

# PHYSICAL ACTIVITY LEVEL OF FACEBOOK USERS

NÍVEL DE ATIVIDADE FÍSICA DOS USUÁRIOS DO FACEBOOK

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ORIGINAL ARTICLE  
ARTIGO ORIGINAL  
ARTÍCULO ORIGINAL

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## ABSTRACT

**Introduction:** Interactions of Facebook users led to a study of the influence that users can exert on behavioral changes for a healthier life. **Objective:** To analyze the behavior of Facebook users in order to define the Users' Behavioral Patterns, by monitoring the practice of physical activities shared online, aided by a social competition among users, with the aim of combating sedentarism through the modern attraction of technology and gamification. **Methods:** A computational tool was developed to extract data from physical activity shared online. The tool, named FitRank, has permissions to access users' data. Tables and classifications were generated based on an analysis of the data in the database, using decision tree algorithms and descriptive statistical analysis. **Results:** users were classified according to sociodemographic data, and data on the creation of competitive rankings and the practice of physical activities, including the definition of the User's Behavioral Pattern. **Conclusion:** The study suggested the importance of technological innovations to combat sedentarism, in line with current social entertainment technologies to make them more enjoyable and motivating for the regular practice of physical activities and to provide a better quality of life. **Level of Evidence II; Retrospective study.**

**Keywords:** Sedentary behavior; Sports; Physical activities; Quality of life; Healthcare.

## RESUMO

**Introdução:** As interações dos usuários do Facebook permitem o estudo da influência que os usuários podem exercer na mudança comportamental para uma vida mais saudável. **Objetivo:** Analisar o comportamento dos usuários do Facebook para definir o Padrão Comportamental do Usuário, por meio do monitoramento da prática de atividades físicas compartilhadas, auxiliado pela competição social entre usuários, de forma a combater o sedentarismo com o atrativo moderno da tecnologia e da gamificação. **Métodos:** Foi desenvolvida uma ferramenta computacional de extração de dados dos compartilhamentos de atividades físicas, denominada FitRank, com permissões de acesso aos dados dos usuários. Os quadros e classificações foram gerados a partir da análise das informações coletadas no banco de dados, com o uso de algoritmos de árvores de decisões e aplicando análise estatística descritiva. **Resultados:** Os usuários foram classificados de acordo com os dados sociodemográficos, os dados de criação de rankings competitivos e com os dados da prática de atividades físicas, incluindo a definição do Padrão Comportamental do Usuário. **Conclusão:** O estudo sugeriu a importância de inovações tecnológicas no combate ao sedentarismo, de forma sintonizada com as atuais tecnologias de entretenimento social, para tornar mais prazerosa e motivadora a prática regular de atividades físicas e proporcionar qualidade de vida melhor. **Nível de evidência II; Estudo retrospectivo.**

**Descritores:** Comportamento sedentário; Esportes; Exercício físico; Qualidade de vida; Cuidados de saúde.

## RESUMEN

**Introducción:** Las interacciones de los usuarios de Facebook permiten el estudio de la influencia que los usuarios pueden ejercer en el cambio comportamental para una vida más saludable. **Objetivo:** Analizar el comportamiento de los usuarios de Facebook para definir el Patrón Comportamental del Usuario, a través de la monitorización de la práctica de actividades físicas compartidas, auxiliado por la competición social entre usuarios, de forma que se combata el sedentarismo con el atractivo moderno de tecnología y de la gamificación. **Métodos:** Fue desarrollada una herramienta computacional para la extracción de datos de las publicaciones de actividades físicas, denominada FitRank, con autorizaciones de acceso a los datos de los usuarios. Los cuadros y clasificaciones fueron generadas a partir del análisis de las informaciones colectadas en el banco de datos, con el uso de algoritmos de árboles de decisión y aplicando análisis estadístico descriptivo. **Resultados:** Los usuarios fueron clasificados de acuerdo con los datos sociodemográficos, los datos de creación de rankings competitivos y datos de la práctica de las actividades físicas, incluyendo la definición del Patrón Comportamental del Usuario. **Conclusión:** El estudio sugirió la importancia de innovaciones tecnológicas en el combate al sedentarismo, de forma sincronizada con las actuales tecnologías de entretenimiento social, para que sea más placentera y motivadora la práctica regular de actividades físicas y proporcionar calidad de vida mejor. **Nivel de evidencia II; Estudio retrospectivo.**

**Descriptorios:** Conducta sedentaria; Deportes; Ejercicio físico; Calidad de vida; Cuidado de la salud.



## INTRODUCTION

Online Social Networks (OSN) are already part of our daily lives. Among OSN, Facebook stands out, usually offering new forms of interaction.<sup>1</sup> These interactions allow researchers to observe the behavior of users,<sup>2</sup> including the motivation or influence that they can have on other people regarding behavioral changes.<sup>3</sup> Facebook has many users and currently is the largest OSN.<sup>4</sup>

Online socialization is increasing and becoming more and more intense, with positive or negative reactions and emotional contagion.<sup>5-7</sup> This emotional contagion can be positive, through behavioral change for a healthy life.<sup>8,9</sup> It can be also negative, with the exposure of intolerances, violence or illegal situations.

Social Media Apps (SMP) are software that enables sharing new experiences and content on OSN profiles. Its use on *smartphones* improves these contents, especially when integrated with technologies such as heart monitor, smart sports wristbands, GPS, smartwatches, sensors, gyroscope and accelerometer.<sup>10</sup>

Thus, the aim of this study was to develop a framework capable of monitoring and enabling the analysis of users' behavior on Facebook,<sup>11</sup> who use these type of technology, in order to define their Standard Behavior Pattern.<sup>3,8,9,12,13</sup> This analysis was carried out by monitoring the practice of shared physical activities on social media. For this, we developed FitRank, an app integrated with Facebook, which extracts the information for monitoring.

The links for FitRank are: <http://eic.cefet-rj.br/app/FitRank/> or <https://www.facebook.com/fitrank.go/>. Its goal is to promote a social competition between users, based on the sharing of rankings related to physical activities. These activities comprise walking, jogging and biking, which are monitored, shared and integrated on Social Apps.

Another FitRank's goal is to motivate and stimulate users to combat sedentary lifestyle. Fighting a sedentary lifestyle is important at all stages of life.<sup>14</sup> With FitRank, this happens through a gamification approach, with the modern appeal of OSN and physical activity apps. This gamification can be triggered by a healthy social competition among users, stimulating the regular practice of physical activities.<sup>15</sup>

With this gamification, we can expect a higher level of socialization among users, which can be achieved by emotional contagion and competitive spirit. Emotional contagion can be understood by the social support among these users, improving their levels of subjective well-being.<sup>5</sup> Sharing physical activity rankings is a good example, since they help to improve the quality of life.<sup>3,9,13</sup>

Moreover, with its dissemination, it is expected that FitRank may become a support tool for combating sedentary lifestyle. It may act as a motivator for the practice of physical<sup>10</sup> activities, which can reduce the costs of public and private health systems, considering the diseases related to a sedentary lifestyle. In addition, it can be a mechanism to reduce barriers to the practice of exercises.

This dissemination may occur due to the following reasons. The first is the low risk of injuries in outdoor physical activities, even considering that the knee joint is very susceptible to injury.<sup>16,17</sup> The second is having access to an appropriate place for physical activities,<sup>18,19</sup> with an infrastructure that can support this practice<sup>19,20</sup>, promoting well-being and safety.<sup>19</sup> The third reason is that the regular practice of physical activities can be perceived as a health issue.<sup>11,19,21-26</sup> Finally, we must consider the way of motivating and maintaining the practice of physical exercises, including tools to set up a safety and healthy exercise program.<sup>28</sup>

## MATERIALS AND METHODS

This study used data collected from FitRank users' profiles on Facebook. The collection was done with authorization from Facebook and

FitRank users.<sup>8</sup> Privacy was fully respected; we used summarized data and did not identify users.

The Facebook's authorization consisted of the permission to FitRank to access data related to the sharing of physical activities. Facebook granted this access after their analysis, and FitRank had the approval, considering all the ethical issues described by the social network.

The authorization of users was exclusively with "Login into Facebook." In the first time, access permissions to the user's public profile are requested, including friends list, email address, and physical activities. All these permissions can be granted or denied, guaranteeing that Facebook users become FitRank users in a consensual way. Thus, the users of this study electronically signed the informed consent form in the first access to FitRank. At any time they can easily quit FitRank, unlinking it from their Facebook account.

Figure 1 shows FitRank's Architecture. The user does physical activities monitored by the app and shares them on Facebook. FitRank collects this information by storing them in a database via RestFB. When the user or his or her friends access FitRank and create a ranking, these data will be considered.

The data collection process is done in the ranking generation, and the information from users and their friends is both extracted. With this, data update occurs when he/she or a friend creates a ranking, which allows updating them more frequently.

The users of this study was initially estimated at 378: 292 men (77%), and 86 women (23%), being the total of all FitRank users. In the first data analysis, this population was reduced to samples of users who created valid rankings, that is, they built them according to the modalities of physical activities practiced. The sample that met these criteria had 125 individuals: 98 men (78%), and 27 women (22%), being the one considered in the study. The prevalence of men in the samples was also observed in other studies.<sup>16,17,19</sup>

We adopted this selection criteria because the information of generated rankings was compared, excluding those that had rankings without any activities. Concerning invalid ranking data, out of the 253 users – 194 men (77%) and 59 women (23%) –, 188 (fitness lifestyle) had shared physical activities – 147 men (78%) and 41 women (22%) –, but they were excluded from this study because they did not create a ranking according to their physical activities: for instance, a biker who establishes

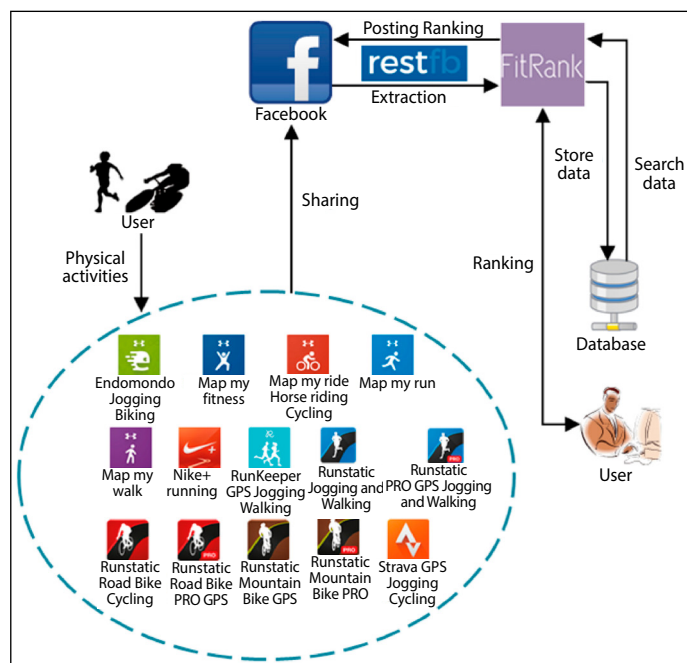


Figure 1. FitRank's architecture.

only a jogging ranking. The other 65 users (non-fitness lifestyle) shared no physical activities – 47 men (72%) and 18 women (28%) –, being in this case outside the scope of FitRank.

The tables and classifications of our study were created and established with decision tree algorithms, implemented in R, and also with tools for building graphs and based on descriptive statistical analysis.

## RESULTS

Figure 2 summarizes sociodemographic data. Some values were described as “unspecified” to represent the absence of information. Zero values indicate the lack of occurrence of the respective value.

The age group in (a) suggests a balance in the ranges 18 to 39 or 40 to 60, with a slight predominance of the former. The age group represented by zero indicates those who declared only month and day of birth. We also noted the presence of minors and older adults, and a concentration of men in the range between 18 and 39 years, and women in the 40 to 60 years age group.

The Brazilian geographic regions indicated in (b) show a concentration in the Southeast region. The South region has the second highest concentration, but much lower than the Southeast. We found a balance for the other regions and absence of users from the North region.

The schooling in (c) suggests a concentration of users with higher education. “Complete high school” has the second highest concentration, but lower than “higher education.” We highlight the lack of information on this topic.

The marital status in (d) indicates a majority of married users. The single status had the second highest concentration, a percentage close to that of married. We also highlight the lack of information on this topic. An interesting fact was the concentration of married men and single women: this is positive, since some studies indicate the importance of the influence of parents’ physical activity level on their children.<sup>29,30</sup>

Figure 3 summarizes the ranking creation data. The Amount of Rankings in (a) shows a concentration in the range of one to ten rankings. The

range of 21 to 40 rankings had the second highest concentration, but well below that of one to ten. There was a balance for the other rankings.

Ranking configurations in (b) suggest a concentration between two to five settings of different configurations. FitRank offers up to 60 different configurations. They are created combining different physical activities (walking, jogging, biking or mixed, that is, walking + jogging + biking) with classification criteria (distance, average speed or number of activities) and period (day, week, month, year or the entire publication period).

People in the rankings in (c) suggest a concentration between two and five. This means that the rankings include the user and up to four friends, indicating a good level of socialization among them. However, we found a significant number of users without friends, i.e., alone in the ranking.

The grouping of Modalities versus Types in (d) summarizes the information of the rankings created (n=2,572). All the selected modalities and types are indicated. We observed a higher concentration of jogging rankings. Mixed rankings and biking rankings are the second and third, respectively. The walking rankings had low occurrence.

Figure 4 summarizes data related to physical activity. In this study, we made a new selection of users from the 125 previously chosen, separating only those who had shared physical activities before and after the use of FitRank. Considering these criteria, the sample was reduced from 125 to 111 users (n=111).

The grouping of Modalities versus Types in (a) summarizes the information of the rankings created (n=17,816). All the selected modalities and types are indicated. We found a concentration on biking, and jogging was the second most common.

The History of Physical Activities in (b) reveals the sharing of physical activities in a continuous period of up to four years. There is also a significant concentration of up to two years. These data suggest that the physical activities have been practiced for a significant period.

The time using FitRank in (c) shows a continuous period of up to six months. The continuous period of seven to twelve months had the

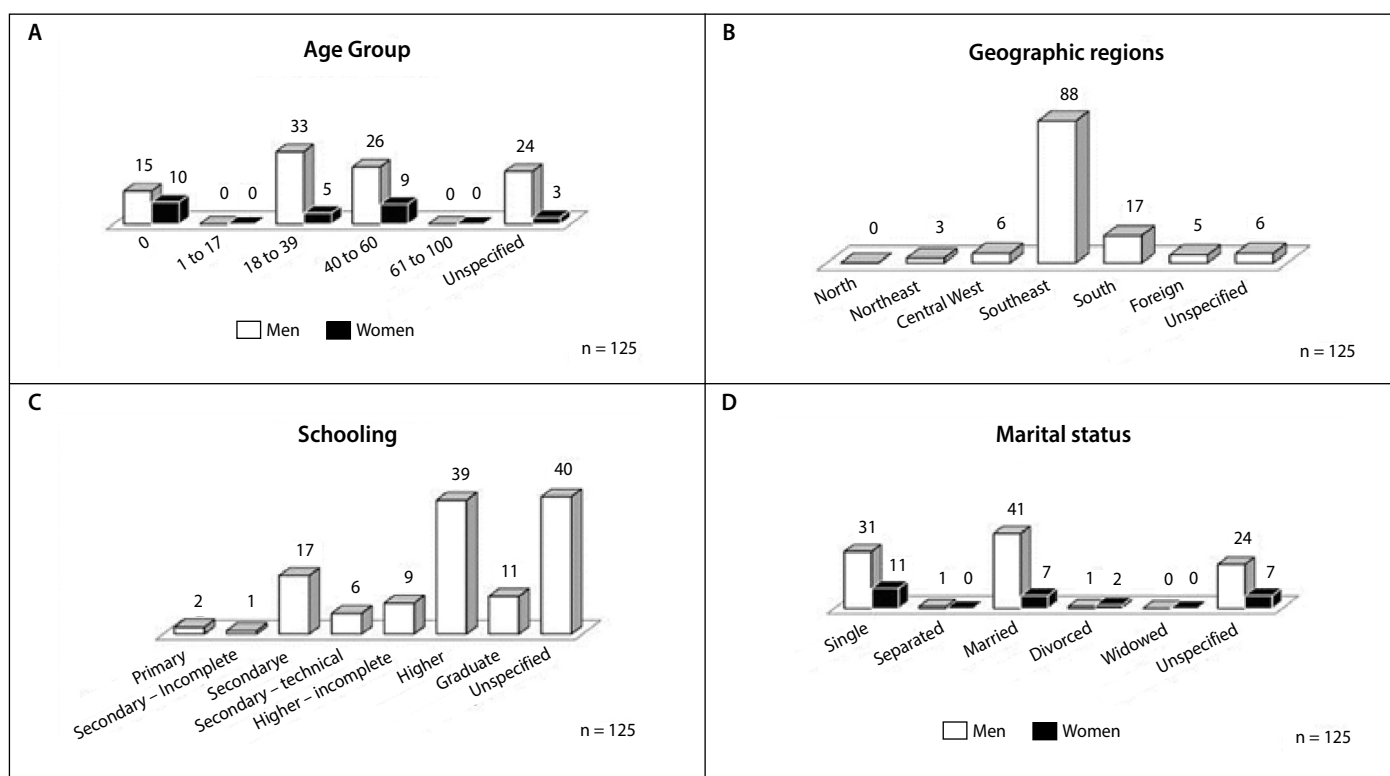


Figure 2. Sociodemographic information.

second-highest concentration. These concentrations suggest that FitRank have been recently used.

The comparison of the activities Previously  $\times$  Subsequent to the use of FitRank in (d) indicates a concentration with up to 50 previous and subsequent activities. There is a balance for other concentrations up to the limit of 400 previous and subsequent activities. These concentrations suggest that FitRank have been recently used.

Finally, the users' behavior pattern (n=111) was classified according to the frequency of physical activity (Figure 5). They were classified according to the modality of physical activity. When a user practiced more than one modality, he or she was classified by order of frequency. An example is the class "Jogger Biker Walker," in which the most to the less frequent activities are jogging, biking and walking.

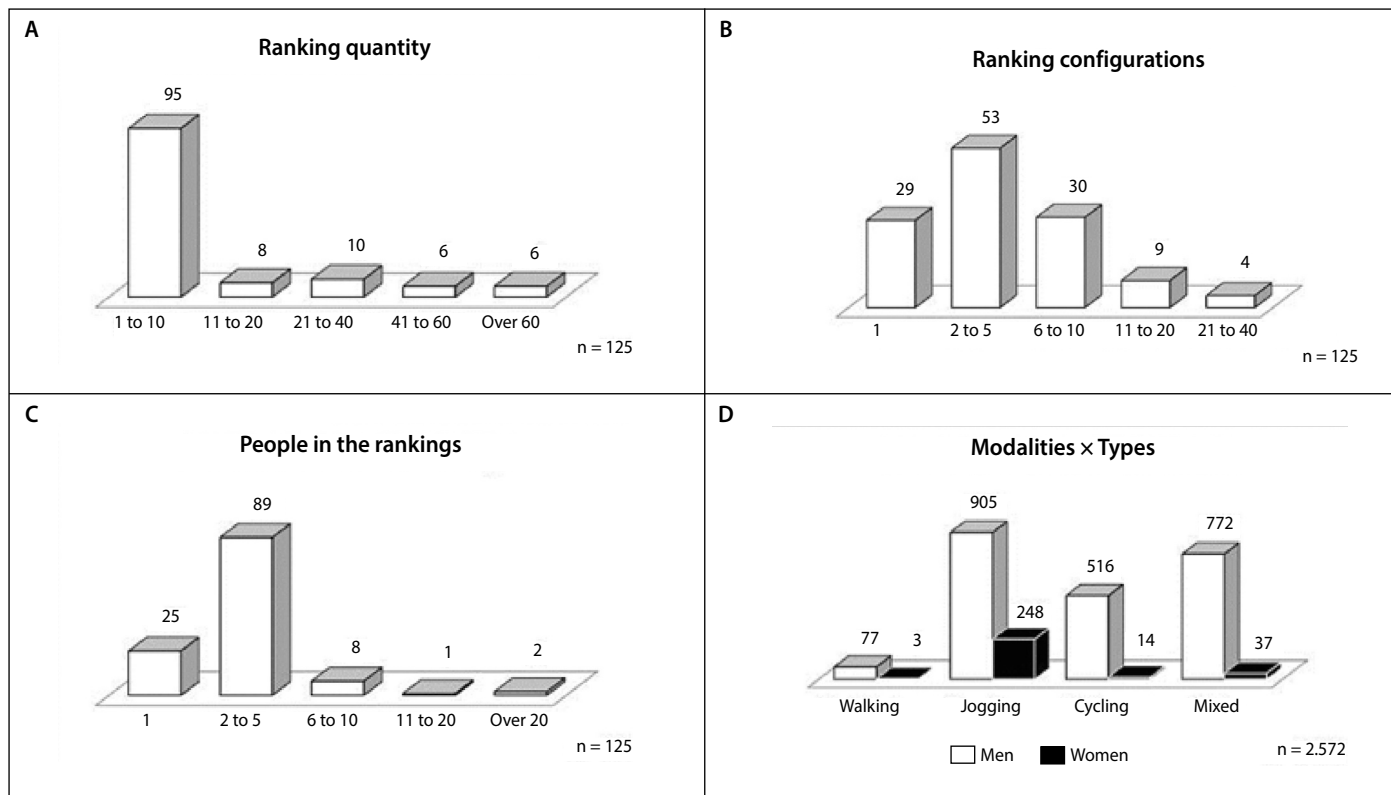


Figure 3. Ranking information generated.

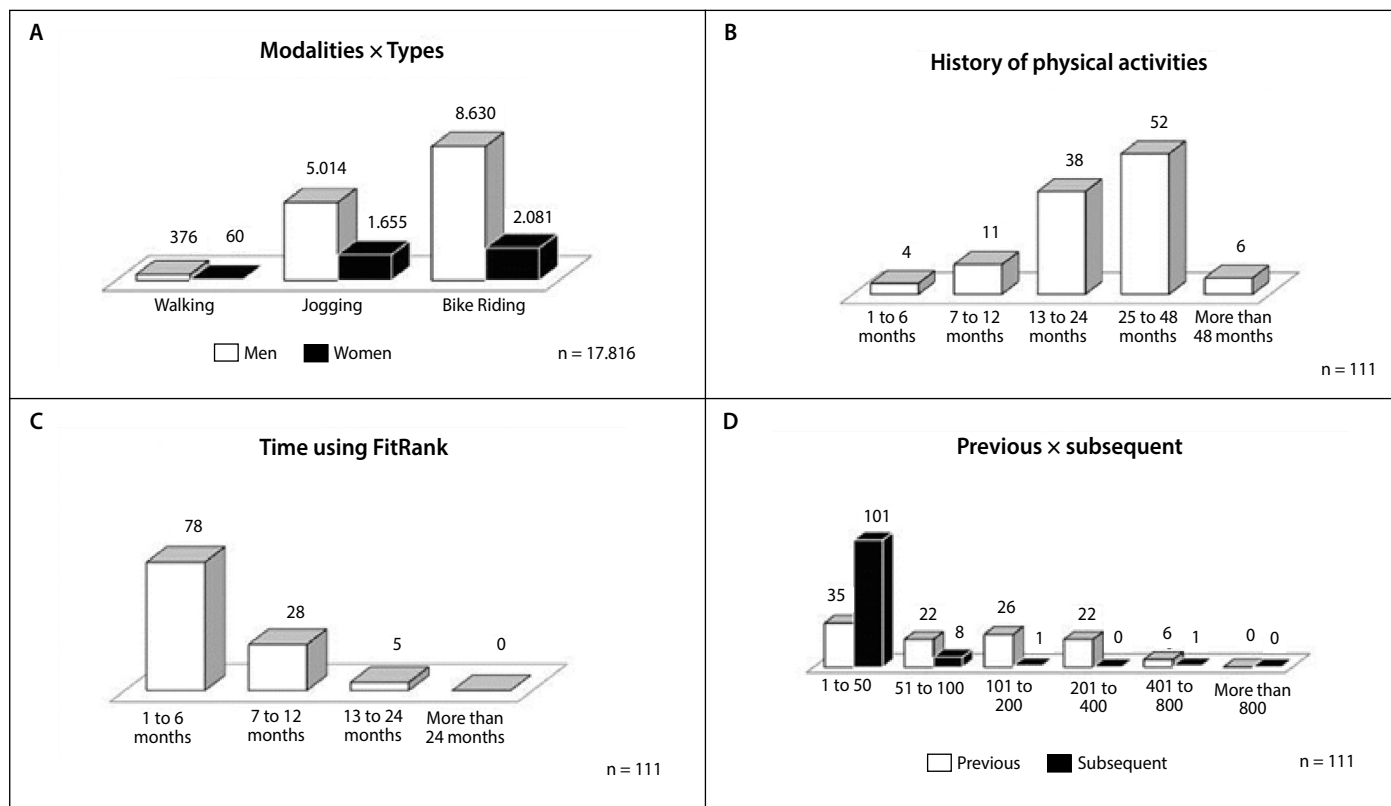


Figure 4. Information on physical activity.

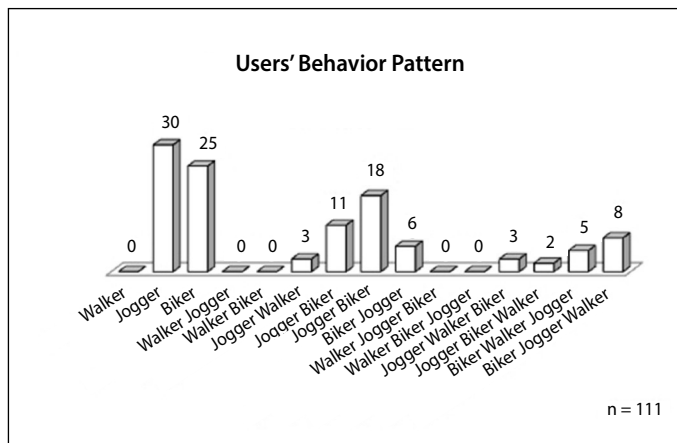


Figure 5. Users' Behavior Pattern.

## DISCUSSION

With the data analysis, it was possible to infer the user's profile pattern through higher frequencies. He or she is between 18 and 39 years old, lives in the Brazilian Southeast region, has higher education and is married. The user created up to 10 rankings, experimented from two to five different ranking settings, had up to four friends in them, being jogging his or her main ranking modality. The user's physical activities focused more on biking, and he or she shares his activities on the profile for at least two consecutive years, with a limit of up to four consecutive years; in addition, he or she uses FitRank from one to six months, and the most frequent physical activities are those he or she already practiced before using FitRank.

Some interesting differences emerged in this study. Regarding marital status, men were predominantly married and women single. Regarding age group, there was a predominance of men between 18 and 39 years, and women between 40 and 60 years.

Although the number of jogging rankings was higher and the number of joggers greater than the bikers in the sample, biking had higher

frequency than jogging. This may indicate that bikers do more physical activities than joggers, with shorter intervals between physical activities.

Even though most FitRank users are recent, we perceive a good level of socialization (up to four friends). With the dissemination of FitRank, currently limited to sponsored posts on Facebook or invitations in groups, greater socialization and greater balance in the modalities of physical activities are expected.

The target audience of this study were Facebook users who shared physical activities on social apps for physical activity monitoring, in specific walks, runs and bike rides, and who use FitRank. Thus, those considered to be outside the scope of FitRank (non-fitness lifestyle), represented by 65 users (17% of the total sample of this study), may have practiced physical activities and not shared them on their profiles.

This study represents a very small audience of Facebook users and does not express their overall behavior, showing only those who share their own physical activities. Future studies would be necessary to deepen both classifications and predictions of behaviors.

In a new study, the plan is to develop classifications of users considering effort levels of physical activities and correlating them to the amount of Metabolic Equivalents (METs) for the classification and prediction of user's behavior, according to recommendations of the World Health Organization.<sup>9</sup>

## CONCLUSIONS

This study pointed out the importance of technological innovations in combating sedentary lifestyle, based on current social media, in order to make the regular practice of physical activities more pleasurable and motivating, and to promote a better quality of life.

## ACKNOWLEDGMENTS

We would like to thank the National Council for Scientific Development (CNPq) for granting a master's degree scholarship.

All authors declare no potential conflict of interest related to this article

**AUTHORS' CONTRIBUTIONS:** Each author made significant individual contributions to this manuscript. FPJ: participated in the conception of the study proposal, the development of the FitRank, collection and analysis of the data and writing and review of the manuscript, GVSR, LMAD and RCM: participated in the development of the FitRank and the data collection, ESO and NFFE: participated in the concept of the study proposal and the review of the manuscript. All authors read and approved the final version of the manuscript.

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