

Dietary Acculturation among International Students in UK: A Systematic Review

Abstract

There is a significant rise in the proportion of international students pursuing tertiary education in the United Kingdom. This population coming from different countries faces a lot of challenges which contribute to negative health effects and needs further attention. One among these challenges is dietary acculturation.

This systematic review aims to explore the factors influencing dietary acculturation and its public health impacts among international students in the UK. Five online databases namely ProQuest Central, Web of Science, Scopus, PsycINFO and Medline were searched, and nine qualitative articles were selected that met the eligibility criteria which were then assessed for quality using Critical Appraisal Skills Program (CASP) checklist.

Methodology involved data extraction and a thematic synthesis, which identified three themes and several sub-themes.

The findings of this review indicate that dietary acculturation among international students was affected by tight academic schedules and global fast-food chains. This led to students consuming unhealthy food, contributing to weight gain. However, having social ties and interaction were found to be helpful in dietary acculturation.

Higher education institutions can emphasis on nutrition education with focus on substitute foods, alternatives to unhealthy choices, and initiatives to make bicultural food accessible to the students to make the unfamiliar environment conducive to learning. Public health policies as well as regulations can be made on informed decisions based on an understanding of differences and specific needs of the foreign student population.

Keywords

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Background

Over 600,000 international students entered UK higher education in 2020-21, representing 22% of all students (Walsh, 2022). For many international students, the UK fulfils key criteria related to learning, living, and employability. A study conducted during the COVID-19 pandemic found 77% of students applied to UK schools due to its strong academic reputation. Over half (53%) said the UK's diversity, multicultural experience, and welcoming culture attracted them to the country (Universities and Colleges Admissions Service (UCAS), 2022). With 244,000 visas issued in 2021, the number of student migrants to the UK surpassed all previous quarters since 2005 after the COVID-19 pandemic (Walsh, 2022).

A micro perspective (a purely educational viewpoint) of international student mobility (ISM) focuses on the educational curriculum, educational methods, and cultural adaptability (Sherry et al., 2010) of international students in a specific learning environment, as well as their behaviour in a particular learning environment (Hou & Du, 2022). There is increasing evidence that ISM is more than a by-product of higher education, and that it is part of globalisation, involving more complex global networks of knowledge, economics, and cultures (Findlay et al., 2012). Students from abroad not only generate revenue for higher education institutions, but also contribute to the economy of their host countries through living expenses, jobs, and tourism (Abbas et al., 2021). International higher education students also contribute to the UK economy in terms of taxes they pay after graduation (Conlon et al., 2019) and provides higher education institutions with a significant source of income (Riaño et al., 2018).

Students who study abroad are motivated (and the choice of study destinations) by a variety of push-pull factors, which have been examined in many studies (Eder et al., 2010; Maringe & Carter, 2007). Cultural, living standards, socioeconomic status, improved career prospects, and immigration opportunities are all examples of pull factors in the host country or institution (Mazzarol & Soutar, 2002). According to Perkins and Neumayer, (2011), migration costs are a major factor in the emigration of students from developing

countries, whereas rankings of universities are only marginally impactful on international student mobility.

Students from abroad may experience cultural shock or "cultural stress" when they arrive in the new host environment, which has a significant impact on their psychological and physical well-being (Selmer, 2001). International students experience higher levels of stress due to their neuroticism and perceived cultural distance, as well as difficulty adapting to a new environment (Yu et al., 2019). Students are free to decide all aspects of their life, such as diet, exercise, alcohol consumption, and drug use (Burns et al., 2020). Previous research have shown that behavioural outcomes whether maladaptive or optimal tend to cluster together in the student population, for example, a poor diet, increases the likelihood that students will order takeout food, smoke, and engage in less physical activity (Sprake et al., 2018). Students are under financial constraint upon entry, resulting in suboptimal choices due to rising tuition fees and limited disposable income, which exacerbate these suboptimal choices (Burns et al., 2020).

It is also common for immigrants to experience food shock when moving to a country with a distinct culture (Brown et al., 2010a). Adapting their food habits to the new environment can be challenging for immigrants due to inadequate information regarding cooking options, shopping, and lack of familiar foods available (Dean et al., 2010). International students are often undernourished and receive little nutritional and medical care compared to their tertiary educational facilities (Shi et al., 2021). Additionally, immigrants face uncertainty with regards to how to adjust their eating habits to the new environment because of the lack of familiar foods (Terragni et al., 2014). Because of adopting western dietary habits, adverse health effects may occur, including obesity and type 2 diabetes. It is important to research among these immigrants as South Asians have a higher prevalence rate of cardiovascular diseases as well as Type-2 diabetes which may be exacerbated with immigration (Lesser et al., 2014). As a result of dietary acculturation, international students often face more

challenges in food security than their domestic counterparts (Shi et al., 2021).

Objectives

To explore dietary acculturation and the factors affecting the process among international students in the United Kingdom. To explore the public health impacts of dietary acculturation on international students in the United Kingdom.

Acculturation

The term acculturation refers to the phenomenon that occurs when individuals from different cultures come into contact continuously, and the culture patterns of one or both groups change accordingly (Berry, 2008). At the individual level, people's customs, habits, activities, languages, and values are transformed through acculturation (Schwartz et al., 2010). Acculturating to a dominant or existing society poses multiple challenges for immigrants who must retain or surrender beliefs and behaviours from their origin culture while eschewing or adopting those from their destination culture.

In fact, immigrant populations are found to have a declining 'healthy' state with increased residence in a new country (McDonald & Kennedy, 2004) and have even been found to deteriorate more than the native-born populations (Tremblay et al., 2005). Changing cultural, socioeconomic, psychological, lifestyle, and social support networks associated with immigration may erode the "healthy immigrant effect" (Lassetter & Callister, 2009).

An insufficient source of food for an active and healthy lifestyle is described as food insecurity (Kanter & Gittelsohn, 2020). Poor availability of traditional foods and the resulting food insecurity can also be the cause for international students to adopt to a new diet. As a result, health can be adversely affected by a less nutritious diet.

Dietary acculturation

Generally, acculturation is related to adopting cultural traits, whereas dietary acculturation refers to members of migrating groups adopting the eating habits/food choices they encounter in their new home (Negy & Woods, 1992). Dietary acculturation studies typically examine food habits after they have been established for a period of time (Mellin-Olsen & Wandel, 2005). In the first phase following

migration, fewer studies have concentrated on food habits, and there are indications that the phase may present particular challenges (BURNS, 2004; Delavari et al., 2013). Dietary modifications may lead to poor health and food security (Hadley et al., 2010) due to the inaccessibility of or high cost of food used in traditional diets, limited information about shopping and cooking options, and changes in lifestyles and working conditions (Sellen et al., 2002).

Many major chronic diseases are associated with changes toward a "Westernized" lifestyle (high in fat, low in fruits and vegetables) among migrants. There are many chronic, non-infectious degenerative diseases that plague Westernized populations, referred to as "civilization diseases", such as obesity, diabetes, cardiovascular disease, cancer, autoimmune diseases, Alzheimer's disease and many more, diseases that are rare or nearly absent in hunter-gatherer societies or other non-westernized nations (Kopp, 2019). It was reported that in individuals who migrated to the United States, the risk of chronic diseases was high, implying acculturation to Western diet as the cause (Shi et al., 2021). Migrants commonly consume convenience foods and sugar sweetened beverages despite adopting local foods due to their ease of access and low cost, and these items have been denoted to change primarily with acculturation, since consumption is primarily driven by taste preferences rather than cultural identity (Roville-Sausse, 2005; Regev-Tobias et al., 2012). Since diet likely contributes to the increased risk of chronic diseases among immigrants, encouraging racial/ethnic minority groups to adopt the healthy eating practices of their new environment while retaining healthy eating habits from their original country or rural area could be an important public health objective (Satia-Abouta, 2003).

There are three major ways in which sociodemographic and cultural factors, exposure to host culture, and changes in diet-related psychosocial and environmental factors can affect immigrants' dietary intake. Depending on their situation, immigrants may continue to follow traditional dietary patterns, adopt host country food and culinary habits, or integrate traditional dietary practices with

host country eating habits (biculturalism). Changes in their eating habits were related to both individual factors and differences in food environments between their home country and the host country. The resulting changes led to weight changes and some negative effects on physical health, causing some people to return to their traditional diets (Shi et al., 2021).

Dahlgren and Whitehead model

This ecological model, also known as the social determinants of health model, is a framework that helps to understand the complex interplay of factors that influence health outcomes (Whitehead & Dahlgren, 1991). This model further emphasises on the broader layers such as social, community as well as environment and its impact on different health outcomes (Bambra et al., 2010). In the context of dietary acculturation, an individual's preferences, attitudes, tastes, and beliefs surrounding food impacts their decision to change or resist. Some individuals find it difficult to adjust to new food environments due to existing preferences or restrictions (Buse et al., 2022). The next layer consists of social as well as community factors that impacts public health. The availability of restaurants, or local stores have an influence on an individual's food choices (Shi et al., 2021).

The findings of this systematic review will be discussed further using these determinants to understand the interplay of multiple factors in dietary acculturation.

Methodology

This systematic review aimed to explore the factors influencing dietary acculturation and its public health impacts among international students in the United Kingdom. The procedures of this systematic review started by identifying a review question and conducting scoping searches. The review question was formulated using the PICO framework and a review protocol was developed prior to the review process and as attached in Appendix 1. This enabled to plan the review keeping the research question in mind. After defining the review question, databases were searched for relevant publications to be included. The systematic review was conducted based on the Preferred Reporting Guidelines for Systematic Reviews and Meta-Analyses (PRISMA). Once the search

results came in the screening process was done to screen titles as well as abstracts to exclude irrelevant ones. Since the databases were accessed using university login, the full-text version of all relevant papers was available that fulfilled the inclusion criteria. Further screening excluded more papers and articles that were relevant to the research question was only retained. The selected nine articles underwent a quality assessment using Critical Appraisal Skills Programme (CASP) checklist for qualitative research.

The next step involved data extraction and formulating a table to present all the essential data that was extracted from individual studies. The studies were subject to manual coding and the analytical themes as well as subthemes were recorded. Thematic synthesis was conducted as part of this review because the selected articles were qualitative and thematic synthesis yielded better in-depth and detailed understanding of the data. The last stage was reporting all the findings in an orderly manner in the results. Further the findings were discussed along with critical analysis of existing literature.

Eligibility criteria and study selection

Search strategy:

The search strategy involved the use of five electronic databases, Scopus, PsycINFO, ProQuest central, Web of Science, and Medline. The articles until 25 January 2023 were included in the search. Advanced search was done using the keywords "food OR diet* OR nutrition OR eating OR cuisine", AND "acculturation OR cultural assimilation OR neophobia OR cultural adoption OR enculturation OR phobic disorders" AND "international students OR foreign students OR overseas students OR exchange students", AND "United Kingdom OR UK OR Britain OR England OR Wales OR Scotland OR Northern Ireland. The Boolean/Phrase search mode was also applied.

Inclusion criteria

The present review only included qualitative studies conducted among the international student population in the United Kingdom. The studies from the year 2010 were only selected for the review. Also, the age group selected for the review was 18 and above.

Exclusion criteria

The studies conducted before the year 2010 were excluded from the review. Also, international students under the age 18 were excluded, which automatically excluded the school going population. The review excluded

grey literature and studies not in English language and which were not conducted in the United Kingdom. Studies that used quantitative and mixed methods were excluded for the present review.

Figure 1. PRISMA Diagram of study selection process

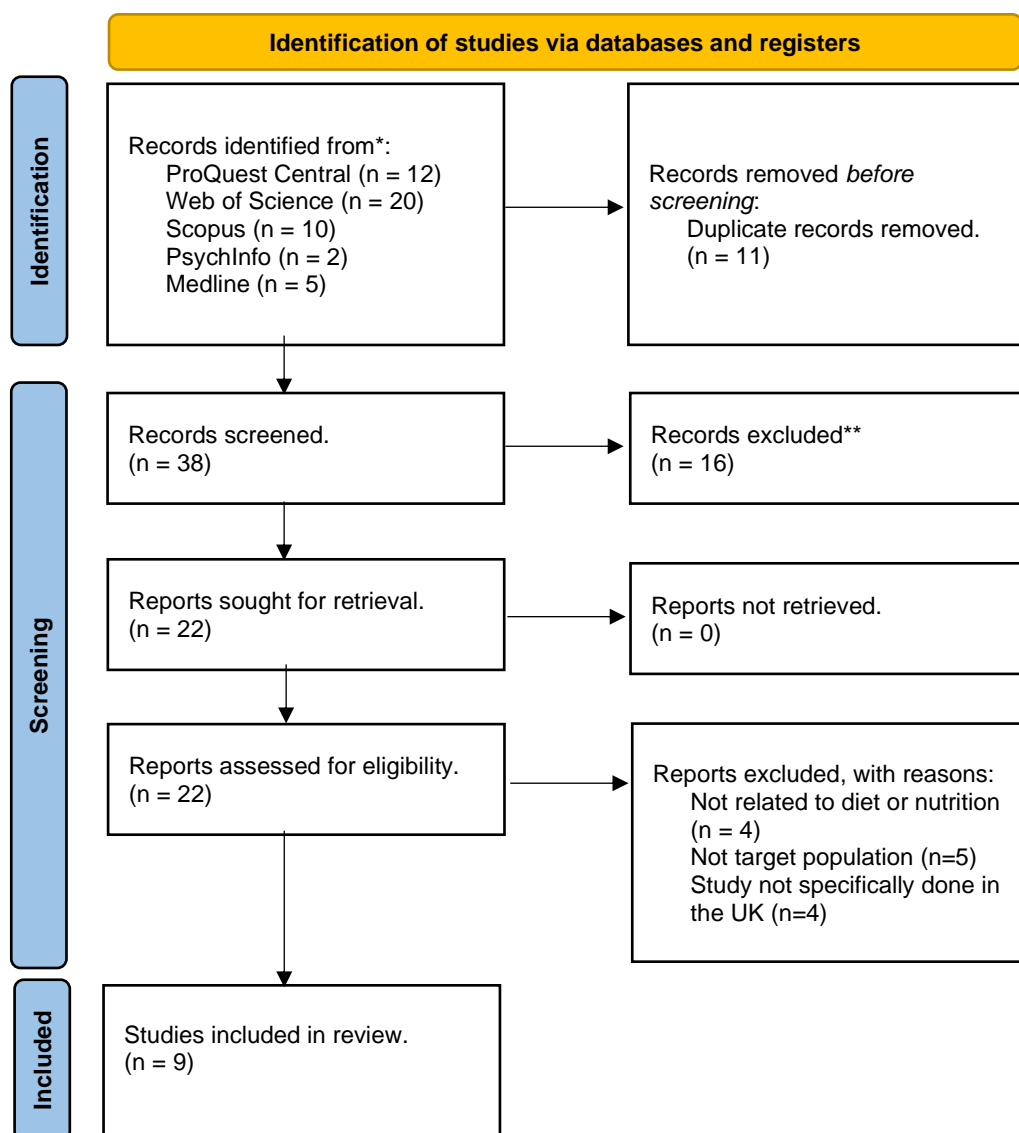


Table 1. The summarization of study and participant characteristics

First author and published year	Country of origin of participants	Aim	Sample size	Method of data collection	Data analysis	Study quality CASP qualitative checklist score
Alloh, 2018	Nigeria	To explore the health experiences of Nigerian students and how studying abroad contributes to their health	9	Semi-structured in-depth interview	Thematic content analysis and interpretative phenomenological analysis	Yes: 9 No: 0 Can't tell: 0
Brown, 2010	Turkey, Italy, Malaysia, Grenada, Thailand, China, Taiwan, South Korea, Spain, France	Explore students' feelings about the food they consume in a new culture	10	Semi-structured in-depth interviews	Thematic analysis	Yes: 7 No: 1 Can't tell: 1
Brown, 2019	Nigeria	To understand of the role of food in the adjustment journey of Nigerian students in the UK	10	Semi-structured in-depth interviews	Thematic analysis	Yes: 8 No: 0 Can't tell: 1
Cappellini, 2010	China	To investigate the effect of social ties on food consumption in a group of Chinese students living in the UK	12	Focus group discussion	Interpretive analysis	Yes: 8 No: 0 Can't tell: 1
Corcoran, 2018	Nigeria Libya Ghana Somalia Philippines Pakistan India	To explore international students' food choices in a semi-rural setting using participatory photovoice techniques	18	Participatory photovoice technique	Thematic analysis	Yes: 7 No: 0 Can't tell: 2
Hartwell, 2010	Europe Asia	To evaluate the extent of changes in international students' food habits whilst studying in the United Kingdom	10	Semi-structured in-depth interview	Content analysis	Yes: 8 No: 0 Can't tell: 1
Mensah, 2022	Asia Europe Caribbean	To examine the extent of dietary acculturation and dietary enculturation on the influence of students'	60	Self-administered multiple choice and short answer	Thematic analysis	Yes: 8 No: 0 Can't tell: 1

	America	food choices using a phenomenological approach		questionnaires and semi structured interviews		
O'sullivan, 2016	Sri Lanka Republic of Lebanon Malta South Korea Netherlands Mauritius Romania Ghana Bangladesh Ireland	Explore the dietary experiences of international students in a British university and how these phenomena differ from what they experienced in their home country	10	Semi-structured in-depth interviews	Thematic analysis	Yes: 8 No: 0 Can't tell: 1
Yen, 2018	China	To investigate a group of Chinese international students' food consumption behaviours and the identity that underlay such competition patterns during their sojourning in the UK	21	Semi-structured in-depth interview	Thematic analysis	Yes: 7 No: 0 Can't tell: 2

Study quality.

In this review, Critical Appraisal Skills Program (CASP) checklist for qualitative research was used to assess the quality and bias of evidence (Critical Appraisal Skills Program (CASP), 2018).

Data extraction and analysis

A data extraction table was used to outline the study characteristics such as name of the Author/s, published year, country of origin, aim, sample characteristics, data collection and analysis methods used, and a study quality (CASP qualitative checklist score). The summarized study and participant characteristics have been illustrated in Table 1. Thematic synthesis by Thomas and Harden was used to analyse and combine the results from the studies (Thomas & Harden, 2008)

Results

Characteristics of articles

The keyword searches in five databases yielded 49 studies. Among these, 11 of the articles were removed during duplication which was done using EndNote software. From the rest of the articles 16 of them were excluded based on the screening of title as well as abstracts. 22 of the articles were assessed for eligibility after retaining in full text forms. After applying inclusion/exclusion criteria and assessing relevance of the studies to the research objective, these full text forms of 22 studies were read and 9 were selected for the review. The summarized table of analysis is reported in Table 1 that includes all the nine articles.

Thematic synthesis Three major analytical themes emerged after the thematic synthesis and further subthemes were also identified and are reported in Table 2. Analytical themes

included dietary changes and effects, dietary explorations, and influences on food habits. Additional descriptive themes eating patterns, healthy/unhealthy intake, body weight variations, traditional food, English food, global brands, new experiences, personal factors, health concerns, family and peer influences, and food-based factors were also recorded.

All nine articles discussed all three major analytical themes. A summary of findings is reported from the results section.

Most of the international students reported of disrupted eating patterns with unhealthy snacking and skipping of meals being a regular routine. Days were differentiated as university days and non-university days where the former were always hectic and busy. For most foreign students' meals like breakfast was forgone as they did not like the alternatives like cereals for breakfast. Many students revealed of not having proper meals in those days due to lack of time or availability of food. They also complained of not getting healthy options on campus and having to resort to fast-food choices in and around university campuses. It was noted that the common pattern among the students were that they compromised their dietary habits to accommodate university demands.

Many international students referred to their traditional diet as being a balanced diet and as a healthier option than the food of the host country. In addition, students frequently complain about the quality of fresh food sold in supermarkets in the UK compared to what they are used to at home. They were concerned about the English food being fattening as well as its bland taste. Initially (within six months of arrival) international students reported of weight gain associated with consumption of unhealthy fast food. fruits and vegetables were reported as the least consumed food among many students. Furthermore, students revealed that lack of social ties with members of the host community functioned as a barrier in understanding and consuming healthy traditional British food. Changes in diet and associated body weight variations were found in all the articles. Increase in body weight was also associated with lack of physical activities

and sedentary lifestyle which mostly focussed on academic activities.

Traditional food consumption was associated with feelings of comfort and familiarity. But finding ingredients and authentic dishes in restaurants were an arduous task. Even though English food were initially considered bland and unhealthy, many after having proper interactions with the members of the host country started cooking and liking British food. it was found that having adequate social ties helped in the process of dietary acculturation. Also, having relationships with fellow international students enabled many students to experience a variety of new cuisines as well as have novel experiences. Students stated that having peers or housemates to cook and share meals increased the motivation as well as boosted the social relationship. However, it was noted that the influence of global brands hindered this process as individuals resorted on fast food from such global food chains when they first arrived in the UK. It was because of the familiarity they felt as it was available in their home country also.

Students shared how the feelings of homesickness, anxiety and stress intensified with lack of home country food. Many students recounted how joint cooking and eating helped them to foster the major aspect of cultural identity, alleviate stress as well as loneliness. Additionally, a wide range of individual factors affects the eating habits of international students including cooking skills, past eating and cooking habits, knowledge, time, and convenience. Furthermore, food-based factors that influenced eating habits and dietary acculturation were availability, cost, and accessibility.

Inter-related themes

Three major themes were found to be influencing each other. There were various kinds of influences on food habits of the acculturating individuals such as personal, health, peer related, and food related factors (sub-themes). This in turn affected their eating habits (theme- dietary changes and defects). This determined whether their dietary intake was healthy or unhealthy which led to a variation in body weight. Dietary explorations again had an impact on the dietary changes. The type of food they consumed depended on

this (sub-themes- traditional food, English food, global brands, new experiences).

Discussion

The aim of this systematic review was to explore the various factors influencing dietary acculturation and its public health impacts among international students in the United Kingdom. Nine qualitative articles were included for this review based on their relevance to the research question. Several articles have mentioned that there is a possibility that dietary acculturation contributes to this higher disease risk (i.e., adopting the food and eating habits of the host country) (Lee et al., 2021b; Brown et al., 2019). The key findings of this systematic review point out that the process of adapting to the new food culture of the host country poses as an additional stressor to the acculturating international students. The new host culture, unfamiliar learning environment, language barriers as well as lack of social ties are some of the major issues that foreign students face (Brown & Holloway, 2008). Additionally, they face a lot of problems related to diet and health. A summary of key findings will be discussed further.

The participants of all the studies mentioned a change in **eating patterns** after coming to the UK. Most of them, despite any national differences, used to have a proper dietary routine as well as a balanced diet back in their home country. A few of them mentioned how their parents used to cook nutritional food at home. The drastic change in their dietary pattern was mostly due to the lack of time (the busy academic schedules), unavailability of traditional ingredients, dislike towards the host food culture and lack of desirable alternatives on campus. Foreign students also mentioned the **unhealthy diet** of the host culture and compared it with their own home country's food. The amount of intake of fruits and vegetables has been significantly decreased from the students' diet and many resort to fast food or snacking rather than having proper meals while at university. This was associated with **weight gain** as well as increased cholesterol levels.

Students often considered their own **traditional food** as "ideal food" and found it as alleviating their homesickness, anxiety, and

loneliness. The familiarity they got from preparing and having traditional food was mentioned as comforting in all the articles reviewed. Furthermore, **English food** was regarded as flavorless, bland, and unhealthy by many. A major reason being not having enough social ties with the members of the host culture to introduce them to proper food of the new culture. Most students were open to **new experiences**, trying out different cuisines (both host culture as well as of fellow international students). **Global brands** had a direct impact on the dietary acculturation as students often relied on these fast-food chains initially (within six months of arrival) on arrival because they were already accustomed to them. And this hindered their acculturation to the new food environment.

A variety of **personal factors** influenced the eating habits of overseas students including cooking skills, knowledge, past eating habits, time, and convenience. Most of the students were cooking for the first time after coming to a new country. Physical as well as psychological **health concerns** came up in several articles. Stress induced eating was one among the concerns along with insomnia, anxiety, and homesickness. Weight gain was another prime concern associated with dietary acculturation. The impact of **social relationships** was crucial in eating habits as many students enjoyed joint preparation and eating and this tend to alleviate the feelings of loneliness. Other **food related factors** such as time, accessibility and availability of shops that provide traditional ingredients, cost as well as location played an important role in determining the cooking and eating habits.

The findings of this review suggests that during the initial phase international students were compelled to rely on fast food from global brands, often described as a "risk-free" choice, as it was easier to order as well as to consume. It makes their selection a safe and reassuring process since they are familiar with such global brands before arriving in the UK (Yen et al., 2018). Global consumer culture (GCC) and the global brands affected the process of acculturation. As a result of multicultural diversity, GCC food represents a common ground where brands, meal structures, and conventions are shared (Cappellini & Yen,

2013). Students lived around a busy academic schedule and the “university days” were usually hectic when they either skipped meals or had four to five meals mostly unhealthy snacks (O’Sullivan & Amirabdollahian, 2016). Similarly, Alakaam and Willyard (2020) found that students had unstructured mealtimes and frequent snacking behaviours while they were in the university. The lack of traditional food choices on campus (Corcoran, 2018) as well as expensive healthier alternatives, and cheap fast food made the students to rely on unhealthy convenience food options (Satia, 2010). Students compared eating patterns with that of what they had at home and linked weight changes to it (O’Sullivan & Amirabdollahian, 2016). Even though most students were aware of unhealthy eating habits, they were unsuccessful in maintaining an ideal lifestyle.

Many potential health effects were identified during this review such as weight gain, mental health issues and increased bad cholesterol levels. In addition to this, other studies on dietary acculturation have found negative impacts including digestive problems, nutritional deficiencies as well as increased risk of chronic diseases (Lesser et al., 2014; Varghese & Moore-Orr, 2002).

The struggle of foreign students to acquire the necessary ingredients to prepare their traditional dishes were mentioned in all the articles that were reviewed. These results were congruent to the findings in other acculturation studies (Renzaho & Burns, 2006; Mellin-Olsen & Wandel, 2005). Later a reflection of inter-cultural adaption (improvising traditional recipes based on locally available ingredients) was observed (Yen et al., 2018). And students travelled to cities to collect specific ingredients and for cheaper rates. Mingling with landlords, peers and flatmates facilitated the process of transfer of cultural meanings associated with food and this guided students in new experiences (Cappellini & Yen, 2013). This finding was consistent with the findings of a recent study by Lee et al. (2022). Chinese students were found to adopt a bicultural eating pattern because of convenience as well as due to increased health literacy and social ties. An achievement of sense of well-being and comfort from traditional food might be

attributed to the possibility of idealisation of traditional food due to home sickness as well as enforced separation from native place (Brown et al., 2019).

The findings of this review will be further contextualized using **the determinants of health model** (Whitehead & Dahlgren, 1991) to consider the public health impacts of dietary acculturation process. This ecological model used in public health conceptualizes how individual, social, and environmental factors interact and influences health outcomes. Different layers surrounding the core, the individual, is seen in this framework. In the first level, immediate environment, a variety of factors such as importance of traditional food, appearance, and taste, cooking skills, personal preferences in trying out new food and similarities to the traditional food influences the individuals’ decision in adopting the new diet culture. Furthermore, lack of familiar food or limited access to traditional dishes may lead to food insecurity (Sherry et al., 2010). This may in turn be the reason an individual adopts a new dietary habit.

The second layer includes the social and community variables such as the cultural beliefs and norms, availability, and accessibility to resources (Whitehead & Dahlgren, 1991). These factors impact the individuals’ health in a more indirect way by influencing the eating behaviours as well as choices. Importance of traditional dishes, cooking skills, the accessibility and availability of traditional ingredients affects foreign students’ preparation of their meals from home country. At the same time, the result in this review suggests that the social interaction and relationships played a vital role in the process of dietary acculturation. Having peers, flatmates, landowners, or colleagues of the host country as well as co-nationals or fellow foreign students helped many students in trying out different cuisines as well as the host country food. This has found to be helpful in the adaption process (Shi et al., 2021). A peculiar finding that few students did not want to share their traditional meals with fellow international students and only co-nationals because the former did not understand the customary norms surrounding the traditional food was also observed (Yen et al., 2018).

The last layer constitutes the wider society and environment that includes economic conditions, policies, cultural factors, living and educational conditions and work environment. Many students complain about the time constraint due to academic stress and intense university schedule. This prevents them from preparing proper meals which eventually leads to skipping meals or unhealthy snacking on cheap food stuff (Sprake et al., 2018). And the type of food available on campus are mostly from global fast-food brands. This hinders dietary acculturation as they are not even getting an opportunity to try authentic English food.

An insufficient source of food for an active and healthy lifestyle is described as food insecurity (Kanter & Gittelsohn, 2020). Students experience food insecurity to a certain extent owing to the unavailability of food that aligns with the personal taste preference, religious and cultural compatibility. Furthermore, students' busy academic schedules made it more challenging for them to prepare their own meals. Residing in rural areas in the UK was also mentioned as a factor in low availability and accessibility of ingredients (Yen et al., 2018).

Due to the easier availability of cheap fast food and unavailability of traditional or healthier food in and around campus, students are neither presented with an option to try out authentic English food, nor have their traditional food. It was remarked in all the reviewed articles that healthier options were usually expensive which forced them to choose the cheaper alternative.

Key public health challenges of dietary acculturation as presented from this review findings are loss of traditional dietary patterns and rise in the consumption of unhealthy and fast-food. Health concerns associated with easily accessible high fat, processed food are increase in cholesterol, weight gain, obesity, and diabetes and other chronic diseases in the long run (Varghese & Moore-Orr, 2002). The change in eating pattern or loss of dietary habits can negatively affect the intake of essential nutrients, fibres, vitamins, and minerals. Most students are ignorant of these health effects and focus on only observable changes such as weight variations. Another potential challenge observed by Sanou et al.

(2014) was language barriers, which was not reported in the present review. These wide range of public health impacts needs to be considered while designing any public health policies or intervention programmes.

In this systematic review, both adaption of host culture diet as well as maintaining traditional diet were found and the latter was more prominent. However, a gradual transition to adoption of host culture, especially bicultural diet (diet incorporating elements of host culture to home country diet) was observed. This depended on the number and quality of social relationships and interaction with members of host nation as well as different nationalities. Therefore, interventions that encourage traditional food along with incorporation of host country food are crucial in facilitating a smooth transition.

Limitations of the review

This systematic review included only qualitative studies and not a mixed method as this was undertaken for academic purpose. Hence, a more resourceful and time-consuming integrated mixed method systematic review could not be done which might have offered a better understanding of the factors affecting dietary acculturation and its public health impacts. However, analysis of qualitative studies helped to gain in-depth and detailed understanding about the participants' issues and feelings regarding transition to a new dietary culture. This review was conducted by only one reviewer and manual coding was undertaken, which might have contributed to bias and errors while coding and synthesis. Further, articles in only English language were included owing to the same reason, as translation was a strenuous task to be accomplished with limited resources as well as time. Also, this review has only included articles published from the year 2010 till present to keep the review up to date. The generalizability of the findings of this systematic review is also limited as this only addresses a limited population.

Conclusion and future directions

The present systematic review attempted to explore the public health impacts and factors affecting dietary acculturation among international students. The initial period was indicated as stressful for the new sojourners as they were coming to an environment with no

familiarity. And initially (within six months of arrival) the students had little or no social ties in the host country. This transition along with lack of adequate food sources created significant stress among the foreign students. Traditional food has said to be physically and emotionally satiating to individuals because of its associated emotional connection (Brown et al., 2010b). Students often complained of the unavailability of cheap healthy food options or traditional food on campus. Weight gain was a common concern among international students owing to higher intake of unhealthy food and low intake of fruits and vegetables. Many studies discussed the chronic disease risk among student sojourners due to dietary and lifestyle changes (Satia-abouta et al., 2002; Regev-Tobias et al., 2012). This is a key area that requires in-dept research.

Most students had limited time to cook and eat because of their intense academic schedules. Many students reported of cooking themselves for the first time. However, the participants of this review were mostly post graduate students, with competent cooking skills. But this may not be a representation of all international students, whom should be investigated further (Corcoran, 2018). Also, it might be beneficial to provide quick, healthy recipes based on traditional foods or designed by students who have fairly competent cooking skills (Corcoran, 2018).

Another key area that can be addressed in the future research is importance of social interaction and relationships in the host country. In the present review it was found that foreign students who had good relationship with members of the host culture were introduced to proper English cuisine. And hence either incorporated host country food to traditional food or started following new diet. Additionally, nutrition education should focus on substitute foods, alternatives to unhealthy choices, and initiatives to make bicultural food accessible to the students.

Further, identifying intervention strategies to support international students based on an understanding of the complexity of adjustment is crucial. For example, organizing extracurricular activities during orientation week, such as tasting sessions or cooking clubs, will allow for group interaction and familiarisation (Hartwell et al., 2011). Public

health nutrition programs and policies should be designed after assessing the food environment (including international students). It should also be done in the higher institution level since foreign students comprise a major proportion of the student population in the UK. Creating an environment conducive to learning should be the goal of all service providers.

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