

Hygienists, Caregivers, Oblivious and Other COVID-19 Confined Canadians: Market Segmentation Analysis of Their Routine Activities¹

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November 25, 2020

Keywords: Routine Activities, Market Segmentation, COVID-19 pandemic, Canada

Abstract

This study examined routine activities reported in a survey sample of 4,600 adult Canadians aged 15 years old and over during the COVID-19 confinement period of May 4-10, 2020 and collected by Statistics Canada. A marketing segmentation analysis was carried out using a roster of 26 typical weekly activity items leading to the extraction of typical activity patterns and the identification of six major segments present in the Canadian adult population: "Hygienists" (25%), "Caregivers"(14%), "Sound Body Minders" (23%), "Home-centric" (19%), "Media-centric" (9%) and "Oblivious" (10%). Weekly activities included a wide range of actions such as washing hands, avoiding crowds, watching T.V., internet browsing, exercising, alcohol consumption and others. The six population segments were identified using a combination of principal component and k-means cluster statistical analysis. Marketing segmentation is a useful tool for decision makers to categorize population members and, by doing so, facilitate better public campaigns, help design messages and implement changes that can promote more efficient ways to deal with the various societal consequences of the COVID-19 confinement.

The segment mottos for the six segments can be summarized as follows: "Clean, Clean, Clean"; "People First!", "Sound body, Sound mind!", "My Home is my Fortress", "I Love Being Plugged" and "Pandemic? What Pandemic?". Hygienists were the most observant of safety guidelines while Caregivers and Sound Body Minders tolerated this environment in order to take care of others and/or promote personal care. Home-centrics were "anchored" to their homes and Media-centrics to their computer, internet and social media. Oblivious carried out their routine activities as if the pandemic never happened and were somewhat negligent of safety guidelines. Members of these two last clusters are particularly challenging and harder to reach by health authorities and institutions. Media-centrics are problematic in terms of reported mental health issues while Oblivious segment members in terms of their negligence in following the enacted sanitary guidelines. Appropriate messages need to be tailored to reach these types of audiences in order to promote the well-being and safety of Canadians at this juncture.

¹ Paper to be presented at the 2021 CSA Meetings, Edmonton-Alberta. The author would like to thank Stein Monteiro, Jennifer Domouilan, the Ontario Data Documentation, Extraction Service and Infrastructure (ODESI-Scholars Portal Statistics) as well as Statistics Canada for making available the data and valuable support and guidance.

1.0. Background

The COVID-19 virus has caused major disruptions across the world, after being declared as a pandemic by the World Health Organization (WHO) on 31st January 2020 (WHO, 2020). This pandemic has led to a break with ordinary routine activities and social contacts for most of the world's population. Canada is presently undergoing the so-called "second" phase. As of October 25, 2020, there had been a total of 9,946 deaths attributed to the coronavirus in Canada². A larger number is expected in the coming months. Most of the reported cases are in Canada's two most populous provinces, Ontario and Quebec, which have declared different sanitary measures to deal with the virus spread in the population.

Under the strict rules of the COVID-19 confinement environment, Canadians carry on various daily activities which help them to ensure personal well-being, perform social roles, leisure and cope with the stress of the shifting nature of interpersonal relations (see Lazarus, 1986; Kelly, 2019). These routine activities provide a sense of meaning to life and personal efficacy. Some individuals direct their efforts to activities which follow sanitary recommendations such as hand washing, keeping physical distance and avoiding crowds. Others direct their efforts to doing more outdoor or indoor exercises as well reading, writing and/or game playing. Browsing the internet has now become a favourite activity among Canadians.

Market segments are groups of individuals who are similar in their reaction to one or more mix of environmental elements (Grover and Briens, 2006). Communalities in terms of routine activities define various possible market segments which can be targeted by public health campaigns aimed at promoting and/or discouraging particular behaviours. Using a sample of the adult population of Canada, the central objectives of the marketing segmentation analysis presented here is to break down the population into meaningful clusters of individuals (homogeneous) in terms of the typical routine activities carried out during the COVID-19 pandemic. Three central questions guided the segmentation analysis: 1) What weekly activities are the most reported by Canadians during the pandemic? 2) Can groups of individuals be differentiated into segments or clusters according to these activities? and 3) What are the typical socio-demographic, residential, employment and psychosocial characteristics of the members of these segments?. The CPSS-Series2 survey conducted by Statistics Canada was the ideal data source chosen to empirically explore these three central research questions.

2.0. Sample and Measures

The CPSS-Series 2 survey (CPSS Series2) is an online survey that collected information on the knowledge and behaviours of 4,600 Canadians aged 15 years old and over residents of the 10 Canadian provinces. It was administered by Statistics Canada between May 4-10, 2020 (the reference week). The probability panel of the survey was created by randomly selecting a subset of the Labour Force Survey (LFS) respondents. It collected a wide range of information on Activities for health, COVID-19, behaviours, delivery services, drugs, employment, Employment insurance (EI)

² Source: <https://www.statista.com/statistics/1107079/covid19-deaths-by-province-territory-canada>.

benefits, food security, physical health and mental health, health impacts, information on COVID-19, grocery, labour market impacts, precautions, shopping, social distancing, telework and other habits³.

The routine activity items comprised a set of 26 questions related to the frequency of weekly activities carried out during the reference week. Items were measured as dichotomous scales (0=no, 1=yes). These items were captured by three types of questions: 1) Which of the following precautions (list shown) have you taken to reduce your risk of exposure to COVID-19? 2) Are you doing any of the following activities (list shown) for your health? and Have your weekly habits (list shown) changed for any of the following activities?. The list of weekly activities ranked by their frequency (average %) is presented in table 1.

3.0. Statistical Methods and Segment Identification

Principal Component Analysis (PCA) and k-means cluster analysis were used as the main statistical techniques for segment identification (see detail of the methodologies followed in Punj and Stewart (1983), Grover and Vriens (2006) and Salkind and Rasmussen (2010). In the first phase, Principal Components (statistical technique aimed at data reduction) extracted 8 major dimensions underlying information on the 26 dichotomous activity related items. In the second phase and using component scores of these dimensions capturing about half of the total data variation (47%), k-means clustering analysis was applied to the CPSS-Series data. This clustering algorithm was developed to sort survey respondents into a k number of clusters through assignments and re-assignments based on the shortest distance between the individual and the centroid (mass centre) of the cluster. The distance measure chosen for this purpose was the Euclidean distance squared. For the cluster, analysis k=2 to k=8 solutions were tested. The k=6 solution proved to be the most valid and informative according to the parsimonious reduction of the Within Sum of Squares (WSS) and the application of the "elbow" criteria as a stopping rule in the partition of clusters (see technical appendix chart A-1). The validation of the partition of the population into six clusters was verified using Analysis of Variance (ANOVA) F tests where the cluster membership was used in the prediction of the socio-demographic and attitudinal characteristics of respondents (see table A-2) in the technical appendix. The highest predicted power of the cluster partition was found in reference to the telework status characteristics of respondents (19% of variance explained).

³ Statistics Canada has already released major findings of the CPSS-Series1 and CPSS-3 surveys (conducted between March 29-April 3 and June 15-21, 2020 respectively), which include: greater anxieties over personal health and the health of others, that most Canadians were following health guidelines, greater time spent on the internet and watching television, women stricter in terms of following guidelines than males and youth less likely to wear masks in public. Sources : 1) <https://www150.statcan.gc.ca/n1/daily-quotidien/200408/dq200408c-eng.htm>; 2) <https://www150.statcan.gc.ca/n1/daily-quotidien/200708/dq200708a-eng.htm>.

Table 1: Weekly Activities (%) ranked by the most frequently reported), Canada 2020

Item Number	Activity Items (no=0,1=yes)	% Yes, Mean	Std. Deviation
1	Precautions - Washed your hands more regularly	95%	22%
2	Precautions - Used physical distancing in public	92%	27%
3	Doing activities for health - Communication with friends and family	91%	29%
4	Precautions - Avoided crowds and large gatherings	91%	29%
5	Precautions - Avoided leaving the house	87%	34%
6	Precautions - Avoided touching your face	73%	44%
7	Doing activities for health - Exercised outdoors	70%	46%
8	Increase in weekly habits - Spent more time on the internet	70%	46%
9	Precautions: Stocked up on essentials	62%	49%
10	Increase in weekly habits - Watched more television	59%	49%
11	Doing activities for health - Exercised indoors	57%	50%
12	Precautions - Made a plan to communicate with others	51%	50%
13	Precautions - Cancelled travel	43%	50%
14	Doing activities for health - Changed food choices	38%	49%
15	Increase in weekly habits - Ate more junk food or sweets	36%	48%
16	Precautions - Filled prescriptions	35%	48%
17	Precautions - Worked from home	29%	45%
18	Increase in weekly habits - Played more video games	27%	44%
19	Doing activities for health - Did Meditation	24%	43%
20	Increase in weekly habits - Played more board games	23%	42%
21	Increase in weekly habits - Consumed more alcohol	19%	39%
22	Made applications for EI benefits, CERB, Sick benefits	19%	69%
23	Precautions - Made plans caring for non household members	18%	38%
24	Precautions - Made plans caring for household members	12%	33%
25	Increase in weekly habits - Consumed more cannabis	7%	25%
26	Increase in weekly habits - Consumed more tobacco products	5%	22%

Source: CPSS-Series2 survey, Statistics Canada, 2020

4.0. Findings

4.0. Segment Prevalence and Traits

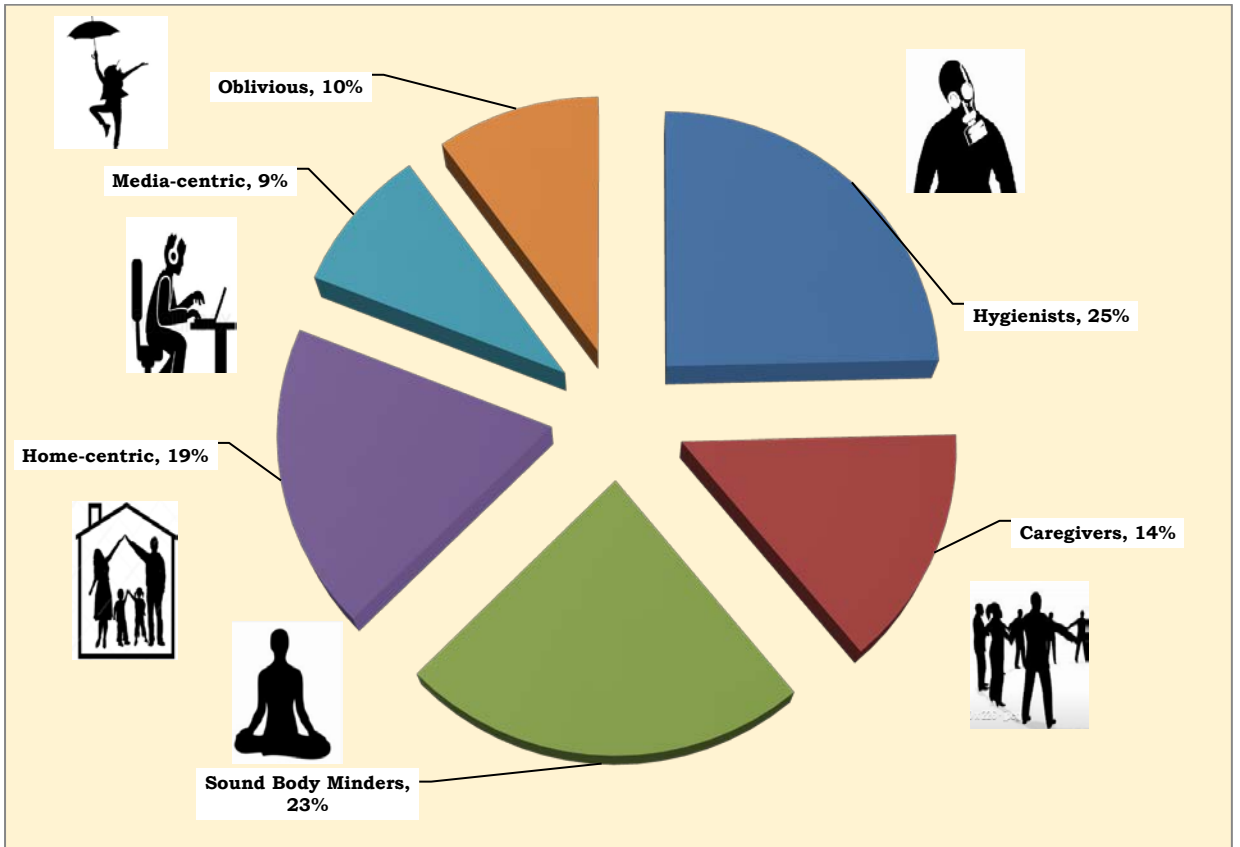
According to the cluster analysis of the survey, six uniquely profiled groups of the Canadian adult population respondents were identified. Their membership was distributed as follows: 25% in segment 1, 14% in segment 2, 23% in segment 3, 19% in segment 4, 9% in segment 5 and 10% in segment 6. Based on the typical activity profiles drawn from the 26 dichotomous scales, the segments were labeled as follows: Segment 1 – "Hygienists", Segment 2- "Caregivers", Segment 3-"Sound Body Minders", Segment 4-"Home-centric", Segment 5-"Media-centric" and Segment 6-"Oblivious". The prevalence ⁴ of segments in the Canadian adult population is presented in pie chart 1.

A visual representation (PCA bi-plot) of the vector of activities and dimensions underlying the data are displayed in chart 2. The first two components extracted by PCA accounted for 20.2% of the variance of all activity items. The first dimension represented by C1 (11.5% of the total variance of items) opposes as polar cases Caregivers vs. Oblivious segment members in terms of their behaviour revealing different orientations in terms of adherence of safety protocols. The second dimension, represented by C2 (8.7% of the total variance of items), opposes Hygienists vs. Media-Centric as polar cases. It reveals behaviours which fundamentally differ in terms of attachment to technology and media practices (i.e. watching T.V. and spending more time in the internet) as well the level of some unintended outcomes of the confinement such as more tobacco and/or cannabis use.

Statistical Note: In the Chart 2 bi-plot, the first two principal components extracted from the data (C1 and C2) are shown. These accounted for 20.2% of the total variation of the 26 dichotomous items representing all weekly activities. They are the most fundamental dimensions summarizing the activity patterns reported by respondents. In the biplot, vectors represent items which are presented as points in space. The bi-plot of the second component on the first component is useful as it displays the correlations of variables in terms of various item vectors of different magnitudes, directions and positions. Proximity of activity traits to group positions in space suggests an over-representation of these traits with respect to the composition of groups while greater distances suggests its converse. Correlations between two indicator variables in component space are equal to the cosines of the angles between the indicator vectors (θ), or $r = \cos(\theta)$. Highly correlated variables are located at sharp angles from each other ($\theta = 90$ degrees or less) while those zero correlated are "orthogonal" to each other ($\theta = 90$ degrees). If variables are perfectly negatively correlated, then $\theta = 360$ degrees (vector in opposite direction).

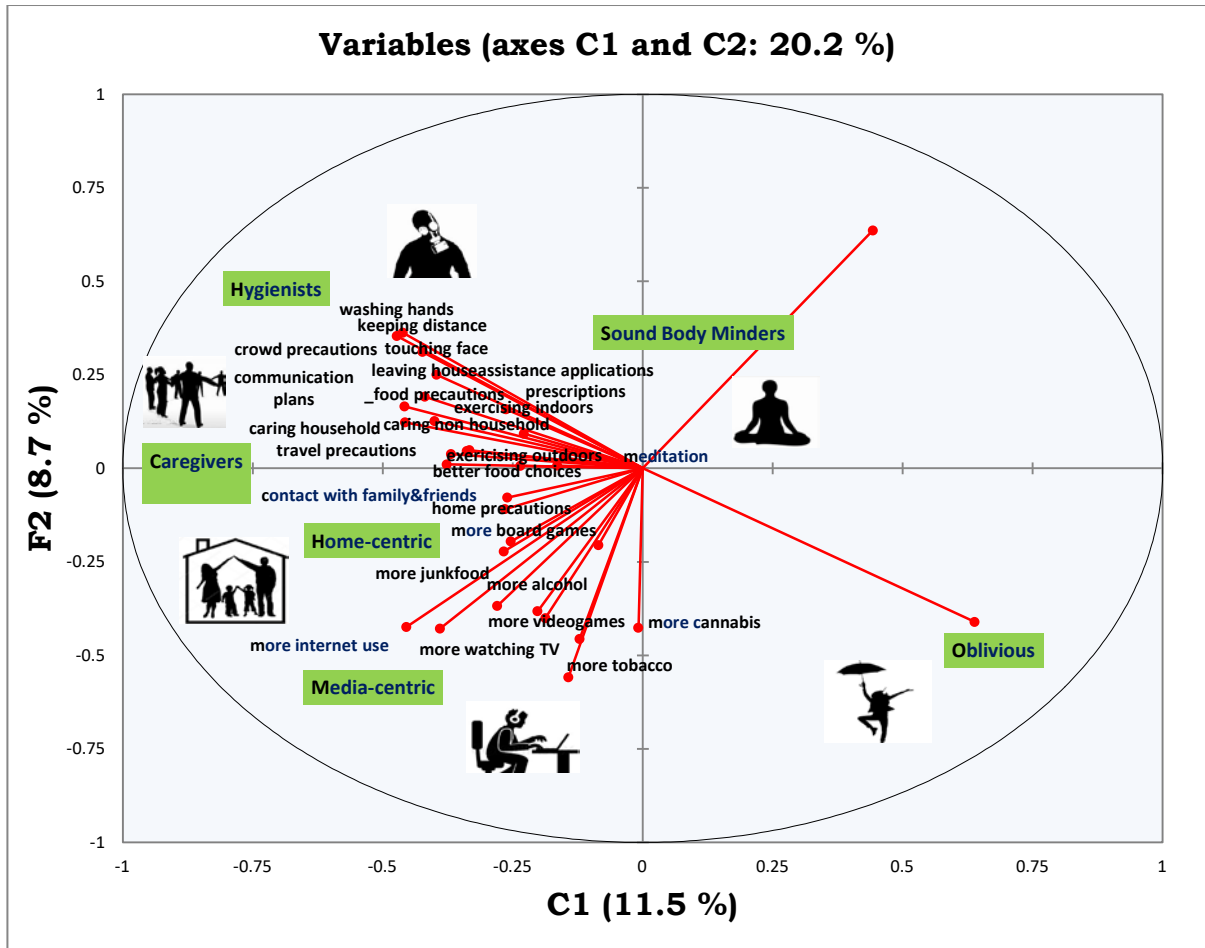
⁴ Population estimates were obtained using weighted frequencies.

Chart 1: Segment Prevalence in the Canadian adult population during the COVID-19 Pandemic, Canadians aged 15 years old and over



Source: CPSS-Series2 Survey, Statistics Canada, 2020

Chart 2: Biplot of Weekly Activities and Segment Positions in Coping Styles during the COVID-19 Pandemic, Canadians aged 15 years old and over



Source: CPSS-Series2 Survey, Statistics Canada, 2020

4.2. Segment Profile Summaries: Who Are they?

The following are the summary descriptions of the market segments found in the CPSS-Series2 data:

Segment 1 – Hygienists (25% representing 8.3 million adult Canadians), Segment Motto: "Clean, Clean, Clean!"

One out of four adult Canadians are part of this cluster of individuals. Members are significantly differentiated by their strict adherence to hygiene principles and meticulous practice of government safety guidelines. They are "exemplary" models of sanitary behaviour. More than 90% washed hands, distanced from public, avoided crowds and avoided leaving their homes. Hygienists were fastidious about sanitary conditions mainly because only 4% worked from home. They were not completely immune from the unintended consequences of confinement such as eating more junk food or sweets (38%) and/or watching television (85%) compared to previous weeks. Over-representation of females (54%) and married and common law marital status individuals (64%) are observable in this segment. Hygienists are the least educated segment of the six: almost half of them had an equivalent of high school or below education (49%). Only 17% of Hygienists reported average moderate or severe levels of generalized anxiety in the COVID-19 environment.

Segment 2 – Caregivers (14% representing 4.9 Million adult Canadians), Segment Motto: "People first!"

Members of this segment react to the pandemic environment displaying notable altruistic or other-oriented behaviour. For them, coping with the pandemic means taking care of others. About 73% made plans to care for non-household members and 61% for household ones. One in three did meditation as a spiritual practice during the reference week (34%). Like hygienists, they also strongly adhered to safety guideline principles particularly in the areas of stocking up on essentials (82%) and the filling of prescriptions (58%). About 60% reported an increase in T.V. watching. Women are over-represented in the caregivers segment (55%) and also about 72% of them reported married and common law marital status. One out of four (25%) reported moderate or severe levels of generalized anxiety in the COVID-19 environment.

Segment 3 – Sound Body Minders (23% representing 6.8 million adult Canadians). Segment Motto: "Sound Body, Sound Mind!"

Sound Body Minders are individuals whose routine activities adhere to safety guidelines but, in addition, adopt personal practices leading to healthier physical and conditions. About 72% exercised outdoors while 47% did so indoors. The most notable behavioral feature, however, is that Sound Body Minders "avoided" potentially negative consequences of confinement such as an increase in T.V. watching (only 13%) and/or consuming more alcohol (only 8%). Over-representation of older individuals 65+ years old (32%) as well as males (53%) are observable in this segment. Sound Body Minders exhibit the lowest levels of moderate or severe anxiety levels of all six segments (9%).

**Segment 4 – Home-centric (19% representing 5.8 million adult Canadians).
Segment Motto: "My Home is my Fortress!"**

Members of this young segment pay special attention to perform home-focused related activities which bring to them a sense of comfort and security. About 77% of Home-centrics were currently employed and 90% were working from home during the pandemic. They also exercised outdoors (83%), spent more time on the internet (86%) and increased their frequency of playing board games (49%). It is the most educated segment of the six segments: 44% achieved average education equivalent to university beyond the bachelor level. Like the Media-centric group, it has an over-representation of younger individuals (52% of them were 35 years old or younger) and had a younger child living in the household with them (46%). Close to one in five Home-centrics were foreign-born (17%). In terms of psychosocial characteristics, about 13% of Home-centrics reported moderate or severe levels of generalized anxiety during the pandemic.

Segment 5 – Media-centric (9% representing 2.6 million Canadians). Segment Motto: "I Love Being Plugged!"

Individuals called Media-centrics represent a special young population segment which heavily use technology and social media to cope with the COVID-19 environment in Canada. They are the most technology "plugged" the segments. Although they appear to be somewhat complying with safety guidelines like the members of the other segments, they also report a greater increase in spending more time in the internet (87%), watching T.V. (81%) and playing video games (55%). By the time of the survey, about 42% had made assistance applications such as the CERB program, Employment Insurance and/or other benefits. Compared to other segments, they reported an increase in alcohol consumption (55%), tobacco products (50%) and particularly cannabis (65%). About half of Media-centrics are under 34 years old and 48% are also single. A strong attachment to media is correlated with some types of mental health -related pathologies as their members reported the highest moderate and/or severe level of generalized anxiety of all segments (43%). Also, almost half of them (49%) reported poor or fair levels of mental health.

Segment 6 – Oblivious (10% representing 2.7 million adult Canadians). Segment Motto: "Pandemic? What Pandemic?"

Members of the Oblivious segment are almost the polar opposite to Hygienists. Their members constitute, perhaps, central targets for messages to be sent by health authorities in Canada. They carry out their daily activity routines as if the pandemic never happened and are somewhat "sloppy" with regards to following the imposed health guidelines. In contrast to other segments, about half of them washed hands regularly (52%), only 37% avoided crowds and large gatherings while only 47% kept physical distancing in public. Only 35% reported stocking up on essentials. They were also not immune to an increase in T.V. watching (40%) although 45% of them exercised indoors during the reference week. Over-representation of males (57%) and single individuals (31%) are observable in this segment. One in five members of this segment reported a moderate and/or severe level of generalized anxiety (19%).

Table 2: Average Weekly Activities (%) Reported by the Six Population Segments, Canada 2020



Weekly Activities	Hygienists (25%)	Caregivers (14%)	Sound-Body Minders (23%)	Home- centric (19%)	Media- centric (9%)	Oblivious (10%)	All Segments (100%)
1. Washed hands more regularly	99%	98%	100%	99%	97%	52%	95%
2. Used physical distancing in public	97%	99%	96%	96%	90%	47%	92%
3. Communicated with friends and family	93%	97%	84%	96%	96%	72%	91%
4. Avoided crowds and large gatherings	97%	99%	96%	95%	87%	37%	91%
5. Avoided leaving the house	92%	96%	85%	92%	87%	50%	87%
6. Avoided touching your face	78%	86%	75%	75%	72%	24%	73%
7. Exercised outdoors	64%	74%	72%	83%	66%	54%	70%
8. Spent more time on the internet	91%	79%	22%	86%	87%	51%	69%
9. Stocked up on essentials	70%	82%	51%	62%	58%	35%	62%
10. Increased watching television	85%	60%	13%	73%	81%	40%	59%
11. Exercised indoors	53%	63%	47%	78%	52%	45%	57%
12. Made a plan communicate	54%	85%	36%	51%	52%	15%	51%
13. Cancelled travel	38%	66%	36%	58%	30%	15%	43%
14. Changed food choices	36%	52%	22%	49%	42%	30%	38%
15. Ate more junk food or sweets	38%	41%	9%	52%	62%	27%	36%
16. Filled prescriptions	44%	58%	32%	16%	34%	19%	35%
17. Worked from home	4%	37%	23%	74%	27%	11%	29%
18. Played more video games	29%	21%	3%	44%	55%	24%	27%
19. Did more meditation	18%	34%	17%	30%	25%	21%	24%
20. Played more board games	18%	27%	8%	49%	20%	13%	23%
21. Consumed more alcohol	6%	16%	8%	39%	55%	15%	19%
22. Made Benefit applications (EI, CERB, etc.)	29%	14%	8%	11%	42%	19%	19%
23. Made plans to care for non-household members	7%	73%	4%	9%	19%	5%	18%
24. Made plan to care for household members	1%	61%	1%	3%	15%	3%	12%
25. Consumed more cannabis	0%	3%	1%	1%	65%	4%	7%
26. Used more tobacco products	0%	1%	1%	0%	50%	6%	5%

Table 3: Socio-demographic, residential and employment profiles of the Six Population Segments, Canada 2020



Socio-Demographic profiles	Hygienists (25%)	Caregivers (14%)	Sound-Body Minders (23%)	Home-centric (19%)	Media-centric (9%)	Oblivious (10%)	All Segments (100%)
% 35 years old or under	30%	28%	15%	48%	52%	24%	33%
% 65+ years old	28%	20%	32%	6%	4%	23%	19%
% Female	54%	55%	47%	51%	48%	43%	50%
% Married & Common Law	64%	72%	71%	57%	43%	56%	60%
% Single marital status	26%	21%	16%	35%	48%	31%	30%
% Canadian Born	74%	78%	75%	73%	83%	80%	77%
% living in households with a 18 year old or under child	32%	38%	25%	46%	33%	27%	34%
% High School Diploma or less	49%	37%	37%	31%	42%	42%	40%
% University education equivalent to bachelor or more	20%	30%	30%	44%	26%	17%	28%
% Urban Residence	83%	86%	79%	85%	90%	83%	84%
% Living in apartment building	19%	16%	20%	19%	23%	21%	20%
% Employed at work for at least part of the reference week	13%	45%	38%	77%	38%	23%	39%
% Work location at home	83%	86%	79%	85%	90%	83%	84%

Table 4: Psychosocial Profiles of the Six Population Segments, Canada 2020

Psychosocial profiles	Hygienists (25%)	Caregivers (14%)	Sound-Body Minders (23%)	Home-centric (19%)	Media-centric (9%)	Oblivious (10%)	All Segments (100%)
% Agreeing they most likely lose job in next 4 weeks	19%	20%	11%	14%	22%	16%	17%
% Stating that the COVID-19 confinement will have moderate or major impacts in life	29%	30%	14%	23%	39%	23%	26%
% Reporting a poor or fair mental health state	18%	25%	13%	24%	49%	22%	25%
% Reporting moderate/severe level of generalized anxiety	17%	25%	9%	13%	43%	19%	21%

Source: CPSS-Series2 Survey, Statistics Canada, 2020

5.0. Reflections

One major contribution of the market segmentation analysis carried-out here is the discovery of new behavioural patterns and the ability to link statistical methods to the monitoring of outcomes in COVID-19 confinement restrictions. A marketing segmentation approach can help federal, regional and local decision makers to better identify universal market segments and tailor segment-suited interventions. Rather than “one size fits all” results, public health programs and activities can be developed for each population cluster and provide tools that can change perceptions and develop more effective responses to tackle positive and negative outcomes of the always changing COVID-19 confinement environment.

It should be noted that the available public version of the CPSS-Series2 survey, regrettably, did not contain provincial or territorial breakdowns and was limited to individual reporting during the “first” phase of the pandemic (May, 2020). CPSS-Series3 findings singled out some of these which included differences in terms of wearing masks and physical distancing as COVID-19 safety measures are relaxed (Prairies vs. Ontario and Quebec, rural vs. urban areas). In the “second” and subsequent phases of the pandemic, shifts in the share of segment composition are likely to occur and so it is desirable to produce a larger longitudinal picture. More frequent surveys carried out by Statistics Canada and other data collection agencies are desirable and could yield important information on common transitions from one cluster to another (e.g. from Oblivious segment members to others) and the perceptions and behaviours of segment members surrounding the transition.

In this study, six population segments were clearly identified using a combination of principal component and k-means cluster statistical analysis of members of the first four segments (Hygienists, Caregivers, Sound Body Minders, Home-centric, Media-centric and Oblivious). Overall, members of the first four segments, have developed various coping styles to deal with the COVID-19 environment restrictions and are, for the most part, compliers with the present sanitary guidelines imposed by federal, provincial and local health authorities. However, members of the “Media-centric” and “Oblivious” clusters are, for different reasons, more likely challenging to reach by health authorities. The former group is problematic in terms of mental health related issues and the latter by some degree of negligence in following the imposed sanitary guidelines. These last two segments are vulnerable to the more negative impacts of confinement such as mental health deterioration, isolation, food insecurity and human cost (see the work of Zajacova et. al,2020). It is suggested that appropriate messages need to be tailored to reach these audiences to promote personal wellbeing and safety.

6.0. References

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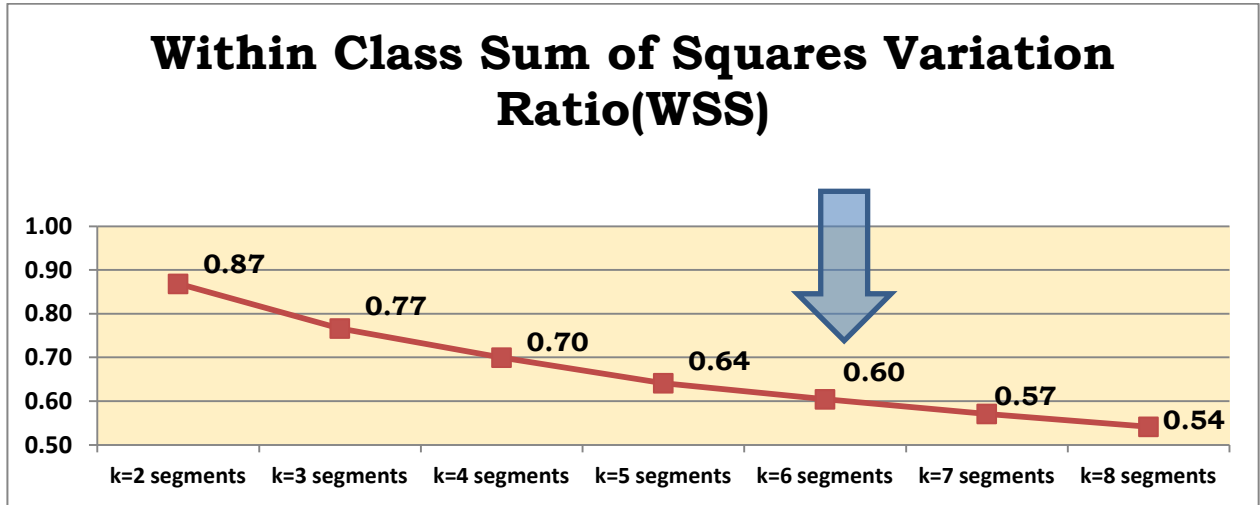
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7.0. Technical Appendix

Chart A-1: Within Class Sum of Squares Variation Ratio for various cluster solutions



Source: CPSS-Series2 Survey, Statistics Canada, 2020

Table A-2: ANOVA F tests predicting Socio-Demographic, Residential, Employment and Psychosocial Characteristics of CPSS-Series 2 survey Respondents

ANOVA Results	Sum of Squares	d.f.	Mean Square	F Ratio	Sig.	R Square
Age group of respondent	266.5	5	53.3	30.8	0.00	0.06
Sex of respondent	7.1	5	1.42	5.7	0.00	0.01
Marital status of respondent	64.3	5	12.8	8.2	0.00	0.02
Immigration status	1.6	5	0.3	2.2	0.05	0.00
Child under 18 resides in dwelling	4.6	5	0.9	4.1	0.00	0.01
Type of dwelling	26.9	5	5.4	4.3	0.00	0.01
Highest level of education	377.4	5	75.5	24.1	0.00	0.04
Telework Status	556.7	5	111.4	122.8	0.00	0.19
Employment Status	95.4	5	19.1	46.2	0.00	0.08
Rural/Urban indicator	4.8	5	0.9	6.2	0.00	0.01
Loosing Job in the Next Weeks	61.9	5	12.4	8.7	0.00	0.02
Mental Health State	131.2	5	26.2	23.3	0.00	0.04
COVID19 Impacts	153.3	5	30.6	17.6	0.00	0.03
Severity of Generalized Anxiety	222.4	5	44.5	39.1	0.00	0.07

Source: CPSS-Series2 Survey, Statistics Canada, 2020