The LOHAs (Lifestyle of Health and Sustainability) Attitude Questionnaire for Assessing Sustainable Lifestyles Among University Students

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ABSTRACT

Aim. This paper introduces the development, implementation, and pilot validation of the LOHAs Attitude Questionnaire. This instrument evaluates sustainable attitudes and behaviour among university students, based on the consumer typology model by the Natural Marketing Institute (NMI). The analysis explores the reliability and validity of the questionnaire and its capacity to identify distinct lifestyle groups and attitudes towards sustainability.

Methods. The LOHAs Attitude Questionnaire was developed through a comprehensive literature review, expert consultation, and iterative pilot testing. The pilot study involved 1,089 full-time university students across three Czech universities, representing various disciplines. Data collection employed a 40-question instrument, with responses captured on a Likert scale. Statistical analyses, including Cronbach's alpha and factor analysis, were conducted using SPSS to determine reliability and to identify latent factors.

Results. The reliability analysis yielded a Cronbach's alpha of 0.881, indicating high internal consistency. Factor analysis identified five distinct components aligning with the NMI's typology: LOHAS, NATURALITES, DRIFTERS, CONVENTIONALS, and UNCONCERNEDS. Findings suggest the questionnaire effectively differentiates lifestyle groups and provides insights into students' attitudes towards sustainability.

Conclusion. The LOHAs Attitude Questionnaire proves to be a reliable and valid tool for assessing sustainable attitudes and behaviour among university students. It offers a robust framework for monitoring the impact of sustainability education and tailoring interventions based on lifestyle categories. Future research should expand its application to diverse cohorts and examine its role in fostering sustainable behaviour through targeted educational initiatives.

Keywords: environmental behaviour and attitudes, LOHAs typology, questionnaire validation, university students' lifestyle, sustainable education, consumer behaviour

Introduction

In the face of significant challenges in our present circumstances, there is a growing imperative to adopt innovative and sustainable ways of living. With the global pop-

ulation witnessing exponential growth, reshaping our behaviour towards sustainable living is essential. Sustainable development is a methodological approach grounded in scientific principles, aiming to meet current needs while ensuring the ability of future generations to meet their own. It encompasses environmental, economic, and societal dimensions, preserving resources, fostering just and inclusive prosperity, and maintaining ecological balance (Brundtland & World Commission on Environment and Development [WCED], 1987).

The United Nations officially designated 2005 to 2014 as the Decade of Education for Sustainable Development, emphasising the crucial role of education in achieving global sustainability. Studies also show that digital technologies deliver different value types, including innovation and sustainability (Uzule et al., 2024). Following this, the younger generation has displayed significant engagement in sustainability issues. Nevertheless, the existing tools for capturing and monitoring their attitudes are found to be inadequate.

One possible starting point has become Lifestyles of Health and Sustainability (LOHAS). LOHAs was presented as a perceptual, attitudinal, and behavioural lifestyle emphasising personal health, well-being, and environmental and social sustainability in pursuing balanced prosperity between the individual, the environment, and society (Cheng et al., 2019). According to Paul H. Ray and Sherry Ruth Anderson (2001), there is a growing demand for products that combine high quality with ethical and virtuous attributes.

Our team aims to develop and evaluate an attitudinal and behavioural assessment tool to monitor and compare lifestyle changes across different groups and cohorts. This paper presents the developed tool and its testing on undergraduate students from various disciplines.

Purpose and Objective

In 2006, the Natural Marketing Institute (NMI) developed a model that identified five lifestyle groups: LOHAS, NATURALITES, DRIFTERS, CONVENTIONALS, and UNCONCERNEDS (Natural Marketing Institute [NMI], 2008). Throughout our research, we will use and analyse this categorisation into groups. Each lifestyle is characterised as follows:

LOHAs (Lifestyles of Health and Sustainability) – an environmental steward, LOHAs consumers are socially responsible, driven to protect the environment, and are avid users of green products. They take action to ensure personal and planetary health and influence others to do the same.

NATURALITES – they are passionate about their health and use many natural consumer packaged goods to address that interest. While less attitudinally committed

to the environmental space, they are an excellent secondary target for many companies with a slightly more mainstream position.

DRIFTERS—they have good intentions about acting in environmentally—and socially-conscious ways, but when it comes to behaviour, other factors have more influence on their decisions. Somewhat price sensitive (and trendy), they are full of reasons why they do not make environmentally friendly choices.

CONVENTIONALS – their attitudes are not easily categorised but are predisposed to various "practical" LOHAs products and activities. CONVENTIONALS are identifying small changes they can make in their behaviour that allow them to participate in the green revolution. With the proliferation of green products, it is increasingly easy for them to do something.

UNCONCERNED – they are not interested in the environment, sustainability, and society.

The imperative to evaluate and compare university students' lifestyles has become increasingly evident among educators in sustainability education, environmental studies, and related fields within the Czech Republic. Understanding the extent to which educational practices influence students' attitudes and behaviour, and determining how pedagogical approaches might be refined to effect such changes, has become a critical concern. However, existing instruments have proven inadequate for this specific evaluative purpose. In response, educators in 2020 recognised the urgent need to develop a suitable tool to measure the impact of education on students' attitudes and behaviour concerning sustainability and related lifestyle aspects, promptly initiating its development.

Tool Creation Procedure, Pre-Pilot, and Pilot Testing

The research team conducted an in-depth review of lifestyle studies and consumer typologies, notably those published by the American agency Natural Marketing Institute (NMI, 2008). They meticulously examined the Lifestyle of Health and Sustainability (LOHAS) framework, drawing insights from the NMI typology as detailed in the document *Understanding the LOHAs Market*™. Subsequently, relevant peer-reviewed articles exploring LOHAs lifestyles were collected, along with standardised analytical tools (e.g., Bishal et al., 2023; Choi & Feinberg, 2021; Pícha & Navrátil, 2019; Szakály et al., 2017; Park, 2015). A comprehensive analysis of these sources was undertaken, supplemented by regular consultations with economics, sociology, education, and statistics experts.

By July 2021, the authors had developed an analytical tool. Extensive discussions ensued regarding its formulation, encompassing considerations of scope, structure, response scale, and other pertinent factors. Initially, demographic elements were designed to establish a foundational framework. Subsequently, approximately three items

were selected, adapted, and assigned to each health category—physical, mental, social, and spiritual—sourced from identified instruments corresponding to each lifestyle type.

Including knowledge-based items to assess respondents' awareness was proposed and deliberated upon. This led to detailed discussions on specific draft items within the instrument, incorporating feedback from statisticians, educators, and sociologists. The instrument encompassed demographic details, health categories (including social, physical, mental, emotional, and spiritual facets), items representing five lifestyles (including reverse items), and knowledge-based inquiries. A Likert 5-point scale format was adopted for most questionnaire items to facilitate responses.

Towards the conclusion of the questionnaire, an item was included prompting respondents to self-identify their lifestyle based on the provided typology, indicating which lifestyle they most closely associated with.

Following extensive discussions and expert consultations, the proposed version of the tool underwent revisions, involving modifications, rephrasing, additions, and, in some cases, removing certain items. Notably, the initial ranking of items according to lifestyle type was omitted from the final version. Continuous collaboration with a statistician ensured the tool's refinement and accuracy throughout this process.

In September 2021, a pre-pilot test of the instrument was conducted with 15 students from various Czech universities—Jan Evangelista Purkyně University in Ústí nad Labem (3), Charles University (5), University of Chemistry and Technology Prague (4), and Palacký University Olomouc (3). These students provided feedback, comments, and suggestions regarding the instrument, significantly contributing to its finalisation. Subsequent discussions focused on the processing and evaluation of the questionnaire data, with particular emphasis on the intricate process of item coding, which garnered significant attention.

Three coding options were proposed, including reverse scoring:

- a) Lohas b) Naturalites c) Drifters d) Conventionals e) Unconcerneds;
- a) Naturalites b) Lohas c) Drifters d) Conventionals e) Unconcerneds;
- a) Lohas and Naturalites b) Drifters c) Conventionals d) Unconcerneds e) Unconcerneds.

For the knowledge-based closed-ended items, there was always one correct answer; otherwise, an open-ended response was required.

In November 2021, an online version of the questionnaire was created, accompanied by a motivational press release for students to pilot test the instrument. Distribution of the questionnaire to students was scheduled for February 2022. However, inconsistencies were identified in the approach to the scale and item scoring design. After consultation with a statistician, a categorical approach was adopted. A working version of the instrument was presented at the 11th World Environmental Education Congress (WEEC) in March 2022, garnering international support for the initiative.

By May 2022, the authors completed a trial version of the instrument to verify the online version's functionality and identify any inconsistencies.

In September 2022, data collection commenced among students from three Czech universities—Charles University, Jan Evangelista Purkyně University in Ústí nad Labem, and Palacký University Olomouc—and concluded in June 2023, spanning the entire 2022/2023 academic year.

Research Methodology

This investigation focused on the research tool – the LOHAs Attitude Questionnaire. This questionnaire was administered to diverse university students across various academic disciplines. The questionnaire, written in Czech, encompassed 40 questions. Ten questions were dedicated to eliciting information about the respondents, focusing on their field of study, background, and familiarity with the subject matter. The remaining 29 questions constituted our research instrument, the LOHAs Attitude Questionnaire. Employing a Likert scale, participants expressed their perspectives on a continuum ranging from 1 (strongly disagree) to 5 (strongly agree). The subsequent data analysis used Statistical Product and Service Solutions (SPSS) software. The questionnaire included a self-evaluation of the students on the Lohas scale.

Essential Characteristics of the Sample

A cohort of 1,089 full-time students, equally drawn from three Czech universities situated in distinct regions, actively engaged in completing the questionnaire. These students were evenly distributed across 13 diverse fields of study, delineated in Table 1. Notably, 34 questionnaires (3.1% of the total) were deemed incomplete and, therefore, were excluded from subsequent analysis.

Reliability Assessment

The first research question was whether the proposed LOHAs Attitude Questionnaire instrument is reliable. Cronbach's alpha was calculated to test this hypothesis. This value represents the internal validation of the questionnaire; it is used to confirm if the questions proposed for the test maintain internal consistency (Stadler et al., 2021; Edwards et al., 2021). Calculating the alpha in our investigation, the value of Cronbach's Alpha Based on Standardized Items was 0.881. This value is higher than the research of Sooyeon Choi and Richard A. Feinberg (2021), indicating the potential for higher reliability of our test. To complement the validation of the test, we apply factor analysis to identify the profile of the participants and determine if all issues contribute to the questionnaire.

Table 1
Basic Characteristics of the Sample

SUBJECT	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	71	6.7	6.7	6.7
Economics	158	14.5	14.5	21.2
Philosophy	4	0.3	0.3	21.5
Human Sciences	223	20.3	20.3	41.8
Medical	33	3.1	3.1	44.9
Mathematics	3	0.3	0.3	45.2
Science	267	24.4	24.4	69.6
Pedagogy	10	0.9	0.9	70.5
Law	38	3.5	3.5	74.0
Social Science	10	0.9	0.9	74.9
Civil Engineering	32	2.8	2.8	77.7
Mechanical Engineering	42	4.0	4.0	81.7
Sports	171	16.0	16.0	97.7
Theology	27	2.5	2.5	100.0
Total	1089	100.0	100.0	

Source. Own research.

Factor Analysis

The research aimed to identify the attitudes characterising students and determine the most compelling questions for capturing these attitudes. Various statistical tools were considered to address these inquiries. However, our specific context necessitates the consideration of diverse variables that might influence perceptions related to LOHAS. Simultaneously examining these aspects and pinpointing relevant characteristics can be a resource-intensive endeavour. Consequently, applying multivariate analysis statistical tools, particularly exploratory factor analysis (EFA), becomes imperative. EFA helps identify the most significant aspects influencing the development of students' self-efficacy based on their questionnaire responses.

According to Daniel Abud Seabra Matos and Erica Castilho Rodrigues (2019), factor analysis is an empirical technique relying solely on questionnaire responses to group variables. Although the factors identified in the process are rooted in empirical data, they are expected to align with theoretical perspectives. EFA stands out as a widely employed multivariate statistical technique in questionnaire-related

research across various fields such as psychology, sociology of education, public management, and health (Matos & Rodrigues, 2019; Brown, 2015). The primary objective of EFA is to streamline the analysis by determining the number and nature of latent variables within the questionnaire or test. These variables elucidate the covariance among a set of observed measurements. The observed measures are correlated as they emanate from a common source – the same underlying construct. Consequently, factor analysis evaluates the dimensionality of a set of indicators, aiming to derive the fewest interpretable factors that are fewer in number than the total measures. This approach facilitates the interpretation of correlations among these measures, as Timothy A. Brown (2015) articulated.

To confirm if the EFA could be applicable, we applied the Kaiser-Meyer-Olkin Measure of Sampling Adequacy. Bartlett's Test of Sphericity was used to verify that the selected data were appropriate for factor analysis. The Kaiser–Meyer–Olkin measure was 0.927, and Bartlett's test of sphericity was significant at the 0.001 level. The results confirmed that this type of analysis can be used (see Table 2).

Table 2

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		**.927**
Bartlett's Test of Sphericity	Approx. Chi-Square	7075.585
	df	351
	Sig. ***	.000

Source. Own research.

Subsequently, the commonality of each question was checked, and the number of factors was analysed. The extraction method Principal Axis Factoring and the rotation method Varimax with Kaiser Normalisation were used to determine each factor. After 17 convergences, five factors were identified to characterise students' attitudes. The mean, standard derivation, and EFA factor loading values are in Table 3. Questions L29, L36, L50, and L51 are not used because their factor loading is smaller than 0.3. We need to eliminate them.

Table 3

Mean, Standard Derivation (SD), and Factor Loading for each Issue

	MEAN	**SD**	**Factor Loading**
Factor 1			
L31	3.426	1.1353	0.668
L26	3.105	1.0046	0.575
L24	2.572	1.1289	0.551
L27	3.011	1.1861	0.512
L33	3.787	0.9763	0.478

	MEAN	SD	Factor Loading
L28	3.185	1.3286	0.467
L35	3.329	1.2970	0.413
L39	3.393	1.2895	0.386
L42	3.726	1.1856	0.350
Factor 2			
L47	1.649	0.9757	0.634
L52	1.975	1.1128	0.582
L48	2.196	1.1383	0.524
L46	2.443	1.4064	0.430
L32	3.854	1.0010	–0.408
L49	1.511	0.8508	0.354
Factor 3			
L30	2.972	1.3417	–0.523
L34	3.093	1.3924	0.374
Factor 4			
L41	2.599	1.2074	0.538
L40	3.438	1.2348	0.493
L45	3.726	1.1093	0.410
L43	2.984	1.3408	0.402
Factor 5			
L37	2.170	1.3310	–0.826
L38	3.215	1.4759	0.343

Source. Own research.

The Pearson Correlation represents correlations between two variables (Janse et al., 2021; Rumsey, 2016). For our analysis of EFA, the independence of factors is preserved. The values presented in Table 4 indicated a high internal consistency in each factor, which collaborated with the Lohas Attitude Questionnaire validation.

Table 4

PCA to Confirm the Internal Independence of the Factors

		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	Pearson Correlation	1	–0.196	0.241	–0.132	0.092
	Sig.(2 tailed)					0.003
Factor 2	Pearson Correlation		1	–0.252	0.091	–0.001
	Sig. (2 tailed)				0.003	0.984
Factor 3	Pearson Correlation			1	–0.028	0.009

		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
	Sig. (2 tailed)				0.36	0.765
Factor 4	Pearson Correlation				1	0.046
	Sig. (2 tailed)					0.133
Factor 5	Pearson Correlation					1
	Sig. (2 tailed)					

Source. Own research.

To better describe the factors, we present some examples of questions with the highest values calculated from the EFA for each of the five factors. The individual factors were characterised as follows:

Factor 1 – Eco-Conscious Consumerism

This factor collectively highlights a strong inclination toward investing more in environmentally friendly products, from food items to electronic devices and appliances. This commitment extends to instances where unconventional choices, like opting for edible plates over cheaper disposable plastic alternatives during social gatherings, underscore this preference.

This consumer behaviour aligns with a distinct preference for businesses and entrepreneurs dedicated to sustainable practices and ethical animal treatment. This dedication is often evidenced through adherence to international eco-labelling standards or local knowledge. Moreover, individuals with these preferences actively advocate for such consumer behaviour among their friends and family, promoting sustainability as a core value.

This factor is best captured by the following four questions (Factor loading > 0.5):

- L31: "I am willing to pay extra for an environmentally friendly product. I am happy to support companies and entrepreneurs by purchasing their products if they strive for a sustainable approach and contribute to saving our planet";
- L26: "I purchase products with an ecological label";
- L24: "Sustainability and a conscientious approach to the environment are the most important criteria for me when deciding to purchase a product";
- L27: "When choosing products, I am interested in the environmental impacts associated with their production".

Factor 2 – Indifferent to Environmental Issues

The factor maps reluctance, lack of interest in environmental issues, indifference, doubts about the individual's importance in protecting the environment, and a focus on the present (not thinking about the future).

This factor is best captured by the following three questions (Factor loading > 0.5):

- L47: "I am not concerned about issues related to environmental quality and its protection";
- L52: "I am unwilling to reduce my consumption to protect the planet and the environment";
- L48: "I have so many personal issues that I cannot focus on the environment".

Factor 3 – Identity and Lifestyle Choices

This factor maps important decisions (eating and dressing) reflected in the respondents' daily lives. These decisions are integral to a person's identity and how they present themselves in their social environment. These are not just purchases or activities but ingrained habits and choices that reflect a person's values and self-concept, particularly in eating and fashion. These choices often determine how an individual positions himself/herself in his/her social group and externally signal his/her attitudes and values.

The following two questions capture this factor:

L30: "When I have a choice, I opt for a meat-based diet";
L34: "I regularly shop in second-hand stores and upcycle (reuse) things" .

Factor 4 – Pragmatic Eco-Consumption

This factor is linked to a willingness to behave sustainably and help the environment where it is also economically viable. The questions specifically address the use of public transport, the purchase of eco-products, and the preference of local farmers.

The following four questions capture this factor:

- L40: "The condition for purchasing a product from an organic farm is a price that does not significantly exceed the price of a similar product in a supermarket";
- L41: "I will buy an environmentally friendly product only if I save money";
- L45: "I would be willing to do something to help protect the environment";
- L43: "I solely utilise public transportation for economic reasons".

Factor 5 – Active Eco-Living and Self-Sufficiency

This factor captures many practical activities related to sustainable gardening, farming, and food self-sufficiency. It specifically mentions various activities such as growing food plants, preserving food through canning, raising poultry and rabbits, grafting plants, milking, making natural cosmetics, weaving wicker baskets, and drying medicinal herbs. It also emphasises sorting bio-waste, composting, and the joy of this way of life.

The following two questions capture this factor:

- L37: "I engage in various activities such as growing food plants, canning, poultry plucking, rabbit handling, grafting, milking, making natural cosmetics, weaving baskets from wicker, drying medicinal herbs, and more";
- L38: "I separate organic waste for composting, and if possible, I joyfully tend to my compost".

Discussion

The Lifestyles of Health and Sustainability (LOHAS) measurement tools published to date do not provide a comprehensive view. Many existing instruments focus on the environmental domain, i.e., environmental awareness and environmental knowledge and attitudes (e.g., Cowan & Kinley 2014; Häyrinen et al. 2016) and the extent of pro-environmental actions (e.g., Park 2015). A somewhat broader conception of the instrument, including items covering health, environment, and ethical awareness, was presented by Szakály et al. (2017). Kamil Pícha and Josef Navrátil (2019) focused on consumer behaviour in the context of LOHAS. However, their instrument neglects the ethical, mental, and emotional dimensions of the LOHAs segment. However, the concept of LOHAs should encompass as many aspects of a person's life as possible, including environmental awareness, values, personality traits, attitudes, and actions concerning sustainability. Most instruments are rather unidimensional scales that do not cover all aspects of LOHAs and, at the same time, have not been adequately validated (Choi & Feinberg, 2021). Their scale represents a six-dimensional construct encompassing individual motivation for healthy living in the physical, mental, emotional, and spiritual domains concerning nature's and society's quality. These aspects are Physical fitness, Mental health, Emotional health, Spiritual health, Environmentalism, and Social consciousness (Choi & Feinberg, 2021). Finding out the relationship between lifestyle health and sustainability (LOHAS) and its associated factors for college students was conducted in parallel with descriptive research in the Purulia district of West Bengal, India. In this study, the Lifestyles of Health and Sustainability Scale by Choi and Feinberg (2021) was also used to randomly collect data from 151 college students. Descriptive statistics such as mean, standard deviation, and Pearson correlation coefficient were used to analyse the data in this study. The result revealed a significant relationship among undergraduate students between LOHAs and related factors. However, there is no significant relationship between LOHAs and related factors (stream, gender, residence) using standard instruments (Das et al., 2024) or the Mahalanobis distance method (Das, 2023).

In developing our tool, we have drawn particular conclusions on that tool, including other existing scales. We included more demographic variables to allow us to observe a broader range of possible predictors for sub-aspects of LOHAS. We worked with several categories of health (social, physical, mental, emotional, spiritual). Unlike existing instruments, we formulated several relevant items for each type of lifestyle (LOHAS,

Naturals, Drifters, Conventionals, Unconcerneds). At the same time, knowledge items were included in the questionnaire to test the respondents' relevant awareness.

The questionnaire can remain current, as indicated by the reliability assessments and factor analysis conducted. If any items in the questionnaire were to be dropped, they would be questions that did not cluster in the factor analysis. The items "I smoke or use other addictive substances" and "I fly on holiday to foreign destinations every year" were not associated with other questions in the factor analysis. This suggests that these particular items may tap unique and independent dimensions of attitudes or behaviour that are not strongly correlated with the factors identified in the study. Peer pressure was identified as a significant factor for smoking (Golestan & Abdullah, 2015). Factors that influence student smoking in South Korea are gender, academic year, college level (e.g., bachelor's, master's), type of college, region of residence (Seoul and surrounding areas vs. rural areas), exposure time to second-hand smoke, health status, regularity drinking alcohol, alcohol use disorders, breakfast (Kim, 2015). Flight avoidance and substitution with other means of transport, as they mention it. Stefan Gössling and Sara Dolnicar (2022) do not appear among Czech university students. Future research could include a deeper examination of these specific items to understand the factors influencing these responses. It may include qualitative research methods or other survey items to capture the nuances of these dimensions. The survey results will be evaluated and compared with available studies in the coming months.

Conclusion

Future research may delve deeper into the effectiveness of sustainability education programmes and explore ways to tailor interventions based on identified consumer segments. The validated LOHAs Attitude Questionnaire can be valuable for ongoing research and educational interventions.

The study successfully addresses the need for a robust tool to assess sustainability attitudes among university students. The meticulous development process, testing, and factor analysis contribute to the credibility of the LOHAs Attitude Questionnaire. The identified factors provide a nuanced understanding of students' attitudes, paving the way for targeted interventions and further research in sustainable living. The study's findings hold implications for educators, policymakers, and researchers interested in promoting sustainable lifestyles among university students.

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