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INTEGRATING SPORT, HEALTH, AND TRAVEL ORIENTATIONS AMONG HUNGARIAN SPORT SCIENCE STUDENTS: A FACTOR-ANALYTIC STUDY OF PREVENTIVE LIFESTYLE PATTERNS

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Abstract: This study explores the interrelationship between sport participation, health behavior, and travel orientation among Hungarian sport science students. The research aims to identify latent lifestyle dimensions that integrate physical activity, health self-regulation, and active travel preferences, offering a multidimensional view of how preventive health orientations manifest across daily and leisure contexts. A quantitative cross-sectional survey was conducted among 545 sport science students from Hungarian universities. The questionnaire assessed sport frequency, health-related practices, and travel motivations. Data were analyzed using exploratory factor analysis (principal-axis factoring with oblimin rotation), non-parametric group comparisons, ordinal logistic regression, and k-means cluster analysis. Three latent factors were identified and used to model behavioral interconnections and subgroup profiles. The factor analysis yielded a coherent three-factor solution - Active Sport Behavior, Health Attitude and Self-Regulation, and Outdoor Travel Orientation - explaining 53.1% of total variance. Male students reported higher physical activity, whereas females exhibited stronger preventive health orientation. Outdoor Travel Orientation significantly predicted the perceived importance of travel, indicating that nature-based recreation functions as an extension of active lifestyle rather than a distinct leisure form. Cluster analysis revealed three lifestyle profiles: Active Travelers, Health-Oriented, and Less Active, reflecting heterogeneity in sport and health engagement even within a specialized student cohort. These results support an integrated model of preventive and experiential lifestyle behavior, where intrinsic motivation and self-regulation connect everyday health practices with active travel preferences. The study extends theoretical understanding of the links between motivation, health regulation, and travel by demonstrating their shared psychological and behavioral roots. It underscores that physically active and health-conscious students are also the most inclined toward outdoor and wellness-oriented travel, suggesting that sport participation and preventive self-regulation jointly foster sustainable, health-enhancing mobility. Practically, the findings highlight opportunities for higher education, tourism, and public health programs to promote integrated lifestyle models that reinforce autonomy, experiential learning, and active recreation.

Keywords: sport participation, health behavior, self-regulation, travel motivation, outdoor recreation, preventive lifestyle, university students, Hungary

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INTRODUCTION

Tourism research increasingly highlights the interplay between individual well-being, workplace structures, and lifestyle practices. While classical approaches emphasized leisure, recreation, or cultural consumption, more recent perspectives show that travel choices are embedded in occupational contexts, health orientations, and generational values (Smith & Puczkó, 2014; De Vos et al., 2013, Medina-Garrido et al., 2023, Magyar & Béki 2024; Csobán et al., 2025). For younger employees, particularly Generation Z, travel behavior cannot be separated from workplace conditions or the shifting demands of modern employment. Preferences and motivations are shaped by preventive health orientations, organizational benefits, and sociocultural trends toward sustainability and well-being (Faragó & Béki, 2015; Muna et al., 2025; Inprasertkul et al., 2025; Dao et al., 2024; Ivancsóné et al., 2025). Workplace well-being

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extends beyond job satisfaction or salary (Demissie et al., 2024). It is increasingly conceptualized as a multidimensional construct spanning physical, psychological, and social domains (Taris & Schaufeli, 2018).

Organizational environments affect not only performance but also health outcomes, lifestyle choices, and leisure practices (Abdirahman et al., 2018). In this setting, travel functions simultaneously as a restorative outlet and a preventive health strategy. The expansion of wellness and health tourism, alongside rising demand for quiet, nature-based destinations, demonstrates that travel is a critical dimension of occupational well-being.

Lifestyle, well-being, and active travel among youth

Research on youth lifestyles increasingly emphasizes the interconnection between sport participation, health behaviors, and travel orientation (Bendíková, 2021; Păunescu et al., 2024). While earlier studies treated these as separate domains—sport as physical performance, health as preventive behavior, and travel as leisure—recent interdisciplinary approaches demonstrate that they share common motivational and psychological foundations (Hall, 2011; Buckworth & Dishman, 2021). Across Europe, changing social conditions and health values have made physical activity, healthy nutrition, and outdoor recreation integral parts of self-regulated lifestyles (Ryan & Deci, 2019). For younger populations, these orientations reflect not only personal habits but also emerging cultural models of well-being, emphasizing authenticity, sustainability, and nature-connectedness (Brymer & Schweitzer, 2017).

The transition to adulthood, particularly among university students, is a formative period for establishing enduring health and leisure behaviors. Within this stage, sport-science students represent a particularly interesting subgroup: their education formally promotes physical activity and health consciousness, yet their actual behavioral patterns often diverge due to academic workload, motivation, or social context (Wasil et al., 2020; Kovács & Moravecz, 2019; Moravecz, 2022; 2024). Understanding how these future professionals integrate sport, health, and travel attitudes into coherent lifestyle patterns can therefore illuminate both educational and public-health dynamics.

Sport participation and health orientation

Sport participation is widely recognized as a key determinant of physical and mental health (Warburton & Bredin, 2017; Mező & Mező, 2022). Beyond physiological benefits, sport contributes to identity formation, social integration, and resilience (Eime et al., 2013). However, numerous studies show that sport involvement does not automatically translate into broader health regulation. Even in populations trained in sport sciences, discrepancies emerge between performance-oriented activity and holistic well-being practices, such as balanced nutrition, stress management, and avoidance of harmful habits (Moreno-Murcia et al., 2011; Kruger et al., 2020). This divergence suggests that sport and health behavior, though related, may function as distinct but overlapping dimensions of lifestyle (Ilies et al., 2018).

Understanding their interrelation is essential for designing educational interventions that promote sustainable and self-regulated well-being among sport professionals. Within the self-determination framework, health-regulating behavior depends on autonomous motivation, reflecting internalized values rather than external enforcement (Ryan & Deci, 2019). Students motivated primarily by professional obligation may engage in sport for performance rather than health maintenance, risking burnout or inconsistency once formal training ends (Moreno-Murcia et al., 2011). Thus, the study of health attitudes and self-regulation within sport-science education serves both a pedagogical and preventive function.

Travel and the experiential dimension of active living

Parallel to these developments, the past decade has witnessed growing academic attention to travel as an extension of health and lifestyle regulation. Nature-based and physically active travel forms—such as hiking, adventure tourism, and wellness trips—combine restorative, experiential, and physical components (Gibson, 2020). They allow individuals to enact health-oriented lifestyles in new spatial and cultural contexts, transforming travel into a behavioral expression of well-being (Voigt et al., 2010). Outdoor and sport-related travel are thus increasingly understood not merely as recreational choices but as integral components of preventive health and identity work (Pomfret & Bramwell, 2016). Young adults, particularly university students, are central actors in this trend. They display strong preferences for experiential, sustainable, and socially engaging forms of travel, often emphasizing nature contact and self-exploration over luxury (Popșa, 2024). For sport-science students, who combine physical competence with health awareness, active travel offers a direct channel through which personal values and professional identity merge. Such students may represent the vanguard of active tourism demand, with implications for both sport-education curricula and the development of sport-tourism industries.

Sport-science education as a social and behavioral microcosm

Sport-science education in Central Europe, and particularly in Hungary, operates at the intersection of professional training, lifestyle modeling, and public-health responsibility. Programs in sport pedagogy, kinesiology, and recreation management aim to produce professionals capable of promoting healthy living and community sport engagement. However, evidence suggests that even within these programs, behavioral heterogeneity persists: some students internalize sport and health values deeply, while others remain motivated primarily by external or career-related rewards. This heterogeneity makes sport-science cohorts an ideal context for exploring intra-group differences in lifestyle orientation. Empirical research on Hungarian youth indicates a polarization in health-related behavior—with some groups adopting preventive and fitness-oriented lifestyles, while others exhibit declining sport participation and increasing sedentary time (Ács et al., 2020). Furthermore, Hungarian students have shown strong interest in domestic

and nature-based travel, supported by cultural traditions of hiking, wellness, and spa tourism (Michalkó & Rácz, 2011). Yet, few studies have systematically integrated these behavioral dimensions—sport, health regulation, and travel orientation—within a unified empirical framework.

Interconnections among sport, health, and travel orientations

Existing research points to multiple bridges linking sport, health, and travel. Participation in sport often predicts greater environmental awareness and preference for active travel (De Vos et al., 2013), while preventive health orientations can enhance motivation for wellness or outdoor tourism (Voigt et al., 2010).

At the same time, motivation for travel may reinforce self-care practices by providing restorative experiences that prevent burnout and stress (Iso-Ahola, 1982). From a sociocultural standpoint, these interconnections reflect broader shifts toward self-managed health citizenship, where individuals construct their identity through choices in diet, activity, and leisure mobility (Cohen & Cohen, 2012). However, the directionality and structure of these relationships remain underexplored among sport-science students. Given their educational exposure to health knowledge and sport practice, it is plausible that these students demonstrate a multi-dimensional lifestyle orientation—but empirical validation has been scarce (Chalabaev et al., 2013). Determining whether these orientations cluster into coherent patterns or remain independent constructs can help clarify how educational programs shape lifestyle integration.

Research gap

Despite extensive research on sport participation and health attitudes, very few studies have investigated how these domains interact with travel preferences among future sport professionals. Existing work on university populations often isolates physical activity or leisure motives without addressing how the same individuals negotiate between structured sport, preventive behavior, and experiential travel (Pegg et al., 2019; Haskins et al., 2021). Moreover, quantitative models of lifestyle integration remain limited, with most relying on separate analyses of activity frequency, motivation, and self-rated health rather than latent constructs. Among Hungarian samples, no study to date has combined polychoric factor analysis, ordinal regression, and cluster segmentation to derive a multidimensional lifestyle typology.

This gap is theoretically significant because it constrains understanding of how health-oriented identities evolve during professional education. If sport-science students do not exhibit integrated lifestyles, this raises questions about the transmission of holistic well-being values in academic settings. Conversely, evidence of integration could demonstrate the field's success in cultivating future professionals capable of modeling health-promoting behavior in society.

Aim and significance of the study

The present study addresses this gap by examining how sport participation, health-related attitudes, and travel orientation interact among Hungarian sport-science students. It applies a combination of polychoric exploratory factor analysis, non-parametric group comparisons, ordinal regression, and K-means clustering to identify latent dimensions and behavioral profiles. The study pursues four specific research objectives:

1. To identify latent dimensions underlying sport activity, health regulation, and travel orientation among sport-science students.
2. To test group differences in these latent factors by gender, educational level, and university.
3. To assess predictive relationships between lifestyle orientations and the perceived importance of travel.
4. To segment students into lifestyle clusters reflecting distinct configurations of sport, health, and travel behavior.

By addressing these questions, the study contributes to both sport-psychological and tourism research, integrating behavioral, motivational, and experiential dimensions of student life. The analysis situates sport-science education as a microcosm of contemporary lifestyle transitions, where young adults learn not only how to teach sport but also how to live it as an identity. Methodologically, it demonstrates how multivariate psychometric modeling can reveal hidden structure within seemingly homogeneous populations. Practically, the findings inform curriculum design, student well-being programs, and sport-tourism development, highlighting how universities can cultivate health-conscious and travel-active professionals. Ultimately, the study positions sport, health, and travel not as isolated activities but as mutually reinforcing expressions of active living. By understanding how these domains cohere—or diverge—within a formative educational context, we can better anticipate how the next generation of sport-science graduates will contribute to healthier, more sustainable, and more experientially engaged societies.

LITERATURE REVIEW

Motivation and Self-Regulation in Sport Behavior

Understanding why individuals engage in sport and sustain healthy lifestyles has been a central theme in sport psychology and health promotion. Early frameworks, such as the Theory of Planned Behavior (Ajzen, 1991), emphasized cognitive antecedents of intention, while later research grounded motivation in Self-Determination Theory (SDT) (Deci & Ryan, 2000). Within this framework, behavior is sustained when autonomy, competence, and relatedness needs are fulfilled (Ntoumanis, 2009). Empirical work confirms that autonomy-supportive contexts foster persistence and enjoyment, whereas externally controlled environments promote dropout (Vlachopoulos et al., 2000). Among sport-science students, self-determination moderates the relationship between health motivation and physical activity frequency (Szabo et al., 2022), suggesting that intrinsic motivation is both an outcome of education and a predictor of behavioral maintenance.

Broader reviews of motivation in health promotion confirm a persistent overreliance on extrinsic incentives rather than internalized values. Dunsmore & Goodson (2006) found that only 9% of studies defined motivation clearly, and most equated it with mere "intention." In contrast, Seifert et al. (2012) demonstrated that health programs emphasizing self-directed goal setting and self-efficacy produced higher and longer-term participation rates than incentive-based approaches. This evidence supports the view that health regulation should be framed as self-regulated competence rather than compliance—a distinction especially relevant to future sport educators.

From a behavioral perspective, past engagement plays a crucial role in shaping current motivation. St. Quinton (2020) showed that past behavior significantly predicted sport participation intention in university students, strengthening perceived behavioral control and internal consistency of motivation. These insights align with findings from Sallis et al. (2006), who identified self-efficacy, peer norms, and access to resources as key determinants of youth physical activity. Together, these studies suggest that motivation for sustained activity arises from a dynamic interplay of past experience, perceived control, and autonomous regulation—the theoretical backbone of the present study's factor structure.

Gender and Social Context in Sport Participation

Gender remains one of the most consistent correlates of sport involvement, yet its underlying motivational architecture is complex. Cross-sectional research consistently shows men participate more frequently, while women score higher on health-oriented and preventive motives (Rintaugu & Ngetich, 2012; Slater & Tiggemann, 2011). Slater & Tiggemann's work revealed that adolescent girls experience greater sport-related teasing and self-objectification, which suppress participation despite equal competence. These findings echo the dual motivational pattern observed in higher education: male students pursue activity through competition and performance, while females prioritize well-being and social connection (Kruger et al., 2020). Parental and contextual influences also shape internalization of sport values. Kovács et al. (2024) demonstrated that parental involvement patterns shift across participation stages and injury status, altering feedback and autonomy experiences for young athletes. In professional preparation programs such as sport sciences, these early socialization mechanisms likely continue to influence self-regulation and perceived support. Consequently, gender and contextualized autonomy emerge as critical moderators in the development of sport-related identities among university students.

Health Behavior and Lifestyle Integration

Health behavior models highlight the integration of cognitive, environmental, and self-regulatory elements. Mesters et al. (2014) showed that perceived control, habits, and knowledge predict physical activity more strongly than demographic or medical variables. Marques et al. (2019) expanded this logic to adolescence, showing that a healthy lifestyle index (activity, diet, no alcohol/tobacco) halves the likelihood of multiple health complaints. These results suggest that behavioral coherence across domains—sport, nutrition, and substance use—forms a composite pattern of self-regulated living.

Within the Hungarian context, Szakály et al. (2017) identified the LOHAS segment—a group defined by sustainability, authenticity, and health consciousness—representing only 8.7% of the population but shaping emerging consumption trends. This segment's ethical and preventive orientation mirrors the identity sought in sport-science education: blending wellness, ethics, and self-management. Perényi (2010) found that Hungarian youth who participate in sport emphasize "open values" such as creativity and friendship rather than material achievement, reinforcing the cultural shift toward self-expression and internal motivation. Nevertheless, the potential downside of commitment also warrants attention. Nogueira et al. (2018) documented exercise addiction rates up to 42% among endurance athletes, linked to obsessive passion and emotional regulation deficits. This underlines the importance of distinguishing adaptive intrinsic motivation from compulsion—a theoretical distinction echoed in SDT through the continuum from integrated to controlled regulation.

Active and Wellness Tourism as Extensions of Healthy Living

In parallel to sport and health behaviors, active and wellness tourism has evolved into a global lifestyle phenomenon. Csirmaz & Pető (2015) traced its exponential growth, identifying demographic aging, individualization, and health consciousness as primary drivers. Within this paradigm, wellness tourism represents not merely an economic sector but a social expression of preventive health and self-care values. Smith (2025) contextualized this evolution in Hungary, highlighting the shift from traditional balneology to modern wellness and preventive service models, emphasizing sustainability and experience quality. These trends intersect directly with young adults' increasing demand for authentic, health-enhancing travel (Darabos et al., 2022; Smith, 2025). Recent research has deepened understanding of sport-tourism motivation dynamics. Mostaghelchi & Tojari (2024) demonstrated that both destination experience and sport participation significantly predict active tourism motivation, confirming that active lifestyles extend beyond habitual sport into travel contexts. Wang et al. (2025) found that lifestyle and physical condition moderate the relationship between motivation and satisfaction in forest tourism, expanding the Push–Pull framework to include internal moderators such as health orientation and self-efficacy. These insights corroborate the current study's empirical finding that Outdoor Travel Orientation functions as an independent yet behaviorally linked domain within health-regulated lifestyles.

At a theoretical level, Lengieza, Hunt, & Swim (2023) merged SDT with eudaimonic well-being, arguing that autonomy and self-realization underpin sustainable engagement in ecotourism. Their model provides a direct conceptual bridge between autonomous motivation and meaningful travel, suggesting that the same psychological needs governing sport persistence also structure satisfaction in active and nature-based tourism. Collectively, these studies justify examining sport, health, and travel as mutually reinforcing lifestyle components rather than isolated domains.

Cognitive and Environmental Determinants of Sustained Activity

The interplay of cognition and environment in sustaining healthy behavior has been confirmed across age groups. Sallis et al. (2006) emphasized that self-efficacy and peer norms outperform informational interventions in promoting youth physical activity. Similarly, Ahuja (2019) found that structured habits and cognitive skills correlate with higher academic achievement, implying that methodological discipline transfers across behavioral domains, including sport and health. This logic supports the current study's methodological framing, where health self-regulation emerges as both a psychological construct and a measurable behavior pattern. From a macro-societal standpoint, public-health scholars have emphasized creating health-promoting environments where structural supports reinforce individual agency (WHO, 2020). For sport-science students, university culture constitutes precisely such an environment, combining education, peer influence, and access to facilities. Yet as previous studies indicate, behavioral heterogeneity persists even under favorable conditions—underscoring the need for empirical typologies such as those derived in the present research.

Synthesis and Conceptual Framework

The literature converges on three interrelated dimensions shaping Generation Z travel:

The literature collectively indicates that sport participation, health behavior, and travel orientation share overlapping motivational roots but diverge in behavioral expression. Self-determination theory provides the conceptual spine, explaining how intrinsic motivation and autonomy shape sustained engagement across all domains (Ntoumanis, 2009). Cognitive-behavioral models (Sallis et al., 2006; St. Quinton, 2020) clarify the role of past behavior and perceived control, while sociocultural research (Perényi, 2010; Szakály et al., 2017) situates these processes within value systems emphasizing openness, sustainability, and authenticity.

Empirically, the reviewed studies converge on three insights foundational to the current work:

1. Multi-dimensionality of lifestyle — sport, health, and travel constitute distinct yet interrelated behavioral systems driven by motivation and context.
2. Autonomous regulation as a core driver — internalized, self-determined motivation predicts persistence and satisfaction across activity and travel domains.
3. Cultural embedding — in Hungary, traditional spa and wellness heritage, combined with new sustainability values, forms a fertile context for health-oriented travel among youth. This synthesis provides the rationale for investigating the latent structure of sport, health, and travel orientation among Hungarian sport-science students.
4. The study extends prior literature by combining polychoric exploratory factor analysis, ordinal regression, and cluster segmentation to empirically map these interconnections within a formative educational population.

MATERIALS AND METHODS

Data source and sample

The empirical foundation of this study derives from a 2024 cross-sectional survey conducted among students enrolled in sport science programs at Hungarian universities. The survey formed part of a broader research initiative exploring links between sport participation, health-related behaviors, and travel orientations among young adults preparing for sport-related careers. Data collection was implemented online through institutional mailing lists and course management systems. Respondents completed an anonymous self-administered questionnaire in Hungarian, taking approximately 10–12 minutes to complete. After data screening for completeness and logical consistency, 545 valid responses were retained for analysis. Participants' mean age was 21.4 years (SD = 2.3), with a gender distribution of 54% male and 46% female. Educational levels were as follows: bachelor (67%), master (28%), and PhD (5%) students. The majority reported engaging in sports outside their university curriculum (78%) and paying regular attention to healthy nutrition (62%). The study was approved by the Research Ethics Committee of the Faculty of Business and Economics at the University of Debrecen (GTK-KB 013/2025), and participation was voluntary and anonymous.

Measures

The survey included multiple sections covering sport activity, health behavior, and travel orientation, alongside demographic variables. For this study, nine items were retained for psychometric and multivariate analysis.

Sport Activity

Two items measured students' physical activity levels: "How many times do you currently do sports per week?" (6-point frequency scale); "Do you currently do extracurricular sport activities?" (yes/no format coded 1–2).

These indicators captured both intensity and engagement beyond compulsory university training.

Health Behavior and Attitude

Four items assessed health-related self-regulation and lifestyle orientation: "How much do you pay attention to healthy nutrition?"; "Do you smoke?" (reverse-coded); "Do you regularly take vitamins or dietary supplements?"; "Choosing sport science: healthy lifestyle is important" (reverse-coded). Each item used a 5-point ordinal scale (1 = not at all, 5 = very much).

Travel Orientation

Three items captured travel-related attitudes and preferences: "Choosing sport science: motivation and community"; "Interested in nature-based trips (mountains, hiking)"; "During travel, seeks hiking or trekking."

Responses reflected the degree of interest or agreement on 5-point scales.

Statistical Procedures

Analyses were conducted using R version 4.4.3 with the psych, GPArotation, dplyr, and ggplot2 packages. Statistical significance was set at $p < .05$ unless otherwise noted.

Descriptive Statistics

Basic sample characteristics were summarized using means, standard deviations, and frequency distributions. Sport participation averaged 3.0 sessions per week (SD = 1.5), and travel importance was rated 5.3 on a 6-point scale, indicating that participants generally viewed travel as a meaningful life experience.

Exploratory Factor Analysis (EFA)

To identify latent dimensions underlying sport, health, and travel behavior, an Exploratory Factor Analysis (EFA) was conducted on the nine items. Because the variables were ordinal, polychoric correlations were computed. The extraction method was principal axis factoring with oblimin rotation to allow factor correlations. Sampling adequacy was confirmed by a Kaiser–Meyer–Olkin (KMO) value of 0.78 and Bartlett's test of sphericity ($\chi^2 = 892.3$, $p < .001$). Parallel analysis and scree plot inspection supported a three-factor solution, jointly explaining 53.1% of total variance. Factors were interpreted as:

F1 – Active Sport Behavior (frequency and engagement),

F2 – Health Attitude and Self-Regulation, and

F3 – Outdoor Travel Orientation.

The rotated factor loadings are presented in Table 1, and the proportion of variance explained is shown in Table 2.

Computation of Factor Scores

Factor scores were computed using the Ten Berge method to preserve latent structure properties. These scores served as inputs for subsequent comparative, correlational, and clustering analyses.

Group Differences

Factor scores were compared across gender, training type (bachelor, master, PhD), and university affiliation. Given deviations from normality, non-parametric tests were employed: the Mann–Whitney U test for gender and the Kruskal–Wallis test for multi-group comparisons. The results are visualized in Figure 1 and Figure 2, respectively.

Correlation and Regression Analysis

Relationships among the three factors were evaluated using Spearman's rank correlations. To assess predictors of perceived travel importance (1–6 scale), an ordinal logistic regression model (MASS: polr) was fitted, with F1–F3 factor scores, gender, and university as predictors. The model fit was evaluated using a likelihood-ratio χ^2 test. Regression estimates are reported in Table 3.

Cluster Analysis

To identify distinct lifestyle profiles, K-means clustering was applied to standardized factor scores. The optimal three-cluster solution (average silhouette = 0.44) yielded interpretable groupings:

1. Active Travelers – high sport activity and strong outdoor orientation;
2. Health-Oriented – moderate sport activity, strong self-regulation;
3. Less Active – lower engagement across all dimensions.

Cluster summaries are reported in Table 4 and visually represented in Figure 3.

Tables and Figures

The tables and figures are structured as follows:

Table 1. Rotated pattern matrix from the three-factor EFA (principal-axis, oblimin rotation).

Table 2. Variance explained by the three-factor solution.

Table 3. Ordinal logistic regression predicting perceived importance of travel.

Table 4. Cluster profiles based on three-factor scores.

Figure 1. Mean factor scores by gender.

Figure 2. Mean factor scores by training type.

Figure 3. Cluster centroids on standardized factor scores.

Together, these results provide an integrated overview of the latent structure, group-level differences, and behavioral segmentation among sport science students.

Methodological Contribution

Methodologically, the study contributes to the integration of behavioral, attitudinal, and travel-related dimensions within the sport sciences domain. The combined application of polychoric EFA, ordinal regression, and cluster analysis offers a multidimensional framework for understanding how young sport professionals relate to health and travel.

This approach bridges psychometric rigor and applied lifestyle segmentation, providing a replicable analytic model for future research on sport-related populations.

RESULTS

Descriptive statistics

A total of 545 valid responses from sport science students were analyzed. Participants' mean age was 21.4 years (SD = 2.3), with 54% male and 46% female respondents. The majority were enrolled in bachelor's programs (67%), followed by master's (28%) and PhD (5%) students. Most reported engaging in sports outside their university studies (78%) and regularly paying attention to healthy nutrition (62%). Sport participation averaged 3.0 sessions per week (SD = 1.5), and travel was perceived as an important life experience (M = 5.3 on a 6-point scale). These descriptive results characterize the sample as health-oriented, physically active, and open to travel experiences.

Exploratory Factor Analysis

An exploratory factor analysis (EFA) was conducted on nine items reflecting sport activity, health-related behavior, and travel orientation. Principal-axis factoring with oblimin rotation was applied to polychoric correlations. The Kaiser–Meyer–Olkin measure of sampling adequacy was 0.78, and Bartlett's test of sphericity was significant ($\chi^2 = 892.3$, $p < .001$), confirming factorability. Parallel analysis and the scree plot both supported a three-factor model explaining 53.1% of total variance. The rotated pattern matrix (Table 1) shows clean and interpretable loadings above |.35|, with no cross-loadings above .30. The factors were conceptually coherent:

F1 – Active Sport Behavior: frequency and involvement in sport activities.

F2 – Health Attitude and Self-Regulation: attention to nutrition, avoidance of smoking, and general lifestyle regulation.

F3 – Outdoor Travel Orientation: preference for nature-based and hiking-related travel.

The three factors explained 53.1% of the total variance (Table 2). Each dimension contributed meaningfully, with Active Sport Behavior accounting for the largest share. Total cumulative variance explained = 53.1 %.

Table 1. Rotated pattern matrix from the three-factor exploratory factor analysis (principal-axis, oblimin rotation; loadings ≥ .35) (Source: Own editing)

English variable	F1 Active Sport Behavior	F2 Health Attitude & Self-Regulation	F3 Outdoor Travel Orientation
How many times do you currently do sports per week?	0.94		
Do you currently do extracurricular sport activities?	0.88		
How much do you pay attention to healthy nutrition?		0.67	
Do you smoke? (reversed)		0.51	
Do you regularly take vitamins or dietary supplements?		0.43	
Choosing sport science: healthy lifestyle is important (reversed)		0.58	
Choosing sport science: motivation/community		0.44	
Interested in nature-based trips (mountains, hiking)			0.81
During travel, seeks hiking or trekking			0.94

Table 2. Variance explained by the three-factor solution (Source: Own editing)

Component	SS Loadings	Proportion Var	Cumulative Var	Proportion Explained
F1 Active Sport Behavior	1.61	0.201	0.201	0.379
F2 Health Attitude & Self-Regulation	1.34	0.167	0.369	0.315
F3 Outdoor Travel Orientation	1.30	0.163	0.531	0.306

Group Differences

Factor scores (estimated via Ten Berge method) were compared across gender, training type, and university.

- Gender. Males scored significantly higher on Active Sport Behavior (W = 45 512, $p < .001$), while females scored slightly higher on Health Attitude & Self-Regulation (W = 33 498, $p = .066$).
- Training type. A significant difference emerged for Active Sport Behavior ($\chi^2 = 17.2$, $p < .001$), with bachelor's students being most active.
- University. No significant institutional differences were found ($p > .25$). These findings are depicted in Figure 1 and Figure 2.

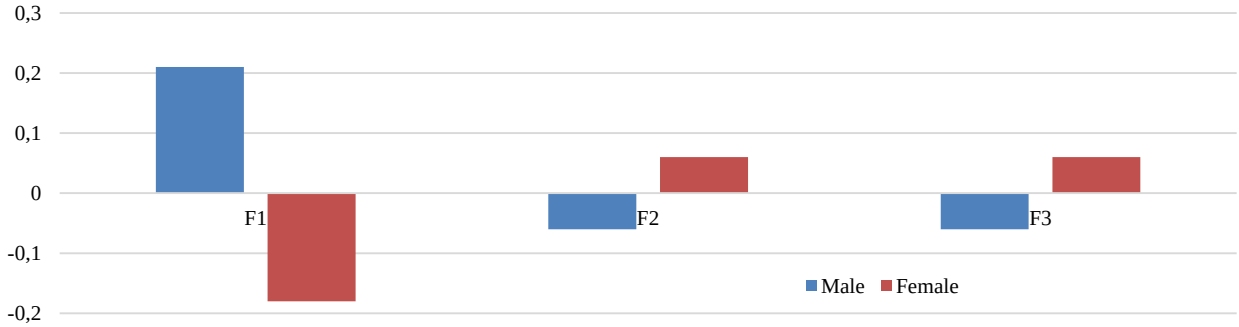

Figure 1. Mean factor scores by gender (Source: Authors)

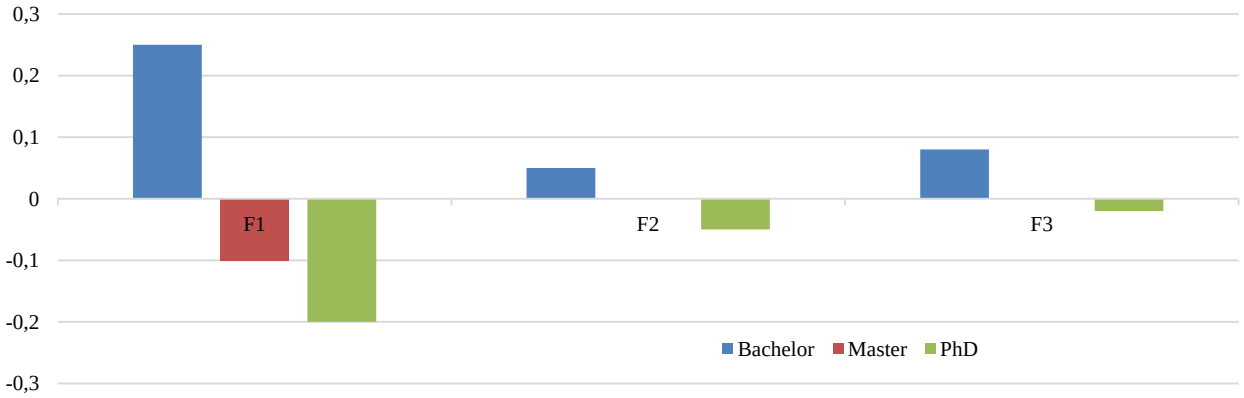

Figure 2. Mean factor scores by training type (Source: Authors)

Correlations and Regression Analysis

Spearman correlations between the latent factors were moderate and positive (r = .27–.34), suggesting that students who are more active in sports also tend to adopt healthier lifestyles and show stronger interest in outdoor travel.

To identify predictors of perceived travel importance (1–6 scale), an ordinal logistic regression was fitted including the three factor scores, gender, and university. The overall model was significant ($\chi^2 = 46.9$, $p < .001$). The Outdoor Travel Orientation factor emerged as the only significant predictor ($\beta = 0.43$, $p < .001$), indicating that students with stronger outdoor interests rated travel as a more central life experience. Results are summarized in Table 3.

Table 3. Ordinal logistic regression predicting perceived importance of travel (Source: Own editing)

Predictor	**Estimate (β)**	**SE**	***z***	***p***
F1 Active Sport Behavior	0.09	0.09	1.00	.317
F2 Health Attitude & Self-Regulation	0.12	0.08	1.48	.139
F3 Outdoor Travel Orientation	0.43	0.08	5.38	< .001
Gender (2 = female)	−0.38	0.18	−2.12	.034
University (2 = NYE)	0.28	0.20	1.40	.161

Cluster Analysis

K-means clustering based on standardized factor scores revealed an optimal three-cluster solution (average silhouette = 0.44). The clusters represented distinct behavioral orientations:

- Cluster 1 – Active Travelers: high sport engagement and strong travel orientation.
- Cluster 2 – Health-Oriented: moderate sport activity but elevated health self-regulation.
- Cluster 3 – Less Active: generally low on all dimensions.

Cluster distributions and descriptive statistics are summarized in Table 4.

Table 4. Cluster profiles based on three-factor scores (Source: Own editing)

Cluster	***n***	**Mean Travel Importance**	**Mean Sport Frequency**	**Cluster**
1	197	5.21	2.21	1
2	314	5.32	3.21	2
3	34	5.03	2.74	3

The distinct centroid profiles across the three clusters are visualized in Figure 3, showing that Active Travelers combine high physical activity with strong outdoor preferences, while Less Active students exhibit consistently lower engagement levels.

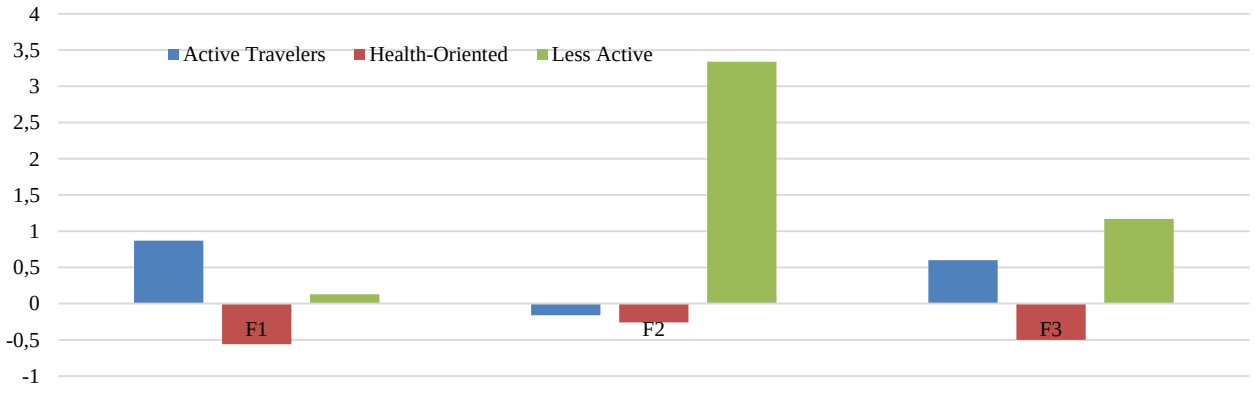

Figure 3. Cluster centroids on standardized factor scores (Source: Authors)

Summary of Findings

The three-factor structure demonstrates a coherent and psychometrically sound pattern, explaining over half of the total variance in students' sport, health, and travel orientations.

Significant gender and program-level differences were observed primarily in physical activity levels, while Outdoor Travel Orientation uniquely predicted the personal importance of travel. Cluster analysis further identified three lifestyle profiles, providing an integrative view of sport and health engagement among sport science students.

DISCUSSION

This study examined the interplay between sport participation, health-related behavior, and travel orientation among sport-science students in Hungary. Using a robust quantitative framework—polychoric exploratory factor analysis, ordinal regression, and clustering—the research identified three latent dimensions: Active Sport Behavior, Health Attitude and Self-Regulation, and Outdoor Travel Orientation. These results provide an integrated view of how future professionals in the sport domain balance personal engagement in sport, attention to health, and openness to active and nature-based travel.

Interpretation of the Factor Structure

The three-factor solution offers a coherent and theoretically meaningful representation of the latent structure underlying students' sport and lifestyle orientations. The first factor (Active Sport Behavior) represents direct behavioral engagement—frequency of sport participation and involvement beyond formal study requirements.

The second factor (Health Attitude and Self-Regulation) reflects internalized attitudes toward maintaining healthy habits and self-regulatory competence, including attention to nutrition, moderation in smoking or alcohol consumption, and valuing preventive lifestyle choices. The third factor (Outdoor Travel Orientation) captures preferences for nature-based and physically active travel, connecting lifestyle and leisure through outdoor experience.

The structural separation of these dimensions is notable. In much of the sport psychology literature, sport and health behaviors are treated as overlapping constructs (Downward & Rasciute, 2011; Buckworth & Dishman, 2021). However, our findings suggest that even among sport-science students—who might be expected to show high homogeneity in attitudes—health self-regulation and active travel remain conceptually distinct from direct sport engagement.

This supports multi-dimensional lifestyle frameworks, such as those proposed by Stebbins' serious leisure theory (Stebbins, 2017) and by the dual-motivation model of sport participation, which distinguishes intrinsic enjoyment and extrinsic regulation (Ryan & Deci, 2019). The distinct emergence of Outdoor Travel Orientation as an independent latent factor broadens this conceptualization further. While previous studies have explored the relationship between sport participation and travel motivation (Hall, 2011; Gibson, 2020), the present results reveal that even within a highly active population, the orientation toward nature-based or sport-related travel constitutes a unique domain of lifestyle identity.

This aligns with the growing recognition of sport tourism and active tourism as hybrid behavioral constructs bridging recreation, health, and cultural exploration (Kouthouris & Alexandris, 2021).

Group Differences in Sport and Travel Orientation

Gender, training level, and university were tested as grouping variables to examine behavioral differentiation. Gender differences followed expected patterns: male students scored significantly higher in Active Sport Behavior, while female students exhibited higher (though not significantly so) scores in Health Attitude and Self-Regulation. This pattern mirrors prior research in both sport-science and public-health cohorts, where male students emphasize performance and activity volume, whereas females prioritize well-being and preventive lifestyle management (Şentürk, 2019; Kruger et al., 2020). The absence of gender differences in Outdoor Travel Orientation suggests that travel motivation is relatively uniform across sexes, potentially reflecting broader societal normalization of outdoor recreation among young adults (Pegg et al., 2019).

Differences across training types indicated that bachelor's students were most active, which may be linked to curricular structure and age-related energy levels. Master's and PhD students often face time constraints, research commitments, and reduced access to organized sport opportunities, which may explain lower engagement (Haskins et al., 2021). This suggests a developmental trend in sport participation during higher education that warrants targeted intervention—universities could integrate flexible, self-paced sport modules into postgraduate curricula to sustain physical activity beyond early study years.

Institutional comparisons yielded no significant differences, implying a relatively consistent sport and health culture across Hungarian sport-science programs. This uniformity may result from shared national curricular standards and a cohesive pedagogical approach to sport and health education.

Interrelations among Factors and Behavioral Prediction

Moderate correlations among the three latent factors ($r \approx .27–.34$) indicate that while sport, health, and travel orientations are interrelated, none is reducible to another. This independence reinforces the need for multi-faceted conceptual models rather than single lifestyle indices. The ordinal regression model identified Outdoor Travel Orientation as the strongest predictor of the perceived importance of travel. Neither sport frequency nor general health self-regulation independently predicted travel significance when controlling for the other variables.

This finding challenges the intuitive assumption that active individuals are automatically more travel-oriented. Instead, travel orientation appears to stem from distinct value-driven motives, such as curiosity, contact with nature, or self-expansion (Pomfret & Bramwell, 2016). Such a differentiation is consistent with the functional motivation theory of leisure travel, which distinguishes "escape–relaxation" and "self-development" motives (Iso-Ahola, 1982).

In this framework, Outdoor Travel Orientation can be interpreted as a self-development pathway extending beyond traditional sport participation. Consequently, the educational challenge for sport-science programs is not only to foster activity but to cultivate integrative mindsets that link health, leisure, and environmental experience.

The cluster analysis further supported this conceptual distinction by identifying three lifestyle types: Active Travelers, Health-Oriented, and Less Active. This segmentation echoes prior typologies found in university and sport contexts (García-Ferrando, 2015; Alexandris et al., 2019). In practical terms, these clusters represent distinct "well-being profiles," useful for designing tailored interventions or communication strategies. The relatively small "Less Active" segment (6%) may be of special concern for institutional policy, as it includes students within sport-science education who nonetheless report low engagement—a paradox warranting focused preventive efforts.

Theoretical Implications

The present findings contribute to the expanding theoretical dialogue linking sport sociology, health psychology, and tourism studies. First, the independence of the three latent dimensions supports multi-domain models of lifestyle construction, in which sport, health, and travel orientations form separate but mutually reinforcing pillars of well-being (Kouthouris & Alexandris, 2021). This challenges traditional unidimensional health frameworks and supports an ecological perspective on active living, consistent with the WHO's concept of "health-promoting environments" (WHO, 2020).

Second, the emergence of Outdoor Travel Orientation as a distinct motivational axis suggests that mobility and experiential exploration are integral to modern sport identities. This observation resonates with theories of experiential consumption and self-transcendence through movement, previously identified in adventure and outdoor education research (Brymer & Schweitzer, 2017). It implies that for sport-science students, travel is not simply an adjunct leisure activity but part of a broader identity project centered on active self-realization.

Finally, by demonstrating that female students score higher on self-regulation while males lead in sport frequency, the study indirectly supports gender-differentiated pathways to active living. This reinforces calls for more inclusive and diversified pedagogical frameworks that recognize distinct motivational architectures across gender and educational stages.

Methodological Implications

Methodologically, the study exemplifies a hybrid analytical pipeline suited to lifestyle and behavioral research. The use of polychoric EFA allowed accurate modeling of ordinal survey items—an improvement over Pearson-based approaches commonly used in social-science sport research. The decision to extract three interpretable factors despite only moderate explained variance (53.1%) demonstrates an empirically grounded balance between parsimony and conceptual clarity. Factor scores computed via the Ten Berge method maintained structural orthogonality, enabling clean downstream analyses (DeShon, 1998). The combination of non-parametric group comparisons, ordinal logistic regression, and K-means clustering provided complementary lenses: distributional, predictive, and typological. Such a sequential integration—psychometric reduction followed by behavioral segmentation—illustrates a replicable model for cross-domain behavioral analysis. It aligns with methodological advances advocating multi-stage latent-structure modeling for lifestyle research (Rhemtulla et al., 2012). Moreover, the segmentation approach emphasizes how latent constructs can serve not only as explanatory tools but as categorical diagnostics, revealing population heterogeneity within nominally homogeneous groups. This is particularly relevant for applied sport sciences, where heterogeneity in motivation and engagement can significantly affect intervention design and pedagogical outcomes.

Practical Implications

From an applied standpoint, the findings have implications for higher education policy, curriculum design, and public health promotion.At the curricular level, universities could use the identified factor structure as a diagnostic framework. Students scoring low on Active Sport Behavior but high on Health Attitude might benefit from experiential field components that connect theory to physical practice. Conversely, students high in sport behavior but low in health regulation may require guidance on long-term well-being and injury prevention. The identification of an Outdoor Travel Orientation factor underscores the pedagogical potential of nature-based learning and active tourism modules within sport-science education. Programs integrating field trips, sport camps, and outdoor leadership projects could enhance both experiential learning and professional preparation for tourism and recreation sectors (Gibson, 2020). For institutional policy, the cluster typology provides a practical segmentation tool. Targeted health-promotion campaigns could address each cluster's dominant orientation - emphasizing sustainability and travel exploration for Active Travelers, preventive education for Health-Oriented students, and re-engagement incentives for the Less Active group. On a broader societal level, sport-science students represent future influencers of population health. Their own behavioral orientations are likely to shape how they later communicate and model active living in schools, sport clubs, and community contexts. Therefore, fostering integrative lifestyles among this group has long-term public-health implications extending beyond the university setting.

Limitations and Future Research

Several limitations must be acknowledged. First, the study's cross-sectional design prevents causal inference. Longitudinal or experimental work is needed to determine whether increased sport engagement promotes outdoor travel orientation or whether shared motivational traits underlie both. Second, all data were self-reported, raising the possibility of social desirability bias. Combining surveys with objective indicators—such as activity trackers or verified participation data—would improve measurement precision. Third, the sample of sport science students limits

generalizability to broader populations. These respondents are already more active and health-aware than average young adults. Replication among students from other fields or among non-student youth would test whether similar patterns emerge in less specialized groups. Fourth, the model excluded potentially relevant psychosocial variables such as perceived stress, environmental concern, or social support, which might mediate the relationship between sport and travel behavior. Including these constructs in future models could enhance explanatory power.

Finally, future research should employ confirmatory and longitudinal designs to validate the factor structure and explore developmental dynamics over time. Mixed-method approaches—especially interviews or reflective diaries—could enrich quantitative findings by capturing how students define and experience the links between health, discipline, and leisure.

Despite these limitations, the study contributes empirically and conceptually to understanding how sport participation and health regulation shape travel preferences. Extending this research to diverse educational and cultural contexts may inform programs promoting integrated, preventive, and sustainable lifestyles among young adults.

CONCLUSIONS

This study identified clear interrelations among sport participation, health behavior, and travel orientation among Hungarian sport science students. Exploratory factor analysis revealed three coherent latent dimensions—Active Sport Behavior, Health Attitude and Self-Regulation, and Outdoor Travel Orientation—together explaining over half of total variance. These findings demonstrate that physically active, health-conscious students tend to integrate sport and travel as complementary components of a preventive lifestyle. The results confirm that autonomous motivation and self-regulation form the psychological basis linking these domains. Students with higher outdoor travel orientation also reported stronger health awareness and placed greater importance on travel as a life experience.

This supports the interpretation that travel, particularly nature-based and active forms, extends the same motivational structure that sustains sport participation.

Gender and training-type differences were consistent with prior research: men showed higher physical activity, while women emphasized health management and preventive practices. The three lifestyle clusters - Active Travelers, Health-Oriented, and Less Active - illustrate distinct configurations of sport and health involvement within the same educational environment. Overall, the study supports viewing sport, health, and travel as mutually reinforcing expressions of self-determined living. For sport science education, this highlights the importance of fostering autonomy, experiential learning, and outdoor engagement to strengthen professional and personal well-being competencies.

The evidence also suggests that intrinsic motivation and lifestyle regulation predict readiness for sustainable, health-oriented tourism - a growing field in both practice and policy.

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