Master's Thesis of Business Administration

The Effect of Disease Salience on the Preference of Multi-Serving Packaging

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Abstract

Humans have developed a set of prevention-focused psychological responses to detect and avoid health-related threats. Such set of psychological responses called the "behavioral immune system" is known to affect evaluations of the self as well as others; however, studies on the effect of the system in consumption context have been limited. Having witnessed consumption behavior changes during the MERS CoV outbreak in South Korea in 2015, I argue that disease salience changes consumers' attitudes towards products in different packaging conditions such as packaging sizes. Through a study, I show that consumers prefer larger, multi-serving packages less than single-serving packages when an infectious disease becomes salient.

Keyword : Disease Salience, Product Packaging, Serving Size, Single-serving Packaging, Multi-serving Packaging
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I. Introduction

Ebola and MERS CoV broke out in 2015, totaling 11,000 deaths and 630 deaths, respectively (as reported by WHO and CDC). The severity of recent global outbreaks is causing much concern for governments, business, and individuals alike, not just because of their high fatality rates, but also because of their economic and societal impacts in affected countries. A research on SARS, in fact, have found that the indirect, global macroeconomic impact of SARS reached US $30-100 billion (Dawood et al., 2012). In case of MERS CoV outbreak in South Korea, the heightened worry and anxiety for contagion caused people to be more distancing and distrusting of others. People refused to go outside of their homes and avoid contact with other people. The preferred channel for retail changed to mobile or online commerce, and people preferred purchasing smaller packages (e.g., a bundle of 500ml bottled-water) to larger packages (1.5L bottled-water).

In considering these behavioral changes, previous research shows that disease outbreaks account for more than a physiological reaction (Stevenson, Hodgson, Oaten, Barouei, & Case, 2011). Rather, people overperceive the presence of disease relevant cues, making people to be more attentive to faces with innocuous disfigurements (Ackerman et al., 2009), perceive disabled individuals as having diseases unrelated to their disabilities (Park,

Faulkner, & Schaller, 2003), and be more hostile towards the elderly and the obese (Park et al., 2003; Park, Schaller, & Crandall, 2007) and even foreigners (C. D. Navarrete & Fessler, 2006). In consumption contexts, people avoid unfamiliar products or foods of foreign origin (Li, White, Ackerman, Neuberg, & Kenrick, 2013), and goods branded as "used" than "new" (Huang & Ackerman, 2012; Morales & Fitzsimons, 2007) due to an increase in concern for contagion.

Based on the research findings, I posit that there is another venue in which disease salience affects: the preference for packaging sizes. As people consider products consumed for a longer duration to be less fresh and more susceptible to contamination, I propound that products in larger packages are registered as more prone to longer product consumption and thus product contamination, particularly for products that are digested. According to Ilyuk & Block (2016), single-serving packages are considered to have a more discrete consumption episode than multi-serving packages because a single-serving package is opened and discarded each time the contained product is consumed. Through a study, I investigate the changes in consumer attitude towards multi-serving conditions in relation to single-serving conditions when there is a disease outbreak.

II. Theoretical Background

Behavioral Immune System

Humans have developed a sophisticated disease fighting system for survival. This system, at the detection of disease pathogen, triggers psychological responses as well as physiological responses. Physiologically, sensing a pathogen presence triggers changes within our bodies to boost our immune system. For instance, simply viewing disease related images triggers an oral inflammatory response, with increased salivary tumor necrotizing factor alpha and albumin, as well as a down-regulation of immunoglobulin A (SIgA) secretion, compared to the control and negative induction groups (primed with guns pointed at the camera). The study result suggests that down-regulated SIgA secretion serves to clear toxins from the oral cavity (Stevenson et al., 2011).

However, fighting infection at physiological level is often very costly; thus, there exists a set of psychological and behavioral strategies – called the "behavioral immune system", that predisposes people to detect and avoid health-related threats (Schaller & Park, 2011). A significant body of research shows that the behavioral immune system causes a host of reactions from personality changes to behavioral responses. For example, when disease is salient, people become less extraverted and open to new experiences and restrict their body movements (Mortensen, Becker,

Ackerman, Neuberg, & Kenrick, 2010). Also, when people feel vulnerable to a pathogen, they tend to negatively perceive people who heuristically carry infectious disease pathogens, like the disabled and the elderly (Schaller, Park, & Faulkner, 2003). However, the effect of disease salience on avoiding perceived disease carriers extends to discriminating certain groups of people such as obese people (Park et al., 2007) and people with different ethnic backgrounds (C. D. Navarrete & Fessler, 2006). Limited, yet growing body of research shows that disease salience motivates consumers to behave in certain ways, mainly disfavoring products that are believed to cause physical harms and illnesses. Women in their first trimester of the pregnancy avoid consuming novel foods (Carlos David Navarrete, Fessler, & Eng, 2007). Seeing an ad for a pharmacy can increase people's willingness to pay for products that are brand new rather than used (Huang & Ackerman, 2012).

Given the research findings on disease salience and human behavior, I propose to extend this line of research by demonstrating that consumers infer health-related safety from packaging sizes. When Middle East Respiratory Syndrome Corona Virus (MERS CoV) swept across South Korea, infectious disease salient consumers changed their consumption behavior to purchasing smaller packaging (e.g., 500ml bottled water) rather than larger packaging (1.5L bottled water). Those who have been using products in s larger packaging suddenly become more aware of the size and felt uncomfortable using the product. In addition, a consumer with a high

demand for hygiene prefers a package design that allows minimum exposure to air or touch of the contained cosmetic product because she is concerned about the product coming in contact with germs and viruses present in the air and human hands. These anecdotal accounts of consumer behavior when disease is salient hints consumer perception of packaging size, thereby affecting consumers' preference.

Packaging Size as Consumption Duration

According to decades of marketing research, product packages can help consumers understand brand characteristics (Orth & Malkewitz, 2008; Underwood & Klein, 2002), make purchase decisions (Ampuero & Vila, 2006; Roehm & Roehm, 2010), determine consumption amount (Argo & White, 2012; Chandon & Wansink, 2002; Wansink, 1996) and infer the conditions of the product contained within (Ilyuk & Block, 2016; McDaniel & Baker, 1977; Yan, Sengupta, & Wyer, 2014). According to contagion literature, packaging damages and vulnerabilities can be understood as a compromise of product quality and safety. For example, a research finds that superficial product damage can raise health and safety doubts about consuming the products and decrease product desirability (K. White, Lin, Dahl & Ritchie, 2016). In addition, when consumers see a product in a clear container being in contact with what is commonly described as "disgusting", they believe the product is contaminated by the disgusting object, thereby

having a negative effect on consumer attitude towards the product (Morales & Fitzsimons, 2007). Lastly, a study finds that whether package is sealed or not can enhance the extent of the contagion effects in that when product package is unsealed, the effect of contagion is magnified compared to when it is sealed (Lin & Shih, 2016).

Based on the contagion research findings, I propound that size can imply an information about the condition of the product inside when consumers overperceive the prevalence of health-related threats. Generally, larger packages last for a longer consumption period as they serve more than one serving (Ilyuk & Block, 2016) if they are consumed by a single person. The longer-lasting quality of larger packages may not be deemed favorable when pathogen prevalence is salient because, once a package is opened, it may not protect the stored content from spoilage or contamination as effectively as an unopened one does. Hence consumers may perceive the products in larger packaging more vulnerable to contamination or damage from an external source. On the contrary, products that are opened specifically for a consumption episode are less likely to come in contact with germs or other contaminants. As a result, when consumers are in high alert for their health, they may prefer packaging conditions that separate products by each consumption episodes (i.e., smaller, single-serving packages).

Based on these research findings, I propose the following research hypotheses:

H1. Disease salience will decrease the desirability of multi-serving products than single-serving products

H1a. People who are in disease salience condition will desire the products in multi-serving packages less than people in control condition.

H1b. There will be no significant consumers' desirability of the products in single-serving packages between people in disease condition and control condition.

To test whether disease salience has a negative effect on the relative desirability of a larger, multi-use packaging in comparison to a smaller, single-use packaging, I conducted a study that examined consumers' preference for products in different packaging conditions, using a series of products in various categories.

III. Study

Design, Stimuli, and Procedure

The study had a two (between: disease salience vs. control) by two (within: single-serving package vs. multi-serving package) mixed design. One hundred and five subjects were recruited from Amazon Mechanical Turk and participated in this study in exchange of 0.50 USD for the completion of the tasks. They were randomly assigned to either the disease salience condition or the control condition and presented a series of products in two different packaging conditions.

The survey read that subjects would participate in several completely unrelated tasks. The first task was evaluating the informativeness of a video content. The cover story served to mask the video content's true purpose as a prime. The video content in the disease salience condition featured a 2-minute news report on a norovirus outbreak in a county in California. The video clip showed images of schools closing down in the district due to the disease outbreak and explained the course of disease transmission, such as coming in contact with contaminated surfaces, as well as the symptoms of the disease. The video content in the control condition featured innocuous images of various cities in the U.S. The video content in each condition was selected because the content closely matched visual stimuli used in previous research on disease salience (Ackerman et al.,

2009; Mortensen et al., 2010). Video clips were used, rather than slide shows - which were often used to prime participants in previous studies, to increase participants' engagement with the provided content.

Then, to further increase the impact of the video content, I asked participants to write about a time in which they had encountered something similar to what they had just seen. For example, one participant in the disease salience condition wrote, "I experienced something similar when there was an outbreak of influenza in my community. A lot of people had contracted the flu and I was very apprehensive about going out at all. I was extremely meticulous when it came to washing my hands and making sure my house was clean and free from contamination as possible. It was a highly stressful time that I do not look back on fondly." Participant's responses in the control condition were not relevant to disease. For example, a participant in the control condition wrote, "I went on a road trip several years back and visited towns and cities in the mountains of Colorado I had never been to before. It was awesome the beauty and creativity in each of the places." To corroborate my cover story, I had participants respond to a question regarding the informativeness of the content they just viewed on a seven-point Likert scale (1= not at all informative, 7 = very informative). After viewing the visual content, participants answered a 10-item PANAS scale (Mackinnon et al., 1999) to check participants' experienced level of emotions since the viewing of the visual content.

Before evaluating their package preferences, participants were asked to complete a filler task to prevent participants from inferring the true purpose of the study. During the filler task, participants were given a short passage that discusses a recent criticism against a literary trend in short stories from the 19th century. After reading the passage, participants identified all the definite articles (i.e., the) in the reading and answered the number of definite articles they found in the passage.

After completing the filler task, subjects completed several choices between single-serving and multi-serving packages in various product categories. Products in single-serving conditions were packaged individually; hence, the package would be thrown away after the completion of a single consumption period. On the other hand, products in multi-serving conditions were packaged in a container; hence, a consumer would have to take some of the product from the package for each usage. Participants chose their packaging preference in the following categories: yogurt (single-serving: 6 packs of 5.3 oz. Danone plain yogurt vs. multi-serving: a 32 oz. container of Danone plain yogurt), facial mask (single-serving: 12 counts of 0.27 oz. Farmhouse Fresh Quac Star Avocado Mask vs. multi-serving: 3.25 oz. glass jar of Farmhouse Fresh Quac Star Avocado Mask), preserved fruits (single-serving: 4 counts of 4 oz. Dole diced peaches in 100% fruit juice vs. multi-serving: a 16 oz. container of Dole diced peaches in 100% fruit juice), cheese (single-serving: 5 counts of 4 oz. Velveeta Cheese Original Mini Blocks vs. multi-serving: a loaf of 20 oz. Velveeta Cheese Original Loaf),

and oatmeal (single-serving: 8 packets of 1.75 oz. Nature's Path Organic Oatmeal vs. multi-serving: a 14 oz. canister of Nature's Path Organic Oatmeal) (see appendix 1). To control for consumers' choosing a smaller, single-serving product due to unfamiliarity with the product, a common product description was provided while controlling for the total quantity of the product in both packaging conditions. Additionally, a caption that notifies no product quality difference between packaging options was provided as cognitively busy consumers can perceive products in smaller, single-serving conditions as better in quality (Yan et al., 2014). After reading the product description and seeing the packaging choices, participants were asked to rate their preferences between the two packaging conditions (i.e., single-serving pack, multi-serving pack). Also, they were asked to rate their attitude towards each product packaging on a nine-point scale (1: dislike, 9: like). Lastly, participants were asked of their demographic information, which includes gender, age, marital status, and the total number of habitants at their current residence.

Experiment Results

Of the 105 responses collected, 16 responses were excluded from analysis because the video content did not upload properly, the respondents did not answer the recall question after viewing the video or failed the instructional manipulation check. PANAS scores showed a marginally

significant effect of infectious disease priming on overall positive affect ($t(87) = 1.911$, $p = .059$) and insignificant effect on negative affect ($t(77.705) = -1.576$, $p = .119$) (see Appendix 2).

To test the extent to which disease salience affected participant's packaging choices, I collapsed the packaging choices (1: single-serving selected, 0: multi-serving selected) of five product categories into a single index and ran a one-away ANOVA with disease priming (vs. control) as a predictor. Participants in the disease priming condition showed a marginally significant preference ($F(1, 87) = 2.781$, $p=.099$) for single-serving products than participants in the control condition. To further examine respondents' packaging choices, I checked the packaging preferences in each product category and found that, with an exception of a cosmetic product, participants preferred single-serving products than multi-serving products when primed with an infectious disease (Table 1). Excluding the facial mask from the product choice set for another one-way ANOVA analysis revealed

Table 1: Packaging Preferences in Control vs Disease Salience Conditions

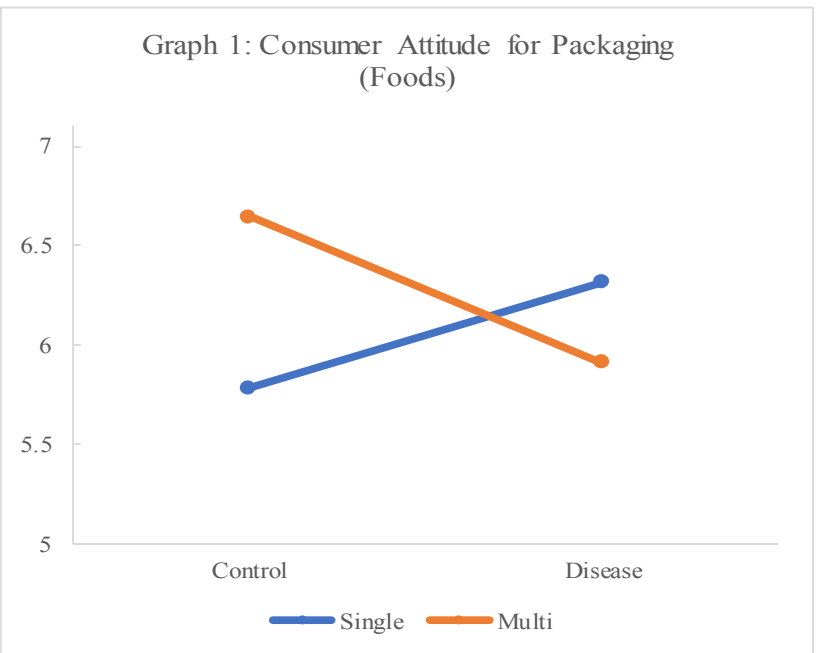
	Control		Disease	
	Multi	Single	Multi	Single
Yogurt	41.9%	58.1%	32.6%	67.4%
Facial mask	60.5%	39.5%	63.0%	37.0%
Fruit	48.8%	51.2%	39.1%	60.9%
Cheese	55.8%	44.2%	43.5%	56.5%
Oatmeal	72.1%	29.7%	45.7%	54.3%

a significant main effect of infectious disease priming on the product choice of multi-serving package (vs. single serving package) ($F(1,87)=3.943$, $p=.050$).

Additionally, I collapsed the subjects' attitudes towards packaging options and made indexes for consumers' attitudes towards single-serving and multi-serving options. I conducted a repeated ANOVA with consumers' attitudes towards different packaging options as with-in variables and disease salience as a between-subject variable. The results showed that, for five product categories, the interaction effect between the disease salience and serving size on consumer attitude was significant ($F(1,87)=4.275$, $p=.042$). The main effect of with-in subject variable (i.e., serving-size) was marginally significant ($F(1,87)=3.146$, $p=.080$); whereas the main effect of between subject variable (i.e., disease salience) was not significant ($F(1,87)=.006$, $p=.940$). A contrast analysis revealed that, in control condition, consumers have a significantly more positive attitude towards multi-serving packaging options than single-serving options ($M_{control\_single}=5.642$, $M_{control\_multi}=6.665$, $F(1,87)=7.138$, $p=.009$). However, when disease is salient, consumers do not have a significant attitude difference between multi-serving packaging options than single serving options ($M_{disease\_single}=6.174$, $M_{disease\_multi}=6.096$, $F(1,87)=.045$, $p=.833$). Furthermore, the contrast analysis showed that disease salience (vs. control condition) has a marginally significant negative effect on the attitude towards multi-serving options ($F(1,87)=3.271$, $p=.074$) but no significant

effect on the attitude towards single-serving options (F(1,87)=1.725, p=.192).

Again, I excluded the facial masks from the choice set and created the indexes for attitudes towards single-serving packaging and multi-serving packaging for foods. I ran a repeated ANOVA with consumers' attitude towards different packaging options for foods as with-in variables and disease salience as a between-subject variable (Graph 1). The result showed that, for foods, the interaction effect of the disease salience and serving size on consumer attitude was significant (F(1,87)=5.388, p=.023). A contrast analysis revealed that, for multi-serving packaging, disease salience has a significant negative effect on its desirability ($M_{control\_multi}$=6.645, $M_{disease\_multi}$=5.913, p=.027). On the other hand, for single-serving packaging, disease salience did not have a significant effect on its desirability



($M_{control\_single}$=5.785, $M_{disease\_single}$=6.315, p=.198).

Since age and gender can increase the effect of disease salience (Mortensen et al., 2010), I controlled the effects of these variables and conducted an ANCOVA and a repeated ANCOVA on packaging choices and on packaging attitudes respective for foods. The results showed neither a significant main effect of age on choice nor a significant interaction effect of age with serving size on attitude (choice: F(1,85)=.147, p=.702; attitude: F(1,85)=.000, p=.926). However, it showed that there was a marginally significant effect of gender on choice, but no significant interaction effect between serving size and gender on attitude (choice: F(1,85)=3.632, p=.060; attitude: F(1,85)=2.466, p=.120). Entering the two control variables, however, decreased the effect of disease salience on product choice to be marginally significant (F(1,85)=3.090, p=.082). The interaction effect of serving size and disease salience was still significant for attitudes (F(1,85)=4.782, p=.032).

Given that the number of habitants at the respondents' residence can affect the preferred packaging options, I conducted another repeated ANCOVA for foods to control the effect of the number of residents. The result revealed that the interaction effect of serving size and the number of residents did not have a significant effect on consumers' packaging preferences and attitudes (choice: F(1,86)=.236, p=.628, attitude: F(1,86)=.159, p=.691). The interaction effect of serving size and disease

salience on packaging preferences and attitudes remained significant (choice: $F(1,86)=4.144$, $p=.046$, attitude: $F(1,86)=4.647$, $p=.034$).

IV. General Discussion

These results from the study provide preliminary support for the hypotheses, which proposed that infectious disease salience would decrease the desirability of the larger, multi-serving products than control condition. While controlling the total quantity of the products, consumers primed with infectious disease choose products in smaller, single-serving products than larger, multi-serving products. The results show that disease salience decreases the desirability of the multi-serving packages compared to control condition, rather than increases the desirability of the single-serving packages.

The study results also reveal that there could be a boundary condition with the product category. Products in various food categories, such as dairy products, canned items and dried goods were preferred in single-serving packages than in multi-serving packages when disease became salient. Non-food product, such as a cosmetic product, was not preferred in single-serving packages than in multi-serving packages. In fact, consumers preferred multi-serving packages regardless of disease salience. However, the observed category effect can be due to the nature of the disease priming used in the scenario, which involved a gastrointestinal virus. If the disease in discussion were regarding a dermatological infection, single-serving products may have been preferred than multi-serving products for cosmetic products as well.

Controlling for various demographic factors, such as sex, age, and numbers of residents, disease salience still showed the main effect on decreasing the desirability of multi-serving packages. For consumer attitudes, disease salience showed a consistently strong main effect on the desirability of multi-serving packages even when the demographic factors were considered; yet, consumer choice between two packaging options was less stable since entering sex into the consideration decreased the effect of disease salience on multi-serving package preference. However, this could be caused by the binary nature of the answer choice.

This research hints that packaging size, which is inherently tied to the duration of a package consumption, can be viewed as a compromise of the integrity and safety of the product contained at times when consumers feel vulnerable to an infectious disease. Hence, the main contribution of this research is that it shows the changing perception and desirability of packaging size when a threat to health is present. In so far, Behavioral Immune System in consumer behavior context is an under studied area. However, there has been an increase in research interest towards the effect of disease salience on consumer behavior (Huang & Ackerman, 2012; Tybur et al., 2011). The proposed research extends the study of behavioral immune system in consumption context by linking the effect of disease salience to consumer attitude towards product packaging. Additionally, I believe the proposed research contributes to packaging literature by delineating a unique case in which larger package is not as favored.

Nevertheless, there are several limitations to this research. This study provides an initial support to the proposed main effect of disease salience on the desirability of multi-serving package compared to the control condition. While it establishes an external validity by examining the proposed effect across a variety of product categories, more studies need to be conducted to test the replicability of the effect and ecological validity. Additionally, the process of the main effect remains unclear; hence, further researches are required to test the mediation of the effect disease salience has on multi-serving packages and single-serving packages. I speculate that contamination fear for the packaged product causes people to consider multi-serving package less desirable.

V. Appendices

Appendix 1

Dairy Product: Yogurt

Single-serving

5.3 oz. plain yogurt per serving,
6 count-case (31.8 oz in total)

Multi-serving

Quart plain yogurt, 32 oz. per container

Cosmetic Product: Facial mask

Single-serving

x 12 packs

Daily pack, 0.27 oz. per pack, 12 counts in total
(12 applications)

Multi-serving

3.25 oz. glass jar, 12-13 applications

Canned Fruit: Sliced/Diced fruit in juice

Single-serving

4 oz. per serving, 4 count-pack

Multi-serving

16 oz. container

Dairy Product: Cheese

Single-serving

Velveeta Cheese Original Mini Blocks, 4 oz. per block, 5 counts in a box, about 20 servings in total

Multi-serving

Velveeta Cheese Original Loaf 20 oz. About 20 servings in total

Dried Good: Oatmeal

Single-serving

1.75 oz. per packet, 8 packets in a box, 14 oz. in Total

Multi-serving

A single canister of 14 oz. Oats.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
PANAS1	Equal variances assumed	1.848	.178	2.338	87	.022	.665	.284	.100	1.230
	Equal variances not assumed			2.324	82.226	.023	.665	.286	.096	1.234
PANAS2	Equal variances assumed	.064	.800	.943	87	.348	.276	.293	-.306	.858
	Equal variances not assumed			.943	86.314	.349	.276	.293	-.306	.858
PANAS3	Equal variances assumed	8.690	.004	2.542	87	.013	.689	.271	.150	1.227
	Equal variances not assumed			2.518	77.650	.014	.689	.273	.144	1.233
PANAS4	Equal variances assumed	5.233	.025	1.668	87	.099	.477	.286	-.092	1.046
	Equal variances not assumed			1.657	81.524	.101	.477	.288	-.096	1.050
PANAS5	Equal variances assumed	1.649	.202	.266	87	.791	.066	.247	-.426	.558
	Equal variances not assumed			.264	83.428	.792	.066	.249	-.429	.560
PANAS6	Equal variances assumed	6.914	.010	-1.475	87	.144	-.205	.139	-.482	.071
	Equal variances not assumed			-1.490	82.417	.140	-.205	.138	-.479	.069
PANAS7	Equal variances assumed	2.470	.120	-1.069	87	.288	-.182	.170	-.520	.156
	Equal variances not assumed			-1.069	86.577	.288	-.182	.170	-.521	.157
PANAS8	Equal variances assumed	9.037	.003	-1.571	87	.120	-.187	.119	-.423	.049
	Equal variances not assumed			-1.595	75.722	.115	-.187	.117	-.420	.046
PANAS9	Equal variances assumed	7.445	.008	-1.263	87	.210	-.199	.158	-.513	.114
	Equal variances not assumed			-1.286	71.018	.203	-.199	.155	-.508	.110
PANAS10	Equal variances assumed	2.304	.133	-1.271	87	.207	-.240	.189	-.614	.135
	Equal variances not assumed			-1.278	86.122	.205	-.240	.187	-.612	.133

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