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Original Investigation

Individual forms of leisure-time physical activity across generations: Determinants in an obesogenic environment

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Purpose: This study aims to explore the external and internal determinants of individual forms of leisure-time physical activity (IF LTPA) among adults living in Świętochłowice, one of the regions with the highest obesity rates in Poland. It explores the effects of the generational cohort on the likelihood of engaging in IF LTPA.
Methods: The authors demonstrate an interdisciplinary approach, integrating public health science, sports science, and management science. In view of this, the convenience sampling recognized in development sciences was used. Data were collected in two phases: anthropometric measurements and a face-to-face questionnaire. The sample (N = 1,065 adults) was divided into three generational cohorts: Generation Y, Generation X and the Baby Boomers. Logistic regression was applied to identify relations between sociodemographic and anthropometric variables and engaging in IF LTPA.
Results: Younger generations are more likely to engage in IF LTPA (36% for Generation Y and 41% for Generation X vs 20% for Baby Boomers). Moreover, only 8% of Generation Y reported no form of LTPA. Significant predictors of IF LTPA included gender, BMI, socioeconomic group, financial situation, motivation (especially health), and overall physical activity level. Women were significantly less likely to engage in IF LTPA across all cohorts.
Conclusions: The results suggest that physical activity and leisure offerings should be tailored to specific generational cohorts. Physical activity and leisure-based products (services) should be designed and managed responsibly. Promoting IF LTPA may enhance engagement in healthy lifestyles and support public health efforts in obesogenic environments.

Keywords: cohort effects, Baby Boomers, Millennials, Generation X, obesity.

Introduction

Modern society is struggling with the growing threat of lifestyle diseases, including obesity.[1] Active leisure is preventive in limiting the obesity epidemic and mitigating its adverse effects. Physically active people are slimmer and less susceptible to the influence of genetic factors on the development of high body mass index (BMI) and waist circumference.[2,3] A higher level of leisure time physical activities (LTPAs) is also positively associated with the likelihood of achieving lower body fat content in women.[4]

Undertaking LTPA depends on its form, i.e., individual, dual, or team. Team and dual forms are carried out at a planned time. They require rotation of places and activities at different aerobic levels. For these reasons, they are difficult for many people to perform and incorporate into their lifestyle.[5] On the other hand, individual forms (IF) of LTPA (including running, walking, cycling, swimming, and weight training)[5,6] allow free choice of the time of activity without the need to coordinate dates. In addition, they are conducive to saving time (without the risk of breaks, cancelled meetings, or travel to the meeting place) and adaptation to life changes (e.g., moving or changing jobs). IF LTPA ensures safety in periods of health threats, enables selection of the intensity of effort, and uses technologies to monitor the body's physiological parameters, which in turn allows management of exercise for health purposes and the undertaking of physical activity throughout life. These features mean that exercise can be taken regularly.[5]

According to Calogiuri and Elliott,[7] if LTPA presents the connection between different domains of physical activity and motivational profiles, it produces different effects. For example, IF LTPA outdoors is focused on health and functional effects, undertaken in fitness groups or at the gym – on improving/maintaining appearance and social relationships, and sports (with a professional or semi-professional profile, focused on results) – on achieving pleasure and mastery.[7] Compared to those involved in team sports, people who prefer IF LTPA show greater support for systematic preventive actions, such as independence, determination, a positive attitude, resistance to stress and faith in their abilities.[8]

The various forms of LTPA adopted depend on people's demographic and sociocultural characteristics. For example, pursuing IF LTPA is associated with higher education and income[6] compared to team sports.[9] The importance and strength of factors determining LTPA changes over the life cycle.[10,11] Older people are less likely to engage in both individual and organized sports.[9] Therefore, LTPA can be analyzed through the prism of generations.[12] A generation is a specific cohort of people

formed based on shared experiences,[13,14] the so-called *cohort effects*, which develop common generational characteristics (e.g., mutual worldviews, values, attitudes, perceptions, needs, motives, and LTPA).[13,14]

Previous studies have shown many intergenerational differences in health and leisure behaviors.[12] However, these differences in LTPA studies remain poorly recognized despite analyses of time trends[15] and relationships between age, historical period, and cohort membership.[16–18] Few studies have considered the effect of age, period, life cycle, and cohort in the context of LTPA.[10,16–19] These studies show that the rate of pursuit of LTPA decreases with age despite the increasing health-promoting motivation.[11,20] At the same time, the fraction of participants in organized sports (in sports clubs) decreases (by 17.3%), while the rate of pursuit of IF LTPA increases (by 9.3%).[21] An increase in time spent and volume of LTPA is noted among women over the age of 50 and a decrease after reaching 70, and among men – a decrease between the ages of 20–40 and an increase between the ages of 60–70.[16]

In LTPA research, various analytical approaches are used - from detailed classifications of factors to holistic explanatory models. In research on various forms of LTPA, no precise classification of factors has been developed to date. Depending on the framework adopted in the research, these classifications are based on analyzing internal (individual) and external factors.[22] Internal factors have their source in the unique characteristics of an individual, such as internal motivations.[23] They are still insufficiently studied in various social groups. On the other hand, external factors include sociocultural, environmental, organizational, and political influences[21,24] and are so complex that analysis of these factors must consider the specificity of a given context.

Such a context is, for example, the obesogenic environment. The concept of an obesogenic environment is ambiguous. On the one hand, it is understood as an area (region) in which unhealthy eating habits are promoted, discouraging physical activity and contributing to obesity among its residents.[25] Karmous et al.[26] highlights that such environments are shaped not just by food availability, but also by underlying sensory drivers of consumption. On the other hand, it refers to the detection of key factors related to the BMI or the level of physical activity of residents of a specific region.[27] Some researchers associate an obesogenic environment with LTPA or physical activity in neighborhoods[28] and schools, as well as nutritional behavior and intervention programs.[25] This is the position adopted for consideration.

Researchers point to the dominant interest in Generation Z in the matter of undertaking LTPA,[29] the assessment of only selected determinants (e.g., political factors),[21] while ignoring the larger part of the population, especially the professionally active generations.[30] Although there is a debate about whether categorizing people using generational labels is accurate (some question them,[28] others present arguments supporting this[24]), insight into the nature of social trends may have practical applications for LTPA. This presents management and marketing challenges that have key public health implications.

In response to calls from researchers,[29] this study examined three generations living in an obesogenic environment: Baby Boomers, Generation X and Generation Y. These groups form the backbone of the contemporary workforce. To better understand the pursuit of IF LTPA by adults from an obesogenic environment in IF LTPA, their leisure behaviors were analyzed through the prism of *cohort effects*. Factors determining the choice of IF LTPA were considered, including external factors (belonging to a generation as a structural, sociocultural factor) and internal factors (sociodemographic, BMI and other anthropometric parameters as biological-physiological factors, level of physical activity as a behavioral factor, and motives for undertaking IF LTPA as a psychological factor).

From theoretical and practical perspectives, this research paper deepens the understanding of the role of determinants in engaging in leisure behaviors in an obesogenic environment. Attempts to capture the relationships in the context of modifiable factors – integrating subjective determinants (behavioral and psychographic factors[31]) with objective somatic variables – are still rare. This is so important that it may impact the studied individuals' self-efficacy, positivity, resilience, self-esteem, and perseverance.[8] The results support the design of local health interventions, including those increasing the effectiveness of obesity prevention strategies.

Methods

Participant

The sample included 1,065 adults (55% women) aged 18–79 (women, with age 43.3 ± 15.3 years, men with age 45.6 ± 15.9 years). They were recruited through a public invitation in the form of announcements displayed on notice pillars. 41 cases were excluded for further analysis due to missing data.

The recruitment method of using public advertisements on notice pillars introduces a high probability of self-selection bias. We used convenience sampling, which is the most frequently employed strategy widely used within developmental science.[32] Additionally, convenience sampling is cost-effective, efficient, and simple to implement,[33] which enables the realization of our cross-sectional study.

The study was conducted in accordance with the Declaration of Helsinki. All participants also signed written informed consent after they were provided with a detailed explanation of the study protocol.

Design

The criteria for including participants in the study relate to the obesogenic environment. In this case the participants were residents of Świętochłowice – one of the three most densely populated towns in the Silesian Voivodeship, with one of the three highest rates of adult obesity in Poland.[34] The behavior of residents of this town is the typical sedentary behavior of the community from this region[35] and their eating habits are the traditional Silesian way of eating, based on high-calorie dishes.[36,37] Despite a shift in eating behaviors to healthier habits, women from this region consume fast food, salty snacks, sweets, red meat and fats more often than men.[36,37] Therefore, the subjects were adults who were able to engage in physical activity and who were able to participate in all measurements. Minors and people with physical or intellectual disabilities prevented from participating in assessments were excluded from the study. The basic characteristics of the study sample are presented in Table 1.

Methodology

The method applied in this research paper adapts approaches utilised in previous articles by the authors.[3] The study was conducted by trained and supervised interviewers, according to a predetermined plan, just before the COVID-19 pandemic outbreak. The research was carried out in two stages. Firstly, participants' weight, height, and waist and hip circumference were measured, and then body fat (BF) status was assessed. In the second phase, participants were asked to complete a paper questionnaire on their level of physical activity, engagement in LTPA (including the forms of LTPA and motives), and

Table 1. Basic characteristics of the study sample (N = 1,065).

Characteristics	Men (n = 470)	Women (n = 595)
Age (years; mean, range)	45.62 (±15.9)	43.35 (±15.34)
Height (cm; mean ± SD)	176.5 (±9.25)	167.8 (±9.74)
Weight (kg; mean ± SD)	76.57 (±11.62)	72.64 (±12.77)
BMI (kg/m^2; mean ± SD)	24.7 (±4.19)	25.84 (±4.63)
WHR (mean ± SD)	.84 (± .06)	.78 (± .06)
BF (%, mean ± SD)	28.89 (±9.98)	32.65 (±10.01)
Marital status (%)		
Unmarried	46.60	39.20
Partnership/marriage	53.40	60.80
Educational level (%)		
Primary	20.50	25.50
Vocational	29.30	31.50
Secondary	45.60	35.50
Higher	4.00	6.70
Material status (%)		
Very poor/poor	12.60	15.30
Hard to say	23.60	25.30
Good/very good	63.80	59.40
Socioeconomic group (%)		
Professionals	13.50	23.30
Technicians and other associate professionals	6.20	5.10
Office workers	.20	2.70
Service and sales workers	4.60	18.80
Craft and industrial workers	17.30	2.40
Plant and machine operators and assemblers	20.50	.80
Elementary occupations	.60	6.90
Not in employment	37.10	40.00
Physical activity (MET, mean, ± SD)	2000.33 (±1913.53)	1829.1 (±1981.2)
Physical activity level (%)		
Low	28.09	41.40
Moderate	23.31	15.45
High	48.61	43.15
LTPA motives (%)		
Health	31.90	21.20
Passion for practicing sports	7.20	12.90
Slim figure/attractive body shape	4.40	13.10
Opportunity to socialize with other people	.40	11.90
Trend/fashion	9.00	8.00
Other	.40	9.60
None	.80	4.50

sociodemographic characteristics.

Assessment of the Sociodemographic Factors

Sociodemographic data were obtained through a questionnaire that included gender (male, female), marital status (married or unmarried), education level (primary, vocational, secondary, or higher), and socioeconomic group (professionals; technicians and associate professionals; service and sales workers; crafts and related trades workers; plant and machine operators and assemblers; elementary occupations; and those not in employment). Respondents were asked about their subjective assessment of their material status (three responses: "very poor"/"poor," "hard to say" or "good"/"very good").

The participants were divided into three generation groups according to age: Baby Boomers (born between 1946 and 1964), Generation X (born between 1965–1980), and Generation Y (born between 1981–1996). A *generation* is understood as a cohort of individuals born within a similar time frame, of comparable age and life stage, and shaped by the same historical and social context.[14] The boundaries between generations are not clearly delineated, and there is no consensus among scholars regarding the use of strictly defined generational limits.[13,29,38] Typically, a generation spans approximately twenty ± five years. The present study analyzed representatives of three generations that make up the contemporary workforce.

BMI and Other Anthropometric Measurements Parameters

Weight and height were measured in light clothing (without shoes) to the nearest .5 kg and .5 cm, respectively. Then the parameters were used to calculate BMI (kg/m^2). Waist circumferences were measured at the end of several consecutive natural breaths, at a level parallel to the floor, midpoint between the top of the iliac crest and the lower margin of the last palpable rib in the midaxillary line. Hip circumference was measured at a level parallel to the floor, at the largest circumference of the buttocks. The waist-to-hip ratio (WHR) was calculated by dividing waist circumference (in cm) by hip circumference (in cm).

An Omron Body Fat Analyzer model HBF-360 (Omron Healthcare, Inc., Vernon Hills, IL, USA), was used to measure body fat in participants. The bioimpedance method (applied in this analyzer) is a valid, non-invasive, inexpensive method, which is easy to use in large-sample studies.[39]

Assessment of the Level of Physical Activity, Participation in Individual Forms of Leisure-Time Physical Activity (LTPA), and Motives of LTPA

A Polish version of the *International Physical Activity Questionnaire - Short Form* (IPAQ-SF)[40] was used to monitor physical activity levels within a population and calculate metabolic equivalent for participants belonging to different age groups. The IPAQ-SF was completed during a face-to-face interview. IPAQ-SF weekly MET-min were calculated by adding MET-min of moderate physical activity (4.0 MET-min/min), vigorous physical activity (8.0 MET-min/min), and walking (3.3 MET-min/min). The cumulative weekly MET-min were then used to classify participants into three categories: low physical activity (individuals who did not meet criteria for moderate or high categories); moderate physical activity (minimum total physical activity of at least 600 MET-min/week); high physical activity (minimum total physical activity of 3000 MET-min/week).[41]

Participants were asked if in the past year they had engaged in any form of LTPA, non-competitive physical activity or sport for their own enjoyment, such as jogging, Nordic walking, cycling, swimming, basketball, etc. with the possible answer "yes" or "no." If the answer was "yes" they were asked to list these forms of LTPA. Based on the forms of LTPA reported by the respondents, the authors of this study (including two professors of sports science) conducted an internal discussion and independently classified the listed forms of LTPA into individual, dual and team. We analyzed only IF LTPA based on the definition that participants in individual sports engage in activities (e.g., walking, running, cycling, swimming) that are usually carried out on their own.[8,42]

Participants were also asked about the motives for engaging in LTPA, with possible answers: health, passion for practicing sports, slim figure/attractive body shape,[24] opportunity to socialize with other people, trend/fashion, other (please specify).

Statistical Analysis

Logistic regression was used to analyze the association between internal factors such as sociodemographic (gender, age, marital status, employment, education, material status), biological-physiological (BMI, WHR, BF), behavioral (level of physical activity), and psychological (motivations) factors and individually undertaken LTPA. A series of models was used to examine the odds of engaging in IF LTPA across the total study population (N = 1,065) and within generational cohorts (external factor): Baby Boomers, Generation X, and Generation Y. Logistic regression is particularly well suited for analyzing categorical dependent variables, such as the likelihood of engaging in various forms of LTPA across generational groups.[28] We used statistical software, the *glm* package in R Studio, which efficiently implements logistic regression and includes appropriate statistical checks for model fit and competence. A 5% level of statistical significance (P< .05) was assumed for the analysis.

Results

The analysis of pursuit of LTPA by the entire study group shows a clear generational trend. Younger generations are more likely to engage in IF LTPA (Y - 36%, X - 41%, Baby Boomers - 20%), accompanied by a decreasing proportion engaging in team and dual LTPA (25% and 30% for Generation Y; 27% and 19% for Generation X; 36% and 19% for Baby Boomers). A positive pattern is also evident in terms of the absence of LTPA (in general), i.e. the proportion of those reporting that they do not engage in LTPA decreases steadily across generations (Baby Boomers - 26%, Generation X - 13% and Generation Y - 8%).

Regression models (Table 2) indicate the significant importance of sociodemographic (gender, socioeconomic group, material status, and education), biological (BMI), psychological (motivations) and behavioral parameters (physical activity level) for engaging in IF LTPA with noticeable differences in effects between generations.

Table 2. Forms of leisure-time physical activity by generations (N = 1,065).

Generation	*N*	Individual (%)	Dual (%)	Team (%)	None (%)
Baby Boomers (1946–1964)	368	20	19	36	26
Generation X (1965–1980)	313	41	19	27	13
Generation Y (1981–1996)	384	36	30	25	8
Total	1,065	32	23	29	16

One of the strongest and most consistent determinants for the total population is gender (Table 3). Across the entire sample, women were found to be significantly less likely to engage in IF LTPA compared to men, with an odds ratio (OR) of .45. This indicates that women had 55% lower odds of engaging in IF LTPA than men. The effect is particularly pronounced in the Baby Boomer and Generation X cohorts. Among Baby Boomers, the OR drops to .41, suggesting that women in this group are 59% less likely to engage in IF LTPA compared to men. An even greater disparity is observed in Generation X, where women exhibit 79% lower odds (OR = .21). While the gender effect is also present in Generation Y (OR = .62), it is slightly less severe.

Table 3. Logistic regression results: Odds ratios (OR) for predictors of individual forms of leisure-time physical activity (LTPA).

	Total		**Baby Boomers**		**Generation X**		**Generation Y**	
Internal factors	**OR**	***P***	**OR**	***P***	**OR**	***P***	**OR**	***P***
(Intercept)	4.99	.299	1833.52	.078	.91	.978	.07	.257
Gender: female vs male	.45	**.001**	.41	.129	.21	**.001**	.62	.237
Marital status: partnerships vs unmarried	.72	.056	1.01	.977	.62	.132	.68	.151
BMI	.85	**.006**	.70	**.003**	.94	.615	.99	.914
BF	1.00	.861	1.02	.765	.96	.407	.96	.400
WHR	1.77	.671	.21	.723	1.78	.855	4.96	.328
Education level: primary (reference cat)	1.00	-	1.00	-	1.00	-	1.00	-
Education level: vocational vs primary	1.17	.771	6.45	.103	1.30	.849	.26	.099
Education level: secondary vs primary	2.06	.178	7.62	.093	3.31	.380	.50	.389
Education level: higher vs primary	2.38	.143	8.29	.120	1.58	.748	1.95	.456
Socioeconomic group: specialist (reference cat)	1.00	-	1.00	-	1.00	-	1.00	-
Socioeconomic group: technicians vs specialist	.82	.555	.60	.632	.70	.511	1.32	.642
Socioeconomic group: office workers vs specialist	.32	.143	.00	.988	.10	.098	2.78	.353
Socioeconomic group: service and sales vs specialist	1.01	.988	.16	**.048**	1.06	.936	5.22	**.032**
Socioeconomic group: craft and industrial vs specialist	.43	.063	.05	**.003**	.22	.071	3.18	.175
Socioeconomic group: plant and machine operators vs specialist	.31	**.009**	.05	**.005**	.09	**.008**	2.34	.295
Socioeconomic group: simple jobs vs specialist	.57	.333	.04	**.030**	1.05	.960	.99	.993
Socioeconomic group: retired vs specialist	.64	.235	.17	**.027**	.40	.320	4.66	**.037**
Material status: poor/very poor (reference cat)	1.00	-	1.00	-	1.00	-	1.00	-
Material status: hard to say vs poor/very poor	1.87	.125	1.81	.394	2.90	.275	2.10	.274
Material status: good/very good vs poor/very poor	2.26	**.043**	.91	.893	4.58	.134	4.01	**.041**
Physical activity level: low (reference cat)	1.00	-	1.00	-	1.00	-	1.00	-
Physical activity level: moderate vs low	1.90	**.013**	1.35	.626	2.78	.060	1.63	.216
Physical activity level: high vs low	3.18	**.001**	4.77	**.001**	6.43	**.001**	1.84	.069
LTPA motives: none (reference cat)	1.00	-	1.00	-	1.00	-	1.00	-
LTPA motives: health vs none	1.75	**.018**	.76	.702	1.42	.476	2.67	**.006**
LTPA motives: love of doing sports vs none	1.30	.412	.50	.322	2.70	.108	1.79	.305
LTPA motives: shapely figure vs none	1.10	.772	.76	.745	3.03	.115	1.12	.830
LTPA motives: interaction vs none	1.12	.768	.70	.741	1.35	.664	1.21	.747
LTPA motives: trend/fashion vs none	1.03	.922	.88	.808	1.07	.924	.82	.829
LTPA motives: other vs none	1.20	.626	.99	.994	1.47	.557	2.31	.170
Observations	1,024		357		298		369	
R^2 Tjur	.319		.465		.398		.245	

Note: $P \leq .05$

Marital status does not show a statistically significant effect in the analyzed cohorts, although individuals in partnerships or marriages in total population exhibit a 28% lower likelihood of engaging in IF LTPA compared to single individuals (OR = .72). This trend, while not reaching conventional levels of significance, may suggest lifestyle constraints or time allocation differences among partnered adults. Only for Baby Boomers was there a slightly higher chance for IF LTPA for individuals in partnership/marriage vs unmarried (OR = 1.01).

In the total sample, a one-point increase in BMI is associated with a 15% decrease in the likelihood of engaging in IF LTPA (OR = .85). This effect is especially strong among Baby Boomers (OR = .70), implying a 30% reduction in odds per BMI point. In contrast, the effect is minimal and statistically non-significant among Generation X (OR = .94) and Generation Y (OR = .99).

Neither BF nor WHR show significant associations with IF LTPA in any model. Odds ratios for BF fluctuate around 1.0, indicating negligible effects.

Individuals with higher education (category 4 – see Table 3 for a full description of categories) are over two times more likely to engage in IF LTPA compared to those with only primary education (category 1) in the overall sample (OR = 2.38). This effect is particularly striking among Baby Boomers, where the odds increase more than eightfold (OR = 8.29).

Socioeconomical group influences IF LTPA mainly in the Baby Boomers cohort. Individuals in lower-skilled professions (categories 5, 7, 8, 9, and 11) are 86% to 95% less likely to engage in individual LTPA compared to specialists (category 2). No significant differences are observed in the total sample or Generation X or Generation Y, suggesting that the occupational gradient in physical activity may be age-dependent (significant only for Baby Boomers).

Finally, material status has a strong impact on the total population. Respondents reporting a very good or good financial situation are two times more likely to engage in IF LTPA compared to those with a poor or very poor status.

For the entire study population, a moderate physical activity level is associated with a twofold increase in the likelihood of engaging in IF LTPA compared to a low physical activity level. By contrast, a high level of physical activity is an even stronger predictor, increasing the odds of IF LTPA threefold relative to the low physical activity group. Moreover, high physical activity levels significantly increase the likelihood of IF LTPA fivefold for Baby Boomers and sixfold for Generation X.

Among all considered factors, only health-related motivation has a statistically significant impact, increasing the likelihood of IF LTPA by 75% across the entire study population (OR = 1.75). The effect is particularly pronounced among the youngest cohort (Generation Y), where health motivation is associated with a 167% increase in the probability of engaging in IF LTPA (OR = 2.67). Other motivational factors, such as love of doing sport, a person's figure, social interaction, fashion, or other motivation, did not exhibit a statistically significant effect on pursuit of IF LTPA.

Discussion

This study analyzed the associations of internal and external factors on the likelihood of residents of Świętochłowice – with an obesogenic environment, engaging in IF LTPA. Like Hulteen et al.,[5] we hypothesized that the WHO's health-promoting physical activity recommendations (to help combat the obesity epidemic) can mainly be implemented through such forms of physical activity. Given that engaging in IF LTPA may be associated with a cohort effect, we studied representatives of three generations: Baby Boomers, Generation X and Generation Y.

Our results show that in general (regardless of team, dual, or individual form), there is a positive pattern of decrease in the proportion of physically inactive residents of Świętochłowice in successive generations (Baby Boomers - 26%, Generation X - 13%, Generation Y - 8%). However, it should be emphasized that the study's reliance on convenience sampling and recruitment via public advertisement may introduce a significant risk of self-selection bias. Our results confirm Canizares and Badley,[24] who showed an increase (resulting from a cohort effect) in the frequency of pursuit of LTPA and communicative physical activity, with a concomitant higher prevalence of sedentary lifestyles, although reports on this issue vary. For example, in a study by Finns[19] and Swedes,[17] younger age groups are likelier to undertake LTPA. However, the opposite trend, i.e., decreased volume and duration, is observed in Australia[16] and Norway.[41] Considering these recent results, the decrease in the fraction of inactive respondents among Polish respondents is cause for cautious optimism, as the number of "earning" residents in the voivodship with one of the three highest rates of adult obesity in Poland may thus decrease. According to current knowledge, physically active people have a greater chance of avoiding the risk of obesity, cancer, diabetes, and heart disease, as well as psychological and emotional stress.[5,43,44]

There was a clear difference in IF LTPA behavior among the individuals surveyed, depending on their generation. Younger generations are more likely to engage in IF LTPA (Generation Y - 36%, Generation X - 41%, vs Baby Boomers - 20%). Considering that only 8% of Generation Y reported no LTPA, this appears to be consistent with the findings of Karusisi et al.[9] Davison and Cowan[45] corroborate this by stating that the rate of increase in pursuits such as cycling in the older age group (66+) is about half that in the younger group (16–65 years). The increase in IF LTPA is accompanied by decreasing pursuit of team LTPA (Generation Y - 24%, Generation X - 32%, Baby Boomers - 39%) – which is confirmed by Dutch observations.[46]

The popularity of IF LTPA in younger generations is due to the change in their lifestyles. Generation X and especially Generation Y are more individualistic and self-centered, resulting in them being referred to as the "Generation Me".[47] This entails a drive to satisfy their own needs. An intrinsic value for Generation X and Generation Y is leisure time,[48] through which they pursue their hobbies, self-create, self-realize, and experience new sensations/pleasures.[12] IF LTPA - diverse, constantly evaluating, providing the ability to temporarily escape the class habitus (requiring constant progress through disciplined work and deferred gratification[48]) - provide an opportunity to realize these needs and a relatively quick expected outcome.[5,48,49] For example, running and strength training forms allow an activity to be tailored more to one's preferences, pace, and goals.[50] These choices are not coincidental - they may correlate with the growing trend of *self-focus*, promoting concern for health, appearance, and overall psycho-physical form and revitalization.[49,51] In our analysis, this fact is very evident, as health is the key motivation for engaging in IF LTPA. This motive, across the entire sample, increases the chance of engaging in IF LTPA by 75%. In Generation Y, this effect is particularly pronounced (as much as a 167% increase in probability), which sheds new light on the age dependence of the increase in the importance of health and physical fitness presented by Twenge et al.[38] and Fletcher.[48] It seems that this finding demonstrates a positive change in the lifestyles of young people, i.e., individual responsibility for health, of which prevention and, above all, an increase in health awareness are an

integral part.

One of the strongest and most consistent internal determinants of pursuit of IF LTPA across all generations is gender. Across the sample (regardless of generation), women are 55% less likely than men to engage in IF LTPA. According to current knowledge, physical activity has played a different role in the lives of men and women.[52] Women are attracted to physical activity through social interaction and active social life, which tends to favor group forms.[53] This effect is particularly pronounced in Generation X. In Generation Y, on the other hand, the gender effect is less severe, again drawing attention to younger generations' lifestyle changes. In developing societies, educated, employed, urban women have progressed towards equality with men, perceiving few gender, family, or social restrictions.[1,38,44] More and more women lead healthy, active lifestyles, and take up running, compete in marathons, and travel by bicycle or scooter to work.[44] Although the rate of men's pursuit of various individual sports is still higher than women's,[54] since the late 1970s, the trends have been changing. Researchers show that women are catching up with men as regards engaging in LTPA and are sometimes even more active than men.[44]

Another important determinant of pursuit of IF LTPA is BMI. Across the sample, a one percentage point increase in BMI is associated with a 15% decrease in the likelihood of engaging in this type of activity. At the same time, this is particularly important among Baby Boomers, where a 30% reduction in the odds of engaging in IF LTPA per BMI point is recorded. This may suggests that higher BMI is a more serious barrier to engaging in IF LTPA among Baby Boomers. This is supported by the fact that in Generation X and Generation Y, this effect is minimal and statistically insignificant (OR = .95; OR = .97, respectively). It is possible that for Baby Boomers who are overweight or obese, group exercise (e.g., gymnastics at a seniors' club) provides more support than running or cycling alone.[55] Moreover, Baby Boomers may not express a desire for exercise done in public at all.[12]

Over time, people with a high BMI may withdraw from individual activity altogether, making the problem even worse.[56] The *self-perpetuating spiral* effect (the higher the BMI, the less physical activity; the less physical activity, the higher the BMI[57]) can lead to dangerous health consequences.

In none of the generations studied do BF or WHR have a significant association with IF LTPA. Some researchers have highlighted such associations for passive forms of LTPA,[58] including sedentary lifestyles.[59,60] However, engagement in IF LTPA is not necessarily directly related to BF or WHR. Instead, these parameters may be related to insufficient levels of LTPA, particularly with regard to its frequency and volume.[61] Therefore, they may be indirectly relevant, but further research is required.

Looking at the socioeconomic group, Baby Boomers in lower-skilled occupations are 86–96% less likely than professionals to engage in IF LTPA. Previous studies support this finding, showing that those with a higher occupational stratification are more likely to care for their physical fitness regularly.[44] This may be because Baby Boomers grew up in an environment where professional status were central to their social standing and lifestyle.[13] High occupational demands included a well-groomed appearance and a high level of commitment, physical fitness, and resilience to stress. Working in clerical or white-collar jobs was associated with greater health consciousness and better access to resources conducive to physical activity, such as sports facilities and leisure time.[62] This usually correlated (and still correlates[63]) with material status. Despite the democratic achievements of modern civilizations (improved technology, transport links, and leisure time), there are still limitations to access - both leisure time and some forms of physical activity. Research confirms that people of low-income generations are more deprived of leisure time than those with high incomes and spend less on culture and recreation.[64] IF LTPA in mountains, oceans, or lakes requires expensive travel, specialized equipment, and specific skills.[65] IF LTPA of this kind is mainly used by privileged people with higher economic status.[65] Our analysis confirms this by showing that those declaring a good financial situation (across the entire study group) are two times more likely to engage in IF LTPA than those with poor status.

In Generation X and Generation Y, the relationship between education, socioeconomic group, and material status is not significantly related to pursuit of IF LTPA - which may be related to more diverse and unstable career paths,[49] a relative decline in the importance of occupational status for lifestyle,[38] and changing patterns of physical activity.[2] For example, the rise in the number of diplomas has meant that higher education no longer guarantees high social status. Automation and digitization have changed the labor market - job changes, temporary contracts, and remote working are more common.[30] Younger generations work as freelancers or run online start-ups, and the Internet has become a professional and private space.[30] As a result, new forms of physical activity have emerged,[66] which are no longer so strongly linked to traditional status indicators. In addition, physical activity has become part of everyday life (regardless of socio-professional position[67]) as modern generations feel the pressure to be healthy people.[49] The adverse effects of the progress of civilization[68] – such as the decrease in the proportion of physical activity in daily life, at work, and during mobility – and the growing awareness of its consequences for the metabolic and functional mechanisms that maintain health and human life, have led to a change in attitudes towards physical activity. As a result, *tracking*, or maintaining physical activity over time, has become one of the key concepts in the life-course approach.[69] Modern technologies facilitate this. Souaifi et al.[70] provides evidence that wearable technology can be effectively integrated into contemporary physical activity habits and may help both promote and monitor physical activity.

Another issue is whether the younger generations are doing enough to stay healthy in a changing civilization. Indeed, developed exercise habits and physical activity levels will be important in this regard. Established behaviors, greater health capital, and a conscious concern for health will undoubtedly be factors conducive to various forms of physical activity, including IF LTPA, which, as researchers[53] have shown, is becoming increasingly important. This is supported by the pattern we have shown, in which moderate levels of physical activity are associated with a twofold increase in likelihood, and high level of physical activity with a threefold increase in likelihood of engaging in IF LTPA across the study group. For Baby Boomers, high levels of physical activity increase the likelihood of engaging in individual forms by five times, and for Generation X by six times. This may explain Bandura's self-efficacy theory.[71] According to this theory, self-efficacy (i.e., belief in one's abilities) influences motivation and action-taking. Individuals with a high sense of self-efficacy (e.g., high levels of physical activity) engage in various domains to promote the development of their skills and abilities. They are also more willing to engage in activities in which they feel competent.[72] Knuth and Hallal[73] further point out the feedback loop, i.e., that the availability and flexibility of different modalities (e.g., IF LTPA) are key predictors of maintaining a high level of physical activity.

There are limitations within this article that need to be considered when interpreting the results. The classification of LTPA forms was carried out as part of an *internal discussion*, which contributed to the subjective nature of the classification. Pursuit of IF LTPA has only been analyzed through the *cohort effects* of the three generations in the labor market. Further research incorporating additional perspectives, such as *period effects* and *life-cycle effects*,[14] will enable deeper analysis and reveal *windows of opportunity*, i.e., moments when people are more open to positive changes regarding engaging in IF LTPA.
The use of non-probabilistic sampling introduces selection bias, preventing the sample from being representative of the overall population. Recruitment through public advertisements may have led to self-selection to some extent, with potentially greater participation from individuals who are more health-conscious and physically active. This should be considered when interpreting the generalizability of the findings.
As recommended, long-term studies (every ten years for five decades) and longitudinal panel data collection should be pursued while maintaining the methodological rigor of generational cohort analysis.[29] Our study was carried out exclusively in an obesogenic environment. Further studies could be carried out in diverse regions[28,74] to allow comparative studies of the IF LTPA behavior of generational cohorts and to deepen our understanding of the factors influencing participation in this gaining form.

Practical Applications

The findings highlight the need for targeted strategies to increase participation in individual forms of leisure-time physical activity (IF LTPA) across generations, especially in obesogenic environments such as Świętochłowice. Younger generations (Generations X and Y) are already more inclined to engage in IF LTPA, often as part of a broader lifestyle change, while Baby Boomers face greater barriers, including higher BMI, lower socioeconomic status, and reduced physical activity levels.
Implications for policy makers and providers of health promotion and physical activity in obesogenic environments:

- Promote and implement IF LTPA tailored to the sex and age of participants.
- Run awareness campaigns in communities (especially among Baby Boomers) with lower levels of education, emphasizing the importance of IF LTPA for health.
- Use health-related motives to promote IF LTPA, particularly to Generation Y.

Conclusions

The study provides valuable information on external and internal factors associated with IF LTPA pursued by residents of Świętochłowice (in an obesogenic environment). The analysis of external factors (belonging to the Baby Boomer generation, Generation X, and Generation Y) indicates that younger generations are more likely to engage in IF LTPA. Due to its potential to realize desired values, IF LTPA may favor tracking physical activity and thus support anti-obesity measures. We have observed the significant importance of factors for engaging in IF LTPA (gender, socioeconomic group, and material status, BMI, and, as well as motivation and level of physical activity), with noticeable differences in effects between generations. Overall, the pursuit by Generations X and Generation Y of IF LTPA is clearly related to lifestyle change. The situation differs for Baby Boomers, for whom high BMI, lower occupational and economic status, and physical activity levels are important barriers to engaging in IF LTPA.

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Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Ethical Committee approval

The study protocol was approved by the Local Bioethical Committee of the Karol Marcinkowski University of Medical Sciences, Poznan, Poland (399/18).

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Author-s contribution

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