Eating habits and physical activity in working adults: a formative research

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Research

Keywords: Eating habits, physical activity, adults, workers, workplace programs, qualitative research, Social Cognitive Theory

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Abstract

Background: Eating habits and physical activity are important factors for the development and prevention of non-communicable diseases. Therefore, the objective of this study was to analyse the beliefs, behaviours, and experiences of dietary and physical activity habits based on the constructs of the Social Cognitive Theory (SCT).

Methods: An exploratory study with a qualitative methodology and a phenomenological study design was conducted using focus groups, in-depth interviews, and indirect non-participatory observation. The sessions were audio-recorded and transcribed with prior written informed consent. Data analysis was performed using a hybrid approach.

Results: Workers reported that they do not eat vegetables or fruits daily; however, the consumption of fast food and sugary drinks was frequent. Participants' behaviour is influenced by environmental factors such as reinforcements (economic bonus and company meetups & events), barriers (workplace policies) and facilitators (availability of drinking water, free tortillas , dining rooms, and recreational areas); and personal factors, such as low self-control when when choosing foods from the grains group (e.g. Mexican pastries, noodles and breads), and emotional confrontation (e.g. few workers try to use strategies to confront their emotions and avoid them from affecting their eating and physical activity). On the other hand, participants indicated not feeling capable of eating specific foods due to their taste, for example vegetables, and doing physical activity due to factors such as time. Finally, other key elements influencing workers' behaviours were observational learning (participants eating behaviour and physical activity are influenced by their coworkers and family's behaviours), social support (coworkers and family) and outcome expectations (participants' hoping to improve their health by eating healthy and physical activity behaviours).

Conclusions: Workers's eating behaviour and physical activity could be modified if different influencing factors are simultaneously addressed. These findings will contribute to the development of worksite health programs, based on the SCT, to address the key factors that could improve workers' eating behaviours and physical activity.

Keywords: Eating habits, physical activity, adults, workers, workplace programs, qualitative research, Social Cognitive Theory.

Background

Unhealthy eating and physical inactivity favour the development of non-communicable diseases (1–3) such as diabetes, hypertension, cardiovascular diseases, and obesity, which are the main causes of morbidity and mortality in the world (4). The low consumption of vegetables, fruits, whole grains, and water is common in adults, in addition to the excessive consumption of sugary drinks, desserts, sweets, and alcohol, and the high prevalence of physical inactivity (5, 6).

These unhealthy behaviours are in part influenced by social and individual factors (2, 3, 7, 8), and the work environment plays a fundamental role as approximately 57.4% of Mexican adults spend most of the day at the workplace (9) and during this time, workers are exposed to the physical environment of the workplace, such as the availability of unhealthy food in vending machines, and the organizational structure (for example, policies and work shifts) that can modify the eating behaviour and the practice of physical activity (10–13).

Accordingly, specific studies, based on theories of human behaviour, have been conducted to promote healthy eating habits and physical activity in the workplace, including intervention programs that implement prevention and wellness strategies (14) to reduce unhealthy behaviours for non-communicable diseases (10, 11, 14, 15).

To increase the probability of success of an intervention program, proper planning and priority-setting according to the target group's needs assessment is recommended (16–20). Considering that habits are based on interactions between an individual and its environment (21, 22), and that these behaviours are formed by biological, psychological and social elements (23), the Social Cognitive Theory (SCT) provides a suitable framework to understand these aspects. The SCT explains the individual-environment relationship (24) and is useful for identifying the complexity of people's beliefs and perceptions about food and physical activity.

In Mexico, there is a lack of qualitative studies about people's knowledge and perception of healthy habits (20). However, qualitative information on these topics is relevant as it seeks to understand phenomena and behaviours in uncontrolled environments (25), and it helps to identify critical elements to favour long-term behavioural modifications (26).

Therefore, the objective of this study was to identify the beliefs, behaviours, and experiences related to eating habits and physical activity of working adults, based on SCT constructs. These findings will later contribute to the development of a nutritional and physical activity counselling program based on the SCT for the adoption of healthy eating habits and physical activity in working adults.

Methods

This paper followed the guidelines outlined in the consolidated criteria for reporting qualitative research (COREQ) (27).

Design

A qualitative methodology with a phenomenological study design was used to identify the beliefs, behaviours, and experiences related to eating and physical activity habits of working adults, through non-participant indirect observation (IO), focus groups (FGs) and in-depth interviews (IDIs). The non-participant IO identifies social roles and generates reflections about the details, events, or interactions that occur in the environment (28,29). FGs facilitate group interaction and discussion, enrich testimonies, and build opinions based on previous attitudes and experiences (30,31). Finally, IDIs allow understanding the specific circumstances or events that determine a person's behaviour and illustrate their experience from a key informant viewpoint. Additionally, IDIs offer greater trust and anonymity since they are individual (32,33). These methods, in conjunction, allowed the in-depth exploration of the targeted topics.

Participants and setting

The participants were workers of a company dedicated to the manufacture and marketing of wound care supplies, personal care, and baby products in the metropolitan area of Guadalajara, Jalisco, Mexico. Workers of both sexes, aged 18 to 59 years, able to read and write, with morning (7:00 am to 3:00 pm), evening (2:00 to 9:00 pm), or mixed shifts (7:00 am to 5:00 pm, or 8:00 am to 6:00 pm), and who voluntarily signed the informed consent, were included. A total of 45 employees participated: 6 in the IDIs and 39 in the FGs.

The key informants in the IDIs were 6 production supervisors (three women and three men) with a mean age of 45.26 years (SD 5.13). One of the supervisors was from the morning shift and five from the mixed shift. All participants were Jalisco natives; five of them were single, and three had a bachelor's degree (Table 1).

Thirty-nine workers participated in the focus groups (37 women and two men), mean age was 40.56 years (SD 9.66).

Table 1 Workers' demographic characteristics (n=45)

	In-depth interviews (n=6)	**Focus groups (n=39)**
Characteristics	Mean ± SD or n (%)	Mean ± SD or n (%)
Age (years)	45.26 ±5.1	40.56 ±9.7
Gender		
Male	3 (50.0%)	2 (5.1%)
Female	3 (50.0%)	37 (94.9%)
Marital Status		
Single	5 (83.3%)	19 (48.7%)
Married	1 (16.7%)	17 (43.6%)
Divorced	0 (0.0%)	2 (5.1%)
Separated	0 (0.0%)	1 (2.6%)
Education (highest level)		
Elementary school (completed)	0 (0.0%)	3 (7.7%)
Middle school (completed)	2 (33.3%)	19 (48.7%)
Middle school (incomplete)	0 (0.0%)	2 (5.1%)
High school (completed)	0 (0.0%)	6 (15.4%)
Technical degree	1 (16.7%)	2 (5.1%)
Bachelor´s degree	3 (50%)	6 (15.4%)
Postgraduate	0 (0.0%)	1 (2.6%)
Shift		
Morning [1]	1 (16.7%)	17 (43.6%)
Evening[2]	0 (0.0%)	3 (7.7%)
Mixed[3]	5 (83.3%)	19 (48.7%)

SD = standard deviation

[1]Morning shift starts at 7:00 am and finish at 3:00 pm.

[2]Evening shift starts at 2:00 pm and finish at 9:00 pm.

[3]Mixed shift comprises two working hours of 7:00 am to 5:00 pm, or 8:00 am to 6:00 pm.

The FGs participants were blue-collar workers, assigned to two different working areas: manufacture and packaging (n = 38), as well as administrative staff (n = 7). Nineteen participants (48.71%) were single, and 19 (48.71%) worked the mixed shift. Middle school was the most frequent education level (48.72%) (Table 1). The FGs participants were assigned to four groups, based on the time availability of their workplace: focus group 1 (FG-1) included 9 participants; FG-2, 15; FG-3, 10; and FG-4, 5 participants. The FGs did not include supervisors to ensure that participants could express themselves freely. Participants did not receive any compensation, and the research team had no personal relationships with the participants before, during, or after the study.

DATA COLLECTION

Topics Guide for focus groups and interviews

The topics guide was developed and validated by experts (STC, GMO, MAM, and NBC), and was used in the FGs and IDIs. Additionally, this guide was tested in one FG and three IDIs conducted among workers of an institution different to the one in this study.

The complete guide covers 23 categories (Additional file 1); however, for this study, it was decided to include only 12 categories because these relate to eating habits (dietary experiences and nutrition, eating habits, water, sugary drinks, vegetables, fruits, fast food and processed foods, red meat, grains, legumes, alcoholic beverages) and physical activity. Four aspects were addressed for each category: beliefs, attitudes, perceptions, and knowledge. At the end of each session (FG or IDI), feedback from participants was obtained to identify doubts and to clarify concepts when needed, as recommended for the application of these techniques (34).

In-depth interviews (IDIs) and focus groups (FGs)

The FGs and IDIs sessions were conducted in a semi-structured manner according to the topics guide (previous section) and took place in the boardroom of the company, a well-known area by participants, adequately ventilated and well-lit. In each session besides participants, there was a moderator or an interviewer (for FGI or IDI, respectively), and observers. The moderator or interviewer was responsible for ensuring discussion, while the observers recorded nonverbal expressions and managed the time established for each FG and IDI session. At the beginning of the sessions, workers were welcomed; the moderator or interviewer and the two observers were introduced; then, all participants completed a registration form with sociodemographic data (name, age, education level, marital status, work area, and shift), and received an information sheet about the project and the informed consent. Approximately 5-10 minutes were provided to read the information sheet, ask questions, and sign the informed consent if they agreed to participate. Subsequently, the project (objectives and stages) and the importance of their participation were verbally explained, and authorisation for audio recording was requested.

FGs participants received a name tag and session rules were explained, which included aspects such as avoiding cellphone use and respecting others and their opinions. It was also emphasised that all personal information collected was confidential, labour repercussions would not be applicable, there were no right or wrong answers, and all opinions were important. Finally, the importance of not talking with other coworkers about the categories discussed in the sessions (to avoid influencing the responses of other participants) and the freedom to withdraw in case of feeling offended or uncomfortable, were highlighted.

IDIs' duration was 31 minutes on average and FGs sessions lasted 37 minutes on average. In the case of FGs, a video prepared by the main researcher, illustrating a typical day of a woman with sociodemographic characteristics similar to those of the study population (single mother in her 40's, with two children, and morning shift work from 7 am to 4 pm), portraying both healthy (consumption of water) and unhealthy habits (physical inactivity, consumption of sugary drinks, processed foods, and high-fat foods) was used to help blue-collar workers to feel confident, without judgments, and express themselves freely; then, the session was conducted according to the categories and key points of the guide. At the end of each session, specific doubts were clarified, and fruit and bottled water were offered to participants.

All researchers participating as moderators, interviewers or observers were previously trained in the data collection techniques applied. Moderators and observers made personal field notes during FGs and IDIs, where they described the impressions and reactions of participants, and methodological field notes to guarantee methodological rigour in each of the applied techniques. To ensure quality procedures, a researcher listened to the recordings after each session (FGs and IDIs) to identify issues not addressed and emphasize them in subsequent sessions to ensure saturation of information.

Indirect Observations (IO)

The research group (NBC, GMO, and MAM) conducted IO before performing FGs and IDIs. A previously developed observation guide was used, which included several key elements: workers' sociodemographic characteristics, company actions to promote healthy habits, commonly consumed food, food availability, and observed health problems.

DATA ANALYSIS

Audio recordings were transcribed verbatim in MS Word format by an independent transcription agency (T-VOX) with a strict confidentiality protocol. Each transcript was reviewed three times by researchers: first, to familiarise themselves with its content; second, to confirm that the transcripts had no errors; and third, to perform the analysis. Data analysis was developed with a hybrid approach (inductive and deductive analysis), which explores the concepts generated by data, as well as those proposed in the conceptual framework of the interview guides (35). First, a code system based on the categories and subcategories of the research guide was developed; those codes were identified afterwards in the transcripts. The code system was extended by assigning new codes (with word "finding") to describe categories and subcategories not included in the original guide (Additional file 1). Finally, all targeted categories and subcategories were identified in the transcripts and were linked to the theoretical framework proposed in the interview guide and to the SCT constructs (reinforcements, self-control, emotional confrontation, observational learning, outcome expectancies, and self-efficacy) (24). The coding and sorting of the data were done in MS Excel (MS Office 2016 version).

ETHICAL CONSIDERATIONS

The guidelines of the Helsinki Declaration for human research were followed to ensure respect for the dignity, rights, and well-being of participants, under ethical and scientific principles (36) . Besides, data confidentiality, absence of work repercussions, and respect for not participating were guaranteed. Moreover, each participant received a letter of

informed consent. The ethical approval was obtained by the Research Ethics and Biosafety Committee of the University Center of Health Sciences (CUCS), of the Universidad de Guadalajara (UDG) with registration number CI-02319.

Results

The results section is organized according to the eating and physical activity behaviours and the reciprocal determinism principle of the SCT: behaviour, environmental factors and personal factors (27). Within each of these three elements, information obtained from supervisors and blue-collar workers is described separately by each technique (IO, FGs and IDIs).

Behaviours

Eating and physical activity

The most consumed drinks in both, supervisors and blue-collar workers, are water (approximately 2 litres per day) and soft drinks, mainly cola drinks during the main meal in the afternoon: " *I drink water as well as cola (...)*". Furthermore, many workers do not eat vegetables frequently *"I eat vegetables three times a week (…)"*. The vegetables that emerged as being consumed more frequently are tomato, chayote, zucchini and carrot.

Most of the workers mentioned that they do not consume fruits regularly: *"Usually during the week I don't eat fruits, but I try to eat fruit on weekends"*. Among these participants, a few of them commonly consume apple, pear, banana, papaya, mango, and pineapple.

Regarding animal products, supervisors indicated a less frequent consumption of meat than poultry or fish: *"I consume more chicken than meat"*. Nonetheless, blue-collar workers mentioned that they like beef greatly: "(...) *I eat meat every day*". And some of them consider their consumption to be excessive: "I think I eat meat excessively"

Moreover, all workers consume frequently legumes as side dish. The most common for blue-collar workers are beans, while for supervisors are lentils and chickpeas. Among the grains food group, the most consumed are "pan dulce" (Mexican pastries), breakfast cereals, amaranth grain, corn tortilla, oatmeal, and cookies: *"(…) I consume a lot of pan dulce (...)"*.

Both, supervisors and blue-collar workers, buy dishes with low nutritional value at least three times per week, mainly "tacos" (corn tortilla with meat), "chilaquiles" (fried corn tortilla with green or red tomato sauce, cream, cheese, and onion), "menudo" (beef belly soup), hamburgers, and "lonches" (baguette bread with a protein source, sour cream, tomato, and onion). Specifically, blue-collar workers indicated that on Saturdays it is common to eat "menudo" and "gorditas" (fried corn dough stuffed with a protein source pork) for breakfast; for this reason, blue-collar workers, as mentioned in previous paragraphs, referred a higher meat intake.

In addition, most of the workers (supervisors and blue-collar workers) explain that they consume processed foods during their work shift, such as chips, cookies, and packaged sweet bread available in the workplace, approximately twice a week, and occasionally drink between one and two alcoholic beverages.

Meal timing varies among blue-collar workers, but it is noteworthy that breakfast is eaten during working hours and includes foods such as salads, meat, "lonches", "gorditas", and "menudo". Particularly, supervisors eat cookies or coffee before breakfast, in addition to other foods such as yogurt and breakfast cereals. The afternoon meal

depends on the workload; many workers do not have time to eat, in particular, some blue-collar workers with evening shift do not have time to eat lunch in the afternoon, while others with morning, and mixed work shift, usually eat at nearby places during their lunch breaks. Furthermore, some workers do not eat dinner because they eat lunch late, and others prefer to eat what they consider as "light" foods, like cereal, fruit, and yoghurt.

Finally, most of participants reported not doing physical activity; while some supervisors and blue-collar workers walk frequently: *"(...) I walk daily to my house; I do forty-five minutes (...)"*, and others attend yoga or "zumba" (cardio-dance workout) classes regularly or play basketball on the weekends. During working hours some workers choose to be standing in their areas, to avoid being seated for a long time.

Environmental factors

Facilitators

Availability and access to drinking water are identified as facilitators for healthy habits: *"(…) we have water dispensers with hot and cold water in all areas (…)"*.Likewise, other elements that are identified as aids to avoid skipping meals are kitchen appliances in the dining room area (refrigerators, cupboards, and microwave ovens) and the corn tortillas provided for free daily by the company. However, blue-collar workers consider that kitchen appliances are insufficient. Finally, the company's annual health programs are identified as facilitators to raise awareness and enhance the importance of individuals' health status.

Barriers

On the other hand, barriers in the workplace environment are company policies, because in particular, some blue-collar workers with the evening shift are not allowed to have a lunch break.

Reinforcements

The work environment and spending time together during breakfast/lunch in the dining hall, are identified as possible reinforcements of healthy and unhealthy behaviours in the workplace. The company promotes "spending time together" during working hours in bimonthly events for the interaction between all areas (operational and administrative) and monthly celebrations of birthdays *"(...) I have tried to get people to get together, work as a team, that at lunch they relate well, that they get along well"*.

Additionally, the company offers an economic bonus for productivity to employees, and this could work as a reinforcement for workers to have healthy behaviours that improve their health and therefore, increase their productivity.

Social Support

Coworkers and family are also a reinforcement. Participants indicated that some coworkers support each other. Additionally, some supervisors report that all their family members consume the same foods, and everyone becomes involved when any family member does lifestyle changes, either because of a disease or the motivation to have healthy habits. However, blue-collar female workers reported that despite preparing healthy food for their family, they do not consume it: *"Yes, I buy it and prepare it (healthy food) in my house for my children, but I don't eat it"*.

Finally, social relations of participants are also favourable since receiving supporting comments from others might translate into behaviour reinforcement "*I lost weight and people say, ´hey, you look very good, you are losing weight´, and then you feel good*".

Personal factors

Self-control

Although many workers have not had previous experiences with a Nutrition professional, supervisors mentioned that they have reduced consumption of some foods; for example, soda, mainly cola drinks, and beef. Blue-collar workers mentioned a lack of self-control in the consumption of sweet bread: *"(...) we always surrender to the (...) desire to eat bread"*. Most workers do not include healthy foods in their daily lives, whether due to lack of time, knowledge, or skills related to healthy cooking methods. Nonetheless, they have implemented small actions to perform physical activity, such as walking and avoiding being seated during the entire workday.

Emotional confrontation

Workers and supervisors acknowledge that their emotions affect their health and food choices. Nonetheless, they only mentioned to cope with stress by attending workshops offered by the company and managing their time: *" I attended excellent workshop of laughter yoga"*. However, some workers mentioned feeling stressed because of gastrointestinal problems, such as irritable bowel syndrome, and sometimes they skip meals: *"(…) sometimes I am so stressed that I am not even hungry (…)"*.

Self-efficacy

Participants indicated to not feel capable to eat healthy and do regular physical activity: "*I cannot say 'today I am going to do this physical activity'"*. Certain barriers that influence workers' self-efficacy are identified, such as taste and time preferences: "*I can eat potato, chayote and carrot, but the others vegetables, I don't like them*".

Otherwise, in relation to the consumption of drinking water, only one participant mentioned feeling capable to consume more water than the daily recommendation: "*I can drink 5 liters of water per without any problem*".

Observational learning

When workers interact, they observe the eating and physical activity behaviours of others, which influence their own behaviour. Some workers decreased their consumption of meat and soda because they realized is harmful for their health, as they have heard that these foods are prohibited for "*containing uric acid*". Likewise, they know that people with kidney disease should avoid drinking soda: *"A brother of mine, he was forbidden to drink it because of the uric acid (...)"*.

Outcome expectancies

Workers know that certain eating habits can prevent non-communicable diseases, such as diabetes, peptic ulcers, and kidney problems. In addition, they identify a relationship between proper job performance and adequate nutrition: *"(…) a person who is well fed and who is not hungry, works better than someone hungry (…)"*. Therefore, they expect healthy eating to improve their health and by turn, their productivity. Furthermore, they perceive that despite feeling tired while doing physical activity, it offers health benefits, such as improved circulation and agility.

Discussion

The objective of this qualitative study was to identify the beliefs, behaviours, and experiences related to eating and physical activity habits of adult workers of a company in the metropolitan area of Guadalajara, and afterwards, to analyse these behaviours using the constructs of the SCT. These findings will be used to design and conduct an

educational nutritional and physical activity program, based on the SCT, for the adoption of healthy eating habits and physical activity in working adults. Conducting a qualitative study prior to the implementation of a health program in a population of interest follows the recommendations of the Workplace Health Model of the Centers for Disease Control and Prevention (CDC) to promote the success of health programs (37).

Regarding the eating behaviours of workers, low consumption of vegetables and fruits, low physical activity, and high consumption of sugary drinks, processed foods and fast food was identified. These findings are similar to the results of the National Survey of Health and Nutrition (ENSANUT-2018) (6). Moreover, regarding meal schedules, it was observed that it is common that workers skip dinner. Also, participants in this study drink water regularly, despite their high consumption of sugary drinks.

These behaviours are influenced by the interaction of the individual with the environment; for this reason, the SCT (24) was used to explain identified behaviours. To the best of our knowledge, there are no studies that have used all the constructs included in the present study for the understanding of eating behaviours and physical activity among workers; however, many of these studies do include some elements, such as self-efficacy, facilitators**,** cognitive-emotional factors, and others (38–43).

In the present study, participants from FGs and IDIs receive social support from their family. Additionally, through FGs, IDIs, and IO it was found that workers perceive that their work environment, including the interactions with coworkers during meals and holiday events organised by the company, the availability of drinking water, the places for recreation, and the company's food availability, are elements that might improve workers' behavioural capability. These observations were similar to those reported in two previous studies with a similar methodology to the present work (qualitative, with FGs and IDIs techniques). In these studies, barriers and facilitators for the adoption of healthy eating and physical activity habits in workers were evaluated, finding as reinforcement the partners, family and unhealthy foods in vending machines (39,40). Moreover, in a few cases, mothers receive positive family influences through observational learning, regardless, some of these participants continue with unhealthy habits, despite their families' habits. In contrast, it has been reported that women directly influence eating habits within the family (39), which was contrary to what it was found in the present study.

Identified facilitators for healthy behaviours were having access to a dining hall, kitchen appliances, drinking water dispenser availability, and healthy food choices availability in the worksite, although the availability of these foods is low. Nevertheless, similar to findings from other studies, the low availability of healthy foods (38), and high price (39–41), create frustration in employees when trying to modify their eating habits (39).

Self-control is the ability of an individual to control their behaviours, as well as to maintain a long-term goal despite negative short-term results (44). In this study, self-control behaviour was identified regarding the consumption of sugary drinks, similarly reported by Wandel and colleagues(38). However, Wandel also reported that Norwegian engineers had self-control in the amount of bread consumption, in contrast, the workers in our study who mentioned it is complicated for them to control their bread (Mexican pastries) consumption (FGs). Furthermore, the participants mentioned that they used to spend their work shift sitting down, and now they make a conscious effort to spend more time standing up for considering it good for their health.

An important aspect to understand behaviours related to eating and physical activity is to identify if people have the knowledge and skills necessary to solve emotional problems and avoid these from affecting their food consumption (24). In the present study, it was found that workers recognize their emotions affect their eating habits, such as sadness and anger, which is similar to the findings reported by Power and colleagues (2017) who found that nurses'

emotions affect their healthy habits (43). Particularly, some workers mentioned that when they feel stressed they skip meals. This finding are similar with previous research among workers in Norway, which found that stress usually determines whether workers eat or not (38). In addition, participants have a positive perception related to physical activity and stress, since they acknowledged that it is a way to cope with their emotions. This was previously reported in a study that assessed eating and physical activity habits of nurses in Scotland, where it was identified that it was necessary to perform physical activity to manage the emotions derived from the death of patients, faced during their workday (43).

Self-efficacy is the self-assessment of the ability to perform a behaviour. It is a prerequisite for changing a habit since it affects the amount of effort invested in a task and its outcome (24). In this regard, various beliefs concerning the effects of food on health, which directly affect the self-efficacy of workers, were identified. For example, they relate unhealthy foods, such as soda, with possible health benefits. In other two studies, similar beliefs about sugary drinks were observed, where people consider them to have physical benefits, such as reducing fatigue. In these studies, food faddism was the main problem affecting workers' healthy behaviours. However, regarding healthy foods, there are beliefs of both negative and positive effects (41,43).

Finally, many of workers' behaviours in this study are performed expecting beneficial results for their health, based either on previous personal experiences or on observational learning. This was identified as well in the nurses' study previously mentioned, where the authors stated that nurses' goals were to improve their health and lose weight to "look good" (43). In addition, in the study of Norwegian engineers, it was essential for them to reduce the risk of non-communicable diseases, such as heart disease (38), as they related it to their occupation.

One of the main limitations of the present study is the lack of analysis by work shifts since the FGs were integrated by workers of several shifts, based on the time availability of the company, to avoid affecting production processes. It is important to emphasize this because work shifts influence the implementation and maintenance of healthy eating and physical activity habits (42). However, despite this limitation, it was identified that during working hours of the evening shift, workers could not consume food as this is part of the company's policy; while during the morning and mixed shifts, blue-collar workers have 30 minutes for a lunch break, while administrative workers have 60 minutes. Furthermore, these findings represent the perceptions, beliefs, and actions of the interviewed workers; therefore, they may not represent all the aspects that influence eating habits and physical activity among this group. In addition, the questions for the FGs were less personalised, therefore it was not possible to collect a detailed response to some questions for each participant. However, before performing a nutritional intervention, participation of workers from different shifts (morning, evening and mixed), combined with above mentioned findings, allow the identification of key elements for changing habits, which increases the chances of success and treatment compliance (26).

Another limitation was that the moderator, interviewer and observer roles were alternated among researchers in each session due to logistic issues, and therefore each individual's perception could influence the uniformity in the collection of data. Nonetheless, for the data analysis and results description, all discrepancies in data collection were solved through discussions with all authors.

On the other hand, an important strength of this research is the application of the three qualitative techniques that allowed the complementarity and greater understanding of the behaviours by using triangulation of all the data collection with these techniques; this guarantees information's consistency because when all the data obtained is combined. In addition, this study included almost 11% of the company's total population, allowing for larger representativeness. Similarly, using the SCT approach to examine eating habits and physical activity is considered a

strength, since most of the research developed in this area is limited to the description of findings, without using a theoretical approach.

In conclusion, this study provides an overview of the beliefs, behaviours, and experiences of workers about their eating habits and physical activity. Influencing factors among workers such as self-control, outcome expectancies, and observational learning have been described but insufficiently addressed in other studies. The findings of this study suggest that eating habits and physical activity of workers can be modified if the different levels of influence are addressed simultaneously. However, future studies could use different methodologies (qualitative, quantitative and even mixed) and a combination of health behaviour change theories to complement these findings. This would allow for a broader understanding of eating habits and physical activity to influence the key factors of behaviour change and the development of effective intervention programs.

Abbreviations

CDC	Centers for Disease Control and Prevention
COREQ	Consolidated criteria for reporting qualitative studies
CUCS	Centro Universitario de Ciencias de la Salud
ENSANUT-2018	2018 National Survey of Health and Nutrition
FNs	Field Notes
FGs	Focus Groups
IDIs	In-depth Interviews
IO	Indirect Observation
SD	Standard Deviation
SCT	Social Cognitive Theory
UDG	Universidad de Guadalajara

Declarations

Ethics approval and consent to participate

The ethical approval was obtained by the Research Ethics and Biosafety Committee of the University Center of Health Sciences (CUCS), of the University of Guadalajara (UDG) with registration number CI-02319.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

NBC (Female, PhD student) was a moderator, interviewer and observer in the applied techniques (FGs and IDIs); besides, she reviewed, analysed, and interpreted the transcripts, and reviewed the writing of this manuscript.

GMO (Female, Public Health Sciences PhD, Professor and researcher at the University of Guadalajara), was a corresponding author, project manager, managed the liaison with the company where the fieldwork was conducted, observer in FGs and an interviewer and observer in IDIs, reviewed and analysed the methodology and the transcripts, as well as the writing of this manuscript.

STC (Female, Master of Science in Health Systems, Researcher at the National Institute of Geriatrics), trained the rest of the team in the OI, FNs, FGs and IDIs techniques, and standardised and revised the methodology, the transcripts, analyses, and the writing of this manuscript.

MBO (Female, Public Health Sciences PhD, Professor and researcher at the University of Guadalajara), was an observer in FGs, reviewed audios to identify untreated categories and subcategories during FGs sessions, analysed and interpreted the transcripts, and reviewed the writing of the present manuscript.

NTT (Female, Biomedical Sciences Orientation in Immunology PhD, Professor and researcher at the University of Guadalajara) and NPRR (Female, Health Convergence, PhD) reviewed and analysed the methodology, the analyses, and the writing of this manuscript.

MAM (Female, Master in Health Psychology, Coordinator and Professor of the Bachelor of Nutrition program of the University of Guadalajara) and AYCM (Female, Master in Health Sciences of adolescence and youth, Professor of the Bachelor of Nutrition of the University of Guadalajara) managed the liaison with the company where the fieldwork was conducted, reviewed the methodology, were moderators, interviewers, and observers in the applied techniques (FGs and IDIs), and reviewed the writing of this manuscript.

All authors read and approved the final manuscript.

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