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Addressing Physical Inactivity in Mexican Children: The Role of Parents and Their Physical Literacy

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ABSTRACT

Introduction: Childhood obesity and physical inactivity rates in Mexico are among the highest in the world. While parenting is a key factor in shaping children's physical activity behavior, there is a lack of research in this area, particularly in Mexico.

Objective: This qualitative study aims to better understand aspects of parenting relevant to children's physical engagement, including what parents understand by physical activity, how engaged they are and how important they find it, that is, their physical literacy.

Methods: Seven focus group discussions were conducted with 43 caregivers of overweight primary school children. Inquiry topics included components of physical literacy (i.e., motivation, confidence, physical competence, knowledge and understanding, engagement in physical activity), parenting practices, role modeling, perception of children's physical activity, parental self-efficacy and general parenting style.

Results: Although many participants stated that they were aware of their child's health problems and that they did not set a good example themselves, most could not overcome personal obstacles to exercise such as lack of time and energy. Most participants showed a knowledge gap about appropriate levels of physical activity or underestimated its importance. Several reported increased motivation after participating in the focus group discussion and developed their own ideas to deal with barriers or to support their children, such as engaging in physical activity together and introducing family routines.

Conclusion: Following a participatory approach, future studies should use these ideas to develop context-sensitive group interventions. Empowering parents by considering their physical literacy in children's weight management could be a valuable addition to theory-based strategies in research and practice.

1 | Introduction

Childhood obesity is a growing public health concern globally, with significant implications for physical and psychological health [1]. In Mexico, childhood obesity has reached an

alarming level of 37.3%, placing it among the countries with the highest childhood obesity rates in the world [2, 3]. Physical activity is a crucial determinant of childhood obesity, influencing both the prevention and management of excess weight [4]. Despite widespread recognition of its importance, many

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children in Mexico engage in insufficient physical activity [5] and it is often overlooked in the context of childhood obesity prevention and treatment in Mexico [6, 7].

Parenting is a key factor in shaping children's physical activity behavior, especially in early childhood [8–10]. Parents can serve as role models, provide support and encouragement, and create environments conducive to active, healthy living [11, 12]. Next to the parent weight, the physical activity level of the parents is among the most robust predictors of child weight status [11–13]. In a study by Carter et al., for example, parental physical activity and body mass index (BMI) influenced physical activity and BMI in adolescents (8–14 years) both directly and indirectly through instrumental support (e.g., signing the child up for a sports team) and encouragement (e.g., engaging in physical activity with the child [14]).

However, in the Mexican context, parents see full responsibility for children's obesity in the children, not in themselves [15]. Many Mexican caregivers reduce childhood obesity to an aesthetic problem and are unaware of the associated health risks [16]. In general, national surveillance systems that monitor physical activity behaviors among Mexican children have revealed a lack of data in the family and peer domain in all recent analyses from 2012 to 2022 [5, 17]. This is surprising given that intervention programs which include physical activity, particularly those in which parents exercise together with children, appear to be the most effective in reducing weight in Mexican children [7]. A deeper analysis of the parental role in this context is urgently needed for developing evidence-based interventions against childhood obesity that empower and capacitate parents in Mexico [18, 19].

In line with Davison et al. integrated Model of Physical Activity Parenting, this study therefore sought to analyze (a) parent's physical literacy including whether and how parents engage in physical activity and what deep personal attitudes, beliefs, and perceptions they have about it and (b) how they pass these patterns and beliefs on to their children [20]. Physical literacy is defined as the motivation, confidence, physical competence, knowledge, and understanding to value and take responsibility for engagement in physical activities for life [21]. Due to its suggested importance for participation in lifelong physical activity, physical literacy is a growing field of research [22]. To our knowledge, however, there is no study to date that examines the physical literacy of adults in Mexico or in the context of physical activity parenting.

2 | Methodology

2.1 | Study Design

This qualitative study is based on seven focus group discussions with parents and caregivers of overweight or obese children that were held in Guadalajara and Chihuahua, Mexico, between February and August 2023. After a literature review and the development of the interview guide, an initial exploratory test event was carried out in December 2022 in Oaxaca, Mexico, which was conducted in a treatment center

for children with obesity and their parents (data was not included in this study). Afterwards, the guidelines were adapted and finalized. In January 2023, a comprehensive training session was conducted via Zoom in which the research teams of all different locations agreed on data collection procedures, the administration of questionnaires and anthropometric measurement.

Following a convenience approach, the research team then visited three public elementary schools in proximity to the research team's institutions, two in Chihuahua and one in Guadalajara, and introduced the research project to the school principal. After the principal's approval, parents and caregivers were invited to an information session about the project. All participants gave their consent for voluntary participation (see Supporting Information S1). The anthropometric measurements of the children were taken during a third visit. Prior to the focus group discussion, the short version of the International Physical Activity Questionnaire (IPAQ) in Spanish was handed out to assess self-reported energy expenditure of the participating parents, as well as a questionnaire containing questions on educational background and the number of children (see Supporting Information S1, S2).

2.2 | Study Population and Sample Size

A total of 785 children (186 in Guadalajara, 599 in Chihuahua [$n = 348$ and 251 at two different elementary schools]) in grades one through six were measured (49.8% girls) with an average age of 9.01 ± 2.23 years. The average BMI of the sample was 18.28 ± 4.18 and BMI Z-score of 0.35 ± 1.54 . Inclusion criteria for participation in this study were written consent from parents or caregivers, age ($> 5 \leq 12$) and classification as overweight or obese according to Centre for Disease Control and Prevention (CDC) 2000 Growth Chart. 192 children (21.1%) were eligible for inclusion. A flow chart on the inclusion of participants can be found in Figure 1.

2.3 | Questionnaire Development

The theoretical framework of the interview guidelines was built upon the concept of physical literacy and different aspects of parenting that are most relevant to the child's physical engagement [10, 22]. As there is no standardized measurement method yet [20], the interview questions were derived from the existing literature. Table 1 shows the primary interview questions and the underlying definitions and references. The full interview guidelines can be found in the supplements.

2.4 | Data Collection

2.4.1 | Anthropometric Data Assessment

Following a standardized protocol, height and weight measurements of children and parents were performed barefoot with a calibrated standard scale (Tanita HD-366/BC-558) and a transportable stadiometer (Seca 213). Height was measured in

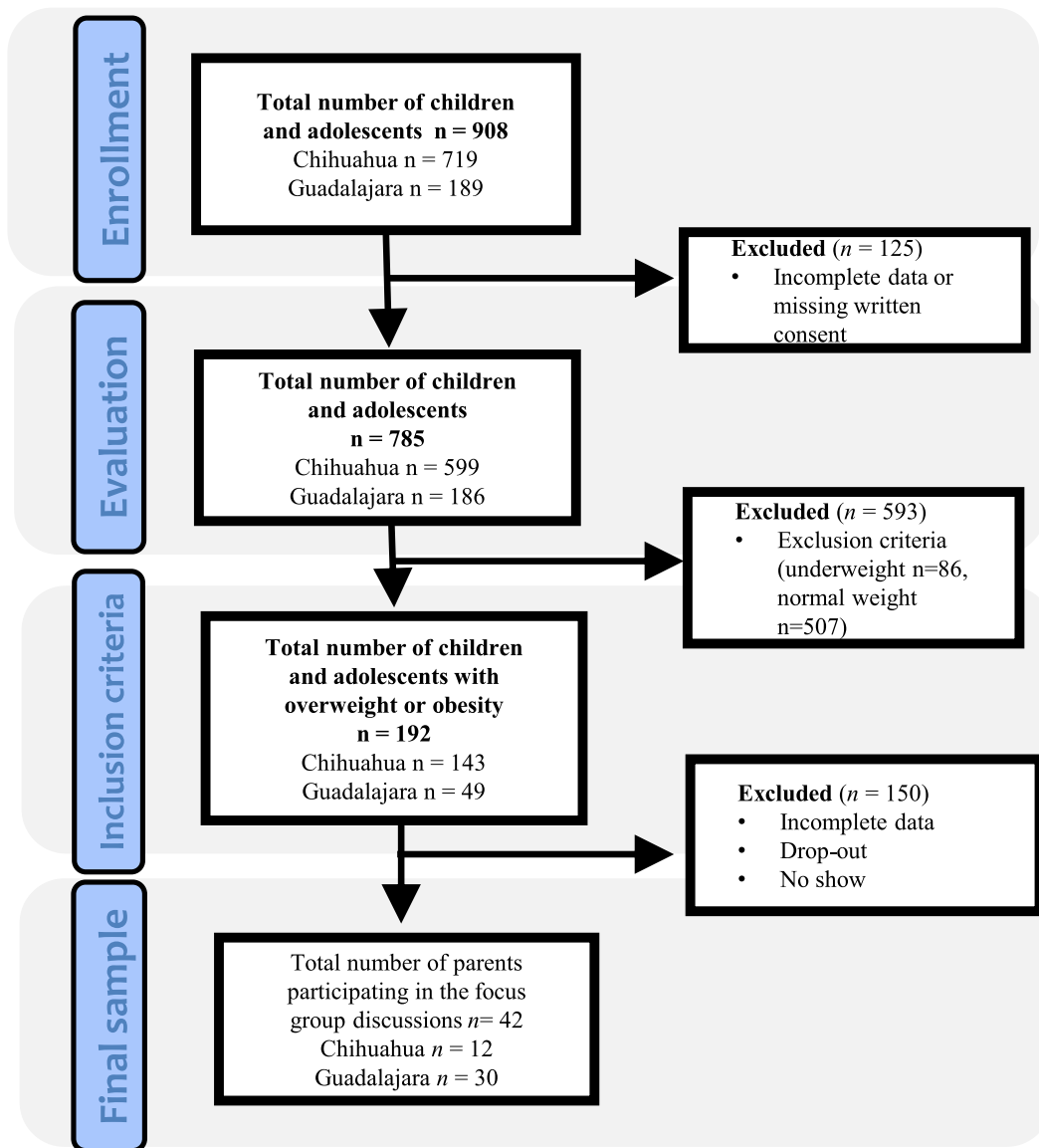


FIGURE 1 | Flow chart of participants.

cm; weight was measured in kg and included light clothing. A triplicate was measured, and the mean value was used for this study. BMI (weight [kg]/height² [m²]) and BMI Z-Scores were assessed using the following equation: $(\text{BMI}/M(t))L(t) - 1)/(L(t) \times S(t)$, where M(t), L(t), and S(t) reflect age- and gender-specific parameters of the child [34]. In accordance with the CDC Growth Chart, children on or above the 85th percentile were classified as overweight and those above the 95th percentile were considered obese [35]. According to the classification of the World Health Organization, adults with a BMI of 25 or more were classified as overweight and those with a BMI of 30 or more were classified as obese [36].

2.4.2 | Focus Group Discussions

Focus groups with parents and caregivers were conducted in Spanish. During the focus group discussion, a moderator led the discussion, an assistant visually collected the responses on a

white board for all participants to see, and two observers took notes on body language and responses. The participants sat in a circle and the sessions were audiotaped. In the second part of the focus group discussions, a so-called carousel of ideas was used, where the questions had been written in advance on four posters. The posters were distributed in different corners of the room and the participants could write down their answers or add to them by moving from one poster to the next. This procedure was repeated three times in Guadalajara and twice in Chihuahua, each time with different participants. Originally, the study was also to be conducted in Oaxaca, but the data collected at a treatment center was incomplete and not comparable.

2.5 | Data Analysis

The audio recordings and the posters which were used during the focus groups were transcribed in Spanish. The transcripts

TABLE 1 | Primary interview questions with underlying definitions and references.

Theoretical concept	Category	Definition	Main questions	Reference
Physical Literacy (oriented on Ryom et al. [22]; The International Physical Literacy Association [21])	Motivation	An individual's enthusiasm for, enjoyment of, and self-assurance in adopting physical activity as an integral part of life	What motivates you to be physically active?	Motives for Physical Activities measure (MPAM-R), Ryan et al. [23]
	Confidence		1. What hinders you to be physically active? 2. Can you remember a situation where you were able to overcome these obstacles on your own? 3. If you were really motivated to be active today, what solutions would you find to really dedicate yourself to physical activity?	
	Physical competence	An individual's ability to develop movement skills and patterns, and the capacity to experience a variety of movement intensities and durations. Enhanced physical competence enables an individual to participate in a wide range of physical activities and settings	1. Do you feel that you are good at sports? 2. How do you see your physical competence compared to other people your age?	Self-Perception Profile for Adults, Messer und Harter [25] (item #30, item #43)
	Knowledge and understanding	The ability to identify and express the essential qualities that influence movement, understand the health benefits of an active lifestyle, and appreciate appropriate safety features associated with physical activity in a variety of settings and physical environments	1. What do you think are the benefits of physical activity in general (and for your child)? 2. What are the risks of physical inactivity?	Canadian Assessment of Physical Literacy (CAPL) for children, Longmuir et al. [26]
Engagement in physical activity	An individual taking personal responsibility for physical literacy by freely choosing to be active on a regular basis. This involves prioritizing and sustaining involvement in a range of meaningful and personally challenging activities, as an integral part of one's lifestyle	What type of sport do you like to do?	International Physical Activity questionnaire (IPAQ), Craig et al. [27]	
Relevant Aspects of Parenting (oriented on Xu et al. [10])	Parenting practices	Concrete behaviors and strategies parents use in specific context in order to	1. What do you do to support you child in doing PA?	Darling and Steinberg [28]; Holt [29]; Lindsay et al. [8]

(Continues)

TABLE 1 | (Continued)

Theoretical concept	Category	Definition	Main questions	Reference
		support children in their socialization goals	2. What role do you think you play in encouraging your child to be physically active?	
	Parents' role modeling	The process by which parents demonstrate behaviors, values, and attitudes that their children observe and often imitate, significantly shaping their development and character	1. What kind of physical activities do you do together with your child? 2. What habits does your family have in relation to physical activity (e.g., routines, rules)?	Social Learning Theory, Bandura [30] Lindsay et al. [8]; Wright et al. [31]
	Parental perceptions of children's physical activity	How parents view, understand, and evaluate their children's engagement in physical exercise, including the importance, benefits, and barriers associated with it	1. What kind of physical activity does your child do? 2. Where and in what context is your child mainly physically active? 3. Do you think your child is sufficiently physically active?	Lindsay et al. [8]; Quirk et al. [32]
	Parental self-efficacy	The subjective conviction or belief in one's own abilities to be a good parent and influence the child in a way that promotes health and success	1. How confident are you that you can get your child to be physically active when they want to play with their mobile phone? 2. How confident are you that you can get your child to be physically active when you don't have much time?	Kieslinger et al. [47]; Bandura [30]; Lindsay et al. [12]; Campbell et al. [33]
	General parenting style	A function of two dimensions of parental behavior: The extent to which parents are (a) responsive to their children's needs (responsiveness/warmth), and (b) controlling of their children's behaviors (demandingness) There are four parenting-style typologies: Authoritative (high demandingness/high responsiveness), authoritarian (high demandingness/low responsiveness), permissive (low demandingness/high responsiveness), and uninvolved/neglecting	What would you do if you realized that your child does not do enough physical activity and spends too much time on screen-based activities?	Sleddens et al. [46]

(Continues)

TABLE 1 | (Continued)

Theoretical concept	Category	Definition	Main questions	Reference
		(low demandingness/low responsiveness), where demandingness is defined as control and responsiveness as warmth		

were read line by line by the research team and checked for quality. Some quotes were translated into English for the analysis by at least two members of the research team, with the Mexican colleagues checking the accuracy of the translations. Qualitative data were managed and analyzed using MAXQDA 2024 (VERBI software). Following the grounded theory, a deductive, theory-guided approach was first used to develop a schematic set of codes around the a priori developed system derived from the predetermined themes of the questionnaire (i.e., the theoretical concepts and their categories, see Table 1; [37]). Second, two researchers independently applied the initial coding scheme to each transcript and identified new emergent themes based on an inductive data-driven approach. Using the constant comparison method, the themes and subthemes of the coders were compared and resorted, and coding discrepancies were resolved through consensus. Responses were allowed to be coded under multiple categories [38]. Finally, selective coding was performed to identify the most relevant code categories for the underlying study. IBM SPSS Statistics 29.0 was used for descriptive analysis of continuous and categorical variables. Different types of physical activities measured using the IPAQ were ranked by intensity: sedentary (1.5 metabolic equivalent [METs]), walking/light (3.3 METs), moderate (4.0 METs), and vigorous activity (8.0 METs) [39].

This study was conducted in line with the principles of the Declaration of Helsinki [40]. Ethics approval was granted by the University of Göttingen for the ethic request with the number 06.01.23 in February 2024.

3 | Results

A total of 43 parents and caregivers (83.7% female) took part in the five focus group discussions with an average of seven participants, of which 35 were mothers, 3 fathers and 5 grandparents. The participants were 39.33 ± 10.04 years old and had a BMI of 30.56 ± 5.29 . The children (46.5% girls) had an average BMI of 27.75 ± 1.89 and a BMI Z-score of 2.01 ± 0.43 . The five interviews lasted 71.55 ± 35.43 min on average. Of the 37 people who provided information on their highest educational qualification, 10.8% stated that they had only completed primary school, 18.9% secondary school, 21.6% high school and 27.0% a university degree. 21.6% indicated that they had another or no educational qualification.

There were three subcategories relating to physical literacy (504 comments) and three subcategories relating to parenting (459 comments). The percentages given for the subcategories refer to

the ratio of given answers within the corresponding super category.

3.1 | Physical Literacy

3.1.1 | Physical Engagement, Competence and Motivation

Fifty-three comments related to parents' and grandparents' own engagements in physical activity. While 11 people (21.6%) said that they do not do any sport at all, walking (29.5%) was the most common form of exercise mentioned in the focus group discussions, followed by gym (13.7%), dancing (11.8%), and soccer (5.9%). The results of the IPAQ showed that on average 48.24 ± 90.98 min of vigorous exercise, 50.55 ± 73.21 min of moderate exercise and 107.56 ± 150.22 min of walking per day were performed, resulting in an average MET of 5832.52 ± 7771.32 . The participants stated that they sat for an average of 235.08 ± 207.88 min a day. The majority reported positive feelings about their physical competence in relation to new, unfamiliar sports (66.7%) but not in comparison to others of the same age (60.0% negative).

Eighty-five comments were related to the factors that could motivate participants to be physically active. The majority (35.2%) stated satisfaction and psychosocial well-being as drivers for physical activity (e.g., "I went into a stage of medium-severe depression and that's what got me out of it, so if I don't go and exercise, I start to feel depressed again" [GDL FG 3 Audio, Pos. 3]). This category also included distress and relaxation, distraction and pleasure.

Physical health was mentioned 14 times (25.9%) as a motivator for physical activity. Increased energy levels (7.4%), the own child (7.5%), body image and beauty including losing or stabilizing weight (5.6%) were also common motivators (e.g., "I still have a lot of pictures and I never want to be like that again" [CHH FG1 Audio, Pos. 29]). Other drivers (1.9%–3.7% each) were socializing, music, having time for themselves, seeing how other people were motivated, and making it an important daily routine.

3.1.2 | Confidence

Of 89 comments on obstacles that prevented them or the children from being physically active, most participants mentioned lack of time (24.0%). Some parents elaborated on this and

differentiated between different responsibilities such as household chores, work and childcare:

I just don't have the time. The truth is that I get up every day at 5:30 in the morning, I have a son in high school, and I have to get up to make him lunch so he can go to high school at 6:30. Then I prepare the other one so I can drop him off at school and go to work. After work, I come home to do my housework and finish the things I have to do at home, organize the uniforms... Then it is 10 o'clock at night and I go to sleep, I don't have time for myself, I just don't have time.

(GDL FG 1 Audio, Pos. 3)

The second most common explanation for not exercising was insecurity (12.0%), directly followed by pain, illness or (fear of) injury (10.7%), lack of energy (9.3%, e.g., "I try to do everything, but there comes a time when you say that your body is tired, and it is not performing the same way anymore and the only thing you want to do is rest" [GDL FG 2 Audio, Pos. 3]), and accessibility including high costs (8.0%).

Lastly, the lack of a suitable trainer (8.0%), of prioritization (8.0%), of self-confidence (6.7%) or motivation (5.3%), feeling shame (5.3%) and bad weather (2.7%) also prevented people from engaging in physical activity. With children, it was also other hobbies or preferences such as painting that discouraged physical activity.

Sixty-one comments dealt with means of overcoming barriers to physical activity. Routine and organization (43.2%) were mainly mentioned in this subcategory. It involved ideas such as seeking family support with childcare, involving a specialist, shorter exercise sessions, or having someone else accompany them. Seven comments (15.9%) related to the need for perseverance, commitment, and discipline. Increasing motivation (11.4%) was also frequently mentioned, including the idea of "just getting started," exercising together with the child, or changing personal priorities. In addition to external motivators such as improving accessibility and availability (9.1%), some comments were also related to personal attitude (6.9%), for example, being more optimistic or daring to move out of their comfort zone.

3.1.3 | Knowledge and Understanding

In 94 comments, participants described the general benefits of physical activity, with health (physical [28.3%] and mental [71.7%]) being mentioned most frequently. Comments on physical health included "more agility," "better condition," "better motor skills" or "it helps cardiovascularly." Mental health involved improved self-esteem and confidence. Twelve comments (22.6%) referred to general well-being and a better quality of life. According to some participants, physical activity has given them energy (9.4%), distracted from worries (9.4%) and contributed to weight loss (3.8%), better appearance (1.9%),

or generally better lifestyle habits (3.8%). With regard to children, it was also stated that sport and exercise can promote healthy child development (13.2%), better concentration, and academic performance (3.8%).

Among the 37 risks of physical inactivity and sedentary behavior, physical illness (63.9%) such as "hypertension," "cardiovascular disease" or "diabetes" was mentioned most frequently, but also obesity (19.4%) and depression or stress (11.1%). Although the main topic of discussion was physical activity as a determinant of childhood obesity, 32 participants touched on other causes of obesity. Nutrition (21.9%) was mentioned the most, but also genetics (18.8%), the COVID-19-pandemic (18.8%), increased cellphone use (12.5%), or personality (9.4%). Concerns about parental neglect (18.8%) were also expressed, as shown in the following statement:

Many times, when we are absorbed with work at home, independently of many things, children feel unmotivated. They feel sad, like they feel the rejection of mom or dad who is very busy but doesn't pay attention to me [the child].

(GDL FG 2 Audio, Pos. 3)

3.2 | Parenting

3.2.1 | Perception of Children's Physical Activity

While the moderators made an effort to focus the discussion on physical literacy on the parents' experiences, this section looks at what the parents had to say about their children. Regarding the perception of the quantity and quality of physical activity engagement of the children, the caregiver's statements were ambiguous. Whilst some parents reported that their children practiced sport several times a week (45.3%), it was also stated that more exercise would be good for children and that they were too inactive (54.7%). In general, there were several mentions of increased media usage and physical inactivity. Five parents said that they thought 30 min of exercise a day was enough for their children, while others did not elaborate on this. Fourteen comments referred to being aware of the child's health status or excess weight, for example,

Mine just wants to eat and eat, and I tell him it hurts you, that you can't be like that, and he doesn't want to drink natural water, just sweet stuff. And I scold him and point it out to him, but he keeps doing what he's doing, he just wants to eat.

(GDL FG 3 Audio, Pos. 3)

Parents said that when their children did sport, they did it mostly at school (25.7%), outside or in the park (25.6%), at home (23.1%), or at a sports facility (23.1%). The sports that their children engaged in most frequently mentioned by the parents were soccer (18.9%) and dancing (16.2%).

3.2.2 | Parenting Practices and Role Modeling

When asked how they support the children in being physically active, many parents and grandparents said that they tried to motivate the children (39.1%). Intending to encourage them through moral support or explaining the benefits of sport to them was coded under this subcategory. Others stated that they supported the children and grandchildren by driving them or signing them up for sports, paying for or organizing sports lessons for them (23.9%), thereby ensuring persistence. This also implied that some decided for the children and forced them to play sports. In contrast, there were many who talked and negotiated with the children about which sport they might enjoy (30.4%). To ensure the child's physical activity, some parents stayed close by to keep an eye on the child for safety reasons (6.5%).

Only four (5.5%) participants stated that they did not engage in any physical activity with the child. Many mentioned that they went for walks (39.5%), played games (19.7%), cycled or exercised together (7.9% each) with the child.

I have to take him with me [even if he says] it is better not to go. I will tell him yes, yes, we have to go. And when we get there, we take a bath, we sweat, we get active, and everything is so great. It generates a lot of adrenaline; it makes you happy.

(CHH FG1 Audio, Pos. 36)

There were 39 more comments on eight different types of physical activities in total that the caregivers do together with the children. In addition, there were 19 comments on establishing family routines, habits and rules, including limiting cell phone and television use, for example, "If she doesn't do her homework, and if she doesn't do the activities that I set for her, she doesn't watch TV" (GDL FG 1 Audio, Pos. 3).

On Sundays we go out for sports, walking and cycling with the child.

(CHH FG 1 Poster, Pos. 102)

A certain amount of time on the cell phone and then do something, go out and play. Yes, sometimes I tell them to go play.

(GDL FG 3 Audio, Pos. 3)

Not everyone agreed on having constant routines, however (26.3%): "In my family, [there are no routines for physical activity or media use] because we do not coincide in time" (CHH FG 1 Poster, Pos. 100).

Twenty-seven comments dealt with the parents feeling a responsibility to be good role models and taking care of their physical health. In this context, some participants also talked about their own overweight and were aware that they were not a good example to their children:

I am overweight, severely overweight. So, well no, my condition is not the best. My children are running five

blocks away and they shout: "Mama, come on!" and well no...(she laughs). What a shame that I am giving that example to my children."

(CHH FG1 Audio, Pos. 31)

3.2.3 | Parenting Styles and Parental Self-Efficacy

The questions relating to parental self-efficacy revealed that of 37 answers, parents were rather (22.2%) or very (75.0%) confident that they could persuade the child to do sport even though he/she would rather play on their mobile phone. 20.1% stated that they were not sure whether they would be able to motivate the child to do sport if they did not have time themselves, for example, due to work. The remaining 79.9% were confident that they could do it even without much time.

In contrast, during the focus group discussions, some parents stated that they struggled with their assertiveness when trying to impose behavior on the child, for example, "You can't do anything to the children because then they cry and then you feel bad, poor kids" (CHH FG 2 Audio, Pos. 209).

Some (8.3%) also mentioned challenges in the division of tasks between husband and wife as well as the interference of grandparents on the one hand or the lack of opportunity to intervene as grandparents on the other.

I think that sometimes they get used to one person and if that person says yes. So, if I say no, then they go to the other person.

(GDL FG 1 Audio, Pos. 3)

As a grandmother I can't do anything. I can't do much because they need the attention of their parents.

(GDL FG 3 Audio, Pos. 3)

If they realized that the child was insufficiently physically active, in 27 (69.2%) of the cases the participants would advise their child to take part in sport and discuss with them what options are available (authoritative parenting style). However, during the focus group discussion, the same participants made comments that suggested a rather permissive style, for example, "It got to the point where it was just too much to argue with her" (GDL FG 3 Audio, Pos. 3).

Ten participants (25.6%) said they would follow an authoritarian parenting style and not negotiate with the child (e.g., "If you don't force them to do it, they don't do it and they just don't take advantage of [all the opportunities]."), while three (7.6%) would either not worry or leave the child do as he/she pleases.

Among the 16 comments that participants took away as lessons from the discussion, many were about strengthening and supporting each other as a community. Some said that they realized how important it is that they looked after their own and their child's sporting activities:

I realize that I am a role model that they can learn from and imitate. Let's start with ourselves.

(CHH FG1 Audio, Pos. 21)

I learned to be thankful that we all share the same experiences.

(CHH FG1 Audio, Pos. 124)

4 | Discussion

By combining the construct of physical literacy with various aspects of parenting, this qualitative study contributes to a better understanding of the role of parents in relation to their children's physical (in-)activity and obesity in Mexico. The results of seven focus group discussions show that the majority of participating parents and grandparents themselves were affected by obesity and not sufficiently physically active in accordance with international recommendations [41]. Similar to earlier studies, caregivers recognized that obesity is a serious health problem but potentially underestimated the degree of obesity experienced by their children [42]. Some parents were aware of their role as role models, and that their children should be more active and spend less time on their cellphones, recognizing the benefits of physical activity, especially for physical and mental health and development. However, they were unable to overcome obstacles such as lack of time, motivation, or energy to increase their own and their child's physical activity levels.

Earlier studies also emphasized the importance of parents as role models for a healthy, active lifestyle [8,13]. For analyzing or strengthening parents' ability to engage in physical activity, the consideration of the comprehensive concept of physical literacy, which takes into account the affective, physical and cognitive wholeness of physical activity, could be a valuable tool [22]. Because physical literacy addresses several components and personal resources relevant to lifelong engagement in physical activity (i.e., motivation, confidence, physical competence, knowledge and understanding and engagement in physical activity), it is expected that it will make physical activity interventions more quantifiable, comparable and effective in improving all-round health. However, there is a lack of research on the physical literacy in adults and no complete assessment tool has been developed to date [43]. The present study attempts to contribute to this shortcoming by grounding the theoretical framework of this study in the concept.

When asking about knowledge and understanding as part of the physical literacy assessment, we found that obesity was often attributed to non-modifiable characteristics of the child such as genetic predisposition or personality, while the role of physical activity, particularly in comparison to diet, tended to be underestimated. Previous literature also suggests that the predominant role of food in Mexican culture in particular discourages the relevance of physical activity or sedentary lifestyle in promoting or preventing obesity [44]. A recent study found that only 34% of Mexican children and adolescents meet worldwide physical activity recommendations, and only

between 32% and 53% of elementary schools in Mexico have a physical education teacher [5]. This highlights a significant gap in physical education, which may contribute to misconceptions about appropriate physical activity levels and the role of exercise in preventing obesity. It has been shown that a misconception of an appropriate level of physical activity leads to little behavior change [19]. In line with this, the sample lacked knowledge about how much sport adults and children do or should do. The IPAQ results also displayed a significant overestimation of physical engagement in some cases—as reflected by the high standard deviation due to extreme upper values—, possibly indicating a lack of understanding in accurately determining the type, intensity and amount of physical activity.

Not only the level of physical literacy of the parents but also how they pass on their personal attitudes plays a role in shaping the physical activity patterns of children [20]. Previous findings suggest that children who grow up in authoritative homes with a clear daily structure yet room for negotiation are more physically active and have a lower BMI than children who grow up with other parenting styles [11,45,46]. In our sample, most parents reported a permissive parenting style. They negotiated with the children about what they wanted but rarely set clear rules and routines. In this context, future studies should also look into the different roles and dynamics within family structures. Although mothers, grandparents and fathers were included in this study, a distinction could not be made as to how personal experiences and perceptions of physical literacy might affect children's physical engagement as caregivers. Similar to earlier research (e.g., [44]), some statements in this study indicated that fathers were more likely to be associated with physical activity and mothers with diet, and that grandparents were less strict when it comes to rules and eating, but further research is needed to substantiate these assumptions.

The consideration of parental practices became particularly relevant against the background that in this study not only children but also parents appeared to be negatively influenced by their screen behavior. Although parents recognized that it may be harmful to their child, they allowed them to use their phone or tablet to keep them occupied or even neglected the children because they were busy on their phones themselves. As parental physical literacy and parenting practices seemed to be closely intertwined, improving parents' skills, knowledge and self-efficacy could be a valuable target for interventions to prevent obesogenic environments [10,12,47].

At the same time, the legitimate barriers such as crime, insecurity and lack of leisure spaces in Mexico, which were also frequently mentioned by the participants of the focus groups, should not be underestimated. It is noteworthy that the parents in our study themselves put forward ideas to overcome these barriers, such as promoting physical activity at home, playing sports together with the children or in groups, transporting the children to sports facilities, supervising the children, or providing structure to the family's physical activity habits. These suggested practices can also lead to better relationships between children and parents, which may be positively associated with a healthy lifestyle for children [48]. Following a participatory approach, they should be taken into account when designing a contextualized intervention program.

Interestingly, the caregivers stated that they had gained motivation and inspiration, that they had recognized the relevance of physical activity both for their child's health and wellbeing as well as for their own and felt less alone with their struggles simply by participating in the focus group discussion. Therefore, the findings suggest that a group intervention aimed at strengthening the physical literacy of parents of children with obesity and empowering them in aspects of parenting that contribute to their children's physical engagement could be an effective way to target childhood obesity in Mexico.

The recommendations we drew from our findings, including examples of practical implementation that emerged from the discussions, are listed in Figure 2. Our findings encourage policy makers and health practitioners to focus on two goals: (a) indirect parental support, increasing parents' physical engagement as a means of becoming a role model for the child, and (b) direct parental support, learning and implementing favorable parenting skills. While multidisciplinary approaches are widely recognized as best practices to combat obesity [49], the implications derived from this study for promoting physical activity in Mexican children are highly relevant as they can serve as a valuable addition to treatment and prevention, taking into account the cultural specificities of Latin American culture on the one hand and being theory-driven on the other. The implementation of theory in practice and the longer-term effects should be investigated in more detail in future studies.

Limitations of our study are biases that may have occurred due to social desirability, which were particularly amplified by the group setting. As the participants were informed that they were invited due to the overweight of their children, selection bias must be taken into account because the motivation of the sample, for example, may differ from others. Results may thus not be valid for other population groups. Further limitations are information bias due to self-reporting and disadvantages due to the qualitative research design. For example, some participants participated more than others, while others seemed intimidated. In this study, we intended to look in detail at certain aspects relevant to obesity, mainly physical activity and parenting, but of course other aspects, such as nutrition, should not be

neglected in the multidisciplinary prevention and treatment of obesity. The small sample size, which does not allow any conclusions to be drawn about differences between the various locations, and the cross-sectional approach, which does not permit any conclusions about causalities, should also be criticized. The non-response to questions limited the interpretability and generalizability of the quantitative results in particular. IPAQ, despite being widely used globally, can overestimate physical activity levels by up to 20% [50]. The questions on parental self-efficacy, which were asked using a questionnaire, were of little value due to the small sample size and their brevity and showed some contradiction to the results of the qualitative analysis, possibly indicating comprehension problems.

5 | Conclusion

This is the first study to examine the physical literacy of adults in Mexico and in the context of physical activity parenting. The results show that the participating parents and grandparents themselves were not sufficiently engaged in physical activity and lacked a clear understanding of all that is involved in supporting children to be physically active (e.g., parental self-efficacy, personal attitudes, beliefs and lifestyle). Many recognized the benefits of physical activity and their important role as good examples for their children. Nevertheless, they failed to overcome barriers to physical engagement, underestimated the importance of physical activity in children's health and obesity, or lacked knowledge about appropriate levels of physical activity. Participation in the focus group, however, seemed to increase motivation and understanding. On the one hand, measures to increase physical activity in children and to reduce obesity should therefore empower and motivate parents to become role models for an active lifestyle for their children, taking into account the principles of physical literacy. On the other hand, parents should be capacitated in the application and knowledge of appropriate parenting styles, skills and practices so they can pass on their physical literacy to their children. Participatory and context-sensitive approaches in Mexico could take place in a group setting and acknowledge the parents' own

Recommendations for tackling physical inactivity and childhood obesity through improved physical literacy and parenting skills

1. Personal goal: the caregiver is regularly engaged in physical activity
 - ➔ Becoming a role model (indirect support)
 - a. Increase knowledge and understanding: Educate the parents on the importance and benefits of physical activity in general and for their children as well as of the risks of physical inactivity.
 - b. Increase motivation and confidence to overcome obstacles (e.g., routines, social support, positive reinforcement, cognitive restructuring)
2. Parenting goal: the child is regularly engaged in physical activity
 - ➔ Supporting the child in being physically active (direct support)
 - a. Increase knowledge and understanding of parental responsibility and influence.
 - b. Adapt parenting practices in favor of the child's physical activity (e.g., logistic support, mental support, joint physical activity, establish family routines)
 - c. Adapt parenting styles in favor of the child's physical activity (e.g., authoritative) and strengthen parental self-efficacy (e.g., exchange with other parents, self-reflection, prioritize health, endure the rebellion of the child)

FIGURE 2 | Lessons learned: Recommendations derived from this study.

suggestions for overcoming obstacles to exercise in order to enable a transfer to their everyday reality.

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Conflicts of Interest

The authors declare no conflicts of interest.

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Supporting Information

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