IIUM JOURNAL OF EDUCATIONAL STUDIES, 10:2 (2022) 124-149

ISSN: 2289-8085

Health Beliefs and Willingness to Engage in T2D Preventive Behaviours Among Malay Youth: A Qualitative Inquiry

Ratnawati Mohd Asraf[1], Atiqah Hanah[2*] and Nadya Supian[3]

[1]Department of Language and Literacy, Kulliyyah of Education,
International Islamic University, Kuala Lumpur, Malaysia
[2] Institute for Life Management Science, The KPI Institute, Docklands, Australia
[3]Department of Modern Languages, Faculty of Creative Industries,
Universiti Tunku Abdul Rahman, Kajang, Malaysia
**Corresponding Author: atiqah.hanah@kpiinstititute.com*

Abstract

Due to sedentariness and poor diet and nutrition, the youth of today are increasingly exposed to early-onset Type 2 diabetes (T2D). Malaysian youth are particularly at risk for T2D since Malaysia has the highest prevalence of obesity among its young population in Asia. Our concern led us to the conduct of this study, which was aimed at discovering what sixteen young Malaysian undergraduates knew about T2D, their health beliefs, and their perspectives on T2D and lifestyles. The study also sought to ascertain if the youth would be willing to engage in T2D prevention behaviours to ward off the onset of the disease. The results of the study would help to inform us of the beliefs that other Malaysian youth *may have* on this issue and also of the possible content that we could propose for Diabetes Awareness Programmes aimed at Malaysian youth. The interview questions were based on the six constructs of the Health Belief Model (Abraham & Sheeran, 2014) and a written interview was conducted via email with the 16 undergraduates. The data, analysed thematically, produced seven themes. We found that the participants generally lacked proper knowledge of and are confused between types of diabetes. Nonetheless, they expressed a willingness to alter their lifestyles to incorporate healthier habits and a more nutritional diet, but were deterred by family attitude, social norms, and social media influence. We recommend two urgent actions. First, an awareness programme to enhance youth's knowledge of T2D to showcase its gravity and consequences. Second, educating the public, especially families, on rendering support to youth who wish to live a healthier, diabetes-free life.

Keywords: *Type 2 diabetes, youth's health beliefs, Health Belief Model, perceived severity of T2D, perceived susceptibility to diabetes*

INTRODUCTION

Type 2 diabetes (T2D) is the most common type of diabetes that affects millions of people worldwide. It is a metabolic disorder of the endocrine system where the body becomes resistant to insulin and is no longer able to use the hormone efficiently to regulate its blood sugar. This deficiency results in chronically high blood glucose levels that, over time, cause various health complications, e.g., cardiovascular problems, kidney failure, limb amputations, pregnancy difficulties, blindness, and even mental health disorders such as depression, anxiety and hypertension (Lindström et al., 2010; Saeedi et al., 2020; Wong et al., 2020). Due to its notoriety, diabetes has been dubbed a "silent killer" by the World Health Organization (WHO) as many individuals afflicted with it are not even aware that they have the disease until they reach late-stage complications (Lee & Yoon, 2018). Of the three categories of diabetes, T2D is the most prevalent type, accounting for almost 90% of all diabetes cases reported globally(International Diabetes Federation, 2021), henceforth, IDF.

The Prevalence of Diabetes Worldwide

According to IDF statistics, an astounding 537 million people between the ages of 20 and 79 were living with diabetes in 2021. The IDF expects this figure to keep going up, estimating that by 2045, about 780 million people worldwide will be affected by diabetes. Ninety per cent of diabetic cases reported globally were identified as T2D, and in the past year, about 537 million people were at risk of getting it due to poor diet, bad eating habits and sedentary lifestyles(International Diabetes Federation, 2021).

Malaysia is among the countries with a high prevalence of T2D. Known for its ability to cause premature death and various life-threatening health hazards, diabetes has been a challenge to Malaysia's healthcare system in terms of providing medical care and proper treatment for those affected (Hussein et al., 2015) . Recent data show that approximately 3.9 million Malaysians aged 18 years and older suffer from diabetes, which means that 1 in every 5 Malaysians is afflicted with this metabolic disorder (Institute for Public Health, 2020) . By 2025, this disease is projected to affect about 7 million Malaysian adults (Institute for Public Health, 2020) .

What is alarming is that most patients are not even aware that they have diabetes because its early symptoms, e.g., increased thirst and appetite, frequent urination, and fatigue, appear as normal physical conditions, and as such, they often go unnoticed. The results of the 2019 National Health and Morbidity Survey (NHMS) show that 8.9% of patients had no knowledge at all about their diabetic condition, a sharp increase of 74.5% from just 5.1% in 2015. Another staggering finding of the 2019 NHMS was that most Malaysians aged between 18 and 29 years who were diagnosed with diabetes only found out about their condition later in life (Institute for Public Health, 2020) . The data paint the general picture that many Malaysians afflicted with diabetes are not even aware that they have the disease until some health complications appear later in their lives. This happens because most patients lack the knowledge of diabetes and its symptoms.

The Prevalence of T2D Among Youth

T2D was previously understood to affect only older people as its symptoms were mostly detected among the older population. However, studies over the past decades have found an increasing occurrence of T2D in all age groups, especially in teenagers and adults as young as 20 (Alberti et al., 2004; Huang & Goran, 2003; Lynch et al., 2020; Nadeau et al., 2016). Individuals greatly exposed to the early onset of T2D are those already afflicted with the problems of obesity, heavy smoking, sedentary lifestyle, unhealthy and imbalanced diet, and high consumption of carbohydrates and sugar in their food intake (Khan et al., 2020; Koren & Levitsky, 2021; Mahaletchumy et al., 2019; Swaminathan et al., 2020). The resulting complications occurring in people with an early onset of T2D are found to be more complex than those usually affecting older people (Amutha & Mohan, 2016).

For young people, the early onset of T2D means having to deal with lifelong hyperglycaemia (i.e., high levels of sugar or glucose in the blood) that often leads to a series of other health complications, e.g., gestational diabetes, hearing impairment, reduced fertility, and early cognitive diminution (Lascar et al., 2018). These complications are qualitatively similar to those seen in older patients, but due to their lifelong implications, they tend to have greater emotional and psychological effects on young people. When stricken with T2D, young people become quite vulnerable to the psychological impact of the disease, such as plunging into depression or anxiety. It is likely that these mental adversities will persist throughout their adult or working life (Lascar et al., 2018; Wilmot & Idris, 2014) . However, despite the seriousness of its complications on the physical and psychological well-being of youth, studies and global data on youth-onset T2D are surprisingly limited and not easy to find (Nadeau et al., 2016).

In the Malaysian healthcare system, diabetes has created many challenges, particularly in dealing with the rising cases of physically deteriorating patients and providing quality healthcare for them. In addition to the mounting T2D cases among its adults, the youth in Malaysia are also at a great risk of developing T2D, given the fact that Malaysia has the highest number of obese children and adolescents in Asia (Abdul & Wan, 2020; Hassan et al., 2018; Ruiz Estrada et al., 2019) . In fact, the number of overweight and obesity cases among Malaysian youth aged 12 to 19 has been on the rise, going from just 14.2% in 2015 (Abdul & Wan, 2020) to an alarming 50% in 2020 (Institute for Public Health, 2020). The pattern indicates that the prevalence of T2D among Malaysian youth will likely increase if the sedentary lifestyle and overweight issues among them are allowed to persist and not addressed by health and education agencies (Yeow et al., 2019).

T2D Risk Factors Among Youth

As comprehensively documented in the medical literature, T2D is caused by factors associated with nutrition (e.g., high intake of sugar and carbohydrates), obesity (i.e., due to insulin resistance) and physical inactivity (e.g., being sedentary and sitting for a prolonged period). Although inherently genetic, T2D can be prevented by adopting a healthy lifestyle that includes eating a healthy diet and doing regular moderate-intensity physical exercises for example, daily

brisk walking (Hallal et al., 2012; International Diabetes Federation, 2021). Overweight and obesity problems among youth are brought about by excessive consumption of junk food and sugary drinks (Booth et al., 2019; Lee & Yoon, 2018; Verzeletti et al., 2009). Due to the lack of nutritional knowledge and sometimes, to group norms and peer pressure, young people often make unhealthy food choices, such as including sweets, soda, and junk food in their daily intake, and engaging in unhealthy habits such as skipping breakfast, smoking, and taking drugs and alcohol (Larson et al., 2016; Moreno et al., 2014; Safari et al., 2013). These habits are detrimental to their health as they trigger metabolic diseases such as T2D (Jannasch et al., 2017).

It is well established that low physical activity level is a significant contributor to T2D, in addition to poor diet choices and poor eating habits. Not getting enough physical exercise increases a person's risk for getting diabetes (Al-Domi et al., 2019; Larsen et al., 2014; McArel et al., 2003). However, researchers now know that the problem is not just the lack of exercise, but also that the amount of time a person spends sitting increases his or her T2D diabetes risk even further. In a 2013 Australian study, a positive correlation was found between sitting time and the risk for T2D and other chronic diseases (George et al., 2013). The researchers discovered that even if people exercise regularly for 30 minutes daily, they still have a higher risk of developing diabetes if they sit for more than four hours a day.

The issue of physical inactivity, especially among the present generation of young people, is more apparent now with the proliferation of advanced technological development that is encouraging a sedentary lifestyle. To illustrate, young people are easily enticed by digital entertainment such as video games, movies, and online streaming platforms—as well as by social media, which can prevent them from living an active and healthy lifestyle (Koplan et al., 2005). Furthermore, young people are often doing things online or on a computer, which entails sitting down for a prolonged period. Prolonged sitting is a form of sedentariness that subsequently results in a very low energy expenditure, thereby increasing youth's risk for T2D. According to the Harvard T.H. Chan School of Public Health (2011), every two hours spent just sitting to perform a task (be it writing an assignment or watching television) increases a person's risk for T2D by 14 percent.

Researchers have concluded that the combination of a sedentary or inactive lifestyle and poor eating habits will likely lead to obesity and, eventually, T2D (Hu et al., 2001; Kamath et al., 2008). Sedentariness is a situation that can easily affect young people if they are not educated about the health hazards of T2D, and if preventive measures are not taken to protect them from the disease. Therefore, it is important to educate the youth of today that their eating habits, physical inactivity, and unhealthy lifestyles can greatly increase the risk of developing T2D, whose effects and complications can last a lifetime (Vangeepuram et al., 2015; Zamora-Kapoor et al., 2018). Before starting on this education and formulating a solution to decrease the prevalence of T2D among youth, it is essential to first assess their dietary habits and degree of physical activity related to diabetes risk factors.

The Importance of Prevention

A perusal of the statistics on T2D indicates that the number of cases will continue to rise with no indication of slowing down, even with increased investment in clinical care and pharmaceutical research (Khan et al., 2020). To the dismay of many parties, especially the government, health agencies, and medical researchers, most medical interventions have turned out to be unsuccessful in reducing the incidence of T2D, despite the ongoing research and efforts to stop the rapid progression of the metabolic disease. The difficulties in finding its remedies further underscore the importance of establishing early and effective prevention programs, especially those involving youth. Prevention is crucial to curbing the number of T2D cases and to improving the overall health and well-being of youth, so that a thriving community can be established. Gow et al. (2016) pointed out that since many of the risk factors of T2D are adjustable, efforts should be focused on preventing the disease by directly addressing the major risk factors themselves, i.e., unhealthy eating habits (e.g., eating late at night and going to bed right after a meal), poor choice of dietary intake (e.g., having sweet desserts after meals) and physical inactivity (e.g., working on a computer for long stretches without any break in between).

To prevent the onset of T2D, the present generation of young people should be well-educated about it; they must have fundamental knowledge of the disease. They should at least know its causes, symptoms and how to avoid its onset. Having such awareness and knowledge of T2D is crucial to developing and implementing necessary prevention steps (Al-Mutairi et al., 2015; Chinnappan et al., 2017; Dussa et al., 2015). However, having diabetes knowledge alone is not enough to put T2D at bay. There have been numerous cases where even people with the right knowledge sometimes unwittingly developed the disease. So, it is important to understand why or what makes people fail to improve their lifestyle to prevent T2D, even though they may be equipped with a basic knowledge of the disease.

Health Belief Model

The study was premised upon our belief that healthy eating habits and an active lifestyle are crucial aspects in the prevention of diabetes. We also believe that the choice of food and lifestyle is influenced, to a certain extent, by a person's knowledge of diabetes, the complications it may cause, and the effects of such complications on their health. However, these aspects alone may not be sufficient to motivate a person to make the necessary changes to prevent the onset of diabetes. For these reasons, the study used the Health Belief Model (HBM) as its theoretical framework to obtain an insight into why people might or might not want to modify their health behaviours.

The HBM postulates that a person's willingness to change their health-threatening behaviours is primarily influenced by their health perceptions. The model lays out six influencing constructs, namely perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy, and lastly, cues to action (Abraham & Sheeran, 2014). Perceived susceptibility refers to a person’s assessment of the likelihood of their contracting a

disease or condition such as diabetes, and the risks for developing adverse health outcomes. For example, people generally assume that an obese person is more susceptible to T2D than a slim individual. That being the case, a slim individual may perceive that he or she is less susceptible to getting T2D than an obese person, a perception that may well be mistaken. Meanwhile, perceived severity means recognizing the seriousness of a health condition.

The next two influencers, perceived benefits, and perceived barriers, reflect an individual's belief about the advantages and the challenges or difficulties, respectively, of acting on health preventive behaviours. The HBM also argues that people, however, ought to have a firm belief in their ability to perform and maintain healthy behaviours if they are going to make qualitative changes to their lifestyle, an idea reflected in the self-efficacy component of the model (Abraham & Sheeran, 2014; Rosenstock et al., 1988; Smith et al., 2005; Vazini & Barati, 2014). The HBM stipulates that once the individual understands that their condition or current habits could be a threat to their overall state of health, and could result in unwanted health outcomes, and if they feel confident in their ability to evince the healthy behaviours, they will be more motivated to change their habits and adopt a healthy lifestyle to prevent the onset of diseases (Smith et al., 2005).

Using the HBM as a framework, we drew insights from it regarding the beliefs of young people regarding T2D-related behaviours, as they are fruitful for designing T2D prevention programmes and strategies (Al-Mutairi et al., 2015). To come up with effective strategies in the education programme for T2D prevention, we need to discern the interrelated factors, such as youth's beliefs about the disease and readiness to change. This is crucial since it would allow us to effectively target the area that young people would need to improve in order for them to lead a healthier lifestyle.

In this paper, we describe the results of our study, which was aimed at investigating the beliefs of a group of Malaysian youth about T2D. By referring to the HBM, this study unveiled the youth's health beliefs and willingness to engage in T2D preventive behaviours, highlighting aspects of their knowledge and beliefs that influence their prevailing lifestyles. The study's insights can be used to further examine the health beliefs of youth groups and design preventive programmes that would encourage them to be more proactive in preventing the early onset of T2D.

METHODOLOGY

The aim of this study was to explore what the participants understood about T2D, their health beliefs, and their perspectives on the association between T2D and lifestyles. It was also conducted to determine if they would be willing to adopt a healthy lifestyle and the reasons behind their willingness to do so. As with any other qualitative case study, this research was not aimed at generalising the findings, but rather, at helping us gain a better understanding of and insight into the lifestyles of these youth and their beliefs about T2D. This would help to inform us of the beliefs that other Malaysian youth *may have* on this issue and also of the content that we would propose for Diabetes Awareness Programmes aimed at Malaysian youth.

Research Site and Participant Selection

To meet the research aims, we determined the criteria for the inclusion of participants. The first of these was that they should be between 15 to 24 years old—to meet the United Nations' definition of youth (The United Nations, 2008). Secondly, we wanted to obtain a homogenous group as our aim, in this qualitative inquiry, was to understand and gain in-depth insights (Patton, 2002) with regard to a specific group of youth. We chose this particular group of teacher education students and this particular institution as the site for our study as they were easily accessible to the primary researcher, permitting her to conduct the research as an insider. As qualitative researchers, we believed that this would allow us to develop rapport with the participants (Auburn et al., 2021)—and gain their trust—as well as to obtain a better understanding of the problem that we wanted to study (Bonner & Tolhurst, 2002). Finally, a very important criterion that we used for the inclusion of participants was that they should *volunteer* to take part in the study. This is because our aim was to obtain honest responses and rich and in-depth data, which needed to be acquired from individuals *willing* to provide the information we needed. Getting volunteers to participate in the study would contribute to the quality of the data and the credibility and trustworthiness of the study (Jessiman, 2013).

We managed to obtain 16 volunteers that fit the criteria that we had set. We deemed the number of participants as being sufficient for the study as our aim was to support our case-oriented analysis, which requires thick and rich data that is central to this mode of inquiry. In addition, we were guided by researchers such Guest et al. (2006), who assert that in studies with a homogeneous group of participants such as the one we undertook, *at least 12* interviews should be conducted to achieve data saturation. Hence, the 16 participants we obtained would be more than sufficient to reach data saturation.

Participants

The participants were a homogeneous group of 16 Malay second-year undergraduate students aged between 20 to 23 undergoing a teacher preparation programme at a Malaysian public university. They were a homogenous group in that all of them were: (1) second-year, (2) Malay, (3) undergraduate students (or youth), (4) aged between 20-23—following UNESCO's definition of youth; (4) undergoing a teacher preparation programme, (5) at a particular Malaysian public university. Ten of them were female and six were male. Of the 16 participants, 12 had a family history of diabetes, while four did not. The inclusion of participants whose families had different experiences with T2D allowed us to gain a greater insight into their perceived severity and perceived susceptibility of T2D and their willingness to change their lifestyles to delay or prevent the onset of T2D.

Data Collection

Interview Method

To collect the data, we conducted in-depth, written interviews as this is a feasible means of data collection that can generate credible results comparable to those of a face-to-face interview (Block et al., 2012). Furthermore, written interviews have unique advantages—they are cost-effective and time efficient (Bowden & Galindo-Gonzalez, 2015) and made the data on youth's health beliefs easier to elicit. Additionally, the written interview method would give the participants the time they needed to reflect on the questions carefully as they require detailed, thoughtful answers that would generate rich data for the study (Fritz & Vandermause, 2018).

Interview Protocol

We prepared the interview protocol to comprise 12 questions. The first two questions, after the demographics, probed into the participants' diabetes knowledge, while the remaining questions—created based on the six constructs of the HBM—that is, perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy, and cues to action—explored their health beliefs about T2D. Ethical considerations were embedded into the questions by informing them, at the onset of the process, of the study's purpose. Additionally, we assured the participants of the confidentiality of their responses and anonymity of their respective identities. These ethical considerations were also explicitly mentioned in the guidelines attached to the interview questions sent to them via email.

Data Analysis

We followed the inductive process of thematic content analysis to identify and extract recurrent themes from the data. Since there was no necessity to transcribe any audio interviews to textual data—thereby eliminating transcriber bias—the written interview method facilitated a seamless transition to the interview data analysis (Hawkins, 2018). Free from background noise that would otherwise be present in video or telephone interviews, written interviews are short and concise, producing data that tend to be more condensed than the data obtained verbally through face-to-face interviews (Bowden & Galindo-Gonzalez, 2015).

Credibility and Trustworthiness

To ensure the credibility and trustworthiness of the study, we paid careful attention to the construction of the interview questions. We did this by conducting an extensive review of the literature to generate the questions that would enable the participants to delve into the "whys" and "hows" of the issues explored in the study as this would allow us to obtain good, insightful data. In getting the participants for our study, we recruited volunteers, that is, individuals *willing* to provide the information we needed as this would contribute to the quality of the data and the credibility and trustworthiness of the study (Jessiman, 2013). We also assured the participants of the confidentiality of their responses and anonymity of their identities as this would encourage them to give their honest opinions, thereby also ensuring the trustworthiness of the

data we obtained. Finally, to establish the credibility of the data, that is, the "fit" between the participants' views and our representation of them (Tobin & Begley, 2004), we further verified the data through member checking (Birt et al., 2016)—by confirming with them if we had correctly interpreted their responses—so that it would not lead to inaccurate and distorted results (Bowden & Galindo-Gonzalez, 2015). These were the procedures—from conceptualisation to execution—that we employed to ensure the credibility and trustworthiness of the data—so that the answers given to us authentically represented the participants' perceived knowledge of, and health beliefs about T2D.

RESULTS

To reiterate, the study sought to understand the knowledge and health beliefs of 16 Malaysian undergraduates about T2D and their willingness to adopt a healthy and active lifestyle to prevent the onset of the disease. The participants' general knowledge of T2D is discussed in the next section while their health beliefs regarding T2D-related behaviours as outlined in the HBM—that is, perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy, and lastly, cues to action—are discussed in the subsequent sections. In compliance with research ethics, the participants' names were changed to ensure anonymity and confidentiality. The responses discussed in the following subsections are those that represented the study's most salient findings.

Knowledge of Diabetes

Most of the participants had limited knowledge of diabetes, being familiar with only some aspects of the disease. For example, they had little understanding of its causes and severity, and could not distinguish between Type 1 (T1D) and Type 2 (T2D) diabetes. Only a few participants had some decent knowledge of it and were fully aware of the differences between T1D and T2D, their causes, symptoms, and resulting complications. Almost one-third of the participants showed a limited awareness of T2D. They knew diabetes generally as a condition associated with a high amount of sugar in the body and the complications often reported in diabetic patients. One of them, Syarifah, knew about the presence of high sugar in the blood but could not tell the difference between T1D and T2D. She explained her understanding of diabetes as such:

> *"I don't know about the type of diabetes, but I am aware that diabetes is a condition [caused by] the high amount of sugar, and it can be [very] dangerous if the diabetic patient did not take good care of their daily consumption."*

Another participant, Nina, admitted knowing about the complications of diabetes and associated the condition with obesity and multiple organ dysfunctions:

> *"…eyesight problems.. kidney problem ..obesity…and [patients] need to take dialysis …The sugar level needs to be maintained by taking medicine or insulin injections. Wounds are hard to be treated and can easily spread, especially in the leg areas... I might be wrong, but these are some of my general knowledge [of diabetes]."*

Nina had scant knowledge of T2D and was comparatively less informed than three other participants—Asma, Aisyah, and Nur—who showed a better understanding of diabetes and could clearly distinguish between T1D and T2D and their corresponding complications. They were able to elaborate on the disease quite extensively, i.e., the nature of the different types of diabetes, their implications on a person's health, and how severe it can be if untreated. However, it should be mentioned that although the participants had different degrees of awareness of T2D, all 16 of them had the same correct understanding that T2D developed from unhealthy eating habits and obesity. Nur gave the following correct explanation regarding the two types of diabetes:

> *"…Type 1 diabetes is usually caused by the body's immune system that has mistakenly destroyed the insulin that will produce beta cells in the pancreas which they identified as foreign invaders which later prevented the body from producing insulin. Meanwhile, Type 2 diabetes is caused by the body's inability to use insulin effectively after it has been produced. In addition, family history, age, geography and genetics could also contribute to diabetes…"*

Aisyah also explained the disorder in a similar way as Nur, shedding light on the health complications associated with T2D:

> *"…Eventually, the sugar levels in our body get too high for it to handle. That could lead to heart disease, blindness, and kidney failure."*

Apart from these few participants, the others generally showed little to no knowledge of diabetes, freely admitting to being uninformed about the disease, especially T2D. From the testimonies of a few others, we discovered several misconceptions of diabetes that prevailed among the participants. One that really stood out was the thinking that T2D is not a serious condition. On top of having this incorrect belief, the participants also gave the wrong information about the specific causes of T1D and T2D and thought of its different types as stages of severity rather than distinct metabolic disorders. Arifin had this notion of diabetes:

> *"I think bad eating habits and not enough exercise are what cause Type 1 diabetes. Type 2 diabetes probably happens when a person continues the bad habits…"*

Muhsin, on the other hand, expressed something that is a cause for concern:

> *"Type 2 diabetes is not too serious a disease because it does not…[lead]…to death."*

To think that diabetes does not lead to death is a grave misconception as countless people have died from its complications—roughly 1.6 million to be exact (Khan et al., 2020). In going through the data, it struck us that there are many crucial aspects about T2D that the participants did not know about.

The participants mentioned deriving their knowledge and information about diabetes from various Internet sources (e.g., websites, TikTok, Instagram, and other social media). Their reliance on the Internet for knowledge has an important implication on the design of educational interventions for youth. This tells us that we can use the Internet effectively as a medium to

educate young adults about health, especially about healthy diet and lifestyles that can prevent the early onset of T2D (Biviá-Roig et al., 2020; Ghweeba et al., 2021; Kim & Ladenson, 2002; Kong et al., 2021; Novichikhina & Romanova, 2020). Additionally, having family members with T2D should be looked at as both an urgency and opportunity to educate youth about the disease (Kim & Kim, 2020). For example, some of the participants had family members with T2D but appeared to be unfamiliar with the nature of the condition. One of them, Azyan, a male participant, admitted that he did not know much about T2D despite having a family member suffering from the complications of the disorder:

> *"I got this information (about diabetes) from the Internet as well as from my experience having a diabetic [relative] in my circle. I don't think that I have adequate knowledge about diabetes since the knowledge about this condition is just something that I know because people talk about it and I never do my own search to understand more about diabetes."*

The findings suggest that awareness programmes should be conducted to help youth to improve their awareness of T2D, especially those with a high risk of getting it due to family history of diabetes. To actively act on preventing T2D, young people must have decent knowledge of its nature and causes. They should be aware that they need to take conscious efforts to halt its early onset. Specifically, youth need to acquire a full understanding of what causes the disease, its symptoms, and complications—these were the aspects that were rarely mentioned in the participants' responses to the interview, showing their lack of knowledge in these areas. Finally, young people should know that they can develop T2D even at a young age, especially if they are not heedful of their food intake and lifestyle.

Perceived Severity of T2D as a Disease

Perceived severity, i.e., participants' perception of the magnitude and significance of the T2D threat, is closely intertwined with their knowledge of the disease. As expounded in the HBM, if a person is aware of the gravity of a disease and its complications, they are more likely to take precautionary steps to prevent it (Abraham & Sheeran, 2014). We found that about half of the participants in our study agreed that T2D is a serious disease, and most of them were aware of the complications, especially those participants with family members living with T2D complications, as can be seen from the following response from Asma:

"... I am aware that diabetes ... can be [very] dangerous if the diabetic patient did not take good care of their daily consumption. One of my family members suffers from diabetes and unfortunately, one of the [toes] on her feet needs to be cut off because her condition is getting worse".

We could trace some evidence of T2D awareness, i.e., that pertaining to its physical complications, surfacing among the participants when they were asked to rate the seriousness of the disease. Most could identify the unpleasant consequences, such as having to constantly monitor and watch their diet, especially their intake of carbohydrates, once they were diagnosed with diabetes. Nur described it as a predicament:

> *"It can make your life harder as you need extra, constant monitoring in your food intake and such, and it can be quite tiring in a way."*

Some highlighted how the health complications of T2D could further develop and become severe, gradually leading to organ damage and failure, such as "…eye damage, slow healing, kidney disease, and more…". One participant, Ros, agreed that T2D:

> *"…is a serious disease because it can affect your heart, blood vessels, nerves, eyes, and kidneys. On a scale of 1 to 5, I would give it a 5 (in terms of severity)."*

However, it is also alarming that some participants were unsure of how severe T2D complications could become. Nad, for example, said,

> *"I am not sure about the complications. But I do know for sure that you have to take the medicine and check with the doctor once in a while."*

Aisyah also had a similar incorrect belief—that T2D is not as severe as T1D:

> *"I think it's not really serious, but it's quite dangerous. Cuz I've read somewhere that it still can give you a heart disease and stroke, even though it's not as bad as Type 1".*

Meanwhile, those who did not see T2D as a real threat mentioned that they did not have specific ideas about the metabolic disorder, as we could see from the testimony of Syarifah:

> *"I do think it is serious because generally it is still diabetes, but I don't really know about this Type 2."*

Our findings on the participants' perceptions of T2D severity show that there is an urgency to enhance their awareness of T2D as a disease so that they can start to treat the issue more seriously and increase the likelihood of their adopting a healthier lifestyle to prevent the disease (Kim & Kim, 2020; Mehta et al., 2012).

Perceived Susceptibility to T2D

From their interview responses, the participants did not perceive themselves as being at risk for developing the disease. Generally, there was a lack of perceived susceptibility to diabetes among the youth group we interviewed. Some of the participants who had family members with T2D believed they were not susceptible to it, despite belonging to the higher risk group. Additionally, participants with no relatives afflicted with T2D also did not think that they could be susceptible to the disease. Nonetheless, they showed a willingness to take better care of their health. One participant mentioned that she had *"never thought of the possibility of having [diabetes] as [her] father and mother [never] experienced [it]. However, [she won't] take [any] chances and [will] monitor [her] health more after this."*

Our perceived susceptibility question yielded interesting and diverse responses from the participants. Two of them, Iman and Ros, did not believe they would develop diabetes, feeling

confident that their dietary habits were in good shape as they made it a point to control their food portions and rarely ate sweet food. Iman assertively said,

> *"No, I don't believe so [i.e., getting diabetes], because I rarely consume a lot of sugar in my diet."*

In contrast, Arifin thought that he would not get T2D because he never experienced any symptoms. Like Iman, he asserted:

> *"I don't think [I will get diabetes] because so far I don't have any symptoms of diabetes."*

Arifin's argument was quite problematic because T2D is known to be a silent killer, and globally, millions of T2D cases have gone undiagnosed and untreated until the last stages of complications (International Diabetes Federation, 2019b). Another participant, Nad, had the belief that she could only get T2D when she became older:

> *"Maybe not in [the] next 5 years, [but the] next 20 years, yes. Because I can see my parents starting to get [various] illnesses from age 40 [onwards]..."*

A few participants believed they should not be worried about getting T2D later in life and were not in any particular hurry to take T2D prevention measures, since their diabetic relatives were not too badly affected by the disease. Aisyah explained her stand as follows:

> *"Yes, I do have family members with diabetes [but that does] not really [worry] me, since their diabetes is not that bad and still under control. But I can see that my mom has reduced her rice intake and is trying to lose some weight. I can say that I'm aware of diabetes, but I don't take it seriously. But still I'm aware of what I eat".*

Aisyah's stand is concerning as it is very important for people with diabetic relatives to be aware of the disease. They need to be more cautious of it as their chances of getting the disease are higher than those who do not have family members with T2D (Attamimy & Qomaruddin, 2018).

However, four participants perceived themselves as having a considerable degree of susceptibility and were aware of early-onset T2D. They had one thing in common, which is a good basic understanding of what causes T2D. For instance, Ahmad, one of the male participants, related that:

> *"… I'm 21 and there's someone even younger than me who already has diabetes. It can happen to obese people as they eat unhealthy food and will surely lack physical activity."*

Nina, who acknowledged her unhealthy eating habits, argued that she might get T2D sometime in her life. She shared her perspective as a person whose parents work with diabetic patients:

> *"….. Because disease just comes without concern for one's age. My mother always told me about her young diabetes patients since I was a kid. So, I do believe that it does exist actually."*

A certain amount of perceived susceptibility is needed to prompt people into the critical action of adopting positive health behaviours that can halt the coming or progression of diabetes (Attamimy & Qomaruddin, 2018; Badlishah-sham et al., 2020). We found that the young adults in this study had varied levels of perceived susceptibility from none whatsoever to high degrees of perceived risks. However, the participants did acknowledge that they could be exposed to greater risks if they kept their unhealthy habits. Being cognizant of the fact that their susceptibility could increase due to their nonchalance, most of them subsequently professed a certain level of willingness to adopt a healthier lifestyle.

Willingness and Motivation to Change Unhealthy Lifestyles

All the participants commonly agreed that maintaining a healthy lifestyle is important. They expressed an eagerness to change their lifestyles, especially those who recognised how unhealthy eating habits and sedentariness could lead to poor health. While some of the participants mentioned preventing diseases such as T2D as their prime motivation for adopting a healthy lifestyle, there were various other motivating factors at play as well. Wanting to live a long, normal, and healthy life was one of them. As stated by Aisyah,

> *"I would make an effort to prevent it because I am still young and there are so many things that I haven't [done] in life. Someday, I would like to travel around the world with my beloved family without [being] stress[ed about] any health issues."*

They also believed that adopting a healthy lifestyle is part of caring for themselves, a way of attaining personal satisfaction. For example, Nina said that she would "eat healthier and take more greens, [avoid] eating too much sweet stuff and foods with no calories, [and] make a conscious effort to adopt a lifestyle that would prevent Type 2 diabetes." She further asserted that she was "getting older and….tired of feeding [her] body with unhealthy foods [as] it deserves better."

Body image was another motivating factor. As reckoned by Nur, she felt "content with [her present] routine," but said "it would be better if [she could] increase [the physical activity] to achieve [her] body weight goals." One participant elaborated further, "The motivation [is] to be slim and healthy…. As a young person in [my] 20s, physical appearance [is] very important to me at this age. Therefore, in order to achieve that, I must be active and eat the right food."

It is also intriguing to see how religiosity could motivate participants to adopt health-promoting behaviours. One of the participants mentioned how being healthy is crucial to Muslims as good health enables a Muslim to perform quality worship. Arifin, in particular, used religious reasoning to explain his motivation to adopt a healthy lifestyle:

> *"I do believe that [having a] healthy lifestyle is crucial, especially as a Muslim, in order to perform ibadah (acts of worship)."*

Cues to Action: Events Triggering the Change of Lifestyle

In the HBM, "cues to action" is an influential factor in health-promoting behaviours. They are stimuli (e.g., events or experiences) that trigger an individual's decision to accept a recommended health action (Abraham & Sheeran, 2014), and played quite a role in the participants' decision to change their habits and lifestyles. While some participants were moved by a sad experience, others were "awakened" by something as simple as a news piece. For example, Kiki mentioned a news item that moved her to change her eating habits and embrace healthier practices:

> *"…. there [was] a piece of news about a girl who [was hospitalized] because she ate lots of instant noodles. This kinda warned me to not eat instant noodles regularly and to eat healthier food."*

According to their testimonies, social media played a huge role in motivating them. Siti, one of the participants, disclosed how her own mindset was transformed by social media content:

> *"…. when I see videos of people exercising in TikTok, Instagram, it kinda motivates me to be more active, especially when they show the results of their exercises."*

Witnessing the struggle of family members who have T2D was another cue to action, one that affected their views on lifestyle and motivated them to engage in health promoting behaviours. One participant, Anis, reminisced about the suffering of her relatives:

> *"It is so sad to see my aunt simply enjoying a piece of cake but then her sugar level suddenly spiked up to 20, which is really bad as the normal range should be 4 to 7 during fasting. I don't know the exact number, but this is the normal range. My grandpa also died [from] diabetes and lung cancer. He could barely eat anything at the end of his life."*

Izza also agreed that such experiences were cues that propelled her to take T2D preventive actions:

> *"My late grandfather had diabetes and it was so painful to see him. His response [to conversations] was weak, healing and recovery [were slow]; [he was] very strict about what he ate. It felt like he was suffering. [His condition] reminds me to always take care of my diet so that I can [avoid getting] in the same state as [he]."*

Self-Efficacy

The HBM talks about self-efficacy as an individual's beliefs in their ability to change towards the better—towards a healthier existence. Such efficacy beliefs are reflected in the conscious initiatives taken by the individual towards living a healthy, positive life. In this regard, many of the participants did mention some efforts that they had undertaken, such as reducing their intake of sweet food, taking plain water—instead of sweet savoury drinks—with every meal, or substituting sugary food with fruits. A non-food related strategy they adopted was looking up friends that could be their exercise partners.

The conscious efforts and initiatives mentioned by the participants indicated their underlying willingness to modify their lifestyles to be more compliant with the idea of healthy living that is free from diabetes. Their disclosure revealed to us that they wanted to change and slowly improve. The next challenge would be to facilitate their transition to a healthier and more active lifestyle.

Barriers to Adopting a Healthy and Active Lifestyle

Adopting and perpetuating a healthy and active lifestyle was not an easy task for most of the youth that had participated in the study. They admitted to living a mostly sedentary and not-so-positive lifestyle and knew they needed to change, but they were hampered from making the necessary transition by many factors. The next two sections discuss the barriers that they faced in adopting healthy eating habits and an active lifestyle.

Barriers to Adopting a Healthy Diet and Eating Habits

Firstly, media food advertisements can be very enticing as delineated by Izza, one of our participants:

> *"They [the media advertisements] really know how to attract our appetite by making lots of 'renovation' to their recipes like McDonald's and KFC. This kinda urges me to try them since they look different and yummy."*

That young people find fast food appealing to their tastebuds is a grave concern and a worrying situation, especially when healthy food often comes across as unappetizing and expensive to them compared to junk food and other unhealthy food options.

> *"The [difference] between healthy food and junk food is it is much easier to get junk food, and it is way cheaper than healthy food. I could buy 2 packs of "Ayam Cheese" for only RM10."*

Additionally, unhealthy food is convenient to get and also takes less effort to prepare. Kiki explained:

> *"I love to eat cakes, fast food, and snacks. It is because they are cheap, convenient, and easy to access. Especially during MCO, I started to learn how to use Grab Food, which makes it harder for me to stop ordering fast food. When I am tired, Maggi, nuggets, fries and [the like] would be my ultimate [choice of diet] because I can simply put them in the air fryer or microwave."*

The root of this problem with junk food was the participants' not knowing how to start eating healthily and where to obtain healthy food. They knew they were not observing a healthy diet and needed to change their ways but were stymied by their lack of knowledge about how to go about making the changes and transition. As explicated by Nur,

> *"I do need to change my eating and lifestyle, but unfortunately, I do not really know where to start."*

They see adopting healthy eating habits as a burdensome task, as Ahmad mentioned, *"it is quite difficult to adapt to a healthier diet unless you have a meal plan or did research on healthier alternatives to these foods."*

For two participants, family was their barrier to living a healthy and active lifestyle. For example, with Lia, her family turned her attempt to practice healthy habits (such as eating healthy food and exercising) into a subject of ridicule. Nina, on the other hand, had a family that simply loved feasting, making it difficult for her to maintain her health-promoting practices and activities.

Additionally, the participants' dependence on their family for food was also a contributing factor. It is difficult to eat healthily at home, claimed Ahmad. This had largely to do with the staple food Malaysian families are accustomed to, i.e., white rice, which has a high amount of carbohydrates that triggers the onset of diabetes. It was difficult for the participants to suddenly stop eating rice because it had been their staple food since childhood. This adds to the importance of the family in providing the social support and reinforcement needed by an individual to adopt and maintain a healthy lifestyle (Baghaei et al., 2011; Pedersen et al., 2012).

To summarise, although the participants agreed that healthy eating is significant in preventing T2D, their thoughts and beliefs were poles apart from what they actually practised and could do. The participants' limitations in keeping a desirable health-oriented style of living are attributable to various reasons, such as media influence, unsupportive social environment, and even their own mindset about diabetes and its preventive measures. If they continue to equate healthy living with high costs and inconvenience, they will remain susceptible to T2D.

Barriers to Adopting an Active Lifestyle

Pressure and disapproval coming from the family and social environment are towering challenges to adopting a healthier lifestyle. One participant, Asma, mentioned being hampered by her family's mockery of her efforts towards a healthier life:

> *"Whenever I [try] to make healthy choices, [my family will] force me to eat, [and] make fun of my diet or exercise. Such [mockery] makes me feel down and [want to] give up. It feels like no one understands me and what I do."*

It was ironic how many participants did not consider physical activity as a potentially significant shield against diabetes, choosing to focus more on food, instead, to ward off T2D. Most did not think that physical inactivity could seriously lead to T2D when the evidence shows that even people with a healthy body mass index (BMI) could develop the disease due to sedentariness (Mainous et al., 2019). This misconception was clearly manifested in Nina's response:

> *"..... I want to do physical activity because I want to have a fit body. But…I don't…do it because… [physical] exercise only [contributes] 20% [to your health] compared to [healthy] eating [which contributes] 70%."*

Moreover, some participants did not see the need to engage in physical activity as they felt they were in a good state of health. Their thinking was that if you are healthy, you don't need to exercise:

> *"..... I do think of increasing my physical activity, but I am still waiting for the right time. Maybe I will wait until my weight [reaches] 50kg, then I will increase my physical activity. I don't think now is the right time, because I still think that I am in a normal condition and activity/exercise requires a lot of effort".*

Clearly, the participants did not see exercising and being physically active as a way of maintaining good health and warding off the onset of T2D. Furthermore, they cited the COVID-19 movement restrictions as an obstacle to performing physical activities. Due to the movement control order (MCO) in Malaysia, people were confined to their homes for long periods, and they found it demotivating to exercise at home. As Syarifah, one of the participants said,

> *"I really want to increase my exercise and physical activity. However, it becomes much more difficult for me when we are currently in the COVID-19 pandemic and [there are] lots of restrictions that we need to follow. I love to jog or exercise outside [the] house, but when it needs to be done inside [the] house, I [feel] less motivated to do so."*

Another participant, Muhsin, showed a lot of motivation to reduce his life's sedentariness but was deterred by social norms. He explained, *"I'm thinking of jogging, but I live in a village where it is rare to see someone jogging. I might look like a weird guy."*

It is clear from the findings that the participants felt a range of obstacles that kept them from living a healthy and active life. There are many aspects of our day-to-day lives that present a challenge to adopting a healthier lifestyle, such as the media, social factors, cost, and convenience. During the conduct of this study, the most profound obstacle was the physical and social restrictions due to the COVID-19 pandemic that had forced people to be more sedentary than ever before. However, it is intriguing to see how certain factors, such as the family, can, at the same time, be both a motivation and an obstacle for the youth to achieve a healthier lifestyle. These findings imply that there is a need to educate society at large, including youth and parents, to engage in healthy T2D prevention and to create a better support system for each other, ensuring a supportive environment for adopting a healthy and active lifestyle.

CONCLUSION

As researchers, the rising incidence of T2D among youth had pushed us to investigate whether the individuals of this age group were aware of their susceptibility to T2D and whether they were willing to change their lifestyles to prevent its early onset. Malaysian youth—who are

reported to live a largely sedentary and less-than-healthy lifestyle and among whom the highest prevalence of obesity in Asia has been reported—were the focus of this study since they have a high risk of developing T2D. The results illustrate that the participants considered healthy eating to be the only aspect of healthy living and proper diet as the only factor in the healthy lifestyle formula, relegating the importance of physical activity to the periphery. The fact that they did not consider being physically active as an integral part of a healthy lifestyle and an important determinant of good health was a misperception we found to be quite prevalent among them. It was also disconcerting to discover that most of the participants did not demonstrate good knowledge of T2D. Therefore, they did not think they were susceptible to the disease, even when some of them were in a high-risk group due to family history.

Most of the participants were willing to change and adopt a healthier lifestyle, but were deterred by some external obstacles, such as unsupportive family attitude, social norms, and movement restrictions due to the pandemic. Some participants were held back by an internal obstacle, i.e., their own mindset, as they tend to think that healthy eating and healthy living are costly and inconvenient. We saw a great deal of opportunity to educate youth about T2D through social media, such as TikTok, Twitter and Instagram, as the participants had cited these platforms as their primary sources of information about diabetes. This followed our discovery of how social media can substantially influence youth's eagerness to change their poor habits and adopt healthier practices and dietary choices.

This study has given us an insight into how the youth perceived T2D. Although the findings were not aimed at generalisation, they could—to a certain extent—be used to understand the views of other youth groups with similar experiences and attempts at adopting healthy living. Our findings point to the urgency of carrying out awareness programmes by government agencies and educational bodies to increase Malaysian youth's knowledge of T2D, with the objective of making them more conscious of its gravity and consequences. It is crucial for young people to realize that prevention and precaution are key to keeping T2D at bay. The content of the awareness programmes must include how certain types of food can trigger insulin resistance in the human body and how young people can fight off T2D through different diet and physical exercise (e.g., swimming, yoga, and aerobic dance) apart from jogging, which is quite commonplace among youth. They should also be educated about healthier eating habits, such as mindful eating and having a weekly nutrition plan.

Young people who desire to transition from poor diet, poor eating and sleeping habits, and sedentariness to a life of health and wellness must receive support for their efforts from their social environment, especially from family members and the public. Therefore, we suggest that all categories of the Malaysian public be adequately educated about T2D so that they can render their support to our youth in working towards and achieving a healthy and productive lifestyle. Towards this end, all parties involved in this educational effort should leverage the power of social media to reach out to various age groups and increase their awareness and understanding of diabetes—in addition to continuously improving upon the programmes that have already been carried out.

We also suggest identifying and removing the obstacles that keep our youth from getting into the habit of taking care of themselves. To ease their transition to a healthy or healthier

lifestyle, the government must help young people to adopt more nutritious eating by making healthier food options available and affordable to them.

In terms of further research, we recommend that the study be replicated in wider communities among Malaysian youth. A better understanding of what young people believe about diabetes and their attitude towards its prevention could be obtained from similar studies. This insight into youth's beliefs about T2D would greatly help stakeholders in designing an effective educational and psychological framework for T2D prevention efforts, which would ideally lead youth to the adoption of a more productive and healthier lifestyle. This is critical as we strive for a healthier Malaysia.

Funding: The writers would like to thank the Ministry of Higher Education Malaysia for the grant, FRGS/1/2019/SSI09/UIAM/01/1, which allowed us to undertake the study and make the publication of this work possible.

REFERENCES

Abdul, W., & Wan, M. (2020). *The Hunger-Obesity Paradox in Malaysia*. *68*, 1–11.

Abraham, C., & Sheeran, P. (2014). The health belief model. *Cambridge Handbook of Psychology, Health and Medicine, Second Edition, January*, 97–102. https://doi.org/10.1017/CBO9780511543579.022

Al-Domi, H. A., Faqih, A., Jaradat, Z., AL-Dalaeen, A., Jaradat, S., & Amarneh, B. (2019). Physical activity, sedentary behaviors and dietary patterns as risk factors of obesity among jordanian schoolchildren. *Diabetes and Metabolic Syndrome: Clinical Research and Reviews*, *13*(1), 189–194. https://doi.org/10.1016/j.dsx.2018.08.033

Al-Mutairi, R. L., Bawazir, A. A., Ahmed, A. E., & Jradi, H. (2015). Health beliefs related to diabetes mellitus prevention among adolescents in Saudi Arabia. *Sultan Qaboos University Medical Journal*, *15*(3), e398–e404. https://doi.org/10.18295/squmj.2015.15.03.015

Alberti, G., Zimmet, P., Shaw, J., Bloomgarden, Z., Kaufman, F., & Silink, M. (2004). Type 2 diabetes in the Young: The Evolving Epidemic. The International Diabetes Federation Consensus Workshop. *Diabetes Care*, *27*(7), 1798–1811. https://doi.org /10.2337/diacare .27.7.1798

Amutha, A., & Mohan, V. (2016). Diabetes complications in childhood and adolescent onset type 2 diabetes - A review. *Journal of Diabetes and Its Complications*, *30*(5), 951–957. https://doi.org/10.1016/j.jdiacomp.2016.02.009

Attamimy, H. B., & Qomaruddin, M. B. (2018). Aplikasi Health Belief Model Pada Perilaku Pencegahan Demam Berdarah Dengue. *Jurnal PROMKES*, *5*(2), 245. https://doi.org/10.20473/jpk.v5.i2.2017.245-255

Auburn, GE; Gott, M; Hoare, K. (2021). Experiences of an insider researcher--interviewing your own colleagues. *Nurse Researcher*. doi: 107748/nr:2021e.1794

Badlishah-sham, S. F., Ramli, A. S., Isa, M. R., Mohd-zaki, N., & Whitford, D. L. (2020). *Are Malaysian Type 2 Diabetes patients willing to be trained to speak to their offspring about risk of diabetes and preventive measures ? 0*, 1–9.

Baghaei, N., Kimani, S., Freyne, J., Brindal, E., Berkovsky, S., & Smith, G. (2011). Engaging families in lifestyle changes through social networking. *International Journal of Human-Computer Interaction*, *27*(10), 971–990. https://doi.org/10.1080/10447318.2011.555315

Birt, L., Scott, S., Cavers, D., Campbell, C., & Walter, F. (2016). Member Checking: A Tool to Enhance Trustworthiness or Merely a Nod to Validation? *Qualitative Health Research*, *26*(13), 1802–1811. https://doi.org/10.1177/1049732316654870

Biviá-Roig, G., Blasco-Sanz, R., Boldó-Roda, A., Vara, M. D., Escrivá-Martínez, T., Herrero, R., La Rosa, V. L., Baños, R. M., & Lisón, J. F. (2020). Efficacy of an internet-based intervention to promote a healthy lifestyle on the reproductive parameters of overweight and obese women: Study protocol for a randomised controlled trial. *International Journal of Environmental Research and Public Health*, *17*(22), 1–15. https://doi.org/10.3390/ijerph17228312

Block, E. S., Dame, N., States, U., & Erskine, L. (2012). *Interviewing by Telephone : Specific Considerations , Opportunities , and Challenges*. 428–445.

Bonner, A., & Tolhurst, G. (2002). Insider/outsider perspectives of participant observation. *Nurse Researcher, 9*(4), 7-19.

Booth, E., Halliday, V., & Cooper, R. J. (2019). Headteachers' and chairs of governors' perspectives on adolescent obesity and its prevention in English secondary school settings. *Journal of Public Health*, 1–11. https://doi.org/10.1093/pubmed/fdz151

Bowden, C., & Galindo-Gonzalez, S. (2015). *Interviewing When You ' re Not Face-To-Face : The Use of Email Interviews in a Phenomenological Study The Values and Limitations of Email Interviews*. *10*, 79–92.

Chinnappan, S., Sivanandy, P., Sagaran, R., & Molugulu, N. (2017). Assessment of Knowledge of Diabetes Mellitus in the Urban Areas of Klang District, Malaysia. *Pharmacy, 5*(4), 11. https://doi.org/10.3390/pharmacy5010011

Dussa, K., Parimalakrishnan, S., & Sahay, R. (2015). Assessment of diabetes knowledge using diabetes knowledge questionnaire among people with type 2 diabetes mellitus. *Asian Journal of Pharmaceutical and Clinical Research*, *8*(2), 254–256.

Fritz, R. L., & Vandermause, R. (2018). *Data Collection via In-Depth Email Interviewing : Lessons From the Field*. https://doi.org/10.1177/1049732316689067

George, E. S., Rosenkranz, R. R., & Kolt, G. S. (2013). Chronic disease and sitting time in middle-aged Australian males: Findings from the 45 and Up Study. *International Journal of Behavioral Nutrition and Physical Activity*, *10*, 1–8. https://doi.org/10.1186/1479-5868-10-20

Ghweeba, M., Shishi, S., Kofi, M., Abdel-Halim, A., Amer, S., & Lindenmeyer, A. (2021). How Diabetes Mellitus-related Health Information is Received by Egyptian Internet Users? A Cross-sectional Study. *Suez Canal University Medical Journal*, *24*(1), 51–60. https://doi.org/10.21608/scumj.2021.161078

Guest, G., Bunce, A., & Johnson, L. (2006). How Many Interviews Are Enough? An Experiment with Data Saturation and Variability. *Field Methods*, *18*(February), 59–82. https://doi.org/10.1177/1525822X05279903

Hallal, P. C., Andersen, L. B., Bull, F. C., Guthold, R., Haskell, W., Ekelund, U., Alkandari, J. R., Bauman, A. E., Blair, S. N., Brownson, R. C., Craig, C. L., Goenka, S., Heath, G. W., Inoue, S., Kahlmeier, S., Katzmarzyk, P. T., Kohl, H. W., Lambert, E. V., Lee, I. M., … Wells, J. C. (2012). Global physical activity levels: Surveillance progress, pitfalls, and prospects. *The Lancet*, *380*(9838), 247–257. https://doi.org/10.1016/S0140-6736(12)60646-1

Hassan, H., Sade, A. B., & Rahman, M. S. (2018). Obesity and overweight issues could undermine Malaysia's competitiveness. *International Journal of Human Rights in Healthcare*, *11*(3), 204–213. https://doi.org/10.1108/IJHRH-09-2017-0050

Hawkins, J. E. (2018). *The Practical Utility and Suitability of Email Interviews in Qualitative Research The Practical Utility and Suitability of Email Interviews in Qualitative Research*. *23*(2), 493–501.

Hu, F. B., Leitzmann, M. F., Stampfer, M. J., Colditz, G. A., Willett, W. C., & Rimm, E. B. (2001). Physical activity and television watching in relation to risk for type 2 diabetes mellitus in men. *Archives of Internal Medicine*, *161*(12), 1542–1548. https://doi.org/10.1001/archinte.161.12.1542

Huang, T. T., & Goran, I. (2003). *Prevention of type 2 diabetes in young people : a theoretical perspective*. *1*, 38–56.

Hussein, Z., Taher, S. W., Kaur, H., Singh, G., Chee, W., & Swee, S. (2015). Diabetes Care in Malaysia : Problems , New Models , and Solutions Diabetes Care in Malaysia : Problems , New Models , and Solutions. *Annals of Global Health*, *81*(6), 851–862. https://doi.org/10.1016/j.aogh.2015.12.016

Institute for Public Health. (2020). *National Health and Morbidity Survey 2019. Non-communicable diseases, healthcare demand, and health literacy:* National Institute of Health, Ministry of Health Malaysia.

International Diabetes Federation. (2021). IDF Atlas 10th Edition. In *Diabetes Research and Clinical Practice* (Vol. 102, Issue 2). https://doi.org/10.1016/j.diabres.2013.10.013

Jannasch, F., Kröger, J., & Schulze, M. B. (2017). Dietary patterns and Type 2 diabetes: A systematic literature review and meta- analysis of prospective studies. *Journal of Nutrition*, *147*(6), 1174–1182. https://doi.org/10.3945/jn.116.242552

Jessiman, W.C. (2013). "To be honest, I haven't even thought about it"--recruitment in small-scale qualitative research in primary care. *Nurse Researcher*, *21*(21), 18-23.

Kamath, C. C., Vickers, K. S., Ehrlich, A., McGovern, L., Johnson, J., Singhal, V., Paulo, R., Hettinger, A., Erwin, P. J., & Montori, V. M. (2008). Behavioral interventions to prevent childhood obesity: A systematic review and metaanalyses of randomized trials. *Journal of Clinical Endocrinology and Metabolism*, *93*(12), 4606–4615. https://doi.org/10.1210/jc.2006-2411

Khan, M. A. B., Hashim, M. J., King, J. K., Govender, R. D., Mustafa, H., & Kaabi, J. Al. (2020). Epidemiology of Type 2 diabetes - Global burden of disease and forecasted trends. *Journal of Epidemiology and Global Health*, *10*(1), 107–111. https://doi.org/10.2991/JEGH.K.191028.001

Kim, M. I., & Ladenson, P. W. (2002). Diabetes on the internet: Resources for patients. *Journal of Clinical Endocrinology and Metabolism*, *87*(8), 3523–3526. https://doi.org/10.1210/jcem.87.8.9999

Kim, S., & Kim, S. (2020). Analysis of the impact of health beliefs and resource factors on preventive behaviors against the covid-19 pandemic. *International Journal of Environmental Research and Public Health*, *17*(22), 1–21. https://doi.org/10.3390/ijerph17228666

Kong, W., Song, S., Zhao, Y. C., Zhu, Q., & Sha, L. (2021). Tiktok as a health information source: Assessment of the quality of information in diabetes-related videos. *Journal of Medical Internet Research*, *23*(9). https://doi.org/10.2196/30409

Koplan, J. P., Liverman, C. T., & Kraak, V. I. (2005). *Preventing Childhood Obesity*. The National Academies Press.

Koren, D., & Levitsky, L. L. (2021). Type 2 diabetes mellitus in childhood and adolescence. *Pediatrics in Review*, *42*(4), 167–177. https://doi.org/10.1542/pir.2019-0236

Larsen, B. A., Martin, L., & Strong, D. R. (2014). *Sedentary behavior and prevalent diabetes in Non-Latino Whites , Non-Latino Blacks and Latinos : findings from the National Health Interview Survey*. *37*(4), 634–640. https://doi.org/10.1093/pubmed/fdu103

Larson, N. I., Miller, J. M., Watts, A. W., Story, M. T., & Neumark-sztainer, D. R. (2016). *Adolescent Snacking Behaviors Are Associated with Dietary Intake and Weight Status 1 – 3*. https://doi.org/10.3945/jn.116.230334.who

Lascar, N., Brown, J., Pattison, H., Barnett, A. H., Bailey, C. J., & Bellary, S. (2018). Type 2 diabetes in adolescents and young adults. *The Lancet Diabetes and Endocrinology*, *6*(1), 69–80. https://doi.org/10.1016/S2213-8587(17)30186-9

Lee, E. Y., & Yoon, K. (2018). *Epidemic obesity in children and adolescents : risk factors and prevention*.

Lindström, J., Neumann, A., Sheppard, K. E., Gilis-Januszewska, A., Greaves, C. J., Handke, U., Pajunen, P., Puhl, S., Pölönen, A., Rissanen, A., Roden, M., Stemper, T., Telle-Hjellset, V., Tuomilehto, J., Velickiene, D., Schwarz, P. E., Acosta, T., Adler, M., Alkerwi, A., … Yilmaz, T. (2010). Take action to prevent diabetes- The IMAGE toolkit for the prevention of type 2 diabetes in Europe. *Hormone and Metabolic Research*, *42*(SUPPL. 1). https://doi.org/10.1055/s-0029-1240975

Lynch, J. L., Barrientos-Pérez, M., Hafez, M., Jalaludin, M. Y., Kovarenko, M., Rao, P. V., & Weghuber, D. (2020). Country-Specific Prevalence and Incidence of Youth-Onset Type 2 Diabetes: A Narrative Literature Review. *Annals of Nutrition and Metabolism*, 289–296. https://doi.org/10.1159/000510499

Mahaletchumy, A., Rampal, L., & Sharif, Z. M. (2019). Prevalence of overweight/obesity and its associated factors among secondary school students in semi urban area in Malaysia. *Medical Journal of Malaysia*, *74*(6), 513–520.

Mainous, A. G., Tanner, R. J., Rahmanian, K. P., Jo, A., & Carek, P. J. (2019). Effect of Sedentary Lifestyle on Cardiovascular Disease Risk Among Healthy Adults With Body Mass Indexes 18.5 to 29.9 kg/m 2. *American Journal of Cardiology*, *123*(5), 764–768. https://doi.org/10.1016/j.amjcard.2018.11.043

McArel, H. E., Vossen, J. F., Thompson, A. M., & Vossen, D. P. (2003). Physical Activity Levels and Number and Duration of Upper Respiratory Infections in Undergraduate Students. *Medicine & Science in Sports & Exercise*, *35*(Supplement 1), S381. https://doi.org/10.1097/00005768-200305001-02122

Mehta, P., Sharma, M., & Lee, R. (2012). Using the health belief model in qualitative focus groups to identify HPV vaccine acceptability in college men. *International Quarterly of Community Health Education*, *33*(2), 175–187. https://doi.org/10.2190/IQ.33.2.f

Moreno, L. A., Gottrand, F., Huybrechts, I., Ruiz, J. R., & González-gross, M. (2014). *Nutrition and Lifestyle in European Adolescents : The HELENA (Healthy Lifestyle in Europe by Nutrition in Adolescence) Study 1 – 3. Part 2*, 615–623. https://doi.org/10.3945/an.113.005678.615S

Nadeau, K. J., Anderson, B. J., Berg, E. G., Chiang, J. L., Chou, H., Copeland, K. C., Hannon, T. S., Huang, T. T. K., Lynch, J. L., Powell, J., Sellers, E., Tamborlane, W. V., & Zeitler, P. (2016). Youth-onset type 2 diabetes consensus report: Current status, challenges, and priorities. *Diabetes Care*, *39*(9), 1635–1642. https://doi.org/10.2337/dc16-1066

Novichikhina, E. V, & Romanova, E. V. (2020). *Attracting the Youth to a Healthy Lifestyle through Mass Media*. *396*(Iceder 2019), 416–418. https://doi.org/10.2991/iceder-19.2020.87

Patton. M. Q. (2002). Qualitative research and evaluation methods (3rd ed.). Thousand Oaks, CA: Sage Publications.

Pedersen, S., Grønhøj, A., & Bech-Larsen, T. (2012). Family members' roles in healthy-eating socialization based on a healthy-eating intervention. *Young Consumers*, *13*(3), 208–223. https://doi.org/10.1108/17473611211261610

Rosenstock, I. M., Strecher, V. J., & Becker, M. H. (1988). Social Learning Theory and the Health Belief Model. *Health Education & Behavior*, *15*(2), 175–183. https://doi.org/10.1177/109019818801500203

Ruiz Estrada, M. A., Swee Kheng, K., & Ating, R. (2019). The Evaluation of Obesity in Malaysia. *SSRN Electronic Journal*, *2013*. https://doi.org/10.2139/ssrn.3455108

Saeedi, P., Salpea, P., Karuranga, S., Petersohn, I., Malanda, B., Gregg, E. W., Unwin, N., Wild, S. H., & Williams, R. (2020). Mortality attributable to diabetes in 20–79 years old adults, 2019 estimates: Results from the International Diabetes Federation Diabetes Atlas, 9th edition. *Diabetes Research and Clinical Practice*, *162*, 108086. https://doi.org/10.1016/j.diabres.2020.108086

Safari, M., Dalilhoush, N., Abbaslou, P., & Abbaszadehzouri, N. (2013). *Assessment of diabetes knowledge among adolescents in selected Iranian schools in UAE*. *2*, 11–17.

Smith, L. H., Holloman, C., Elder, J. P., Holub, C. K., Arredondo, E. M., Maria Sanchez-Romero, L., Moreno-Saracho, J. E., Barquera, S., Rivera, J., & SERVICES, U. S. D. O. H. A. H. (2005). Theory at a Glance. In *U.S. DEPARTMENT OF HEALTH AND HUMAN SCIENCES*.

Swaminathan, S., Avezum, A., Lopez-jaramillo, P., & Yusuf, S. (2020). *White Rice Intake and Incident Diabetes : A Study of 132 , 373 Participants in 21 Countries*. *43*(November), 2643–2650. https://doi.org/10.2337/dc19-2335

Tobin, G. A., & Begley, C. M. (2004). Methodological rigour within a qualitative framework. Journal of Advanced Nursing, 48, 388–396. doi:10.1111/j.1365-2648.2004.03207.x

Vangeepuram, N., Carmona, J., Arniella, G., Horowitz, C. R., & Burnet, D. (2015). Use of Focus Groups to Inform a Youth Diabetes Prevention Model. *Physiology & Behavior*, *176*(5), 139–148. https://doi.org/10.1016/j.physbeh.2017.03.040

Vazini, H., & Barati, M. (2014). The Health Belief Model and Self-Care Behaviors among Type 2 Diabetic Patients. *Iranian Journal of Diabetes and Obesity*, *6*(3), 107–113.

Verzeletti, C., Maes, L., Santinello, M., & Vereecken, C. A. (2009). *Soft drink consumption in adolescence : associations with food-related lifestyles and family rules in Belgium Flanders and the Veneto Region of Italy*. *20*(3), 312–317. https://doi.org/10.1093/eurpub/ckp150

Wilmot, E., & Idris, I. (2014). Early onset type 2 diabetes_ risk factors, clinical impact and management _ Enhanced Reader.pdf. *Therapeutic Advances in Chronic Disease*, *5*(6), 234–244.

Wong, J. J., Addala, A., Abujaradeh, H., Adams, R. N., Barley, R. C., Hanes, S. J., Iturralde, E., Lanning, M. S., Naranjo, D., Tanenbaum, M. L., & Hood, K. K. (2020). Depression in context: Important considerations for youth with type 1 vs type 2 diabetes. *Pediatric Diabetes*, *21*(1), 135–142. https://doi.org/10.1111/pedi.12939

Yeow, T. P., Aun, E. S., Peng, C., Id, H., Lim, S. L., Khaw, H., & Aziz, N. A. (2019). *Challenges in the classification and management of Asian youth-onset diabetes mellitus-lessons learned from a single centre study*. 1–14.

Zamora-Kapoor, A., Fyfe-Johnson, A., Omidpanah, A., Buchwald, D., & Sinclair, K. (2018). Risk factors for pre-diabetes and diabetes in adolescence and their variability by race and ethnicity. *Preventive Medicine*, *115*(August), 47–52. https://doi.org/10.1016/j.ypmed.2018.08.015