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Concerning Cannabis-Infused Edibles: Factors That Attract Children to Foods

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I. EXECUTIVE SUMMARY

A. Research Charge

The Washington State Liquor and Cannabis Board (“WSLCB”) tasked the Cannabis Law & Policy Project (“CLPP”) with completing a survey of research on food and food marketing that is appealing to children, with the central aim to inform potential regulation of cannabis-infused foods (“edibles”) specifically with regards to protecting minors from consumption of these foods. Edibles currently make up a significant minority of total adult-use sales in Washington, with an estimated market share of 10-20%, which could increase over time.¹ At the same time, the August 29, 2013, memorandum from U.S. Deputy Attorney General James Cole, titled “*Guidance Regarding Marijuana Enforcement*” listed “preventing the distribution of marijuana to minors” as an enforcement priority particularly important to the federal government.² Thus, one of WSLCB’s top priorities in its regulation of Washington’s adult-use cannabis industry is preventing minors from accessing cannabis. In order to accomplish this, WSLCB sought research showing what physical elements of food—including color, odor, shape, and taste—make some foods more attractive to children than others, as well as research on what marketing and branding children respond to. In order to obtain this, WSLCB arranged for CLPP to perform this research. This Report summarizes our findings.

B. Background and Methodology

Edibles are of particular concern to WSLCB because small children are more likely to consume cannabis that is infused in edibles (e.g. brownies, cookies, or candies) than cannabis flower. Cannabis flower is typically smoked or vaporized and would appear to be not as attractive a food as an edible might be. WSLCB could simply ban all edibles from the adult-use market, but this could cause a myriad of problems. For example, some patients that use cannabis for medicinal purposes prefer to consume it in edible form because smoke or vapor may compromise their immune system. In addition, banning edibles would likely lead edibles into the black market, the diversion of which is another of WSLCB’s priorities. And third, WSLCB already allows edibles to be sold, so banning them should require a showing of significant public risk over other forms of state-legal cannabis. WSLCB could also eliminate any differential regulation of edibles over other forms of cannabis, but this could bring its own problems, particularly with regard to children. Children are highly curious, and one can expect them to explore things, such as food, without sufficient concern for their personal safety. Accordingly, WSLCB sought high quality academic research that can inform this important public policy decision.

To assist WSLCB, CLPP surveyed current empirical research on: **(1) what physical elements of food children are attracted to, including color, odor, shape, and taste; and (2) what food marketing and branding children respond to.** This Report summarizes that research, but makes no particular policy recommendations as that is within the exclusive purview of WSLCB. Further, this Report proceeds from two general assumptions: (a) children are

¹ Sean O’Connor & Sam Méndez, *Estimating Canopy Size for the Washington Medical Marijuana Market* (Mar. 25, 2016) available at www.lcb.wa.gov/publications/Marijuana/Estimating-Canopy-Size-for-the-Washington.pdf.

² Memorandum from U.S. Dep’t of Justice, Office of the Deputy Attorney Gen., on *Guidance Regarding Marijuana Enforcement* (Aug. 29, 2013), available at www.justice.gov/iso/opa/resources/3052013829132756857467.pdf.

curious and are attracted to numerous substances potentially dangerous in a household, such as alcoholic products, pharmaceutical drugs, cleaning chemicals, and many other potential hazards; and therefore, (b) governmental regulation aside, parents share in the responsibility to keep children safe from potentially dangerous substances.

C. Summary of Findings and Qualifications

CLPP found two major categories of factors affecting children's inclination to ingest food objects:

1. Particular colors, shapes, odors, and tastes all have an impact on the decisions children make when consuming food—both whether to ingest or to avoid:

- a. Color is an important factor and children prefer foods that are red, orange, yellow, or green
- b. Shapes that children may be more attracted to are novel ones over conventional ones;
- c. Odors that children generally prefer include sweet, fruity, or candy-like odors;
 - i. One study found the following odors to be pleasant to children: apple, banana, cinnamon, lemon, licorice, mint, pineapple, and rose;
 - ii. The same study found the following odors to be unpleasant to children: fish, clove, coffee, and garlic;
- d. Taste, rather than odor, is likely more useful as a deterrent for children;
 - i. At birth, infants prefer sweet taste and reject sour and bitter tastes, with a preference for salty tastes emerging after four months.

2. Unsurprisingly, particular kinds of marketing and branding can have a significant impact on children's decisions to consume certain foods:

- a. Promotional characters in marketing and branding, including cartoon and licensed characters, influence children's taste and food preferences;
- b. Television advertising influences the food and beverage preferences, purchase requests, and short-term consumption of children ages 2-11, but there is not sufficient evidence to draw the same conclusions with regard to teens aged 12-18.
- c. Numerous states have packaging and labeling requirements, a summary of which is attached hereto as Exhibit A.

It is important to note that this research is on food in general and not specifically on cannabis-infused edibles. However, it is reasonable to expect similarities to children's approaches to cannabis-infused edibles, absent some kind of marked and experientially obvious difference between such edibles or their packaging and other foods of similar color, shape, odor, or taste.

II: FOOD AND ITS COLOR, ODOR, SHAPE, & TASTE

A. Color

1. *Children's eating preferences and color*

Food choice reflects many different influences, with individuals discriminating among foods on the basis of sensory attributes like color, texture, flavor, shape, temperature, appearance, and aroma.³ Physiological states also contribute to food selection, as do sociocultural aspects of childhood. Research suggests that preschool children preferred yellow and orange.⁴ Other research noted that red, orange, and clear green were generally the most appealing food colors while colors associated with fruits were strongly liked to favorable taste expectations.⁵ Additionally, researchers have suggested that color is an important variable in food selection and that personal preferences for colors may affect food choice when flavor expectations/associations are unknown.⁶ One study concluded that children preferred foods that were red, green, orange, and yellow in that order.⁷

2. *Kids prefer choices and colors*

A 2012 study from Cornell University reinforces the anecdotal truth that what children find visually appealing is very different than what their parents are attracted to.⁸ Focusing on the foods plated for children at meal times, the Cornell study found that, compared to adults, children prefer plates with more elements and colors, as well as entrees placed in the front of the plate with figurative designs.⁹

Color does appear to affect flavor intensity among children, especially older children, as well as affecting flavor quality (how “true” something tasted like a particular flavor such as cherry) and overall acceptability.¹⁰ One study indicates that younger children (ages 2-7; 8-9 years) make more color-associated errors, relying on the color of a drink more than did older individuals in making a decision about its taste.¹¹

³ Lynn M. Walsh, et al., *Color Preference and Food Choice Among Children*, 124 J. OF PSYCHOLOGY 645 (1990).

⁴ *Id.* (citing M.E. Lowenberg, *Food for the Young Child* (1934)).

⁵ *Id.* (citing F. Birren, *Color and Human Appetite*, 17 FOOD TECHNOLOGY 45 (1956); M. A. Walker, et al., *Fruit and Vegetables Acceptance by Students*, 62 J. OF AM. DIETETIC ASS'N 268 (1973)).

⁶ *Id.* (citing B.J. Rolls, *Experimental Analyses of the Effects of Variety in a Meal on Human Feeding*, 42 AM. J. OF CLINICAL NUTRITION 932 (1985)).

⁷ Walsh, *supra* note 1.

⁸ See Susan S. Lang, *Kids Prefer Lots of Choices*, CORNELL CHRONICLE (Jan. 2, 2012), <http://www.news.cornell.edu/stories/2012/01/how-you-plate-food-kids-matters>.

⁹ *Id.*

¹⁰ D.H. Philipsen, *Consumer Age Affects Response to Sensory Characteristics of A Cherry Flavored Beverage*, 60 J. OF FOOD SCIENCE 364 (1995)

¹¹ N. Oram, *The Influence of Flavor and Color on Drink Identification by Children and Adults* 28 DEV. PSYCHOBIOLOGY 239 (1995).

3. Inconsistency?

Literature on the effects of color on taste and flavor judgments is consistent in its inconsistency. A number of studies have found relationships between color and sweetness and between color and liking¹² while other studies have failed to note consistent relationships.¹³

4. Color and packaging

Children across all grades used package colors to determine what constituted a “healthy choice” in one Canadian study.¹⁴ Results from this study indicated that children chose foods that were “green” as healthy or “rainbow” colored as unhealthy (e.g., Lucky Charms cereal), remarking that a packaged product that was deemed unhealthy because it did not present “natural colors as in fruits.”¹⁵ Foods with muted colors were deemed healthy, the color green representing organic or healthy.¹⁶

B. Shape

1. Context and product category is key

Shape can have an important impact on children’s attraction to foods, but context and product category is key. Existing studies on the influence of shape on children’s¹⁷ food choices have addressed two main research questions: (1) can shape make vegetables more attractive to children?; and (2) does a change in shape affect children’s consumption of snack foods?

Our review of the literature strongly suggests that the answer to the first question is in the affirmative. More than one empirical study has found that children are significantly more likely to choose vegetables that are cut into interesting shapes than vegetables in their natural form. One of these studies found that while vegetables cut into figures were more attractive to children than those cut into “normal” shapes, there was no significant difference between the appeal of vegetables cut into slices and sticks.¹⁸ This suggests that, in particular, novel shapes have the potential to attract children more than various kinds of other more conventional shapes.

The answer to the second question is much less clear. Food companies that market to children think that, among other factors, shape has an important influence on children’s

¹² See e.g. H. Tuorila-Ollikainen, et al., *Relative Importance of Color, Fruity Flavor and Sweetness in the Overall Liking of Soft Drinks*, 49 J. FOOD SCI. 1598 (1984); J. Johnson, et al., *Psychophysical Relationships Between Perceived Sweetness and Color in Cherry-flavored Beverages*, 45 J. FOOD PROTECTION 601 (1982); and H.A. Roth, et al., *Psychophysical Relationships Between Perceived Sweetness and Color in Lemon- and Lime-flavored Drinks*, 53 J. FOOD SCI. 1116 (1988).

¹³ Frank et al., 1989; Philipson et al., 1995.

¹⁴ Charlene Elliott & Meaghan Brierley, *Healthy Choice?: Exploring How Children Evaluate the Healthfulness of Packaged Foods*, 103 CANADIAN J. OF PUBLIC HEALTH 453 (2012).

¹⁵ *Id.* at 454.

¹⁶ *Id.*

¹⁷ All of the empirical studies reviewed under this heading dealt with preschool-aged children approximately ages 2 to 5.

¹⁸ Annemarie Olsen, *Serving styles of snack vegetables. What do children want?*, 59 APPETITE 556-562 (2012) (comparing vegetables cut “normally” to uncut vegetables and vegetables cut in the shape of stars); Salma H. Alhabshi, *Interesting Shapes of Vegetables: Is it a Strategy to Promote Consumption Among Preschool Children?* (May 2, 2014) (unpublished M.S. thesis, The University of Western Ontario) (on file with The University of Western Ontario Libraries).

preferences. The cereal industry is one noted example of this phenomenon, with popular brands such as “Lucky Charms” using the shape of their cereal (with a variety of shapes) as a key component of their advertising and brand identity.¹⁹ Academic empirical evidence, on the other hand, is mixed.²⁰ One study compared the relative influence of flavor, color, and shape/texture on young children presented with different varieties of yogurt and found that the impact of changes in shape/texture were significant regardless of the size of the added pieces.²¹ The same study also tested the effect of changes in color and flavor and found that the change in texture had the greatest impact; changes in flavor and color did not result in any meaningful change in preference.²² Another study, however, compared children’s preferences for three snack foods (banana bread, pancakes, and sandwiches) in their normal form as well as cut into the shape of a heart, hand, or animal and found no change in intake.²³ An overlay of the two findings may suggest that shape is at least relevant for children’s choice of snack food insofar as it impacts the sensory experience of eating with respect to texture. However, companies’ persistent use of shapes to appeal to children makes the case much stronger for the effect of shapes on children. And, even if the shape of food is not determinative of children’s preferences, novel shapes animate many marketing and branding initiatives.

It should be noted that the literature on food shapes appears limited to what makes food attractive. We found no studies seeking shapes that might deter children from ingesting an object. The literature also analyzes a relatively limited number of shapes and kinds of shapes.

2. Animal shapes, and familiar symbols are most likely to attract children.

The studies that found shape significantly influences children’s preferences used cookie-cutter-type devices to produce vegetables shaped like familiar animals and symbols.²⁴ The researchers did not provide a robust rationale for choosing particular shapes, but the ones used are not unlike the shapes of common candies, cookies, and other foods known to be attractive to children. Specifically, researchers used animal shapes such as owls and bats and simple representations of stars and flowers.²⁵ Each of these was presented alongside either uncut vegetables or vegetables cut into slices or sticks.²⁶ This suggests that “plain” shapes may lessen children’s attraction to foods versus foods with novel shapes. One study found evidence that snack foods cut into different shapes alone cannot render unappealing an otherwise appetizing snack, at least insofar as that change in shape does not affect texture.²⁷

¹⁹ Thomas Green, *Tricksters and the Marketing of Breakfast Cereals*, 48 J. POPULAR CULTURE, 49, 55 (2007).

²⁰ It should be noted that this literature base is inherently missing some—if not most—of the picture, as companies that use shapes to market to children may do so on the basis of proprietary market research that is kept confidential.

²¹ Jessica Werthmann, *Bits and Pieces. Food texture influence food acceptance in young children*, 84 APPETITE 181-187 (2014).

²² Participants were given a baseline yogurt along with lemon and apple varieties.

²³ Lauren E. Boyer, *Shape of snack foods does not predict snack intake in a sample of preschoolers: a cross-over study*, 9 INTL. J. OF BEHAVIOR, NUTRITION, AND PHYSICAL ACTIVITY 94, 99.

²⁴ Olsen, *supra* note 2; Werthmann, *supra* note 2.

²⁵ *Id.*

²⁶ *Id.*

²⁷ *Id.*

C. Odor

Odor generally serves two purposes: (1) it informs us about items at a distance, and (2) it informs us of the character of things as we consume them.²⁸ As Hilary Schmidt & Gary Beauchamp state in their article, “The human sense of smell is of major importance in determining food acceptability and in the detection of toxic substances. The hedonic²⁹ quality of an odor mediates both of these functions: unpleasant odors can signal decay, contamination, or poison, and generally lead to rejection or avoidance of substances for ingestion or inhalation, while pleasant odors can signal the safety of a substance for human consumption.”³⁰

Although odor is often tied to taste, studies show that odor can independently be an attractor or detractor. For example, a 1977 study showed that “packages with no fragrance, pleasant fragrance and antiseptic fragrance resulted in 30%, 33% and 44% attraction, respectively, in children between 3 and 5 years of age. It is difficult to predict what sort of fragrances will attract children.”³¹ While the odor of a cannabis-infused edible could be regulated to detract children, inconclusive odor preferences of children makes it unlikely for odor alone to both avert children and leave the product appealing enough to adults for commercial viability.

1. *Odor preferences of children are not universal*

It is a widely accepted view that people are not born with a fixed set of olfactory preferences; rather, olfactory likes and dislikes are greatly shaped by evaluative conditioning.³² In their article, Lenka Martinec Novakova et al. conclude, “Thus, certain odors are encountered more frequently than others in specific contexts and, as a result, are attributed with locally specific meaning and hedonic value which people outside this cultural setting may not share.”³³ Whether young children’s hedonic reactions to odors varies from those of adults has received little attention.³⁴ However, according to Schmidt & Beauchamp, “[T]he few experiments that have focused on this issue suggest that children are sensitive to odorants, but that their hedonic experience of odors is quite different from that of adults. In several different paradigms, children less than 5 years old have not responded differentially to odors that are judged by adults to have different hedonic values.”³⁵

There is no surprise that studies show children generally prefer sweet, fruity, and candy-like odors³⁶ One study which tested the preferences of children ages 5 to 7, 8 to 10, and 14 years

²⁸ Joseph G. Lavin & Harry T. Lawless, *Effects of Color and Odor on Judgments of Sweetness Among Children and Adults*, 9 FOOD AND QUALITY PREFERENCE 284 (1998).

²⁹ “Hedonic,” meaning “relating to or considered in terms of pleasant (or unpleasant) sensations.

³⁰ Hilary J. Schmidt & Gary K. Beauchamp, *Adult-Like Odor Preferences and Aversions in Three-Year-Old Children*, 59 CHILD DEVELOPMENT 1 (1988) (citations omitted).

³¹ Scientific Committee on Consumer Safety Opinion on the Potential Health Risks Posed by Chemical Consumer Products Resembling Food and/or Having Child-Appealing Properties, 10th Sess, SCCS/1359/10 (22 March 2011) 21 (*hereinafter* SCCS Opinion).

³² Lenka Martinec Novakova et al., *Positive Relationship Between Odor Identification and Affective Responses of Negative Valenced Odors*, 6 FRONTIER IN PSYCHOLOGY (2015). Available at www.ncbi.nlm.nih.gov/pmc/articles/PMC4426687/.

³³ Novakova, *supra* note 4.

³⁴ Schmidt, *supra* note 2 at 1.

³⁵ *Id.*

³⁶ SCC Opinion, *supra* note 3 at 21.

old indicated that children perceived vanilla to be sweeter, and thus, more preferable.³⁷ The younger group of 5 to 7 year olds, however, found the sweetness to be less pronounced than the older group.³⁸

Another study examined the relationship between the identification of an odor and the pleasantness of that odor.³⁹ The study hypothesized that “an odor would be rated as more pleasant when identified correctly, aiming to assess whether the previously reported positive relationship between odor pleasantness and olfactory knowledge could be generalized to an age group that clearly exhibits ongoing olfactory learning.”⁴⁰ The study included the participation of 91 Czech children ages 8 to 11 years old.⁴¹ The olfactory assessment required the participants to rate odor pleasantness with the use of 16 different “Sniffin’ Sticks,” or odor-dispensing devices with odors familiar to the general European population.⁴² The participants were to rate each odor from 1 to 5 (1 = very pleasant order, 5 = very unpleasant odor).⁴³ The results indicated that the group of pleasant odors included apple, banana, cinnamon, lemon, licorice, mint, pineapple, and rose.⁴⁴ The group of unpleasant odors consisted of fish, clove, coffee, and garlic.⁴⁵

2. *Odor alone is unlikely to deter children*

A study conducted by Trygg Engen from Brown University specifically looked to study the potential usefulness of sensations of odor and taste in keeping children away from harmful substances.⁴⁶ With respect to odor, the study concluded that taste, rather than odor, is likely more useful as a deterrent for children.⁴⁷ The study used five odorants: alcohol, heptanal, aromatic spirits of ammonia, saffrole, and neroli oil.⁴⁸ The participants included children aged 4 years, 7 years, and adults.⁴⁹ The odors were presented in pairs and all ten pairs (excluding identical pairs) were presented in a balanced series.⁵⁰ The first pair of odors was repeated at the end for all the subgroups to estimate the reliability of the responses, meaning each group made a total of eleven comparisons.⁵¹ After smelling each pair of stimuli, the participant was to point to the one he or she “liked best” or “liked least.”⁵² The resulting data shows the proportion of the subjects in each

³⁷ *Lavin, supra* note 1 at 284.

³⁸ *Id.* at 287.

³⁹ Novakova, *supra* note 4.

⁴⁰ *Id.*

⁴¹ *Id.*

⁴² “We used the 16-item Sniffin’ Sticks odor identification test, a psychophysical test of orthonasal chemosensory performance based on pen-like odor dispensing devices. The Sniffin’ Sticks test has been widely used by clinicians and researchers across Europe to test olfactory abilities in adults and children. The identification test consists of odorants familiar to the general European population, such as orange, rose, garlic, and fish.” *Id.* (citations omitted).

⁴³ The participants originally rated the odors according to the grading system used in Czech schools (1 = very pleasant odor, 5 = very unpleasant odor). The scores were subsequently recoded to 1 = very unpleasant, 5 = very pleasant.

⁴⁴ *Id.*

⁴⁵ *Id.*

⁴⁶ Trygg Engen, *The Potential Usefulness of Sensations of Odor and Taste in Keeping Children Away From Harmful Substances*. 237(1) ANNALS OF THE N.Y. ACAD. OF SCI. 224 (1974).

⁴⁷ *Id.* at 228.

⁴⁸ *Id.* at 224.

⁴⁹ *Id.* at 225.

⁵⁰ *Id.* at 224-25.

⁵¹ *Id.* at 225.

⁵² *Id.*

group who chose one odorant over the other for each of the ten pairs.⁵³ Essentially, a higher positive score indicated a preference for the odor, and a higher negative score indicated a preference against the odor. For example, the highest value for 4-year-olds was heptanal at 0.21, compared to -0.20 for 7-year-olds and -1.20 for adults. The lowest value for 4-year-olds was safrole at -0.12, compared to 0.20 for 7-year-olds and 0.84 for adults. Perhaps the most interesting conclusion from the study was the difference in the value ranges among all odors for each age group. Essentially, adults are more able to discern preferences for odors than 4-year-olds. The results show that “[a]lthough children, aged three to seven, were able to discriminate between the intensities of the odors, they were neither attracted to nor repelled by them as much as adults. The younger the child, the smaller the range of hedonic values associated with the odors.”⁵⁴ This indicates that children are less likely to discern preferences among odors compared to adults.

D. Taste

1. *Genetic predispositions towards tastes*

In *Development of Food Preferences*, Leann Birch concluded that there are genetic predispositions to prefer sweet and salty tastes, a tendency to reject new foods, and other preferences formed by post-ingestive consequences and social contexts of eating.⁵⁵ It is noted that development of food preferences could contribute to the design of diet intervention strategies.⁵⁶

Birch’s article adopted a “developmental systems perspective,” viewing the development as a result of the interaction of genetic predispositions with environmental factors, to address how food preferences develop.⁵⁷ Initial genetic predispositions include a preference for sweet and salty foods, rejection of sour and bitter tastes, rejection of novel food, learned preferences for familiar foods, and a predisposition to learn preferences by associating foods with the contexts and consequences of eating them.⁵⁸

At birth, there is evidence babies prefer sweet taste and reject sour and bitter tastes.⁵⁹ A preference for salty tastes emerges by approximately 4 months.⁶⁰ However, these predispositions for basic tastes are readily altered through experience with food and eating.⁶¹ The ease of modification of these preferences through experience limits the contribution of these preferences to our understanding of early food preferences.⁶² There is also limited evidence that individual genetic differences are linked to preferences for complex food stimuli in children.⁶³

⁵³ *Id.*

⁵⁴ *Id.* at 228.

⁵⁵ Leann L. Birch, *Development of Food Preferences*, 19 ANN. REV. NUTRITION 41, 56 (1999).

⁵⁶ *Id.* at 57.

⁵⁷ *Id.* at 44.

⁵⁸ *Id.* at 45.

⁵⁹ *Id.* at 48.

⁶⁰ *Id.*

⁶¹ *Id.*

⁶² *Id.*

⁶³ *Id.*

2. Neophobia

Food neophobia, the fear of new foods, manifests in omnivores, including humans, and leads to the rejection of unfamiliar foods.⁶⁴ However, experience and learning, such as repeated opportunities to consume new foods, can offset the neophobic reaction to new foods.⁶⁵ Neophobia also changes through development, with it being minimal in infancy, increasing through early childhood, and then declining from early childhood to adulthood.⁶⁶ Social factors also decrease neophobia. Observing others eating a new food has been found to reduce neophobia.⁶⁷ For children, the magnitude of this impact depends on their relationship with the other person.⁶⁸ The magnitude of this impact is greater in older children than younger children, mothers greater than strangers, and, for pre-schoolers, adult “heroes” greater than “normal adults.”⁶⁹

3. Learned food preferences and aversions based on post-ingestive consequences

Humans learn to associate foods’ flavors with the consequences that follow eating.⁷⁰ Repeated association with positive post-ingestive signals can produce food preferences, while association with negative consequences leads to aversions.⁷¹ Aversions are more readily formed to unfamiliar foods.⁷² Food aversions can be the result of a single experience and can persist for decades.⁷³ Food preferences form more slowly than aversions and are more easily extinguished.⁷⁴

III. MARKETING & BRANDING OF FOOD TOWARDS CHILDREN

A. Promotional Characters

Promotional characters, including cartoon and licensed characters, have been shown to

⁶⁴ *Id* at 49.

⁶⁵ *Id* at 50. (citing Leann L. Birch & Diane W. Martin, *I don't like it; I never tried it: effects of exposure to food on two-year-old children's food preferences*, 3 *APPETITE* 353 (1982)).

⁶⁶ *Id* at 51. (citing Marcia L. Pelchat & Patricia Pliner, “Try it. You'll like it.” *Effects of information on willingness to try novel foods*, 24 *APPETITE* 153 (1995); Patricia Pliner, *Development of measures of food neophobia in children*, 23 *APPETITE* 147 (1994); Patricia Pliner & E. Ruth Loewen, *Temperament and food neophobia in children and their mothers*, 28 *APPETITE* 239 (1997); Traci McFarlane & Patricia Pliner, *Increasing willingness to taste novel foods: effects of nutrition and taste information*, 28 *APPETITE* 227 (1997); Ulla-Kaisa Koivisto & Per-Olow Sjöden, *Food and general neophobia in Swedish families: parent-child comparisons and relationships with serving specific foods*, 26 *APPETITE* 107 (1996)).

⁶⁷ *Id* at 52. (citing Bennet Galef Jr., *Social Influences on food preferences and feeding behaviors of vertebrates* (1996)).

⁶⁸ *Id* at 53. (citing Leann L. Birch, *Effects of peer models' food choices and eating behaviors on preschoolers' food preferences*, 51 *CHILD DEVELOPMENT* 489 (1980); K. Duncker, *Experimental modification of children's food preferences through social suggestion*, 33 *J. OF ABNORMAL AND SOCIAL PSYCHOL.* 490 (1938); Lawrence V. Harper & Karen M. Sanders, *The effect of adults' eating on young children's acceptance of unfamiliar foods*, 20 *J. OF EXPERIMENTAL CHILD. PSYCHOL.* 206 (1975)).

⁶⁹ *Id.*

⁷⁰ *Id* at 54.

⁷¹ *Id.* (citing John Garcia & Robert A. Koelling, *Relation of cue in avoidance learning*, 4 *PSYCHONOMIC SCI.* 123 (1966); Glenn E. Schafe & Ilene L. Bernstein, *Taste aversion learning* (1996)).

⁷² *Id* at 55. (citing Schafe, *supra* note 19).

⁷³ *Id.* (citing Jane L. Garb & Albert J. Stunkard, *Taste aversions in man*, 131 *AM. J. PSYCHOL.* 1204 (1974); A.W. Logue, Iris Ophir & Kerry E. Strauss, *The acquisition of taste aversions in humans*, 19 *BEHAV. RES. AND THERAPY* 319 (1981); Schafe, *supra* note 19).

⁷⁴ *Id.*

influence children's taste and food preferences.⁷⁵ Characters also attract children's attention, improve their memory and recognition of food products, and create positive brand attitudes and loyalty towards products from early ages.⁷⁶ Research has shown that young children lack the developmental capacity to identify an advertiser's intent and purpose, and that older children who may understand persuasive intent but still report desiring the product and make purchase requests to parents/caregivers.⁷⁷

A Yale University study underscores the above discussion. In the study conducted by Yale's Rudd Center for Food Policy and Obesity, children ages 4 to 6 were asked what snacks they wanted: gummy fruit, graham crackers, or carrots labeled with stickers of cartoon characters, or identical snacks without stickers.⁷⁸ Of the 40 children asked, most wanted snacks labeled with cartoon stickers and most said the gummy fruit and graham crackers with stickers tasted better than those without, except for the carrots.⁷⁹ The "study [highlights] both the power of advertising to influence young children and the ineffectiveness of using the same techniques to convince them to eat more nutritious foods."⁸⁰

Another article examined the persuasive power of character marketing through a review of the experimental studies that evaluate the influence of cartoon brand mascots or media characters on children's diet-related cognitive, behavioral, and health outcomes.⁸¹ Results suggested cartoon media character branding is a powerful influence on children's food preferences, choices, and intake.⁸²

The article reviewed resources from business and marketing, child development and communication literature, and non-experimental and industry trade literature.⁸³ Eleven experimental studies were identified as meeting the selection criteria and used for the review.⁸⁴ These studies were conducted in five different countries, including the US, Netherlands, Belgium, Guatemala, and Turkey.⁸⁵ The age range of children involved was 2 to 11 years.⁸⁶

The article's authors found it difficult to draw firm conclusions from their review because of the differences in the methodologies used, but summarized the most salient results as follows:

⁷⁵ C.A. Roberto, et al., *Influence of Licensed Characters on children's Taste and Snack Preferences*, 126 PEDIATRICS 88 (2010); A.M. Leven, et al., *Packaging of Healthy and Unhealthy Food Products for Children and Parents*, 9 J. OF CONSUMER BEHAVIOR 393 (2010).

⁷⁶ S. Neeley, et al., *Using Animated Spokes-Characters in Advertising to Young Children: Does Increasing Attention to Advertising Necessarily Lead to Produce Preference?* 33 J. OF ADVERTISING 7 (2004); J.A. Garrison & S. Burton, *The Role of Spokescharacters as Advertisement and Package Cues in Integrated Marketing Communications*, 69 J. OF MARKETING 118 (2005); R. Mizerski, *The Relationship Between Cartoon Trade Character Recognition and Attitude Towards Product Category in Young Children*, 59 J. OF MARKETING 58 (1995).

⁷⁷ J.E. Brand, *Television Advertising to Children: A Review of Contemporary Research on the Influence of Television Advertising Directed to Children*, http://www.acma.gov.au/webwr/_assets/main/lib310132/tv_advertising_to_children.pdf; see also K. Mehta, et al., *Australian Children's Views about Food Advertising on Television*, 55 APPETITE 49 (2010).

⁷⁸ Dierdre Lockwood, *Shrek Lures Kids to Sugary Snacks, Not Carrots*, CHICAGO TRIBUNE (2010), http://articles.chicagotribune.com/2010-06-21/health/sc-nw-junk-food-0621-20100621_1_snacks-foods-stickers.

⁷⁹ *Id.*

⁸⁰ *Id.*

⁸¹ V. I. Kraak & M. Story, *Influence of food companies' brand mascots and entertainment companies' cartoon media characters on children's diet and health: a systematic review and research needs*, 16 OBESITY REV. 107, 108 (2015).

⁸² *Id.* at 107.

⁸³ *Id.* at 111.

⁸⁴ *Id.* at 113.

⁸⁵ *Id.*

⁸⁶ *Id.*

- i. Media character branding *may* be a promising strategy to increase children’s preference for, purchase request, choice, and intake of fruits and vegetables compared with no character branding;
- ii. An unfamiliar cartoon media character may increase children’s appetite, preference for, choice and intake of healthy foods compared with no character branding; and
- iii. When healthy foods compete against energy-dense foods (e.g. fruit or vegetables versus cookies, candy or chocolate), familiar media character branding is a more powerful influence that increases children’s appetite, preference for, choice and intake of less healthy foods.

Additionally, the various authors cited in this subsection identified several research gaps to be addressed in future studies, including:

- a. Using theory-grounded experimental research, which can help to design relevant studies;
- b. Developing a clearer understanding children’s parasocial relationships with mascots and media characters and their influence on diet-related outcomes;
- c. Addressing how children’s associative learning can impact dietary outcomes;
- d. Disentangling the influence of several mediating factors (e.g. visual animation, auditory messages, special effects, bright colors, and familiarity); and
- e. Understanding how a child interprets promotional messages in food-retail settings.

B. Effects of Marketing on Children

The report, “Food Marketing to Children and Youth: Threat or Opportunity?”, looked to assess the influence of marketing on the nutritional beliefs, choices, practices, and outcomes for children and youth.⁸⁷ The report was influenced by the observation that children and youth, generally, are not achieving basic nutritional goals.⁸⁸ Instead, the report stated youth are consuming excess calories and added sugars, as well as higher than recommended amounts of sodium, total fat, and saturated fats.⁸⁹ The report noted that television remains the primary medium for measured media marketing, but that the focus is shifting toward unmeasured sales promotion, such as marketing through product placement, character licensing, special events, in-school activities, and games. In 2004, only 20% of all food and beverage marketing was devoted to advertising on television, radio, print, billboard, or the internet.⁹⁰ While there are numerous influences that affect the dietary and health related patterns of children—all of which have evolved over time—media has assumed the central socializing role for young people.⁹¹ Marketing that targets children is difficult to avoid. “Virtually all children ages 2-18 years now live in households with a television, and more than half of today’s youth report that their families have no rules for television viewing. Children and youth under the age of 18 years compromise 20% of those using the internet.”⁹²

⁸⁷ J. MICHAEL MCGINNIS ET AL., FOOD MARKETING TO CHILDREN AND YOUTH: THREAT OR OPPORTUNITY? (2006).

⁸⁸ *Id.* at 2.

⁸⁹ *Id.*

⁹⁰ *Id.* at 4.

⁹¹ *Id.* at 2.

⁹² *Id.* at 5.

An example of the influence of advertising to children can be seen in the food and beverage industry. An estimated \$10 billion per year is spent on food and beverage marketing targeted toward children.⁹³ “Between 1994 and 2004, the rate of increase in the introduction of new food and beverage products targeted to children and youth substantially outpaced the rate for those targeting the total market.”⁹⁴ Such marketing affects children early in life. “Over the span of 2-11 years, they develop consumption motives and values as they are exposed to commercial activities; they develop knowledge about advertising products, brands, pricing, shopping; and they begin to develop strategies for purchase requests and negotiation.”⁹⁵ Children and youth spend an estimated amount of \$200 billion annually, not including the influence they have on the purchase choices of their parents and other adults.⁹⁶ Of the food and beverages children purchase and influence, the key categories include candy, carbonated soft drinks, and salty snacks.⁹⁷

At what point in a child’s life marketing reaches them is an important issue. “Before a certain age, children lack the defenses, or skills, to discriminate commercial from noncommercial content, or to attribute persuasive intent to advertising.”⁹⁸ This ability develops generally around the age of 8 years old, however, some 11 year olds may lack the ability to discern commercial from noncommercial content.⁹⁹ This consideration influenced the Federal Trade Commission (“FTC”) to undergo a rulemaking process in the 1970’s to determine whether advertising to children should be restricted or banned.¹⁰⁰ Congress intervened and the FTC terminated its rulemaking process.¹⁰¹

The report drew a few key conclusions, including that “television advertising influences the food preferences, purchase requests, and diets, at least of children under the age of 12 years, and is associated with the increased rates of obesity among children and youth.”¹⁰² In fact, there is strong evidence that television advertising influences the food and beverage preferences, purchase requests, and short-term consumption of children ages 2-11.¹⁰³ However, there is not sufficient evidence to draw the same conclusions with regard to teens age 12-18.¹⁰⁴

C. Self-Regulatory Bodies Limits on Product Presentations/Claims to Children

The Children’s Advertising Review Unit (“CARU”), a self-regulatory body for advertisers targeting children/youth populations recommends advertisers avoid deceptive and/or inappropriate advertising to children involving presentations and claims.¹⁰⁵ CARU recommends the following:

⁹³ *Id.* at 4.

⁹⁴ *Id.* at 4.

⁹⁵ *Id.*

⁹⁶ *Id.* at 5.

⁹⁷ *Id.*

⁹⁸ *Id.*

⁹⁹ *Id.*

¹⁰⁰ *Id.*

¹⁰¹ *Id.*

¹⁰² *Id.* at xv.

¹⁰³ *Id.* at 8.

¹⁰⁴ *Id.* at 8.

¹⁰⁵ Information from Children’s Advertising Review Unit (CARU). CARU is a self-regulatory program that promotes responsible children’s advertising. CARU is administered by the Council of Better Business Bureaus, and

1. Advertisements should avoid promotions that deceive children such as those that:
 - a. mislead children about the product or performance characteristics like speed, method of operation, color, sound, durability, nutritional benefits;
 - b. exploit a child's imagination—while fantasy with animation and computer-generated imagery is appropriate for younger/older children, it should not create unattainable performance expectations or create difficulty in distinguishing between real and fanciful;
 - c. do not demonstrate performance and use of product in a way that can be duplicated by a child for whom product is intended;¹⁰⁶
2. Advertisements should be understandable to children such as those that:
 - a. compare the product to another product based on real product attributes in language appropriate to the relevant age group;
 - b. do not use an excessive amount of the product, and no more than is reasonable to acquire, use, or consume by the person depicted in the situation;
 - c. encourage responsible use of the product towards healthy development of a child, without disparaging healthy lifestyle choices, consumption of fruits and vegetables, or other foods recommended by USDA Dietary Guidelines;
 - d. clearly depict the appropriate role of the product within the framework of eating depicted in the occasion presented;
 - e. account for the limited vocabulary and language skills of the particular youth demographic target, e.g., use simpler words for younger children and consider that children often rely on pictures rather than words, so demonstrative disclosures are encouraged;¹⁰⁷
3. When making advertisements involving endorsements from a celebrity or authority figure, advertisers should:
 - a. recognize that appearance of a celebrity or authority figure with a product can significantly alter a child's perception of that product;
 - b. avoid creating the false impression that use of the product enhanced the celebrity or authority figure's performance;
 - c. recognize that children may have difficulty distinguishing between program/editorial content and advertising;
 - d. not blur distinction between ads and program/editorial content, which could mislead children;
 - e. not use TV ads (whether live or animated) to advertise products or services with a TV personality in TV programs directed to children under 12 years in which the same personality or character appears;
 - f. not advertise products derived from or associated with a TV program directed primarily to children under 12 years during or adjacent to that program;
 - g. recognize that their use of premiums, kids' clubs, contests and sweepstakes has the potential to enhance the appeal of their products to children.¹⁰⁸
4. Advertisers should promote safety in advertising to children and recognize that:

designed to set standards for the industry to assure that advertising to children is not deceptive, unfair or inappropriate. See <http://www.caru.org/guidelines/guidelines.pdf>.

¹⁰⁶ *Id.* at 6-7.

¹⁰⁷ *Id.* at 8.

¹⁰⁸ *Id.* at 8-10.

- a. children are prone to exploration, imitation and experimentation and may imitate product demonstrations or other activities depicted without regard to risk;
 - b. products directly to children that pose safety risks (drugs, dietary supplements, alcohol, or products labeled “Keep out of reach of children”) should not be advertised;
 - c. advertisements should depict products being used by children in the appropriate age range for that product;¹⁰⁹
5. Advertisers should not pressure children to ask parents to purchase products, nor should they suggest that a parent who purchases a product is better, more intelligent or more generous than one who does not.¹¹⁰

D. State Packaging & Labeling Regulations

A brief review of state packaging and labeling regulations is attached hereto as Exhibit A.

IV. FINDINGS AND CONCLUSION

CLPP found two major categories of factors affecting children’s inclination to ingest food objects:

1. Particular colors, shapes, odors, and tastes all have an impact on the decisions children make when consuming food—both whether to ingest or to avoid:

- a. Color is an important factor and children prefer foods that are red, orange, yellow, or green
- b. Shapes that children may be more attracted to are novel ones over conventional ones;
- c. Odors that children generally prefer include sweet, fruity, or candy-like odors;
 - i. One study found the following odors to be pleasant to children: apple, banana, cinnamon, lemon, licorice, mint, pineapple, and rose;
 - ii. The same study found the following odors to be unpleasant to children: fish, clove, coffee, and garlic;
- d. Taste, rather than odor, is likely more useful as a deterrent for children;
 - i. At birth, infants prefer sweet taste and reject sour and bitter tastes, with a preference for salty tastes emerging after four months.

2. Unsurprisingly, particular kinds of marketing and branding can have a significant impact on children’s decisions to consume certain foods:

- a. Promotional characters in marketing and branding, including cartoon and licensed characters, influence children’s taste and food preferences;
- b. Television advertising influences the food and beverage preferences, purchase requests, and short-term consumption of children ages 2-11, but there is not sufficient evidence to draw the same conclusions with regard to teens aged 12-18.
- c. Numerous states have packaging and labeling requirements, a summary of which is attached hereto as Exhibit A.

¹⁰⁹ *Id.* at 12.

¹¹⁰ *Id.* at 11-12.

It is important to note that this research is on food generally and not on cannabis-infused edibles specifically. However, it is reasonable to expect similarities to children's approaches to cannabis-infused edibles, absent some kind of marked and experientially obvious difference between such edibles or their packaging and other foods of similar color, shape, odor, or taste.

Exhibit A
Brief Review of State Packaging/Labeling Regulations

State	Packaging/Labeling Details	Law/Regulation
Alaska	<p>Any marijuana or marijuana product sold at retail store must be packed in opaque, re-sealable, child-resistant packaging.</p> <p>Must be designed or constructed so difficult for children under 5 years to open.</p> <p>Must have label identifying store selling product or distinctive logo, amount of THC in product, and warning about addictive nature of product and health risks associated</p>	3 AAC 306.345
Arizona	Child-resistant packaging	DHS website
California	<p>Cities and counties without ordinances on medical cannabis will be subject to state law by March 1, 2016</p> <p><i>Example of local ordinance:</i> City of Berkeley local rules</p> <p>Tamper-evident package, that shall not be attractive to children with certain information prominently displayed in clear/legible font. Information required to be on the package include: manufacture date/source; schedule 1 controlled substance, keep out of reach of children and animals in bold, etc.</p>	<p>Assembly Bill 266</p> <p>12.27.070 Product Safety, Quality Assurance and Labeling</p>
Colorado	<p>Prior to sale, retail store must place any cannabis products in a container that:</p> <ul style="list-style-type: none"> - Is child-resistant or placed into an ‘exit package’ that is child-resistant; - Opaque; - Closable if not intended for single use; - Labeled according to Colorado Retail Marijuana Code (i.e., not appealing to children, makes no false or misleading statements about health or physical benefits, text not smaller than 1/16 of inch, clearly written in English, unobstructed and conspicuous) - Includes Colorado’s Universal THC symbol - Labeled with all ingredients 	Colorado Dep’t of Revenue Marijuana Enforcement Div. 1 CCR 212-2 (2013).
Connecticut	<p>Individually package, label and seal products in unit sizes for single unit containing only 1 month supply of cannabis.</p> <p>Child-resistant and light-resistant packaging.</p>	CT Reg. Sec. 21a-408-56

	Securely affix label that states in English the name/address of producer, brand name registered with department, unique serial number, date of final testing and packaging, expiration date, quantity, THC, THCA, CBD, DBDA levels, and pass/fail rating based on laboratory's microbiological analysis	
Delaware	Description of packaging of useable marijuana, including: strain, batch, and quantity; "product is for medical use only, not for resale;" and details indicating free of contaminants and levels of active ingredients	DE Administrative Code, Medical Marijuana 4470
Washington D.C.	Medical marijuana must be in a container with label stating name of cultivation center, name of dispensary, quantity, cannabinoid profile plus THC level, any other ingredients, name of recommending physician, patient's name and registration card number, and statement that product is for medical use and not resale or transferable	Rule 22-C5607, Labeling and Packaging of Medical Marijuana
Hawaii	Minimum standards: child-resistant packaging that is opaque so product cannot be seen from outside; clearly labeled with phrase "for medical use only;" and contains info about contents and potency of product	Hawaii HB 321
Illinois	Each product must include a label, and must be packaged in child-resistant and light-resistant container, with cultivation center name on label.	General Provisions for the Compassionate Use of Medical Cannabis Pilot Act
Maine	Packaging and labeling for prepared marijuana and marijuana products for sale by registered dispensaries and caregivers must comply with State label laws in 22 M.R.S.A sect. 2157: <ul style="list-style-type: none"> - Cannot have false or misleading label - Cannot be sold under name of another food - If imitation of another food, label must bear word "imitation" - Cannot have misleading container - Label must have name and place of business to ID manufacturer, packer or distributor - Accurate statement of quantity in terms of weight, measure or count - Conspicuous 	22 M.R.S.A. Sect. 2157
Maryland	Packaging must be plain; opaque; tamper-evident and child-resistant ; bear lot number and expiration date, with clear warning for qualifying patients and illegal to transfer, keep away from children, bear State poison control center emergency telephone number, bear licensee that packaged the medical cannabis finished product; allergen warning; non-medical cannabis ingredients, itemization and weight of cannabinoid and	Subtitle 62 of Maryland Dep't of Health & Mental Hygiene

	<p>terpene ingredients.</p> <p>Cannot show statement, artwork or design that could mislead any person to believe package contains anything other than a medical cannabis finished product; cannot bear any seal, flag, crest, coat of arms, or other insignia that could mislead someone into believing product has been endorsed or used by any State, county, or municipality or agency.</p> <p>Cannot bear a cartoon, color scheme, image, graphic, or feature that might make package attractive to children.</p>	
Massachusetts	<p>Packaging should be in plain, opaque, tamper-proof and child-proof containers without depictions of the product, cartoons, or images other than RMD’s logo. Edibles shall not bear a reasonable resemblance to any product available for consumption as commercially available candy</p> <p>Affix label with wording no less than 1/16 inch in size on each package.</p>	<p>105 CMR 725.000: Implementation of an Act for the Humanitarian Medical Use of Marijuana</p>
Minnesota	<p>Medical cannabis packaging must be in containers that are plain, designed to maximize shelf life of medical cannabis, tamper-evident and child-resistant.</p> <p>Cannot bear any reasonable resemblance to any commercially available product.</p> <p>Package must minimize appeal to children and not depict images other than medical cannabis manufacturer’s business name and logo.</p>	<p>4770.0850 Packaging and Labeling. Subpart 1.</p>
Nevada	<p>Packaging must be child-resistant.</p> <p>Marijuana-infused products in solid or liquid form must be packaged in plastic 4 millimeters in thickness and head-sealed w/o easy-open tab, dimple, corner, or flap so that it’s difficult for a child to open and tamperproof measure.</p>	<p>Chapter 453A – Medical Use of Marijuana</p>
New Hampshire	<p>See NH House Bill 573</p>	
New Jersey	<p>Similar regime to other state’s medical marijuana labeling</p>	<p>See 42 N.J.R. 2669(a) Draft Rules for Medical Marijuana Program</p>
New Mexico	<p>Packaging must be opaque, child-resistant with a label</p>	<p>Title 7, Chapter 34,</p>

	containing name of entity producing cannabis and name of manufacturer; batch number of code; production date or expiration date and “use by” or “freeze by” date for certain products, instructions for use, description of number of units of usable cannabis within product, warnings, appropriate storage instructions, approved lab analysis, name of strain, product facts, nutrition facts and statement that for medical use and kept away from children.	Part 4 – Licensing Requirements for Producers
New York	Child-resistant, tamper-proof/tamper-evident, light-resistant, and in a resealable package that minimizes oxygen exposure	NY Medical Marijuana Program Regulations
Oregon	<p>Must be child-resistant safety packaging, designed and constructed to be significantly difficult for children under 5 years old to open and not difficult for adults to use properly; opaque so product cannot be seen from outside; closable for any product intended for more than a single use or containing multiple services.</p> <p>“Container” means a sealed, hard, or soft-bodied receptacle in which a tetrahydrocannabinol infused product is placed prior to being transferred to a patient or caregiver.</p> <p>“Packaged in a manner not attractive to minors” means the tetrahydrocannabinol-infused product is not in a container that is brightly colored, depicts cartoons or images other than the logo of the facility, unless the logo of the facility depicts cartoons, in which case only the name of the facility is permitted.</p>	<p>333-008-1225 Packaging</p> <p>Medical Marijuana Dispensary Program</p>
Rhode Island	Minimum requirements: A label containing the name of the strain, batch, and quantity; and a statement that the product is for medical use and not for resale.	R21-28.6-MMP: Rules and Regulations for Medical Marijuana Program
Vermont	<p>Registered dispensary shall package all marijuana dispensed in an envelope or other container used for sale.</p> <p>A label shall identify the particular strain of marijuana and the weight of marijuana contained within the package in gram or ounce units.</p> <p>Label shall contain statement the State of Vermont does not attest to the medicinal value of cannabis, a statement that this product is not for resale, and clearly identify “marijuana” is contained within the packaging.</p>	18 V.S.A. Chapter 86 Sub 2: Marijuana for Medical Use (2015)