Why people are crazy for chewing? Understanding the effect of chewing on mental construal

by

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Abstract

Different from other sensory information, oral-sensory information can be received in different ways (chewing, swallowing, and drinking). The way of receiving gustatory information and the experience of consumption have been neglected by previous studies and literatures. This research examines that chewing (vs. swallowing) food activates people's low mental construal, may help consumers focus on the current moment and appreciates the experience of eating. Study 1 and Study 2 focused on the main effect of discovering the relationship between chewing and mental construal levels by using behavioral identification form and goal focus form. The result shows that chewing can activate people's concrete thinking, which may help them to pay attention to be the present moment and accepting any thoughts or feelings. Study 3 and Study 4 investigated the calcium supplement market in terms of chewable supplements and swallowable supplements. The result shows chewable supplements indicate a higher desire to purchase the supplements. These findings may explain the popularity of chewable and crunchy food in the market.

Key words: Chewing, Construal Level, Effort, Goal Focus

Chewing transforms even toxins into nutritive substances.

---George Ohsawa

Introduction

In 2019, the global chewing gum market reached 3,263 billion U.S. dollars, and the number has grown by more than 14% in the last three years (Indhumathi & Kumar, 2020). Have you ever wondered why chewable and crunchy foods are so popular, why the products in the market emphasize crunchiness, and “stay crunchy in milk”? Have you noticed that whenever you eat potato chips, gummy, or crackers chewing is required to some degree?

Interestingly, chewing has a metaphorical meaning in the Chinese context. It means thinking over and ruminating , as well as thinking more complicated and more profound. For example, besides its original chewing meaning, the Chinese word “反复咀嚼(Fan Fu Ju Jue)” and “咀嚼英华(Ju Jue Ying Hua)” means thinking while reading papers. Additionally, the Chinese word “含商咀征(Han Shang Ju Zheng)” means deeply involved in the music.

In marketing research, we realized that gustatory senses are related to food evaluations (e.g., Biswas, Szocs, and Abell 2019; Krishna 2011), food taste perceptions (Krishna and Morrin 2006), healthy eating (Chandon and Wansink 2007), and portion sizes (Cornil and Chandon

2016) were mainly studied in previous research. However, few research takes into consideration of ways we eat food (i.e., chewing vs. swallowing). More importantly, only different ways are used to receive gustatory information instead of other sensory information. Even in biological and physiological research the benefits of chewing gum were put forward, including controlling food intake (e.g., Hetherington & Boyland 2007), improving memory (Wilkinson, Scholey & Wesnes, 2002), enhancing attention and alertness (Tucha, Mecklinger, Maier, Hammerl & Lange, 2004), and lessening depression (Otomaru, Sakurma, Mochizuki, Ishida, Kanoya & Sato, 2011). It is urgent to figure out the reason why people love chewing or chewable food in consumer research. If chewing helps consumers pay attention to the experience of the moment, they are more likely to appreciate the food experience and enjoy the concrete feeling of the food. This could be the reason that popcorns and chips are good companions for an enjoyable moment like watching movies. The substantial marketing implications were discussed in this study to build brand image and to help brands explore consumers' preferences.

Conceptual Background

Chewing

As mentioned above, Chewing has the metaphor meaning of thinking over and understanding the content in-depth in Chinese. Take the examples mentioned above, besides its original chewing meaning, the Chinese word "反复咀嚼(Fan Fu Ju Jue)" and "咀嚼英华(Ju Jue Ying Hua)" means thinking over while reading papers. It means people attend more on details of whatever their task is because "chewing it over" means there is "something to chew on". That implies some situations where attention is needed, which should shift processing to a more detail-oriented mode.

In literature, chewing gum benefits performance on attentional tasks and working-memory tasks. Mastication is the process that the lower jaw is moving by muscles to result in the food chew by teeth (Tsutsui, Kaku, &Motokawa, 2007). This process requires people to savour every bite, eat slowly, and chew each mouthful thoroughly for maximum effort and feelings. Also, the researchers propose that gum improves performance due to "mastication-induced arousal." The chewing act ensures that the participants focus current task (Onyper, Carr, Farrar & Floyd 2011). Some papers in neuroscience have found that chewing gum benefits performance on attentional tasks and working-memory tasks. According to neuropsychological data, it is confirmed that the gum improves the

sustained attention (Allen& Smith, 2012). In our prediction, this mastication-induced high arousal may facilitate a concrete level of mental construal (Chan & Maglio 2019). Hence, we urgently need to find out more details about chewing.

Construal Level

The construal level has been widely studied in previous researches. Here we directly quote the construal level theory, which assumes that "people mentally construe objects that are psychologically near in terms of low-level, detailed, and contextualized features, whereas at a distance, they construe the same objects or events in terms of high-level, abstract, and stable characteristics" (Yaacov& Nira, 2010). There is a critical term named goal focus in the literature of the construal level.

Goal Focus

The process focuses on the goal that refers to the mean, while the outcome focuses on outcomes and consequences of goal pursuit. Meanwhile, the mean focus is more proximal and concrete but the outcome focus is more distal and abstract. Under complicated task conditions, the positive effects of mastery goals are more significant, whereas the positive effects of performance-approach goals could be improved and the negative impact of performance-avoidance goals could

be reduced under simple task conditions improve (Donovan& Hafsteinsson& Lorenzet,2017).

Table 1. Main Differences Between a Process and an Outcome Focus

Process focus	Outcome focus
Means/actions	End state/consequences
Proximal/concrete	Distal/abstract
Contextualized	Decontextualized
Provides no standard of comparison between actual and desired state	Provides clear standard of comparison between actual and desired state
Guides goal-related actions	Provides direction and meaning

(Donovan & Hafsteinsson & Lorenzet, 2017)

In summary, past research and idioms pointed out several features of chewing. Chewing in Chinese means being deeply involved, and in literature, it is related to enhanced sustained attention (Tucha, Mecklinger, Maier, Hammerl & Lange, 2004) and focus on the current task (Onyper, Carr, Farrar & Floyd 2011). It means chewing can help people focus on and be deeply involved in the task on the hand with longer sustained attention. Furthermore, when people are deeply involved in their current task, we assume that it represents a close phycological distance, which means a low construal level. In addition, the extant research suggests that mastication-induced high arousal may facilitate a concrete level of mental construal. Also, according to the construal level

theory, people mentally construe objects that are psychologically near in terms of low-level, detailed, and contextualized features. This creates a loop that is chewing leads to a lower construal level in detail.

Moreover, in the theory of goal focus, the process focuses on the goal that refers to the mean. The mean focus is more proximal and concrete, as well as contextualized. It is obvious that we can detect the keyword “contextualized” both in definitions of the goal focus and construal level. It is easy to find the word “concrete” above, which refers to mean/process focus is more on concrete things, while we can find that low construal level also represents “detailed” things. Another word is proximal in the definition of process focus. We can equal this word to the psychologically near in the definition of low construal level. Thus, we assume, if mastication-induced high arousal can facilitate a concrete level of mental construal, does it mean that chewing also leads to a mean/process focus in goal focus theory? Because both low construal level and process focus attach importance to a detailed, concrete, contextualized, and proximal mode. This finding is new to the literature world that a new link between chewing and goal focus is established. Another contribution to the literature world is that new research considers ways we eat food, which has barely been studied.

Based on past literatures and idioms in Chinese, we are curious that, will chewing (vs. swallowing) help consumers focus on the current

moment and appreciate the experience of eating, by activating people's low mental construal?

Hypothesis: Chewing and Goal Focus

As stated above, the chewing linkage with construal level has been firmly established in past literature. Past literature has proved that chewing means people are deeply involved in the current task. Furthermore, when people are deeply involved in something, it means psychologically near and proximal to certain goals. Then this leads our attention to the similar definitions in terms of low-construal level and process goal focus. Since past literature has stated that mastication movement can activate low construal levels, we urgently need to find the linkage between chewing and goal focus.

H1: The chewing behavior activates consumers for more concrete goals and chooses the lower construal level statements.

- **Efforts**

Efforts have not been studied but play an essential role between chewing and goal focus. Here, we assume that the effort is a mediator in hypothesis 1. A similar study has been done between goal contagion and efforts. The results showed that an increase in a perceived effort led to more solid inferences of the implied goal (Giel Dik & Henk

Aarts, 2005). In addition, a high effort led goal inference, whereas the relationship between goal inference and goal adoption can be increased by personal goal value. Researchers found more evidence for explicit goal inference in the experiment (Corcoran, Brohmer, Eckerstorfer, and Machera, 2017). Wan's work discovered the brand-new side of the efforts of goal pursuits; the participants will still enhance the desire and motivation of the focal goal, then influence the participants' relevant judgment (Zhao& Wan, 2019). According to another study, as an investment in a goal, consumers' initial input effort may impact the perception of the goal and the consumer's motivation afterward (Zhang et al., 2010). Based on past research, we can infer that efforts influence people's judgment, which may reflect the level of construal and goal focus.

- **H1a:** The more efforts consumers made on chewing, the more concert goal and the lower construal level statements consumers would choose.

Hypothesis: Supplement Marketing Implication

In order to take a further step in marketing research, it is essential to figure a linkage between chew and production evaluation. Past literature pointed out that gustatory senses are related to food evaluations (e.g., Biswas, Szocs, and Abell 2019; Krishna 2011). Hence, based on the

previous finding that chewing activates people's concrete goals, detailed perspective, and low construal level, we are curious to find out that chewing may help consumers focus on the current moment and appreciate the experience of eating. Thus, we propose that chewing behavior impacts product evaluation(Chen et al., 2017). Moreover, several factors also need to be investigated, including the mediation analysis in the effort, the effectiveness of the product, and the moderation analysis in the product information.

- **H2:** The chewing behavior increase consumer's evaluations of the products by exaggerating the process of eating and focusing on the detailed perspective.
- **H2a:** The more efforts consumers made on chewing, the better consumer's evaluations of the product are.
- **H2b:** The better effectiveness of products that consumers perceived on chewing, the better consumer's evaluations of the product are.
- **H2c:** Chewing leads to a better consumer's evaluations on products, only work when the product information was shown beforehand.

Study Overview:

We validated these predictions in four experimental studies involving diverse demographic populations: Canadian and Chines populations.

Study 1 and study 2 are designed to validate hypothesis 1, while study 3 and study 4 are designed to validate hypothesis 2.

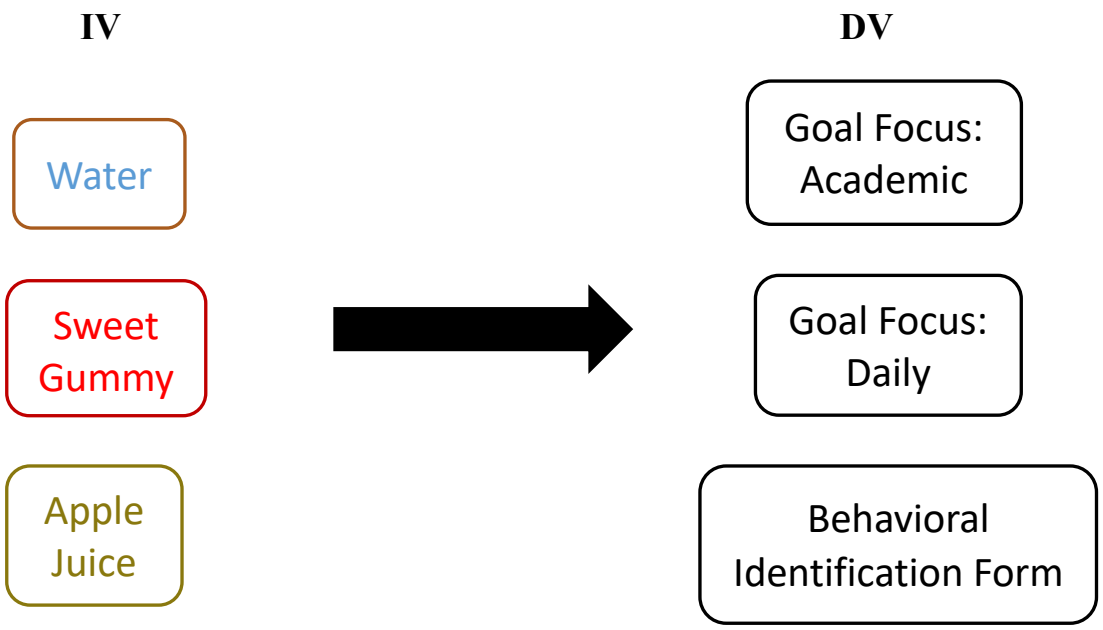
In all studies, the main task was to determine the relationship between chewing and mental construal level. Study 1, run at the University of Manitoba, demonstrated the basic effect that chewing could help people pay attention to the present moment and accept any thoughts or feelings by activating their concrete thinking. Study 2 replicated the effect by changing the stimuli from liquid to solid and adds more credibility. Study 3 tested the underlying mechanism that chewing may affect consumers' judgment on product evaluation by the perception of effectiveness. Study 4 manipulated the supplement information as a moderator to see whether chewing affects consumers' judgment.

Study 1: Chewing and Goal Focus

This study is designed to prove that chewing with efforts can activate people's concrete thinking, to validate the hypothesis 1. As a result, it may help them pay attention to the present moment and accept any thoughts or feelings. Study 1 aims to identify the relationship between chewing and goal focus form, and the behavioural identification form, to validate chewing can active people's concrete thinking. The study design is a one-way (Water, Sweet Gummy and Apple Juice) between-subject

model. Participants are randomly assigned one of three simulated threat situations.

Model 1: Main Effect



Method

Participant

One hundred and thirty-six students (Mean age = 20) from the University Center and Drake building of University of Manitoba have been recruited to participate in a 3-minute survey where they can receive some course credits in return.

Procedure

Participants are randomly assigned one of the three situations, where they can take either water, sweet gummy or apple juice. After that participants answer the questionnaires of Goal Focus and Behavioral Identification Form.

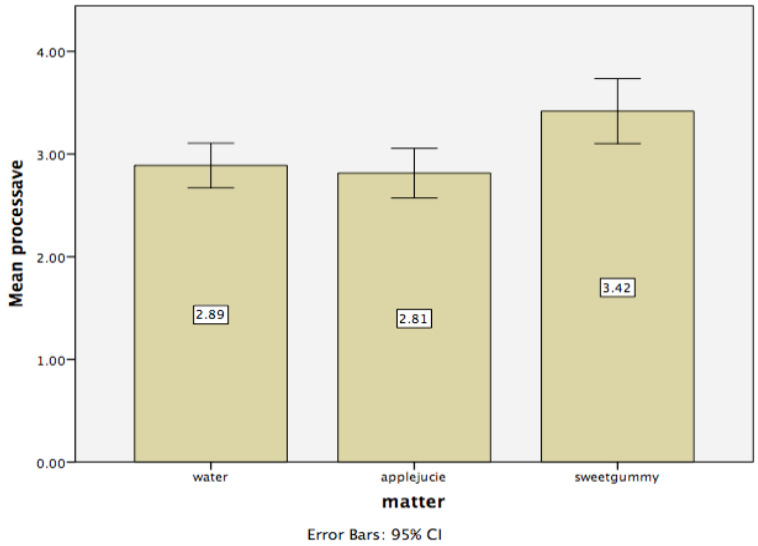
For each goal, participants need to select five statements out of the ten that is best described the goal (Freund & Hennecke, 2015). The goal was divided into two parts: daily goal focus and academic goal focus (Appendix 1). More specifically, two goals (preparing a presentation in the class & losing weight) were presented to participants one by one. Each goal was described by ten different statements, half of which described the goal in terms of process of achieving it (i.e., process statements: read five papers related my topic vs jagging 5 km daily), the other half statements in terms of outcomes (i.e., outcome statements: delivery good presentation skills vs have a good looking).

Next, the participants finished the Behavioral Identification Form (BIF, Vallacher & Wegner, 1989), which measures the level of construal (Appendix 2). Typically, the means focus are more proximal and concrete, than the more distal and abstract outcomes focus (Carver & Scheier, 1998; Trope & Liberman, 2003; Vallacher & Wegner, 1989). For each goal, participants were to select five of the ten statements that, in their opinion, best described the goal. The dependent variable was

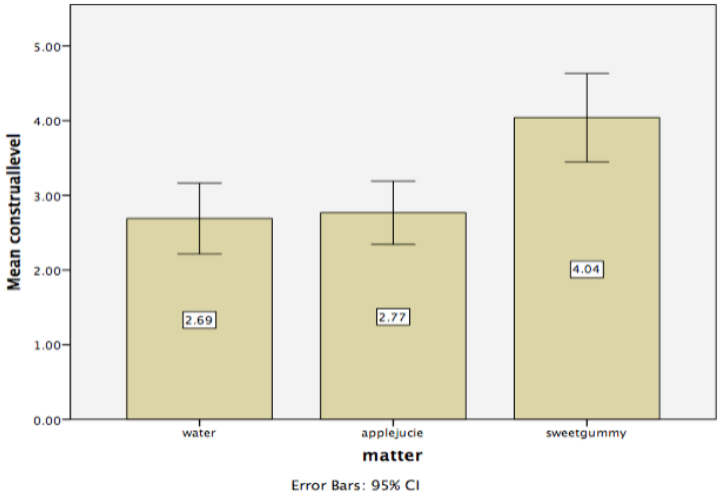
participants' process orientation as indexed by the mean number of detailed statements selected per goal (maximum 5) over the two goals. Take an example, the task "reading" follows with two actions, including "getting nutrition(high-level construal)" and "chewing and swallowing(low-level construal)". For each action, participants need to choose the description that best described the action—the proportion of concrete choices considered as the measure of low-level construal. Then participants should report the effort of chewing their food as the reference for mediation analysis.

Result.

A one-way ANOVA shows that there is a significant difference among three groups $F(2,134) = 9.28$. $p<.001$. Specifically, the post hoc test reveals that participants who chew apple gummy ($M=4.04$, $SD=2.06$) choose more concrete choices than those drink apple juice ($M=2.77$, $SD=.1.38$, $p=.001$) and drink water ($M=2.69$, $SD=1.58$, $p<.001$). The latter two groups do not differ $p>.25$. There is no difference in the latter two groups $p>.25$, which means more effort is required to chew apple gummy than to drink water and apple juice.



(Goal Focus)



(Behavioral Identification Form)

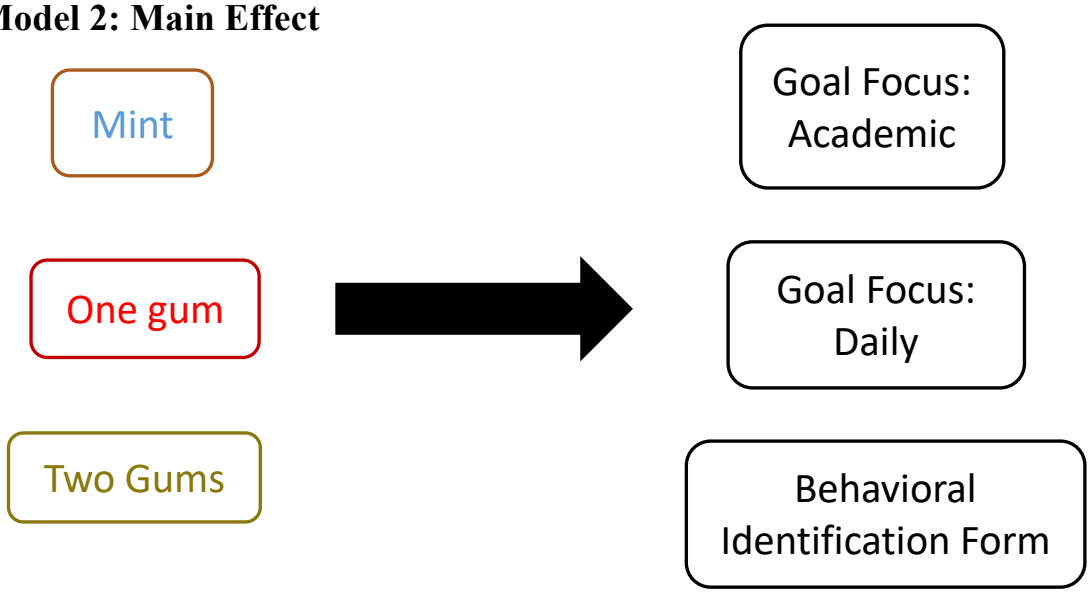
We can see from the charts that the sweet gummy group has a higher mean construal level score than the other two groups, which shows that chewing can help people pay attention to the present moment and accept any thoughts or feelings by activating their concrete thinking.

Based on the result of study 1, it needs to be replicated and also worthy to be explored in the future studies.

Study 2: Chewing and Goal Focus

To validate our preliminary exploration between the chewing behaviour and construal level, the results with different stimuli of chewing and measurements of construal level were designed to be replicated. In this study, participants were randomly assigned to 3 groups. Different from Study 1, Study 2 replaces the stimuli from water and apple juice to mint and extra gums. The reasoning is that liquid (apple juice and water) is different from the solid (gum). To improve the credibility, the study 2 result should replicate the study 1 result, by changing the liquid stimuli into other solid stimuli.

Model 2: Main Effect



Method

Participants.

One hundred and fifty-seven students (Mage = 21) mainly from the University Center and Drake building of University of Manitoba have been recruited to participate in a 3-minute survey where they can receive some course credits in return.

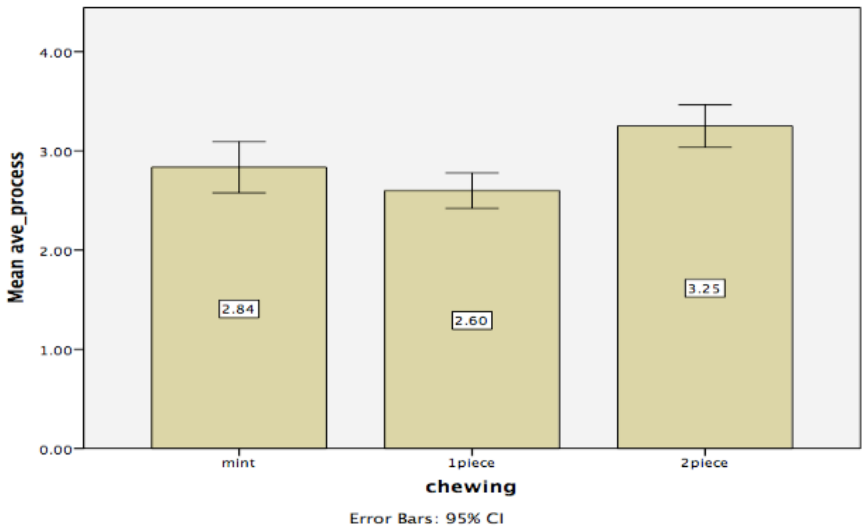
Procedure

The procedure of study 2 is the same as study 1, except for the change of stimuli. To test the expected effect of chewing behaviour on construal level, we randomly assigned participants to three chewing conditions (2 pieces of chewing gum vs. 1piece of chewing gum vs. 1 piece of mint). The flavours of chewing gum and mint are the same. After that participants answer the questionnaires of Goal Focus Form (Appendix 1) and Behavioral Identification Form (Appendix 2). Also, participants need to report the efforts of chewing using 1-7 scale points.

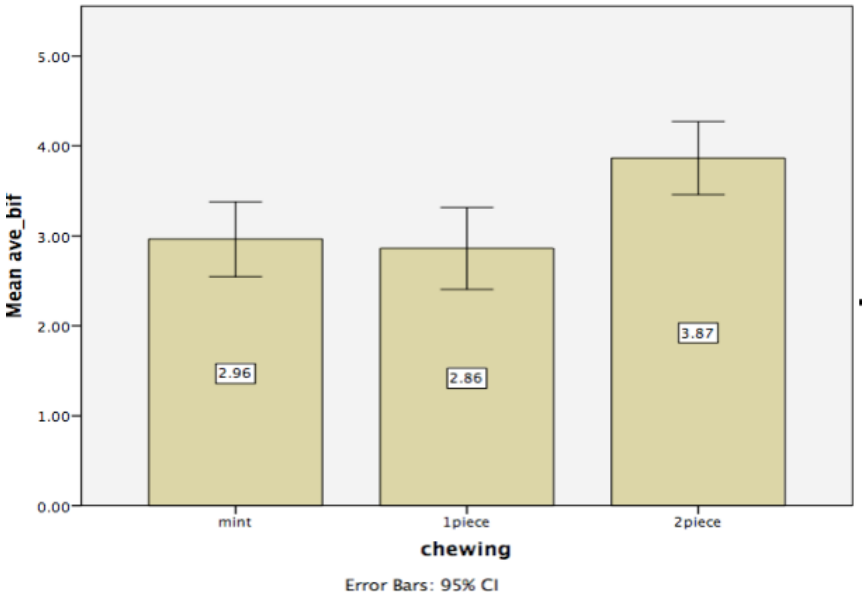
Result

Total 157 participants were recruited for this study, with an average age of 21 years old and 42.3% female participants. The one-way ANOVA shows a significant difference among three groups $F(2,154) = 8.60$. $p<.001$ on process statement. We use Bonferroni test to process the

multiple comparisons among three conditions on goal focus. Bonferroni test is regarded as one of the most conservative methods. The Bonferroni test result reveals that participants who chew two pieces of gum (M=3.25, SD =.77) choose more process statements than those who chew one piece of gum (M=2.60, SD=.63, p<.001) and chew one piece of mint (M=2.84, SD=.96, p=.026). There is no difference in the latter two groups p>.25. The manipulation check also proves that participants spend different levels of effort on chewing food, F (2,154) =4.73, p=.001. More effort is required to chew two pieces of gum (M=3.62, SD =1.48) than to chew one piece of gum (M=2.78, SD=1.53, p=.007) and chew one piece of mint (M=2.85, SD=1.58, p=.011).



(Goal Focus)



(Behavioral Identification Form)

According to the results of this study, it is proved that chewing activates low construal level thinking and excludes the effect of taste on construal because participants did not respond differently to behavioural identification form between water and apple juice conditions. It can be concluded from study 1 and study 2 that that chewing can help people pay attention to the present moment and accept any thoughts or feelings by activating their concrete thinking.

In terms of the mediation analysis of efforts, we conduct a 5000 resample bootstrap test (Appendix 5) of the indirect effect of chewing condition on behavioral identification form (Hayes, 2018, Model 4), which revealed that effort DID not mediate of this effect (b=0.0436, SE=0.05, 95% CI: [-.0342, .0899]).

Under the same condition, we conduct a 5000 resample bootstrap test (Appendix 5) of the indirect effect of chewing condition on goal focus form (Hayes, 2018, Model 4), which revealed that effort DID not mediate of this effect (b=-0.0240, SE=0.05, 95% CI: [-.0483, .0230]).

However, there remains a question that, if the effort is not mediating this process, what is meditating? If the effort is not the difference between 1 piece of gum and two pieces of gum, what will be an alternative choice? The effort will be re-evaluated in study 4 and leave for future discussion.

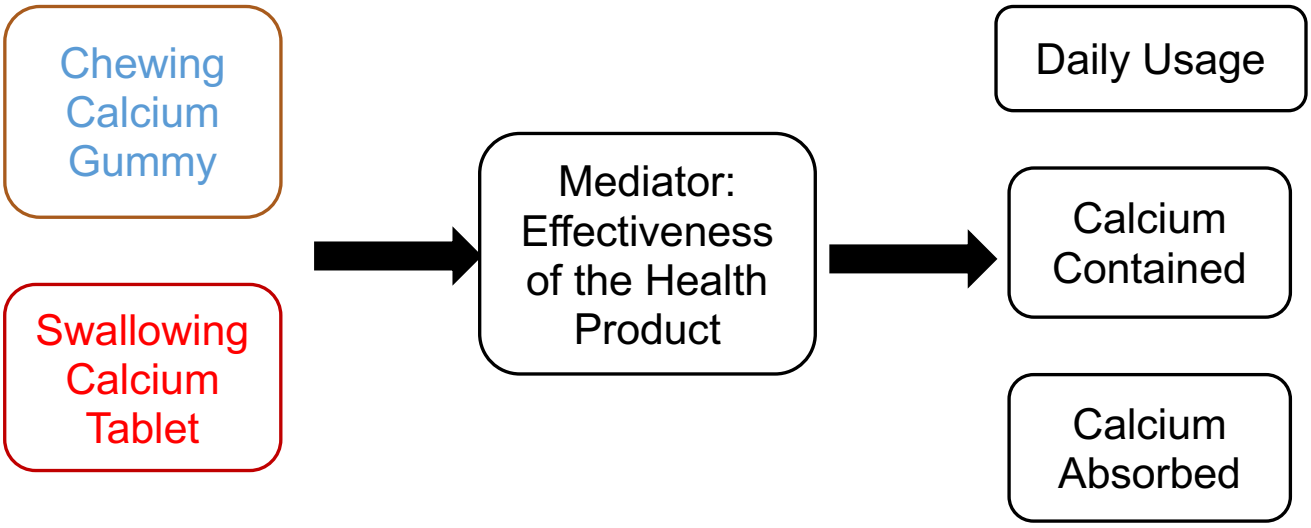
Study 3

In the following studies, the research switches focus from literature to the application in marketing. To apply marketing inference on the effect of chewing on the evaluation of the product they eat, the results were replicated in a realistic setting. Chewing helps people to focus on the detailed perspective, either in means and process. This may help exaggerate the experience and process of eating, making people believe the product's goal can be achieved (Freud & Hennecke, 2015). We assume that chewing supplements will increase participants' evaluations on the supplements by exaggerating the experience and process of eating and focusing on the detailed perspective, either the means and process, which makes people believe the product's goal can be achieved. Thus, we

created four dimensions in terms of the product's evaluation, including the product's effectiveness (Chen et al. 2017), the daily usage, the calcium contained in the supplement, the calcium that can be absorbed in the supplement. Moreover, we believe the effectiveness of the product mediated this process to reach the overall product evaluations.

Model

Proposed Model



Method

Participants

One hundred and fifty-nine students (Mage = 21) mainly from the University Center and Drake building of University of Manitoba have been recruited to participate in a 10-minute survey where they can receive some course credits in return.

Procedure

The between-subject model was used for this study. Participants are randomly assigned one of two simulated threat situations, including Chewing Calcium Gummy group (74 participants) and Swallowing Calcium Tablet group (85 participants). The gummy group is required effort to chew the gum while the tablet group is required to swallow. Then the participants need to fill the evaluation scales, started with the Effectiveness of the product (Chen et al. 2017) scale, including effect, powerful, and useful scales to measure products in supporting health, followed by the scales contained daily usage, and calcium contains in each gummy or caplet (Appendix 3). Lastly, the participants should present their views about calcium absorbed condition.

Result

An independent sample t-test shows a significant difference among the two groups, effectiveness: $t(157) = 2.192$, $p=.030$, $\alpha = .98$, daily usage guess: $t(157) = 4.623$, $p<.001$, calcium contained: $t(157) =2.191$, $p=.030$, calcium abosrbed: $t(157) = 2.433$, $p=.016$. In sum, as for effectiveness, it is reported a higher effectiveness participants in the chewing condition than participants in the swallowing condition. Participants in the chewing condition report higher daily usage of calcium than participants in the swallowing condition. Participants in the chewing condition report a

higher level of calcium absorbed and calcium contained than participants in the swallowing condition.

To figure out the underlying logic behind the influence on consumers' judgements, we take effectiveness as mediator into consideration. First of all, we conduct a 5000 resample bootstrap test (Appendix 6) of the indirect effect of chewing condition on daily usage (Hayes, 2018, Model 4), which revealed that effectiveness DID NOT mediate this effect (b=0.23, SE=0.05, 95% CI: [-0.112, .2837]).

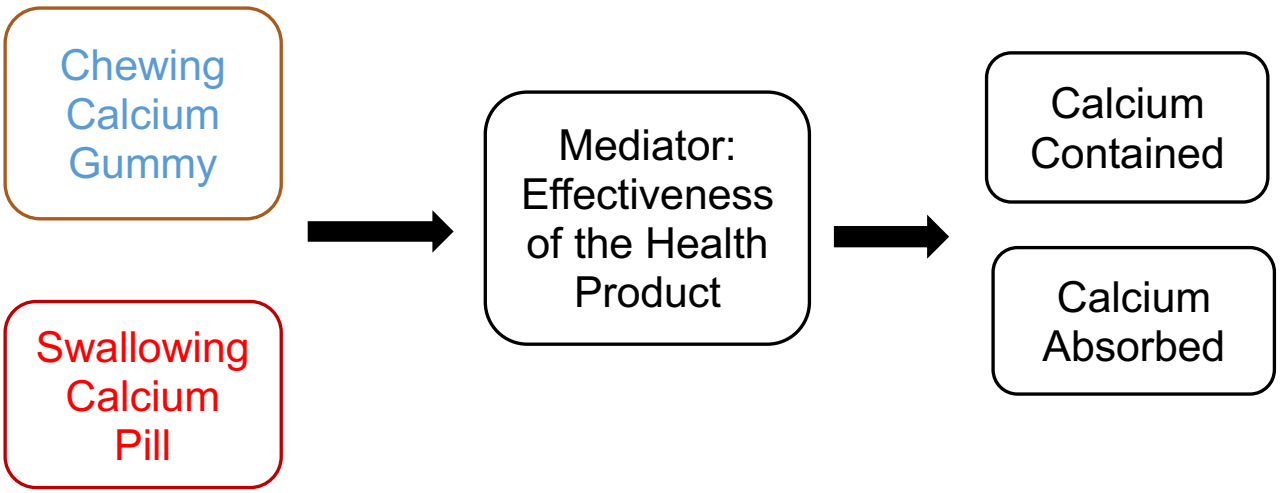
However, we conduct a 5000 resample bootstrap test (Appendix 6) of the indirect effect of chewing condition on calcium absorbed (Hayes, 2018, Model 4), which revealed that effectiveness DID mediate of this effect (b=11.28, SE=0.05, 95% CI: [.48, 13.12]).

Finally, we conduct a 5000 resample bootstrap test (Appendix 6) of the indirect effect of chewing condition on calcium contained (Hayes, 2018, Model 4), which revealed that effectiveness DID mediate of this effect (b=10.04, SE=0.05, 95% CI: [.12, 12.51]).

Here we can conclude that the product's effectiveness is a mediator between the independent and dependent variables. In other words, the significant difference between chewing calcium gummy group and swallowing calcium tablet group, in calcium contained and calcium absorbed, is mediated by the product's effectiveness. Thus, the final model of study 3 settled as the following chart. Participants in the

chewing condition report higher effectiveness of the product, which leads to a higher level of calcium absorbed and calcium contained than participants in the swallowing condition.

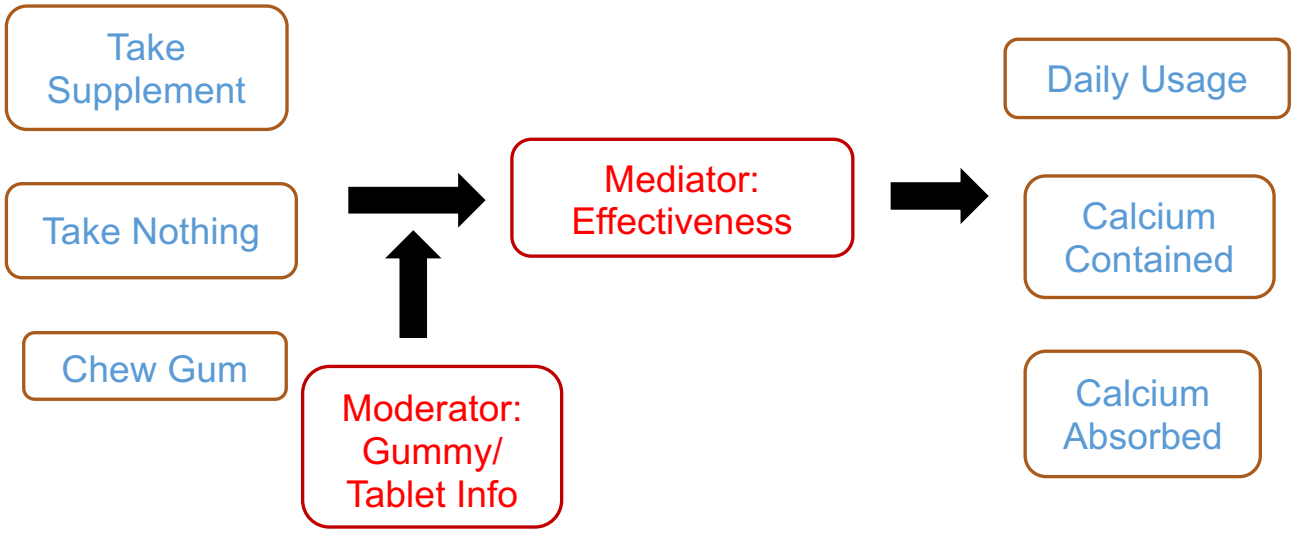
Study 3 Final Model



Study 4

To replicate the study 3 result and research for more moderators, study 4 has been done. Unlike study 3, the independent variable design has been more sophisticated, with one more stimulus using gum to test the mediation effect of effort. In addition, a moderator with product information was involved in this study design.

Proposed Model



Method

Participants

In study 4, three hundred and twenty-four participants (Mean Age = 19), recruited at Donghua University in China can receive course credits in return. The 3 (Chewing: take supplements vs. taking nothing vs chewing gum) x 2 (information: gummy info vs. tablet info) between-subject model is used in this study design. Participants are randomly assigned one of six simulated threat situations.

Procedure

Participants are randomly assigned one of the six situations, either the group given the gummy information and chew the gummy, the group given the tablet information and swallow the tablet, the group given the gummy information and take nothing, the group given the tablet

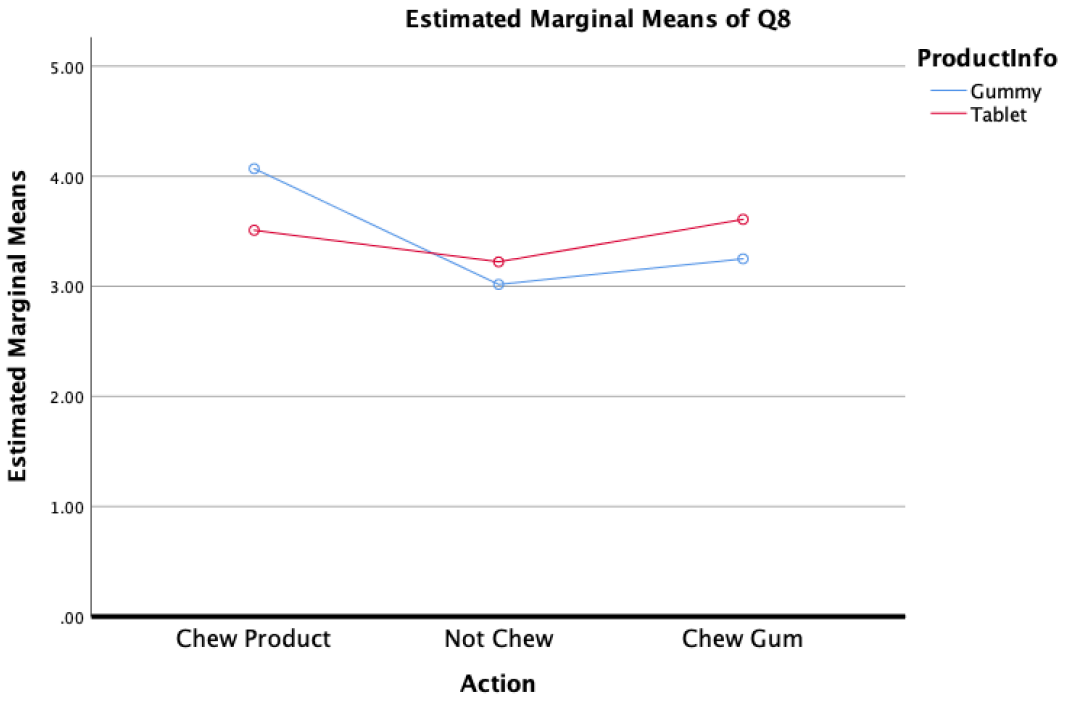
information and take nothing, the group given the gummy information and chew gum, or the group the tablet information and chew gum. In a word, the participants will be distributed into 2 (Gummy Information, Tablet Information) X3 (Take Supplement, Take Nothing and Take Gum) regression analysis. Later, participants answer the same questionnaires the same as study 3.

Compared with study 3, and study 4 is aimed to replicate the previous result and add the moderator supplement information before participants take it, either gummy or tablet. In addition, to validate the result, four control groups are added to the main test to exclude the influence on chew efforts, either chew gum or chew nothing.

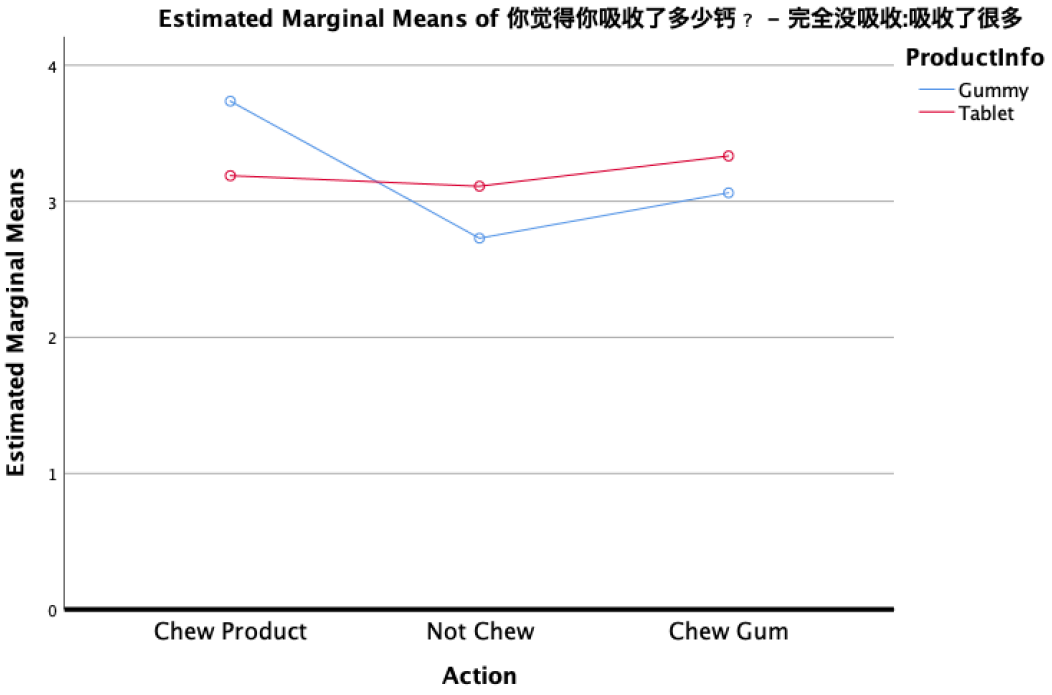
Result

The demographic of the 324 samples, follows with 18.79 years old, and 25% of them are male. A regression analysis shows that there is a significant difference among six groups. The IV1 is chew product vs. others, while IV2 is chew gum vs. others. Participants who were chewing product report higher level of product effectiveness ($F(2, 322)=3.538$, $p<.000$, $\alpha = .91$), than people who chewed nothing and chewed gum. Participants who were chewing product indicated that they absorbed more calcium ($F (2, 322) =2.819$, $p<.005$), comparing to people who chewed nothing and chewed gum. There is no significant difference in terms of

likeness and how much absorbed. The manipulation check reveals same results gummy requires more efforts than tablet.



(Effectiveness)



(Calcium Absorbed)

In sum, for the main effect, the highest effectiveness of the health product existed in the participants who were chewing gum. Additionally, for the regression result, ($F(2, 322)=3.538$, $p<.000$, $\alpha = .91$, when chewing the product, the higher effectiveness of the health product existed in participants who saw the gummy information before chewing. There is no difference in effectiveness between seeing gummy information and tablet information when not chewing or chewing gum.

Moreover, for the main effect, compared with people who chewed nothing and chewed gum, the chewing gum participants indicated that they absorbed more calcium. Additionally, for the regression result($F (2, 322) =2.819$, $p<.005$), when chewing the product, participants who saw the gummy information before chewing indicated that they absorbed more calcium. There is no difference in effectiveness between seeing gummy information and tablet information when not chewing or chewing gum.

Furthermore, we conducted a 5000 resample bootstrap test (Appendix 7) of the indirect effect of chewing condition on effectiveness (Hayes, 2018, Model 4), which revealed that effort DID not mediate of this effect ($b=-0.138$, $SE=0.05$, 95% CI: [-.0231, .0437]). We conduct a 5000 resample bootstrap test (Appendix 7) of the indirect effect of chewing condition on calcium absorbed (Hayes, 2018, Model 4), which revealed that effort DID not mediate of this effect ($b=-0.0120$, $SE=0.05$, 95% CI:

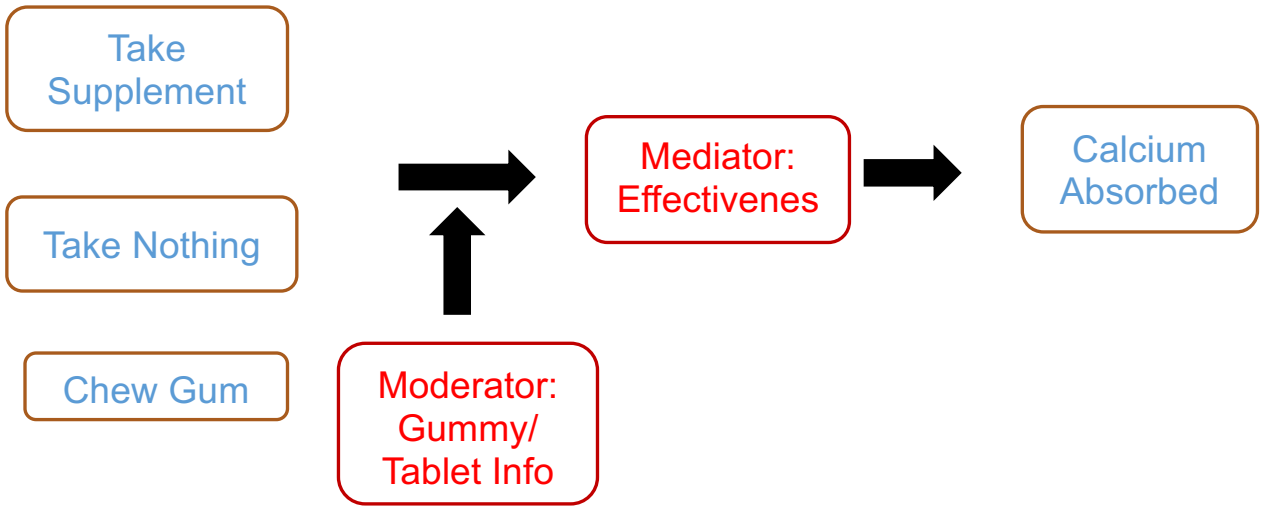
[-.0226, .0113]). The mediation analysis of efforts being a mediator also did not work in study 4.

This is timing to change the mediator from effort to effectiveness of the product. To test the parallel mediation on the effectiveness , we conduct a 5000 resample bootstrap test of the indirect effect of chewing condition on daily usage (Hayes, 2018, Model 4), which revealed that effectiveness mediated this effect (SE=0.05, 95% CI: [-0.0785, -0.0018]) and that effort did not mediate this effect (SE=0.05, 95% CI: [-0.0104, 0.0368]). Next, the mediation analysis revealed that mediated the effect of chewing condition on calcium contained (SE=0.05, 95% CI: [-0.1384, -0.0024]) and that effort did not mediate this effect (SE=0.05, 95% CI: [-0.0337, 0.0227]). Finally, the 5000 resample bootstrap test of the indirect effect of chewing condition on calcium absorbed revealed that effectiveness mediated this effect (SE=0.05, 95% CI: [-0.0799, -0.002]). To sum up, effort is not a mediator in this study setting, and effectiveness is the mediator.

We then did a moderated mediation analysis with effectiveness as the mediator and product information as the moderator. The result showed that there was no moderated mediation on daily usage (SE=0.05, 95% CI: [-.3875, .3039]), that there was a moderated mediation on calcium contained (SE=0.05, 95% CI: [.0434, .3071]), that there was a moderated mediation on calcium absorbed (SE=0.05, 95% CI: [.0276, .1800]).

In sum, the analysis itself has proved that the mediation effect of the effectiveness and moderated mediation is working in one specific dependent variable, which is calcium absorbed. Participants who chew the gummy think the product is more effective than those who swallow the tablet, thus feel they absorbed more calcium than other groups who take nothing and gums. Moreover, when the participants were shown the gummy supplement information, the effect follows the previous sentence statement; while the participants were shown the tablet supplement information, the participants do not think they absorbed more calcium than the tablet group.

Study 4 Final Model



Discussion and Limitation

In sum, these findings are expected to support our prediction that chewing behavior may help people to focus on the current feelings and appreciate the detailed experience of the food by activating our concrete mental construal. In addition, the result shows chewable supplements indicate a higher desire to purchase the supplements. Although this study fails to validate the mediation effects of efforts in both hypotheses 1 and 2, it is still worth investigating in the future study. However, there is a potential moderator that if the chewable food tastes awful, the low mental construal will enhance the bad experience of the food, and consumers will dislike the food more. The following research keeps exploring the process of different eating behavior because it is not studied in marketing literature.

One significant limitation of the study is that the chewing efforts cannot be quantified in this stage. In the future, more research should be expected on quantified chewing efforts with larger sample sizes. One limitation is that this study did not specify the reasoning and difference between one gum and two gums, which could be tested in future studies. The other significant limitation of the study is that the marketing implication is not thoroughly studied. This study only researches the gum, gummy, and supplements, which excluded the chips and crackers market. Moreover, it has been found several demographic differences in

terms of favorable chewing. Thus it is interesting to find out who are those people love chewing, including gender, age, and social class.

Implication

This study will have substantial marketing implications since the super big market of gum worth 3,263 billion U.S. dollars in 2019. Also, the popularity of chewable and crunchy food in the market was observed, such as potato chips, pretzels, gummy, or crackers. Oral-sensory information, different from other sensory information, can be received differently, including chewing, swallowing, and drinking. Past Research identified that gustatory senses were related to taste perception and food evaluations (e.g., Biswas, Szocs, and Abell 2019; Krishna 2011). Prior Research focused on food taste perceptions (Krishna and Morrin 2006), healthy eating (Chandon and Wansink 2007), and portion sizes (Cornil and Chandon 2016). As previous content researched, gustatory information is focused that influences the experience of consumption in this study.

These findings may help design supplements, including supplements designed for weight loss or vitamins, etc. Moreover, the finding may help the company create a well-established brand image, with the impression of higher efficacy, leading customers with a stronger desire to pay for the brand.

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Appendix 1: Goal Focus

- Q7 Please select best **5 statements** which can represent the goal in the scenario above

- ☐ read papers related my topic (1)
- ☐ get a high grade (2)
- ☐ preform well at the presentation (3)
- ☐ receive compliment from presentation (4)
- ☐ organize a good presentation framework (5)
- ☐ rehearsal the presentation (6)
- ☐ delivery good presentation skills (7)
- ☐ overcome nervousness for presentation (8)
- ☐ determine the topic of presentation (9)
- ☐ show academic abilities (10)

- Q45 Please select best 5 statements which can represent of the goal in the scenario above

- ☐ lose 20 pounds (1)
- ☐ jogging 5 km daily (2)
- ☐ keep healthy (3)
- ☐ in a good body shape (4)
- ☐ throw out unhealthy food (5)
- ☐ take in low calories food (6)
- ☐ go to gym in routine (7)
- ☐ improve body balance (8)
- ☐ have a good looking (9)
- ☐ quit bad habit such as stay up late or smoking (12)

Appendix 2: Behavioral Identification Form

- Q53 1.Making a list
  - a. Geting organized (1)
  - b. Writing things down (2)
- Q54 2. Reading
  - a. Following lines of print (1)
  - b. Gaining knowledge (2)
- Q55 3. Washing clothes
  - a. Removing odors from clothes (1)
  - b. Putting clothes into the machine (2)
- Q57 4. Eating
  - a. Getting nutrition (1)
  - b. Chewing and swallowing (2)
- Q58 5. Painting a room
  - a. Applying brush strokes (1)
  - b. Making the rooms look fresh (2)
- Q59 6. Chopping down a tree
  - a. Getting firewood (1)
  - b. Wielding an axe (2)
- Q60 7. Caring for houseplants
  - a. Making the rooms look nice (1)
  - b. Watering plants (2)
- Q62 8. Measuring a room for carpeting
  - a. Using a yardstick (1)
  - b. Getting ready to remodel (2)

End of Block: preference to process or outcome

Appendix 3: Study 2 Questionnaire

- Q14 How many Elemental Calcium do you think each caplet contains?

	100 mg (1)	150mg (2)	200 mg (3)	250 mg (4)	300 mg (5)	350 mg (6)	400 mg (7)
mg (1)	○	○	○	○	○	○	○

- Q15 How many Elemental Calcium can be fully absorbed by each caplet?

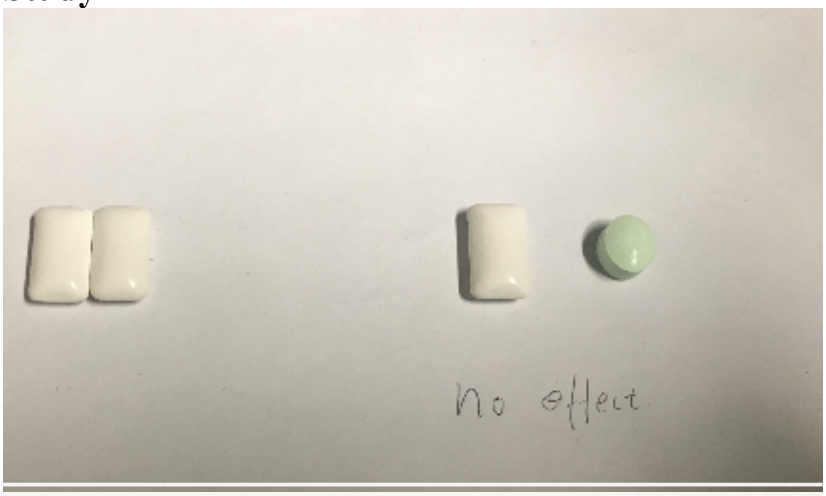
	100 mg (1)	150mg (2)	200 mg (3)	250 mg (4)	300 mg (5)	350 mg (6)	400 mg (7)
mg (1)	○	○	○	○	○	○	○

- Q12 How much do you think the calcium supplement can be fully absorbed?

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	
Not At All	○	○	○	○	○	○	○	Very Much

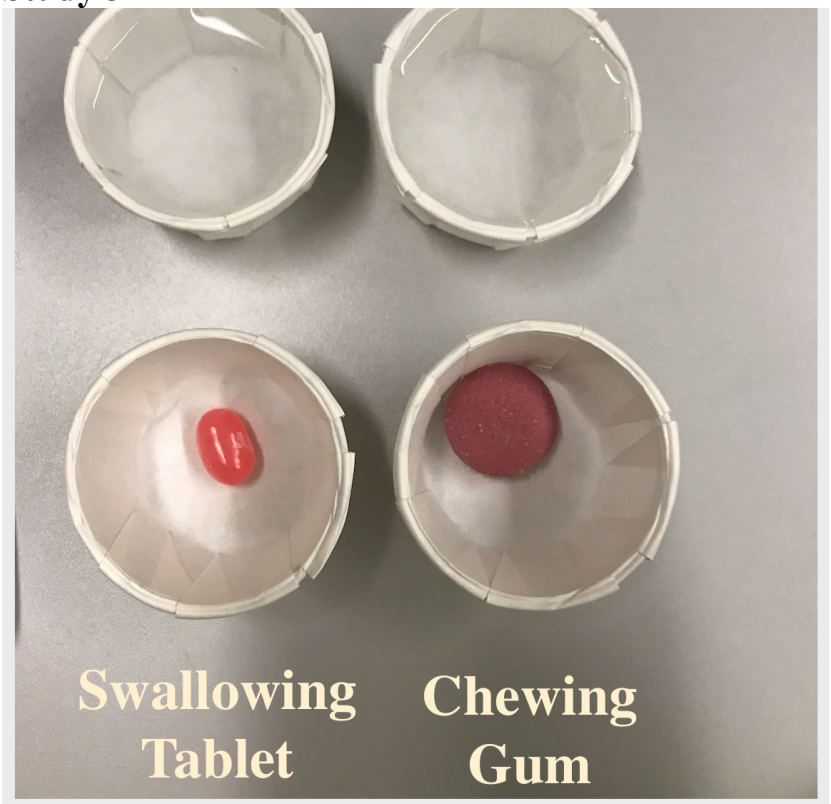
Appendix 4: Manipulation

Study 2



The Size of Three Types of Food

Study 3



Appendix 5: Hayes Mediation Analysis in Study 2

Behavioral Identification Form

```
Model Summary
          R       R-sq        MSE          F        df1        df2
p
      .2362      .0558     2.4142     4.5493     2.0000
154.0000      .0120

Model
              coeff         se          t          p       LLCI       ULCI
constant     2.6736      .2921     9.1542      .0000     2.0967
3.2506
chewing       .4295      .1533
2.8018      .0057      .1267      .7324
effort        .0436      .0809      .5386      .5909
-.1163      .2034

****************** DIRECT AND INDIRECT EFFECTS OF X ON Y
******************

Direct effect of X on Y
    Effect         se          t          p       LLCI       ULCI
     .4295      .1533     2.8018      .0057      .1267      .7324

Indirect effect(s) of X on Y:
         Effect    BootSE  BootLLCI   BootULCI
effort     .0164      .0317     -.0342      .0899

************************ ANALYSIS NOTES AND ERRORS
************************

Level of confidence for all confidence intervals in output:
  95.0000

Number of bootstrap samples for percentile bootstrap confidence
intervals:
  5000

------ END MATRIX -----
```

DV:BIF

Goal Focus

```
Model Summary
          R       R-sq        MSE          F        df1        df2
p
      .2044      .0418      .6867     3.3585     2.0000
154.0000      .0374

Model
              coeff         se          t          p       LLCI       ULCI
constant     2.7642      .1558    17.7447      .0000     2.4564
3.0719
chewing       .2119      .0818
2.5914      .0105      .0504      .3734
effort       -.0240      .0432     -.5555      .5794
-.1092      .0613

****************** DIRECT AND INDIRECT EFFECTS OF X ON Y
******************

Direct effect of X on Y
    Effect         se          t          p       LLCI       ULCI
     .2119      .0818     2.5914      .0105      .0504      .3734

Indirect effect(s) of X on Y:
          Effect    BootSE   BootLLCI   BootULCI
effort     -.0090      .0172     -.0483      .0230

************************ ANALYSIS NOTES AND ERRORS
************************

Level of confidence for all confidence intervals in output:
  95.0000

Number of bootstrap samples for percentile bootstrap confidence
intervals:
  5000

NOTE: Variables names longer than eight characters can produce incorrect
output.
      Shorter variable names are recommended.
```

DV: Goal Focus

Appendix 6: Hayes Mediation Analysis in Study 3

```
****************** DIRECT AND INDIRECT EFFECTS OF X ON Y *****************

Direct effect of X on Y
     Effect         se          t          p       LLCI       ULCI
     1.3809      .3249     4.2505      .0000      .7392     2.0226

Indirect effect(s) of X on Y:
            Effect     BootSE   BootLLCI   BootULCI
avg_effe      .1129      .0769     -.0112      .2837

************************ ANALYSIS NOTES AND ERRORS ************************




OUTCOME VARIABLE:
 calcium_

Model Summary
          R       R-sq        MSE          F        df1        df2          p
      .3025      .0915  4303.6849     7.8559     2.0000   156.0000      .0006

Model
              coeff         se          t          p       LLCI       ULCI
constant   113.8049    15.7512     7.2252      .0000    82.6918   144.9181
conditio    20.4325    10.5886     1.9297      .0555     -.4832    41.3481
avg_effe    11.2779     3.6640     3.0781      .0025     4.0405    18.5152

****************** DIRECT AND INDIRECT EFFECTS OF X ON Y *****************

Direct effect of X on Y
     Effect         se          t          p       LLCI       ULCI
    20.4325    10.5886     1.9297      .0555     -.4832    41.3481

Indirect effect(s) of X on Y:
            Effect     BootSE   BootLLCI   BootULCI
avg_effe     5.6168     3.3283      .4802    13.1209
```

```
Model Summary
          R       R-sq        MSE          F        df1        df2          p
      .2766      .0765  4084.7040     6.4614     2.0000   156.0000      .0020

Model
              coeff         se          t          p       LLCI       ULCI
constant   150.9081    15.3452     9.8342      .0000   120.5968   181.2193
conditio    17.7504    10.3157     1.7207      .0873    -2.6261    38.1270
avg_effe    10.0393     3.5695     2.8125      .0055     2.9885    17.0901

****************** DIRECT AND INDIRECT EFFECTS OF X ON Y *****************

Direct effect of X on Y
     Effect         se          t          p       LLCI       ULCI
    17.7504    10.3157     1.7207      .0873    -2.6261    38.1270

Indirect effect(s) of X on Y:
             Effect     BootSE   BootLLCI   BootULCI
avg_effe     5.0000     3.2179      .1229    12.5066

************************ ANALYSIS NOTES AND ERRORS ************************
```

Appendix 7: Hayes Mediation Analysis in Study 4

- Effectiveness

```
INDIRECT EFFECT:
 Action      ->    effort      ->    Q8

   ProductI     Effect     BootSE   BootLLCI   BootULCI
      .0000     -.0010      .0155     -.0195      .0374
     1.0000     -.0014      .0165     -.0231      .0437

Index of moderated mediation (difference between conditional indirect effects):
              Index     BootSE   BootLLCI   BootULCI
ProductI     -.0004      .0063     -.0179      .0080
---
```

- Calcium Absorbed

```
INDIRECT EFFECT:
 Action      ->    effort      ->    Q11_1

   ProductI     Effect     BootSE   BootLLCI   BootULCI
      .0000      .0018      .0177     -.0119      .0508
     1.0000      .0026      .0179     -.0137      .0590

Index of moderated mediation (difference between conditional indirect effects):
              Index     BootSE   BootLLCI   BootULCI
ProductI      .0008      .0082     -.0226      .0113
---
```

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