foods, and thus, children might develop behaviors consistent with these messages.

Second, one possible explanation about the age differences found is that younger children have less established preferences [47]. As children grow up, their dietary habits become more established [56]. That is, the preferences for a certain low nutritional value food may not be as defined for a younger child as they are for an older child; therefore, the youngest children might be more influenced by the appearance of this specific food placement. Additionally, younger children are more impulsive than older children in go/no-go tasks [57], which, in the present study, might mean

that this age group has less self-control to refrain their impulses of selecting the placed foods. Although middle childhood comprises primary school—that is, children from 6 to 12 years of age—some organizations such as the Common Sense Media Organization [58] or centers such as the Centers for Disease Control and Prevention [59] establish differences in this age range with regard to children's cognitive, social and emotional development. In the first stage of middle childhood (6–8 years of age), children are less aware of the point of view of others than in the second stage (9–11 years of age). As cartoon characters might be seen as models with other points of view, it might not be strange that younger children are less aware of these perceptions and, therefore, are more influenced by the food portrayals. Additionally, the age differences that we found might be because as children grow up, they become less interested in cartoons. As public data shows, younger children watch cartoons the most, and older children begin to change their interests to other forms of leisure media [60]. Therefore, younger children might be more open and receptive to food messages in cartoons, whereas older children might be more disconnected from these messages.

Third, it is important to highlight that the food placement scenes selected for the present study were randomly chosen from the database of a content analysis that examined the presentation of non-branded foods placed in animated cartoons targeted to children over 7 [5]. In that content analysis [5], traditional execution factors were considered named as factors of prominence: placement duration (in seconds), screen position (background vs. foreground), plot connection (low vs. high) and modality (unimodal vs. bimodal). It was found that low nutritional value foods were more prominent than high nutritional value foods when it comes to animated cartoons targeted to audiences over age 7. Similarly, in Matthes and Naderer (2018) [4]'s content analysis of foods placed in children's movies which also measured placement interaction and placement consumption, higher persuasive potential of low nutritional value food placements compared to high nutritional value food placements was found. According to SCT [35], both the salience (prominence) and the context (positive, neutral and negative) of messages placed in media influence modelled behaviors. As low nutritional value food placements are more prominent and present more positive contexts (celebration, joy, pleasure) than high nutritional value food placements, our results might be also explained by the different salience and enthusiasm between both types of foods.

The present study has some limitations. First, we exposed children to placements in excerpts of the cartoon series. Although foods in cartoons are prevalent, it is not an easy task to find an episode that contains several types of foods (low nutritional value foods and high nutritional value foods) combined with different types of placement; therefore, we used scenes instead of using full episodes to control these variables. However, the length of the cartoon video should be tested in future research. Second, although food cards were designed to include foods that belonged to the same food category (fruits, vegetables, snacks, sweets, etc.), it was not easy to control the degree of appeal of the foods represented on each card. This could have affected the measurement of non-branded food placement effects, as both the experimental and control groups chose the target food at a high rate. We suggest taking this aspect is taken into account when designing options for a task that involves food choice. Third, in the present study, modality did not play a key role in food placement effectiveness. As aforementioned, modality is among the most studied execution factors in the literature about product placements [22,41,43]. However, recent studies have explored other variables that might be more strongly implicated in the effectiveness of food placements. For example, Binder, Naderer and Matthes (2019) [38] found that children's choices were affected by small variations in endorsement—that is, in function of the number of animated characters eating the food. Further, Naderer, Matthes and Zeller (2017) [26] explored how the different levels of interaction between characters and products (foods) influence children's food choices. In the present study, we controlled type of food and modality. However, we did not control other variables that might affect children's food choices.

Our findings concerning the behavioral effects of non-branded food placements have considerable practical implications. Children spend many hours watching cartoons that include food placements. According to a recent content analysis of non-branded food placements in cartoons, children are exposed, on average, to one placement less than every 5 min [5]. Further, when it comes

to cartoons targeted to children over 7, a high percentage of food messages (approximately 60%) are non-supportive to educational food content [5]. That is, not only are low nutritional value food placements prevalent, but also these portrayals appear associated with positive contexts. In our study, low nutritional value foods placed in cartoons seem to have a greater short-term impact than high nutritional value foods for young children. Combining both types of studies (content analysis and the present experiment), the consequences of portraying low nutritional food placements in cartoons targeted to children over 7 are negative when it comes to educate recommended eating habits. With regard to high nutritional value food placements, although we did not find short-term effects on this type of food, it is necessary to investigate whether long-term effects could take place on these foods.

5. Conclusions

We hope that our present study paves the way for future research. Considering the potential influence on children's diet, these results should not be overlooked. The type of food plays a key role in non-branded food placement effectiveness, and unfortunately, the effects are not aligned with the WHO's (2015) [48] food consumption recommendations. The problem of childhood obesity requires that urgent strategic measures be taken related not only to advertisements and packaging but also to other strategies, such as food placements.

Young children constitute a sector of the public that should be among the main foci of political strategic measures. The younger the children are, the more moldable their behavior is, both in a positive [61] or in a negative way. We recommend policy makers to take these results into account when designing strategies to prevent obesity, specifically when cartoons are targeting the youngest children.

Supplementary Materials: The following are available online at www.mdpi.com/xxx/s1. Figure S1: Food card distribution.

Author Contributions: All authors contributed to the design, execution and analysis of the study. The first author was the lead manuscript author. All authors contributed to and approved the manuscript content. Author responsibilities were as follows: Conceptualization, V.V.-N., M.-J.M.-S. and R.A.A.-P.; Methodology, V.V.-N., M.-J.M.-S. and R.A.A.-P.; Validation, V.V.-N., M.-J.M.-S. and R.A.A.-P.; Formal analysis, V.V.-N.; Investigation, V.V.-N., M.-J.M.-S. and R.A.A.-P.; Resources, V.V.-N., M.-J.M.-S. and R.A.A.-P.; Data curation, V.V.-N.; Writing—original draft preparation, V.V.-N.; Writing—review and editing, V.V.-N., M.-J.M.-S. and R.A.A.-P. Visualization, V.V.-N.; Supervision, M.-J.M.-S. and R.A.A.-P.

Funding: This research received no external funding.

Acknowledgments: We would like to thank the school Colegio del Sagrado Corazón de Jesus (Cordoba, Spain) for their collaboration, support and help. We would also like to thank the participants and their parents who made it possible to conduct this study. Finally, many thanks to the students who participated in the experiment.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Stiglic, N.; Viner, R.M. Effects of screentime on the health and well-being of children and adolescents: A systematic review of reviews. *BM. J. Open.* **2019**, *9*. e023191.
2. Kelly, B.; Halford, J.C.G.; Boyland, E.J.; Chapman, K.; Bautista-Castaño, I.; Berg, C.; Caroli, M.; Cook, B.; Coutinho, J.G.; Effertz, T. Grammatikaki, E. Television food advertising to children: A global perspective. *Am. J. Public Health.* **2010**, *100*, 1730–1736.
3. Lee, M.; Choi, Y.; Quilliam, E.T.; Cole, R.T. Playing with food: Content analysis of food advergames. *J. Consum. Aff.* **2009**, *43*, 129–154.
4. Matthes, J.; Naderer, B. Sugary, fatty, and prominent: food and beverage appearances in children's movies from 1991 to 2015. *Pediatr. Obes.* **2018**, *14*, e12488.
5. Araque-Padilla, R.; Villegas-Navas, V.; Montero-Simo, M.J. Non-branded food placements in children's entertainment programs: A content analysis. *Health. Commun.* **2019**, *34*, 1222–1229.

6. Naderer, B.; Matthes, J.; Spielvogel, I. How brands appear in children's movies. A systematic content analysis of the past 25 Years. *Int. J. Advert.* **2017**, *0487*, 1–21.
7. Auty, S.; Lewis, C. Exploring children's choice: The reminder effect of product placement. *Psychol. Mark.* **2004**, *21*, 697–713.
8. Naderer, B.; Matthes, J.; Binder, A.; Marquart, F.; Mayrhofer, M.; Obereder, A. Spielvogel, I. Shaping children's healthy eating habits with food placements? Food placements of high and low nutritional value in cartoons, Children's BMI, food-related parental mediation strategies, and food choice. *Appetite* **2018**, *120*, 644–653.
9. Brown, C.L.; Matherne, C.E.; Bulik, C.M.; Howard, J.B.; Ravanbakht, S.N.; Skinner, A.C.; Wood, C.T., Bardone-Cone, A.M.; Brown, J.D.; Perrin, A.J.; Levine, C. Influence of product placement in children's movies on children's snack choices. *Appetite* **2017**, *114*, 118–124.
10. Matthes, J.; Naderer, B. Children's consumption behavior in response to food product placements in movies. *J. Consum. Behav.* **2015**, *14*, 127–136.
11. Naderer, B.; Matthes, J.; Marquart, F.; Mayrhofer, M. Children's attitudinal and behavioral reactions to product placements: Investigating the role of placement frequency, placement integration, and parental mediation. *Int. J. Advert.* **2018**, *37*, 236–255.
12. Wang, Y.; Lobstein, T. Worldwide trends in childhood overweight and obesity. *Int. J. Pediatr. Obes.* **2006**, *1*, 11–25.
13. WHO. Childhood overweight and obesity [Internet]. 2019. Available online: https://www.who.int/end-childhood-obesity/en/(accessed on 21 August 2019)
14. Whitaker, R.C.; Wright, J.A.; Pepe, M.S.; Seidel, K.D.; Dietz, W.H. Predicting Obesity in Young Adulthood from Childhood and Parental Obesity. *N. Engl. J. Med.* **1997**, *337*, 869–873.
15. Wang, F.; Wild, T.C.; Kipp, W.; Kuhle, S.; Veugelers, P.J. The influence of childhood obesity on the development of self-esteem. *Heal. Reports.* **2009**, *20*, 21–27.
16. Campbell, A. *Prohibiting Product Placement and the Use of Characters in Marketing to Children.* **2005**, 1–71.
17. Chan, F.F.Y.; Lowe, B.; Petrovici, D.; Petrovici, B.L.D. Processing of product placements and brand persuasiveness. *Mark. Intell. Plan.* **2016**, *34*, 355–375.
18. Dias, M.; Agante, L. Can advergames boost children's healthier eating habits? A comparison between healthy and non-healthy food. *J. Consum. Behav.* **2011**, *10*, 152–160.
19. Esmaeilpour, F.; Heidarzadeh Hanzaee, K.; Mansourian, Y.; Khounsiavash, M. Children's food choice: Advertised food type, health knowledge and entertainment. *J. Food. Prod. Mark.* **2018**, *24*, 476–494.
20. Folkvord, F.; Anastasiadou, D.T.; Anschütz, D. Memorizing fruit: The effect of a fruit memory-game on children's fruit intake. *Prev. Med. Reports.* **2016**, *5*, 106–111.
21. Pempek, T.A.; Calvert, S.L. Tipping the balance: Use of advergames to promote consumption of nutritious foods and beverages by low-income African American children. *Arch. Pediatr. Adolesc. Med.* **2009**, *163*, 633–637.
22. Charry, K.M. Product placement and the promotion of healthy food to pre-adolescents: When popular tv series make carrots look cool. *Int. J. Advert.* **2014**, *33*, 599–616.
23. Royne, M.B.; Kowalczyk, C.M.; Levy, M.; Fox, A.K. Milk, juice, or cola? Exploring the effect of product placement on children? attitudes and behavior. *Health. Mark. Q.* **2017**, *34*, 128–141.
24. Gonçalves, S.; Ferreira, R.; Conceição, E.M.; Silva, C.; Machado, P.P.P.; Boyland, E. The impact of exposure to cartoons promoting healthy eating on children's food preferences and choices. *J. Nutr. Educ Behav.* **2018**, *50*, 451–457.
25. Hudson, S.; Elliott, C.; Hudson, S. Measuring the impact of product placement on children using digital brand integration. *J. Food. Prod. Mark.* **2013**, *19*, 176–200.
26. Naderer, B.; Matthes, J.; Zeller, P. Placing snacks in children's movies: Cognitive, evaluative, and conative effects of product placements with character product interaction. *Int. J. Advert.* **2018**, *37*, 852–870.
27. Toomey, D.A.; Francis, A.L. Branded product placement and pre-teenaged consumers: influence on brand preference and choice. *Young. Consum.* **2013**, *14*, 180–192.
28. Uribe, R.; Fuentes-García, A. The effects of TV unhealthy food brand placement on children. Its separate and joint effect with advertising. *Appetite* **2015**, *91*, 165–172.
29. Kelly, B.; Boyland, E.; King, L.; Bauman, A.; Chapman, K.; Hughes, C. Children's exposure to television food advertising contributes to strong brand attachments. *Int. J. Environ. Res. Public. Health.* **2019**, *16*, 2358.

30. Spinelli, S.; Masi, C.; Zoboli, G.P.; Prescott, J.; Monteleone, E. Emotional responses to branded and unbranded foods. *Food. Qual. Prefer.* **2015**, *42*, 1–11.
31. Verhellen, Y.; Oates, C.; Pelsmacker, P.; Dens, N.; De Pelsmacker, P.; Dens, N. Children's responses to traditional versus hybrid advertising formats: The moderating role of persuasion knowledge. *J. Consum. Policy.* **2014**, *37*, 235–255.
32. Habib, K.; Soliman, T. Cartoons ' effect in changing children mental response and behavior. *Open. J. Soc. Sci.* **2015**, *3*, 248–264.
33. Rai, S.; Waskel, B.; Sakalle, S.; Dixit, S.; Mahore, R. Effects of cartoon programs on behavioural , habitual and communicative changes in children. *Int. J. Commu. Med. Public. Health.* **2017**, *3*, 1375–1378.
34. Brunick, K.L.; Putnam, M.M.; McGarry, L.E.; Richards, M.N.; Calvert, S.L. Children's future parasocial relationships with media characters: The age of intelligent characters. *J. Child. Media.* **2016**, *10*, 181–190.
35. Bandura, A. Social cognitive theory of mass communication. *Media. Psychol.* **2009**, *3*, 265–299.
36. Nowlis, S.M.; Mandel, N.; McCabe, D.B. The Effect of a Delay between Choice and Consumption on Consumption Enjoyment. *J. Consum. Res.* **2004**, *31*, 502–510.
37. Folkvord, F.; Anschütz, D.J.; Buijzen, M.; Valkenburg, P.M. The effect of playing advergames that promote energy-dense snacks or fruit on actual food intake among children. *Am. J. Clin. Nutr.* **2013**, *97*, 239–245.
38. Binder, A.; Naderer, B.; Matthes, J. Do children's food choices go with the crowd? Effects of majority and minority peer cues shown within an audiovisual cartoon on children's healthy food choice. *Soc. Sci. Med.* **2019**, *225*, 42–50.
39. Wiles, M.A.; Danielova, A. The worth of product placement in successful films: An event study analysis. *J. Mark.* **2009**, *73*, 44–63.
40. Yang, M.; Roskos-Ewoldsen, D.R. The effectiveness of brand placements in the movies: Levels of placements, explicit and implicit memory, and brand-choice behavior. *J. Commun.* **2007**, *57*, 469–489.
41. Balasubramanian, S.K.; Karrh, J.A.; Patwardhan, H. Audience response to product placements: An integrative framework and future research agenda. *J. Advert.* **2006**, *35*, 115–141.
42. Russell, C.A. Investigating the effectiveness of product placements in television shows: The role of modality and plot connection congruence on brand memory and attitude. *J. Consum. Res.* **2002**, *29*, 306–318.
43. Hang, H. The implicit influence of bimodal brand placement on children: Information integration or information interference? *Int. J. Advert.* **2012**, *31*, 465–484.
44. Law, S.; Braun, K.A. I'll have what she's having: Gauging the impact of product placements on viewers. *Psychol. Mark.* **2000**, *17*, 1059–1075.
45. Chassiakos, Y.R.; Radesky, J.; Christakis, D.; Moreno, M.A.; Cross, C.; Hill, D. Children and adolescents and digital media. *Pediatrics* **2016**, *138*, e20162593.
46. Rozendaal, E.; Buijzen, M.; Valkenburg, P. Do children's cognitive advertising defenses reduce their desire for advertised products? *Communications.* **2009**, *34*, 287–303.
47. Nederkoorn, C.; Jansen, A.; Havermans, R.C. Feel your food. The influence of tactile sensitivity on picky eating in children. *Appetite* **2015**, *84*, 7–10.
48. World Health Organization (WHO). Healthy diet [Internet]. Healthy Diet Fact Sheet N394. 2015. Available online: https://www.who.int/nutrition/publications/nutrientrequirements/healthydiet_factsheet/en/(accessed on 27 September 2018)
49. Psychology Software Tools, I. E-Prime 2.0 [Internet]. 2016. Available online: https://pstnet.com/tag/e-prime/(accessed on 3 November 2019)
50. Hayes, A.F. *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*;: The Guilford Press: N Y New York; 2013.
51. Raghunathan, R.; Naylor, R.W.; Hoyer, W.D. The unhealthy = tasty intuition and its effects on taste inferences, enjoyment, and choice of food products. *J. Mark.* **2006**, *70*, 170–184.
52. Meer, F. Van; Laan, L.N. Van Der; Charbonnier, L.; Viergever, M.A.; Adan, R.A.H.; Am, P. Developmental differences in the brain response to unhealthy food cues : an fMRI study of children and adults. *Ame. J. of Clinicl Nutrition.* **2016**, *104*, 1515–1522.
53. Junghans, A.F.; Hooge, I.T.C.; Maas, J.; Evers, C.; De Ridder, D.T.D. UnAdulterated - Children and adults' visual attention to healthy and unhealthy food. *Eat. Behav.* **2015**, *17*, 90–93.
54. Spielvogel, I.; Matthes, J.; Naderer, B.; Karsay, K. A treat for the eyes. An eye-tracking study on children's attention to unhealthy and healthy food cues in media content. *Appetite* **2018**, *125*, 63–71.

55. Woodward, H.E.; Treat, T.A. Unhealthy how?: Implicit and explicit affective evaluations of different types of unhealthy foods. *Eat. Behav.* **2015**, *17*, 27–32.
56. Scaglioni, S.; De Cosmi, V.; Ciappolino, V.; Parazzini, F.; Brambilla, P.; Agostoni, C. Factors influencing children's eating behaviours. *Nutri.* **2018**, *10*, 1–17.
57. Brocki, K.C.; Bohlin, G. Executive functions in children aged 6 to 13: A dimensional and developmental study. *Dev. Neuropsychol.* **1986**, *26*, 571–593.
58. Common Sense Media (CSM). Behind the common sense media ratings system [Internet]. 2018. Available online: https://www.commonsensemedia.org/about-us/our-mission/about-our-ratings(accessed on 14 November 2018)
59. Centers for Disease Control and Prevention. Middle childhood (6-8 years of age) [Internet]. 2019. Available online: https://www.cdc.gov/ncbddd/childdevelopment/positiveparenting/middle.html(accesed on 12 September 2019)
60. Cherney, I.D.; London, K. Gender-linked differences in the toys, television shows, computer games, and outdoor activities of 5- to 13-year-old children. *Sex. Roles.* **2006**, *54*, 717–726.
61. Laureati, M.; Bergamaschi, V.; Pagliarini, E. School-based intervention with children. Peer-modeling, reward and repeated exposure reduce food neophobia and increase liking of fruits and vegetables. *Appetite* **2014**, *83*, 26–32.

International Journal of Environmental Research and Public Health

MDPI

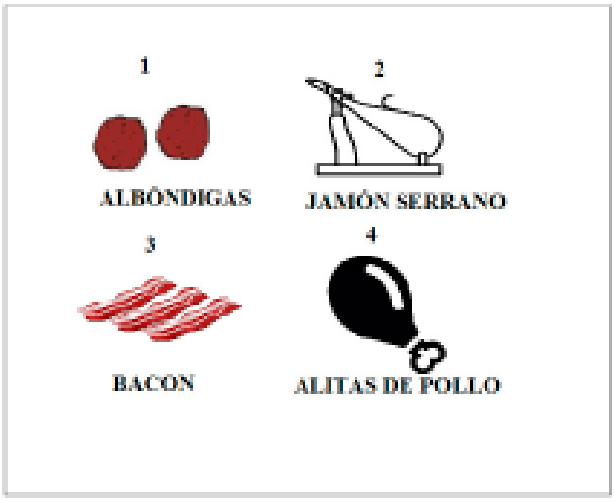
Article

Investigating the Effects of Non-Branded Foods Placed in Cartoons on Children's Food Choices through Type of Food, Modality and Age

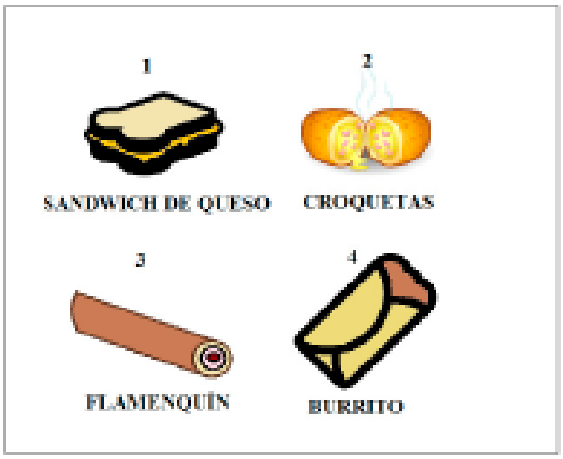
Foods cards distribution

Bimodal low recommended foods

Bacon

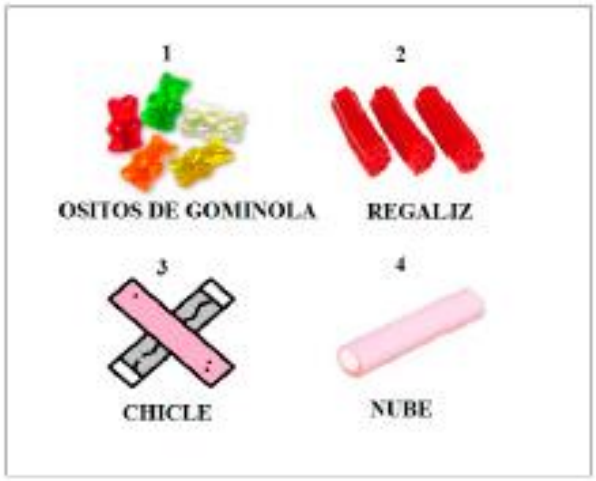


Burrito



Int. J. Environ. Res. Public Health 2019, 16, 5032; doi:10.3390/ijerph16245032 www.mdpi.com/journal/ijerph

Gummy bears



Mayonnaise

Unimodal low recommended foods

Cookies

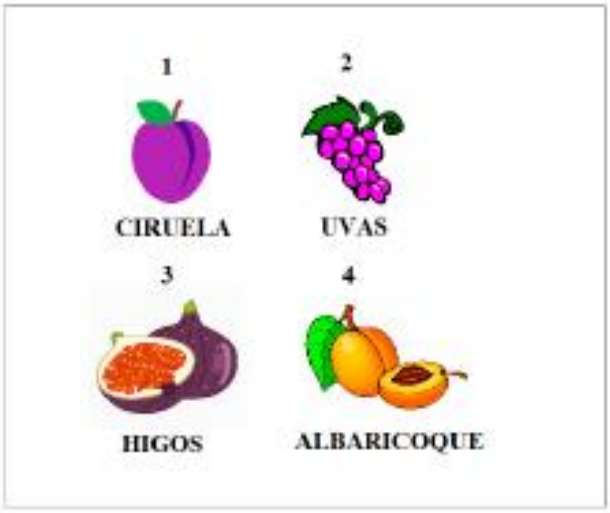
Hot dog

Nachos

Pizza

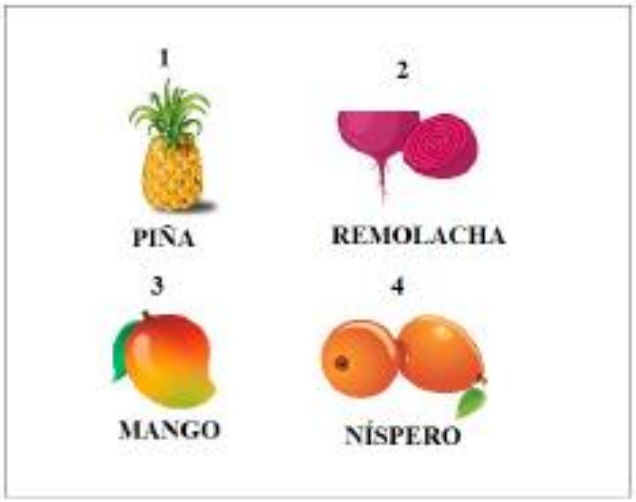
Bimodal highly recommended foods

Grapes

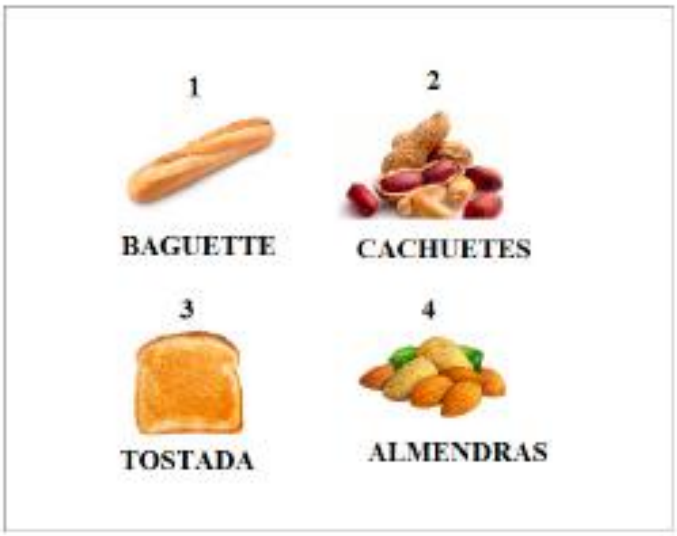


Lettuce

Pineapple

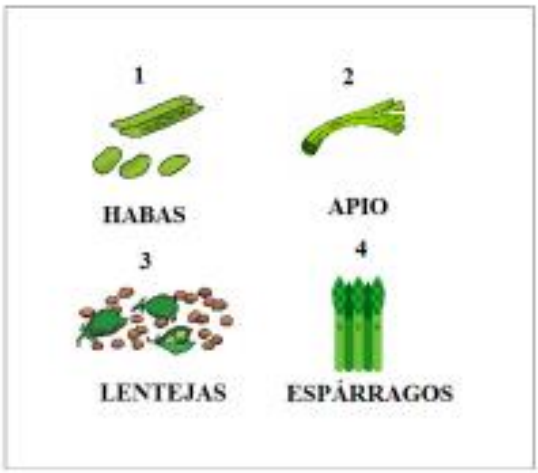


Toast

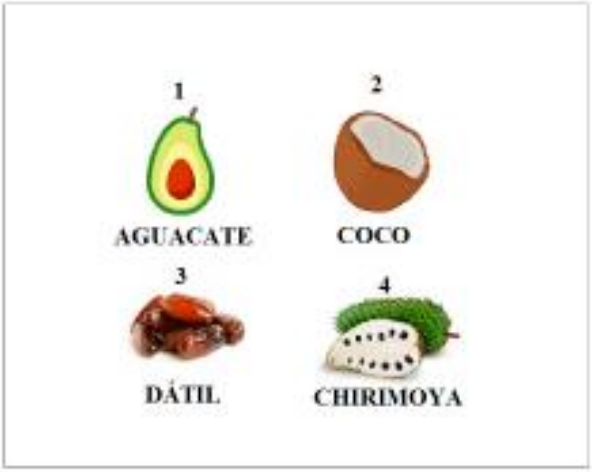


Unimodal highly recommended foods

Asparagus



Coconut



Corn

Water

Capítulo 3 Discusión

La presente tesis ha centrado su foco de investigación en los emplazamientos de comida sin marca representados en los dibujos animados dirigidos a niños. Son tres los estudios que la componen.

En primer lugar, los resultados relativos a la pregunta de investigación 1 (Artículo I) muestran que los emplazamientos de comida sin marca representados en los dibujos animados son, por una parte, frecuentes y prominentes.

Frecuentes porque aproximadamente cada 5 minutos tiene lugar una representación de estos emplazamientos. No obstante, esta cifra contrasta con otros análisis de contenido similares, como el de Korr & Jeremy (2008) donde la frecuencia hallada fue de un emplazamiento cada 3 minutos. La frecuencia de aparición de los emplazamientos de comida en dibujos animados podría, por tanto, haber experimentado un descenso en la última década.

Prominentes porque, si atendemos a las variables de ejecución analizadas, alrededor del 50% de los emplazamientos son bimodales, tienen alta conexión con la trama y ocupan un primer plano en la pantalla.

Además, los resultados del primer estudio arrojaron que, en cuanto a la valencia, la mayoría de los emplazamientos aparecían asociados a mensajes neutros, seguidos de mensajes positivos y de una minoría de mensajes negativos. Este patrón respecto de la valencia de los mensajes parece ser el que se encuentra en estudios similares ya sea en análisis de contenido que se enfocan en películas (Matthes y Naderer, 2019) o en programas de televisión emitidos en canales para preadolescentes (Hahn y Aubrey, 2018).

Respecto al tipo de comida, las representaciones de alimentos de bajo y de alto contenido nutricional son prevalentes y similares en frecuencia (siendo los primeros ligeramente más frecuentes), mientras que los de contenido nutricional medio son escasos. Resultados similares se obtienen al analizar la naturaleza educativa de los emplazamientos: en general, existe equilibrio entre mensajes educativos frente a los poco educativos. Es decir, a la hora de ver dibujos animados (considerando la totalidad de la muestra analizada), los niños reciben un repertorio de mensajes diverso en el que se alternan, de forma equilibrada, mensajes "recomendables" con mensajes "poco recomendables" de alimentación.

Por otro lado, al analizar las representaciones de alimentos según la edad del público objetivo al que van destinados los dibujos animados se obtuvo que cuando los dibujos están orientados a niños más mayores, la naturaleza educativa de los emplazamientos descendía considerablemente. En otras palabras, si bien los dibujos destinados a menores de 5 años transmiten mensajes más recomendables a nivel nutricional (más de la mitad de estos mensajes

son educativos), el patrón se invierte cuando el público objetivo son los niños mayores de 7 años (donde más de la mitad de los mensaje de alimentación son poco recomendables). Estos resultados parecen indicar una intención de proteger a los niños más pequeños a través del fomento hábitos de alimentación saludables, pero a la vez muestran una mayor desatención en el caso de los niños más mayores.

Por último, con respecto a las diferencias según el origen geográfico de los dibujos animados, el análisis de contenido mostró que las series norteamericanas fueron las que presentaron mayor porcentaje de mensajes poco recomendables a nivel nutricional comparado con las series europeas o asiáticas. Una de las razones de estas diferencias se debe a que en los dibujos animados, ya sea a través de los personajes imitando comportamientos (como consumir una hamburguesa en una cadena de comida rápida), a través del decorado de la escena (como sería un bol de naranjas en la mesa de la cocina), entre otros contextos, tiene lugar una emulación de situaciones que suceden en el día a día de las distintas sociedades (Scanlan y Feinberg, 2000).

En segundo lugar, y a modo de síntesis, los resultados relativos a la pregunta de investigación 2 (artículo II) sugieren que los alimentos embebidos en medios de entretenimiento (entre los que se incluyen los emplazamientos de comida) influyen sobre los comportamientos alimentarios (elección y consumo calórico) de los niños. Dado que la mayoría de los alimentos embebidos en los estudios incluidos en la revisión sistemática y en los metaanálisis fueron de bajo valor nutricional y con marca, los resultados comentados están principalmente asociados a alimentos de estas características. Esto, muestra la necesidad (entendida como *gap*) de indagar más sobre los efectos de los emplazamientos de alto contenido nutricional y sin marca.

De la revisión sistemática (enfoque cualitativo) se desprende que hay ciertas características asociadas a la presentación de los alimentos embebidos que resultan tener más impacto sobre las variables comportamentales analizadas. Por una parte, los resultados muestran que los alimentos embebidos de manera más prominente (Brown et al., 2017; Naderer et al., 2017) influyen más que los embebidos sutilmente (Hudson y Hudson, 2006; Royne et al., 2017). Por otra parte, la edad parece desempeñar un rol moderador sobre los efectos de los alimentos embebidos (a menor edad, mayores efectos), aunque los hallazgos son mixtos (Matthes y Naderer, 2015; Naderer et al., 2017; Uribe y Fuentes-García, 2015). Los resultados también apuntan a que es la interacción de varias variables las que aumentan los efectos de los alimentos embebidos en medios de entretenimiento. Por ejemplo, al combinar

alimentos de bajo contenido nutricional con emplazamientos de alta conexión con la trama y de valencia positiva.

Por otro lado, la dirección de los resultados de los metaanálisis (enfoque cuantitativo) incluidos en el estudio 2 van en la línea de los hallados en la revisión sistemática: cuando los alimentos embebidos en los medios de entretenimiento son de bajo valor nutricional, con marca, conectados con la trama, bimodales y dirigidos a los niños más pequeños; los efectos sobre la elección y el consumo calórico son mayores que sus correspondientes contrapuestos.

Los resultados de la revisión sistemática y los metaanálisis aportan otra contribución más a las revisiones realizadas hasta la fecha que han indagado en los efectos de los mensajes de alimentación sobre los comportamientos alimentarios de los niños. Ya sean anuncios publicitarios (Boyland et al., 2016), estrategias de Marketing variadas (Sadeghirad et al., 2016), advergames (Folkvord y van 't Riet, 2018), o videojuegos digitales (DeSmet et al., 2014); los niños están expuestos a un "entorno obesogénico" que les predispone a malos hábitos alimentarios.

Finalmente, el experimento realizado para dar respuesta a la pregunta de investigación 3 (artículo III) encontró que los emplazamientos de comida sin marca representados en los dibujos animados infantiles contemporáneos influyeron en la elección de alimentos que realizaron posteriormente los niños cuando convergieron una serie de características o variables: en concreto, cuando los emplazamientos fueron de bajo valor nutricional y los niños tenían edades inferiores a los 9 años.

Los resultados del experimento se deben a varios factores. Por un lado, los alimentos de bajo contenido nutricional suelen presentar un mayor atractivo para los niños que los de alto contenido nutritivo en términos evaluativos, afectivos o atencionales (Raghunathan et al., 2006; Spielvogel et al., 2018; Woodward y Treat, 2015).

Por otro lado, los emplazamientos no se representan con el mismo entusiasmo y en particular con la misma valencia cuando se trata de alimentos de alto que cuando son de bajo contenido nutricional (en el caso de dibujos animados dirigidos a audiencias mayores de 7 años). Dado que las escenas de dibujos animados a las que estuvieron expuestos los niños se extrajeron de manera aleatoria del análisis de contenido del estudio 1, no resulta extraño que los alimentos de bajo contenido nutricional utilizados en el experimento se presenten en contextos de alegría, celebración y agrado en mayor proporción que los emplazamientos de alimentos de alto contenido nutricional.

En el experimento, al igual que se registraron en el metaanálisis sobre la variable elección, la edad desempeñó un papel clave: fueron los niños con edades comprendidas entre

los 7 y los 8 años los que estuvieron más influidos por los emplazamientos de comida de bajo valor nutricional. Este rol moderador de la edad se debe a varias razones. Como se comentó en el Capítulo 1, las habilidades persuasivas de los niños (Rozendaal et al., 2009), al igual que su desarrollo cognitivo (Feldman, 2004; Piaget, 1964), está ligado a la edad. Los niños más pequeños, al tener las estrategias persuasivas menos desarrolladas, fueron más vulnerables a los efectos de los mensajes de comida emplazados en los dibujos animados. Otra posible explicación es que a medida que los niños se hacen mayores, sus preferencias de comida se van asentando: los emplazamientos de comida no surtirían el mismo efecto en los más mayores porque tienen sus preferencias de comida más preestablecidas (Cooke y Wardle, 2004). También, la impulsividad, entendida como la tendencia a reaccionar de forma automática ante estímulos externos o internos (en el caso que nos ocupa, relacionados con la comida), va asociada a la edad (Pauli-Pott et al., 2010). Los niños más pequeños, podrían haber elegido de forma más impulsiva que los más mayores, reflejándose estas diferencias en los resultados encontrados en el experimento.

En general, no sólo en el caso de los niños (también en los adultos), los mensajes que nos llegan de los medios nos pueden influir en mayor o menor medida en función de la conexión y el grado de atractivo que tiene lugar al hacer uso de ellos. Dicho de otro modo, lo que para un espectador puede resultar un programa que despierta su interés y curiosidad (conectando así con el programa) para otro puede ser algo insípido y aburrido. Esta variación en gustos, propia de las diferencias individuales de las personas, también evoluciona con la edad (Reid Chassiakos et al., 2016): un dibujo animado que para un niño de 7 años puede ser entretenido, puede ser catalogado como "infantil" para uno de 11 años. Ésta podría ser otra explicación de las diferencias en edad encontradas en el experimento: los dibujos animados podrían perder atractivo para las audiencias de los niños más mayores.

En el experimento, la variable comportamental que se midió fue la elección. Si bien la elección no indica la cantidad de comida ingerida por el niño (consumo calórico), da una primera aproximación de la dirección hacia donde se dirigen los efectos de los emplazamientos de comida. En el estudio experimental, los alimentos de alto contenido nutricional no arrojaron efectos significativos mientras que los de bajo consumo nutricional sí, en el caso de los niños más pequeños.

Los hallazgos encontrados en esta tesis sugieren que los emplazamientos de comida sin marca representados en los dibujos animados son un factor más de influencia sobre los comportamientos alimentarios desarrollados por los niños. Esto se debe a varios motivos. Por un lado, los dibujos animados presentan un número abundante de emplazamientos de comida

que aparecen de manera prominente y llamativa, muchos de los cuales son de bajo valor nutricional, estando asociados a mensajes de naturaleza educativa escasa o baja. Por otro lado, estos resultados no serían motivo de preocupación sino fueran acompañados por los efectos negativos que dichos emplazamientos tienen sobre los comportamientos alimentarios: según los resultados del tercer estudio, los efectos sobre la elección a corto plazo tienen lugar en el caso de los alimentos de bajo valor nutricional.

La actual tesis presenta varias fortalezas. La principal es la relativa al foco de estudio que se cubre: emplazamientos de comida sin marca, los cuales, al haberse estudiado poco anteriormente representaban un *gap* en la literatura. Además, el uso de tres metodologías diferentes confiere un valor añadido a este trabajo, ya que se aborda la influencia potencial de estas representaciones de comida desde diversas perspectivas.

La fortaleza del primer estudio reside principalmente en la variable creada expresamente para el análisis de contenido: la naturaleza educativa de los mensajes de comida, la cual ofrece una visión más completa del tipo de mensajes de alimentación que reciben los niños. El segundo estudio presenta como fortalezas la sistematización seguida para llegar a los resultados: el uso de la declaración PRISMA, el registro del protocolo, el análisis del sesgo de publicación, la búsqueda independiente y por duplicado y demás carácterísticas propias de una revisión sistemática combinada con dos metaanálisis. El tercer estudio tiene como fortalezas las variables que se tuvieron en cuenta a la hora de diseñar el experimento: se emplearon dibujos animados reales (lo que aumentó la validez externa) y se emplazaron alimentos de alto contenido nutricional (poco frecuentes en la literatura que mide los efectos de los emplazamientos de comida).

3.1. Limitaciones

La presente tesis presenta varias limitaciones, algunas de ellas son generales a los tres estudios mientras que otras son específicas de cada uno de ellos.

La limitación compartida por los tres estudios es la relativa a la categorización del tipo de comida atendiendo a la frecuencia de consumo recomendado por la OMS (2018a). Los alimentos que aparecen emplazados en los dibujos animados y demás medios de entretenimiento son representaciones (visuales, verbales o audiovisuales) que indican si estamos ante frutos secos, verduras, zumos, entre muchos otros. Sin embargo, de los emplazamientos de comida no se puede extraer la información nutricional exacta en términos de kilocalorías, porcentaje de grasas saturadas, hidratos de carbono, etc. Esto hace que, en el caso de emplazamientos de determinados alimentos, como por ejemplo los zumos, la categorización pueda ser errónea. Un vaso pequeño de zumo de naranja natural entraría dentro

de alimentos de alto contenido nutricional mientras que si el vaso del zumo de naranja es concentrado (aquellos que tienen alto contenido de azúcares libres), el alimento emplazado ya no caería en la mencionada categoría.

Otra limitación compartida es que las variables de ejecución o características analizadas no incluyeron variables que también resultan ser relevantes en los estudios sobre los emplazamientos, como es el caso de la variable Interacción Producto - Personaje (IPP), que procede del término Character Product Interaction (CPI). La variable IPP es complementaria a la variable conexión con la trama en tanto que da un paso más e indica si el alimento en cuestión es consumido o no por el personaje (Naderer et al., 2017).

La principal limitación del estudio 1 (análisis de contenido) es que, de las series analizadas, la mayoría eran norteamericanas y europeas, siendo las asiáticas minoritarias. Esta distribución, aunque se basó en las series más vistas a nivel internacional, hace que los resultados acerca del origen geográfico de las series necesiten ser tomadas con cautela.

Entre las limitaciones del estudio 2 (revisión sistemática y metaanálisis) se encuentra la heterogeneidad hallada en los metaanálisis, la cual seguía estando presente tras el análisis de los moderadores. Además, la mayoría de los niños que participaron en los estudios incluidos fueron europeos y norteamericanos lo que refleja la necesidad de realizar estudios experimentales en otras regiones.

Las limitaciones del estudio 3 (estudio experimental) son varias. Por un lado, debido a la naturaleza de los estudios transversales como el caso del experimento realizado, los resultados son aplicables a un momento específico del tiempo. Por tanto, se requieren, en un futuro, estudios de corte longitudinal para analizar los efectos acumulativos en el tiempo. Por otro lado, en el experimento se intentó mantener cierta "naturalidad" haciendo que los niños vieran escenas de dibujos animados actuales con emplazamientos de comida de la forma en la que aparecen representados; sin embargo, no se controló la variable valencia del emplazamiento lo que podría haber alterado los resultados.

3.2. Líneas de investigación futuras

Para ampliar el conocimiento acerca de los alimentos emplazados no sólo en dibujos animados sino también en los medios de entretenimiento infantiles serían necesarios estudios de diversa naturaleza: cualitativos, longitudinales, centrados en alimentos poco familiares y fisiológicos, entre otros.

En la reciente revisión sistemática de Smith, Kelly, Yeatman, & Boyland (2019), se halló una escasez de estudios cualitativos acerca de las influencias del Marketing de alimentación sobre el consumo, preferencias y actitudes en los niños. En relación con el objeto de estudio de

la presenten tesis, los estudios cualitativos – tipo entrevistas, análisis del discurso, técnicas proyectivas o dinámicas de grupo - acerca de los emplazamientos de comida serían necesarios en tanto que ofrecerían una perspectiva complementaria a los estudios cuantitativos.

Por otro lado, los estudios longitudinales ofrecerían la posibilidad de analizar los efectos de los alimentos emplazados teniendo en cuenta el impacto en el medio/ largo plazo. En Folkvord, Anschutz, & Buijzen (2016) se encontró como las elecciones de alimentos saludables (manzanas) tenían efectos positivos en el IMC de los menores al cabo de los 2 años de la medición. Este tipo de estudios son necesarios ya que la mayoría de los realizados hasta la fecha son transversales y miden las respuestas en el inmediato/corto plazo.

Otra posible línea de investigación a explorar sería aquella que se centrara en analizar los efectos de los emplazamientos de comida, pero esta vez, de aquellos alimentos que tienen alto contenido nutricional y al mismo tiempo son poco familiares. La revisión sistemática del estudio 2 mostró cómo la mayoría de los estudios experimentales sobre alimentos embebidos en medios de entretenimiento eran sobre alimentos de bajo contenido nutricional y que, de los estudios (minoritarios) que analizaban los efectos de los alimentos con alto contenido nutricional, un alto porcentaje empleaba alimentos familiares (manzanas, mandarinas, plátanos, uvas, entre otros). Investigar cómo influyen los alimentos poco familiares en las elecciones o consumo posterior que realizan los niños sería interesante porque las preferencias preexistentes de los pequeños no intervendrían con la misma intensidad que con los alimentos familiares y, se podrían analizar los efectos de manera más pura (Cruwys et al., 2015).

De esta forma, en los diseños experimentales, se podrían emplear alimentos de alto contenido nutricional poco familiares como la calabaza, el aguacate, el coco, el brócoli o la coliflor, entre muchos otros. Según la OMS (2018a), una alimentación sana pasa por incluir una dieta variada y equilibrada que contenga, por tanto, diferentes alimentos de alto contenido nutricional. Además, el consumo de frutas y verduras variadas aporta al organismo diferentes vitaminas, minerales y micronutrientes necesarios para un buen desarrollo del niño.

Otra área poco explorada y que podría arrojar luz sobre las respuestas implícitas de los niños ante la exposición de alimentos presentados en los medios de entretenimiento es la de los estudios fisiológicos (Smith, Kelly, Yeatman, y Boyland, 2019). Los estudios fisiológicos, en comparación con aquellos que miden variables comportamentales o cognitivas, son menos propensos a presentar sesgos (como el sesgo de deseabilidad social). Hasta la fecha, se han realizado experimentos que miden el tiempo de fijación atencional a los alimentos en los niños a través de cámaras de seguimiento ocular como es el caso de los estudios de Spielvogel et al. (2018) y de Binder et al. (2020) al igual que también se han llevado a cabo estudios que miden

la activación (*arousal*) emocional a través de la medición de la dilatación de las pupilas (Binder et al., 2020) o de las respuestas de conductancia de la piel (Smith, Kelly, Yeatman, Johnstone, et al., 2019). Sin embargo, estos estudios utilizaron imágenes estáticas y, por tanto, se requieren más estudios que midan dichas y otras variables fisiológicas en otros formatos (como serían los dibujos animados).

Capítulo 4 Conclusiones

Esta tesis ha mostrado cómo los comportamientos alimentarios infantiles se ven influidos por los emplazamientos de comida representados en los dibujos animados, los cuales constituyen uno de los múltiples mensajes que reciben los niños cuando hacen uso de los medios de entretenimiento. De los hallazgos de esta tesis se deduce que, por una parte, los alimentos representados en los dibujos animados son prevalentes, prominentes y que una buena parte de ellos son de bajo valor nutricional, especialmente cuando las series animadas son dirigidas a un público mayor de 7 años y cuando su origen geográfico es norteamericano. Estos primeros resultados ofrecen un panorama un tanto pesimista, especialmente al combinarlos con los resultados de los dos últimos estudios. Por una parte, los alimentos embebidos en medios de entretenimiento dan forma a los comportamientos alimentarios de los niños, sobre todo los de bajo contenido nutricional. Por otra parte, y, concretamente, los emplazamientos de comida sin marca de bajo contenido nutricional representados en los dibujos animados influyen en las elecciones posteriores que realizan los niños tras haber estado expuestos a ellos cuando los participantes son menores de 9 años.

En general, un uso excesivo de los *media* - en EE. UU., por ejemplo, los menores de 13 años llegan a estar aproximadamente hasta 4 horas diarias viendo la TV, jugando a videojuegos o utilizando aplicaciones electrónicas- (Twenge y Campbell, 2018) - promueve la repetición de ciertos comportamientos que pueden convertirse en hábitos (LaRose, 2010) los cuales no sólo están asociados a la falta de actividad física, como sería el sedentarismo sino también los referidos a los malos hábitos alimentarios.

No obstante, tal y como indica la TCS de Bandura (Bandura, 2009; Bandura et al., 1966); las personas (incluyendo aquí a los niños), no somos meros sujetos pasivos moldeables por la información que nos llega del entorno, sino que somos agentes proactivos con capacidad de autorregulación y autodirección. Si bien es cierto que los más pequeños tienen las habilidades persuasivas, de autorregulación y de autodirección menos desarrolladas que las de los adultos (Francis y Susman, 2009), estas habilidades se pueden trabajar y desarrollar, entre otras cosas para que, los comportamientos alimentarios de los niños se ajusten más a sus necesidades nutricionales.

A modo de recomendaciones, sería aconsejable que los agentes implicados – tanto en materia de legislación como en el diseño de series de dibujos animados – adoptaran una serie de medidas conducentes a reducir los efectos negativos que los emplazamientos de comida sin marca representados en los dibujos animados tienen sobre los comportamientos alimentarios de los niños.

Por ejemplo, una posible medida en materia de legislación (especialmente teniendo en cuenta que los emplazamientos sin marca están actualmente fuera del foco de las regulaciones públicas) sería que, al comienzo o durante la emisión del dibujo animado se indicara el nivel educativo de la serie según el valor nutricional de los mensajes de alimentación que transmite. Esta posible "etiqueta" podría servir de referencia a los padres para conocer y supervisar la naturaleza educativa de los mensajes de alimentación que aparecen en los dibujos animados que ven sus hijos.

También, los diseñadores de medios de entretenimiento podrían tener los resultados de la presente tesis en cuenta a la hora de emplazar los alimentos dado que las representaciones de alimentos que aparecen en los dibujos animados y los patrones alimentarios que se dan en las distintas sociedades guardan una relación bidireccional; esto es, los emplazamientos influyen en los patrones alimentarios y a su vez, los patrones alimentarios de las sociedades se representan en los dibujos animados. Esta relación bidireccional viene explicada por la TCS de Bandura (2009) que indica que las personas son tanto "productores" como "productos" de los sistemas sociales. Así, sería recomendable que los diseñadores y demás agentes implicados en la retransmisión de los dibujos animados tuvieran en cuenta esta relación y adoptaran medidas que revertieran en patrones alimentarios más saludables para los niños. Por ejemplo, podrían reducirse el número de emplazamientos de alimentos, específicamente de aquellos de bajo valor nutricional, ya que una mayor frecuencia de aparición de estos emplazamientos conlleva mayores efectos en variables asociadas a comportamientos alimentarios como la elección (Matthes y Naderer, 2015). Así mismo, también podrían atenuarse los mensajes de alimentos de bajo contenido nutricional (ya que se presentan en contextos de mucho entusiasmo, celebración o alegría) y, al mismo tiempo podrían fortalecerse, a través de mensajes positivos, los emplazamientos de comida de alto o medio contenido nutricional. De esta forma se podría fomentar el denominado *edutainment* donde se combina, de forma simultánea entretenimiento y educación (Charry, 2014; Melgarejo Moreno y Rodríguez Rosell, 2019),

Los emplazamientos de comida sin marca forman parte de un amplio abanico de mensajes de alimentación que reciben los niños diariamente. Como se comentó en el Capítulo 1, además de cuando hacen uso de los *media*, los niños están expuestos a mensajes que dan forma a sus comportamientos alimentarios desde el entorno familiar, escolar, cuando acuden a los supermercados y tiendas de alimentación, entre otros. Es necesario, por tanto, crear entornos de alimentación saludables para los niños en los que se propicie el consumo de alimentos ricos en nutrientes y se reduzca el consumo de alimentos hipercalóricos. Se requiere del diálogo y la acción conjunta de los diversos agentes implicados:

- Organismos públicos

Se deberían tomar medidas encaminadas a aumentar la asequibilidad de las dietas saludables. También, serían necesarias medidas legislativas que protegieran más a la infancia en lo que a nutrición se refiere. Por ejemplo, aplicando políticas fiscales que incrementaran el precio de los productos con alto contenido en azúcares, grasas y sal.

- Industrias alimentarias

Las diferentes empresas que comercializan productos alimentarios de bajo contenido nutritivo orientado a niños deberían consensuar sus estrategias de Marketing con las recomendaciones de los organismos públicos e intentar adaptar sus productos a la legislación vigente. Reducir el tamaño del envase de un zumo alto en azúcares sería un ejemplo de medida de protección a la infancia.

- Familias

Desde el entorno familiar, sería de especial relevancia que los padres de los pequeños fueran una fuente de imitación ejemplar (en la medida de lo posible) en materia de nutrición. Sería necesario, además, que se limitara la compra de productos ultraprocesados, se fomentara el consumo de frutas y verduras, y se incrementara el conocimiento nutricional. Esto último, se podría lograr empleando estrategias de mediación activas, esto es, haciendo a los niños conocedores de la información nutricional de los alimentos a través de explicaciones y razonamientos adaptados a su edad.

A su vez, sería recomendable que los padres y tutores de los niños supervisaran los contenidos mediáticos que los pequeños ven, especialmente cuando no están orientados a su edad debido a las influencias negativas de alimentación que éstos podrían tener.

- Colegios

El entorno escolar también juega un papel clave en la educación nutricional. Preparar al profesorado para que se impartan clases o actividades extracurriculares en materia de nutrición serían ejemplos de medidas encaminadas a fomentar hábitos alimentarios saludables.

Los problemas de sobrepeso y obesidad infantil son asuntos globales. No obstante, existen regiones que son más vulnerables al desarrollo de estos problemas. En la revisión de Scaglioni et al. (2018), indicadores como un bajo nivel socioeconómico y educativo de familias en países desarrollados se asocian al desarrollo y mantenimiento de la obesidad infantil (vía consumo de alimentos ultraprocesados en detrimento del consumo de frutas y verduras). En lo que respecta a los países en vías de desarrollo, la inseguridad alimentaria (estrechamente relacionada con la baja calidad de las dietas) es una realidad a la que se enfrentan muchas

familias. Si atendemos a las poblaciones en cifras, más de la mitad de África, aproximadamente un tercio de América Latina y El Caribe y más de un quinto de Asia, padecen de inseguridad alimentaria moderada o grave (FAO et al., 2020). Además, los países en vías de desarrollo han experimentado en las últimas dos décadas una apertura comercial que ha servido de puerta de entrada a las diversas industrias alimentarias, entre las que se encuentran las cadenas de comida rápida (Christian y Gereffi, 2018). Esto, ha supuesto el debilitamiento del consumo de la dieta local tradicional, la cual es más saludable en términos nutritivos que la que proporciona la industria alimentaria (Keshari y Mishra, 2016) haciendo que muchas familias opten por elegir este tipo de alimentos (con aporte calórico poco nutritivo) a precios razonables (Martínez y Visbal, 2017) repercutiendo todo esto en incrementos en las cifras de sobrepeso y obesidad infantil.

Si bien los emplazamientos de alimentos sin marca representados en los dibujos animados constituyen una potencial fuente de influencia sobre los comportamientos y hábitos alimentarios de los niños, es necesario preguntarse si estas influencias son mayores en el caso de niños que viven en entornos desfavorecidos (familias con ingresos, nivel socioeconómico y educativo bajo) con respecto a los que viven en entornos más favorables. Por una parte, los niños que viven en entornos más favorables cuentan con mayor apoyo y supervisión nutricional por parte de los padres que los niños que viven en zonas empobrecidas (Mech et al., 2016). Por otra parte, los desiertos alimentarios – barriadas en la que la comida saludable es cara o difícil de encontrar (Shannon, 2014)- abundan más entre las zonas más desfavorecidas. De tal modo que, aunque a priori, los efectos de los emplazamientos de alimentos pudieran ser los mismos, los niños de entornos más desfavorecidos podrían estar expuestos a un mayor grado de ambiente obesogénico. A modo de ejemplo, un niño de América Latina podría estar recibiendo mensajes de alimentación de escasa calidad nutritiva (a través del Marketing tradicional o digital, al ver dibujos animados…) que hace que se dirija hacia aquellos alimentos que además de resultarle más atractivos (a pesar de ser poco recomendables a nivel nutritivo), están más a su alcance (como ocurre en los desiertos alimentarios propios de las regiones y zonas más pobres donde hay más inseguridad alimentaria).

Abordar los problemas de sobrepeso y obesidad infantil no es tarea fácil. Desde de esta tesis, se ha pretendido arrojar luz sobre uno de los múltiples factores implicados. Esperamos que los hallazgos encontrados sirvan de base para futuras investigaciones encaminadas a abordar y prevenir el sobrepeso y la obesidad infantil desde la perspectiva de las influencias que ejercen los medios de entretenimiento.

Referencias

Auty, S., y Lewis, C. (2004). Exploring children's choice: The reminder effect of product placement. *Psychology and Marketing*, *21*(9), 697-713. https://doi.org/10.1002/mar.20025

Balasubramanian, S. K., Karrh, J. A., y Patwardhan, H. (2006). Audience response to product placements: An integrative framework and future research agenda. *Journal of Advertising*, *35*(3), 115-141. https://doi.org/10.2753/JOA0091-3367350308

Bandura, A. (2009). Social cognitive theory of mass communication. *Media Psychology*, *3*(3), 265-299. https://doi.org/10.1207/S1532785XMEP0303

Bandura, A., Grusec, J. E., y Menlove, F. L. (1966). Observational learning as a function of symbolization and incentive set. *Child Development*, *37*(3).

Bere, E., Brug, J., y Klepp, K. I. (2008). Why do boys eat less fruit and vegetables than girls? *Public Health Nutrition*, *11*(3), 321-325. https://doi.org/10.1017/S1368980007000729

Binder, A., Naderer, B., y Matthes, J. (2020). A "forbidden fruit effect": An eye-tracking study on children ' s visual attention to food Marketing. *International Journal of Environmental Research and Public Health*, *17*. https://doi.org/10.3390/ijerph17061859

Borzekowski, D. L. G., y Robinson, T. N. (2001). The 30-second effect: An experiment revealing the impact of television commercials on food preferences of preschoolers. *Journal of the American Dietetic Association*, *101*(1), 42-46. https://doi.org/10.1016/S0002-8223(01)00012-8

Boyland, E. J., Nolan, S., Kelly, B., Tudur-Smith, C., Jones, A., Halford, J. C. G., y Robinson, E. (2016). Advertising as a cue to consume: a systematic review and meta-analysis of the effects of acute exposure to unhealthy food and nonalcoholic beverage advertising on intake in children and adults. *American Journal of Clinical Nutrition*, *103*(2), 519-533. https://doi.org/10.3945/ajcn.115.120022

Brown, C. L., Matherne, C. E., Bulik, C. M., Howard, J. B., Ravanbakht, S. N., Skinner, A. C., Wood, C. T., Bardone-Cone, A. M., Brown, J. D., Perrin, A. J., Levine, C., Steiner, M. J., y Perrin, E. M. (2017). Influence of product placement in children's movies on children's snack choices. *Appetite*, *114*, 118-124. https://doi.org/10.1016/j.appet.2017.03.022

Calvert, S. L. (2008). Children as consumers: Advertising and marketing. *Future of Children*, *18*(1), 205-234. https://doi.org/10.1353/foc.0.0001

Campbell, A. (2005). *Prohibiting product placement and the use of characters in marketing to*

children.

Charry, K. M. (2014). Product placement and the promotion of healthy food to pre-adolescents. *International Journal of Advertising*, *33*(3), 599-616. https://doi.org/10.2501/IJA-33-3-599-616

Chesi, A., y Grant, S. F. A. A. (2015). The Genetics of Pediatric Obesity Alessandra. *Trends in Endocrinology and Metabolism*, *26*(12), 711-721. https://doi.org/10.1016/j.tem.2015.08.008.The

Christian, M., y Gereffi, G. (2018). Fast-food value chains and childhood obesity: A global perspective. En *Pediatric Obesity: Ethiology, pathogenesis and treatment*. https://doi.org/10.1007/978-3-319-68192-4_5

Common Sense Media (CSM). (2018). *Behind the common sense media ratings system*. https://www.commonsensemedia.org/about-us/our-mission/about-our-ratings

Cooke, L. J., y Wardle, J. (2004). Age and gender differences in children's food preferences. *The British Journal of Nutrition*, *93*(5), 741-746. https://doi.org/10.1079/bjn20051389

Cruwys, T., Bevelander, K. E., y Hermans, R. C. J. (2015). Social modeling of eating: A review of when and why social influence affects food intake and choice. *Appetite*, *86*, 3-18. https://doi.org/10.1016/j.appet.2014.08.035

Davó-Blanes, M. C., Ortiz-Moncada, R., Gil-González, D., Álvarez-Dardet, C., y Lobstein, T. (2013). The impact of marketing practices and its regulation policies on childhood obesity. Opinions of stakeholders in Spain. *Appetite*, *62*, 216-224. https://doi.org/10.1016/j.appet.2012.11.030

De Cosmi, V., Scaglioni, S., y Agostoni, C. (2017). Early taste experiences and later food choices. *Nutrients*, *9*(2), 1-9. https://doi.org/10.3390/nu9020107

De Jans, S., Hudders, L., y Cauberghe, V. (2016). Advertising literacy training: the immediate versus delayed effects on children's responses to product placement. *European Journal of Marketing*. https://doi.org/https://doi.org/10.1108/EJM-08-2016-0472

Delhomme, V. (2020). Improving Food Choices Through Nutrition Labelling: Towards a Common 'Nutri-Score' Scheme Across the EU. *College of Europe Policy Brief*, *3*(20).

DeSmet, A., Van Ryckeghem, D., Compernolle, S., Baranowski, T., Thompson, D., Crombez, G., Poels, K., Van Lippevelde, W., Bastiaensens, S., Van Cleemput, K., Vandebosch, H., y De Bourdeaudhuij, I. (2014). A meta-analysis of serious digital games for healthy lifestyle promotion. *Preventive Medicine*, *69*, 95-107. https://doi.org/10.1016/j.ypmed.2014.08.026

Dias, M., y Agante, L. (2011). Can advergames boost children's healthier eating habits? A

comparison between healthy and non-healthy food. *Journal of Consumer Behaviour*, *10*(3), 152-160. https://doi.org/10.1002/cb.359

Dinsa, G. D., Goryakin, Y., Fumagalli, E., y Suhrcke, M. (2012). Obesity and socioeconomic status in developing countries : a systematic review. *Public Health*, *November*, 1067-1079. https://doi.org/10.1111/j.1467-789X.2012.01017.x

Dovey, T. M., Staples, P. A., Gibson, E. L., y Halford, J. C. G. (2008). Food neophobia and «picky/fussy» eating in children: A review. *Appetite*, *50*(2-3), 181-193. https://doi.org/10.1016/j.appet.2007.09.009

Dudley, D. A., Cotton, W. G., y Peralta, L. R. (2015). Teaching approaches and strategies that promote healthy eating in primary school children: A systematic review and meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity*, *12*(1). https://doi.org/10.1186/s12966-015-0182-8

Esmaeilpour, F., Heidarzadeh Hanzaee, K., Mansourian, Y., y Khounsiavash, M. (2018). Children's food choice: Advertised food type, health knowledge and entertainment. *Journal of Food Products Marketing*, *24*(4), 476-494. https://doi.org/10.1080/10454446.2017.1315843

FAO, FIDA, OMS, PMA, y UNICEF. (2020). *Versión resumida de El estado de la seguridad alimentaria y la nutrición en el mundo 2020*. FAO, IFAD, UNICEF, WFP and WHO. https://doi.org/10.4060/ca9699es

Federal Communications Commission. (2020). *Children's Educational Television*. https://www.fcc.gov/consumers/guides/childrens-educational-television

Feldman, D. H. (2004). Piaget's stages: The unfinished symphony of cognitive development. *New Ideas in Psychology*, *22*(3 SPEC. ISS.), 175-231. https://doi.org/10.1016/j.newideapsych.2004.11.005

Folkvord, F., Anschutz, D. J., y Buijzen, M. (2016). The association between BMI development among young children and (un)healthy food choices in response to food advertisements: a longitudinal study. *The International Journal of Behavioral Nutrition and Physical Activity*, *13*, 16. https://doi.org/10.1186/s12966-016-0340-7

Folkvord, F., y van 't Riet, J. (2018). The persuasive effect of advergames promoting unhealthy foods among children: A meta-analysis. *Appetite*, *129*(March), 245-251. https://doi.org/10.1016/j.appet.2018.07.020

Folta, S. C., Goldberg, J. P., Economos, C., Bell, R., y Meltzer, R. (2006). Food advertising targeted at school-age children: A content analysis. *Journal of Nutrition Education and Behavior*, *38*(4), 244-248. https://doi.org/10.1016/j.jneb.2006.04.146

Francis, L. A., y Susman, E. J. (2009). Self-regulation and rapid weight gain in children from age 3 to 12 years. *Archives of Pediatrics and Adolescent Medicine*, *163*(4), 297-302. https://doi.org/10.1001/archpediatrics.2008.579

Habib, K., y Soliman, T. (2015). Cartoons' effect in changing children mental response and behavior. *Open Journal of Social Sciences*, *3*(September), 248-264. https://doi.org/10.4236/jss.2015.39033

Hahn, R., y Aubrey, J. S. (2018). The tween television diet: a content analysis of US tween program food references. *Journal of Children and Media*, *12*(2), 175-191. https://doi.org/10.1080/17482798.2017.1405830

Harris, J. L., Bargh, J. a., y Brownell, K. D. (2010). Priming Effect of Television Food Advertising on Eating Behavior. *Health Psychology*, *28*(4), 404-413. https://doi.org/10.1037/a0014399.Priming

Hudson, S., y Elliott, C. (2013). Measuring the Impact of Product Placement on Children Using Digital Brand Integration. *Journal of Food Products Marketing*, *19*(3), 176-200. https://doi.org/10.1080/10454446.2013.724370

Hudson, S., y Hudson, D. (2006). Branded entertainment: A new advertising technique or product placement in disguise? *Journal of Marketing Management*, *22*(5-6), 489-504. https://doi.org/10.1362/026725706777978703

Kelly, B., Halford, J. C. G., Boyland, E. J., Chapman, K., Bautista-Castaño, I., Berg, C., Caroli, M., Cook, B., Coutinho, J. G., Effertz, T., Grammatikaki, E., Keller, K., Leung, R., Manios, Y., Pedley, C., Prell, H., Raine, K., Recine, E., Serra-Majem, L., … Summerbell, C. (2010). Television food advertising to children: A global perspective. *American Journal of Public Health*, *100*(9), 1730-1736. https://doi.org/10.2105/AJPH.2009.179267

Keshari, P., y Mishra, C. P. (2016). Growing menace of fast food consumption in India: time to act. *Int J Community Med Public Health*, *3*(6), 1335-1362.

Korr, J. L., y Jeremy, L. (2008). Healthy Cartoons? *Food, Culture & Society*, *11(4)*(July), 449-462.

LaRose, R. (2010). The Problem of Media Habits. *Communication Theory*, *20*(2), 194-222. https://doi.org/10.1111/j.1468-2885.2010.01360.x

Law, S., y Braun, K. A. (2000). I'll have what she's having: Gauging the impact of product placements on viewers. *Psychology and Marketing*, *17*(12), 1059-1075.

LLorente & Cuenca. (2016). *Chile's Law on Food Labelling and Advertising: A Replicable Model for Latin America? May*. http://www.emol.com/noticias/nacional/2011/04/13/475822/manalichcalificad

Mallinckrodt, V., y Mizerski, D. (2007). The effects of playing an advergame on young children's perceptions, preferences, and requests. *Journal of Advertising*, *36*(2), 87-100. https://doi.org/10.2753/JOA0091-3367360206

Martínez, E. G., y Visbal, L. (2017). Obesity and poverty, who is to blame? *Salud Uninorte*, *33*(2), 202-212. https://doi.org/10.14482/sun.33.2.10549

Matthes, J., y Naderer, B. (2015). Children's consumption behavior in response to food product placements in movies. *Journal of Consumer Behaviour*, *14*(2), 127-136. https://doi.org/10.1002/cb.1507

Matthes, J., y Naderer, B. (2019). Sugary, fatty, and prominent: food and beverage appearances in children's movies from 1991 to 2015. *Pediatric Obesity*, *14*(4), e12488. https://doi.org/10.1111/ijpo.12488

Mech, P., Hooley, M., Skouteris, H., y Williams, J. (2016). Parent-related mechanisms underlying the social gradient of childhood overweight and obesity: a systematic review. *Child: Care, Health and Development*, *42*(5), 603-624. https://doi.org/10.1111/cch.12356

Mehta, K., Phillips, C., Ward, P., Coveney, J., Handsley, E., y Carter, P. (2012). Marketing foods to children through product packaging: prolific, unhealthy and misleading. *Public Health Nutrition*, *15*(09), 1763-1770. https://doi.org/10.1017/S1368980012001231

Melgarejo Moreno, I., y Rodríguez Rosell, M. M. (2019). Producción audiovisual infantil española: 'Pocoyó' y 'Jelly Jamm' como referentes de series de animación educativas para el 2º ciclo de Educación Infantil. *index.comunicación*, *9*(3), 237-260.

Ministerio de Sanidad y Consumo. (2012). *Código de corregulación de la publicidad de alimentos y bebidas dirigida a menores, prevención de la obesidad y salud (CÓDIGO PAOS)*. http://www.aecosan.msssi.gob.es/AECOSAN/docs/documentos/nutricion/Nuevo_Codigo_PAOS_2012_espanol.pdf

Naderer, B., Matthes, J., Binder, A., Marquart, F., Mayrhofer, M., Obereder, A., y Spielvogel, I. (2018). Shaping children's healthy eating habits with food placements? Food placements of high and low nutritional value in cartoons, Children's BMI, food-related parental mediation strategies, and food choice. *Appetite*, *120*, 644-653. https://doi.org/10.1016/j.appet.2017.10.023

Naderer, B., Matthes, J., Marquart, F., y Mayrhofer, M. (2016). Children's attitudinal and behavioral reactions to product placements: investigating the role of placement frequency, placement integration, and parental mediation. *International Journal of Advertising*, *November*, 1-20. https://doi.org/10.1080/02650487.2016.1218672

Naderer, B., Matthes, J., y Zeller, P. (2017). Placing snacks in children's movies: cognitive, evaluative, and conative effects of product placements with character product interaction. *International Journal of Advertising*, 1-19. https://doi.org/10.1080/02650487.2017.1348034

OMS. (2016). *Sobrepeso y obesidad infantiles*. https://www.who.int/dietphysicalactivity/childhood/es/

OMS. (2018a). *Alimentación sana*. https://www.who.int/es/news-room/fact-sheets/detail/healthy-diet

OMS. (2018b). *Malnutrición*. https://www.who.int/es/news-room/fact-sheets/detail/malnutrition

OMS. (2018c). *Policies to limit marketing of unhealthy foods to children fall short of protecting their health and rights*. http://www.euro.who.int/en/health-topics/disease-prevention/nutrition/news/news/2018/10/policies-to-limit-marketing-of-unhealthy-foods-to-children-fall-short-of-protecting-their-health-and-rights

OMS. (2020a). *Nutrición*. https://www.who.int/topics/nutrition/es/

OMS. (2020b). *Obesidad y sobrepeso*. https://www.who.int/es/news-room/fact-sheets/detail/obesity-and-overweight

Open Food Facts. (2020). *Compare the Nutrition Quality of Food Products with the Nutri-Score!* https://world.openfoodfacts.org/nutriscore

Pauli-Pott, U., Albayrak, Ö., Hebebrand, J., y Pott, W. (2010). Association between inhibitory control capacity and body weight in overweight and obese children and adolescents: Dependence on age and inhibitory control component. *Child Neuropsychology*, *16*(6), 592-603. https://doi.org/10.1080/09297049.2010.485980

Piaget, J. (1964). Part I: Cognitive development in children: Piaget development and learning. *Journal of Research in Science Teaching*, *2*(3), 176-186. https://doi.org/10.1002/tea.3660020306

Radnitz, C., Byrne, S., Goldman, R., Sparks, M., Gantshar, M., y Tung, K. (2008). Food cues in children's television programs. *Appetite*, *52*(1), 230-233. https://doi.org/10.1016/j.appet.2008.07.006

Raghunathan, R., Naylor, R. W., y Hoyer, W. D. (2006). The unhealthy = tasty intuition and its effects on taste inferences, enjoyment, and choice of food products. *Journal of Marketing*, *70*(4), 170-184. https://doi.org/10.1509/jmkg.70.4.170

Rasmussen, M., Krølner, R., Klepp, K. I., Lytle, L., Brug, J., Bere, E., y Due, P. (2006). Determinants of fruit and vegetable consumption among children and adolescents: A

review of the literature. Part I: Quantitative studies. *International Journal of Behavioral Nutrition and Physical Activity*, *3*(June 2014). https://doi.org/10.1186/1479-5868-3-22

Reid Chassiakos, Y. (Linda), Radesky, J., Christakis, D., Moreno, M. A., y Cross, C. (2016). Children and Adolescents and Digital Media. *Pediatrics*, *138*(5), e20162593. https://doi.org/10.1542/peds.2016-2593

Rincón-Gallardo Patiño, S., Rajamohan, S., Meaney, K., Coupey, E., Serrano, E., Hedrick, V. E., da Silva Gomes, F., Polys, N., y Kraak, V. (2020). Development of a Responsible Policy Index to Improve Statutory and Self-Regulatory Policies that Protect Children's Diet and Health in the America's Region. *International Journal of Environmental Research and Public Health*, *17*(2), 1-21. https://doi.org/10.3390/ijerph17020495

Royne, M. B., Kowalczyk, C. M., Levy, M., y Fox, A. K. (2017). Milk, juice, or cola? Exploring the effect of product placement on children?s attitudes and behavior. *Health Marketing Quarterly*, *34*(2), 128-141. https://doi.org/10.1080/07359683.2016.1275241

Rozendaal, E., Buijzen, M., y Valkenburg, P. (2009). Do children's cognitive advertising defenses reduce their desire for advertised products? *Communications*, *34*(3), 287-303. https://doi.org/10.1515/COMM.2009.018

Russell, C. A. (2002). Investigating the effectiveness of product placements in television shows: The role of modality and plot connection congruence on brand memory and attitude. *Journal of Consumer Research*, *29*(3), 306-318. https://doi.org/10.1086/344432

Russell, C. A., Russell, D. W., y Grube, J. W. (2009). Nature and impact of alcohol messages in a youth-oriented television series. *Journal of Advertising*, *38*(3), 97-112. https://doi.org/10.2753/JOA0091-3367380307

Sadeghirad, B., Duhaney, T., Motaghipisheh, S., Campbell, N. R. C., y Johnston, B. C. (2016). Influence of unhealthy food and beverage marketing on children's dietary intake and preference: a systematic review and meta-analysis of randomized trials. *Obesity Reviews*, *17*(10), 945-959. https://doi.org/10.1111/obr.12445

Salvy, S., Haye, K. De, Bowker, J. C., y Hermans, R. C. J. (2012). Influence of Peers and Friends on Children's and Adolescents' Eating and Activity Behaviors. *Physiology and Behavior*, *106*(3), 369-378. https://doi.org/10.1016/j.physbeh.2012.03.022.Influence

Saura, J. R., Palos-Sanchez, P., y Herráez, B. R. (2020). Digital marketing for sustainable growth: Business models and online campaigns using sustainable strategies. *Sustainability*, *12*(3), 3-7. https://doi.org/10.3390/su12031003

Scaglioni, S., De Cosmi, V., Ciappolino, V., Parazzini, F., Brambilla, P., y Agostoni, C. (2018).

Factors influencing children's eating behaviours. *Nutrients*, *10*(6), 1-17. https://doi.org/10.3390/nu10060706

Scanlan, S. J., y Feinberg, S. L. (2000). The cartoon society: Using the Simpsons to teach and learn sociology. *Teaching Sociology*, *28*(2), 127-139. https://doi.org/10.2307/1319260

Shannon, J. (2014). Food deserts: Governing obesity in the neoliberal city. *Progress in Human Geography*, *38*(2), 248-266. https://doi.org/10.1177/0309132513484378

Smith, R., Kelly, B., Yeatman, H., y Boyland, E. (2019). Food marketing influences children's attitudes, preferences and consumption: A systematic critical review. *Nutrients*, *11*(4). https://doi.org/10.3390/nu11040875

Smith, R., Kelly, B., Yeatman, H., Johnstone, S., Baur, L., King, L., Boyland, E., Chapman, K., Hughes, C., y Bauman, A. (2019). Skin conductance responses indicate children are physiologically aroused by their favourite branded food and drink products. *International Journal of Environmental Research and Public Health*, *16*(17). https://doi.org/10.3390/ijerph16173014

Spielvogel, I., Matthes, J., Naderer, B., y Karsay, K. (2018). A treat for the eyes. An eye-tracking study on children's attention to unhealthy and healthy food cues in media content. *Appetite*, *125*, 63-71. https://doi.org/10.1016/j.appet.2018.01.033

Sutherland, L. A., Mackenzie, T., Purvis, L. A., y Dalton, M. (2010). Prevalence of food and beverage brands in movies: 1996–2005. *Pediatrics*, *125*(3), 468-474. https://doi.org/10.1542/peds.2009-0857

Twenge, J. M., y Campbell, W. K. (2018). Associations between screen time and lower psychological well-being among children and adolescents: Evidence from a population-based study. *Preventive Medicine Reports*, *12*(September), 271-283. https://doi.org/10.1016/j.pmedr.2018.10.003

Uribe, R., y Fuentes-García, A. (2015). The effects of TV unhealthy food brand placement on children. Its separate and joint effect with advertising. *Appetite*, *91*, 165-172. https://doi.org/10.1016/j.appet.2015.03.030

Wang, Y., y Beydoun, M. A. (2007). The obesity epidemic in the United States - Gender, age, socioeconomic, racial/ethnic, and geographic characteristics: A systematic review and meta-regression analysis. *Epidemiologic Reviews*, *29*(1), 6-28. https://doi.org/10.1093/epirev/mxm007

WHO. (2015). Healthy diet. En *Healthy Diet Fact Sheet N394* (Número May). http://www.who.int/nutrition/publications/nutrientrequirements/healthydiet_factsheet394.pdf

Williams, K., Petrosky, A., Hernandez, E., y Junior, R. P. (2011). Product placement effectiveness: Revisited and renewed. *Journal of Management & Marketing Research*, *6491*(May), 1-24.

Woodward, H. E., y Treat, T. A. (2015). Unhealthy how?: Implicit and explicit affective evaluations of different types of unhealthy foods. *Eating Behaviors*, *17*, 27-32. https://doi.org/10.1016/j.eatbeh.2014.12.011

World Health Organization (WHO). (2013). *Marketing of foods high in fat, salt and sugar to children: update 2012–2013*. *December 2015*, 44. https://doi.org/10.13140/2.1.1507.5207

Zarychta, K., Mullan, B., y Luszczynska, A. (2016). It doesn't matter what they say, it matters how they behave: Parental influences and changes in body mass among overweight and obese adolescents. *Appetite*, *96*, 47-55. https://doi.org/10.1016/j.appet.2015.08.040

Anexos

Resumen Comunicación Congreso Internacional ICORIA 2018

Tema del congreso: Brand Comunication with Multi Touchpoints

Effects of cartoons food placements on children

Food placements are prevalent in cartoons, however, little it is known about the impact that these food placements can have in children eating preferences. In an experimental study with 124 children (51.6% girls, M_{age}= 9.24, SD=1.19), 62 children in the experimental condition were exposed to food placements in cartoons whereas children in the control condition were exposed to cartoon scenes without foods. Healthiness of the placed food (healthy and unhealthy) as well as the modality of food placements were manipulated. After watching the cartoon scenes, each child completed a choice task where the placed food appeared in each choice card. Our results indicate that unhealthy food placements directed to the youngest children had effects.

Keywords: non-branded food placements, children, unhealthy food, cartoon, age differences

Resumen comunicación Congreso REEDES 2018

Tema del congreso: La investigación sobre desarrollo frente a los límites de la globalización

Revisión sistemática de los efectos de los emplazamientos de comida en niños: consecuencias para el problema de la obesidad infantil en países empobrecidos

Resumen:

La obesidad infantil es un problema social global. En los países menos desarrollados ésta convive con la malnutrición. Según la Organización Mundial de la Salud, más de tres cuartas partes de los niños menores de cinco años con sobrepeso en el mundo viven en países de medianos y bajos ingresos, con una preocupante tendencia creciente. Son múltiples los factores que influyen sobre este problema, entre ellos el Marketing. En concreto, el emplazamiento de producto es una de las herramientas publicitarias que ha experimentado un crecimiento más continuo en los últimos años. Por tanto, cabe cuestionarse hasta qué punto los emplazamientos de alimentos en la programación audiovisual influyen en los hábitos de alimentación entre los niños, y si este efecto se da del mismo modo entre productos con o sin marca y más o menos saludables. Para ello, se llevó a cabo una revisión sistemática (método PRISMA), sobre una base de estudios experimentales que analizaran el impacto a nivel cognitivo, afectivo y comportamental.

Los resultados obtenidos, mayoritariamente centrados en emplazamientos de productos con marca y no saludables, nos permiten subrayar que el impacto de los emplazamientos en niños se produce fundamentalmente en los niveles cognitivos y comportamental, y no tanto en el ámbito afectivo. Al mismo tiempo, la fuerza de dicho impacto aumenta a medida que los emplazamientos están relacionados con comida poco saludable. Así como, en lo referente a los emplazamientos con marca, existen abundantes evidencias positivas sobre sus efectos, se hallan bastante menos estudios sobre los emplazamientos de productos sin marca, donde no hay una intencionalidad comercial explícita, pero sí un posible efecto educativo. En todo caso, las evidencias analizadas refuerzan la necesidad de una mayor preocupación de las autoridades públicas por su control. Se presentan las principales conclusiones e implicaciones, especialmente para los países menos desarrollados.

Palabras clave: revisión sistemática, emplazamientos de comida, niños, obesidad infantil, pobreza

Aprobación del Comité de Ética de la Investigación incluida en el artículo III

El Comité de Ética de la Universidad Loyola Andalucía ha emitido valoración relativa al Proyecto de Investigación *Efecto sobre el público infantil de los emplazamientos de comida en series de dibujos animados* remitido por la Dra. María José Montero para su valoración ética, después de que el comité solicitara subsanación en su informe emitido el 19 de mayo de 2017.

El Comité de Ética de la Universidad Loyola Andalucía ha valorado, por unanimidad, que el proyecto cumple con los criterios éticos necesarios para su desarrollo.

A continuación, el Comité de Ética responde a las alegaciones remitidas a este comité por el Dr. Rafael Araque Padilla en su correo electrónico del día 23 de mayo de 2017. Se procede de la siguiente forma: primero se incorpora la alegación e, inmediatamente después, se responde a la misma.

Alegación 1 del Dr. Rafael Araque: "Las alegaciones de un comité revisor de un proyecto entiendo que deberían quedar establecidas tras la primera revisión, y luego comprobar que se cumplen o no en las sucesivas presentaciones. Pero con relación al proyecto referido, nos encontramos con que cada vez que atendemos las alegaciones que se nos hacen, se nos vuelven a hacer otras nuevas que no se hicieron al principio. Las revisiones del comité no pueden ser de novo, como si no se hubiera leído antes. Esto, además de ser frustrante para los solicitantes, retrasa enormemente la aprobación final. Y esto es lo que viene ocurriendo con nuestro proyecto. Llevamos más de dos meses encontrándonos con nuevas sorpresas en cada revisión".

Respuesta del Comité de Ética de la Universidad Loyola Andalucía a la alegación 1: Respecto a las apreciaciones nuevas, estaban motivadas por la incorporación de nuevos miembros en el comité que veían ese trabajo por primera vez; también porque el trabajo (memoria científica) cambió y se nos comunicó así por parte de los investigadores del proyecto. En cuanto a los plazos, hubo varias reuniones del comité en las que no hubo subsanación. En concreto, después de la reunión del comité del 3 de marzo de 2017, se piden subsanaciones, y la Dra. Mª José Montero indica que van a modificar el proyecto, cuestión que se expone en la reunión del comité del 20 de marzo de 2017. Para las reuniones del comité que tuvieron lugar los días 29 de marzo y 3 de abril no se recibió ninguna solicitud relativa a este proyecto. Fue para la reunión del 25 de abril que se realizó un envío del proyecto. Se pidieron subsanaciones y no se recibieron para ser valoradas en la reunión del comité del 2 de mayo. Dicha subsanación se recibió para ser valorada en la reunión del comité del 15 de mayo. Esto supone que, en su totalidad, no se han sucedido dos meses.

Alegación 1 del Dr. Rafael Araque: En segundo lugar, rogaríamos una aclaración del punto 2 del último informe. No entendemos qué se nos quiere decir, toda vez que los grupos de control se forman dentro del mismo colectivo de alumnos. La asignación a grupos de control es aleatoria, y no hacen nada adicional al resto.

Respuesta del Comité de Ética de la Universidad Loyola Andalucía a la alegación 2: Respecto a esta cuestión, se delibera en el comité y, dadas las características del grupo control que se plantea en el estudio, se valora que la aclaración aportada por los investigadores es suficiente y que no es necesario elaborar otras hojas informativas ni consentimientos para ese grupo control.

Resolución: **INFORME FAVORABLE.**

Documentos que han sido aprobados: "Anexo modificado Protocolo FMK 01_06_17" y memoria científica con título "Protocolo FMK-2".

Sevilla, 9 de junio de 2017.

La secretaria

Fdo. Sandra Racionero Plaza

V°B° El Presidente

Fdo. Juan Plaza Sánchez

VILLEGAS NAVAS MARIA VICTORIA - 30999641B

Firmado digitalmente por VILLEGAS NAVAS MARIA VICTORIA - 30999641B
Fecha: 2020.10.14 10:45:13 +02'00'

Tesis depositada en Universidad Loyola Andalucía
Córdoba, 2020

Universidad LOYOLA