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Research Article

Effect of Cognitive Influence on Consumer Online Health Information Seeking for Supplemental Nutrition: A Study of Young Urban Professionals of Kuala Lumpur

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Abstract

This study examines the influence of contemporary literature-supported cognitive influences on consumer Online Health Information Seeking (OHIS) and Online Health Information Usage (OHIU) Intentions; taking a case of supplemental nutrition-related information seeking and Kuala Lumpur's resident young urban professionals (23 to 38 years of age, educated professionals or business owners of Malaysian nationality) as the target survey population. This study found that Internet Self-Efficacy and Perceived Health Risk both exhibit a strong positive influence on consumers' Intention of OHIS, while Perceived Health Value and Perceived Value of Information Seeking exhibit a moderate positive influence on Intention of OHIS. On the other hand, Health Self-Efficacy and Perceived Value of Privacy were found to exhibit a moderate negative influence on Intention of OHIS. Similarly, Perceived Information Content Quality exhibit a strong positive influence on consumers' Intention of OHIU, while Perceived Information Source Quality and Perceived Information Value exhibit a moderate positive influence on Intention of OHIU. It was also found that Personal Bias exhibit a moderate negative influence on Intention of OHIU. Also Intention of OHIS was found to exhibit a moderate to strong positive influence on Intention of OHIU. The study utilised a Self-Completion Questionnaire Survey and analyzed the collected survey data using a PLS Algorithm Path Analysis Test on Smart-PLS 3 statistical software..

Keywords: cognitive influence, online health information seeking, online health information usage, perception

1. Introduction

The internet is often the first place consumers turn to for health information search, and expectations about finding useful information on the internet are ever increasing [1]. Consumers generally seek online information on a wide variety of health topics, ranging from healthy lifestyles (exercise and nutrition), causes of symptoms, and the severity of a condition, to treatment options and prognoses [2]. Additionally, Online Health Information Seeking or as abbreviated as "OHIS" is used for a range of other purposes, including seeking advice, connecting with experts and individuals with similar experiences, sharing questions and concerns around treatment options, or understanding professional diagnoses [3]. According to [4], "*more people are posing health questions to Google than to their doctors*". Online health information seekers generally encounter a plethora of different online sources of information, from a variety of organizations and individuals, and of varying quality, accuracy and reliability [4], presenting challenges in evaluating and selecting the sources to use, and more specifically in

assessing the credibility and trustworthiness of those sources [5]. Interestingly, [6] presents an emerging issue that consumers, due to their cognitive differences and subsequently varied cognitive influences, understand different aspects of health information differently, depending on whether it is media-related, people-related, actively sought or passively sought; and also seek different types and amounts of information depending on their specific contexts and needs. Another highlighted challenge of modern times is that online mediums and the range of information channels available to the health information seekers have further proliferated [7], [8], [9], and the vast quantity of information can make it difficult for consumers to know what is good-quality information, leading to frustration and confusion and these variations in quality may lead to different levels of trust for different channels [10]. Cognitive influence, from the domain of consumer behaviour and psychology, in simple phraseology is defined as a perception, sensation, idea, belief or intuition resulting from the process of cognition i.e. the mental action or process of acquiring knowledge and understanding through thought, experience, and the senses [11]. Cognitive influence can also be elaborated as "cognitive evaluations" of an individual to an object, interface or mode of communication [12] which significantly affect all aspects of consumer behaviour – particularly information search behaviours, information processing and the subsequent consumer learning as a stage of the consumers' buying decision process. There is limited prominent recent research from the knowledge domain of OHIS, which has individually explored the field from the perspectives of consumer online information evaluation [13], relationship between health beliefs and OHIS [14], information source selection in OHIS [2], [13], general consumer trends in OHIS [15]–[17], [22], social value and information quality in OHIS [18], role and comparison of search engines and social media in OHIS [3], and broad review of different information search consumer approaches in OHIS [19]. However, there is a significant gap to further explore the effect of cognitive influences on consumer OHIS, providing a detailed insight into the knowledge-centric, confidence-centric, value-centric, risk-centric, quality-centric and preference-centric cognitive variables and their subsequent effect on the consumer intentions to OHIS and also, Online Health Information Usage / OHIU, as [6] suggests that it may be valuable in future studies pertaining to this knowledge domain to consider OHIS as a "*continuum of information seeking, rather than a discretely occurring behaviour*". Therefore, the cognitive influences on both consumer OHIS and OHIU should be explored in one sequential consumer decision making process flow. According to [20], OHIU can be on three key dimensions for the consumer: "*changing decisions*", "*consulting others*", and "*promoting self-efficacy*". [2] also specifically suggest that online health information source selection is not solely dependent on source accessibility and quality (as concluded by most previous researches), but also on other cognitive factors and decision rules, and suggest future research on factors related to consumers' cognitive and emotional states, which have been rarely studied in modern consumer health information source selection theory. [3] also suggests similar future research to understand the cognitive characteristics of online health information seekers, as it is difficult to infer differences in their cognitive norms of use in online searches, compared to its physical manifestation (traditional offline information searches). As for the supportive argument pertaining to the possible research population for the proposed study, [21] suggest that those with more education, a younger age, and a high income and those who are employed seek online health information more frequently compared to the rest of the potential consumer segments. [22] also state that younger consumers with higher education and English proficiency are more likely to engage in OHIS. In justification of the geographic scope of the proposed study, Malaysia offers one of most potent digital landscapes in the world. According to Datareportal Digital 2020 Statistics, there were 26.69 million internet users in Malaysia as of January 2020; the number of internet users in Malaysia increased by 919 thousand (+3.6%) between the years 2019 and 2020; and the internet penetration was recorded at 83% in January 2020. The same statistics also indicated that there were 26.00 million social media users in Malaysia in January 2020, which is an increase of 1.0 million (+4.1%) since April 2019; and the social media penetration was recorded at 81% as of January 2020. The Datareportal Digital 2020 Statistics further recorded 40.69 million mobile connections in Malaysia as of January 2020, which is an increase of 175 thousand (+0.4%) since January 2019 and the number of mobile connections in Malaysia as of January 2020 were equivalent to 127% of the total population. According to Department of Statistics Malaysia 2019 Survey, the percentage of household access to internet increased to 90.1% (+3.1%) and that of mobile phone remained steady at 98.2%. The same statistics also indicated percentage of individuals using the internet has increased by 3%, from 81.2% in 2018 to 84.2% in 2019, and the percentage of individuals using mobile phones remained steady at 97.9% as of the year 2019. The Department of Statistics Malaysia 2019 Survey further recorded that 83.5% of the Malaysian internet users actively use the internet for specific information searching, 97.1% for social networking, 84.7% for downloading online content, 77.4% for telephoning over the internet / VoIP and 77.1% for downloading software and applications. According to Malaysian Communications and Multimedia Commission (*Suruhanjaya Komunikasi Dan Multimedia Malaysia*) 2020 Survey Report, 1.3% (9.6% in 2018) of the Malaysian internet users spend less than 1 hour per day on the Internet, 24.9% (39.2% in 2018) spend 1 to 4 hours, 28.6% (23.9% in 2018) spend 5 to 8 hours, 21.5% (13.4% in 2018) spend 9 to 12 hours, 9.0% (5.7% in 2018) spend 13 to 18 hours and 11.5% (8.1% in 2018) spend more than 18 hours per day on the Internet as of the year 2020 – hence 26% (49% in 2018) of the Malaysian internet users are categorized as "*mild users*", 50% (37% in 2018) as

"*regular users*" and 21% (14% in 2018) as "*heavy users*" of the Internet as of the year 2020. The same report also indicates that 43% (62% in 2018) of the Malaysian internet users were sharing content online in 2020, and smartphones were the most popular device to access the internet by Malaysian internet users, reaching a near-saturation usage level at 98.7% in 2020. The Malaysian Communications and Multimedia Commission 2020 Survey Report further indicated that 2.5% (3.7% in 2018) of the Malaysian internet users have been using the internet for less than a year, 12.2% (11.7% in 2018) for 1 to less than 3 years, 15.8% (15.0% in 2018) for 3 to less than 5 years, 21.0% (32.7% in 2018) for 5 to less than 7 years, 19.1% for 7 to less than 10 years, 18.0% (25.0% in 2018) for 10 to less than 15 years and 10.2% (11.9% in 2018) for more than 15 years as of the year 2020; and the locations to access the Internet by the Malaysian internet users were recorded to be the workplace at 30.1%, on-the-go at 64.4%, commercial internet facilities at 2.0%, community internet facility at 4.2%, place of education at 8.2%, home at 70.5%, free Wi-Fi location at 6.0% and another person's home at 1.3% as of the year 2020 (70.5% of the home access of the Internet is attributed to the COVID-19 pandemic and the subsequent Movement Control Orders / MCOs in Malaysia). The Malaysian Communications and Multimedia Commission 2020 Survey Report further recorded that 74.3% (85.5% in 2018) of the Malaysian internet users use the Internet to get specific information, 93.3% (85.6% in 2018) to visit a social networking platform and 87.3% (77.6% in 2018) to watch videos as of the year 2020. A recent survey of OHIS behaviour patterns of over 18 years old adult consumers of Klang Valley Malaysia [23] reveals that about 27% of the target population search online health information "several times a day", 7% search "once a day", 9% search "three to five times a week", 21% search "one to two days a week", and 23% search "once a month"; and also that 55.4% of the consumers use OHIS to seek information relating to "*diet, nutrition, vitamins, or nutritional supplements*", an information category which was found to be the most abundantly searched health topic amongst the target population – even more abundant than "*disease-related information*" (43.4%) and "*exercise and fitness*" (48.8%).

2. Literature Review

Seeking Domain of the OHIS Continuum

Firstly discussing the Health Risk and Self-Efficacy, Health Perceptions are the cognitive representations or beliefs that consumers have about health conditions or diseases. They are influential predictors of how consumers behave during their health condition experiences and are directly associated with positive health outcomes [24]. As recent studies reveal, more positive health perceptions are related to more positive health management and outcomes [25]. Recent studies have also revealed that provision of customized online health information to consumers can influence the formation of more positive health perceptions [26], [27]. [14] presented a framework to understand consumer acceptance of online health information services by amalgamating the Health Belief Model / HBM, first developed by social psychologists to explain health-related behaviours in social psychology and health science (Janz and Becker 1984, Rosenstock 1966, 1974), later applications by [28] - and the Extended Valence Framework / EVF by [29] (an extension of the Valence Framework / VF - Bilkey 1953, Peter and Tarpey 1975). In a nutshell, Health Beliefs Model / HBM states that an individual's tendency to adopt health-related behaviours is determined by perceived threats and outcome expectancies. Perceived threats include the Perceived Susceptibility - feeling of vulnerability to a health condition, or a risk perception of contracting a health condition, and Perceived Severity - seriousness of the clinical or social consequences of a health condition. Outcome expectancies include the perceived benefits of adopting the health-related behaviour relative to the perceived barriers associated with performing the behaviour. Self-Efficacy (in general) - belief in one's ability to succeed in specific situations or accomplish a task to adopt the behaviour - has been an addition to the model in recent study of [28]. The Valence Framework / VF, on the other hand, is based on the premise that perceived risks and benefits are two basic aspects of consumers' purchasing behaviour. The Extended Valence Framework / EVF, presented by [29], states that trust beliefs precede risk perceptions and perceived benefits, and all three in combination are influential predictors of online consumer behaviours. [14] framework drew on the EVF to include trust and its effects on both perceived benefits as well as perceived risks, and identified consumer trust in the online health information provider's ability, benevolence, and integrity as relevant trust beliefs, which can further influence perceived risks, benefits, and intentions toward these services. The framework further drew on the HBM to include the influence of perception variables of perceived susceptibility, perceived severity and the possible interaction of self-efficacy with both susceptibility and severity to predict health information searching behaviours. Research conclusions showed trust beliefs to exert the strongest positive effect and perceived risks a direct significant negative effect on consumer acceptance. Perceived susceptibility was found important to consumer acceptance of online health information services and also having a significant positive effect on perceived severity. Self-efficacy was found to have non-significant effects on consumer behavioural intentions; but moderated the effect of perceived severity on the intentions. Contrary to these findings, [30] draws attention to the importance and potential consequences of self-efficacy (or lack thereof) in OHIS as an area of future research – particularly negative

influences of consumers' cognitive biases on their abilities to successfully retrieve and evaluate the credibility of health information online and to effectively apply information for the betterment of their lives. [28] also found that self-efficacy and perceived threat play a small, yet significant, role in explaining online mental health information seeking. Also based on an integrated model extracted from HBM and Technology Acceptance Model / TAM, [31] study and subsequent framework on health information seeking of women online health information seekers provides insights into the positive effect of perceived health risk (perceived susceptibility and perceived severity) on perceived usefulness of health information seeking (perceived value of information seeking) using the internet via the influencing role of health consciousness (perceived health value) and concludes that women consumers who exhibit high levels of health consciousness (compared to medium and low levels of the same) tend to have a more positive attitude to their own health, which in turn results in health information seeking behaviour / OHIS intentions. However, past researches basing their research construct on the HBM have largely overlooked the "*Perceived Rarity*" component of Perceived Health Risk, besides *Perceived Susceptibility* and *Perceived Severity*. Perceived Rarity is the consumer perception about the rarity or exclusiveness of a health condition or disease, and this risk perception can potentially exhibit an imperative influence on consumers' health information seeking behaviours [32]. According to [33], consumers with severe health conditions prefer the physician / expert opinion leader to take a major role in the decision making process and to provide them with the necessary information for health management. However, in the case of rare health conditions or as perceived so, consumers tend to become experts of their own health condition in gathering related health information for health management [32], [34]. [35] on the other hand, state that consumer organizations are most often the main or only source of information for consumers with rare health conditions. Past studies have identified that those with a higher levels of health self-efficacy rating are more likely to continue a positive health behaviour change, compared with those with lower levels of health self-efficacy [36]. Also OHIS itself has been found to exert a positive influence on consumers' health self-efficacy levels [37], particularly the type and timing of online information use in OHIS [38]. Taking a different angle of the debate, it has also been found that consumers who actively and frequently engage in OHIS have higher health self-efficacy levels in comparison to those consumers who only interact with their physicians about health-related matters [39]. While "*Internet Self-Efficacy*" refers to belief in one's ability to accomplish a task or get desirable outcomes while using the internet; "*Health Self-Efficacy*" refers to belief in one's ability to accomplish a task or get desirable outcomes while managing personal health. According to [20] study, patients engaged in OHIS in the face of health problems were associated with having higher levels of self-efficacy on (i) searching for valid, accurate, and credible health information; (ii) using the health information; and (iii) making correct health judgments. Also, consumer familiarization with the internet and previous digital knowledge and experience, what is referred as internet self-efficacy, in OHIS is a pertinent factor behind consumers appreciating the internet as a good resource for seeking health-related information [40]. Internet self-efficacy is also referred as, by some researches, as "perceived ease of internet use" [31]. Recent studies have shown that the more frequently consumer use the internet for themselves, the more they perceive it to be a good resource to improve their health-related knowledge [40], [41]. Highlighting another factor of influence, [38] states that "*perceived severity*" of a health condition (i.e. seriousness of the clinical or social consequences of a health condition – which is a pertinent component of consumers' overall health condition perception) and health self-efficacy are interconnected and seem to influence one another, besides influencing the overall OHIS consumer process. [42] also found that consumers' "*perceived health status*" is connected to the frequency and diversity of online health information searches, but this perceived health status is not necessarily indicative of a preference of the internet as a health information source. Building upon the same debate, health condition perception, in general, is the cognitive representation or belief that a consumer has about his / her current health or medical condition; and this is an important predictor of how a consumer will behave during his / her long-term health or medical condition experience, which is directly associated with the number of health outcomes [25], [43], [44]. In some past studies, health condition perceptions are also referred to as "personal models of illness" [45]. However, past studies have also shown that provision of adequate and customized online health information to consumers can influence the formation of more positive health condition perceptions [26], [27]. Negative health condition perceptions, on the contrary, are directly associated with consumers' overall impaired quality of life and health-related outcomes across many recent past studies of consumers with chronic health conditions [46]–[48], and are also possibly associated with the consumer rejection of additional online health information due to the prevailing belief that additional knowledge would be futile in health management [49]. Consumers are thought to initially engage in OHIS in order to reduce perceived health risk, owing to their sense of uncertainty over their current health condition / status and a perceived health knowledge gap [50]. However, [21] state that online health information seekers with health anxiety misinterpret medical information and "perceive" health issues as being more dangerous than they really are – this is considered "hypochondriasis", which entails a negative consumer bias toward disease-related information, and this information misunderstanding can cause a cognitive bias toward perceiving personal threats and catastrophes. [51], on the other hand, reported that seeking health information online itself may exacerbate the severity, duration, and frequency of health anxiety. Similarly from

the context of a public health crises (such as the prevailing COVID-19 outbreak), OHIS itself has been found to play a crucial role in the public awareness of the prevailing health risks which are most often invisible or remote to the majority of the population [52]–[55]. According to [21], the frequency and number of health information website visits are significantly associated with health anxiety (i.e. people who are more anxious about their health are more likely to frequently seek health information and browse more websites). Similar to these findings some past studies have also concluded that higher perceived health risk / anxiety, from a broader perspective, reflects higher levels of uncertainty regarding health and greater health information insufficiency [56], [57], which, as a result, leads to consumer health information seeking behaviours in general [58], [59], and therefore, also possibly to the consumer intention to OHIS [50], [60], [61]. [62] presents a different angle to this debate and state that engaging in OHIS can be seen as beneficial as it reduces the perceived health risk / health anxiety of consumers by addressing their relevant health knowledge gap, and subsequently, their health uncertainty (both factors which contribute to their overall health anxiety development). [63] indicated a positive correlation between the frequency and placement of serious illnesses on result pages and negative emotions (e.g. feeling overwhelmed and frightened). [64] suggest further research on the impact of the "perceived seriousness" of the health issue being researched and the consumers' previous related product / service experience and knowledge on OHIS. [65] also suggest future research in studying the impact of different types of perceived risks (which differ significantly with product category type) and their subsequent impact on both traditional information search and online information seeking. Furthermore, [66] suggest future research on understanding the consideration of different aspects of risk (both perceived and objective) in the consumer OHIS intention formation. Past studies have also found health anxiety to be an influential predictor of internet usage in the scenario of health caregiving / in the case of health caregivers for family members [67]. Existing research has also revealed the consumers' different motivations for OHIS in times of a public health crisis (such as the prevailing COVID-19 pandemic) when the general public health anxiety is on a much higher level [68], [69], emphasizing on the needs for additional information, receiving timely and unfiltered information, learning about the magnitude of a public health crisis, checking on family and friends, mobilizing, connecting with a community and fostering emotional support [70]. In such circumstances, early and intensive public health communication, which consumers can effectively and positively decipher, is associated with the necessity to counter rumours, alternative views and potential panic / public hypochondria [71], since in a more recent survey pertaining to OHIS related to the COVID-19 pandemic, 45% of the survey population claimed to have had difficulty finding trustworthy sources and reliable guidance during their preliminary OHIS [72]. Contemporary literature pertaining to consumers' health behaviours during the COVID-19 pandemic also suggests that the domain of perceived health risk stretches beyond the traditional hazard attributes (perceived susceptibility and perceived severity) and is primarily based on cognitive factors such as experiences, beliefs, attitudes, judgments, conceptions (or on the other hand, misconceptions) and feelings, as well as wider social, cultural and institutional factors [73]. Although perceived health risk acts as a trigger for health precautionary measures, consumers' adoption of health precautionary measures is not merely determined by their awareness of the objective health risks, but also influenced by their health beliefs and specific health cognitions [74]. [75] identifies some key features explaining perceived health risk and their influence on consumers' decision-making, which are: familiarity, controllability, voluntary exposure, potential catastrophe, equity; immediacy of danger and level of knowledge. [73] state that perceived health risk, according to the approach of [75], is the subjective judgment that consumers create regarding the characteristics, severity, and way in which the perceived health risk is addressed or managed. Therefore, one of the most pertinent aspects is the sense of outrage and indignation that the perceived health risk generates, which magnifies health anxiety and swiftly spreads through the society [73]. Literature also defines perceived health risk as "a product between hazard and outrage", being a probabilistic assessment produced by drawing a comparison between the likelihood that a health hazard occurs (perceived susceptibility) and the perceived seriousness (or perceived severity) of the potential damage caused by the health hazard [76]. [73] building upon the findings of [77] and from the perspective of consumers' perception of the prevailing health risk during the COVID-19 pandemic, state that voluntariness (if the health risk is taken voluntarily by the consumer, it is perceived lower in intensity), knowledge (unusual or unknown risk to the consumer is perceived with a higher intensity), visibility (invisible risk is perceived as more hazardous than a visible one) and trust (if the consumer has confidence in those managing the risk, say physicians or public health management, it is perceived lower in intensity) are all possible factors that increase or mitigate perceived health risk. Consumers' perceived health risk in the case of particular virus outbreaks before the COVID-19 pandemic, more specifically the influenza A (H1N1) outbreaks in the Netherlands and Hong Kong, has also been highlighted by contemporary literature as the most significant factor contributing to an increase in the general public's participation in adopting preventive measures [78]–[80]. According to the Protection Motivation Theory / PMT by [81], the intention of the general public to adopt precautionary measures is significantly influenced by higher levels of perceived health risk. The theory states that general public's perceived susceptibility and perceived severity of a particular health threat determines their perceived health risk concerning the potential health threat. Perceived health risk has also been found to be an

affective emotional response to a potential health threat, in this case the COVID-19 pandemic, which can predict protective health behaviours independent of the health threat's severity [82]. [83], while studying the initial psychological responses of consumers during the Swine Flu outbreak, state that the consumers' anxiety related to potential health threats does not occur independently in a vacuum, rather under certain circumstances where a consumer might be quickly affected or influenced by the emotional reactions of others, which reveals a strong correlation between perceiving the health-related anxieties of family and friends and the consumer's personal health concern. According to [82] and from the perspective of the COVID-19 pandemic, the social context (i.e. the socio-economic class the consumer belongs to) may also affect the experienced levels of health-related anxiety (the lower income class can potentially be more concerned with issues such as the unequal and unfair distribution of health services, which can increase their health-related anxiety). Thus, during a particular disease outbreak, the lower socio-economic classes may experience emotional responses to health risk, more health risk perceptions, increased negative emotions and expressions such as anger or fear, and subsequently, huge apparent challenges to their health risk reduction [84]. Another factor possibly influencing consumers' health-related anxiety, as highlighted by contemporary literature, is the conservation values of the consumer such as security, conformity and tradition i.e. consumers who emphasize conservation values would carefully put to practice health precautionary measures, whereas consumers with the opposite values such as high self-direction, stimulation and hedonism based on Schwartz's model [85] may pay less concern to the desirable health behaviours [83]. One more factor which may contribute towards shaping perceived health risk in consumers from a potential health threat is trust, which being the consumers' prime mechanism of receiving, interpreting and responding to public health messages [82]. Some literature suggests that the mass media (which includes the internet and OHIS) has the lowest trust position in such an event [86], [87]; however other studies suggest otherwise, citing it as a promising mean with which to provide health-related information that potentially influences consumers' health behavioural outcomes on a significant scale [88], [89]. Studies of both [86] and [90] pertaining to the consumers' health-related behaviours during influenza A (H1N1) and COVID-19 outbreaks respectively suggest that, due to the disseminating potential, OHIS has become a predominant factor in driving the change of precautionary health-related behaviours, as well as minimizing the risk of the virus outbreak spread within the community, resulting in the positive association between OHIS and disease control behaviours on the part of the consumers. It is therefore hypothesized:

H1: Perceived Health Risk (Susceptibility, Severity and Rarity) has a Significant and Positive Effect on Intention of Nutrition-Related OHIS

H2: Internet Self-Efficacy has a Significant and Positive Effect on Intention of Nutrition-Related OHIS

H3: Health Self-Efficacy has a Significant and Positive Effect on Intention of Nutrition-Related OHIS

Past studies have produced evidence in support of the effect of perceived value of information seeking on consumer attitude towards internet use in health behaviours [91], [92]. More recently, [93], while exploring the factors that influence consumers' mobile health information seeking (MHIS), presented an interesting framework to gauge the impact of information quality (fitness for use and reliability of information – based on parameters of relevance, sufficiency, accuracy, and timeliness), perceived value (overall evaluation in regards of output and input - basing the value construct on social, epistemic and utilitarian values), personal health value (general health-orientation) and trust (grounded on the parameters of ability, integrity, and benevolence) on the intention of mobile health information seeking / MHIS and intention of mobile health information use / MHIU – taking consumers' current health status (both physical and psychological) as a moderating variable. In the Perceived Value of Information Seeking construct, epistemic value refers to the value obtained from information seeking which arouses curiosity, to offer novelty, or to satisfy a desire for knowledge (parents as child caregivers, for example, in [94] study reported greater control over seeking online child health information to increase their general knowledge and understanding than in using it to diagnose / treat their child); utilitarian value refers to the value obtained from what the consumers need from information seeking (say to solve a health problem or address a concern), and social value refers to the social utility derived from information seeking - people tend to belong in a group, whether online or offline, and the perception of belonging to a specific group could enhance the perceived value [95]. [93] research concluded that information quality, perceived value, and trust positively affect both the consumer intention to seek and to use health information through mobile and the intention to seek affects the intention to use, and out of the three components of perceived value construct, the utilitarian and epistemic values were found to have significant effects on intention to seek. In addition, the current health status of consumers moderated the relationships between intention of MHIS and intention of MHIU, and their determinants. [18] also utilized the same perceived information value construct as [93] in their framework and stated that when satisfied users make their decisions to repeat OHIS or information sharing on internet and digital social networks, they consider representation quality / RQ (i.e. interpretability, compactness, conciseness, ease of manipulation, and consistency of the format) and context quality / CQ (i.e. higher relevance, completeness, appropriateness and timeliness) of health information more than intrinsic quality / IQ

(i.e. accuracy, reliability and correctness) and access quality / AQ (i.e. ease of access to information, provisions which enhance obtainability of information, speed of OHIS, compatibility or manipulability of information formats). "*Perceived Value of Information Seeking*", from the context of this study, refers to the nature and extent of the value of online health information seeking for the consumer as an activity in itself, and drawing from the *Theory of Consumption Values* by [95], which has also been used as the core underlying theory by [18], [41], [93] studies, the complete dimensions the information seeking value construct include epistemic (increasing knowledge or mitigating curiosity), utilitarian (addressing a health problem or concern), social (enhancing social appeal or sense of belongingness to a particular group), convenience (offering ease of access and use) and emotional (reducing health-related anxiety / stress) values. [40] state that parents associate high utilitarian value with OHIS in the capacity of caregivers for their children. With reference to selected literature from the initial phase of academic research on the domain of OHIS, [96]–[98] argue in their past studies that consumers are generally motivated to seek online health information for a range of reasons which include sense of hurriedness and receiving limited lifestyle guidance from their doctors / consultations; finding more up-to-date information, internet being readily accessible source of information, finding alternative options for treatment, and to augment their understanding of their health issue before or after a professional consultation. According to [41], convenience value (i.e. 24/7 access to ready and immediate health information) is the most significant reason for consumers engaging in OHIS. Similar observations were reflected in [23] study of Malaysian over 18 years old adult consumers from Klang Valley which showed that 63.1% of the respondents seek online health information because of time saving, 46.7% because of convenience of access, 39% to obtain up-to-date information immediately, 27% because of less cost of accessing compared to other traditional sources, 25% to obtain comprehensive information, 32% due to ease of use, and only 17% because of the high credibility of the online information sources. Other than the previously mentioned possible consumer motivations of OHIS, [99] identify consumer privacy as the paramount aspect of the eHealth environment. Perceptions of social costs and a belief that one's image maybe jeopardized by seeking health information is identified, by past studies, as a pertinent factor which can possibly influence the OHIS behaviour of consumers [100]. More recently, [101] study also identifies consumers' "concerns about the disclosure of problems or illness to others" as one of the three key barriers to OHIS. [102] in their statistical study determined that 36% of consumer respondents knew that advertisers are allowed to track their visits to health-related websites while engaged in OHIS, while [103] revealed that 67% of consumer respondents agreed with the statement that online health information seekers have lost all control over how their personal health information shared online may be collected and used by a third-party (companies or advertisers). The importance of privacy has also been recognized in a number of works, mainly [104] and proposal by [105] lists it in an "ethical checklist" for eHealth systems. [3] state that consumers do, in some cases, underestimate the privacy implications of pursuing health content on public online channels while engaging in OHIS. New practices raise concerns about matters such as privacy. [106] showed that people often made errors in determining what health information was shared with whom in their social network. Closely related to information disclosure on online social platforms is the inherent stigma ascribed to many health conditions [3]. Social stigma describes negative feelings towards an individual or group on socially-characteristic grounds that distinguish them from others. [3] showed that compared with those with non-stigmatized conditions, those with stigmatized illness were more likely to find health information online; similar to [23] study which states that 46.1% of Klang Valley Malaysia adult consumers engage in OHIS to learn about a sensitive health topic which, being stigmatic by nature, is difficult to talk about with others. However, [107] showed that video logs (to help people share stories, experiences, and knowledge) could possibly support the disclosure of serious illnesses such as HIV, helping those afflicted overcome aspects of social stigma. [3] suggest that despite being aware of the privacy risks of search engine use or public social media use, consumers use both, though differentially, to seek and share information on conditions which are socially considered to be stigmatic. Past studies also suggest that caregivers dealing with a stigmatized condition (depression and suicidal tendencies in particular) obtain valuable support from online social groups [108]. Contrarily, [109] argue that concerns regarding external environments (e.g. consumers considering internet environment as dangerous and worrying that their information may be stolen or disclosed) hinders consumers from engaging with the online environment and disclosing information; from the context of online shopping in particular. According to [21], one of the key benefits of OHIS for consumers is lack of embarrassment and privacy protection, especially for those with chronic health problems. When a health condition is stigmatized, such as herpes, consumers are more likely to use the web for information, whereas for less stigmatized subjects, turn to family and friends for information [2]. The confidentiality of consumers' personal information in the domain of health remains to be a sensitive subject as consumers are largely aware of the fact that their health-related information can potentially be stored in data servers as digital records or logs and also about the fact that privacy of health information is the individual right of a consumer so as to prevent his or her health-related information from being disclosed without their consent to any entity for commercial or non-commercial motives [110]. Health-related confidentiality and privacy has been found to be particularly important to the younger health information seekers [109]. "*Perceived Value of Privacy*", from the context of

this study, refers to the value of health-related privacy for the consumer or the value of maintaining secrecy pertaining to health status, problems or concerns. [110] identify two main reasons behind the importance of health-related privacy for consumers; firstly maintaining anonymity to protect personal identity and individuality; and secondly, possible functional benefits of maintaining health-related privacy such as fostering social and professional relationships, particularly in the case of stigmatized health conditions like STDs, depression or health complications as a result of substance abuse. [73] from the perspective of consumer health-related behaviours during the COVID-19 pandemic, suggest as a recommendation for public health management during a pandemic crisis that "*attention to the aspects of equity and the respect for rights and privacy should be maximized*". [93] state that consumers with higher perceived health value (i.e. *general perception about the importance of good health in life*) rely heavily on the trustworthiness of the providers and information quality in seeking health information through internet and mobile phones and similarly, the trust of consumers on the provider influence their decisions on whether they should follow treatment solutions and whether they should share the information with others. [42] also found that perceived health value can significantly affect all stages of OHIS. Perceived health value has previously been investigated as an antecedent of health behaviour in general [111], [112], [115], [116], and of OHIS [31], [42], [61] and also as an outcome variable [113], [114]. [115] explains perceived health value as consumers' general orientation towards overall health and conceptualized it as a concept comprised of mainly three core elements: self-health awareness, personal responsibility and health motivation; each being an imperative and impactful dimension of the concept. Perceived health value, from the perspective of consumer traditional / offline health information searches, has been found to drive consumers towards actively seeking health-related information because a consumer with high levels of perceived health value is generally motivated to engage in health preventive behaviours, such as health information seeking in order to maintain good everyday health [116]. [117] defines perceived health value or health consciousness as "*the degree to which a person is inclined to take health actions*"; having the characteristics of a consumer being sensitive to physical health stress and health hazard factors [118]. "*Perceived Health Value*", from the context of this study, refers to the health consciousness of the consumer or the value of maintaining overall good health for the consumer. [119] suggests that perceived health value comprises of four possible dimensions of health self-consciousness, health involvement, health alertness and health self-monitoring. According to [115], perceived health value has three potential dimensions of health self-consciousness, personal responsibility and health motivation. Literature suggests that there appears to be a consistency between perceived health value of consumers and their health-related behaviours. Consumers with high perceived health value tend to have a better understanding of health on their own, pay concern to their individual health problems, and adopt health precautions and measures to ensure their personal health [120]. Generally, consumers with higher perceived health value tend to have numerous and diversified health-related goals pertaining to general health maintenance, nutrition, exercise and disease or disability prevention [121]. Once health life goals are formed, the motivation of the consumers to engage in health-related behaviours will also increase as a mutually-stimulant effect [122] and this health life goal orientation of the consumers has been found to have many positive effects on the consumers' health-related behaviours, life satisfaction and mental health [123]–[125]. [126] states that consumer consciousness itself, in general, is related to the cognitive function of preparing for relevant actions. The more the consumers are aware of something within their power, the more control they exhibit over it. Similarly, the stronger the consumers' perceived health value (health consciousness), the stronger is their belief or conviction that they can positively control their health outcomes, and the lower the probability that their health will be negatively affected by particular health hazards [121]. [121] while studying the relationship between health consciousness (perceived health value) and health-related behaviours (more particularly, home-based exercise) of the Chinese consumers during the COVID-19 pandemic suggest that health consciousness has a significant positive influence on health behaviours and perceived behavioural control acts as the mediator between health consciousness and health-related behaviours; and perceived health value can also influence health-related behaviours through health life goals and perceived behavioural control. It is therefore hypothesized:

H3: Perceived Value of Information Seeking has a Significant and Positive Effect on Intention of Nutrition-Related OHIS

H4: Perceived Value of Privacy has a Significant and Positive Effect on Intention of Nutrition-Related OHIS

H5: Perceived Health Value has a Significant and Positive Effect on Intention of Nutrition-Related OHIS

Usage Domain of the OHIS Continuum

Online Health Information Usage / OHIU, according to [20], includes three key dimensions: "changing decisions", "consulting others", and "promoting self-efficacy". [127] in their survey of OHIS patterns amongst consumers, pregnant women in particular, reported that 83% of the respondents actually put to use the online health information they had searched for and obtained. Furthermore, [128] study suggested that consumers were

more likely to change their lifestyles based on their OHIS if the searched online health information included specifically the topic of nutrition. [23] state that 46% of Klang Valley Malaysia adult consumers engaged in OHIS reported that the searched online health information affected a decision about how to treat a health condition, 44% reported effect on change of overall approach towards maintaining personal health or the health of someone they take care of, 24% reported that online information led them to ask doctor new questions or to get a second opinion from another doctor, 25% had changed the way they think about diet, exercise, stress management or other health related issues, and only a small percentage (9.5%) had changed nothing. However, studies show that this rapid increase in the use of online health and nutrition information has no corresponding increase in the quality of available online health information content, which can potentially be biased and there is little control over the timeliness of updates [129]. In information searches and health behaviours, consumers put to use the information which they perceive as of being of "good quality" and "trustworthy / credible" in general. Consumers' "perceived credibility" of the online health information, therefore, is a major predictor in shaping the consumer attitudes towards OHIS [61]. However, it is difficult for consumers to evaluate the quality of online health-related information because of prevailing inconsistencies between the content of different online health information sources [130]. Research also suggests that although most consumers engaging in OHIS are usually sceptical of trusting online health information, they may not pay attention to how they select the online health information [20]. Past research shows that older consumers tend exhibit a greater level of trust in online health information sources than younger consumers [131], [132], since older consumers have been found to be more experienced in discerning between high and low quality of online health information sources [42]. Utilitarian value, epistemic (knowledge) value, and emotional value are known constructs of perceived information value (as discussed earlier), which affect user satisfaction, and therefore should lead to OHIU. However, perceived social value is a much lesser known and lesser researched construct of information value which, according to [18] and [133], can also affect consumer satisfaction in OHIU. *Perceived Information Value*", from the context of this study, refers to the nature and extent of the value for the consumer of the retrieved online health information by the consumer as a result or consequence of online health information seeking. Drawing from the *Theory of Consumption Values* by [95], the complete dimensions the value construct of perceived information value will also include epistemic (increasing knowledge or mitigating curiosity), utilitarian (addressing a health problem or concern), social (enhancing social appeal or sense of belongingness to a particular group), convenience (offering ease of access and use) and emotional (reducing health-related anxiety / stress) values. Online health information differs considerably in reliability and incorrect or inaccurate information is common to find [134]. [135], on similar lines, state that today's consumers are highly involved in their healthcare and actively engage in OHIS using various non-advertising and advertising sources online and in doing so, they face a considerable challenge of comparing many different types of resources and determining the source of information and source trustworthiness. According to [136], consumers focus on quality, timeliness and appropriateness of information and this information search by consumers can be conducted in two forms; firstly paying attention to references and reports and \ or existing advertisements associated with intended product and obtaining required information, and secondly, referring to information in their memory and trusting it. [101] study states that the most important consumer criteria for assessing the quality of online health information (related to high-risk behaviours in particular), in respective order, are "trueness and correctness", "validity and reliability", and "understandability" of the information content. [135] research concluded that to determine whether a certain website is trustworthy or not in OHIS, consumers do rely on various website trust cues such as the website URL (e.g. .com vs .edu or .gov), site identity cues (e.g. Pfizer vs WebMD vs US FDA), advertiser or sponsor relations and third-party endorsements. [15] argued that consumers collect most information from news and blog articles in their OHIS. Alternatively, consumers can often use visual elements, such as design and graphics, to assess website credibility in OHIS [137], [138], often termed by some literature as "*surface credibility*" [139]. Addressing this particular debate, according to one study, poor website designs or content and number of advertisements and / or distractors are possible "quality-centric" barriers for consumers to engage in OHIS [94]. Past research has also found that the content and the design / style of health-related websites might influence the level of consumer trust in a specific piece of online health information [140], [141]. [142] in a past study conducted during the early internet phase of search engine dominance, emphasized the importance of five factors: accuracy, credibility, currency, clarity, and ease of understanding; as consumer criteria for assessing the quality of online health content in their OHIS. [2] state that when an information source is recommended by someone, particularly someone trusted by the consumer, it was more likely to be trusted and used; this factor tends to serve as an indicator of the quality of a source (trustworthiness and authoritativeness). [15] state that most often consumers face challenges to identify the disease accurately in their OHIS, despite the large amount of health information resource on the Web, and this is a result of factors such as disorganization, information overload and lack of knowledge of medical terminologies – all contributing factors towards e-Confusion. Vast quantity of information can make it difficult for consumers to identify good-quality information, leading to e-Confusion, and these variations in quality may lead to different levels of trust at different stages of OHIS [10]. [94] on similar grounds also suggest that understanding

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online heath information seekers' socio-cognitive processes that guide their use of online health information in the capacity of caregivers is important given the "sometimes-questionable" quality of health information available online, which can also result in e-Confusion. It is due to these concerns that [94] further emphasize that there is an urgent and imperative need for health professionals to provide health information seekers (particularly the ones in the capacity of caregivers) with evidence-based health information websites in addition to general public education on how to evaluate the quality and authenticity of online health information. Furthermore [2], in a purely qualitative study, presented an interesting debate that an information source in OHIS is a repository that carries and provides content and thus, an information source consists of two components: a *container* and the *content in the container*; both having an impact on source selection by consumers in OHIS. "*Perceived Information Source Quality*", from the context of this study, refers to the consumer's extent of sensitivity to and consideration of quality pertaining to specifically the source (as a container of information) of the retrieved information during online health information seeking, while "*Perceived Information Content Quality*" refers to the consumer's extent of sensitivity to and consideration of quality pertaining to specifically the retrieved information content (as dissociated from the information source) during online health information seeking. The key criteria of *source as a container of information* in [2] study were found to be - Accessibility, Quality, Usability, and Interactivity, each with its own source factors. Studies show that the consumers' perceived quality of online health and nutrition information can be influenced by latent factors such as trustworthiness, truthfulness, readability and completeness [143] and the readability factor (i.e. health information source which is more convenient to read, interpret and comprehend by the consumer) can potentially optimize the consumers' perceived information source and content quality, but this does not necessarily foster the consumers' overall trust in both the online information source and the content [144]. The objectivity of the online health and nutrition information i.e. how unbiased is the online health information source and as a content factor, convenience of use i.e. how much the online health and nutrition information content appeals to or connects with a consumer's own perceptions and biases [145] are also potentially imperative factors which can influence perceived online health information source and content quality in OHIS. Studies have also shown that the irrelevance and inappropriateness of specific online health and nutrition information can possibly be counter-productive in fostering consumers' trust is OHIU [146]–[148], more particularly information complexity [149] and information bias [150]. The consumers' perceived information source and content quality of online health and nutrition information can possibly be based on multi-dimensional consumer information evaluation influences covering reliability, accuracy, clarity, credibility and trustworthiness [151]; and also the relevance of "referral links" i.e. other online health information sources that are linked to that particular information source, which is an indication of that information source's importance as an information provider in the online environment on a particular health or nutrition search topic [4]. Past studies have also identified other reasons for consumers' trust in online health and nutrition information such as online health information source / website being commercially sponsored [152]; websites in terms of trust and credibility preferred more over online blogs, bulletin boards and homepages [153], displayed advertising / web banners and interactive features possibly hindering the consumers' credibility perception of an online health information source [154], consumers' trust in mass media and in their healthcare provider being possible factors enhancing their trust in online health and nutrition information [155], and the ever-growing trend of ubiquitous computing shifting the consumer trust from physicians to online health and nutrition information [156]. Some studies suggest that consumers trust in online health information is associated with consumer's health self-efficacy and perceived health risk, and consumers with higher health self-efficacy and lower perceived health risk are more inclined to use offline / traditional information sources [135], [157], [158], while others suggest that higher health self-efficacy positively influences intention of OHIS and trust in online health information [132], [159] or has no relationship with intention of OHIS and trust in online health information [131], [160]. Debating on the information source evaluation aspect of OHIS, [153] found that, college students in particular, considered health information on websites from sources identified as experts to be more credible than information obtained from laypeople, showing that the credibility of online health information is determined by the source of information in OHIS. It is also likely for consumers to be personally biased towards an information source or even content; or have personal beliefs which coincide with an information source or content in OHIS; which can be a core reason for OHIU. [161], for example, state in their study of international graduate students in the US that consumers who do not speak English as their first language can be "language-biased" towards online health information sources and content in their native language while engaging in OHIS. Other previous researches have also pointed out that language barriers offset consumers in effectively finding health information online, hence their biasness for health content in native language or language of preference [162]. Cultural biases also have an influence on consumers' usage of social networks in particular and exert a great influence on their online search behaviours on social networking sites [163]. Furthermore, [164] states that consumers are biased towards using online health information sources that they are familiar and comfortable with, sources that match their interests, or sources that are personal and engaging. Parents as care-givers for example, in one recent study [40]; were found to be most often positively biased towards online health

information which is relatable to their own past experience. "*Personal Bias*" refers to the cognitive inclinations and disinclinations / prejudices prevailing in the consumers, and overall personal bias construct encompasses sub-cultural / own-ethnicity bias [163], [165], national bias [163], preferred language bias [161] [162], past experience bias [2], [40], trusted recommendation bias [2], [40] and religious / spiritual belief bias [166], [167]. In the personal bias construct of this study, dimensions of ethnicity / race, ethnic language and religious belief were of prime importance since Malaysia's ethnic composition is extremely diverse, a prime example of a multiethnic society with ethnic groups of Malay (50.4%) followers of Islam, Chinese (23.7%) followers of mostly Buddhism and speak Chinese as second / ethnic language, Indian (7.1%) followers of mostly Hinduism (some Christianity, Sikhism and Islam) and speak mostly Tamil or Punjabi as second / ethnic language, indigenous Bumiputra groups (11%), and others (7.8% including Arabs, Western Caucasians, Africans, South Asians and more) according to Department of Statistics Malaysia 2018, is far more ethnically diverse than the renowned homogeneous societies of Japan and South Korea, or even Taiwan (which is largely split between indigenous Taiwanese and mainlanders) or Singapore (which has similar major ethnic groups as Malaysia but is >75% Chinese). This high scale of ethnic diversity in Malaysia has been indicated by the Ethnic Fractionalization Index / EFI [168], an index that measures the ethnic (phenotypical), linguistic and religious cleavages in society (the higher scores represent greater ethnic diversity) and is based on the probability that a randomly selected pair of individuals in a society will belong to different ethnic groups [169] and Malaysia therefore ranked third in the index with an EFI score of 0.694, after India (0.876) and Canada (0.714). It is therefore hypothesized:

H7: Intention of Nutrition-Related OHIS has a Significant and Positive Effect on Intention of Nutrition-Related OHIU

H8: Perceived Information Value has a Significant and Positive Effect on Intention of Nutrition-Related OHIU

H9: Personal Bias has a Significant and Positive Effect on Intention of Nutrition-Related OHIU

H10: Perceived Information Content Quality has a Significant and Positive Effect on Intention of Nutrition-Related OHIU

H11: Perceived Information Source Quality has a Significant and Positive Effect on Intention of Nutrition-Related OHIU

Hence the framework of this study (Fig. 1) is primarily segmented into two key interconnected and sequential consumer behavioural domains of Online Health Information Seeking / OHIS and Online Health Information Usage / OHIU. Consumer Intention of OHIS and Intention of OHIU are taken as two sequentially-examined dependent variables for the two different stages of OHIS consumer behaviour; with 10 independent variables and a total of 11 literature-derived hypotheses.
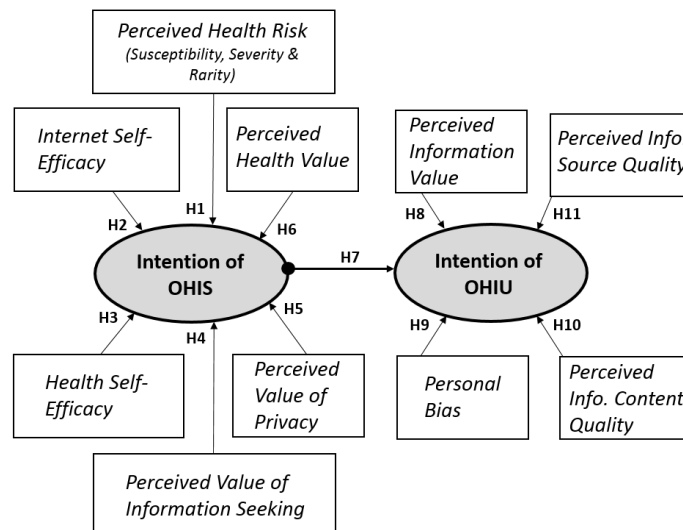

Fig. 1 - Research Framework

3. Scope And Methodology

Scope and Data Collection Strategy

Effect of Cognitive Influence on Consumer Online Health Information Seeking for Supplemental Nutrition: A Study of Young Urban Professionals of Kuala Lumpur

The target population of the study was the Young Professionals Segment of the city of Kuala Lumpur (Malaysia) - which according to [21] is the most promising segment of research on OHIS and OHIU in any given population, being the "*most active seekers and users of online health information*". The ideal geographic, demographic, behavioural and attitudinal profiles of the target respondents for this study are extracted and amalgamated from [170]–[172], and is as follows: An urban professional of Malaysian nationality, well-versed with both Bahasa Melayu and Professional English, having attained undergraduate or graduate professional education or a professional certification; an entrepreneur, small business owner, digital nomad (freelancer) or in his / her early to mid-career of executive level (white-collar) employment (mainly tech, business, law, design, finance, events, hospitality or consulting services) based in Kuala Lumpur, between the age bracket of 23 to 38 years; earning a reasonably good pay or income, enjoying the cultural attractions of sophisticated urban life and thought; hip fashion, cool appearance, studied poise, elite education, proper recreation and fitness and general proximity to liberal-thinking elites; having an "obsession with success" and "plagued with loneliness" [171]; strongly attached to technology, internet and social media. As for the industry scope, the focus was on nutritional supplements – commonly known as "dietary supplements", "health supplements" or more professionally as VMHS (Vitamins Mineral Herbal Supplements) – the most widely available and accessible (subject to over-the-counter access) and most commonly used (and largely relevant) health products by a larger proportion of the target population, which require a considerable amount of OHIS – primarily on problem or concern nutritional diagnosis, uses and dosages, natural diet sources, side effects and allergies, deficiency and overdose symptoms and conditions; available supplement forms by source, physical state and quality superiority, relevant scientific studies, long-term intake benefits and possible interactions with other supplements or drugs. Recently [23], in their cross-sectional survey of over 18 years old adult consumers of Klang Valley Malaysia, stated that 55.4% of the consumers use OHIS to seek information relating to "*diet, nutrition, vitamins, or nutritional supplements*", an information category which was found to be the most abundantly searched health topic amongst the target population – even more abundant than "*disease-related information*" (43.4%) and "*exercise and fitness*" (48.8%). From the scope of this research (and according to the Food and Drug Authorities of most nations including Malaysia), nutritional supplements can be categorized as follows: Products which are not pharmaceutical drugs, food additives like spices or preservatives, or conventional food, and which also meet any of these three criteria; (i) the product is intended to supplement a person's diet to compensate for nutritional deficiencies or to cater to special nutritional needs, despite it not being usable as a meal replacement, (ii) the product is or contains a vitamin, dietary element, herb used for herbalism or botanical used as a medicinal plant, amino acid, any substance which contributes to other food eaten, or any concentrate, metabolite, ingredient, extract, or combination of these things, and (iii) the product is labelled as a dietary supplement, and mainly covers Vitamins, Minerals; Amino Acids, Enzymes and Hormones; Protein Supplements, Essential Fatty Acids (Fish Oils and Omega 3 Supplements), Probiotic Supplements and Herbal Supplements. The duration and time scope within which the quantitative data was collected through self-completion questionnaires was during the months of January, February and March of the year 2020, prior to the Movement Control Order / MCO lockdown in Malaysia due to the COVID-19 pandemic. As for the methodology of this study, a research strategy using the survey method was designed to collect data and test the devised hypotheses. The option of choosing a survey design looked more feasible as large number of research variables (2 dependent variables and 10 independent variables) did not pose much problem (except for slightly increasing the length of the self-completion questionnaire). This research was quantitative since the data collection and analysis was in numerical format. The survey was kept cross-sectional to collect primary data using a literature-adapted self-completion questionnaire / SCQ. The emphasis of the SCQ survey was on studying to explain the relationships between the set independent and dependant variables. The SCQ responses were collected at a prominent coworking facility and service provider's spaces situated at nine appropriately disperse locations within the geographical limits of the city of Kuala Lumpur, which were: Damansara Heights, Ampang, Eco City, Q Sentral, Bukit Bintang, TTDI, Mont Kiara, Jalan Sultan Ismail and Bangsar South. Coworking, a rapidly rising trend amongst the young professionals in Malaysia and other Southeast Asian nations facing urban space limitations, is an arrangement in which several executives from different companies (predominantly small to medium scale enterprises) share an office space, allowing cost savings and convenience through the use of common infrastructure [173], [174], such as equipment, utilities, and receptionist and custodial services, and in some cases, refreshments and parcel acceptance services. According to Savills Research Malaysia (2019), coworking market in Kuala Lumpur has grown about tenfold since 2016, with most new spaces opened in 2017 and an average of 200,000 square feet (18,600 square meters) of coworking space is injected into the market annually, and therefore, according to JLL Asia-Pacific Research (2019), Kuala Lumpur is the fastest-growing coworking market of all the major cities in the Asia Pacific region. Most coworking spaces in Kuala Lumpur are operated in quality purpose-built office buildings. Also according to Savills Research Malaysia (2019), there are over 63 coworking spaces of about 700,000 square feet (65,000 square meters) of aggregate area in Klang Valley, with nearly 70% of them located in Kuala Lumpur city (Regus, Common Ground and WeWork being top market operators). Research suggested that the work ambience of

coworking spaces can possibly foster a greater level of cooperation from the space users as compared to traditional corporate office spaces [175]–[177], since social interaction and enhancing one's social life is one of the most significant consumer motivations for using coworking spaces [178]–[180]. The sampling technique for this study was chosen to be non-probability sampling. Therefore all visitors (one-time facility users or members) fitting into the target respondent profile of this study, at the nine appropriately disperse locations of the chosen coworking facility and service provider within the geographical limits of the city of Kuala Lumpur comprised of the research sample of this study. Under non-probability sampling, both convenience and purposive sampling techniques were used. Purposive sampling for the reason that the chosen coworking facility and service provider was selected on the criteria that it was the largest coworking service provider in Kuala Lumpur with over 1500 member entities in Klang Valley and also with nine appropriately disperse geographic locations which covered the entire length and breadth of the Kuala Lumpur city area. Convenience sampling for the reason that it was also convenient to run the data collection drive with one coworking franchise chain as taking prior permissions every time before a data collection visit could have been a significant barrier and would have unnecessarily prolonged the data collection process with no apparent advantages. Before the start of data collection, this research targeted 420 *"completes" (i.e. high quality fully completed questionnaires by the target research population, ideally collected in equal quantity from each of the nine coworking locations in Kuala Lumpur) which could be effectively assessed and tabulated within the research time frame.* This sample size of 420 completes was roughly bench-marked with two recent and relevant Malaysian studies of [23], [31]; the first one being the only recent survey available pertaining to OHIS patterns amongst specifically young people (over 18 year olds) from Klang Valley, and the second pertaining to OHIS patterns amongst internet-using women living in the state of Selangor.

Research Instrument Design and Data Collection

The SCQ of the study was segmented into three major parts: (i) *The Boilerplate*: Recording the demographic data of the respondent, based on 12 key questions gauging age, gender, education level, industry, industry role, ethnicity, monthly income range, nationality, locality, marital status, children and religion; (ii) *The Behavioural Questions Section*: Recording the information of the respondent pertaining to OHIS frequency, nature and motivation, preference for different OHIS mediums and experience with dietary / health supplements usage (covered in a total of six closed-ended multiple choice questions), and (iii) *The Attitudinal Questions Section*: Recording the intensity of the occurrence of each of the 12 research variables (2 dependent variables and 10 independent variables) in the respondent, gauged by 5-Point Likert Scale questions, 67 in total, with minimum five and maximum seven questions to test the intensity of the occurrence of each research variable. The questionnaires of some of the existing studies offered relevant Likert Scale statements for some of the research variables, which were modified to suit the specific requirements of this study (i.e. were changed from, say a chronic or an acute disease or a public health issue focus to a nutrition-related OHIS focus). Firstly, Intention of OHIS and Intention of OHIU (the two dependent variables) Likert Scale statements were adapted primarily from [31], [93]. For the Intention of OHIS, [93] parameters of the study's "*Intention to Seek*" variable (from the context of Mobile Health Information Seeking / MHIS) and [31] parameters of the study's "*Attitude Towards Internet Use*" variable were set as benchmarks. Hence six Likert Scale statements were finalized, (i) Consumers' Current Intention of OHIS (*I am all in favour of searching the internet for desired health & nutrition information*), (ii) Consumers' Future Intention of OHIS (*I intend to search the internet for desired health & nutrition information in the future*), (iii) Level of Trust in OHIS (*I think internet is overall a trustworthy medium to search health & nutrition information*), (iv) Urgency of Use of OHIS as the First Natural Instinctive Response (*Internet searching is my first natural response when I suddenly face a health problem or a concern*), (v) Perception of Utility of OHIS in Daily Health Management (*I think internet searching can make day-to-day health management so much convenient & beneficial*) and (vi) Recommending Others to Engage in OHIS / Advocacy for OHIS (*I would recommend people to search the internet for desired health & nutrition information*). For the Intention of OHIU, [93] parameters of the study's "*Intention to Use*" variable (from the context of Mobile Health Information Seeking / MHIS) were set as a benchmark. Five Likert Scale statements were finalized, (i) Consumers' Current Intention of OHIU (*I am most likely to make a health decision through the online nutrition information I search*), (ii) Future Intention of OHIU (*I intend to make health decisions in the future through the online nutrition information I search*), (iii) Level of Trust in OHIU (*I face no such hesitation in making health decisions through the online nutrition information I search*), (iv) Perception of Sufficiency of OHIU (*I think online nutrition information is mostly enough to cure a health problem or address a health concern*) and (v) Recommending Others to Engage in OHIU / Advocacy for OHIU (*I would recommend people to use online nutrition information to address their health problem or concern*). For the Internet Self-Efficacy independent variable from the OHIS domain, parameters from the variable of "*Internet Self-Efficacy*" of the study of [14] on OHIS behaviours of South African young online consumers and the variable of "*Perceived Ease of Internet Use*" of the study of [31] mentioned earlier were set as benchmarks. Five Likert Scale

statements were finalized, (i) Confidence / Self-Belief in Personal Skill (*I consider myself skilled enough to search health & nutrition information on the internet*), (ii) Self-Perception of Superiority over the Average (*I am more familiar to searching health & nutrition information on the internet compared to common man*), (iii) Understandability of the Skill (*I think my interaction with the internet for searching health & nutrition info. is clear & understandable*), (iv) Perceived Ease of Interactivity (*I find the internet for searching health & nutrition information flexible to interact with*) and (v) Confidence / Self-Belief in Personal Skill Knowledge (*I know about all the possible mediums of searching health & nutrition information on the internet*). For the Health Self-Efficacy independent variable from the OHIS domain, parameters from the variable of "*Perceived Self-Efficacy*" of the recent study of [181] on the Intention to Quit Smoking of the Students in Bangladesh were used as guiding statements, which offered all key dimensions of measuring consumer self-efficacy of moving towards a positive health behaviour change, as reflected in the five devised Likert Scale statements (i) Confidence / Self-Belief in Health Goals Achievement (*I can easily achieve the health goals I set for myself*), (ii) Confidence / Self-Belief in Personal Will-Power for Overall Health Management (1. *I can easily maintain my good health if I desire so*, 2. *I have the potential to make positive health changes in my life whenever needed*) and (iii) Confidence / Self-Belief in Personal Will-Power for Daily Health Management (1. *I can easily follow my set diet plans if I desire so*, 2. *I can easily abstain from daily life habits which can harm my health like unhealthy eating, smoking etc.*). For the Perceived Health Value independent variable from the OHIS domain, parameters from the variable of "*Personal Health Value*" of the recent study of [93] and the variable of "*Health Consciousness*" from the recent study of [31] were set as benchmarks; and hence five Likert Scale statements were devised (i) Self-Consciousness (1. *I am self-conscious about my health & nutrition*, 2. *I am willing to make daily sacrifices for good health & nutrition*), (ii) Attention to Subconscious (*I am generally attentive to my inner feelings about my health & nutrition*) and (iii) Perception of Importance of Good Health (1. *Living a life without disease & illness is important to me*, 2. *There is nothing more important in life than good health*). For the Perceived Value of Information Seeking independent variable from the OHIS domain, the relevant Likert Scale statements were adapted from the studies of [18], [41], [93], and were intended to access the complete value construct of this study covering epistemic (increasing knowledge or mitigating curiosity), utilitarian (addressing a health problem or concern), social (enhancing social appeal or sense of belongingness to a particular group), convenience (offering ease of access and use) and emotional (reducing health-related anxiety / stress) values (one question for each value dimension); drawing from the *Theory of Consumption Values* by [95]. Hence five Likert Scale statements were devised, (i) Epistemic Value (*I think searching the internet can provide me with valuable general knowledge about health & nutrition*), (ii) Utilitarian Value (*I think searching nutrition information on the internet can help resolve my health problems or concerns*), (iii) Emotional Value (*I think searching nutrition information on the internet can help reduce my health-related stress or worry*), (iv) Social Value (*Internet can help me connect & interact with people with similar health problems or concerns as mine*) and (v) Convenience Value (*Internet is the most convenient way to gather nutrition information compared to other available info. sources*). For the Perceived Value of (Health-Related) Privacy independent variable from the OHIS domain, Likert Scale parameters were adapted from the studies of [3], [21], [109]; and hence five Likert-Scale statements were devised covering the two core consumer health-related privacy dimensions highlighted in these three studies, mainly (i) Perception of the Importance of Health-Related Privacy (1. *My health status is my personal & private matter*, 2. *Protecting my health privacy is important to me*) and (ii) Resistance to Health Status or Concern Disclosure (1. *I am not comfortable discussing with family & friends about my health problems or concerns*, 2. *I am secretive about my health problems or concerns*, 3. *I am not comfortable consulting a doctor about a very personal or stigmatic health condition like STDs*). As for the final independent variable from the OHIS domain, Perceived Health Risk (with sub-dimensions of Perceived Susceptibility, Perceived Severity and Perceived Rarity), Likert Scale parameters were adapted from the studies of [14], [31], [32], [182], [183], and hence six Likert Scale statements were devised, two for each of the three perceived risk construct dimensions of (i) Perceived Susceptibility (1. *I am a kind of person who can develop future health problems due to deficient / incomplete nutrition*, 2. *I am worried about the future health problems which I can develop due to deficient nutrition*), (ii) Perceived Severity (1. *I believe health problems due to deficient nutrition can be severe in nature i.e. seriously harm quality of life*, 2. *I am worried that if I develop health problems due to deficient nutrition it would very badly impact my life*) and (iii) Perceived Rarity (1. *I think people suffering from health problems due to deficient nutrition are rare cases / few in number*, 2. *I am worried that if I develop health problems due to deficient nutrition I will be a rare case / amongst few*). The two Likert Scale statements for each of the sub-dimensions of the Perceived Health Risk construct were devised to gauge both the consumers' (i) General Perception of the Intensity of the Health Risk and (ii) Personal Reflection / Assessment of the Risk's Impact on their Personal Life [182], [183]. For the Personal Bias independent variable from the second domain of the research framework, the OHIU domain, overall personal bias construct was based on sub-cultural / own-ethnicity bias [163], [165], national bias [163], preferred language bias [161] [162], past experience bias [2], [40], trusted recommendation bias [2], [40] and religious / spiritual belief bias [166], [167]. Hence seven Likert Scale statements were devised (i) Sub-Cultural / Own-Ethnicity Bias (*I am*

likely to use online nutrition information which comes from sources relating to my sub-culture or ethnicity), (ii) National Bias (*I am likely to use online nutrition information which comes from a Malaysian source*), (iii) Ethnic (or Second) Language Bias (*I am likely to use online nutrition info. from sources giving info. in my ethnic language i.e. Bahasa, Chinese*), (iv) Past Experience Bias / Experiential Bias (*I am likely to use online nutrition information which is similar to a past experience in my life*), (v) Trusted Recommendation Bias (1. *I am likely to use online nutrition information which comes from a source recommended by someone I trust*, 2. *I am likely to use online nutrition info. which comes from an expert / doctor I had personally known well*) and (vi) Religious / Spiritual Belief Bias (*I am likely to use online nutrition information which is in harmony with my religious or spiritual belief*). For the Perceived Information Value independent variable from the OHIU domain, the relevant Likert Scale statements were adapted from the studies of [18], [41], [93], and were intended to access the complete value construct of this study covering epistemic, utilitarian, social, convenience and emotional values discussed earlier (one question for each value dimension). Hence five Likert Scale statements were devised, (i) Epistemic Value (*I am curious to try different online nutritional remedies which address my health problems or concerns*), (ii) Utilitarian Value (*I think using online nutritional remedies would be sufficient to address my health problems or concerns*), (iii) Emotional Value (*I believe that using online nutritional remedies can help reduce my health-related stress or worry*), (iv) Social Value (*I think online nutritional remedies are mostly great to share with my family & friends*) and (v) Convenience Value (*I think using online nutritional remedies is most convenient way to address a health problem or a concern*). Finally, for the last two independent variables from the OHIU domain, Perceived Information Source Quality and Perceived Information Content Quality, the extensive recent study of [2] was taken as the guiding literature. [2] *Container and Content Theory of Online Source Selection in OHIS* presented all possible dimensions of Information Source and Content Quality from the OHIS perspective, examining both the information source ("*the container*") and content ("*the content in the container*") as two distinct factors with a specific focus and a separate set of quality dimensions. Hence six Likert Scale statements were devised for Perceived Information Source Quality, (i) Popularity and Authenticity (1. *I am likely to use online nutrition information source which is popular or has a well-known brand*, 2. *I am likely to use online nutrition information source operated by the government / .gov health websites* – [135]), (ii) Editorial Process (*I am likely to use a wiki-based online nutrition info. source i.e. content is edited collaboratively by users*), (iii) Scope (*I am likely to use online nutrition information source which covers a wider range of health topics*), (iv) "*Surface Credibility*" (as termed by [139]) or Look and Feel (*I am likely to use online nutrition information source which has a professional and elegant interface design*) and (v) Level of Expertise (*I am likely to use online nutrition information source which is operated by experts / doctors, nutritionists*). And then, seven Likert Scale statements were devised for Perceived Information Content Quality, based on [2] information content quality dimensions, mainly (i) Relevance (*I am likely to use online nutrition information which is directly relevant to my search topic*), (ii) Usefulness and Usability (1. *I am likely to use online nutrition information which is easy to understand*, 2. *I am likely to use online nutrition information which is presented in my preferred format i.e. video, text etc.*), and (iii) Quality (1. *I am likely to use online nutrition information which is most recent / up-to-date*, 2. *I am likely to use online nutrition information which is free from quality glitches like misspellings*, 3. *I am likely to use online nutrition information which does not seem like some kind of advertisement*, 4. *I am likely to use online nutrition information which is complete and accurate*). The SCQ was pilot-tested before the actual survey with a small sample of people representative of the target population (43 responses in total) to remove inconsistencies and to improve its readability and design. The reliability of the SCQ was tested via conducting reliability test on SPSS software and Cronbach's Alpha test score of 0.84 was determined, which falls in the "Very Good" range. During the actual data collection process, which lasted from 20th January 2020 till 13th March 2020, total of 422 complete responses were collected, out of which 29 responses were categorized as "irrelevant" or "low-quality" in the data cleaning process. Therefore, a total of 393 (93.1%) responses were accepted (Table. 1). Privacy of respondent information was maintained with utmost attention, and respondents were financially compensated (RM 20) for their effort and time in filling the SCQ. Also, this research was conducted in accordance with the Declaration of Helsinki 1964 (Rev. 1975, 1983, 1989, 1996, 2000, 2002, 2004, 2008, 2013) by the World Medical Association – applicable clauses to this research were 10, 14, 20 and 21.

Location	Collected Responses	Disregarded Responses	Accepted Responses
Damansara Heights	37	4	33
Ampang	46	5	41
Eco City	47	2	45
Q Sentral	49	4	45
Bukit Bintang	61	6	55
TTDI	42	1	41
Mont Kiara	51	5	46
Jalan Sultan Ismail	55	2	53
Bangsar South	34	0	34
Total	**422**	**29**	**393**

Table. 1 - Summary of Collected and Disregarded Responses by Location

4. Data Analysis

Demographic and Behavioural Profile of the Respondent Population

The 393 SCQ responses, which were accepted after the data cleaning process, had the following demographic population characteristics, each exhibited in both number and percentage: *Age*: 24% of the respondents (94) were from the age bracket of 23 years to 26 years, 30% (119) from 27 years to 30 years, 27% (107) from 31 years to 34 years and 19% (73) from 35 to 38 years. *Gender*: 58% of the respondents (226) were male, and 42% (167) were female. *Ethnicity*: 47% (184) were of Malay ethnicity, 41% (163) Chinese, 9% (35) Indian Tamil, 2% (7) Indian Punjabi and 1% (4) were Multi-Ethnic. *Religion*: 48% (189) were of Muslim faith, 39% (154) Buddhist, 6% (22) Hindu, 3% (12) Christian, 2% (7) Sikh and about 2% (9) of other faiths or beliefs. *Marital Status*: 62% of the respondents (245) were Single, 33% (131) Married, about 2% (6) categorized themselves as Divorced, 1% (4) Separated, over 1% (5) Living with Another and only 2 in number were Widowed. *Children*: 68% of the respondents (269) had no children, 16% (64) had one child, 13% (49) had two children and 3% (11) had three or more children. *Highest Education Level*: 55% of the respondents (216) had a Bachelor / Graduate Degree as their highest earned academic qualification, 19% (76) Masters / Postgraduate Degree, 12% (47) Professional Diploma, 11% (43) Professional Certification, 2% (8) Professional Qualification and only less than 1% (3) had a Doctorate / PhD. *Employment or Business Industry*: 26% of the respondents (102) identified their employment / business industry as Internet and eBusiness, 21% (82) IT and Software, 11% (43) Consultancy, 8% (31) Information and Data Processing, 6% (23) Scientific and Technical Services, 5% (20) Retailing, 5% (19) Advertising and Promotion, 4% (15) Event Management, and 14% (58) collectively represented the other smaller percentage industries (each not exceeding 3% contribution, 9 industries in total) specifically Banking and Finance (8 in number), Higher Education (4 in number), Wholesale (12 in number), Warehousing (5 in number), Broadcasting and Publishing (11 in number), Legal Services (3 in number), Healthcare (2 in number), Food Services (2 in number) and Telecommunications (11 in number). *Industry Role*: 4% of the respondents (15) categorized themselves as being employed or working in an Upper Management position, 13% (53) Middle Management, 19% (76) Junior Management, 4% (15) Administrative Staff, 2% (7) Support Staff, 5% (20) Trained Professional, 12% (47) Consultant, around 3% (11) Temporary Employee, 2% (7) Researcher and 36% (142) as Self-Employed or Business Partner. *Monthly Income Bracket*: 12% of the respondents (48) stated a current monthly income of less than RM 2000 (USD 480 approx.), 24% (95) RM 2000 to RM 2999 (USD 480 to 725 approx.), 17% (66) RM 3000 to 3999 (USD 725 to 966 approx.), 18% (69) RM 4000 to 4999 (USD 966 to 1205 approx.), 17% (67) RM 5000 to 5999 (USD 1205 to 1450 approx.), 8% (30) RM 6000 to 6999 (USD 1450 to 1690 approx.), less than 3% (10) RM 7000 to 7999 (USD 1690 to 1930 approx.), around 1% (6) RM 8000 to 8999 (USD 1930 to 2175 approx.) and less than 1% (2) RM 9000 (USD 2175 approx.) or more. The respondents of this study had the following behavioural population characteristics, each exhibited in both number and percentage: *Perceived Frequency of OHIS*: 51% of the respondents (199) perceived themselves to be Frequent Users of OHIS, 37% (145) Occasional Users and 12% (49) Rare Users. *Nature of OHIS*: 59% of the respondents (232) engaged in OHIS for Self only, 20% (80) in the capacity of Care-Givers and 21% (81) for Both for Self and in the capacity of Care-Givers. *Prime Reason for OHIS*: 36% of the respondents' (142) Prime Reason for OHIS was Acute Health Problems, 21% (80) Child Health and Birth, 18% (69) General Well-Being, 8% (33) Chronic Health Condition, 7% (29) Athletic Fitness, 5% (21) Beauty Enhancement, about 2% (6) for General Knowledge, about 1% (5) Weight Management, 1% (3) Sexual Health and Fertility and 1% (3) for Other Reasons. *Preferred Medium to Initiate OHIS*: 69% of the respondents (271) preferred initiating OHIS via Search Engines, 14% (55) Social Networks, 7% (28) Video Sharing Portals, 6% (23) Commercial / Non-Government Health Websites, 2% (7) Government Operated / .gov Health Websites and 2% (6) Wikis. *Supplement Category Usage by Numbers*: Respondents were asked a question where they could select / tick mark more than one relevant options on their past experience with using each of the listed health supplement categories – 239 had used Vitamin and Mineral Supplements in the past, 133 Herbal and Detox Supplements, 82 Fish Oils and Omega 3s / Essential Fatty Acids or EFAs, 15 Amino Acids and Enzymes, 55 Probiotic Supplements, 35 Protein Supplements, 11 Others; while 44 were Non-Users of Health Supplements in the past.

PLS Algorithm Path Analysis Test Result

A PLS Algorithm Path Analysis Test on Smart-PLS 3 statistical software was conducted on the collected SCQ responses data (imported to Smart-PLS 3 from MS-Excel datasheet converted to Comma-Separated Values / CSV format file), with maximum iterations set on 1000 and stop criterion set on seven; along with a Consistent Bootstrapping Test which was Bias-Corrected and Accelerated (BCa) Two-Tailed Basic Bootstrap Test with 1000 subsamples, 0.05 significance level (95% confidence level) and with parallel processing enabled; all latent

variables were not connected for Initial Calculation. The PLS Algorithm Path Analysis Test, therefore, generated firstly the path coefficients (the standardized regression coefficients which show the direct effect of an independent variable / IV on a dependant variable / DV in the path model) for all the 11 model paths (HSE -> In.OHIS, ISE -> In.OHIS, PHR -> In.OHIS, PHV -> In.OHIS, PVIS -> In.OHIS, PVP -> In.OHIS, In.OHIS -> In.OHIU, PIV -> In.OHIU, PB -> In.OHIU, PISQ -> In.OHIU, PICQ -> In.OHIU), and secondly the six specific indirect effects between the latent variables of the OHIS domain of the path model on those of the OHIU domain of the path model (HSE -> In.OHIS -> In.OHIU, ISE -> In.OHIS -> In.OHIU, PHR -> In.OHIS -> In.OHIU, PHV -> In.OHIS -> In.OHIU, PVIS -> In.OHIS -> In.OHIU, PVP -> In.OHIS -> In.OHIU). For the path coefficients in the Information Seeking Domain of the model, Internet Self-Efficacy / ISE (0.275) and Perceived Health Risk / PHR (0.283) both exhibit a strong positive influence on Intention of OHIS / In.OHIS, while Perceived Health Value / PHV (0.101) and Perceived Value of Information Seeking / PVIS (0.134) exhibit a moderate positive influence on Intention of OHIS / In.OHIS. On the other hand, Health Self-Efficacy / HSE (-0.130) and Perceived Value of Privacy / PVP (-0.181) were found to exhibit a moderate negative influence on Intention to OHIS / In.OHIS. Similarly in the Information Usage Domain of the model, Perceived Information Content Quality / PICQ (0.281) exhibit a strong positive influence on Intention of OHIU / In.OHIU, while Perceived Information Source Quality / PISQ (0.211) and Perceived Information Value / PIV (0.171) exhibit a moderate positive influence on Intention of OHIU / In.OHIU. However, it was found that Personal Bias / PB (-0.181) exhibit a moderate negative influence on Intention of OHIU / In.OHIU. Examining the Inter-Domain Effect between Information Seeking and Information Usage Domains, Intention of OHIS / In.OHIS (0.248) was found to exhibit a moderate to strong positive influence on Intention of OHIU / In.OHIU. All the effects were significant at 95% confidence level. The relatively stronger positive indirect effects on Intention of OHIU / In.OHIU from the latent variables of the Information Seeking Domain were of Perceived Health Risk / PHR (0.070) and Internet Self-Efficacy (0.068). The relatively moderate positive indirect effects on Intention of OHIU / In.OHIU from the latent variables of the Information Seeking Domain were of Perceived Value of Information Seeking / PVIS (0.033) and Perceived Health Value / PHV (0.025). However, the relatively moderate negative indirect effects on Intention of OHIU / In.OHIU from the latent variables of the Information Seeking Domain were of Perceived Value of Privacy / PVP (-0.045) and Health Self Efficacy / HSE (-0.032).
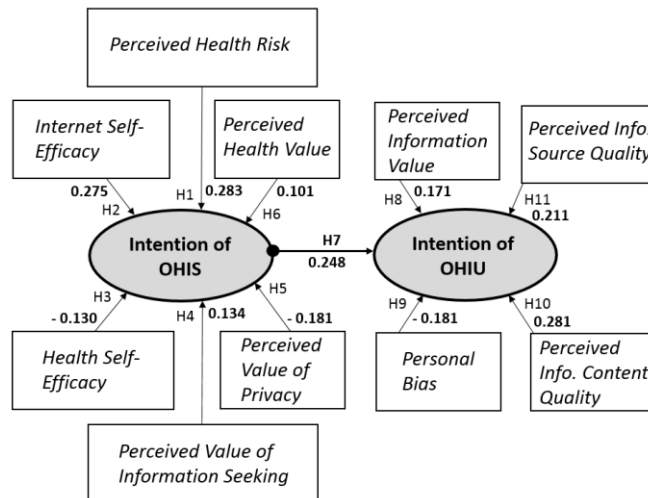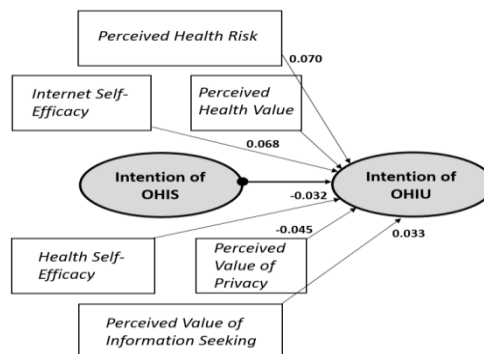

Fig. 2 - Path Coefficients

Fig. 3 - Specific Indirect Effects

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted
HSE	0.829	0.838	0.880	0.595
ISE	0.793	0.817	0.858	0.548
In.OHIS	0.908	0.910	0.929	0.686
In.OHIU	0.892	0.899	0.920	0.699
PB	0.886	0.907	0.910	0.591
PHR	0.863	0.869	0.897	0.593
PHV	0.827	0.837	0.878	0.592
PICQ	0.857	0.860	0.890	0.536
PISQ	0.820	0.828	0.869	0.527
PIV	0.794	0.798	0.858	0.549
PVIS	0.799	0.816	0.861	0.555
PVP	0.853	0.865	0.895	0.631

Table. 2 - Construct Reliability and Validity Data

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P-Values
HSE -> In.OHIS	-0.130	-0.131	0.027	4.740	0.000
ISE -> In.OHIS	0.143	0.143	0.014	10.193	0.000
In.OHIS -> In.OHIU	0.096	0.090	0.026	3.686	0.001
PB -> In.OHIU	-0.188	-0.188	0.010	19.433	0.000
PHR -> In.OHIS	0.228	0.226	0.019	11.958	0.000
PHV -> In.OHIS	0.220	0.221	0.014	15.260	0.000
PICQ -> In.OHIU	0.321	0.319	0.031	10.465	0.000
PISQ -> In.OHIU	0.238	0.243	0.029	8.217	0.000
PIV -> In.OHIU	0.216	0.218	0.020	10.813	0.000
PVIS -> In.OHIS	0.180	0.180	0.012	14.447	0.000
PVP -> In.OHIS	-0.155	-0.154	0.025	6.134	0.000

Table. 3 - Path Coefficients and T-Statistics

	Original Sample (O)	Sample Mean (M)	Bias	2.5%	97.5%
HSE -> In.OHIS	-0.130	-0.131	-0.001	-0.185	-0.078
ISE -> In.OHIS	0.143	0.143	-0.000	0.113	0.169
In.OHIS -> In.OHIU	0.096	0.090	-0.006	0.037	0.135
PB -> In.OHIU	-0.188	-0.188	-0.000	-0.209	-0.173
PHR -> In.OHIS	0.228	0.226	-0.002	0.191	0.265
PHV -> In.OHIS	0.220	0.221	0.001	0.190	0.247
PICQ -> In.OHIU	0.321	0.319	-0.002	0.274	0.370
PISQ -> In.OHIU	0.238	0.243	0.005	0.198	0.284
PIV -> In.OHIU	0.216	0.218	0.002	0.176	0.251
PVIS -> In.OHIS	0.180	0.180	0.000	0.157	0.207
PVP -> In.OHIS	-0.155	-0.154	0.001	-0.204	-0.102

Table. 4 - Path Coefficients: Confidence Intervals Bias-Corrected

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)
HSE -> In.OHIS -> In.OHIU	-0.012	-0.011	0.003	3.604
ISE -> In.OHIS -> In.OHIU	0.014	0.013	0.003	3.965
PHR -> In.OHIS -> In.OHIU	0.022	0.020	0.006	3.526
PHV -> In.OHIS -> In.OHIU	0.021	0.020	0.006	3.457
PVIS -> In.OHIS -> In.OHIU	0.017	0.016	0.005	3.450
PVP -> In.OHIS -> In.OHIU	-0.015	-0.014	0.005	2.727

Table. 5 - Specific Indirect Effects and T-Statistics

	Original Sample (O)	Sample Mean (M)	Bias	2.5%	97.5%
HSE -> In.OHIS -> In.OHIU	-0.012	-0.011	0.001	-0.021	-0.008
ISE -> In.OHIS -> In.OHIU	0.014	0.013	-0.001	0.007	0.020
PHR -> In.OHIS -> In.OHIU	0.022	0.020	-0.001	0.010	0.033
PHV -> In.OHIS -> In.OHIU	0.021	0.020	-0.001	0.008	0.031
PVIS -> In.OHIS -> In.OHIU	0.017	0.016	-0.001	0.007	0.025
PVP -> In.OHIS -> In.OHIU	-0.015	-0.014	0.001	-0.027	-0.005

Table. 6 - Specific Indirect Effects - Confidence Intervals Bias-Corrected

As for the construct reliability and validity, Cronbach's Alpha scores for all latent variables were observed to fall in "Very Good" to "Excellent" ranges and Average Variance Extracted / AVE values were over the 0.5 threshold [184] which also presented a good construct reliability and validity indication. Also all rho_A and Composite Reliability readings were recorded to occur exceeding the 0.70 quality threshold [185]. In the Consistent Bootstrap Test, all t-statistics were observed to be over the 1.96 threshold and were therefore significant indicators. Also the P-Values for all independent variables effects on respective dependent variables were less than 0.05. By convention, if P-Value is less than 0.05 (p < 0.05 i.e. is below 5%), the difference is taken to be large enough to be "significant". Hence, the smaller the P-Value the stronger the evidence that the null hypothesis should be rejected. A P-Value of less than 0.05 (typically ≤ 0.05) indicates strong evidence against the null hypothesis, as there is less than a 5% probability that the null hypothesis is correct and the results are random. The P-Values recorded for all the hypothesized model effects of this study were extremely low i.e. less than 0.000, only in one case the P-Value was recorded at 0.001 (In.OHIS -> In.OHIU). Therefore, in all independent variable effects on the respective dependent variable, the null hypothesis was rejected. For assessing the Discriminant Validity, the Fornell-Larcker (1981) criterion and the Heterotrait-Monotrait Ratio of Correlations (HTMT) were examined. All Fornell-Larcker criterion extremity diagonal linear readings were observed to be the highest readings in any other row or column, and hence presented a good discriminant validity indication and all HTMT values of this study's PLS-SEM data analysis were observed to occur below 0.8, which also presented a good discriminant validity indication as the (conservative) threshold bracket ranges from values lower than 0.85 to 0.90 for discriminant validity to be established between two reflective constructs [186]–[188]. Assessing the Model Fit, only two indicators are of prime importance; the Standardized Root Mean Square Residual / SRMR and Normed Fit Index / NFI or Bentler and Bonett (1980) Index. The SRMR of Estimated Model was observed to be 0.075, which is a satisfactory indication as a value less than 0.10 or of 0.08 is considered a good fit [189]. NFI value of Estimated Model was 0.955, which also exceeds the 0.9 quality threshold and is a satisfactory indication as the closer the NFI is to 1, the better the fit [190]. As for Collinearity Statistics, all Variance Inflator Factor / VIF Values were recorded to occur less than 3, which usually presents a good data quality indication.

5. Discussion

Academic Debate on Hypotheses Outcomes

First of all, this study showed the Perceived Health Risk (Hypothesis-1), with the perceived risk construct constituting of Perceived Susceptibility, Perceived Severity and Perceived Rarity; exerts the strongest positive influence on consumers' intention of seeking online health and nutrition-related information. This finding is authenticated by many past researchers from the broader health behaviours domain. One such research study has suggested that consumers are thought to initially engage in OHIS in order to reduce perceived health risk, owing to their sense of uncertainty over their current health condition / status and a perceived health knowledge gap [50]. Also according to [21], the frequency and number of health information website visits are significantly associated with health anxiety (i.e. people who are more anxious about their health are more likely to frequently seek health information and browse more websites). Similar to these findings some past studies have also concluded that higher perceived health risk / anxiety, from a broader perspective, reflects higher levels of uncertainty regarding health and greater health information insufficiency [56], [57], which, as a consequence, can possibly lead to consumer health information seeking behaviours in general [58], [59], and therefore, also possibly to the consumer intention of OHIS [50], [60], [61]. Past studies have also found health anxiety to be an influential predictor of internet usage in the scenario of health caregiving / in the case of health caregivers for family members [67]. However, some studies have found otherwise. According to these studies, negative health condition perceptions, on the contrary, are directly associated with consumers' overall impaired quality of life

and health-related outcomes of consumers with chronic health conditions [46]–[48], and are also possibly associated with the consumer rejection of additional online health information due to the prevailing belief that additional knowledge would be futile in health management [49]. Aligned with the past studies of [17], [36], [40], [41], [64], [65], pertaining to consumer online behaviours and health behaviours in general; this study showed that Internet Self-Efficacy (Hypothesis-2) or the "*Perceived Ease of Internet Use*", as referred to in some past studies, mainly [31], exerts a significant positive influence on consumers' intention to seek health and nutrition-related online information. This finding was contrary to that of [14], [28], who found that internet self-efficacy plays an insignificant role in explaining health behaviours. Similarly aligned with the past study of [181] pertaining to positive health behaviour life changes and contrary to the broadly-relevant past studies of [30], [37], [39], Health Self-Efficacy (Hypthesis-3) exerts a moderately significant negative influence on consumers' intention to engage with the online environment to seek health and nutrition-related information. A few more past studies, from the general health behaviours domain, have similar findings and state that consumers with higher health self-efficacy and lower perceived health risk are more inclined to use offline / traditional information sources instead of engaging in OHIS [157], [158], while some studies have identified that those with higher levels of health self-efficacy rating are more likely to continue a positive health behaviour change, compared to those with lower levels of health self-efficacy [36], [132], [159]. A few studies have been neutral and state that Health Self-Efficacy has no relationship (neither positive nor negative) with the development of consumer trust in online health information [131], [160]. Aligned with the studies of [18], [40], [93], pertaining to different online health behaviour domains of Mobile Health Information Seeking / MHIS and Online Health Information Sharing / OHI-Sh, this study found that Perceived Value of Information Seeking (Hypothesis-4) exerts a moderately significant positive influence on consumers' intention to seek online health and nutrition-related information. This study also showed that Perceived Value of (Health-Related) Privacy (Hypothesis-5) exerts a significant negative influence on consumers' intention to seek online health and nutrition-related information. This finding is aligned with the unrelated past studies and surveys of [100]–[103], [109], and is contrary to that of [2], [3], [21], [23], [108]. Some studies indirectly support the findings and state that the confidentiality of consumers' personal information in the domain of health remains to be a sensitive subject as consumers are largely aware of the fact that their health-related information can potentially be stored in data servers as digital records or logs and also about the fact that privacy of health information is the individual right of a consumer so as to prevent his or her health-related information from being disclosed without their consent to any entity for commercial or non-commercial motives [110], and also that health-related confidentiality and privacy has been found to be particularly important to the younger health information seekers [109]. This study also found that Perceived Health Value (Hypothesis-6) or Health Consciousness as termed by some past studies, exerts a moderately significant positive influence on consumers' intention to seek online health and nutrition-related information. Perceived health value has previously been investigated as an antecedent of health behaviour in general [111], [112], [115], [116], and of OHIS [31], [42], [61], and also as an outcome variable [113], [114]. This finding is aligned with that of the past studies of [31], [42], [115], [116]. Examining the inter-domain effect between the OHIS and OHIU behavioural domains of the research model (Hypothesis-7), this study found that consumers' intention of seeking online health and nutrition information / Intention of OHIS exerts a strong positive influence on consumers' intention to use online health and nutrition information / Intention of OHIU - a finding aligned with the past studies of [23] (a survey of Klang Valley Malaysia), [93] (where the emphasis was on Mobile Health Information Seeking and Usage / MHIS and MHIU), [94], [127], [128], [181]. However on the contrary, some past studies have suggested otherwise that most consumers engaging in OHIS are usually sceptical of trusting online health information for usage [20] and that older consumers, as compared to young adults, tend to exhibit a greater level of trust in online health information sources for usage [131], [132], since older consumers have been found to be more experienced in discerning between high and low quality of online health information sources [42]. Discussing the influences of the latent variables from the OHIU domain, this study found that Perceived Information Value (Hypothesis-8), exerts a significant positive influence on the consumers' intention to use online health and nutrition-related information or their OHIU intentions. This finding supported those of the studies of [18], [40], [93], [133], and was contrary to those of [10], [15], [94], [134], [135], which have emphasized on lack of trustworthiness of online health information (in terms of reliability, incorrect or inaccurate information, disorganization, information overload and lack of knowledge of medical terminologies) leading to e-Confusion and possibly resulting in consumers' low perceived online health information value. Another significant finding of this study from the OHIU domain was of Personal Bias (Hypothesis-9) exerting a significant negative influence on the consumers' intention to use online health and nutrition-related information; a finding aligned with the past broadly-relevant studies on health behaviours in general of [145], [161]–[163]. [40], [164], have also previously stated that consumers can possibly be negatively biased towards using online health information sources that they are not familiar and comfortable with, sources that do not match their interests, sources that are not personal and engaging, and sources that are not relatable to their own past experience. The final two latent variables of the OHIU domain, Perceived Information Content Quality (Hypothesis-10) and Perceived

Information Source Quality (Hypothesis-11) were both found to exert a significant positive influence on consumers' intention to use online health and nutrition-related information. However, contrary to the findings of [135], [137]–[139], the influence of Perceived Information Content Quality was found to be much stronger than that of Perceived Information Source Quality on consumers' OHIU intention. Past studies from the broader online health behaviours paradigm have also found an indirect but positive association between Perceived Information Source Quality and OHIU Intention [2], [140], [141], [153], [164], and Perceived Information Content Quality and OHIU Intention [2], [101], [134], [136], [149]. As an indirect counter argument, some studies have also concluded that excessive and erratic consumption of online health content which is often incorrect and misleading can lead to both e-Confusion and "*information obesity*", two possible factors which can hinder consumers' OHIU intentions [191]–[194].

Recommendations

One of the most predominant findings of this study from the OHIS paradigm pertains to consumers' perceived value of (health-related) privacy exerting a significant negative influence on their OHIS intentions. Two possible reasons can be attributed to this finding. Firstly, as according to [102] statistical study, 36% of consumer respondents knew that advertisers are allowed to track their visits to health-related websites while engaged in OHIS, while [103] revealed that 67% of consumer respondents agreed with the statement that online health information seekers have lost all control over how their personal health information shared online may be collected and used by a third-party (companies or advertisers). This rising consumer awareness relating to third-party consumer health-related information trackers and the provision of subsequent online web search-related advertising could be a possible reason. The Personal Data Protection Act 2010 (PDPA) is an act that regulates the processing of personal data with regard to commercial transactions which came into force in Malaysia in November 2013 with the objective of protecting the personal data of consumers with respect to commercial transactions. This act applies to any person who collects and processes personal data with regard to commercial transactions. The PDPA is seen as a key enabler to strengthen consumer confidence in the electronic environment, given the rising number of cases of selling of personal data without customer consent. The act imposes strict requirements on any person who collects or processes personal data (data users) and grants individual rights to 'data subjects'. The act also classifies "the physical or mental health or condition of a data subject" under Sensitive Personal Data category, which covers all data which can only be processed with the explicit consent of the data subject and also within the limited circumstances set out in the PDPA. The prevailing view with respect to international web analytics companies that have established a presence in Malaysia (by say opening a branch office in Malaysia) is that they will be considered as a data user and be subject to the PDPA regulations for any data which they process in Malaysia. However, the fact of the matter is that data processed wholly outside of Malaysia may not fall within the purview of the PDPA. There appears to be some doubt about the application of the PDPA to web analytics companies where it concerns data of users of social media if the interpretation taken is that this data is not being processed by the branch office in Malaysia or that no equipment in Malaysia is being used to process the data, except for the purpose of transit through Malaysia. Also PDPA has not developed specific rules to deal with data privacy issues created by cookies, online tracking, cloud computing, the internet of things or big data. All these mentioned short-comings can be possible avenues where the PDPA could consider revisions and develop subsequent regulations. [109] also argue that concerns regarding external environments (e.g. consumers considering internet environment as dangerous and worrying that their information may be stolen or disclosed) hinders consumers from engaging with the online environment and disclosing information. Malaysian government's efforts appear to be focused on positioning the country appropriately to benefit from digital information innovations. For example, the Ministry of Science, Technology and Innovation has unveiled the National Internet of Things Strategic Roadmap / National IoT Strategic Roadmap where a centralized regulatory and certification body will be established to address privacy, security, quality and standardization concerns. The second possible reason for consumers' perceived value of (health-related) privacy exerting a significant negative influence on their OHIS intentions could be that the data collection of the study was carried during late January, February and mid-March of the year 2020 during the early days of the COVID-19 pandemic, which did have a certain level of perceived social rejection and isolation stigma associated with it since the pathogen is airborne and highly contagious and "social distancing" was probably the most sloganized precaution. Since a surprising percentage of respondents (14%) were preferring social networks to initiate their OHIS (as the medium of first choice, preferred over search engines), possibly through online health and nutrition-related communities and groups. According to [3], consumers most often turn to search engines to learn about serious or stigmatic conditions. [106] also showed that people often are sceptical in determining what health information was shared with whom in their social network. Closely related to information disclosure on online social networks is the inherent stigma ascribed to many health conditions [3]. Another significant finding of this study from the OHIS paradigm pertains to consumers' Health Self-Efficacy exerting a significant negative influence on their OHIS intentions,

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which leads to the analysis that consumers with lower self-belief in achieving their desired health-related outcomes and goals on their own or are even clueless about their health outcomes and goals are more likely to engage in OHIS. Therefore, greater health efficacy levels lead to lower levels of hypochondriasis. [21] state that online health information seekers with hypochondriasis / health anxiety and lower health efficacy levels misinterpret medical information and "perceive" health issues as being more dangerous than they really are; which can possibly be the reason in this study behind lower health efficacy levels leading to higher OHIS intention. As a reverse effect, [51] also reported that seeking health information online itself may exacerbate the severity, duration, and frequency of health anxiety and lower health efficacy – the term often referred as "*Cyberchondria*" (i.e. person's anxiety about their health which is created or exacerbated by using the internet to search for medical information). [21] stated in their consumer survey that frequency and number of health information website visits are significantly associated with health anxiety. On the contrary however, some academic studies from over a decade ago [37], [39], did conclude that internet usage leads to greater health efficacy levels. But these studies were from the early internet days with extremely low social media impact, information fragmentation and exchange and the subsequent e-confusion. Building upon the same argument, another major finding of this study from the OHIS paradigm was of consumers' Perceived Health Risk exerting a strong positive influence on their OHIS intentions. This strong influence could again be possibly attributed to the fact that the data collection for this research study was conducted during late January, February and mid-March of the year 2020, at the time of the initial stages of the COVID-19 pandemic, which could have generally led to the residents of Kuala Lumpur having a higher than usual level of hypochondria (and cyberchondria), leading to possibly a higher than usual Perceived Health Risk (Susceptibility, Severity and Rarity) and intention to OHIS, since as on February 28th 2020 Malaysia had initially reported a total of 25 COVID-19 Novel Coronavirus cases (Ministry of Health Malaysia - March 2020 Data). There were also large scale public health awareness campaigns executed in Kuala Lumpur, along with numerous online, social media and mobile messaging campaigns during this time to educate (and sometimes, like in the case of unregulated and unmonitored social media and mobile messaging campaigns, even misguide) the general public about the prevailing health risks associated with this new virus, some of them encouraging people to use Vitamin-C, Vitamin B-Complex, Vitamin-D, Vitamin-E, Garlic Powder, Selenium and Zinc Health Supplements to boost the body's natural immune system to counter possible virus threats. Subsequently, the trend of people extensively wearing facial masks following this new airborne virus outbreak in public areas could also be a factor contributing towards the possibly rising public hypochondria (although the Movement Control Order / MCO Lockdown was implemented by the Malaysian government much later after mid-March 2020 in Malaysia when the COVID-19 cases began to rise drastically in the country and globally, the restrictions of which largely tapered down gradually by the end of June 2020, taking forms of Conditional Movement Control Order / CMCO and Recovery Movement Control Order / RMCO). This also proves that in the situation of prevailing public hypochondria, in case of a new pathogen outbreak or any other biological catastrophe, consumers' OHIS intention increases along with perceived health risk almost as a mutually-stimulant effect. This study also found that consumers' OHIS intention exerted a moderate to strong influence on their OHIU intention; which means that most of the consumers who engage in supplemental nutrition-related OHIS actually put-to-use the information they have sought online – hence seeking is leading to usage, and the online supplemental nutrition-related information largely has a utilitarian value (i.e. is sought to resolve a particular health problem or address a particular health concern) and possibly convenience value (i.e. 24/7 access to ready and immediate health information) rather than epistemic value (i.e. value obtained from information seeking which arouses curiosity, to offer novelty, or to satisfy a desire for knowledge) or social value (social utility derived from information seeking - people tend to belong in a group, whether online or offline, and the perception of belonging to a specific group could enhance the perceived value). One of the most predominant findings of this study from the OHIU paradigm pertains to consumers' personal bias exerting a significant negative influence on their OHIU intentions. Biases in this study mainly covered sub-cultural / own ethnicity bias, national bias, preferred language bias, past experience bias, trusted recommendation bias and religious / spiritual belief bias. There seems to be a possible disconnect between the currently available online supplemental nutrition-related health information to the Malaysian consumers and the mentioned bias parameters. Recent studies have revealed that provision of customized online health information to consumers can influence the formation of more positive health perceptions and online information acceptance [26], [27]. One of the possible avenues for future digital marketers and digital marketing content and interface developers, and search engine optimization / SEO marketers of health and nutritional products, health-related or nutrition-enriched products, general health services, specialized health services, public or commercial online health and nutrition awareness campaigns, and public or private sector eHealth campaigns is to broadly consider the ethnic, ethnic language and religious population demographic and psychographic divides and develop specifically targeted online commercial or non-commercial content. Malaysia primarily has three significant ethnic social divides; the Malay, Chinese and Indian Tamil. Effectively targeting individual ethnic segments and devising online health and nutrition content to positively appeal to the ethnic (and even the ethnic language) biases of each segment can possibly maximize

the impact of such online health campaigns. The Malaysian Indian Tamil consumers, for an example, might positively connect with the Ayurvedic dietary meal plans or the Malaysian Chinese consumers with TCM (Traditional Chinese Medicine) Diet and Chinese Herbal Supplementation. Another predominant finding of this study from the OHIU paradigm pertains to both consumers' Perceived Information Source Quality and Perceived Information Content Quality exerting a significant positive influence on their OHIU intentions. However, Perceived Information Content Quality influence is much stronger on OHIU intentions, which means that OHIU intention is more content-driven rather than information source driven i.e. consumers are more convinced to use online supplemental nutrition-related health information by its content than by its source. This dilemma can possibly lead to consumers being misguided just by the content which appeals more to them rather than the source which is more trustworthy, credible or authentic; leading to the possibility of unregulated and unmonitored misleading information being accepted and passed on by health information seekers pertaining to dietary supplementation options. In OHIS, source evaluation is especially important since the information or advice gleaned may have a significant effect on health-related behaviours and decisions [2], [4]. The government's (Ministry of Health Malaysia / MOH) intervention in this regard to educate the public and possibly list out trustworthy online health and nutrition information sources or the criteria of assessing the trustworthiness of an online health and nutrition information source would be an effective measure, along with intervening whenever false health and nutrition information is being circulated within the public. One way the Ministry of Health Malaysia / MOH can ensure that the general public utilizes only the most authentic and high quality online health and nutrition information sources in their OHIS is that the Ministry conducts a quality audit and subsequently assign quality scores to both regional and international uncertified online health and nutrition information sources, which are then effectively communicated to the public. There are established international scoring systems or quality evaluation mechanisms which have been developed overtime as a set of indicators applicable to online health and nutrition information sources / health websites to provide an information quality score and a seal of quality certification, which are mainly three: the Health on the Net Foundation Code of Conduct (HONcode), the Journal of the American Medical Association (JAMA) Benchmarks and the DISCERN Instrument. Briefly put, these quality score systems evaluate an online health information source / website on the parameters of authorship (how open is the online health information source regarding the relevant credentials and affiliations of the authors / contributors of the source?), attribution (how clearly referenced is the online health information source for all of the content it provides?), disclosure (how open is the online health information source regarding its ownership, sponsorship, advertising, underwriting, commercial funding and possible conflicts of interest if any or applicable in each case?) and currency (how presently updated is the online health information source, and how frequently is it updated?). The public can also be educated about the general and open access internet algorithms to assess the quality of any online information source (not specifically health information) such as "The Google Rank" (also known as "Page Rank") which gives a numeric value to an online information source depending on the number of times other online information sources (websites) are directed to that particular source, and this determines the source's importance as an online information provider. The Google Rank can be accessed by any online information seeker via "*SEO Review Tools. Website Authority Checker*" (URL: https://www.seoreviewtools.com/website-authority-checker/) and "*Serprobot Beta. SERP Checker*" (URL: https://www.serprobot.com/serp-check.php) and information source rankings can be checked using specific keywords (such as "COVID-19" or "Dietary Health Supplements"). It has also been previously found that information provided by peers rather than by health experts on social media might be less trustworthy or even misguiding [195]. The Ministry of Health Malaysia / MOH has been very efficient and effective in communicating authentic information pertaining to COVID-19 Coronavirus, keeping the public updated with the national statistics and precautions, and negating any false information or rumours through their COVID-19 Online Information Portal (covid-19.moh.gov.my/). The same strategy can be replicated for specifically nutrition-related information. Many past consumer studies on disparate geographic, demographic and ethnic populations engaging in health information seeking - such as Chinese and East Indian immigrant women [196], Spanish adolescents [197], Korean-American adults [161] and Vietnamese-American men [198] - all concluded that consumers consider family / friends as an important source for credible health information. Government intervention is necessary to ensure the flow of correct health and nutrition information from these informal / non-specialist sources.

1. Conclusion

This study can aid Malaysian, Southeast Asian and also global digital marketers and digital marketing content and interface developers, digital campaign managers and search engine optimization / SEO marketers of health and nutritional products, health-related or nutrition-enriched products, general health services, specialized health services, public or commercial online health and nutrition awareness campaigns, and public or private sector eHealth campaigns to better understand the role consumer perceptions, biases, and self-efficacy (cognitive influences) play in their OHIS and OHIU, and in their acceptance of online health and nutrition-related information. This in turn can result in better and more consumer-oriented web health content

development, more effective and productive online health awareness campaigns, more perceptually receptive online health information consumer interfaces, and as a result, generally better measures to aid everyday consumers to effectively address daily health problems through better digitally-acquired health and nutritional knowledge (both for self and as caregivers); raising the levels of domestic health, health and nutritional knowledge and eHealth literacy in society, and ensuring (or rather restoring) consumer confidence in online health and nutrition information by defining ethical boundaries based on the apparent and growing consumer health privacy concerns. The COVID-19 pandemic has changed both human lives and consumerism forever. Never in the last 100 years was health a more important matter of concern for humanity. Consumers' ability to effectively seek and utilize health and nutrition-related information online; and public, commercial and non-profit institutions' ability to effectively devise and communicate health and nutrition-related information online has become a matter of paramount importance given the fragmentation of both authentic and unauthentic / independent information sources online. However, the cognitive influences vary from person to person in both nature and intensity, and create a significant perceptual barrier in achieving the desired communication outcomes and subsequent health behavioural changes. Understanding such influences and harnessing their utmost potential to maximize the quality of human interaction with and understanding of online health information offers a very imperative area for future academic investigation and research driven innovations. The COVID-19 pandemic has taught humanity the importance of the effectiveness, readiness and reach of health information communication channels and more importantly, beyond OHIS and OHIU, the influence and impact of Online Health Information Sharing which is largely independent, unregulated and unmonitored, and can affect public health management outcomes by either fostering unnecessary public hypochondria or on the other end of the spectrum, an underestimation and public negligence of potential health issues and risks. As for the future research, this study was limited to the geographic population of the city of Kuala Lumpur (Malaysia's largest and most multi-ethic cosmopolitan, and a global city) and emphasized on the Young Professionals segment. Future scholarly research, for a different perspective of this study, can focus on other global geographic populations, and other demographic segments (i.e. middle-aged and older health information seekers, retired professionals, and high school and university students etc.) and explore whether cognitive variations exist across global geographic populations or demographic segments. Also, this study was only focused on the cognitive influences on consumer online health information seeking / OHIS and online health information usage / OHIU, and would recommend future researchers for an extended study to investigate the effect of cognitive influences on consumer Online Health Information Sharing / OHI-Sh, given the advent of social media and mobile technologies in the paradigm of health behaviours. Another proposed future research recommendation is to explore in depth the influence (on both OHIS and health behaviours in general) of the largely ignored Perceived Health Risk sub-construct of Perceived Rarity, which is the consumer perception about the rarity or exclusiveness of a health condition or disease, and this risk perception can potentially exhibit an imperative influence on consumers' health information seeking behaviours [32]–[35]. Most past studies basing their research construct on the Health Belief Model / HBM have largely overlooked the Perceived Rarity component of Perceived Health Risk, besides Perceived Susceptibility and Perceived Severity. The final proposed future research recommendation is to explore in depth the possible influence of Perceived Emotional Value of information seeking or of online health information on OHIS intention. Recent past health behaviour studies, who have derived their value constructs from the Theory of Consumption Values by [95] have only focused on Utilitarian, Epistemic, Convenience and Social Values. Emotional Value refers to the value of information seeking (or any other health behaviour) as a possible health-related stress reducer or as a mitigating factor for prevailing consumer hypochondria. All these proposed research avenues would be genuine and unique contributions to the OHIS and health behaviours contemporary knowledge paradigm. Although the research model of this study was conceptualized with the intent of studying the cognitive influences on consumers' Supplemental Nutrition-Related OHIS, it can also be applied with equal effect to consumers' OHIS related to (i) diseases and health conditions - both for self and as caregivers and both chronic and acute (particularly new virus outbreaks and possible pandemics); (ii) medical service providers (hospitals, clinics, health centres and medical practitioners) - both general and specialized, and both local and international; and also (iii) domestic medical and therapy equipment / machines and other health or health-related products which are not orally consumed by consumers.

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Appendix: Survey Questions (Likert Scale 1-Lowest, 5-Highest)

Instructions given to respondents on Section-3 (Likert Scale Questions Section) of the Self-Completion Questionnaire:

The term "Internet Search", "Internet Searching" or "Online Search" in Section-3 of this questionnaire refers to searching information for personal use through search engines (like Google), specific websites, social media groups and pages (Facebook, Instagram etc.) and video sharing websites (like YouTube). The term "Nutrition" in Section-3 of this questionnaire specifically refers to: supplemental nutrition, which is the use of "dietary or health supplements", which can be classified as: (i) The product is intended to supplement a person's diet to compensate for nutritional deficiencies or to cater to special nutritional needs despite it not being usable as a meal replacement; (ii) The product is labelled as a "dietary supplement", and mainly covers Vitamins, Minerals; Amino Acids, Enzymes and Hormones; Protein Supplements, Essential Fatty Acids (Fish Oils, Omega 3 Supplements); Probiotics and Herbal Supplements.

Intention of OHIS

- I am all in favour of searching the internet for desired health & nutrition information
- I intend to search the internet for desired health & nutrition information in the future
- I think internet is overall a trustworthy medium to search health & nutrition information
- Internet searching is my first natural response when I suddenly face a health problem or a concern
- I think internet searching can make day-to-day health management so much convenient & beneficial
- I would recommend people to search the internet for desired health & nutrition information

Intention of OHIU

- I am most likely to make a health decision through the online nutrition information I search
- I face no such hesitation in making health decisions through the online nutrition information I search
- I intend to make health decisions in the future through the online nutrition information I search
- I think online nutrition information is mostly enough to cure a health problem or address a health concern
- I would recommend people to use online nutrition information to address their health problem or concern

Internet Self-Efficacy

- I consider myself skilled enough to search health & nutrition information on the internet
- I am more familiar to searching health & nutrition information on the internet compared to common man
- I think my interaction with the internet for searching health & nutrition info. is clear & understandable
- I find the internet for searching health & nutrition information flexible to interact with
- I know about all the possible mediums of searching health & nutrition information on the internet

Health Self-Efficacy

- I can easily achieve the health goals I set for myself
- I can easily maintain my good health if I desire so
- I have the potential to make positive health changes in my life whenever needed
- I can easily follow my set diet plans if I desire so
- I can easily abstain from daily life habits which can harm my health (unhealthy eating, smoking etc.)

Perceived Health Value

- I am self-conscious about my health & nutrition
- I am willing to make daily sacrifices for good health & nutrition

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- I am generally attentive to my inner feelings about my health & nutrition
- Living a life without disease & illness is important to me
- There is nothing more important in life than good health

Perceived Value of Information Seeking

- I think searching the internet can provide me with valuable general knowledge about health & nutrition
- I think searching nutrition information on the internet can help resolve my health problems or concerns
- I think searching nutrition information on the internet can help reduce my health-related stress or worry
- Internet can help me connect & interact with people with similar health problems or concerns as mine
- Internet is the most convenient way to gather nutrition information compared to other available info. sources

Perceived Value of Privacy

- My health status is my personal & private matter
- I am secretive about my health problems or concerns
- I am not comfortable discussing with family & friends about my health problems or concerns
- Protecting my health privacy is important to me
- I am not even comfortable consulting a doctor about a very personal or stigmatic health condition (like STDs)

Perceived Health Risk – Susceptibility, Severity and Rarity

- I am a kind of person who can develop future health problems due to deficient (incomplete) nutrition
- I am worried about the future health problems which I can develop due to deficient nutrition
- I believe health problems due to deficient nutrition can be severe in nature (i.e. seriously harm quality of life)
- I am worried that if I develop health problems due to deficient nutrition, it would very badly impact my life
- I think people suffering from health problems due to deficient nutrition are rare cases (few in number)
- I am worried that if I develop health problems due to deficient nutrition, I will be a rare case (amongst few)

Perceived Information Value

- I am curious to try different online nutritional remedies which address my health problems or concerns
- I think using online nutritional remedies would be sufficient to address my health problems or concerns
- I think online nutritional remedies are mostly great to share with my family & friends
- I believe that using online nutritional remedies can help reduce my health-related stress or worry
- I think using online nutritional remedies is most convenient way to address a health problem or a concern

Personal Bias

- I am likely to use online nutrition information which comes from sources relating to my culture or ethnicity
- I am likely to use online nutrition information which comes from a Malaysian source
- I am likely to use online nutrition info. from sources giving info. in my ethnic language (Bahasa, Chinese)
- I am likely to use online nutrition information which is similar to a past experience in my life
- I am likely to use online nutrition information which comes from a source recommended by someone I trust
- I am likely to use online nutrition information which is in harmony with my religious or spiritual belief
- I am likely to use online nutrition info. which comes from an expert (doctor) I had personally known well

Perceived Information Content Quality

- I am likely to use online nutrition information which is directly relevant to my search topic
- I am likely to use online nutrition information which is easy to understand
- I am likely to use online nutrition information which is presented in my preferred format (video, text etc.)
- I am likely to use online nutrition information which is most recent (up-to-date)
- I am likely to use online nutrition information which is free from quality glitches like misspellings
- I am likely to use online nutrition information which does not seem like some kind of advertisement
- I am likely to use online nutrition information which is complete and accurate

Perceived Information Source Quality

- I am likely to use online nutrition information source which is popular or has a well-known brand
- I am likely to use online nutrition information source operated by the government (.gov health websites)
- I am likely to use a wiki-based online nutrition info. source (i.e. content is edited collaboratively by users)
- I am likely to use online nutrition information source which covers a wider range of health topics
- I am likely to use online nutrition information source which has a professional and elegant interface design
- I am likely to use online nutrition information source which is operated by experts (doctors, nutritionists)

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