



NATÁCIA CAMPOS MARTINS

**INFLUÊNCIA DO USO DE DISTRATORES DURANTE AS
REFEIÇÕES NA INGESTÃO CALÓRICA DE CRIANÇAS E
ADOLESCENTES: REVISÃO SISTEMÁTICA E META-
ANÁLISE DE ENSAIOS CONTROLADOS COM INTERVENÇÃO**

**LAVRAS – MG
2021**

NATÁCIA CAMPOS MARTINS

**INFLUÊNCIA DO USO DE DISTRATORES DURANTE AS REFEIÇÕES NA
INGESTÃO CALÓRICA DE CRIANÇAS E ADOLESCENTES: REVISÃO
SISTEMÁTICA E META-ANÁLISE DE ENSAIOS CONTROLADOS COM
INTERVENÇÃO**

Dissertação apresentada à Universidade Federal de Lavras, como parte das exigências do Programa de Pós-Graduação em Ciências da Saúde, área de concentração em Ciências da Saúde para obtenção do título de Mestre.

Orientador:
Prof. Dr. Luciano José Pereira

**LAVRAS – MG
2021**

Ficha catalográfica elaborada pelo Sistema de Geração de Ficha Catalográfica da Biblioteca
Universitária da UFLA, com dados informados pelo(a) próprio(a) autor(a).

Martins, Natácia Campos.

Influência do uso de distratores durante as refeições na ingestão calórica de crianças e adolescentes.: Revisão sistemática e metaanálise de ensaios controlados com intervenção / Natácia Campos Martins. - 2021.

68 p.

Orientador(a): Luciano José Pereira.

Dissertação (mestrado acadêmico) - Universidade Federal de Lavras, 2021.

Bibliografia.

1. tempo de tela. 2. ingestão de energia. 3. crianças. I. Pereira, Luciano José. II. Título.

NATÁCIA CAMPOS MARTINS

**INFLUÊNCIA DO USO DE DISTRATORES DURANTE AS REFEIÇÕES NA
INGESTÃO CALÓRICA DE CRIANÇAS E ADOLESCENTES: REVISÃO
SISTEMÁTICA E META-ANÁLISE DE ENSAIOS CONTROLADOS COM
INTERVENÇÃO**

**INFLUENCE OF EATING WITH DISTRACTORS ON CALORIC INTAKE OF
CHILDREN AND ADOLESCENTS: A SYSTEMATIC REVIEW AND META-
ANALYSIS OF INTERVENTIONAL CONTROLLED STUDIES**

Dissertação de mestrado apresentada à
Universidade Federal de Lavras, como parte das
exigências do Programa de Pós-Graduação em
Ciências da Saúde, área de concentração Ciências
da Saúde, para a obtenção do título de Mestre.

APROVADA em 22 de novembro de 2021

Prof. Dra. Carolina de Castro Martins – UFMG-MG

Prof. Dra. Sabrina Carvalho Bastos – UFLA-MG

Prof. Dr. Luciano José Pereira (Orientador) – UFLA-MG

Prof. Dr. Luciano José Pereira

LAVRAS – MG

2021

*A Deus, pela vida e pelas oportunidades.
A minha família, por todo amor.*

AGRADECIMENTOS

Primeiramente agradeço a Deus, pela saúde e pelas oportunidades de crescimento, pela força e coragem de sempre recomeçar.

A espiritualidade que me orienta e conduz. Agradeço a minha família, ao meu amado pai Paulo, a minha amada mãe Vanda e ao meu irmão Thiago pelo amor além da vida. Agradeço ao meu amor João Antônio, companheiro de vida e de lutas, obrigada por me acompanhar e incentivar.

A psicanálise e a Rosália por ser o “farol” por onde eu não conseguia enxergar.

A minha querida amiga Ana Caroline pelas trocas e pelo apoio.

Ao meu orientador Prof. Luciano pela paciência e auxílio.

Aos meus amigos de Lavras e a UFLA pelo acolhimento.

RESUMO

Hábitos alimentares não saudáveis desenvolvidos na infância podem se perpetuar ao longo da vida e contribuir para o surgimento de transtornos alimentares. O uso de distratores durante as refeições tem sido associado ao aumento do consumo alimentar, sobrepeso e obesidade em adultos. O presente estudo teve como objetivo avaliar a influência do uso de distratores durante as refeições sobre a ingestão calórica de crianças e adolescentes. Realizou-se uma revisão sistemática da literatura seguindo as diretrizes PRISMA (Preferred Reporting Items for Systematic Review and Meta-Analysis) e o protocolo foi registrado na base PROSPERO (International Prospective Register of Systematic Reviews) sob número CRD42021259946. A estratégia PICOS (Population, Intervention, Comparison Group, Outcome, Study desing) foi utilizada e consistiu na avaliação de estudos envolvendo crianças e adolescentes (P), expostos a distratores durante as refeições (I), em comparação com nenhuma distração (C) e o desfecho foi a ingestão calórica (O) avaliada por meio de estudos crossover ou ensaios clínicos randomizados - ECR (S). As buscas foram realizadas nas bases de dados PubMed, Scopus, Web of Science, Cochrane, Proquest, Embase e LILACs. O risco de viés foi avaliado utilizando a ferramenta Risk of Bias 2 (RoB 2). O nível de evidência foi determinado pelo GRADE (Grading of Recommendations Assessment, Development and Evaluation). Foram retornadas 9.576 referências (sem duplicatas). Quarenta e três artigos foram selecionados para a leitura na íntegra, sendo treze selecionados com base nos critérios de elegibilidade. Destes, cinco estudos eram crossover e oito ECR. Os voluntários avaliados nos estudos apresentavam entre 3 e 17 anos de idade. Todos os estudos avaliaram a TV como distrator, porém dois artigos também avaliaram a influência da música e da alimentação em grupos. A maioria dos estudos apresentou risco de viés alto a moderado. Na análise qualitativa, oito estudos (61%) não indicaram influência do uso de distratores durante as refeições experimentais sobre a ingestão calórica, enquanto três encontraram aumento (23%). A meta-análise de ECR também não indicou diferença significativa na ingestão calórica ao comparar refeições com e sem TV (MD = 0,05; IC 95% -0,13 - 0,23), com nível de evidência baixo pelo GRADE. Em conclusão, não houve influência do uso de distratores (especialmente TV) durante as refeições experimentais controladas sobre a ingestão calórica de crianças e adolescentes.

Palavras-chave: tempo de tela, ingestão de energia, pré-escolar, crianças, ingestão de

ABSTRACT

Unhealthy eating habits developed during childhood can be perpetuated along life and contribute to the emergence of eating disorders. We aimed to systematically review the influence of distractors during meals on the caloric intake of children and adolescents. We followed the PRISMA guidelines (Preferred Reporting Items for Systematic Review and Meta-Analysis) and the study was registered in the International Prospective Register of Systematic Reviews (PROSPERO CRD42021259946). The PICOS strategy consisted of children and adolescents (P), exposed to distractors during meals (I), compared with no distraction (C) and the outcome was caloric ingestion (O) evaluated by means of crossover or randomized clinical trials (RCTs) (S). Searches were conducted in PubMed, Scopus, Web of Science, Cochrane, Proquest, Embase, and LILACs databases. We employed the Risk of Bias 2 (RoB 2) tool. The level of evidence was determined by the Grading of Recommendations Assessment, Development and Evaluation (GRADE). Databases searches returned 9,576 references (without duplicates). Thirteen articles were selected based on eligibility criteria, being five crossover and eight RCT. Volunteers aged from 3 to 17 years-old. All studies evaluated TV as distractor, but two articles also evaluated music and eating in groups. Most studies presented high to moderate risk of bias. In the qualitative analysis, eight studies (61%) indicated no influence of distractors on caloric ingestion, while three found an increase (23%). Meta-analysis of RCT also indicated no significant difference in caloric ingestion while eating with TV (MD=0.05; 95% CI -0.13 – 0.23, P=0.57), but the level of certainty was low. In conclusion, under laboratory conditions, eating with distractors seems to barely alter the caloric ingestion for children and adolescents.

Keywords: Childhood Eating and Feeding Disorders, satiation, attentional bias, hunger

LISTA DE FIGURAS

SEGUNDA PARTE - ARTIGO

Figura 1	60
Figura 2	61
Figura 3	62

LISTA DE TABELAS

SEGUNDA PARTE – ARTIGO

TABELA.....	55
TABELA.....	59

LISTA DE ABREVIATURAS E SIGLAS

PRIMEIRA PARTE

BMI	do inglês <i>Body Mass Index</i>
GRADE	Do inglês <i>Grading of Recommendations Assessment, Development and Evaluation</i>
ECR	Ensaio Clínico Randomizado
IOTF	do inglês <i>International Obesity Task Force</i>
PRISMA	Do inglês <i>Preferred Reporting Items for Systematic Review and Meta-Analysis</i>
PROSPERO	Do inglês <i>International Prospective Register of Systematic Reviews</i>
TFEQ	do inglês <i>Three Factor Eating Questionnaire</i>
VAS	do inglês <i>Visual Analogue Scales</i>
WHO	do inglês <i>World Health Organization</i>

SEGUNDA PARTE

GRADE	Grading of Recommendations Assessment, Development and Evaluation
PRISMA	Preferred Reporting Items for Systematic Review and Meta-Analysis
PROSPERO	International Prospective Register of Systematic Reviews
RCT'S	Randomised Clinical Trial's
ROB 2	Risk of Bias 2

SUMÁRIO

PRIMEIRA PARTE

1.	INTRODUÇÃO	13
2.	REFERENCIAL TEÓRICO	14
2.1	Hábitos alimentares na infância e adolescência	14
2.2	Fatores que influenciam os hábitos alimentares	15
2.3	Obesidade e sobrepeso em crianças e adolescentes	15
2.4	Distratores e alimentação	17
2.4.1	Tv e alimentação	18
2.4.2	Música e alimentação	18
2.4.3	Tecnologia, smartphone e internet.....	19
2.4.4	Vídeo-games e alimentação	19
2.4.5	Interação social e alimentação	19
2.5	Distratores e modelos dos estudos da ingestão alimentar	20
3.	CONSIDERAÇÕES GERAIS	22
	REFERÊNCIAS	23

SEGUNDA PARTE

1.	ARTIGO - Influence of eating with distractors on caloric intake of children and adolescents: a systematic review and meta-analysis of interventional controlled studies	31
----	---	----

1. INTRODUÇÃO

Distúrbios alimentares são cada vez mais frequentes em idades precoces. Em especial, a prevalência de sobrepeso e obesidade tem crescido em crianças brasileiras, chegando a números alarmantes acima dos 30% (SILVA et al., 2018). Em 2016, estimou-se que aproximadamente 124 milhões de crianças e adolescentes em todo o mundo eram obesas, com previsões de aumento da prevalência para os anos futuros (NCD Risk Factor Collaboration, 2017; WORLD HEALTH ORGANIZATION, 2020). Tal cenário representa grande preocupação para a saúde pública, uma vez que estes indivíduos apresentam grande propensão a se tornarem adultos obesos (ALMAN et al., 2021; CHAPUT et al., 2011).

As mudanças no estilo de vida a partir do surgimento do rádio e da TV e posteriormente pela inclusão digital têm sido associadas ao aumento do sobrepeso e da obesidade na população (GONZÁLEZ et al., 2016). Ao longo das últimas décadas, a modernização e a crescente presença de novas tecnologias na vida diária tem levado os indivíduos a um comportamento cada vez mais sedentário (REY-LÓPEZ et al., 2008), aliado a um alto consumo de energia e ao uso de distratores durante as refeições (LA MARRA; CAVIGLIA; PERRELLA, 2020). Entre os distratores, os mais comuns se encontram no grupo das telas (JOHAR, 2019; MARSH; NI MHURCHU; MADDISON, 2013). O tempo de tela é definido como o tempo diário que um indivíduo permanece em frente a televisão, *smartphones* ou jogando vídeo game (LEBLANC et al., 2017). A desfavorável relação entre o tempo de tela excessivo e desfechos não-saudáveis tem inclusive motivado a criação de diretrizes para limitação desse tempo para crianças e adolescentes de acordo com as faixas etárias (AMERICAN ACADEMY OF PEDIATRIC, 2013).

Estar atento no momento da refeição é uma prática necessária para que esta ocorra de maneira saudável. A atenção plena significa alimentar-se estando atento ao alimento que é ingerido, percebendo o que é ingerido, onde e o quanto é ingerido, enfim, observando o ambiente e tudo o que acontece no momento da alimentação, principalmente o que se come (BYRD; HATTON, 2019). Quando o indivíduo está engajado com a própria refeição diminui as chances da interferência de distratores e os malefícios que uma refeição com distração pode trazer (KILDARE; MIDDLEMISS, 2017).

Estudos recentes indicam que realizar as refeições na presença de distratores, tais como televisores, aumenta o apetite em crianças e adolescentes (RODRIGUES et al., 2020), bem como favorece o sobrepeso e a obesidade (BAKER et al., 2020; BORGUESE et al., 2015; ROBINSON et al., 2017). Sugere-se que distração seja prejudicial para o desenvolvimento da

percepção de saciedade, promovendo maior ingestão alimentar não somente no momento da refeição, como também nas refeições subsequentes (BRUNSTROM; MITCHELL, 2006; HIGGS, 2015). Porém, existem também evidências de alguns indivíduos se distraíam ao ponto de se esquecerem das refeições (LONG et al., 2011)

Em decorrência das controvérsias existentes na literatura, a realização de revisões sistemáticas pode auxiliar na solução de dúvidas clínicas, tendo como base a aplicação de estratégias científicas que limitam vieses e promovem uma avaliação crítica baseada na melhor evidência disponível (MANCHIKANTI et al., 2009). Diante da crescente prevalência de distúrbios alimentares em crianças e adolescentes, em paralelo à epidemia de obesidade e sobrepeso infantil e em adultos, torna-se importante investigar a influência do uso de distratores durante as refeições na infância, visando contribuir com o desenvolvimento de estratégias preventivas e/ou terapêuticas que favoreçam hábitos mais saudáveis e/ou privação de comportamentos deletérios.

2. REFERENCIAL TEÓRICO

2.1. Hábitos alimentares na infância e adolescência

A alimentação acontece além da necessidade de suprir necessidades fisiológicas, é um hábito culturalmente incorporado e que depende da vontade e da disponibilidade pessoal, sendo assim, os hábitos alimentares têm inferências na qualidade de vida e conseqüentemente na saúde do indivíduo (FARHANGI; DEHGHAN; JAHANGIRY, 2018). Conhecidamente, a conscientização e a busca por uma alimentação e pelo estilo de vida saudáveis são favorecidas quando iniciadas na infância (PIASETZKI; BOFF, 2018).

A infância é fase de grande importância para o desenvolvimento de hábitos alimentares, uma vez que é nesse momento que se desenvolve a cognição, psicomotricidade e a descoberta das preferências do indivíduo (CAN-YASAR et al., 2012). É nessa fase que a criança é habituada com os vários tipos de alimentos a depender dos hábitos familiares. Portanto, é importante que seja ofertada a criança alimentos ricos em nutrientes como vitaminas e minerais, entre outros, pois é conhecido que hábitos alimentares adquiridos durante a infância tendem a se perpetuar ao longo da vida do indivíduo (DI CESARE et al., 2019; RAMOS; STEIN, 2000).

Já durante a adolescência, período de grandes mudanças físicas e psicológicas, os hábitos e preferências alimentares são característicos. Podem haver tantos hábitos relacionados

a inibição alimentar, principalmente em meninas, uma vez que culturalmente comer à vontade seria inadequado, como também pode haver o hábito alimentar relacionado a desinibição, onde haveria excesso na ingestão alimentar, principalmente em meninos (CAVAZZA; GUIDETTI; BUTERA, 2015; KELLY et al., 2020). Porém, a escolha alimentar dos indivíduos nessa fase, é percebido uma preferência por alimentos altamente calóricos, como alimentos açucarados e fast foods, dietas irregulares com a presença de grandes períodos de jejum seguidos da realização de grandes quantidades de comida, com a troca de alimentos saudáveis por alimentos industrializados (MORAES et al, 2018).

2.2. Fatores que influenciam os hábitos alimentares

Vários fatores influenciam os hábitos alimentares de crianças e adolescente, como as escolhas no grupo familiar, a alimentação no ambiente escolar e a influência de comerciais e propagandas de alimentos hipercalóricos (ROBLIN, 2007). Além disso, padrões corporais estéticos expostos pelas mídias visto pela sociedade como ideais podem levar a insatisfação corporal principalmente ao público adolescente, levando a dietas muito restritivas que estimulam alterações na rotina alimentar na tentativa de alcançar esses padrões na maioria das vezes inatingíveis (JUSTO, 2016; LÓPEZ-GUIMERA et al., 2010).

Uma vasta gama de conteúdo é destinada a estas faixas etárias através de dispositivos eletrônicos que dão acesso a internet, ou televisão, tornando crianças e adolescentes consumidores alvos (CALVERT, 2008).

Com isso, sabe-se que o tempo gasto na utilização estes dispositivos é cada dia maior (TWENGE et al., 2018). Cada vez mais presente na rotina de crianças e adolescentes os dispositivos eletrônicos podem influenciar os hábitos alimentares de forma negativa levando a uma alimentação pobre em nutrientes e rica em açúcares, além de promover a atividade sedentária entre estas faixas etárias (SCAGLIONI et al., 2018).

2.3. Obesidade e sobrepeso em crianças e adolescentes.

A população mundial tem passado por grandes transformações socioeconômicas ao longo das últimas décadas. Tais transformações tem repercutido na qualidade e quantidade da dieta consumida bem como a mudanças no estilo de vida (SHETTY, 2013). A adoção de hábitos não saudáveis - dieta com alta densidade energética e baixa concentração de nutrientes, rica em alimentos ultraprocessados, aliada à diminuição das práticas de atividade física - está

diretamente relacionada ao aumento da prevalência de obesidade e comorbidades (BOSU, 2015; PNAN, 2013, WORLD HEALTH ORGANIZATION, 2021).

Obesidade e sobrepeso são definidos como quantidade anormal e excessiva de gordura corporal que pode prejudicar a saúde de adultos, adolescentes e crianças (WORD HEALTH ORGANIZATION, 2021). Ambas condições são decorrentes de um balanço energético positivo, ou seja, quando a quantidade de energia consumida supera o gasto calórico de forma prolongada (AHMAD et al., 2015). A determinação do sobrepeso e obesidade em estudos populacionais frequentemente se dá pela mensuração do índice de massa corpórea ($IMC = \text{massa (kg)} / \text{altura(cm)}^2$) (COLE et al., 2005). Porém, a avaliação de crianças e adolescentes deve ser cautelosa em razão de variações inerentes ao crescimento do indivíduo (WORD HEALTH ORGANIZATION, 2021).

A obesidade/sobrepeso infanto-juvenil tornaram-se problemas de saúde pública ao redor do mundo, sendo a obesidade considerada a doença metabólica e nutricional mais comum em crianças e adolescentes (AHAMAD, 2015; NCD Risk Factor Collaboration, 2017). A OMS estimou em 2016 que havia mais de 340 milhões de crianças e adolescentes, entre 5 e 19 anos obesas ou com sobrepeso. Já no ano de 2019, identificou-se que 38,2 milhões de crianças menores de 5 anos estavam obesas ou com sobrepeso (WORD HEALTH ORGANIZATION, 2021). Estima-se que em 2025, 91 milhões de crianças estarão obesas (LINDBERG et al., 2020).

A ocorrência de obesidade e/ou sobrepeso durante infância e adolescência tendem a serem perpetuadas durante a vida adulta, levando a maior predisposição a comorbidades e diminuição da qualidade de vida (DI CESARE, et al., 2019). As principais consequências incluem problemas psicossociais como depressão, *bullying* ansiedade e baixa autoestima (QUEK et al., 2017), além de inflamação de baixo grau, hipertensão arterial, dislipidemias, diabetes tipo 2 e alto risco cardiovascular (FRIEDEMANN et al., 2012). A longo prazo, existe ainda predisposição ao desenvolvimento de alguns tipos de câncer, desordens musculoesqueléticas e morte prematura (PARK et al., 2012).

Entre os fatores de risco para obesidade e sobrepeso em crianças e adolescentes, são reportados o aumento do consumo de alimentos processados e refinados, uso de telas, sedentarismo, uso de medicações, problemas durante a gestação (diabetes gestacional e obesidade gestacional), além de características genéticas e endócrinas (AGGARWAL; JAIN, 2018; LEE; YOON, 2018).

O principal alvo para controle de obesidade e sobrepeso é a prevenção (LEE; YOON, 2018). Padrões de comportamentos que irão relacionar-se com o desenvolvimento da obesidade

são gerados na infância. A mudança do comportamento obesogênico deve ser um objetivo primário na prevenção da obesidade infantil e por consequência, dos adultos (PANDITA, et al., 2016). Entretanto, quando a obesidade e sobrepeso já se encontram instalados, estratégias comportamentais também são importantes, incluindo educação nutricional, modificações de hábitos, incremento da frequência de atividade física e o maior envolvimento dos pais e da escola no acompanhamento das crianças e adolescentes (BAUTISTA-CASTAÑO; DORESTE; SERRA-MAJEM, 2004).

2.4. Distratores e Alimentação

As novas tecnologias de comunicação e suas ferramentas trouxeram inúmeros benefícios para a vida moderna. Porém, o uso abusivo de dispositivos eletrônicos tem sido associado a vários problemas de saúde (TAKAO et al., 2009), tais como ansiedade, depressão, instabilidade emocional, bem como insônia, dificuldade de concentração e baixa autoestima (BOSCH, 2018; O'DONNELL; EPSTEIN, 2019).

O tempo de tela, definido como o tempo gasto por um indivíduo com dispositivos que possuam tela (TV, vídeo game, *tablets* e *smartphones*), tem sido limitado por especialistas, como forma de prevenir os prejuízos à saúde infanto-juvenil (JOHAR, 2019). A Academia Americana de Pediatria definiu que para crianças até 18 meses, a exposição a telas deve ser evitada, uma vez que pode levar a prejuízos em seu desenvolvimento neurológico. Já para crianças de 2 a 5 anos, o tempo é de no máximo uma hora diária, enquanto para crianças de 6 anos até adolescentes, o máximo de 2 horas diárias (HALL et al., 2019; JOHAR, 2019).

O uso de dispositivos eletrônicos está associado a redução de processos cognitivos que necessitem de atenção, sendo considerados potentes distratores (BOSCH, 2018; O'DONNELL; EPSTEIN, 2019). O desvio da atenção durante a alimentação, pode levar o indivíduo tanto a comer em excesso, como ao esquecimento do ato de alimentar-se, com tendência à primeira opção (HIGGS; DONOHOE, 2011; ROZIN et al., 1998). Diversos estudos reportam aumento da ingestão de alimentos quando uma refeição é consumida em condições de distração (BRUNSTROM; MITCHELL, 2006). Sugere-se que isso ocorra devido à ausência da formação de memória da quantidade de alimento ingerida durante a refeição, influenciando também refeições posteriores (HIGGS; DONOHOE, 2011). Assim a distração limitaria a capacidade de um indivíduo de monitorar sinais relacionados à saciedade, prejudicando a formação de memória desta refeição. Uma ingestão alimentar normal necessita, portanto de algum nível de concentração (MITCHELL; BRUNSTROM, 2005; OGDEN et al., 2017). Porém, dependendo

do grau de engajamento em relação ao distrator, pode ocorrer uma perda de atenção tão significativa, em que o comportamento motor necessário ao processo de alimentar-se não seja executado, levando a redução da ingestão alimentar (LONG et al., 2011).

2.4.1. TV e Alimentação

A TV aparece como principal tipo de distrator envolvido no desenvolvimento da obesidade infantil e é a principal atividade sedentária entre crianças (BELLISSIMO et al., 2007; CHAPUT et al., 2011). A distração promovida pela TV prolonga a refeição atual e pode adiantar a próxima refeição, pois acredita-se que visualização de TV irá atrapalhar a memória recente da refeição (OGDEN et al., 2013). Adicionalmente, o tempo sedentário em frente à TV está associado ao maior consumo de alimentos tipo *fast food* e bebidas açucaradas, além da diminuição do consumo de vegetais e frutas em pessoas jovens (PEARSON; BIDDLE., 2011; ALBLAS et al., 2020).

Estudo recente que avaliou o consumo alimentar mostrou que quase 90% dos voluntários relataram realizar ao menos uma refeição diária utilizando telas (JENSEN et al., 2021). Além do efeito da TV como distrator em si, existem ainda relatos sobre a influência de comerciais e propagandas sobre a ingestão alimentar, uma vez que há uma vasta gama midiática voltada ao público infantil (ROBINSON et al., 2017b) que podem favorecer a busca e a ingestão de alimentos pouco saudáveis (LORENZONI et al., 2017).

2.4.2. Música e alimentação

O ato de ouvir música durante as refeições também parece interferir na ingestão alimentar (CHAPUT, et al., 2011), atuando como estímulo para a ingestão calórica (STROEBELE; DE CASTRO, 2006). O ritmo e o volume da música são de importância, de modo que estudos verificaram que música alta aumenta o consumo de bebidas alcólicas enquanto música baixa ou ambiente aumentam o tempo gasto em um jantar e a quantidade de bebidas alcoólicas ingeridas (MCCARRON; TIERNEY, 1989). Por outro lado, em um estudo com adolescentes após a realização de exercício físico, a presença da música durante alimentação *ad libitum* não aumentou a ingestão calórica (LIVOCK et al., 2018).

2.4.3. Tecnologia, *smartphone* e internet

O uso de novas tecnologias conjuntamente ao surgimento da *internet* tem gerado grandes mudanças na rotina das pessoas. Tal ferramenta possibilita uma maior interação interpessoal, já que permite a comunicação de qualquer lugar do mundo, encurtando distâncias, mudando de forma acertiva a vida da sociedade (CHAPLAIS et al., 2015; TAKAO; TAKAHASHI; KITAMURA, 2009). Atualmente 65,6% da população mundial tem acesso a *internet* (MINIWATTS MARKETING GROUP., 2021).

O desenvolvimento tecnológico trouxe inúmeros benefícios a população, tanto no lazer como para fins ocupacionais (COUGHLIN et al., 2016; DUGGAN; SMITH., 2013; TEMPLE et al., 2008). Particularmente, no momento atual de pandemia por Covid-19, o isolamento social fortaleceu o uso indiscriminado da *internet* (SUN et al., 2020). O uso de *smartphones* é crescente tendo ultrapassado a marca de mais de 3 bilhões de usuários (O'DEA, 2020). O uso durante a alimentação provoca aumento da ingestão calórica em adultos (GONÇALVES et al., 2019), porém em crianças e adolescentes os estudos ainda são escassos.

2.4.4 Vídeo games e alimentação

Vídeos games funcionam como distratores durante a alimentação de crianças e adolescentes, não apenas pelo fato de requererem grande parte da atenção, mas também pela necessidade do uso das mãos na sua utilização. Nesse sentido, a ingestão calórica tende a ser prejudicada, com menor consumo de alimentos (MELLECKER et al., 2010). Porém, assim como a TV, o vídeo game atua inibindo a saciedade, atrapalhando a habituação a propriedades sensoriais dos alimentos (EPSTEIN et al., 2009).

Uma estratégia interessante é a utilização de jogos eletrônicos como ferramenta interativa para estímulo a alimentação (CHOW et al., 2020). Essas ferramentas encorajam a criança a comer alimentos saudáveis, como frutas e legumes (MA; LIU; LIU, 2021).

2.4.5 Interação social e alimentação

A ingestão calórica na presença de familiares tende a ser maior, enquanto comer na presença de pessoas desconhecidas promove um efeito inibitório (MEKHMOUKH; CHAPELOT; BELLISLE, 2012). Observa-se que quando as pessoas estão em grupos de amigos estas comem mais do que quando estão sozinhas, meramente por ver ou escutar as

outras pessoas comendo (STROEBELE; CASTRO, 2004). Existem duas hipóteses para a teoria da facilitação social, a primeira é que há uma excitação ao comer em grupo, o que faz com que o indivíduo se alimente mais rápido e conseqüentemente, se alimente mais. A segunda é chamada de extensão, que afirma que comer em grupo aumenta a interação social, que prolonga a duração das refeições e aumenta também o tempo de exposição aos alimentos, levando assim à maior ingestão calórica. Já comer com desconhecidos gera menor ingestão por questões relativas ao condicionamento social de que não é educado comer em excesso (DE CASTRO, 1990).

Em crianças, o efeito da facilitação social ainda precisa ser melhor elucidado (LUMENG; HILLMAN, 2007). Observa-se que há aumento do consumo quando as crianças comem em grupo, principalmente com alimentos altamente palatáveis (MEKHMOUKH; CHAPELOT; BELLISLE, 2012).

2.5 Distratores e modelos de estudo da ingestão alimentar

Condições ambientais e hábitos podem modular a ingestão calórica, influenciando o indivíduo a se alimentar em maior ou menor quantidade (STROEBELE; CASTRO, 2004), dependendo do tipo de estímulo (LA MARRA; CAVIGLIA; PERRELLA, 2020). Os modelos de estudos com distratores e alimentação infantil podem ser divididos em relação a refeições experimentalmente controladas (em laboratório) ou realizadas no ambiente familiar e relatadas por meio de questionários. Majoritariamente, a verificação da ingestão calórica ocorre por meio de questionários alimentares, que estimam a ingestão calórica do indivíduo. Porém, alguns estudos do tipo clínico randomizados realizam a ingestão alimentar em laboratório (MEKHMOUKH; CHAPELOT; BELLISLE, 2012).

Outras variáveis como dados demográficos, frequência de atividade física, dados antropométricos, são importantes na estimativa da ingestão calórica (BELLISSIMO et al., 2007). Observa-se que amostras de indivíduos obesos, com sobrepeso e com peso normal podem apresentar variações inerentes das características dos voluntários (TEMPLE et al., 2008). Adicionalmente, o tempo entre as refeições, a intensidade da fome e os tipos de alimentos oferecidos são de importância. Os questionários utilizados podem variar, como é o caso do (TFEQ) (*Three-Factor Eating Questionnaire*), a escala VAS (*Visual analogue scales*) para verificação da palatabilidade, fome e sede (GREGORI et al., 2017; GREGORI et al., 2014). Nesse sentido, estudos idealizados para verificar a influência de distratores sobre a

ingestão calórica devem atentar para tais características a fim de agrupar estudos com metodologias semelhantes.

3. CONSIDERAÇÕES GERAIS

O uso de distratores durante a alimentação infantil é uma realidade crescente. Considerando-se os possíveis riscos que este comportamento pode trazer a saúde das crianças, uma revisão sistemática com meta análise se faz necessária para auxiliar no desenvolvimento de estratégias preventivas e/ou terapêuticas que favoreçam hábitos mais saudáveis e/ou privação de comportamentos deletérios.

REFERÊNCIAS

- AGGARWAL, B.; JAIN, V. Obesity in Children: Definition, Etiology and Approach. **Indian Journal of Pediatrics**, v. 85, n. 6, p. 463–471, 2018.
- AKOBENG, A. K. Understanding randomised controlled trials. **Archives of Disease in Childhood**, v. 90, n. 8, p. 840–844, ago. 2005.
- ALMAN, K. L. et al. Dietetic management of obesity and severe obesity in children and adolescents: A scoping review of guidelines. *Obesity Reviews*, v. 22, n. 1, p. 1–8, 2021. **American academy of pediatrics**. Ages & Stages - HealthyChildren.org.
- ATIK, D.; ERTEKIN, Z. O. Children’s perception of food and healthy eating: dynamics behind their food preferences. **International Journal of Consumer Studies**, v. 37, n. 1, p. 59–65, jan. 2013.
- AVERY, A.; ANDERSON, C.; MCCULLOUGH, F. Associations between children’s diet quality and watching television during meal or snack consumption: A systematic review. **Maternal & child nutrition**, v. 13, n. 4, out. 2017.
- BAKER, M. et al. Pre-meal active video game playing increased subjective appetite but not food intake in children and adolescents. **Physiology and Behavior**, v. 222, n. May, p. 112931, 2020.
- BAUTISTA-CASTAÑO, I.; DORESTE, J.; SERRA-MAJEM, L. Effectiveness of interventions in the prevention of childhood obesity. **European Journal of Epidemiology**, v. 19, n. 7, p. 617–622, 2004.
- BELLISLE, F.; DALIX, A.; SLAMA, G. Non food-related environmental stimuli induce increased meal intake in healthy women: comparison of television viewing versus listening to a recorded story in laboratory settings. **Appetite**, v. 43, n. 2, p. 175–180, out. 2004.
- BELLISSIMO, N. et al. Effect of television viewing at mealtime on food intake after a glucose preload in boys. **Pediatric Research**, v. 61, n. 6, p. 745–749, 2007a.
- BELLISSIMO, N. et al. Effect of television viewing at mealtime on food intake after a glucose preload in boys. **Pediatric research**, v. 61, n. 6, p. 745–749, jun. 2007b.
- BERGER, V. W. et al. A roadmap to using randomization in clinical trials. **BMC Medical Research Methodology** 2021 21:1, v. 21, n. 1, p. 1–24, ago. 2021.
- BORGHESE, M. M. et al. Television viewing and food intake during television viewing in normal-weight, overweight and obese 9- to 11-year-old Canadian children: a cross-sectional analysis. **Journal of Nutritional Science**, v. 4, p. 1–9, 2015.
- BOSCH, M. D. P. B. The Mere Presence Effect: **Attentional Bias Promoted by Smartphone Presence Recommended Citation**. SJSU ScholarWorks, 2018.
- BOSU, W. K. An overview of the nutrition transition in West Africa: Implications for non-communicable diseases. **Proceedings of the Nutrition Society**, v. 74, n. 4, p. 466–477, 2015.

- BROWN, A. Media use by children younger than 2 years. **Pediatrics**, v. 128, n. 5, p. 1040–1045, nov. 2011.
- BRUNSTROM, J. M.; MITCHELL, G. L. Effects of distraction on the development of satiety. **The British journal of nutrition**, v. 96, n. 4, p. 761–9, 2006.
- BRUNSTROM, J.; MITCHELL, G.; BAGULEY, T. Potential early-life predictors of dietary behaviour in adulthood: A retrospective study. **International Journal of Obesity**, v. 29, n. 5, p. 463–474, maio 2005.
- BYRD, J. J.; HATTON-, H. N. Optimizing healthy eating habits in early childhood with mindfulness. *Neb guide*, v. 2019, n. October, p. 1–4, 2019.
- CALVERT, S. L. Children as consumers: Advertising and marketing. **Future of Children**, v. 18, n. 1, p. 205–234, 2008.
- CAVAZZA, N.; GUIDETTI, M.; BUTERA, F. Ingredients of gender-based stereotypes about food. Indirect influence of food type, portion size and presentation on gendered intentions to eat. **Appetite**, v. 91, p. 266–272, ago. 2015.
- CHAPLAIS, E. et al. Smartphone Interventions for Weight Treatment and Behavioral Change in Pediatric Obesity: A Systematic Review. **Telemedicine and e-Health**, v. 21, n. 10, p. 822–830, 2015.
- CHAPMAN, C. et al. Watching TV and food intake: the role of content. **PloS one**, v. 9, n. 7, jul. 2014.
- CHAPUT, J. P. et al. Modern sedentary activities promote overconsumption of food in our current obesogenic environment. **Obesity Reviews**, v. 12, n. 5, p. 12–20, 2011.
- CHOW, C. Y. et al. Can games change children’s eating behaviour? A review of gamification and serious games. **Food Quality and Preference**, v. 80, p. 103823, 2020.
- COLE, T. J. et al. What is the best measure of adiposity change in growing children: BMI, BMI %, BMI z-score or BMI centile? **European Journal of Clinical Nutrition**, v. 59, n. 3, p. 419–425, 2005.
- COLLABORATION, N. R. F. Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-based measurement studies in 128·9 million children, adolescents, and adults. **The Lancet**, v. 390, n. 10113, p. 2627–2642, 2017.
- COUGHLIN, S. S. et al. Smartphone Applications for Promoting Healthy Diet and Nutrition: A Literature Review. **Jacobs journal of food and nutrition**, v. 2, n. 3, p. 021, 2016.
- DE CASTRO, J. M. Social facilitation of duration and size but not rate of the spontaneous meal intake of humans. **Physiology and Behavior**, v. 47, n. 6, p. 1129–1135, 1990.
- DE GRAAF, C. et al. Biomarkers of satiation and satiety. **The American journal of clinical nutrition**, v. 79, n. 6, p. 946–961, 2004.

- DI CESARE, M. et al. The epidemiological burden of obesity in childhood: A worldwide epidemic requiring urgent action. **BMC Medicine**, v. 17, n. 1, p. 1–20, 2019.
- DICK, B.; FERGUSON, B. J. Health for the world's adolescents: A second chance in the second decade. **Journal of Adolescent Health**, v. 56, n. 1, p. 3–6, 2015.
- DUGGAN, M.; SMITH, A. Cell Internet Use 2013 | Pew Research Center. Pew Internet: Washington, D.C., p. 15, 2013.
- DWYER, J. T. et al. Adolescents' Eating Patterns Influence their Nutrient Intakes. **Journal of the American Dietetic Association**, v. 101, n. 7, p. 798–802, jul. 2001.
- EPSTEIN, L. H. et al. Habituation as a Determinant of Human Food Intake. **Psychological Review**, v. 116, n. 2, p. 384–407, 2009.
- FIELD, A. P.; GILLET, R. How to do a meta-analysis. **British Journal of Mathematical and Statistical Psychology**, v. 63, n. 3, p. 665–694, 2010.
- FRANCIS, L.; BIRCH, L. Does eating during television viewing affect preschool children's intake? **Journal of the American Dietetic Association**, v. 106, n. 4, p. 598–600, abr. 2006.
- FRIEDEMANN, C. et al. Cardiovascular disease risk in healthy children and its association with body mass index: Systematic review and meta-analysis. **BMJ (Online)**, v. 345, n. 7876, 2012.
- GANESH, S.; MARSHALL, P.; ROGERS, Y. FoodWorks: Tackling Fussy Eating by Digitally Augmenting Children's Meals. **Proceedings of the 8th Nordic Conference on Human-Computer Interaction: Fun, Fast, Foundational**, v. NordiCHI '14, p. 147–156, 2014.
- GHOBADI, S. et al. Association of eating while television viewing and overweight/obesity among children and adolescents: a systematic review and metaanalysis of observational studies. **Obesity reviews : an official journal of the International Association for the Study of Obesity**, v. 19, n. 3, p. 313–320, mar. 2018.
- GONÇALVES, R. F. DA M. et al. Smartphone use while eating increases caloric ingestion. **Physiology and Behavior**, v. 204, n. October 2018, p. 93–99, 2019.
- GONZÁLEZ, C. S. et al. Learning healthy lifestyles through active videogames, motor games and the gamification of educational activities. **Computers in Human Behavior**, v. 55, p. 529–551, 2016.
- GREGORI, D. et al. Investigating the obesogenic effects of marketing snacks with toys: an experimental study in Latin America. **Nutrition journal**, v. 12, p. 95, 2013.
- GREGORI, D. et al. Food Packaged with Toys: An Investigation on Potential Obesogenic Effects in Indian Children. **Indian Journal of Pediatrics**, v. 81, n. 1, p. 30–38, 2014a.
- GREGORI, D. et al. Food packaged with toys: an investigation on potential obesogenic effects in Indian children. **Indian journal of pediatrics**, v. 81 Suppl 1, n. 1, p. 30–38, 2014b.

GREGORI, D. et al. Is brand visibility on snacks packages affecting their consumption in children? Results from an experimental ad-libitum study. **Archivos Latinoamericanos de Nutrición**, v. 67, n. 1, p. 36–49, 2017a.

GREGORI, D. et al. Food advertising on TV and energy intake in children: results from the OBEY-AD Mexico. **Archivos Latinoamericanos de Nutrición**, v. 67, n. 1, p. 11–23, 2017b.

HALL, C.; VIVANTI, A.; ABBEY, K. Impact of television on nutritional intake in communal dining room settings among those with acquired brain injury: A pilot study.

Nutrition and Dietetics, p. 1–5, 2019.

HIGGS, S. Manipulations of attention during eating and their effects on later snack intake. **Appetite**, v. 92, p. 287–294, 2015.

HIGGS, S.; DONOHOE, J. E. Focusing on food during lunch enhances lunch memory and decreases later snack intake. **Appetite**, v. 57, n. 1, p. 202–206, 2011.

HIGGS, S.; WOODWARD, M. Television watching during lunch increases afternoon snack intake of young women. **Appetite**, v. 52, n. 1, p. 39–43, fev. 2009.

JENSEN, M. et al. Television viewing and using screens while eating: Associations with dietary intake in children and adolescents. **Appetite**, p. 105670, set. 2021.

JOHAR, J. Screen Time and Childhood Obesity : A Commentary on the Evidence Behind Current Guidelines. **University of British Columbia Medical Journal (UBCMJ)**, v. 10, n. 2, p. 55–56, 2019.

JUSTO, A. M. Corpo E Representações Sociais: Sobrepeso, Obesidade E Práticas De Controle De Peso. p. 1–249, 2016.

KABALI, H. et al. Exposure and Use of Mobile Media Devices by Young Children. **Pediatrics**, v. 136, n. 6, p. 1044–1050, dez. 2015.

KILDARE, C. A.; MIDDLEMISS, W. Impact of parents mobile device use on parentchild interaction: A literature review. **Computers in Human Behavior**, v. 75, p. 579–593, 2017.

KOSTECKA, M. The influence of preschool children's diets on the risk of lifestyle diseases. A pilot study. **Roczniki Panstwowego Zakladu Higieny**, v. 69, n. 2, p. 139–145, jan. 2018.

LA MARRA, M.; CAVIGLIA, G.; PERRELLA, R. Using Smartphones When Eating Increases Caloric Intake in Young People: An Overview of the Literature. **Frontiers in Psychology**, v. 11, n. December, p. 1–6, 2020.

LEBLANC, A. et al. The Ubiquity of the Screen: An Overview of the Risks and Benefits of Screen Time in Our Modern World. **Translational Journal of the American College of Sports Medicine**, v. 2, n. 17, p. 104–113, 2017.

LEE, E. Y.; YOON, K. H. Epidemic obesity in children and adolescents: risk factors and prevention. **Frontiers of Medicine**, v. 12, n. 6, p. 658–666, 2018.

LEVITSKY, D. A. The non-regulation of food intake in humans: Hope for reversing the epidemic of obesity. **Physiology and Behavior**, v. 86, n. 5, p. 623–632, 2005.

LINDBERG, L. et al. Association of childhood obesity with risk of early all-cause and cause-specific mortality: A Swedish prospective cohort study. **PLoS Medicine**, v. 17, n. 3, p. 1–14, 2020.

LIVOCK, H. et al. Watching television or listening to music while exercising failed to affect post-exercise food intake or energy expenditure in male adolescents. **Appetite**, v. 127, p. 266–273, 2018.

LONG, S. et al. Effects of distraction and focused attention on actual and perceived food intake in females with non-clinical eating psychopathology. **Appetite**, v. 56, n. 2, p. 350–356, 2011.

LÓPEZ-GUIMERA, G. et al. Influence of mass media on body image and eating disordered attitudes and behaviors in females: A review of effects and processes. **Media Psychology**, v. 13, n. 4, p. 387–416, 2010.

LORENZONI, G. et al. Does food advertising influence snacks consumption in Chilean children? Results from an experimental ad libitum study. **Archivos latinoamericanos de nutrición**, v. 67, n. 1, p. 24–35, 2017a.

LORENZONI, G. et al. Effect of TV advertising on energy intake of Georgian children: Results of an experimental study. **Mediterranean Journal of Nutrition and Metabolism**, v. 10, n. 3, p. 183–192, jan. 2017b.

LUMENG, J. C.; HILLMAN, K. H. Eating in larger groups increases food consumption. **Archives of Disease in Childhood**, v. 92, n. 5, p. 384–387, 2007.

MANCHIKANTI, L. et al. Evidence-Based Medicine, Systematic Reviews, and Guidelines in Interventional Pain Management: Part 3: **Systematic Reviews and MetaAnalyses of Randomized Trials**. p. 35–72, 2009.

MARSH, S.; NI MHURCHU, C.; MADDISON, R. The non-advertising effects of screenbased sedentary activities on acute eating behaviours in children, adolescents, and young adults. A systematic review. **Appetite**, v. 71, n. September, p. 259–273, 2013.

MCCARRON, A.; TIERNEY, K. J. The effect of auditory stimulation on the consumption of soft drinks. **Appetite**, v. 13, n. 2, p. 155–159, 1989.

MEKHMUKH, A.; CHAPELOT, D.; BELLISLE, F. Influence of environmental factors on meal intake in overweight and normal-weight male adolescents. A laboratory study. **Appetite**, v. 59, n. 1, p. 90–95, ago. 2012.

MELLECKER, R. R. et al. Energy intake during activity enhanced video game play. **Appetite**, v. 55, n. 2, p. 343–347, 2010.

MELO, K. M. et al. Influence of parents' behavior during the meal and on overweight in childhood. **Escola Anna Nery**, v. 21, n. 4, p. 20170102, set. 2017.

MITCHELL, G. L.; BRUNSTROM, J. M. Everyday dietary behaviour and the relationship between attention and meal size. **Appetite**, v. 45, n. 3, p. 344–355, 2005.

MORAES, D. M. et al. Exposição à mídia e hábitos alimentares de adolescentes em uma escola privada de São Luís-MA. **Revista Investigação Biomédica São Luís**, v. 10, p. 165-171, 2018.

O'DONNELL, S.; EPSTEIN, L. H. Smartphones are more reinforcing than food for students. **Addictive Behaviors**, v. 90, p. 124–133, 2019.

OGDEN, J. The psychology of eating : from healthy to disordered behavior. [s.l.] Wiley-Blackwell, 2010.

OGDEN, J. et al. Distraction, the desire to eat and food intake. Towards an expanded model of mindless eating. **Appetite**, v. 62, p. 119–126, mar. 2013.

OGDEN, J.; OIKONOMOU, E.; ALEMANY, G. Distraction, restrained eating and disinhibition: An experimental study of food intake and the impact of “eating on the go”. **Journal of Health Psychology**, v. 22, n. 1, p. 39–50, 2017.

OLDHAM-COOPER, R. et al. Playing a computer game during lunch affects fullness, memory for lunch, and later snack intake. **The American journal of clinical nutrition**, v. 93, n. 2, p. 308–313, fev. 2011.

PANDITA, A. et al. Childhood obesity: Prevention is better than cure. Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy, v. 9, p. 83–89, 2016.

PARK, M. H. et al. The impact of childhood obesity on morbidity and mortality in adulthood: A systematic review. **Obesity Reviews**, v. 13, n. 11, p. 985–1000, 2012.

PATEL, B. et al. Television viewing at mealtime reduces caloric compensation in peripubertal, but not postpubertal, girls. **Pediatric research**, v. 70, n. 5, p. 513–517, nov. 2011.

PEARSON, N.; BIDDLE, S. J. H. Sedentary behavior and dietary intake in children, adolescents, and adults: A systematic review. **American Journal of Preventive Medicine**, v. 41, n. 2, p. 178–188, 2011.

PÉNEAU, S. et al. Influence of environmental factors on food intake and choice of beverage during meals in teenagers: a laboratory study. **The British journal of nutrition**, v. 102, n. 12, p. 1854–1859, dez. 2009.

PNAN. **Política Nacional de Alimentação e Nutrição**, 2013.

QAZI IQBAL AHMAD, CHAROO BASHIR AHMAD, S. M. A. Childhood obesity. **JAMA - Journal of the American Medical Association**, v. 314, n. 8, p. 850, 2015.

QUEK, Y. H. et al. Exploring the association between childhood and adolescent obesity and depression: a meta-analysis. **Obesity Reviews**, v. 18, n. 7, p. 742–754, 2017.

REY-LÓPEZ, J. P. et al. Sedentary behaviour and obesity development in children and adolescents. **Nutrition, Metabolism and Cardiovascular Diseases**, v. 18, n. 3, p. 242–251, 2008.

ROBINSON, T. et al. Screen Media Exposure and Obesity in Children and Adolescents. **Pediatrics**, v. 140, n. Suppl 2, p. S97–S101, nov. 2017a.

ROBINSON, T. N. et al. Screen media exposure and obesity in children and adolescents. **Pediatrics**, v. 140, p. S97–S101, 2017b.

ROBLIN, L. Childhood obesity: Food, nutrient, and eating-habit trends and influences. **Applied Physiology, Nutrition and Metabolism**, v. 32, n. 4, p. 635–645, 2007.

RODRIGUES, L. et al. Taste sensitivity and lifestyle are associated with food preferences and BMI in children. **International Journal of Food Sciences and Nutrition**, v. 71, n. 7, p. 875–883, 2020.

ROSIEK, A. et al. Effect of television on obesity and excess of weight and consequences of health. **International Journal of Environmental Research and Public Health**, v. 12, n. 8, p. 9408–9426, 2015.

ROZIN, P. et al. What Causes Humans to Begin and End a Meal? A Role for Memory for What Has Been Eaten, as Evidenced by a Study of Multiple Meal Eating in Amnesic Patients. **Psychological Science**, v. 9, n. 5, p. 392–396, 1998.

SCAGLIONI, S. et al. Factors influencing children's eating behaviours. **Nutrients**, v. 10, n. 6, p. 1–17, 2018.

SHETTY, P. Nutrition transition and its health outcomes. **Indian journal of pediatrics**, v. 80 Suppl 1, n. March, p. 21–27, 2013.

SILVA, A. P. DA et al. Prevalence of overweight and obesity and associated factors in school children and adolescents in a medium-sized Brazilian city. **Clinics**, v. 73, n. 7, p. e438, 2018.

STAIANO, A. et al. Influence of Screen-Based Peer Modeling on Preschool Children's Vegetable Consumption and Preferences. **Journal of nutrition education and behavior**, v. 48, n. 5, p. 331- 335.e1, maio 2016.

STERNE, J. et al. RoB 2: a revised tool for assessing risk of bias in randomised trials. **BMJ (Clinical research ed.)**, v. 366, 2019.

STROEBELE, N.; DE CASTRO, J. Television viewing is associated with an increase in meal frequency in humans. **Appetite**, v. 42, n. 1, p. 111–113, 2004a.

STROEBELE, N.; DE CASTRO, J. M. Effect of ambience on food intake and food choice. **Nutrition**, v. 20, n. 9, p. 821–838, 2004b.

STROEBELE, N.; DE CASTRO, J. M. Listening to music while eating is related to increases in people's food intake and meal duration. **Appetite**, v. 47, n. 3, p. 285–289, 2006.

SUN, M. et al. Eating Habits and Their Association with Weight Status in Chinese School-Age Children: A Cross-Sectional Study. **International journal of environmental research and public health**, v. 17, n. 10, maio 2020.

TAKAO, M.; TAKAHASHI, S.; KITAMURA, M. Addictive personality and problematic mobile phone use. **Cyberpsychology and Behavior**, v. 12, n. 5, p. 501–507, 2009a.

TAKAO, M.; TAKAHASHI, S.; KITAMURA, M. Addictive personality and problematic mobile phone use. **Cyberpsychology & behavior: the impact of the Internet, multimedia and virtual reality on behavior and society**, v. 12, n. 5, p. 501–507, out. 2009b.

TEMPLE, J. et al. Television watching increases motivated responding for food and energy intake in children. **The American journal of clinical nutrition**, v. 85, n. 2, p. 355–361, fev. 2007.

TEMPLE, J. L. et al. Overweight children find food more reinforcing and consume more energy than do nonoverweight children. **American Journal of Clinical Nutrition**, v. 87, n. 5, p. 1121–1127, 2008.

TWENGE, J. M. et al. Increases in Depressive Symptoms, Suicide-Related Outcomes, and Suicide Rates Among U.S. Adolescents After 2010 and Links to Increased New Media Screen Time. **Clinical Psychological Science**, v. 6, n. 1, p. 3–17, 2018.

WAN, X. et al. Estimating the sample mean and standard deviation from the sample size, median, range and/or interquartile range. **BMC medical research methodology**, v. 14, n. 1, p. 135, dez. 2014.

ZHAO, J.; GRANT, S. F. A. Genetics of childhood obesity. **Journal of Obesity**, v. 2011, 2011.

Influence of eating with distractors on caloric intake of children and adolescents: a systematic review and meta-analysis of interventional controlled studies

Natácia C. Martins^a, nataciamartins@hotmail.com ORCID: 0000-0001-6888-463X

Adriana P. Bezerra^b, adrianapbezerra@hotmail.com ORCID: 0000-0002-4971-2741

Ana C. V. Godoy^a, godoyanacaroline@gmail.com ORCID: 0000-0003-4789-1691

Eric F. Andrade^c, ericfrancelinoandrade@gmail.com ORCID: 0000-0002-9253-3108

Thais M. S. V. Gonçalves^b, thais.goncalves@ufsc.br ORCID: 0000-0002-0510-2140

Luciano J. Pereira^a, lucianojosepereira@ufla.br ORCID: 0000-0002-0502-2554

^aFaculdade de Ciências da Saúde, Departamento de Medicina, Universidade Federal de Lavras (UFLA), Lavras, Minas Gerais, Brasil ^bDepartamento de Odontologia, Universidade Federal de Santa Catarina (UFSC), Florianópolis, Santa Catarina, Brasil ^cInstituto de Ciências Agrárias, Universidade Federal dos Vales do Jequitinhonha e Mucuri, Campus Unaí (UFVJM), Unaí, Minas Gerais, Brasil

Correspondence:

Prof. Luciano José Pereira

Faculdade de Ciências da Saúde (FCS) – Departamento de Medicina (DME)

Programa de Pós-graduação em Ciências da Saúde (PPGSA)

Universidade Federal de Lavras – UFLA

Caixa Postal 3037 CEP 37200-000, Lavras – Minas Gerais – Brasil

e-mail: lucianojosepereira@ufla.br Telefone: +55 (35) 3829-5211

ABSTRACT

Unhealthy eating habits developed during childhood can be perpetuated along life and contribute to the emergence of eating disorders. We aimed to systematically review the influence of distractors during meals on the caloric intake of children and adolescents. We followed the PRISMA guidelines (Preferred Reporting Items for Systematic Review and Meta-Analysis) and the study was registered in the International Prospective Register of Systematic Reviews (PROSPERO CRD42021259946). The PICOS strategy consisted of children and adolescents (P), exposed to distractors during meals (I), compared with no distraction (C) and the outcome was caloric ingestion (O) evaluated by means of crossover or randomized clinical trials (RCTs) (S). Searches were conducted in PubMed, Scopus, Web of Science, Cochrane, Proquest, Embase, and LILACs databases. We employed the Risk of Bias 2 (RoB 2) tool. The level of evidence was determined by the Grading of Recommendations Assessment, Development and Evaluation (GRADE). Databases searches returned 9,576 references (without duplicates). Thirteen articles were selected based on eligibility criteria, being five crossover and eight RCT. Volunteers aged from 3 to 17 years-old. All studies evaluated TV as distractor, but two articles also evaluated music and eating in groups. Most studies presented high to moderate risk of bias. In the qualitative analysis, eight studies (61%) indicated no influence of distractors on caloric ingestion, while three found an increase (23%). Meta-analysis of RCT also indicated no significant difference in caloric ingestion while eating with TV (MD=0.05; 95% CI -0.13 – 0.23, P=0.57), but the level of certainty was low. In conclusion, under laboratory conditions, eating with distractors seems to barely alter the caloric ingestion for children and adolescents.

Keywords: Childhood Eating and Feeding Disorders, satiation, attentional bias, hunger

Introduction

Physiological signs of satiety are essential to regulate food intake and, consequently, energy balance (DE GRAAF et al., 2004). However, the presence of external stimuli - not related to food in the meal environment - can negatively interfere with this control (BELLISLE; DALIX; SLAMA, 2004), ultimately influencing food intake (BRUNSTROM; MITCHELL, 2006; OGDEN, 2010; OGDEN et al., 2013).

The use of distractors - especially electronic devices - has been reported as a harmful eating habit (GONÇALVES et al., 2019; TAKAO; TAKAHASHI; KITAMURA, 2009b). Eat while watching TV (HIGGS; WOODWARD, 2009; OGDEN et al., 2013), playing computer games (OLDHAM-COOPER et al., 2011), or manipulating smartphones (GONÇALVES et al., 2019) are behaviors that can influence eating habits. Distractors can promote both excessive food intake or overlooking about meals, depending on the engagement generated in the distraction (HIGGS; DONOHOE, 2011; ROZIN et al., 1998), in addition to the impairment of the use of hands generated (GONÇALVES et al., 2019). Distraction is believed to impair memory formation of the amount of food eaten during a meal (BRUNSTROM; MITCHELL, 2006; MITCHELL; BRUNSTROM, 2005; OGDEN; OIKONOMOU; ALEMANY, 2017). Thus, an ideal meal requires some level of concentration (BRUNSTROM; MITCHELL, 2006; HIGGS; DONOHOE, 2011). Children usually spend about 13 hours weekly in front of TV and almost 90% of them report of consuming at least one meal or snack per day while using screens (JENSEN et al., 2021).

The use of mobile devices among children during meals is a very common practice nowadays, and may represent both a strategy to improve fussy children to eat healthily (GANESH; MARSHALL; ROGERS, 2014) or a potential danger to physiological processes related to satiety mechanisms (BROWN, 2011; KABALI et al., 2015).

Moreover, bad eating habits established during childhood can perpetuate and facilitate the development of eating disorders such as obesity in later life (BRUNSTROM; MITCHELL; BAGULEY, 2005; KOSTECKA, 2018; LEVITSKY, 2005; SUN et al., 2020).

The effect of using distractors during meals on the caloric consumption of children and adolescents is still controversial. Previous studies in children and adolescents revealed since a decrease (FRANCIS; BIRCH, 2006), no difference (PATEL et al., 2011; STAIANO et al., 2016) or increase (BELLISSIMO et al., 2007b; TEMPLE et al., 2007) in food ingestion while using distractors. Besides, to our knowledge there are no previous systematic reviews on this subject. Thus, the aim of this systematic review was to assess the influence of distractors (e.g. television, video games, cell phones, tablets, and smartphones) during meals for children and adolescents.

Material and Methods

Registration Protocol and Study Design

This systematic review was written according to the PRISMA (Preferred Reporting Items for Systematic Review and Meta-Analysis) guidelines (<http://www.prisma-statement.org/>) The research protocol was registered in the PROSPERO database (International Prospective Register of Systematic Reviews; <https://www.crd.york.ac.uk/prospero/>) under number CRD42021259946. The elaboration of the research question was carried out according to the PICO strategy (Population: children and adolescents; Intervention: meal with a distractor; Comparison: meal without a distractor; Outcome: caloric intake). Eligibility criteria included both crossover and randomized controlled trials (RCT) studies evaluating the use of distractors during meals (compared to the same meal without a distractor) in children and adolescents, ie, individuals between 1 and 18 years of age (AMERICAN ACADEMY OF PEDIATRICS, 2021). We included only studies involving experimental sessions under controlled

environments (such as a laboratory or specific room) in order to control additional distractions. There were no limitations regarding the sex of participants or types of distractors.

Exclusion criteria were: studies without a control group (no distractor); studies that assessed food intake after (not during) the distraction; studies with adults and elderly; studies involving children or adolescents who were unable to eat by themselves; studies carried out without supervision at the family environment; studies focused only in analyzing the recognition and/or preferences of food brands, or educational videos to increase consumption of certain foods; observational studies and opinion/technical reports; abstracts; review articles; guidelines; and letters to editors.

Search strategy

Based on the PICOS acronym, a search strategy was developed, and a comprehensive literature search was performed in six databases including PubMed, Scopus, Web of Science, Cochrane Library, Embase and LILACs (Latin American and Caribbean Health Sciences Literature). Additionally, we searched gray literature through the Proquest platform. A more detailed description of search terms and word crossing can be found at Supplementary Material (Chart 1). Searches were carried out until September 2021, with no restriction on language or publication date. All references were exported to the EndNote X9 desktop software (Thomson Reuters Co.).

Selection of studies

After duplicate removal, study selection was performed through a two-phase process. In the first phase, eligibility criteria were applied to the titles and abstracts of the included references. This process was performed independently by the six authors, separated in pairs (to review each other's selection) using the Rayyan software (<https://www.rayyan.ai/>).

In the second phase, each article was read in its entirety by two reviewers (N.C.M and A.C.V.G.). At all stages, disagreements were resolved by a group meeting. Manual searches in the reference lists of the included studies were carried out to cover all the relevant literature on the subject. The study selection phases are described in Figure 1.

Data extraction

Relevant information such as authors' names and year of publication, study design, number and age of participants, type of distractors, as well as main results related to caloric intake (mean \pm standard deviation) were independently extracted by two reviewers (N.C.M. and A.P.B) (Table 1). In situations where the primary studies did not contain all the necessary information, the corresponding authors were contacted by email for three consecutive weeks.

Bias Risk Assessment

Risk of bias was independently assessed by two reviewers (A.P.B and N.C.M.). The risk of bias was analyzed according to the Cochrane RoB 2 tools for Crossover (<https://sites.google.com/site/riskofbiastool/welcome/rob-2-0-tool/rob-2-for-crossover-trials?authuser=0>) and for randomized clinical trials (RCT) (<https://sites.google.com/site/riskofbiastool/welcome/rob-2-0-tool/current-version-ofrob-2?authuser=0>) depending on primary studies design (STERNE et al., 2019).

Statistical Analysis

Two meta-analyses were performed by using the Comprehensive Meta-Analysis software (CMA, V. 3, Biosta, Inc., USA). We evaluated the cross-Over studies and RCTs separately. The inverse variance and the DerSimonian–Laird methods were used to estimate the difference between-studies variance (τ^2). Statistical heterogeneity was also assessed using the I-square statistics, where $I^2 > 50\%$ was considered a sign of substantial heterogeneity.

The mean difference (MD) was the effect measurement (i.e., the mean caloric ingestion in distractor groups/sessions minus the mean value in control group/session - without distractor). Confidence intervals (CI%), sensitivity and effect of the groups were also observed (FIELD; GILLET, 2010). Random effect models were used for both analyses. In this design, we used the mean value, standard deviation, and sample size of each study, reported (or estimated) for both experimental and control groups. The publication bias was not quantitatively evaluated by Egger test or funnel plot despite the small number of studies grouped in the funnel plot.

Quality of Evidence

We assessed the quality of evidence using the Grading of Recommendations Assessment, Development and Evaluation (GRADE). Two independent reviewers (A.P.B. and N.C.M.) made judgments, and each topic was assessed as having no limitations, serious limitations, or very serious limitations. The overall quality of the evidence was categorized as high, moderate, low, and very low (GRADEpro GDT; the GRADE Working Group; <https://gradepro.org/>).

Results

Study Selection and Characteristics

The search in all databases returned 15,796 articles. After removal of duplicates 9,576 references remained. Of these, 43 were included in the second phase (full-text reading). At the end of this step, 13 articles were selected. Among them, five were crossover studies (BELLISSIMO et al., 2007b; FRANCIS; BIRCH, 2006; MEKHMOUKH; CHAPELOT; BELLISLE, 2012; PATEL et al., 2011; PÉNEAU et al., 2009) and eight were RCTs (GREGORI et al., 2013, 2014b, 2017a, 2017b; LORENZONI et al., 2017a, 2017b; STAIANO et al., 2016; TEMPLE et al., 2007). The age of the volunteers ranged from 3 to 17 years, and the samples ranged between 8 and 168 participants per group. Eight studies (FRANCIS; BIRCH, 2006; GREGORI et al., 2013, 2014b, 2017a, 2017b; LORENZONI et al., 2017a, 2017b; STAIANO et al., 2016) evaluated children under 12 years-old (~ 61%). One-hundred and eleven children participated in crossover studies while 535 participated in RCTs.

Regarding the type of distractor, all studies used TV. Besides evaluating the influence of TV distraction during the meal, two studies evaluated the influence of music and eating in groups (MEKHMOUKH; CHAPELOT; BELLISLE, 2012; PÉNEAU et al., 2009). The type of meal varied between lunch (BELLISSIMO et al., 2007b; FRANCIS; BIRCH, 2006; MEKHMOUKH; CHAPELOT; BELLISLE, 2012; PATEL et al., 2011; PÉNEAU et al., 2009) or snacks (FRANCIS; BIRCH, 2006; GREGORI et al., 2013, 2014b, 2017a, 2017b; LORENZONI et al., 2017a, 2017b; STAIANO et al., 2016; TEMPLE et al., 2007) including ground beef and mashed potatoes, pizza, popcorn, potato chips, chocolate cake, green bell peppers, dry cereal, chocolate bars, easter egg, among others.

Risk of bias

Results of the risk of bias assessment are presented on Figure 2. Regarding the RCTs (Figure 2A), only one study (GREGORI et al., 2017b) presented a low risk of bias in all domains, but

all the other RCTs (GREGORI et al., 2013, 2014b, 2017a; LORENZONI et al., 2017a, 2017b; STAIANO et al., 2016; TEMPLE et al., 2007) presented a low risk of bias on domains 3 and 5. These seven RCTs also lacked adequate description of the randomization process, therefore, were judged as some concerns. In addition, two studies presented a high risk of bias regarding deviations from intended intervention (LORENZONI et al., 2017b) and measures of the outcome (STAIANO et al., 2016).

A similar pattern was observed for the crossover studies, where three studies showed high risk of bias (Figure 2B) (FRANCIS; BIRCH, 2006; MEKHMOUKH; CHAPELOT; BELLISLE, 2012; PÉNEAU et al., 2009), while two studies were considered as some concerns (BELLISSIMO et al., 2007b; PATEL et al., 2011). Bias arose mainly from lack of adequate description of the method for sample randomization (Domain 1), and from problems with the method of outcome measurement (Domain 4). One study (FRANCIS; BIRCH, 2006) presented a high risk of bias on Domain S (bias arising from period and carryover effects) due to insufficient wash-out time between experimental sessions (less than one week). No problems were observed regarding Domains 3 (bias due to deviations from intended intervention) and 5 (bias in selection of the reported result); thus, these domains were judged as low risk.

Results for individual studies

Qualitative analysis regarding caloric ingestion (with distraction in comparison to no distraction) indicated no influence of distractors on caloric ingestion in eight studies (61%) (GREGORI et al., 2013, 2014b, 2017a, 2017b; LORENZONI et al., 2017a, 2017b; PATEL et al., 2011; STAIANO et al., 2016). Only one study (8%) found an intake reduction while watching TV (FRANCIS; BIRCH, 2006), whereas three others indicated an increase in food intake (23%), being two while watching TV (BELLISSIMO et al., 2007b; TEMPLE et al., 2007) and one while listening to music (MEKHMOUKH; CHAPELOT; BELLISLE, 2012).

Additionally, one study (8%) indicated no difference for solid food, but found increased soda consumption while watching TV (PÉNEAU et al., 2009).

Meta-analysis

Four articles (GREGORI et al., 2017b, 2017a; STAIANO et al., 2016; TEMPLE et al., 2007) were excluded from the analyses due to lack of data for certain measurements. The remaining six studies were divided in two subgroups, regarding their similarities. One subgroup was composed of crossover studies (BELLISSIMO et al., 2007b; PATEL et al., 2011) and the other group encompasses the RCTs (GREGORI et al., 2013, 2014b; LORENZONI et al., 2017a, 2017b). The study of Gregori (GREGORI et al., 2017b) was not included in the meta-analysis as the sample was the same as its previous study (GREGORI et al., 2013). The latter was selected because it contained a larger and more complete sample. Caloric ingestion results for RCT articles were converted from medians and interquartile into means and standard deviations (WAN et al., 2014). These subgroups included the same experience of food intake and distraction (pizza lunch until feeling completely full while watching TV or not, or *ad libitum* chocolate snacks while watching or not watching TV, respectively) and children under 12-years-old. Two meta-analyses were then performed separately.

The meta-analyses were performed by measuring the results of caloric consumption, based on means and standard deviations. All studies included in both metaanalyses compared eating while watching TV versus eating with no distractor. In some studies, it was necessary to convert the amount of food to (kcal) to standardize the measurement units. Statistical heterogeneity (I^2) was verified as acceptable, indicating low variability among studies.

The meta-analysis of crossover studies included only two articles and the heterogeneity was extremely high ($I^2=92\%$), jeopardizing the use of these results. On the other hand, the metanalysis of RCTs included four very homogenous studies ($I^2=0\%$), indicating no difference

in caloric ingestion when comparing eating while watching TV with eating without distraction (MD=0.05; 95% CI -0.13 – 0.23, P=0.57) (Figure 3).

Quality of Evidence

The GRADE overall certainty was determined as low based on the four RCT articles included in the meta-analysis. (Table 2). Inconsistency and indirectness items were judged to be not serious since heterogeneity was very low and all participants were children and adolescents, respectively. On the other hand, the risk of bias and imprecision were deemed as serious, due to problems in outcome measurements between intervention groups and sample size of less than 400 participants among included studies.

Discussion

The present findings indicate no influence of distractors (mostly TV) in caloric ingestion of children and adolescents submitted to controlled laboratory meals. Qualitative and quantitative analysis of crossover and RCT confirmed this outcome. This result may seem surprising, since eating whilst distracted has seem to be associated with poorer diet quality among children (AVERY; ANDERSON; MCCULLOUGH, 2017).

It is important to consider that this is the first systematic review with meta-analysis involving strictly laboratorial outcomes, comparing children and adolescents' caloric ingestion with and without distractors. Contrasting results were observed in a previous systematic review (GHOBADI et al., 2018), but only observational studies were included and the authors intended to compare those children who never ate in front of TV against those who declared to eat more than once while watching TV regularly at home. Another review, evaluating only cross-sectional trials of case control or cohort studies, measured the associations between eating whilst watching TV and children's food and drink intake (AVERY; ANDERSON; MCCULLOUGH, 2017). The authors found a positive association between TV viewing and

consumption of pizza, fried foods, sweets, and snacks, and a negative association of fruit and vegetable consumption with eating whilst watching TV. It is important to highlight that both reviews did not include interventional studies. It is well known that RCTs provide the most reliable evidence on the effectiveness of interventions since they minimize the risk of confounding factors that could influence the results (AKOBENG, 2005). Thus, the present systematic review differs from previous ones for considering the caloric ingestion under controlled experimental conditions, in contrast to meals taken at home and/or without supervision. Indeed, family habits and the combination of distractors - such as eating with other people at the same time TV is on - may influence results on a regular basis and maybe not reflect the real importance of distractors on caloric ingestion.

The link between the use of distractors and nutritional disorders is influenced by several factors (JENSEN et al., 2021), such as loss of attention, exposure to low-nutrient food and beverage marketing that influences children's preferences, and increased sedentary behavior (ROBINSON et al., 2017a). Experimental studies in adults suggest that distractors may disturb the ability to regulate energy intake and promote overeating (BELLISLE; DALIX; SLAMA, 2004; GONÇALVES et al., 2019; STROEBELE; DE CASTRO, 2004a). Even for children, TV increased lunchtime food intake by an average of 228 kcal (BELLISSIMO et al., 2007b) in a crossover experiment. However, independent of age, the level of engagement with the distraction seems to be essential, since a continuous television cartoon increased the time spent on eating and the energy intake when compared to a repeated segment also on TV (TEMPLE et al., 2007). Thus, an increase in caloric intake while watching TV is not obvious and possibly relies more on the context (engagement) (CHAPMAN et al., 2014) than on the habit itself (LORENZONI et al., 2017a).

Other important aspects are related to the meal (lunch or snack), since children's attitudes to food during the afternoon snack is less modified by exposure to known common factors like TV (GREGORI et al., 2017a). Moreover, exposition to distractors during a previous

meal before the experiment (BELLISSIMO et al., 2007b) and limitations of meal duration in some experiments (STAIANO et al., 2016) may also have influence food intake, jeopardizing further comparisons. Most studies were conducted using chocolate, pizza or other “unhealthy” foods and children's perception of food depends on different appeals and social influences (ATIK; ERTEKIN, 2013). Probably, the economical access on daily basis to this type of food have some influence of their greediness during experiments. Moreover, asking parents about their child's food preferences (STAIANO et al., 2016) may not represent kid's predilection.

Subjective appetite before each intervention session (BELLISSIMO et al., 2007b), family environment (MELO et al., 2017), genetic composition (ZHAO; GRANT, 2011), and cultural/lifestyle in different countries (LORENZONI et al., 2017b) may also interfere with the results. However, when controlling for children's body composition, sex and puberal stage (PATEL et al., 2011) the distractor still did not influence caloric ingestion.

The selected studies showed moderate to high risk of bias. The most important problems were related to unclear information regarding the randomization process and in the measurement of the outcome. These limitations summed to small sample size (less than 400 participants demand for GRADE imprecision item) contributed to a low evidence quality. Randomization is mandatory for clinical trials involving treatment comparisons, in order to mitigate selection bias, provide similarity among treatment groups (BERGER et al., 2021). Experimental sessions were well controlled and standardized meals, which may minimize the risk of external interferences and mimic natural conditions in real life (LORENZONI et al., 2017b). Some limitations should be considered such as limited structure to provide standardized meals for a large sample of volunteers, food choices that may not cover the all-volunteers' preference and children's perception about the assessment of the amount they are eating. However, the same is true for the control groups (LORENZONI et al., 2017b).

Regarding to age (children vs adolescents) it is hard to differentiate children from adolescents especially between 10-14 years old. The World Health Organization (WHO)

considers adolescence the period between 10 and 19 years of age, which is divided in two sub-phases: from 10 to 14 years and from 15 to 19 years (DICK; FERGUSON, 2015). The studies included in the meta-analysis comprised samples from 3-12 years-old preventing separation between children and adolescents. This is important to consider since adolescents, in comparison with younger children, may have more control over their eating habits (DWYER et al., 2001) and might be more worried about social exposure while eating, especially girls (CAVAZZA; GUIDETTI; BUTERA, 2015).

Thus, the present study found no differences in caloric consumption during controlled intervention meals with and without distractors. Longitudinal studies with large samples considering different age groups and cultural aspects, a broader variety of distractors, and also foods are encouraged in order enhance the quality of evidence.

Conclusion

In conclusion, under laboratory conditions, eating with distractors did not alter caloric ingestion for children and adolescents in comparison with no distraction.

Funding National Council for Scientific and Technological Development (CNPq), the Higher Education Personnel Improvement Coordination (CAPES) and the Minas Gerais State Research Support Foundation (FAPEMIG).

Ethics approval Not applicable

Consent to participate Not applicable

Consent for publication Not applicable

Availability of data and material Available upon request

Code availability Not applicable

Authors' contributions Article writing (NCM, APB, ACVG, LJP). Database search (NCM, APB, ACVG); Statistics (APB); Data compilation (NCM, APB, ACVG, EFA, TMSVG, LJP); Project supervision and approval (TMSVG, EFA, LJP).

References

- AGGARWAL, B.; JAIN, V. Obesity in Children: Definition, Etiology and Approach. **Indian Journal of Pediatrics**, v. 85, n. 6, p. 463–471, 2018.
- AKOBENG, A. K. Understanding randomised controlled trials. **Archives of Disease in Childhood**, v. 90, n. 8, p. 840–844, ago. 2005.
- ALMAN, K. L. et al. Dietetic management of obesity and severe obesity in children and adolescents: A scoping review of guidelines. **Obesity Reviews**, v. 22, n. 1, p. 1–8, 2021.
- AMERICAN ACADEMY OF PEDIATRICS. **Ages & Stages - HealthyChildren.org**.
- ATIK, D.; ERTEKIN, Z. O. Children's perception of food and healthy eating: dynamics behind their food preferences. **International Journal of Consumer Studies**, v. 37, n. 1, p. 59–65, jan. 2013.
- AVERY, A.; ANDERSON, C.; MCCULLOUGH, F. Associations between children's diet quality and watching television during meal or snack consumption: A systematic review. **Maternal & child nutrition**, v. 13, n. 4, out. 2017.
- BAKER, M. et al. Pre-meal active video game playing increased subjective appetite but not food intake in children and adolescents. **Physiology and Behavior**, v. 222, n. May, p. 112931, 2020.
- BAUTISTA-CASTAÑO, I.; DORESTE, J.; SERRA-MAJEM, L. Effectiveness of interventions in the prevention of childhood obesity. **European Journal of Epidemiology**, v. 19, n. 7, p. 617–622, 2004.
- BELLISLE, F.; DALIX, A.; SLAMA, G. Non food-related environmental stimuli induce increased meal intake in healthy women: comparison of television viewing versus listening to a recorded story in laboratory settings. **Appetite**, v. 43, n. 2, p. 175–180, out. 2004.
- BELLISSIMO, N. et al. Effect of television viewing at mealtime on food intake after a glucose preload in boys. **Pediatric Research**, v. 61, n. 6, p. 745–749, 2007a.
- BELLISSIMO, N. et al. Effect of television viewing at mealtime on food intake after a glucose preload in boys. **Pediatric research**, v. 61, n. 6, p. 745–749, jun. 2007b.
- BERGER, V. W. et al. A roadmap to using randomization in clinical trials. **BMC Medical Research Methodology** 2021 21:1, v. 21, n. 1, p. 1–24, ago. 2021.

- BORGHESE, M. M. et al. Television viewing and food intake during television viewing in normal-weight, overweight and obese 9- to 11-year-old Canadian children: a cross-sectional analysis. **Journal of Nutritional Science**, v. 4, p. 1–9, 2015.
- BOSCH, M. D. P. B. The Mere Presence Effect: Attentional Bias Promoted by Smartphone Presence Recommended Citation. **SJSU ScholarWorks**, 2018.
- BOSU, W. K. An overview of the nutrition transition in West Africa: Implications for non-communicable diseases. **Proceedings of the Nutrition Society**, v. 74, n. 4, p. 466–477, 2015.
- BROWN, A. Media use by children younger than 2 years. **Pediatrics**, v. 128, n. 5, p. 1040–1045, nov. 2011.
- BRUNSTROM, J. M.; MITCHELL, G. L. Effects of distraction on the development of satiety. **The British journal of nutrition**, v. 96, n. 4, p. 761–9, 2006.
- BRUNSTROM, J.; MITCHELL, G.; BAGULEY, T. Potential early-life predictors of dietary behaviour in adulthood: A retrospective study. **International Journal of Obesity**, v. 29, n. 5, p. 463–474, maio 2005.
- BYRD, J. J.; HATTON-, H. N. Optimizing healthy eating habits in early childhood with mindfulness. **Neb guide**, v. 2019, n. October, p. 1–4, 2019.
- CALVERT, S. L. Children as consumers: Advertising and marketing. **Future of Children**, v. 18, n. 1, p. 205–234, 2008.
- CAVAZZA, N.; GUIDETTI, M.; BUTERA, F. Ingredients of gender-based stereotypes about food. Indirect influence of food type, portion size and presentation on gendered intentions to eat. **Appetite**, v. 91, p. 266–272, ago. 2015.
- CHAPLAIS, E. et al. Smartphone Interventions for Weight Treatment and Behavioral Change in Pediatric Obesity: A Systematic Review. **Telemedicine and e-Health**, v. 21, n. 10, p. 822–830, 2015.
- CHAPMAN, C. et al. Watching TV and food intake: the role of content. **PloS one**, v. 9, n. 7, jul. 2014.
- CHAPUT, J. P. et al. Modern sedentary activities promote overconsumption of food in our current obesogenic environment. **Obesity Reviews**, v. 12, n. 5, p. 12–20, 2011.
- CHOW, C. Y. et al. Can games change children’s eating behaviour? A review of gamification and serious games. **Food Quality and Preference**, v. 80, p. 103823, 2020.

- COLE, T. J. et al. What is the best measure of adiposity change in growing children: BMI, BMI %, BMI z-score or BMI centile? **European Journal of Clinical Nutrition**, v. 59, n. 3, p. 419–425, 2005.
- COLLABORATION, N. R. F. Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-based measurement studies in 128·9 million children, adolescents, and adults. **The Lancet**, v. 390, n. 10113, p. 2627–2642, 2017.
- COUGHLIN, S. S. et al. Smartphone Applications for Promoting Healthy Diet and Nutrition: A Literature Review. **Jacobs journal of food and nutrition**, v. 2, n. 3, p. 021, 2016.
- DE CASTRO, J. M. Social facilitation of duration and size but not rate of the spontaneous meal intake of humans. **Physiology and Behavior**, v. 47, n. 6, p. 1129– 1135, 1990.
- DE GRAAF, C. et al. Biomarkers of satiation and satiety. **The American journal of clinical nutrition**, v. 79, n. 6, p. 946–961, 2004.
- DI CESARE, M. et al. The epidemiological burden of obesity in childhood: A worldwide epidemic requiring urgent action. **BMC Medicine**, v. 17, n. 1, p. 1–20, 2019.
- DICK, B.; FERGUSON, B. J. Health for the world's adolescents: A second chance in the second decade. **Journal of Adolescent Health**, v. 56, n. 1, p. 3–6, 2015.
- DUGGAN, M.; SMITH, A. Cell Internet Use 2013 | Pew Research Center. **Pew Internet: Washington, D.C.**, p. 15, 2013.
- DWYER, J. T. et al. Adolescents' Eating Patterns Influence their Nutrient Intakes. **Journal of the American Dietetic Association**, v. 101, n. 7, p. 798–802, jul. 2001.
- EPSTEIN, L. H. et al. Habituation as a Determinant of Human Food Intake. **Psychological Review**, v. 116, n. 2, p. 384–407, 2009.
- FIELD, A. P.; GILLETT, R. How to do a meta-analysis. **British Journal of Mathematical and Statistical Psychology**, v. 63, n. 3, p. 665–694, 2010.
- FRANCIS, L.; BIRCH, L. Does eating during television viewing affect preschool children's intake? **Journal of the American Dietetic Association**, v. 106, n. 4, p. 598– 600, abr. 2006.
- FRIEDEMANN, C. et al. Cardiovascular disease risk in healthy children and its association with body mass index: Systematic review and meta-analysis. **BMJ (Online)**, v. 345, n. 7876, 2012.

GANESH, S.; MARSHALL, P.; ROGERS, Y. FoodWorks: Tackling Fussy Eating by Digitally Augmenting Children's Meals. **Proceedings of the 8th Nordic Conference on Human-Computer Interaction: Fun, Fast, Foundational**, v. NordiCHI '14, p. 147–156, 2014.

GHOBADI, S. et al. Association of eating while television viewing and overweight/obesity among children and adolescents: a systematic review and metaanalysis of observational studies. **Obesity reviews : an official journal of the International Association for the Study of Obesity**, v. 19, n. 3, p. 313–320, mar. 2018.

GONÇALVES, R. F. DA M. et al. Smartphone use while eating increases caloric ingestion. **Physiology and Behavior**, v. 204, n. October 2018, p. 93–99, 2019.

GONZÁLEZ, C. S. et al. Learning healthy lifestyles through active videogames, motor games and the gamification of educational activities. **Computers in Human Behavior**, v. 55, p. 529–551, 2016.

GREGORI, D. et al. Investigating the obesogenic effects of marketing snacks with toys: an experimental study in Latin America. **Nutrition journal**, v. 12, p. 95, 2013.

GREGORI, D. et al. Food Packaged with Toys: An Investigation on Potential Obesogenic Effects in Indian Children. **Indian Journal of Pediatrics**, v. 81, n. 1, p. 30–38, 2014a.

GREGORI, D. et al. Food packaged with toys: an investigation on potential obesogenic effects in Indian children. **Indian journal of pediatrics**, v. 81 Suppl 1, n. 1, p. 30–38, 2014b.

GREGORI, D. et al. Is brand visibility on snacks packages affecting their consumption in children? Results from an experimental ad-libitum study. **Archivos Latinoamericanos de Nutrición**, v. 67, n. 1, p. 36–49, 2017a.

GREGORI, D. et al. Food advertising on TV and energy intake in children: results from the OBEY-AD Mexico. **Archivos Latinoamericanos de Nutrición**, v. 67, n. 1, p. 11–23, 2017b.

HALL, C.; VIVANTI, A.; ABBEY, K. Impact of television on nutritional intake in communal dining room settings among those with acquired brain injury: A pilot study. **Nutrition and Dietetics**, p. 1–5, 2019.

HIGGS, S. Manipulations of attention during eating and their effects on later snack intake. **Appetite**, v. 92, p. 287–294, 2015.

HIGGS, S.; DONOHOE, J. E. Focusing on food during lunch enhances lunch memory and decreases later snack intake. **Appetite**, v. 57, n. 1, p. 202–206, 2011.

- HIGGS, S.; WOODWARD, M. Television watching during lunch increases afternoon snack intake of young women. **Appetite**, v. 52, n. 1, p. 39–43, fev. 2009.
- JENSEN, M. et al. Television viewing and using screens while eating: Associations with dietary intake in children and adolescents. **Appetite**, p. 105670, set. 2021.
- JOHAR, J. Screen Time and Childhood Obesity : A Commentary on the Evidence Behind Current Guidelines. **University of British Columbia Medical Journal (UBCMJ)**, v. 10, n. 2, p. 55–56, 2019.
- JUSTO, A. M. Corpo E Representações Sociais: Sobrepeso, Obesidade E Práticas De Controle De Peso. p. 1–249, 2016.
- KABALI, H. et al. Exposure and Use of Mobile Media Devices by Young Children. **Pediatrics**, v. 136, n. 6, p. 1044–1050, dez. 2015.
- KILDARE, C. A.; MIDDLEMISS, W. Impact of parents mobile device use on parentchild interaction: A literature review. **Computers in Human Behavior**, v. 75, p. 579– 593, 2017.
- KOSTECKA, M. The influence of preschool children’s diets on the risk of lifestyle diseases. A pilot study. **Roczniki Panstwowego Zakladu Higieny**, v. 69, n. 2, p. 139– 145, jan. 2018.
- LA MARRA, M.; CAVIGLIA, G.; PERRELLA, R. Using Smartphones When Eating Increases Caloric Intake in Young People: An Overview of the Literature. **Frontiers in Psychology**, v. 11, n. December, p. 1–6, 2020.
- LEBLANC, A. et al. The Ubiquity of the Screen: An Overview of the Risks and Benefits of Screen Time in Our Modern World. **Translational Journal of the American College of Sports Medicine**, v. 2, n. 17, p. 104–113, 2017.
- LEE, E. Y.; YOON, K. H. Epidemic obesity in children and adolescents: risk factors and prevention. **Frontiers of Medicine**, v. 12, n. 6, p. 658–666, 2018.
- LEVITSKY, D. A. The non-regulation of food intake in humans: Hope for reversing the epidemic of obesity. **Physiology and Behavior**, v. 86, n. 5, p. 623–632, 2005.
- LINDBERG, L. et al. Association of childhood obesity with risk of early all-cause and cause-specific mortality: A swedish prospective cohort study. **PLoS Medicine**, v. 17, n. 3, p. 1–14, 2020.
- LIVOCK, H. et al. Watching television or listening to music while exercising failed to affect post-exercise food intake or energy expenditure in male adolescents. **Appetite**, v. 127, p. 266–273, 2018.

- LONG, S. et al. Effects of distraction and focused attention on actual and perceived food intake in females with non-clinical eating psychopathology. **Appetite**, v. 56, n. 2, p. 350–356, 2011.
- LÓPEZ-GUIMERÀ, G. et al. Influence of mass media on body image and eating disordered attitudes and behaviors in females: A review of effects and processes. **Media Psychology**, v. 13, n. 4, p. 387–416, 2010.
- LORENZONI, G. et al. Does food advertising influence snacks consumption in Chilean children? Results from an experimental ad libitum study. **ARCHIVOS LATINOAMERICANOS DE NUTRICIÓN**, v. 67, n. 1, p. 24–35, 2017a.
- LORENZONI, G. et al. Effect of TV advertising on energy intake of Georgian children: Results of an experimental study. **Mediterranean Journal of Nutrition and Metabolism**, v. 10, n. 3, p. 183–192, jan. 2017b.
- LUMENG, J. C.; HILLMAN, K. H. Eating in larger groups increases food consumption. **Archives of Disease in Childhood**, v. 92, n. 5, p. 384–387, 2007.
- MANCHIKANTI, L. et al. Evidence-Based Medicine, Systematic Reviews, and Guidelines in Interventional Pain Management: Part 3: Systematic Reviews and MetaAnalyses of Randomized Trials. p. 35–72, 2009.
- MARSH, S.; NIMHURCHU, C.; MADDISON, R. The non-advertising effects of screen-based sedentary activities on acute eating behaviours in children, adolescents, and young adults. A systematic review. **Appetite**, v. 71, n. September, p. 259–273, 2013.
- MCCARRON, A.; TIERNEY, K. J. The effect of auditory stimulation on the consumption of soft drinks. **Appetite**, v. 13, n. 2, p. 155–159, 1989.
- MEKHMUKH, A.; CHAPELOT, D.; BELLISLE, F. Influence of environmental factors on meal intake in overweight and normal-weight male adolescents. A laboratory study. **Appetite**, v. 59, n. 1, p. 90–95, ago. 2012.
- MELLECKER, R. R. et al. Energy intake during activity enhanced video game play. **Appetite**, v. 55, n. 2, p. 343–347, 2010.
- MELO, K. M. et al. Influence of parents' behavior during the meal and on overweight in childhood. **Escola Anna Nery**, v. 21, n. 4, p. 20170102, set. 2017.
- MITCHELL, G. L.; BRUNSTROM, J. M. Everyday dietary behaviour and the relationship between attention and meal size. **Appetite**, v. 45, n. 3, p. 344–355, 2005.

O'DONNELL, S.; EPSTEIN, L. H. Smartphones are more reinforcing than food for students. **Addictive Behaviors**, v. 90, p. 124–133, 2019.

OGDEN, J. **The psychology of eating : from healthy to disordered behavior**. [s.l.] Wiley-Blackwell, 2010.

OGDEN, J. et al. Distraction, the desire to eat and food intake. Towards an expanded model of mindless eating. **Appetite**, v. 62, p. 119–126, mar. 2013.

OGDEN, J.; OIKONOMOU, E.; ALEMANY, G. Distraction, restrained eating and disinhibition: An experimental study of food intake and the impact of “eating on the go”. **Journal of Health Psychology**, v. 22, n. 1, p. 39–50, 2017.

OLDHAM-COOPER, R. et al. Playing a computer game during lunch affects fullness, memory for lunch, and later snack intake. **The American journal of clinical nutrition**, v. 93, n. 2, p. 308–313, fev. 2011.

PANDITA, A. et al. Childhood obesity: Prevention is better than cure. **Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy**, v. 9, p. 83–89, 2016.

PARK, M. H. et al. The impact of childhood obesity on morbidity and mortality in adulthood: A systematic review. **Obesity Reviews**, v. 13, n. 11, p. 985–1000, 2012.

PATEL, B. et al. Television viewing at mealtime reduces caloric compensation in peripubertal, but not postpubertal, girls. **Pediatric research**, v. 70, n. 5, p. 513–517, nov. 2011.

PEARSON, N.; BIDDLE, S. J. H. Sedentary behavior and dietary intake in children, adolescents, and adults: A systematic review. **American Journal of Preventive Medicine**, v. 41, n. 2, p. 178–188, 2011.

PÉNEAU, S. et al. Influence of environmental factors on food intake and choice of beverage during meals in teenagers: a laboratory study. **The British journal of nutrition**, v. 102, n. 12, p. 1854–1859, dez. 2009.

PNAN, 2013. **Política Nacional de Alimentação e Nutrição**. [s.l.: s.n.].

QAZI IQBAL AHMAD, CHAROO BASHIR AHMAD, S. M. A. Childhood obesity. **JAMA - Journal of the American Medical Association**, v. 314, n. 8, p. 850, 2015.

QUEK, Y. H. et al. Exploring the association between childhood and adolescent obesity and depression: a meta-analysis. **Obesity Reviews**, v. 18, n. 7, p. 742–754, 2017.

REY-LÓPEZ, J. P. et al. Sedentary behaviour and obesity development in children and adolescents. **Nutrition, Metabolism and Cardiovascular Diseases**, v. 18, n. 3, p. 242–251, 2008.

ROBINSON, T. et al. Screen Media Exposure and Obesity in Children and Adolescents. **Pediatrics**, v. 140, n. Suppl 2, p. S97–S101, nov. 2017a.

ROBINSON, T. N. et al. Screen media exposure and obesity in children and adolescents. **Pediatrics**, v. 140, p. S97–S101, 2017b.

ROBLIN, L. Childhood obesity: Food, nutrient, and eating-habit trends and influences. **Applied Physiology, Nutrition and Metabolism**, v. 32, n. 4, p. 635–645, 2007.

RODRIGUES, L. et al. Taste sensitivity and lifestyle are associated with food preferences and BMI in children. **International Journal of Food Sciences and Nutrition**, v. 71, n. 7, p. 875–883, 2020.

ROSIEK, A. et al. Effect of television on obesity and excess of weight and consequences of health. **International Journal of Environmental Research and Public Health**, v. 12, n. 8, p. 9408–9426, 2015.

ROZIN, P. et al. What Causes Humans to Begin and End a Meal? A Role for Memory for What Has Been Eaten, as Evidenced by a Study of Multiple Meal Eating in Amnesic Patients. **Psychological Science**, v. 9, n. 5, p. 392–396, 1998.

SCAGLIONI, S. et al. Factors influencing children's eating behaviours. **Nutrients**, v. 10, n. 6, p. 1–17, 2018.

SHETTY, P. Nutrition transition and its health outcomes. **Indian journal of pediatrics**, v. 80 Suppl 1, n. March, p. 21–27, 2013.

SILVA, A. P. DA et al. Prevalence of overweight and obesity and associated factors in school children and adolescents in a medium-sized Brazilian city. **Clinics (Sao Paulo, Brazil)**, v. 73, n. 7, p. e438, 2018.

STAIANO, A. et al. Influence of Screen-Based Peer Modeling on Preschool Children's Vegetable Consumption and Preferences. **Journal of nutrition education and behavior**, v. 48, n. 5, p. 331-335.e1, maio 2016.

STERNE, J. et al. RoB 2: a revised tool for assessing risk of bias in randomised trials. **BMJ (Clinical research ed.)**, v. 366, 2019.

STROEBELE, N.; DE CASTRO, J. Television viewing is associated with an increase in meal frequency in humans. **Appetite**, v. 42, n. 1, p. 111–113, 2004a.

STROEBELE, N.; DE CASTRO, J. M. Effect of ambience on food intake and food choice. **Nutrition**, v. 20, n. 9, p. 821–838, 2004b.

STROEBELE, N.; DE CASTRO, J. M. Listening to music while eating is related to increases in people's food intake and meal duration. **Appetite**, v. 47, n. 3, p. 285–289, 2006.

SUN, M. et al. Eating Habits and Their Association with Weight Status in Chinese School-Age Children: A Cross-Sectional Study. **International journal of environmental research and public health**, v. 17, n. 10, maio 2020.

TAKAO, M.; TAKAHASHI, S.; KITAMURA, M. Addictive personality and problematic mobile phone use. **Cyberpsychology and Behavior**, v. 12, n. 5, p. 501–507, 2009a.

TAKAO, M.; TAKAHASHI, S.; KITAMURA, M. Addictive personality and problematic mobile phone use. **Cyberpsychology & behavior : the impact of the Internet, multimedia and virtual reality on behavior and society**, v. 12, n. 5, p. 501–507, out. 2009b.

TEMPLE, J. et al. Television watching increases motivated responding for food and energy intake in children. **The American journal of clinical nutrition**, v. 85, n. 2, p. 355–361, fev. 2007.

TEMPLE, J. L. et al. Overweight children find food more reinforcing and consume more energy than do nonoverweight children. **American Journal of Clinical Nutrition**, v. 87, n. 5, p. 1121–1127, 2008.

TWENGE, J. M. et al. Increases in Depressive Symptoms, Suicide-Related Outcomes, and Suicide Rates Among U.S. Adolescents After 2010 and Links to Increased New Media Screen Time. **Clinical Psychological Science**, v. 6, n. 1, p. 3–17, 2018.

WAN, X. et al. Estimating the sample mean and standard deviation from the sample size, median, range and/or interquartile range. **BMC medical research methodology**, v. 14, n. 1, p. 135, dez. 2014.

WEIWEI MA, BO LIU, LIU, Z. **Influence of a Video Game on Children's Attention to Food: Should Games Be Served with a Character During Mealtime?** [s.l: s.n.].

ZHAO, J.; GRANT, S. F. A. Genetics of childhood obesity. **Journal of Obesity**, v. 2011, 2011.

Table 1. Data extraction of the selected studies.

Authors (Year of publication)	Country	Study design	Age of participants (Years)	participants per group	Sex of participants	Distractor and control groups	Type of meal	Main results
(FRANCIS; BIRCH, 2006)	EUA	Crossover	3-5	n=12 boys n=12 girls	boys and girls	1. No TV 2. TV	Lunch and afternoon snacks	Children ate significantly less snack or lunch in the TV condition compared with the no TV condition (P<0.001).
(BELLISSIM O et al., 2007b)	Canada	Crossover	9-14	n=14	boys	1. No TV 2. TV	Lunch (pizza and water) 30 minutes after glucose preload or control preload	TV increased lunchtime food intake (p < 0.001).
(TEMPLE et al., 2007)	EUA	RCT	9-12	1. No TV (n=9) 2. repeated segment (n=8) 3. continuous TV (n=9)	boys and girls	1. no TV 2. TV repeated segment (1.5 minutes of a TV program that was repeated in a loop) 3. TV Continuous (episode of a program)	Each participant chose his favorite snack (Smartfood White Cheddar Popcorn, Doritos Cool Ranch, Lay's Wavy Potato Chips and Cheetos) and received a portion of 1000 Kcal and water <i>ad libitum</i>	The continuous television group spent more time eating (P <0.0001) and consumed more energy than groups without television and with repeated segment (P = 0.007).
(PÉNEAU et al., 2009)	France	Crossover	15-16	n=29	boys and girls	1. eating alone 2. eating in groups of three 3. eating alone while viewing TV	main course: ground meat and mashed potatoes dessert: chocolate cake, mineral water,	Solid and liquid food intake was different (significantly lower) only in the condition of 'group eating'. More soda was consumed when participants were watching TV, and more water was consumed while

						4. eating alone while listening to music	orange juice and soda <i>ad libitum</i>	listening to music. In all conditions, more soda of what water was consumed.
(PATEL et al., 2011)	Canada	Crossover	09-14	Peripubertal (n=17) postpubertal (n=8)	girls	1. peripubertal with TV 2. peripubertal without TV 3. postpubertal with TV 4. postpubertal without TV	pizzas offered <i>ad libitum</i>	Watching TV at mealtimes had no effect on food intake.
(MEKHMOU KH; CHAPELOT; BELLISLE, 2012)	France	Crossover	15-17	n=19	boys	1. eating alone 2. eating in groups (3 familiar person) 3. eating alone while listening to music 4. eating alone with TV	Lunch (hachis parmentier, brownie, water, orange juice, soda) were offered <i>ad libitum</i> .	There was no significant effect of meal condition or group for total energy intake (from solids plus fluids). Normal weight participants consumed more energy from solids in the “Music” than in the “Alone” (P = 0.026) and in the “Group” (P = 0.049) conditions but the difference with the “Television” condition just failed to reach significance (P = 0.06). No difference was significant between “Television” and “Alone” (P = 0.98), “Television” and “Group” (P = 0.85) or “Group” and “Alone” (P = 0.91).
(GREGORI et al., 2013)	Latin America (Argentina, Brazil and Mexico)	RCT	3-10	No film (without TV) (n=60) Film (with TV) (n=60)	boys and girls	1. No TV 2. TV	Snack (chocolate mimicking an easter egg) were offered <i>ad libitum</i> up to a maximum 12 snacks	No significant differences emerged between groups.

(GREGORI et al., 2014b)	Indian	RCT	3-11	No film No Spot (No TV) (n=161) Film No Spot (TV) (n=168)	boys and girls	1. No TV 2. TV mimicking an easter egg) ad libitum up to 10 snacks	Snack (chocolate egg) ad libitum up to 10 snacks	No significant association between food intake and TV exposure.
(STAIANO et al., 2016)	EUA	RCT	3-5	DVD (n=14) No DVD (n=14)	boys and girls	1. No TV 2. TV (DVD)	green bell pepper, cereal <i>ad libitum</i>	There was no difference in bell pepper consumption between the two groups and across time.
(GREGORI et al., 2017a) ^a	Italy	RCT	6-11	with TV (n=16) without TV (n=16)	boys and girls	1. No TV 2. TV	Snacks (cocoa biscuits, individually packaged soft pastries with apricot jam, milk cream, chocolate chips, individually packaged soft sponge with cocoa cream topping and filled with milk cream, individually packaged mini-plum cakes made with yogurt	Exposure to TV showed no significant association with energy intake in the different groups and with the likelihood of being a high consumer.
(Gregori et al., 2017b)	Mexico	RCT	3-10	No film (without TV) (n=12) Film (with TV) (n=12)	boys and girls	1. No TV 2. TV	Snacks (two shapes of chocolate containing a small gadget) were offered ad libitum up to a maximum 12 snacks	No significant differences emerged between groups.

(LORENZONI et al., 2017a)	Chile	RCT	6-12	1. No Film boys and girls no spot (n=8)		1. No TV 2. TV	Snacks during the afternoon break	No significant differences were identified in caloric intake among children randomized to different levels of TV spots.
				2. Film no spot (n=8)				
(LORENZONI et al., 2017b)	Georgia	RCT	3-11	No TV (No film No spot) (n=12)	boys and girls	1. No TV 2. TV	Snacks during the afternoon	No significant association between energy intake and TV
				TV No advertisement (Film No Spot) (n=9)				

Table 2. Results of quality assessment of studies included in meta-analyses. (The Grading of Recommendations Assessment, Development and Evaluation – GRADE).

Outcome	N° of studies	Study design	Certainty assessment					Others	Certainty
			Risk of bias	Inconsistency	Indirectness	Imprecision			
Snacks Intake	4	RCT	serious ^a	not serious	not serious	serious ^b	none	⊕⊕○○ LOW	

Explanations:

^a Risk of bias due to problems in outcome measurements between intervention

groups. ^b Sample size of less than 400 participants among included studies.

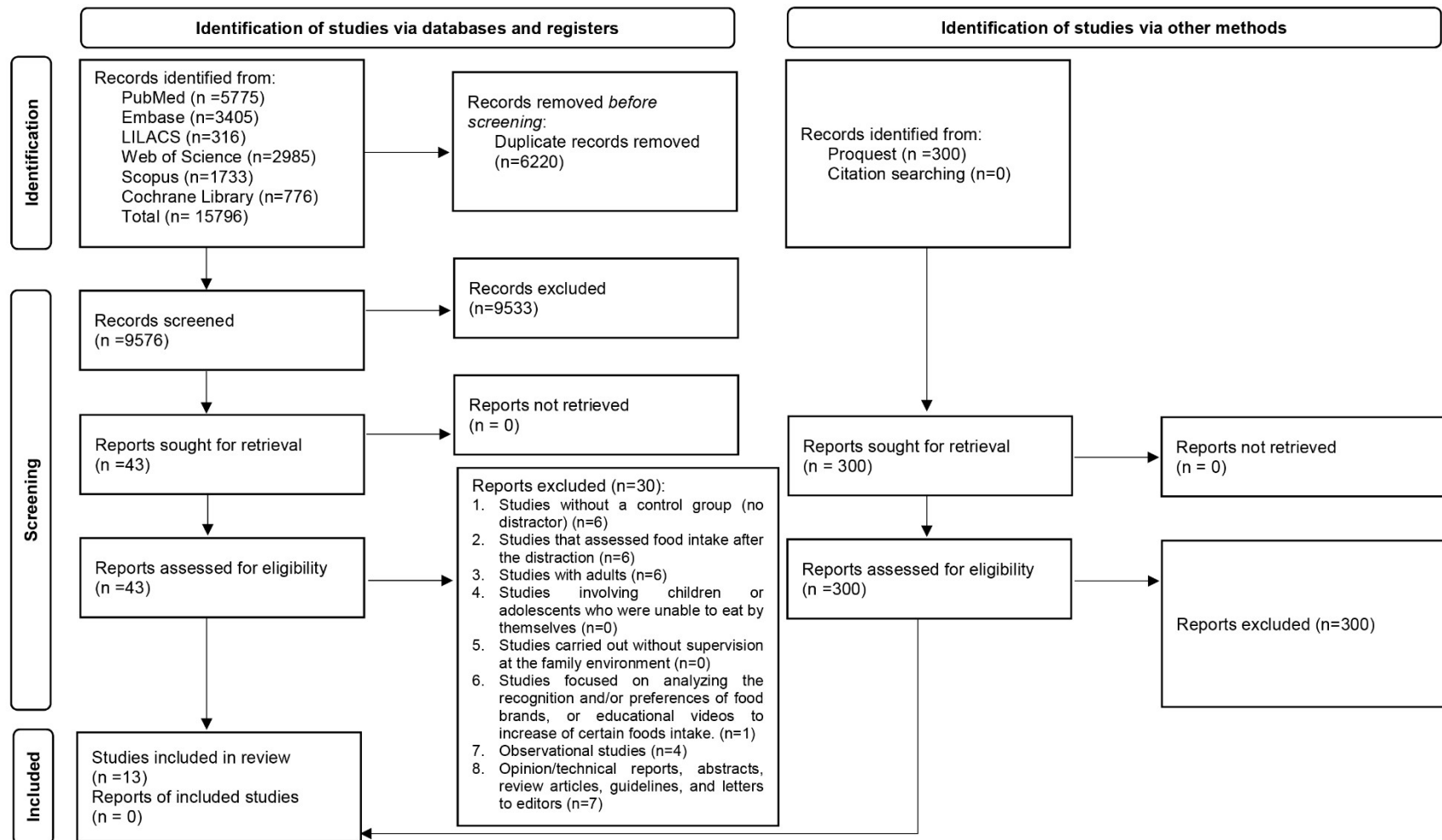





Figure 1. Flowchart of the screened articles (adapted from the PRISMA statement).

A

Study	Risk of bias domains					Overall
	D1	D2	D3	D4	D5	
Gregori et al, 2013	-	+	+	+	+	-
Gregori et al, 2014	-	-	+	+	+	-
Gregori et al, 2017a	-	+	+	+	+	-
Gregori et al, 2017b	+	+	+	+	+	+
Lorenzoni et al, 2017a	-	+	+	+	+	-
Lorenzoni et al, 2017b	-	X	+	+	+	X
Staiano et al, 2015	-	+	+	X	+	X
Temple et al, 2007	-	-	+	+	+	-

Domains:
D1: Bias arising from the randomization process.
D2: Bias due to deviations from intended intervention.
D3: Bias due to missing outcome data.
D4: Bias in measurement of the outcome.
D5: Bias in selection of the reported result.

Judgement
 High
 Some concerns
 Low

B

Study	Risk of bias						Overall
	D1	DS	D2	D3	D4	D5	
Belissimo et al, 2007	-	-	-	+	-	+	-
Francis et al, 2006	X	X	+	+	+	+	X
Peneau et al, 2009	-	+	+	+	X	+	X
Patel et al, 2011	-	+	+	+	-	+	-
Mekhmoukh et al, 2012	-	+	+	+	X	+	X

Domains:
D1: Bias arising from the randomization process
DS: Bias arising from period and carryover effects
D2: Bias due to deviations from the intended interventions
D3: Bias due to missing outcome data
D4: Bias in measurement of the outcome
D5: Bias in selection of the reported result




Judgement
 High
 Unclear
 Low

Figure 2. Risk of Bias of (A) randomized controlled trials - RCT and (B) crossover studies in accordance to RoB2 instrument.

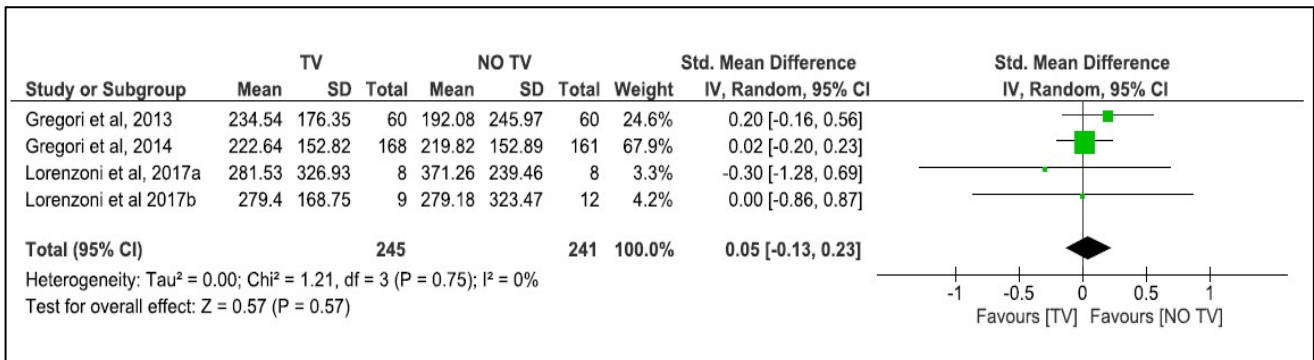


Figure 3. Forest plot and meta-analysis of caloric ingestion in children and adolescents for randomized controlled trials (RCT).

Supplemental Material

Chart 1. Search strategy on databases

<p>LILACS</p> <p>("child" OR "children" OR "kid" OR "kids" OR "adolescent" OR "adolescents" OR "teen" OR "teens" OR "teenager" OR "teenagers" OR "childhood" OR "adolescence" OR "preschool" OR "preschools" OR "criança" OR "crianças" OR "adolescente" OR "adolescentes" OR "infância" OR "adolescência" OR "pré-escolar" OR "pré-escolas" OR "niño" OR "ninõs" OR "adolescente" OR "adolescentes" OR "infancia" OR "adolescencia" OR "preescolar" OR "preescolares") AND (("distractor" OR "distractors" OR "screen time" OR "screen view" OR "smartphone" OR "smartphones" OR "cell phone" OR "cellphones" OR "video game" OR "video games" OR "game" OR "games" OR "computer games" OR "magazine" OR "magazines" OR "TV" OR "television" OR "televisions" OR "television viewing" OR "audiovisual aids" OR "recreation" OR "distrator" OR "distratores" OR "tempo de tela" OR "visualização de tela" OR "smartphone" OR "smartphones" OR "telefone celular" OR "telefones celulares" OR "vídeo game" OR "vídeo games" OR "jogo" OR "jogos" OR "jogos de computador" OR "revista" OR "revistas" OR "TV" OR "televisão" OR "televisões" OR "visualização de televisão" OR "recursos audiovisuais" OR "recreação" OR "distractor" OR "distratores" OR "tiempo de pantalla" OR "vista de pantalla" OR "teléfono inteligente" OR "teléfonos inteligentes" OR "teléfono celular" OR "teléfonos celulares" OR "videojuego" OR "juego de vídeo" OR "juego" OR "juegos" OR "juegos de computadora" OR "revista" OR "revistas" OR "TV" OR "televisión" OR "televisiones" OR "ver la televisión" OR "recursos audiovisuales" OR "recreación") AND ("energy intake" OR "eating" OR "food intake" OR "caloric intake" OR "dietary intake" OR "nutritional intake" OR "eating habit" OR "eating habits" OR "meal" OR "meals" OR "food consumed" OR "food consumption" OR "feeding behavior" OR "ingestão de energia" OR "ingestão de alimentos" OR "consumo alimentar" OR "consumo calórico" OR "consumo dietético" OR "ingestão nutricional" OR "hábito alimentar" OR "hábitos alimentares" OR "refeição" OR "refeições" OR "alimentos consumidos" OR "consumo de alimentos" OR "comportamento alimentar" OR "ingestión de energia" OR "ingestión de alimentos" OR "la ingesta de alimentos" OR "la ingesta calórica" OR "la ingesta dietética" OR "la ingesta nutricional" OR "hábito alimentício" OR "hábitos alimentícios" OR "comida" OR "comidas" OR "alimentos consumidos" OR "consumo de alimentos" OR "conducta alimentaria"))</p>
<p>PUBMED</p> <p>("child"[MeSH Terms] OR "child" OR "children" OR "kid" OR "kids" OR "adolescent"[MeSH Terms] OR "adolescent" OR "adolescents" OR "teen" OR "teens" OR "teenager" OR "teenagers" OR "childhood" OR "adolescence" OR "preschool" OR "preschools") AND (("distractor" OR "distractors" OR "screen time"[MeSH Terms] OR "screen time" OR "screen view" OR "smartphone"[MeSH Terms] OR "smartphone" OR "smartphones" OR "cell phone"[MeSH Terms] OR "cell phone" OR "cellphones" OR "video game" OR "video games"[MeSH Terms] OR "video games" OR "game" OR "games" OR "computer games" OR "magazine" OR "magazines" OR "TV" OR "television"[MeSH Terms] OR "television" OR "televisions" OR "television</p>

viewing" OR "audiovisual aids"[MeSH Terms] OR "audiovisual aids" OR "recreation"[MeSH Terms] OR "recreation") AND ("energy intake"[MeSH Terms] OR "energy intake" OR "eating"[MeSH Terms] OR "eating" OR "food intake" OR "caloric intake" OR "dietary intake" OR "nutritional intake" OR "eating habit" OR "eating habits" OR "meal" OR "meals"[MeSH Terms] OR "meals" OR "food consumed" OR "food consumption" OR "feeding behavior"[MeSH Terms] OR "feeding behavior"))

SCOPUS

(TITLE-ABS-KEY ("child" OR "children" OR "kid" OR "kids" OR "adolescent" OR "adolescents" OR "teen" OR "teens" OR "teenager" OR "teenagers" OR "childhood" OR "adolescence" OR "preschool" OR "preschools") AND (TITLE-ABS-KEY ("distractor" OR "distractors" OR "screen time" OR "screen view" OR "smartphone" OR "smartphones" OR "cellphone" OR "cellphones" OR "video game" OR "video games" OR "game" OR "games" OR "computer games" OR "magazine" OR "magazines" OR "TV" OR "television" o) AND TITLE-ABS-KEY ("energy intake" OR "food intake" OR "caloric intake" OR "dietary intake" OR "nutritional intake" OR "eating" "eating habit" OR "eating habits" OR "meal" OR "meals" OR "food consumed" OR "food consumption" OR "feeding behavior")))

WEB OF SCIENCE

COCHRANE

PROQUEST

("child" OR "children" OR "kid" OR "kids" OR "adolescent" OR "adolescents" OR "teen" OR "teens" OR "teenager" OR "teenagers" OR "childhood" OR "adolescence" OR "preschool" OR "preschools") AND ("distractor" OR "distractors" OR "screen time" OR "screen view" OR "smartphone" OR "smartphones" OR "cellphone" OR "cellphones" OR "video game" OR "video games" OR "game" OR "games" OR "computer games" OR "magazine" OR "magazines" OR "TV" OR "television" OR "televisions" OR "television viewing" OR "audiovisual aids" OR "recreation" OR "Screen Time") AND ("energy intake" OR "food intake" OR "caloric intake" OR "dietary intake" OR "nutritional intake" OR "eating" OR "eating habit" OR "eating habits" OR "meal" OR "meals" OR "food consumed" OR "food consumption" OR "feeding behavior")

EMBASE

#1 AND [embase]/lim NOT ([embase]/lim AND [medline]/lim)
('child' OR 'children' OR 'kid' OR 'kids' OR 'adolescent' OR 'adolescents' OR 'teen' OR 'teens' OR 'teenager' OR 'teenagers' OR 'childhood' OR 'adolescence' OR 'preschool' OR 'preschools') AND ('distractor' OR 'distractors' OR 'screen view' OR 'smartphone' OR 'smartphones' OR 'cellphone' OR 'cellphones' OR 'video game' OR 'video games' OR 'game' OR 'games' OR 'computer games' OR 'magazine' OR 'magazines' OR 'tv' OR 'television' OR 'televisions' OR 'television viewing' OR 'audiovisual aids' OR 'recreation' OR 'screen time') AND ('energy intake' OR 'food intake' OR 'caloric intake' OR 'dietary intake' OR 'nutritional intake' OR 'eating habit' OR 'eating habits' OR 'meal' OR 'meals' OR 'food consumed' OR 'food consumption')

