

RESEARCH ARTICLE OPEN ACCESS

Who Knows, Cares and Acts for Sustainability in Times of Uncertainty? Demographic Differences in Perceived Knowledge, Concerns, and Pro-Environmental Behaviors

Rosa Maria Dangelico¹ | Serena Filippelli²  | Luca Fraccascia^{3,4}  | Andrea Viggiani¹ 

¹Department of Mechanics, Mathematics, and Management, Politecnico di Bari, Bari, Italy | ²Department of Engineering for Industrial Systems and Technologies, University of Parma, Parma, Italy | ³Department of Computer, Control, and Management Engineering “Antonio Ruberti”, Sapienza University of Rome, Rome, Italy | ⁴Department of High-Tech Business and Entrepreneurship, University of Twente, Enschede, the Netherlands

Correspondence: Andrea Viggiani (a.viggiani@phd.poliba.it)

Received: 31 October 2025 | **Revised:** 5 June 2026 | **Accepted:** 27 June 2026

Keywords: climate change | economic concern | environmental concern | health concern | multiple crises | polycrisis | pro-environmental behavior | sustainable consumption

ABSTRACT

In 2026, some years after the Covid-19 pandemic and the related economic crisis, the global landscape remains profoundly unsettled. Geopolitical conflicts, such as the war between Russia and Ukraine and the Middle East conflicts, continue to drive instability, reshaping global priorities and challenges. At the same time, the intensifying climate emergency and rising environmental pressures are having increasingly severe consequences for human life. Following the Knowledge-Attitude-Behavior framework and drawing on Gender Socialization theory and the Life Course perspective, this study examines how consumers' perceived knowledge and concerns related to major global issues (health, economic, geopolitical, and environmental) as well as sustainable consumer behavior (in terms of sustainable product purchases and other pro-environmental behaviors) differ across demographic groups, based on gender and age. Data were collected through a survey conducted on 1324 Italian consumers between April and July 2024. Significant differences are evaluated using statistical tests (Kruskal–Wallis, Dunn's test with Bonferroni adjustment), revealing differences across gender and age groups in all the dimensions analyzed. The results contribute to the literature on sustainable consumer behavior and advance knowledge in the Gender Socialization theory and the Life Course perspective. The study also provides key insights for managers and policymakers.

1 | Introduction

In recent years, the world has experienced a succession of disruptive events with far-reaching global repercussions, including pandemics, conflicts, and extreme environmental phenomena (World Economic Forum 2024, 2026).

In 2020, every country globally confronted the Covid-19 pandemic caused by the SARS-CoV-2 virus, highly contagious, capa-

ble of being transmitted by both symptomatic and asymptomatic individuals. The pandemic resulted in over seven million deaths worldwide (World Health Organization 2025), severely disrupted global supply chains, overwhelmed healthcare systems (Ngo and Dang 2023; Yemeke et al. 2023), and triggered major economic contractions (Chetty et al. 2024). From a consumer perspective, it accelerated digitalization, increased online shopping, and shifted spending toward health, hygiene, and home-related products (McKinsey and Company 2020).

This is an open access article under the terms of the [Creative Commons Attribution](https://creativecommons.org/licenses/by/4.0/) License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

© 2026 The Author(s). *Sustainable Development* published by ERP Environment and John Wiley & Sons Ltd.

On 24 February 2022, Russia invaded Ukraine, occupying Crimea, parts of Donetsk and Luhansk. The onset of the Russia-Ukraine war had a profound impact on Europe, showing the need to reduce dependence on Russian energy, particularly natural gas. The Russia-Ukraine war led to sanctions on Russian oil and gas imports, contributing to rising energy prices, disruptions in agricultural exports, and increased food insecurity (Mahlstein et al. 2022; Balsalobre-Lorente et al. 2023; Lin et al. 2023; Zhang et al. 2023). These dynamics have shifted consumer behavior toward essential goods and energy efficiency, while also fostering solidarity-based actions such as boycotting Russian products (Josiassen et al. 2024). A similar pattern is observable in response to the escalation of the Middle East conflicts in October 2023, when Israel launched military operations in Gaza following a large-scale attack by Hamas. The escalation of the Middle East conflicts has generated global spillover effects, including boycott movements (Airlangga et al. 2024). More broadly, geopolitical tensions, such as the recent¹ instability in the Strait of Hormuz—a critical global oil chokepoint—have highlighted the vulnerability of global energy and raw material supply chains. In response to such risks, the European Commission has encouraged coordinated energy-demand reduction strategies and voluntary fuel-saving measures, particularly in the transport sector (such as limiting non-essential mobility, promoting a shift toward public transportation, and encouraging remote working) to strengthen resilience to potential disruptions in energy supply (European Commission 2026).

In recent years, the world experienced a series of extreme weather events driven by climate change, including severe heat waves in South and Southeast Asia, catastrophic flooding in Brazil and the UAE, deadly floods in Kenya, intense wildfires in Canada, a powerful cyclone in Bangladesh and West Bengal, and destructive tornadoes in the USA (Climate Council 2024; United Nations 2024). These events may have had significant repercussions on consumer behavior. For instance, exposure to drought and water scarcity has been associated with more resource-conscious behaviors (Velooso et al. 2024). More generally, environmental knowledge has been shown to foster environmental concern, which in turn promotes sustainable consumption choices (Saari et al. 2021).

Taken together, the Covid-19 pandemic, economic uncertainty, geopolitical conflicts, and environmental emergencies can be expected to significantly influence sustainable consumer behavior. Prior research supports this view. For example, Dangelico et al. (2022) show that the Covid-19 pandemic led Italian consumers to adopt more pro-environmental behaviors, including a higher frequency of sustainable products purchase and a greater willingness to pay for them. At the same time, the pandemic also generated environmental externalities, including increased plastic waste associated with the widespread use and disposal of face masks, raising concerns about their environmental impact (e.g., Bacchetta et al. 2026; Kong et al. 2026). On the other hand, Liobikienė and Liobikas (2025) find that the war in Ukraine increases individuals' intention to save energy, primarily due to rising energy prices. More broadly, recent energy-related geopolitical tensions have encouraged behavioral adjustments aimed at reducing mobility and energy consumption. Furthermore, environmental concern has been shown to strengthen the influence of social norms on millennials' purchase of organic products (e.g.,

Cavite 2025; Ahmed et al. 2021; De Canio et al. 2021). Overall, these findings suggest that sustainability-oriented behaviors may function as adaptive strategies for consumers to navigate uncertainty and cope with the multifaceted challenges posed by global crises, geopolitical tensions, and environmental disruptions.

Despite the burgeoning body of literature in the field of sustainable consumption, prior research has predominantly investigated consumers' perceived knowledge within isolated domains, most notably health (Al-Mohrej et al. 2016), economics (Walstad and Rebeck 2002; Wobker et al. 2014), and environmental issues (Mostafa 2007). Consequently, insufficient attention has been devoted to the interplay between diverse dimensions of consumers' perceived knowledge during periods characterized by polycrisis and overlapping sources of uncertainty. Moreover, only a few recent studies have examined consumers' perceptions in the context of geopolitical conflicts affecting countries not directly involved in conflicts (Barchielli et al. 2022; Regnoli et al. 2023; Lass-Hennemann et al. 2024; Liobikienė and Liobikas 2025). To the best of our knowledge, no study has simultaneously investigated consumers' perceived knowledge related to geopolitical conflicts among individuals indirectly affected by war. In addition, building on a recent research stream (Barchielli et al. 2022; Lass-Hennemann et al. 2024), this study adopts a holistic approach by jointly analyzing multiple domains of concern (health, economic, geopolitical, and environmental) in order to provide a more comprehensive understanding of consumer perceptions and behavioral responses in periods of uncertainty. Furthermore, prior research on sustainable consumer behavior has often focused on specific actions, such as recycling (Babaei et al. 2015), purchasing organic food (Cavite 2025), buying sustainable fashion goods (Jeong and Seock 2026), or purchasing energy-saving products (Azar and Al Ansari 2017), with only a few exceptions considering a broader range of behaviors (e.g., Dangelico et al. 2022). This study addresses this limitation by examining multiple pro-environmental behaviors simultaneously. Finally, previous studies suggest that demographic characteristics based on gender and age may influence consumers' perceived knowledge, concerns, and sustainable behaviors (e.g., Barchielli et al. 2022; Orkut and Perrin 2026). However, empirical evidence on these differences remains fragmented.

To address these gaps, this study adopts three complementary theoretical frameworks: the Knowledge-Attitude-Behavior framework, the Gender Socialization theory, and the Life Course perspective. The Knowledge-Attitude-Behavior framework posits that individuals' knowledge (such as environmental knowledge) influences their attitudes (such as environmental concern), which in turn shapes specific behaviors (such as pro-environmental behaviors) (Polonsky et al. 2012). While originally developed in the environmental domain, this framework can be extended to other areas characterized by uncertainty, including health, economic, and geopolitical contexts. Prior evidence, such as the major economic contractions triggered by the pandemic, disruptions in raw material management during geopolitical conflicts, and environmental disturbances, suggests that health, economic, geopolitical, and environmental concerns drive consumer behaviors aimed at more efficient resource management and the adoption of sustainable practices. Gender Socialization theory suggests that social norms and

early-life socialization shape individuals' attitudes, perceived knowledge, and behaviors, leading to systematic differences between men and women across domains such as technical, economic, and political (Reinking and Martin 2018; Bordalo et al. 2019). Life Course perspective emphasizes that individuals' behaviors evolve over time, influenced by age, life stage, and accumulated exposure to social and environmental contexts (Elder Jr 1994).

Based on these premises, the aim of this study is to investigate how the levels of (i) consumers' perceived knowledge in areas related to uncertainty, (ii) consumers' concerns related to multiple uncertainty, and (iii) sustainable consumer behavior (in terms of sustainable product purchase and other pro-environmental behaviors) differ across demographic groups (based on gender and age).

Accordingly, this study addresses the following research questions:

RQ1. Does consumers' perceived knowledge across domains characterized by uncertainty (health, economic, geopolitical, and environmental) differ across demographic groups?

RQ2. Does consumers' perceived concern across domains characterized by uncertainty (health, economic, geopolitical, and environmental) differ across demographic groups?

RQ3. Does consumers' pro-environmental behavior (sustainable product purchases and other pro-environmental behaviors) differ across demographic groups?

To achieve this goal, an online survey involving 1324 Italian consumers has been conducted. Italy was chosen as the setting for this study for several reasons. First, while the rise in energy prices across Europe, triggered by post-Covid supply disruptions and exacerbated by the Russian-Ukrainian conflict, has generated widespread concerns about economic performance

(Martin-Valmayor et al. 2023), in Italy the strong dependence on fossil fuels has intensified the impact of energy price fluctuations, contributing to significant inflation that has also affected essential goods (Eurostat 2024). Second, Italy is among the most active European countries in promoting sustainable behaviors. According to Eurostat (2024), in 2023 Italy ranked second in the EU for the use of recycled materials, reflecting a long-standing commitment to sustainable practices and growing public engagement in pro-environmental behaviors, such as eco-friendly purchasing and domestic recycling. Third, Italy was one of the European countries that have been most affected by the Covid-19 pandemic (Peluso et al. 2021; World Health Organization 2025).

The results of this study show significant differences across consumers' demographic groups in terms of perceived knowledge and perceived concern in relation to domains characterized by uncertainty (health, economic, geopolitical, and environmental), as well as pro-environmental behavior (including sustainable product purchases and other pro-environmental behaviors) in a polycrisis context. These findings have theoretical, managerial, and policy implications.

The paper is organized as follows. In Section 2, the literature review and the hypotheses development are reported, while in Section 3 methodological details are described. Section 4 focuses on results and discussion, while Section 5 reports implications for scholars, managers, and policymakers. The article ends with limitations, future research directions, and conclusion in Section 6.

2 | Theoretical Background and Hypotheses Development

Figure 1 presents the theoretical framework of this study, which integrates three theoretical perspectives: (i) the Knowledge-Attitude-Behavior framework, explaining the focus on consumers' perceived knowledge and concern, as well as

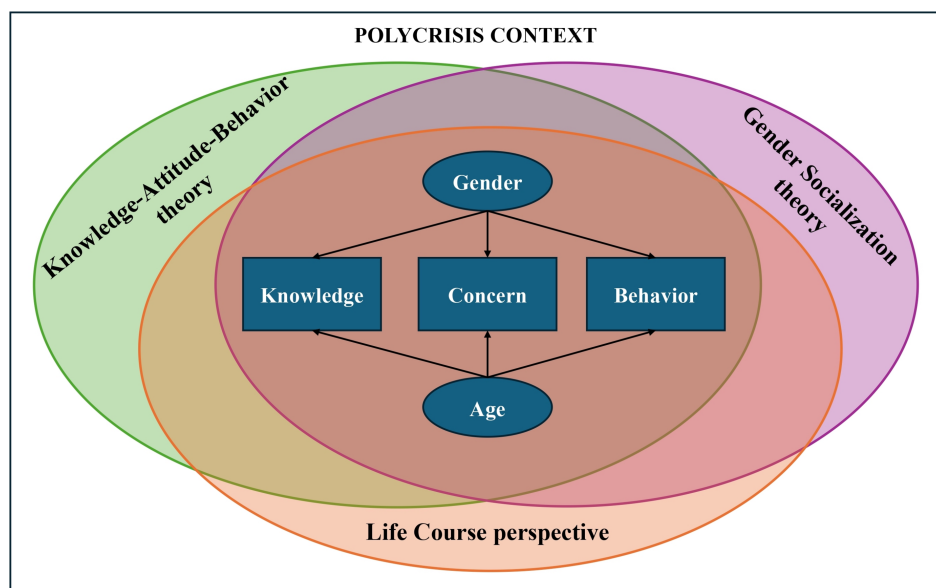


FIGURE 1 | Theoretical framework of this study.

sustainable consumption; (ii) Gender Socialization theory, which justifies the examination of gender differences; and (iii) Life Course perspective, which justifies the examination of age differences. Furthermore, these three theoretical perspectives are situated within a polycrisis context, characterized by health, economic, geopolitical, and environmental crises.

The Knowledge-Attitude-Behavior framework has progressively developed over time through the contributions of multiple scholars. Early contributions by Kallgren and Wood (1986) highlight that attitudes are more likely to guide behavior when they are accessible, that is, when they are rooted in salient beliefs and prior experiences. Attitude accessibility, defined as the ease with which an evaluation can be retrieved from memory, therefore plays a crucial role in shaping the relationship between attitudes and behavior. Subsequently, this framework has been widely applied in the field of sustainable consumption (e.g., Polonsky et al. 2012; Taufique et al. 2017; Dhir et al. 2021; Almansour 2025; Krishen et al. 2025; Trinh et al. 2025). For instance, Polonsky et al. (2012) show that both general and specific environmental knowledge are associated with more favorable environmental attitudes, which are in turn reflected in behavior. Similarly, Taufique et al. (2017) find that environmental and eco-label knowledge are positively related to pro-environmental attitudes, while trust strengthens their association with sustainable consumer behavior.

In the sustainable consumer behavior literature, environmental concern is frequently used as a proxy for pro-environmental attitudes (e.g., Rausch and Kopplin 2021; Dangelico et al. 2024; Mannoni 2025). From this perspective, environmental concern represents the evaluative and affective dimension through which individuals assign relevance to environmental issues and, more broadly, to major contemporary challenges. For instance, Krishen et al. (2025) suggest that higher levels of perceived knowledge are associated with greater concern and a higher openness toward sustainable solutions. In light of this theoretical model, the present study adopts a theoretical framework consistent with the Knowledge-Attitude-Behavior framework, focusing on three key dimensions: perceived knowledge, concern, and pro-environmental behavior. In particular, perceived knowledge and concern refer to individuals' subjective understanding and perceived relevance of contemporary issues: health, economic, geopolitical, and environmental. Pro-environmental behavior is considered both in general terms and with specific reference to sustainable consumption.

Although the Knowledge-Attitude-Behavior framework traditionally suggests a sequential relationship among the components, the present study does not aim to test causal relationships. Rather, it uses this structure to justify the joint consideration of knowledge, concern, and pro-environmental behavior as complementary dimensions in the analysis of consumers' perceptions and sustainable consumption practices.

Gender Socialization theory suggests that social norms and early-life socialization shape individuals' perceived knowledge, concern, and behaviors, leading to systematic differences between men and women across domains such as technical, economic, and political (Reinking and Martin 2018;

Bordalo et al. 2019). These differences can be explained by persistent gender stereotypes, which originate early and are reinforced through social and cultural pressures.

Finally, the Life Course perspective emphasizes that individuals' attitudes and behaviors evolve over time, shaped by age, life stage, and accumulated exposure to social, economic, and environmental contexts (Elder Jr 1994). As individuals age, they may develop different levels of knowledge, concern, and behavioral responses, reflecting both generational experiences and changing priorities across the life span.

Building on these theoretical frameworks, this study examines how individuals' perceived knowledge and concern about domains of uncertainty, as well as pro-environmental behavior, vary across gender and age. The following literature review and hypothesis development are grounded in the assumptions of these theoretical perspectives (Gender Socialization theory and Life Course perspective) and supported by prior empirical evidence.

The remainder of this section is organized into three subsections, aimed at analyzing the role of demographic variables (based on gender and age) in shaping consumers' perceived knowledge (Section 2.1) and concern (Section 2.2) regarding health, economic, geopolitical, and environmental issues, as well as sustainable consumer behavior in times of uncertainty (Section 2.3).²

2.1 | Knowledge on the Areas Related to Uncertainty and the Influence of Demographic Variables

In the literature, individual knowledge is commonly operationalized through two distinct approaches: perceived knowledge and factual knowledge. Perceived knowledge refers to individuals' subjective assessment of their level of understanding, whereas factual knowledge is measured through objective tests. Although both approaches are considered in the following review, the hypotheses developed in this study are grounded in perceived knowledge, as it is more closely related to consumers' perceptions.

According to Gender Socialization theory (e.g., Reinking and Martin 2018; Bordalo et al. 2019) and Life Course perspective (Elder Jr 1994), demographic characteristics such as gender and age may influence individuals' perceived knowledge across key domains of uncertainty, including health, economic, geopolitical, and environmental issues.

2.1.1 | Perceived Health Knowledge

Perceived health knowledge refers to individuals' self-assessed level of understanding of health-related issues, with particular reference to the Covid-19 pandemic.

With regard to gender, prior research consistently indicates that women tend to report higher levels of awareness and attention to health-related issues compared to men (e.g., Al-Mohrej et al. 2016; Zhong et al. 2020). This pattern can be explained

by differences in social roles and responsibilities, which assign women a more prominent role in health-related matters (Spagnolo et al. 2020) within both family and social contexts, thereby increasing their exposure to and engagement with health information.

With regard to age, empirical evidence indicates that older individuals tend to exhibit higher levels of knowledge concerning the Covid-19 pandemic (Zhong et al. 2020) and health-related issues more broadly (Al-Mohrej et al. 2016), compared to younger individuals. This pattern can be attributed to accumulated experience and greater exposure to health risks, which increase attention to and familiarity with health-related information.

Based on the previous findings, we hypothesize that:

H1a. *Women exhibit higher levels of perceived health knowledge than men in times of uncertainty.*

H1b. *Older consumers exhibit higher levels of perceived health knowledge than younger consumers in times of uncertainty.*

2.1.2 | Perceived Economic Knowledge

Perceived economic knowledge refers to individuals' self-assessed understanding of economic issues.

Regarding gender differences, the literature consistently shows that women tend to be perceived as less informed than men (Walstad and Rebeck 2002; Wobker et al. 2014). Several scholars (Reinking and Martin 2018; Bordalo et al. 2019; Jüttler and Schumann 2019) suggest that this gap is largely driven by gender stereotypes. These stereotypes originate in early childhood through socialization processes and are further reinforced during adolescence by cultural norms and social pressures (Reinking and Martin 2018). As a consequence, women may internalize beliefs of lower competence in technical and scientific domains (Bordalo et al. 2019), as well as in economics (Jüttler and Schumann 2019), thereby contributing to a persistent gap in both perceived and actual knowledge. Supporting this view, in a study conducted among German citizens, Wobker et al. (2014) attribute part of this disparity to men's historically greater exposure to formal education in economics and business-related fields. Additional insights are provided by Georgouli Loupi et al. (2025), who highlight how women students are less likely to view economics as interesting or enjoyable, and more likely to perceive it as a difficult subject in which they are unlikely to perform well. This perception is closely linked to the association of economics with mathematics, a factor that appears to discourage women's engagement. In contrast, male students (while also perceiving economics as relatively challenging) are more likely to find it interesting and to believe they will succeed in it.

With respect to age, Walstad (1997) finds that older individuals in the United States display a higher level of factual economic knowledge compared to younger individuals. This difference can be explained by the accumulation of experience over time, as prolonged exposure to economic events and market dynamics fosters a deeper understanding of how the economy functions. However,

some evidence suggests that the positive relationship between age and economic knowledge may weaken in later stages of life, particularly after the age of 60, potentially due to cognitive aging (Wobker et al. 2014). Nevertheless, the prevailing evidence generally supports higher levels of economic knowledge among older individuals compared to younger individuals.

Based on the previous findings, we hypothesize that:

H2a. *Men exhibit higher levels of perceived economic knowledge than women in times of uncertainty.*

H2b. *Older consumers exhibit higher levels of perceived economic knowledge than younger consumers in times of uncertainty.*

2.1.3 | Perceived Geopolitical Conflicts Knowledge

Perceived geopolitical knowledge refers to individuals' self-assessed understanding of geopolitical issues, such as international crises and armed conflicts. To the best of our knowledge, no prior research has explicitly examined consumers' perceived knowledge in the context of geopolitical conflicts, particularly with regard to demographic differences. Therefore, the hypotheses are developed based on previous studies analyzing demographic differences with regard to perceived political knowledge.

Regarding gender differences, previous studies (e.g., Verba et al. 1997; Fortin-Rittberger 2016; Bos et al. 2022; Keeling 2023) suggest that women report lower levels of factual knowledge and interest in political matters compared to men. This gender gap is due to several reasons. Women often encounter constraints on time and resources, as they tend to allocate more effort to family responsibilities than to following political developments, reducing opportunities to remain informed about daily political events (Verba et al. 1997). Gendered Socialization further shapes these patterns, with societal norms encouraging men to pursue status and autonomy while traditionally discouraging women from engaging with political institutions (Bos et al. 2022). Moreover, pervasive negative stereotypes regarding women's political abilities can undermine motivation, confidence, and cognitive performance, increasing the cognitive effort required to respond to knowledge questions (Fortin-Rittberger 2016; Keeling 2023). Specifically, Keeling (2023) demonstrates that the gender gap is more pronounced when questions concern institutional politics or current political issues, whereas it is reduced for topics such as public policies or historical political events, which are more closely aligned with the domains in which women tend to be engaged.

With respect to age, Trepte and Schmitt (2017) highlight that the primary tools for enhancing political knowledge are newspapers and online news, which stimulate political discussion, in turn fostering perceived political knowledge. However, the effectiveness of this combination varies across age: among younger individuals, reading and discussing news together is particularly effective for acquiring new knowledge, as it allows them to complement their limited political experience through social interaction. Among older adults, reading news still influences political knowledge, but immediate discussion adds less value, since cognitive structures and political schemas are already

consolidated. Furthermore, according to Walstad (1997), the accumulation of experience over time promotes deeper perceived knowledge among older individuals.

Based on the previous findings, we hypothesize that:

H3a. *Men exhibit higher levels of perceived geopolitical knowledge than women in times of uncertainty.*

H3b. *Older consumers exhibit higher levels of perceived geopolitical knowledge than younger consumers in times of uncertainty.*

2.1.4 | Perceived Environmental Knowledge

Perceived environmental knowledge refers to individuals' self-assessed understanding of environmental issues. More broadly, environmental knowledge can be defined as "a general knowledge of facts, concepts, and relationships concerning the natural environment and its major ecosystems" (Fryxell and Lo 2003, 45). This knowledge can be further distinguished into abstract knowledge (such as understanding climate change) and concrete knowledge, which relates to everyday behaviors and local environmental issues (Schahn and Holzer 1990).

Regarding gender differences, several studies suggest that men tend to perceive themselves as more knowledgeable than women (Schahn and Holzer 1990; Mostafa 2007). This pattern is further supported by Robelia and Murphy (2012), who find that men in the United States consistently report higher levels of factual environmental knowledge than women. The authors attribute this difference to men's greater exposure to and specialization in technical and scientific fields.

With respect to age, existing research suggests that younger individuals may have more limited exposure to formal sustainability education, particularly in the high school context (Fabbrizzi et al. 2016). Although younger generations often display higher engagement in pro-environmental behaviors, this does not necessarily translate into higher levels of perceived knowledge, which may instead develop with greater educational and experiential accumulation over time.

Based on the previous findings, we hypothesize that:

H4a. *Men exhibit higher levels of perceived environmental knowledge than women in times of uncertainty.*

H4b. *Older consumers exhibit higher levels of perceived environmental knowledge than younger consumers in times of uncertainty.*

2.2 | Perception of Concerns in Times of Uncertainty and Influence of Demographic Variables

According to Gender Socialization theory (e.g., Reinking and Martin 2018; Bordalo et al. 2019) and Life Course perspective (Elder Jr 1994), gender and age could influence people's concerns about health, economic, geopolitical, and environmental issues, shaping the intensity and interpretation of these concerns.

2.2.1 | Health Concern

The literature on health concerns, particularly in the context of the Covid-19 pandemic, highlights the crucial role of demographic factors, especially gender (e.g., Makhashvili et al. 2020; Broche-Pérez et al. 2021) and age (e.g., Huang and Zhao 2020; Wilson et al. 2021), in shaping consumers' perceptions and levels of concern.

According to previous literature (Lauri Korajlija and Jokic-Begic 2020; Spagnolo et al. 2020; Broche-Pérez et al. 2021; Kitz et al. 2022; Barchielli et al. 2022) women exhibit higher levels of concern about safety and Covid-19 than men. This greater vulnerability is attributed to biological, psychological, and socio-cultural factors (Spagnolo et al. 2020), including a higher predisposition to anxiety, depression, phobias, and panic attacks in response to chronic health-related stress (Kudielka and Kirschbaum 2005; Broche-Pérez et al. 2021). A crucial role is played by social and family responsibilities: women, often primary caregivers and employed in frontline healthcare roles, face greater stress and risk of infection, further increasing their concerns (Spagnolo et al. 2020). Additionally, women with children were significantly more worried about the Covid-19 pandemic than those without (Lauri Korajlija and Jokic-Begic 2020; Ravaldi et al. 2020). Moreover, women exhibit heightened sensitivity to health risks associated with everyday choices, such as purchasing consumer goods (Ek 2015). This awareness reflects a more conscious approach to health protection, extending beyond pandemics to general well-being and family security.

The analysis of age-related differences reveals varying perspectives on Covid-19 concerns. According to Barchielli et al. (2022), adult Italian women perceive greater concern than men about isolation and illness from Covid-19, while these differences are not significant among the elderly. Wilson et al. (2021) observe that older U.S. individuals, while more concerned about the pandemic, exhibit lower levels of anxiety and panic compared to younger individuals, who, despite being less concerned about the pandemic itself, tend to experience higher anxiety levels. This difference is attributed to older adults' greater ability to regulate emotions and manage stress, as also confirmed by Huang and Zhao (2020) and Bruine de Bruin (2021). Furthermore, Peluso et al. (2021) find that older Italians are more optimistic than younger individuals about the pandemic, which in turn promotes a sense of altruism that increases their willingness to purchase sustainable products.

Based on the previous findings, we hypothesize that:

H5a. *Women exhibit higher levels of health concern than men in times of uncertainty.*

H5b. *Younger consumers exhibit higher levels of health concern than older consumers in times of uncertainty.*

2.2.2 | Economic Concern

The literature on individual economic concerns highlights the role of demographic characteristics, particularly gender (Arbuckle and Mercer 2020; Bou-Hamad et al. 2022) and age

(e.g., Barchielli et al. 2022), in shaping both the consumers' perception of economic issues and the level of concern associated with them.

Focusing on gender differences, prior studies (Arbuckle and Mercer 2020; Bou-Hamad et al. 2022) generally show that men report higher levels of economic concern than women. This pattern is often explained by traditional gender roles, whereby men are more likely to be perceived as primary financial providers. In contexts characterized by stronger patriarchal norms, such as Lebanese society (Bou-Hamad et al. 2022), this responsibility may increase men's perceived economic vulnerability, particularly during periods of economic instability such as the Covid-19 pandemic.

Focusing on age-related differences, previous studies (Barchielli et al. 2022; Bou-Hamad et al. 2022) indicate that older consumers are generally more concerned about economic issues than younger ones. Specifically, Barchielli et al. (2022) find that older Italians are particularly sensitive to rising energy and food prices, while Bou-Hamad et al. (2022) link this pattern to difficulties in accessing savings and their devaluation since 2019.

Based on the previous findings, we hypothesize that:

H6a. *Men exhibit higher levels of economic concern than women in times of uncertainty.*

H6b. *Older consumers exhibit higher levels of economic concern than younger consumers in times of uncertainty.*

2.2.3 | Geopolitical Conflicts Concern

The onset of the Russo-Ukrainian war in February 2022 and Israel-Palestine conflict in October 2023 heightened public apprehension regarding the potential for nuclear conflict (Riad et al. 2023), compounding existing economic difficulties. Key issues include the unsustainable increases in gas and energy bills, the rising costs of gasoline and diesel, and the significant increase in food prices. These are coupled with diffused fears about inflation eroding purchasing power at a time when many see global conflict as a possibility. Despite these evident concerns, academic literature has given limited attention to consumers' demographic differences in perceptions of geopolitical conflicts (Barchielli et al. 2022; Regnoli et al. 2023; Lass-Hennemann et al. 2024).

Observing gender differences, several studies in the literature-conducted in different European countries-find that women are more concerned about war conflict than men (Barchielli et al. 2022; Regnoli et al. 2023; Lass-Hennemann et al. 2024). Among adults, women show heightened worry about rising food prices, a disparity that diminishes significantly in older populations, where men and women share similar concerns regarding food inflation (Barchielli et al. 2022). Furthermore, within the young group, women are more concerned than men about the risk of isolation. The women's heightened ability to recognize and interpret complex emotional states may contribute to their increased sensitivity to conflict-related issues (Hamilton et al. 1988).

Observing age differences, Barchielli et al. (2022) underscore that Italian adults mainly focus on rising food prices and the risk

of food shortages, while older Italian consumers are more concerned about energy costs and social isolation. Young people, on the other hand, fear the risk of mortality and a possible worsening of the Covid-19 pandemic due to ongoing conflicts. Furthermore, researchers do not find significant differences among age groups regarding concerns about rising food prices.

Based on the previous findings, we hypothesize that:

H7a. *Women exhibit higher levels of geopolitical conflicts' concern than men in times of uncertainty.*

H7b. *Older consumers exhibit higher levels of geopolitical conflicts' concern than younger consumers in times of uncertainty.*

2.2.4 | Environmental Concern

Environmental concern is defined as "the awareness or insight of individuals that the natural state of the environment is threatened through resource overuse and pollution by humans" (Franzen and Meyer 2010, 220). Previous studies highlight the role of demographic characteristics, particularly gender (e.g., Saari et al. 2021; Aguilar-Gomez et al. 2025) and age (Barchielli et al. 2022), in shaping the level of consumers' environmental concern.

Previous studies on gender differences in environmental concern (Arbuckle and Mercer 2020; Migheli 2021; Saari et al. 2021; Dangelico et al. 2022; Aguilar-Gomez et al. 2025; Orkut and Perrin 2026) show that women are generally more environmentally aware and engaged than men. This disparity is often attributed to gender socialization processes and role expectations that emphasize caregiving and community-oriented values traditionally associated with women (Casey and Scott 2006). According to these theories, gender differences in environmental concerns arise from behaviors and values instilled during childhood, as well as societal expectations that shape priorities and concerns. Women's stronger association with caregiving roles fosters compassion and protective attitudes, making them more likely to prioritize environmental issues.

Regarding age-related differences in environmental concern, Barchielli et al. (2022) find that young Italian consumers exhibit heightened environmental awareness, a stronger inclination toward habit change, and a greater willingness to adopt sustainable behaviors in the future than older consumers.

Based on the previous findings, we hypothesize that:

H8a. *Women exhibit higher levels of environmental concern than men in times of uncertainty.*

H8b. *Younger consumers exhibit higher levels of environmental concern than older consumers in times of uncertainty.*

2.3 | Sustainable Consumer Behavior in Times of Uncertainty and Influence of Demographic Variables

Sustainable consumer behavior is defined as "behavior that attempts to satisfy present needs while simultaneously benefiting

or limiting environmental impact” (Trudel 2019, 85). In line with the Knowledge-Attitude-Behavior framework, prior research shows that knowledge can shape individuals’ attitudes which in turn influence pro-environmental consumer behavior (e.g., Polonsky et al. 2012). More broadly, this framework could be extended to other domains characterized by uncertainty, such as health, economic, and geopolitical. In these domains, knowledge contributes to shaping consumers’ perceptions and concerns, ultimately influencing their behavioral dynamics (Zhang and Chang 2021). Unexpected events, such as pandemics (e.g., Dangelico et al. 2022; Liu et al. 2023), terrorist attacks (e.g., Herzenstein et al. 2015; Baumert et al. 2020), armed conflicts (Barchielli et al. 2022), and environmental disasters (e.g., Mainardes et al. 2021; Ho et al. 2024), can significantly alter consumers’ preferences and purchasing behavior, often reinforcing a shift toward more sustainable consumption patterns. For instance, the stress generated by the Covid-19 pandemic has been shown to increase perceptions of food scarcity, leading consumers to engage in stockpiling behaviors (Bender et al. 2022). At the same time, consumers became more attentive to product attributes, increasingly scrutinizing labels and showing stronger preferences for local food (Dangelico et al. 2022; Grunert et al. 2023). The pandemic also fostered a higher frequency of pro-environmental behaviors, such as waste separation and reduction (e.g., Rodgers et al. 2021; Dangelico et al. 2022).

Similarly, in times of geopolitical conflict, consumers may express solidarity with affected countries by supporting their products and boycotting those of perceived aggressors (e.g., Airangga et al. 2024; Josiassen et al. 2024). Environmental disasters, in turn, can heighten awareness of the consequences of human activity on the environment, thereby encouraging more sustainable purchasing choices (Mainardes et al. 2021). Building on these insights, it becomes essential to examine consumers’ levels of perceived knowledge and concern across different domains (health, economic, geopolitical, and environmental), as well as consumers’ pro-environmental behaviors. Health, economic, geopolitical, and environmental topics represent key areas of uncertainty that have been shown to shape consumer responses, making them particularly relevant for a comprehensive understanding of sustainable consumer behavior. Furthermore, according to Gender Socialization theory (e.g., Reinking and Martin 2018; Bordalo et al. 2019) and the Life Course perspective (Elder Jr 1994), gender and age could influence differently pro-environmental behaviors, as highlighted in prior research (e.g., Luchs and Mooradian 2012; Gray et al. 2019; Lauri Korajlija and Jokic-Begic 2020).

With reference to gender, a substantial body of literature indicates that women tend to report higher levels of sustainable consumption and pro-environmental behavior than men (e.g., Gilg et al. 2005; Luchs and Mooradian 2012; Bulut et al. 2017; Lauri Korajlija and Jokic-Begic 2020; Migheli 2021; Rausch et al. 2021; Xu et al. 2021; Janská et al. 2023; Villa-Castaño 2025). Moreover, external shocks such as the Covid-19 pandemic appear to amplify these differences. For example, Dangelico et al. (2022) find that Italian women showed a stronger increase than men in behaviors such as waste reduction and the avoidance of packaged products following the pandemic.

With reference to age, recent studies suggest that younger individuals tend to express stronger intention toward eco-friendly behaviors and sustainable consumption (e.g., Bulut et al. 2017; Gray et al. 2019; Janská et al. 2023; Seifian et al. 2023; Hwang et al. 2025; Villa-Castaño 2025). However, this intention does not always translate into real behavior (intention-behavior gap). For instance, despite their pro-environmental attitudes, many millennials frequently purchase from fast-fashion brands such as Shein, which are widely criticized for their unsustainable practices (Zimand-Sheiner and Lissitsa 2024). This inconsistency may stem from limited knowledge or awareness of the environmental impact of certain industries, such as fashion (Zimand-Sheiner and Lissitsa 2024).

Based on these findings, we propose the following hypotheses:

H9a. *Women exhibit higher levels of sustainable consumption than men in times of uncertainty.*

H9b. *Younger consumers exhibit higher levels of sustainable consumption than older consumers in times of uncertainty.*

H10a. *Women exhibit higher levels of other pro-environmental behaviors than men in times of uncertainty.*

H10b. *Younger consumers exhibit higher levels of other pro-environmental behaviors than older consumers in times of uncertainty.*

3 | Methodology

This section is divided into three subsections, which address the questionnaire (Section 3.1), the procedure of data collection, and the characteristics of the sample (Section 3.2), and report data analysis (Section 3.3).

3.1 | Questionnaire

To collect the data for this study, a structured questionnaire is developed and administered. It is organized into four sections, each aimed at capturing different dimensions of consumers’ perceptions and behaviors. The measurement items are mainly adapted from existing validated scales in the literature and complemented with self-developed items to better reflect the specific context of this study. The full list of items and their sources are reported in Table A1.

The first section begins with a screening question (Q0) to ensure that only individuals residing in Italy are included. Question Q1 assesses consumers’ perceived knowledge related to health, economic, geopolitical, and environmental issues. Respondents are asked to compare their level of knowledge with that of the average person by indicating their agreement with 12 items (all items adapted from Mostafa (2006)), using a five-point Likert scale (“completely disagree” to “completely agree”).

The second section includes Question Q2, which measures consumers’ perceived level of concern across the same four domains: health, economic, geopolitical, and environmental issues (eight

items adapted from Vargová et al. (2024), six items from Dangelico et al. (2022), and seven items self-developed). A total of 21 items are used, evaluated on a five-point Likert scale (from “not at all” to “extremely”).

The third section presents Questions Q3 and Q4. Question Q3 captures the frequency of sustainable product purchases over the past 2 years. Responses are collected using a five-point Likert scale, ranging from “never” to “always” and include 14 items (six from Dangelico et al. (2022), one adapted from Huang (2016), and seven self-developed), referring to different product categories, such as local, organic, eco-friendly, and products with environmentally friendly packaging. Q4 examines the frequency of other pro-environmental behaviors over the past 2 years, such as reducing energy consumption, using more sustainable transport, and managing waste responsibly. Q4 consists of 14 items (three adapted from Kaiser and Wilson (2004), four from Lee (2008), three from Huang (2016), and three self-developed). Responses are collected using a five-point Likert scale, ranging from “never” to “always”.

The fourth section collects socio-demographic information, including gender, age, level of education, and monthly net family income. These variables allow for the examination of differences in perceived knowledge, concern, and sustainable behavior across demographic groups within the Italian context.

3.2 | Procedure and Sample

The developed questionnaire was pre-tested on a small convenience sample to ensure clarity and understanding of the questions. Following the pre-test, minor adjustments were made to the wording of some phrases to improve clarity.

The questionnaire was then administered through the Qualtrics survey platform. The survey was distributed, between April and July 2024, to individuals living in Italy, through the snowball sampling method (Noy 2008), widely used in consumer behavior research (e.g., Di Renzo et al. 2020; Jian et al. 2020; Peluso et al. 2021; Dangelico et al. 2022). Distribution took place via multimedia channels, such as social networks and instant messaging clients. Participants were asked to respond to the questionnaire and to share it as widely as possible among their contacts.

In the survey, all questions were mandatory and only one answer could be selected for each question. The first question was designed to filter consumers living in Italy, who then gained access to the remainder of the questionnaire (for others, the completion of the questionnaire was blocked). The questionnaire could only be submitted after all questions were answered. All responses were submitted and recorded anonymously.

The final sample consists of 1324 respondents. There were no missing values in the dataset. The socio-demographic characteristics of respondents are reported in Table 1.

3.3 | Data Analysis

The collected data are analyzed using IBM SPSS software to test the proposed hypotheses. The methodological approach follows

TABLE 1 | Socio-demographic characteristics of the sample.

Variable	Group	Frequency	Percentage
Gender	Man	501	37.84%
	Woman	823	62.16%
Age	18–24	331	25.00%
	25–34	225	16.99%
	35–44	164	12.39%
	45–54	235	17.75%
	55–65	260	19.64%
	> 65	109	8.23%
Education	Middle school or lower	39	2.95%
	High school	376	28.40%
	Bachelor's degree	288	21.75%
	Master's degree	506	38.22%
Net monthly household income (euros)	PhD	115	8.69%
	< 1,500	175	13.22%
	1501–3000	570	43.05%
	3001–4500	301	22.73%
	> 4500	278	21.00%

prior studies on consumer behavior (e.g., Tzavaras et al. 2010; Bulut et al. 2017; Ben Hassen et al. 2022; Kitz et al. 2022; Dangelico et al. 2022; Janská et al. 2023) and it is consistent with the objectives of the study, which focus on identifying statistically significant differences across demographic groups at the item level.

First, descriptive statistics, including means and standard deviations, as well as Cronbach's alpha, are computed to assess the reliability and internal consistency of the measurement scales. As reported in Table 2, all constructs show Cronbach's alpha values above 0.70, indicating satisfactory internal consistency. However, it should be noted that subsequent analyses are conducted at the item level, allowing for a more granular examination of the data. Next, the Shapiro–Wilk test is conducted to assess the normality of the data distribution. The results indicate that the dataset does not follow a normal distribution. While large sample sizes may reduce concerns related to normality due to the Central Limit Theorem, the presence of non-normal distributions at the item level and the ordinal nature of the data justify the use of non-parametric tests. In particular, the Kruskal–Wallis test is performed for each item to identify statistically significant differences across demographic groups (based on gender and age). For the age variable, which includes more than two groups, post hoc pairwise comparisons are conducted using Dunn's test with Bonferroni adjustment, in order to identify the specific group differences. A significance level of 0.05 is adopted for all statistical tests.

The results of the analyses are presented in the Results section, while the detailed outputs of the statistical tests are reported in the Appendix A. Statistically significant differences identified through the Kruskal–Wallis test are indicated in the figures with an asterisk (*) placed above the label of the corresponding item. A hypothesis is considered fully supported when statistically significant differences emerge across demographic groups for all items within a given dimension. It is considered partially supported

TABLE 2 | Descriptive statistics and reliability analysis.

Question	Dimension	Statement	Cronbach's alpha	Mean	Standard deviation
Q1-Perceived knowledge	Perceived health knowledge	A. I feel well informed about public health issues (e.g., Covid-19 pandemic, epidemics, vaccines)	0.901	3.59	0.90
		B. I know more about public health issues (e.g., Covid-19 pandemic, epidemics, vaccines), than the average person		3.41	0.94
		C. I know quite a lot about public health issues (e.g., Covid-19 pandemic, epidemics, vaccines)		3.44	0.92
	Perceived economic knowledge	D. I feel well informed about economic trends (e.g., trends of prices and interest rate)	0.922	2.94	1.02
		E. I know more about economic trends than the average person (e.g., the trends of prices and interest rate)		2.88	1.01
		F. I know quite a lot about economic trends (e.g., the trends of prices and interest rate)		2.82	1.00
	Perceived geopolitical knowledge	G. I feel well informed about current geopolitical conflicts (e.g., war in Ukraine, conflicts in the Middle East)	0.889	3.21	1.02
		H. I know more about current geopolitical conflicts (e.g., war in Ukraine, conflicts in the Middle East) than the average person		3.08	1.01
		I. I know quite a lot about current geopolitical conflicts (e.g., war in Ukraine, conflicts in the Middle East)		3.11	1.00
	Perceived environmental knowledge	J. I feel well informed about environmental issues (e.g., pollution, global warming and climate change)	0.827	3.63	0.90
		K. I know more about environmental issues (e.g., pollution, global warming and climate change) than the average person		3.39	0.92
		L. I know quite a lot about environmental issues (e.g., pollution, global warming and climate change)		3.45	0.94
Q2-Perceived concern	Perceived health concern	A. Covid-19 pandemic	0.705	2.39	1.18
		B. Future epidemics and diseases		3.01	1.09
		C. My health condition		2.93	1.15
		D. Health conditions of my loved ones (family, friends)		3.72	1.08
		E. Functioning of the Italian healthcare system		3.83	1.15
	Perceived economic concern	F. Economic crisis in Italy	0.835	3.63	1.04
		G. Rising prices of essential items (e.g., food, medicine)		4.02	0.96
		H. Rising prices of electricity, gas and fuels		4.09	0.93
		I. Rising of interest rates		3.73	1.12
		J. My economic condition		3.40	1.18
	Perceived geopolitical concern	K. Potential political crisis in Italy	0.807	3.03	1.30
		L. Potential political crisis in other countries		2.87	1.24
		M. International critical events (e.g., attacks on merchant ships, closure of the Suez Canal)		3.31	1.15
		N. Concern about the war moving to the EU or the world		4.00	1.03
		O. Nuclear threat related to conflicts		3.78	1.14
	Perceived environmental concern	P. Global warming and climate change	0.917	4.09	1.07
		Q. Pollution (air, soil, and water)		4.18	0.96
		R. Biodiversity loss		3.90	1.05
		S. Disposal of undifferentiated waste		3.87	1.05
		T. Natural habitat destruction		4.04	0.99
		U. Unsustainable management of natural resources		3.96	0.97

(Continues)

TABLE 2 | (Continued)

Question	Dimension	Statement	Cronbach's alpha	Mean	Standard deviation
Q3-Sustainable consumption	Sustainable consumption	A. Products sold by neighborhood stores	0.763	3.57	0.94
		B. Made in Italy products		3.68	0.75
		C. Local Products		3.59	0.79
		D. Fair Trade products		2.71	0.84
		E. Organic product		2.96	0.87
		F. Eco-sustainable products		3.06	0.79
		G. Products with recycled materials		3.01	0.71
		H. Second-hand products		2.30	0.98
		I. Refurbished or remanufactured products (e.g., smartphone, PC)		1.95	0.99
		J. Energy efficient products (e.g., LED light bulbs, energy efficient home appliances)		3.84	1.01
		K. Healthy food products		3.94	0.76
		L. Vegan products		2.07	1.03
		M. Draft products, bringing your own bottle (e.g., laundry detergent) or versions that do not require plastic packaging (e.g., solid soaps, detergents, shampoo)		2.07	1.06
		N. Products with eco-friendly packaging		3.08	0.86
Q4-Other pro-environmental behaviors	Other pro-environmental behaviors	A. Turn off or unplug electronic devices when not needed	0.844	3.57	1.19
		B. Reduce air conditioning		3.92	1.03
		C. Reduce driving, and walk, cycle or use public transportation or mobility sharing (e.g., bike or car sharing)		3.35	1.10
		D. Lower the thermostat of domestic heating		3.73	1.05
		E. Turn off lights when leaving rooms		4.65	0.66
		F. Prefer low temperature washing programs (for washing machine and/or dishwasher)		4.05	0.94
		G. Cook more efficiently (e.g., cooking multiple foods simultaneously in the oven)		3.74	1.03
		H. Recycling		4.67	0.75
		I. Use own bag when shopping		4.16	1.01
		J. Wait until appliances (dishwasher or washing machine) is full to run		4.52	0.72
		K. Look at the label/packaging information, when buying a product, to see if it contains substances that are environmentally damaging		3.27	1.26
		L. Look at the label/packaging information, when buying a product, to see if it contains substances that are damaging for health		3.61	1.21
		M. Look at the label/packaging information, when buying a product, to see if the product can be recycled		3.14	1.18
		N. Look at the label/packaging information, when buying a product, to see if the packaging can be recycled		3.15	1.19

when significant differences are found for some, but not all, items within the same dimension. When the results across items are inconsistent—specifically, when items within the same dimension yield conflicting outcomes—the hypothesis is classified as exhibiting mixed results.

4 | Results and Discussion

In this section, results are described, discussed (according to Gender Socialization theory and Life Course perspective) and depicted in figures (Figures 2–8). In part (a) the figure “Over-

Q1 - Please indicate to what extent you agree or disagree with the following statements:

- A. I feel well informed about public health issues (e.g., Covid-19 pandemic, epidemics, vaccines)
- B. I know more about public health issues (e.g., Covid-19 pandemic, epidemics, vaccines), than the average person
- C. I know quite a lot about public health issues (e.g., Covid-19 pandemic, epidemics, vaccines)
- D. I feel well informed about economic trends (e.g., trends of prices and interest rate)
- E. I know more about economic trends than the average person (e.g., the trends of prices and interest rate)
- F. I know quite a lot about economic trends (e.g., the trends of prices and interest rate)
- G. I feel well informed about current geopolitical conflicts (e.g., war in Ukraine, conflicts in the Middle East)
- H. I know more about current geopolitical conflicts (e.g., war in Ukraine, conflicts in the Middle East) than the average person
- I. I know quite a lot about current geopolitical conflicts (e.g., war in Ukraine, conflicts in the Middle East)
- J. I feel well informed about environmental issues (e.g., pollution, global warming and climate change)
- K. I know more about environmental issues (e.g., pollution, global warming and climate change) than the average person
- L. I know quite a lot about environmental issues (e.g., pollution, global warming and climate change)

[from 1 = “strongly disagree” to 5 = “strongly agree”]

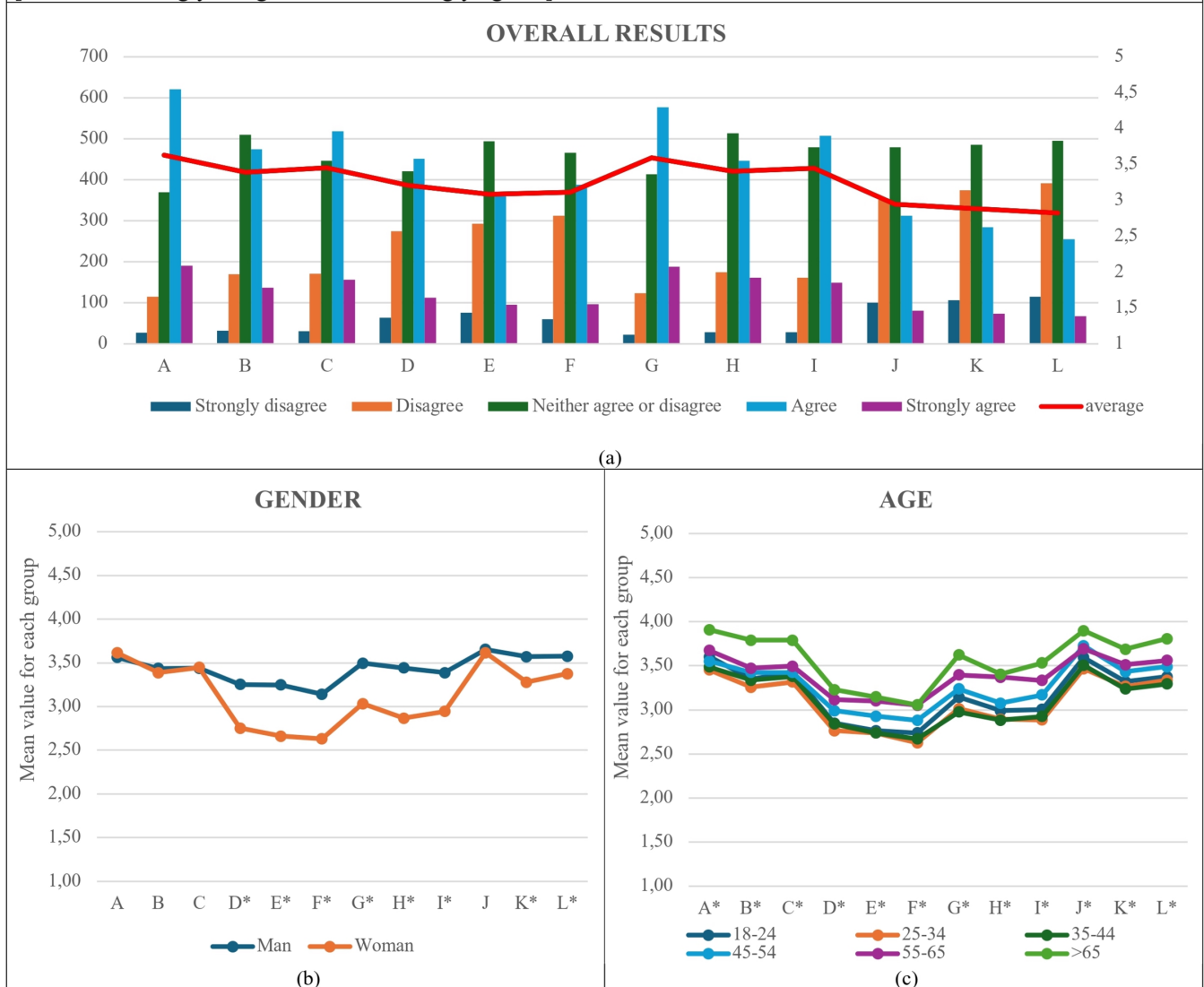


FIGURE 2 | Level of perceived knowledge across health, economic, geopolitical, and environmental issues. (a) Overall results; (b) Gender differences; (c) Age differences. Statistically significant differences based on the Kruskal–Wallis test are indicated by an asterisk (*).

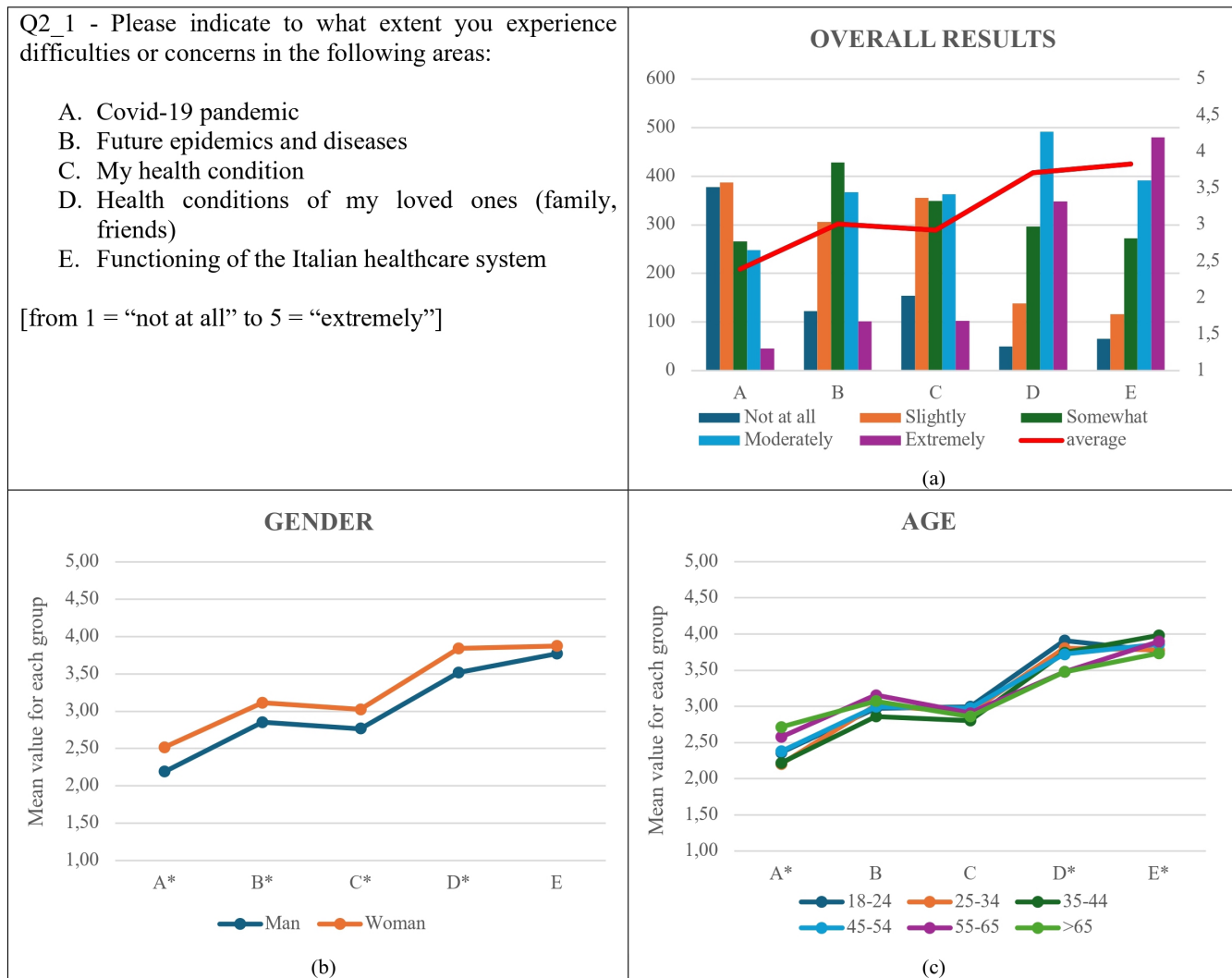


FIGURE 3 | Consumers' perceived level of health concern. (a) Overall results; (b) Gender differences; (c) Age differences. Statistically significant differences based on the Kruskal–Wallis test are indicated by an asterisk (*).

all results” gives a descriptive analysis for each item, referring to the whole sample in terms of the distribution of responses on the five-point Likert scale. Part (b) shows the means for the different gender groups, and (c) the means for the different age groups. The graph shows the average for each item and group (different colored lines represent each group). Detailed outcomes of performed statistical tests are provided in Tables A2 and A3.

4.1 | Perceived Knowledge of Uncertainty Related to Current Problems

4.1.1 | Perceived Health Knowledge

Results show that consumers have a high level of perceived health knowledge (items A, B, and C in Figure 2a), with an average of 51% of respondents agreeing or strongly agreeing with items indicating high perceived health knowledge.

Regarding gender, no significant differences emerge: both men and women report a high level of perceived knowledge about health (Figure 2b). This finding contrasts with previous studies (e.g., Al-Mohrej et al. 2016; Zhong et al. 2020), which suggest that women tend to report higher levels of awareness and attention to health-related issues compared to men.

With respect to age, respondents aged over 65 demonstrate a higher level of perceived knowledge about public health issues compared to other age groups (Figure 2c). This pattern, which is consistent with prior research (e.g., Al-Mohrej et al. 2016; Zhong et al. 2020), may be explained by accumulated life experience and greater exposure to health risks among older individuals, which likely increases their attention to and familiarity with health-related information.

Therefore, H1a is not supported (gender), whereas H1b is fully supported (age).

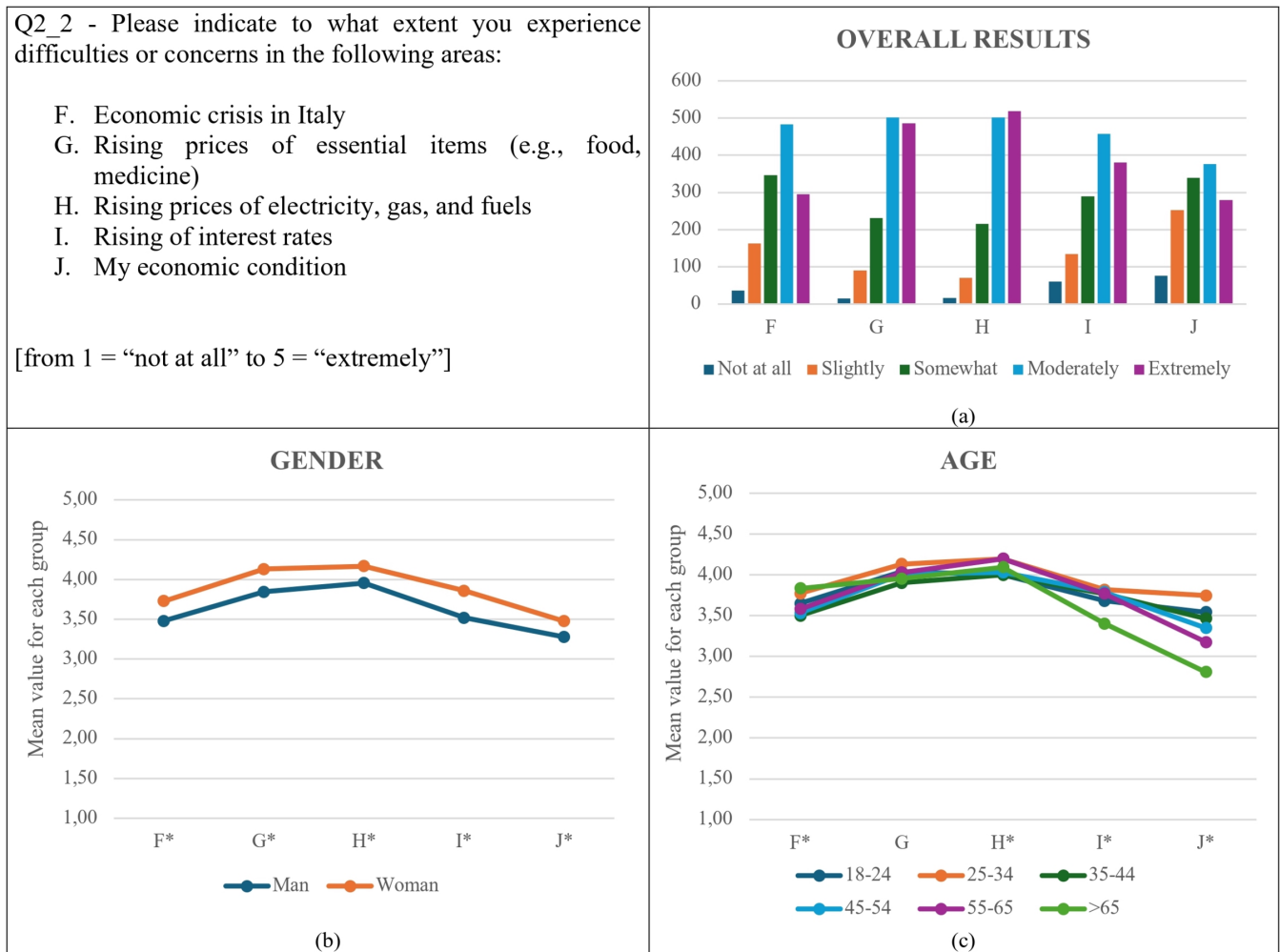


FIGURE 4 | Consumers' perceived level of economic concern. (a) Overall results; (b) Gender differences; (c) Age differences. Statistically significant differences based on the Kruskal–Wallis test are indicated by an asterisk (*).

4.1.2 | Perceived Economic Knowledge

Results show that consumers have a low level of perceived economic knowledge (items D, E, and F in Figure 2a), with an average of 27% of respondents agreeing or strongly agreeing with items indicating high perceived economic knowledge.

Regarding gender, men perceive themselves as more knowledgeable than women about economic issues (Figure 2b). This finding is consistent with previous studies (Walstad and Rebeck 2002; Wobker et al. 2014), which emphasize the gender gap in perceived economic knowledge. This gap has often been attributed to gender stereotypes (Reinking and Martin 2018; Bordalo et al. 2019; Jüttler and Schumann 2019), which may lead women to internalize beliefs of lower competence in technical, scientific, and economic domains.

With respect to age, respondents in the 55–65 and over 65 groups perceive themselves as more knowledgeable about economic issues than those in the 18–24, 25–34, and 35–44 groups (Figure 2c). This finding aligns with Walstad (1997), who shows that older individuals in the US tend to demonstrate greater fac-

tual understanding of economic topics than younger individuals. This pattern may be explained by the accumulation of experience over time, as prolonged exposure to economic events and market dynamics enhances familiarity with such issues.

Therefore, H2a is fully supported (gender) and H2b is fully supported (age).

4.1.3 | Perceived Geopolitical Conflicts Knowledge

Results show that consumers have a low level of perceived geopolitical conflicts knowledge (items G, H, and I in Figure 2a), with an average of 38% of respondents agreeing or strongly agreeing with items indicating high perceived geopolitical conflicts knowledge.

Regarding gender, men perceive themselves more knowledgeable than women on geopolitical conflicts (Figure 2b). This finding is consistent with previous studies (Verba et al. 1997; Fortin-Rittberger 2016; Bos et al. 2022; Keeling 2023), which suggest that family responsibilities and societal norms reduce

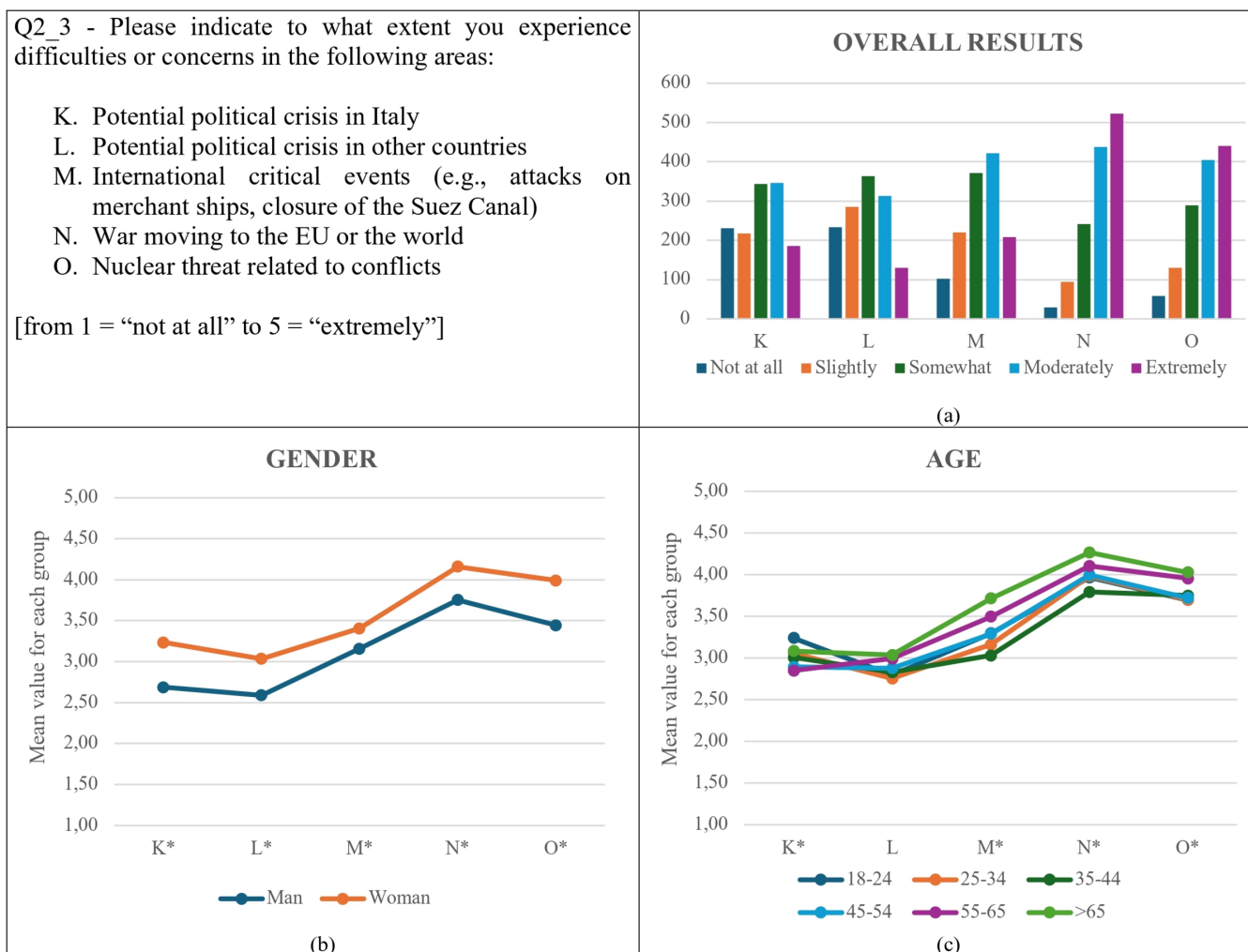


FIGURE 5 | Consumers' perceived level of geopolitical conflicts concern. (a) Overall results; (b) Gender differences; (c) Age differences. Statistically significant differences based on the Kruskal–Wallis test are indicated by an asterisk (*).

women's attention to political issues and, consequently, their perceived political knowledge.

With respect to age, the 55–65 and over 65 groups report greater perceived geopolitical conflicts knowledge than other groups, likely due to their accumulated experience (Walstad 1997). Furthermore, the 45–54 group considers itself significantly more informed on geopolitical issues than the 35–44 group (Figure 2c).

Therefore, H3a is fully supported (gender) and H3b is fully supported (age).

4.1.4 | Perceived Environmental Knowledge

Results show that consumers have a high level of perceived environmental knowledge (items J, K, and L in Figure 2a), with an average of 53% of respondents agreeing or strongly agreeing with items indicating high perceived environmental knowledge.

Regarding gender, men perceive themselves as more informed than women about environmental issues (Figure 2b). This

finding is consistent with previous studies (Schahn and Holzer 1990; Mostafa 2007). According to Robelia and Murphy (2012), this difference may be explained by men's greater exposure to and specialization in technical and scientific fields in the past years. However, this finding stands in contrast to Setiawan et al. (2023), who find that among Generation X, women display significantly higher levels of environmental knowledge than men. This discrepancy may reflect differences in the sample composition, suggesting that gender gaps in environmental knowledge are not uniform and may vary across generations.

With respect to age, respondents in the over 65 group perceive themselves as more informed about environmental issues than most of the sample, showing a similar level only to the 55–65 group. In fact, after the over 65 group, consumers aged 55–65 report the highest level of perceived knowledge, followed by the 45–54 group (Figure 2c). This finding is consistent with previous studies (e.g., Fabbrizzi et al. 2016) and contributes to the ongoing debate on the mismatch between younger consumers' perceived knowledge and their increasing attention to environmental issues (e.g., Gray et al. 2019; Dwidienawati et al. 2021; Dangelico et al. 2022). While younger individuals are often more

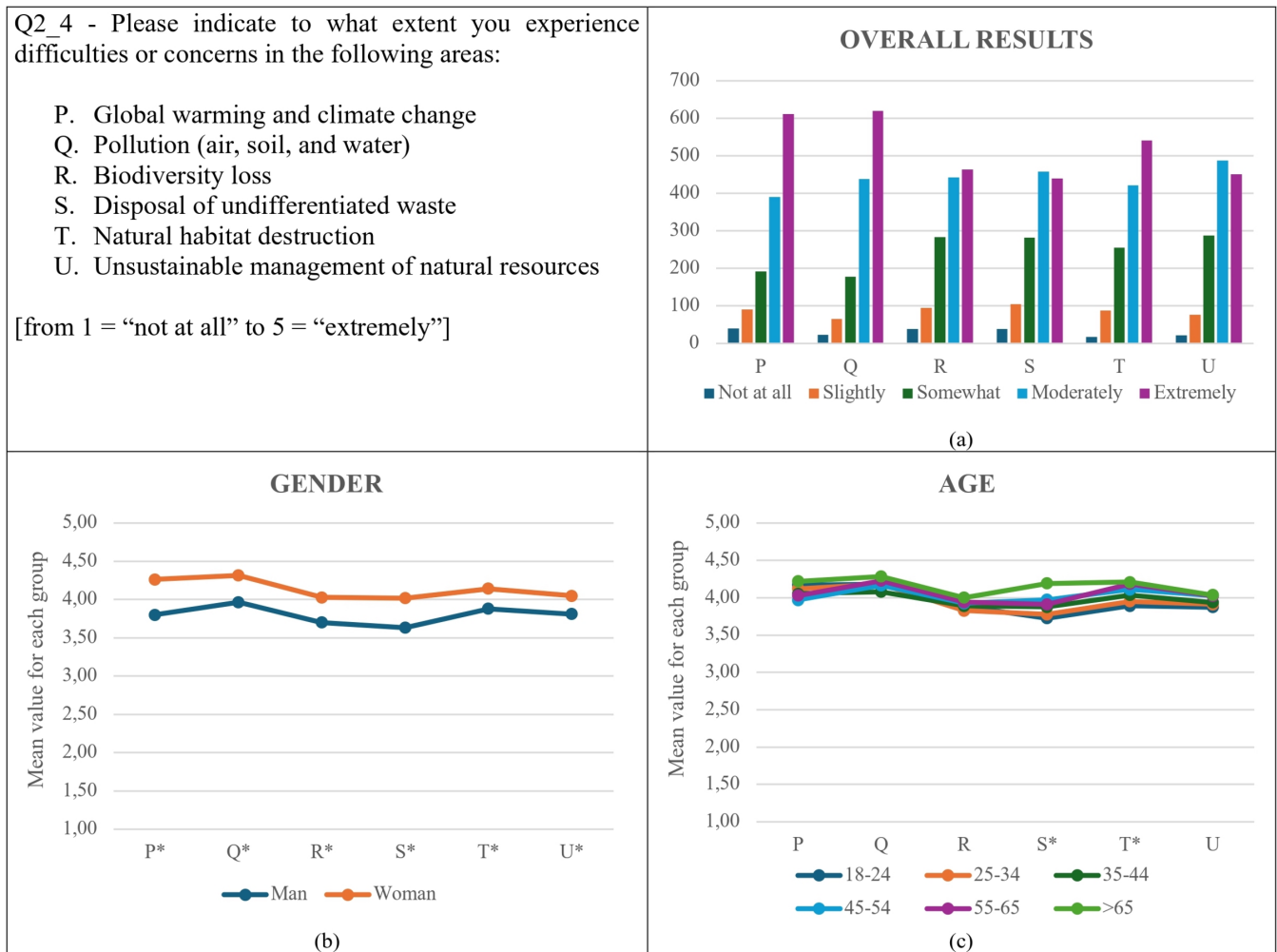


FIGURE 6 | Consumers' perceived level of environmental concern. (a) Overall results; (b) Gender differences; (c) Age differences. Statistically significant differences based on the Kruskal–Wallis test are indicated by an asterisk (*).

engaged with sustainability topics, they may report lower perceived knowledge due to more critical self-evaluation or greater awareness of the complexity of environmental problems. Conversely, older consumers may rely on accumulated life experience and repeated exposure to environmental discourse, which can enhance their perceived familiarity with such issues.

Therefore, H4a is partially supported (gender) and H4b is fully supported (age).

4.2 | Concerns for Uncertainty Related to Current Problems

4.2.1 | Health Concern

Analysis of Figure 3a shows that the highest level of difficulty and concern relates to the functioning of the Italian healthcare system, with about 66% of respondents expressing moderate or extreme concern. This is followed by difficulty and concern for the health of loved ones (63% of respondents). These findings are consistent with Mertens et al. (2020), who highlight

how the pandemic has amplified such worries. Approximately 60% and 54% of respondents report being somewhat or moderately concerned about future epidemics and their own health conditions, respectively. In contrast, about 58% of respondents report being not at all or only slightly concerned about the Covid-19 pandemic. This result suggests a change over time in consumers' concerns—different patterns are reported by Dangelico et al. (2022)—thus confirming the dynamic nature of consumer perceptions.

With regard to gender differences (Figure 3b), women generally report higher levels of difficulty and concern than men across all the items examined, except for the functioning of the Italian healthcare system, where similar levels of concern are observed. This finding is consistent with previous studies (e.g., Ek 2015; Lauri Korajlija and Jokic-Begic 2020; Spagnolo et al. 2020; Broche-Pérez et al. 2021; Kitz et al. 2022; Barchielli et al. 2022), which show that women tend to experience greater concern about health issues (such as Covid-19 pandemic) than men. This higher level of concern has been attributed to a combination of biological, psychological, and socio-cultural factors (Spagnolo et al. 2020), including a greater predisposition to anx-

Q3 - Please indicate how frequently did you buy each of the following products during the last two years:

- A. Products sold by neighborhood stores
- B. Made in Italy products
- C. Local Products
- D. Fair Trade products
- E. Organic product
- F. Eco-sustainable products
- G. Products with recycled materials
- H. Second-hand products
- I. Refurbished or remanufactured products (e.g., smartphone, PC)
- J. Energy efficient products (e.g., LED light bulbs, energy efficient home appliances)
- K. Healthy food products
- L. Vegan products
- M. Draft products, bringing your own bottle (e.g., laundry detergent) or versions that do not require plastic packaging (e.g., solid soaps, detergents, shampoo)
- N. Products with eco-friendly packaging

[from 1 = “never” to 5 = “every time”]

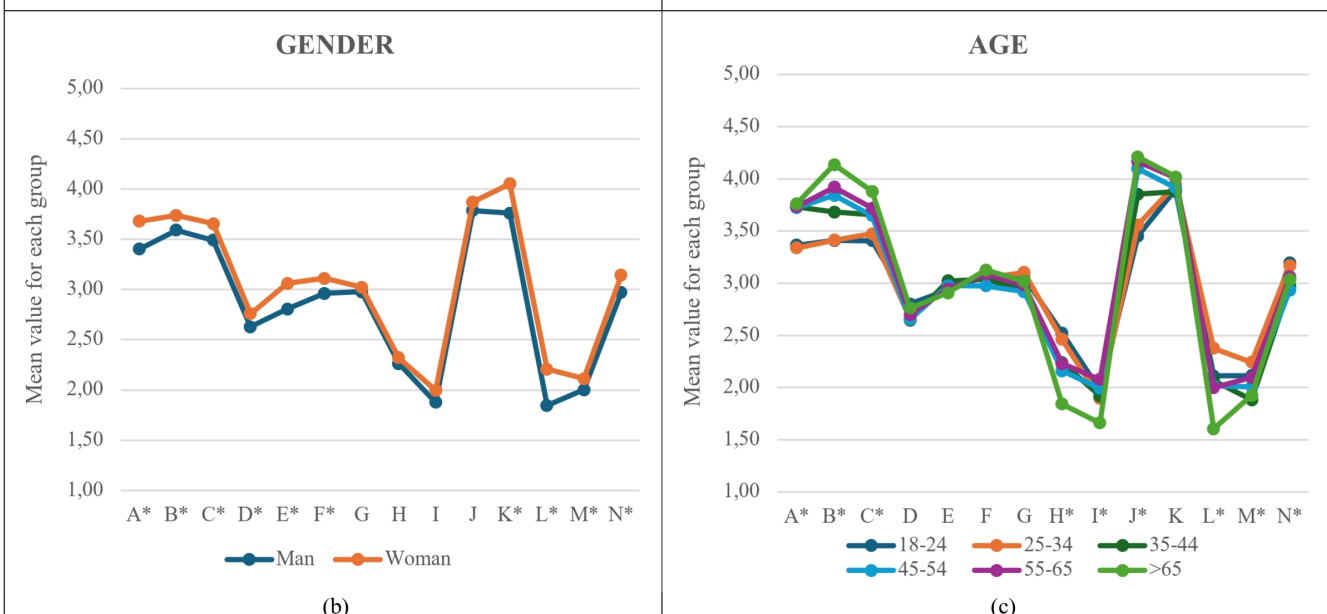


FIGURE 7 | Consumers' sustainable product purchasing behavior. (a) Overall results; (b) Gender differences; (c) Age differences. Statistically significant differences based on the Kruskal–Wallis test are indicated by an asterisk (*).

iety, depression, phobias, and panic disorders in response to chronic health-related stress (Kudielka and Kirschbaum 2005; Broche-Pérez et al. 2021). Additionally, women, who are more frequently primary caregivers and are highly represented in front-line healthcare roles, may experience higher levels of stress and perceived risk of infection, further increasing their concerns (Spagnolo et al. 2020).

Regarding age differences (Figure 3c), respondents aged over 55 report higher levels of difficulty and concern about the Covid-19 pandemic compared to younger consumers, likely due to the

higher mortality risk experienced by older populations during the pandemic (Amore et al. 2021). This finding is consistent with Wilson et al. (2021), who show that older age groups in the US express greater concern about Covid-19. However, the same study also finds that older individuals tend to report lower levels of anxiety and panic compared to younger people. This apparent discrepancy may be explained by older adults' greater ability to regulate emotions and cope with stress, as also suggested by Huang and Zhao (2020) and Bruine de Bruin (2021). Conversely, younger consumers appear to be more concerned about the health conditions of family members and friends than older individuals. This

- Q4 - Please indicate how frequently did you perform each of the following actions during the past two years:
- A. Turning off or unplug electronic devices when not needed
 - B. Reducing air conditioning
 - C. Reducing driving, and walk, cycle or use public transportation or mobility sharing (e.g., bike o car sharing)
 - D. Lowering the thermostat of domestic heating
 - E. Turning off lights when leaving rooms
 - F. Preferring low temperature washing programs (for washing machine and/or dishwasher)
 - G. Cooking more efficiently (e.g., cooking multiple foods simultaneously in the oven)
 - H. Recycling
 - I. Using own bag when shopping
 - J. Waiting until appliances (dishwasher or washing machine) is full to run
 - K. Looking at the label/package information, when buying a product, to check if it contains substances that are environmentally damaging
 - L. Looking at the label/package information, when buying a product, to check if it contains substances that are damaging for health
 - M. Looking at the label/package information, when buying a product, to check if the product can be recycled
 - N. Looking at the label/package information, when buying a product, to check if the packaging can be recycled

[from 1 = “never” to 5 = “every time”]

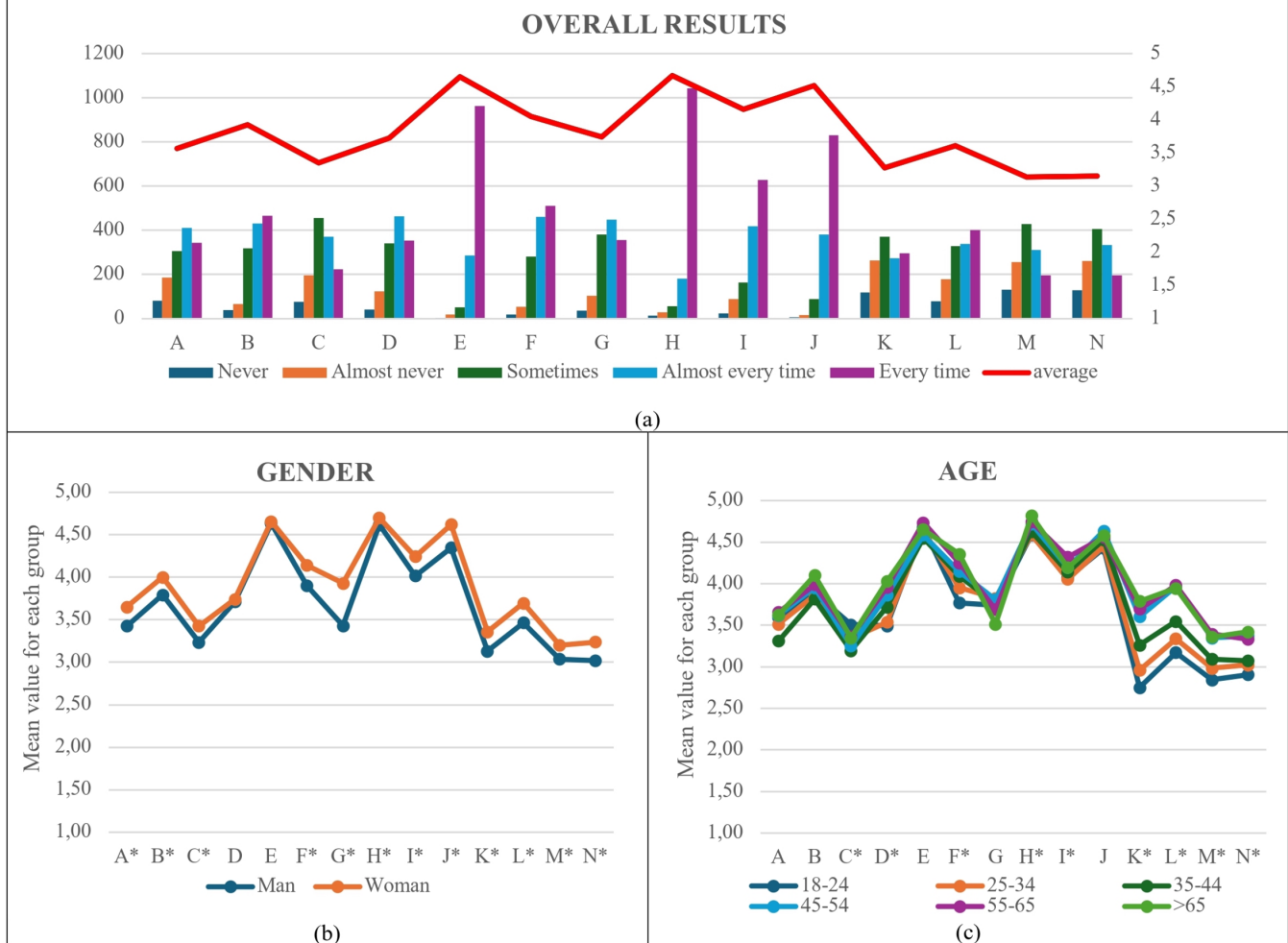


FIGURE 8 | Consumers' pro-environmental behaviors. (a) Overall results; (b) Gender differences; (c) Age differences. Statistically significant differences based on the Kruskal–Wallis test are indicated by an asterisk (*).

finding aligns with Peluso et al. (2021), who report that older Italians tend to be more optimistic about the pandemic, which may foster a sense of altruism and increase their willingness to engage in pro-social behaviors. Moreover, the 18–24 group shows lower concern about the functioning of the Italian health-care system compared to the 25–34, 35–44, and 45–54 groups, while the 25–34 group is less concerned than the 35–44 group on this issue. Conversely, in a study on Georgian consumers, Makhashvili et al. (2020) do not find a significant relationship between age and concern about Covid-19.

Therefore, H5a is partially supported (gender), while H5b shows mixed results (age).

4.2.2 | Economic Concern

Figure 4a shows that the highest level of difficulty and concern relates to rising prices of electricity, gas, and fuels, with 77% of respondents expressing moderate or extreme concern. This is followed by difficulty and concern about rising prices of essential goods (75%), increases in interest rates (63%), the possibility of an economic crisis in Italy (59%), and one's own economic conditions (50%).

With regard to gender differences (Figure 4b), women report significantly higher levels of difficulty and concern than men across all the issues examined. This finding contrasts with previous studies (Arbuckle and Mercer 2020; Bou-Hamad et al. 2022), which often suggest that men exhibit higher levels of concern about economic issues. This discrepancy may be explained by contextual factors, such as the specific economic environment or shifting gender roles. While traditional perspectives associate men with the role of primary financial providers, particularly in more patriarchal settings (Bou-Hamad et al. 2022), increasing economic uncertainty may lead women to perceive higher vulnerability and thus report greater concern.

Regarding age differences (Figure 4c), respondents aged 25–34 and over 65 exhibit greater difficulty and concern about a potential economic crisis compared to those in the 35–44, 45–54, and 55–65 groups. The 18–24 group shows lower concern about rising prices of electricity, gas, and fuels compared to the 25–34 and 55–65 groups, while the 35–44 group is less concerned than the 55–65 group. This finding is consistent with Barchielli et al. (2022), who report that rising energy costs are a greater concern for older Italian consumers than for younger ones. Concerning interest rates, the over 65 group appears less concerned than other age groups, while the 18–24 group reports lower concern compared to the 25–34 group. These results are partially consistent with Zhong and Huo (2024), who find that older individuals tend to underestimate inflation uncertainty, whereas younger individuals tend to overestimate it. Conversely, Bou-Hamad et al. (2022) show that older consumers express greater concern about access to savings and their devaluation, highlighting the complexity of age-related differences in economic perceptions. Significant differences also emerge regarding concern for one's own economic situation. The over 65 group is the least concerned, while the 55–65 group reports lower concern compared to the 18–24, 25–34, and 35–44 groups. Notably, the 25–34 group expresses higher concern than the 18–24, 35–44,

and 45–54 groups, suggesting that individuals in early adulthood may feel particularly exposed to economic uncertainty, possibly due to career instability and financial commitments.

Therefore, H6a is not supported (gender), while H6b shows mixed results (age).

4.2.3 | Geopolitical Conflicts Concern

Figure 5a shows that the highest level of difficulty and concern relates to the potential spread of war to the EU or globally (73% of respondents), followed by difficulty and concern about nuclear threats arising from conflicts (64%), international critical events (60%), a potential political crisis in Italy (52%), and political instability in other countries (51%).

With regard to gender differences (Figure 5b), women tend to report higher levels of difficulty and concern than men across all the issues examined. This finding is consistent with previous studies (e.g., Barchielli et al. 2022; Regnoli et al. 2023; Lass-Hennemann et al. 2024). In particular, Barchielli et al. (2022) show that, in conflict contexts such as the Russia-Ukraine war, Italian women report greater concern about the economic consequences of war, including rising prices of food and energy, compared to men. This pattern may be explained by women's greater sensitivity to risk and higher ability to recognize and process complex emotional and social threats (Hamilton et al. 1988), which can lead to stronger concern about conflict-related issues.

Regarding age differences (Figure 5c), the 18–24 group reports higher difficulty and concern about a potential political crisis in Italy compared to the 45–54 and 55–65 groups. In contrast, the 45–54 and 55–65 groups show greater concern about international critical events, while the 35–44 group appears less concerned than both the 18–24 and 45–54 groups. Concerning the potential spread of war in Europe or globally, the over 65 group shows significantly higher concern compared to most other age groups, with levels similar only to the 55–65 group. In turn, the 55–65 group reports higher difficulty and concern than the 18–24 and 35–44 groups. A similar pattern emerges for nuclear threats, with respondents aged 55–65 and over 65 expressing higher levels of concern than younger groups (18–24, 25–34, and 45–54). These results may reflect older individuals' greater exposure to historical geopolitical tensions and heightened perception of large-scale risks, which can increase their sensitivity to global instability.

Therefore, H7a is fully supported (gender), while H7b shows mixed results (age).

4.2.4 | Environmental Concern

Figure 6a shows that the highest level of difficulty and concern relates to pollution, with 80% of respondents expressing moderate or extreme concern. This is followed by difficulty and concern about global warming and climate change (76%), natural habitat destruction (73%), unsustainable management of natural resources (71%), biodiversity loss (69%), and the disposal of undifferentiated waste (68%).

With regard to gender differences (Figure 6b), women report significantly higher levels of difficulty and concern than men across all the issues examined. This finding is consistent with several previous studies (Arbuckle and Mercer 2020; Migheli 2021; Saari et al. 2021; Dangelico et al. 2022; Aguilar-Gomez et al. 2025; Orkut and Perrin 2026). This disparity is often attributed to gender socialization processes and role expectations that emphasize caregiving and community-oriented values traditionally associated with women (Casey and Scott 2006). Women's stronger association with caregiving roles may foster greater empathy and protective attitudes toward the environment, leading them to prioritize environmental issues more strongly than men.

Regarding age differences (Figure 6c), younger respondents tend to report lower levels of difficulty and concern than those aged over 45, with respect to the disposal of undifferentiated waste. The over 65 group emerges as the most concerned about this issue, while the 25–34 group appears less concerned than both the 45–54 and over 65 groups. A similar pattern is observed for natural habitat destruction, where the 18–24 group reports lower concern than respondents aged over 45, and the 25–34 group is less concerned than those aged over 55. These findings contrast with previous studies (e.g., Diamantopoulos et al. 2003; Casey and Scott 2006), which suggest that older individuals tend to be less concerned about environmental issues than younger people, as well as with Barchielli et al. (2022), who find that younger Italian consumers exhibit higher environmental awareness than older groups. However, they are partially consistent with Gray et al. (2019), who find no clear age-related differences in environmental concern among US consumers. One possible explanation for these results is that older individuals may have developed greater sensitivity to environmental degradation through cumulative life experience and direct observation of environmental changes, while younger individuals, despite being more exposed to environmental discourse, may exhibit lower perceived concern due to normalization of such issues or differences in risk perception.

Therefore, H8a is fully supported (gender), while H8b is not supported (age).

4.3 | Sustainable Consumer Behavior

4.3.1 | Sustainable Products' Purchase

Figure 7a shows that 76% of respondents report purchasing healthy food products always or almost always, followed by energy-efficient products (67%), made in Italy products (60%), and local products (53%). In contrast, the least frequently purchased products in the last 2 years are refurbished or remanufactured products, with 70% of respondents reporting that they never or almost never purchase them, followed by vegan products (64%) and second-hand products (56%). According to Sharkasi et al. (2025), factors such as experiential and instrumental attitudes, as well as perceived severity and vulnerability related to environmental issues, play a significant role in shaping consumers' willingness to purchase refurbished products. These factors are particularly relevant as they may help overcome the widespread perception of refurbished products as being of inferior quality (Seifian et al. 2023).

With regard to gender differences (Figure 7b), women report purchasing most product categories more frequently than men. This finding is consistent with previous research suggesting that women are generally more inclined toward sustainable consumption behaviors (Luchs and Mooradian 2012; Bulut et al. 2017; Rausch et al. 2021; Villa-Castaño 2025). However, no significant gender differences emerge for products made with recycled materials, second-hand products, refurbished or remanufactured products, and energy-efficient products.

Regarding age differences (Figure 7c), younger consumers (aged 18–24 and 25–34) report lower purchasing frequencies for products sold by neighborhood stores, made in Italy products, and local products compared to older groups. Conversely, respondents aged 55–65 and over 65 report higher levels of local product consumption over the past 2 years. Older consumers (over 65) also report significantly lower purchasing of refurbished and second-hand products, whereas younger groups (18–24 and 25–34) show greater engagement with these product categories. Similarly, second-hand products are less frequently purchased by the over 65 group and more commonly purchased by younger consumers, although the 25–34 and 35–44 groups exhibit similar purchasing patterns.

With respect to energy-efficient products, younger respondents (18–24 and 25–34) report significantly lower purchasing frequencies compared to the rest of the sample. Significant differences also emerge among middle and older age groups (35–44, 45–54, and 55–65), with the latter showing a higher propensity to purchase these products. These patterns may be explained by differences in financial resources, consumption habits, and sensitivity to long-term economic savings associated with such products. In contrast, Bulut et al. (2017) find no significant differences between age groups in consumption of energy-efficient products.

Therefore, H9a is partially supported (gender), while H9b shows mixed results (age).

4.3.2 | Other Pro-Environmental Behaviors

Figure 8a shows that most respondents frequently engage in pro-environmental behaviors: 94% report turning off lights, 91% use appliances efficiently, and 92% recycle regularly. Furthermore, a large proportion of respondents report bringing their own shopping bags in the past 2 years, thereby reducing the use of plastic bags, even biodegradable ones, with 79% doing so always or almost always.

With regard to gender differences (Figure 8b), women exhibit higher levels of pro-environmental behavior than men across most activities, except for lowering the thermostat for domestic heating and turning off lights when leaving a room (where similar levels of behavior are observed). This finding is consistent with a large body of literature indicating that women tend to display stronger environmental engagement (e.g., Luchs and Mooradian 2012; Ek 2015; Bulut et al. 2017; Lauri Korajlija and Jokic-Begic 2020). However, other studies do not find significant gender differences in sustainable behaviors (Rice 2006; Tan et al. 2010), suggesting that such differences may depend on context and the type of behavior considered. Interestingly, these

findings contrast with Orkut and Perrin (2026), who highlight women's lower participation in environmental activism. They suggest that this gap may be driven by competing priorities in leisure time, as well as by family and work responsibilities, which can limit the extent to which environmental concern translates into active engagement.

Regarding age differences (Figure 8c), younger respondents (18–24 and 25–34) report lower levels of recycling in the past 2 years compared to older groups (45–54, 55–65, and over 65). This finding is consistent with Diamantopoulos et al. (2003), who show that older individuals are more likely to engage in recycling behaviors. Similarly, the 18–24, 25–34, and 35–44 groups are less likely to read product labels to assess harmful substances, health risks, recyclability, or packaging sustainability compared to respondents aged over 45. These findings are in line with previous studies identifying a positive relationship between age and sustainable behavior (Diamantopoulos et al. 2003; Gilg et al. 2005; Rice 2006). However, contrasting evidence also exists: Gray et al. (2019) find that younger individuals in the US may show stronger pro-environmental attitudes, while Hwang et al. (2025) report that food waste tends to increase with age. These mixed findings highlight the complexity of age-related effects on sustainable behavior, which may vary depending on the specific domain considered. For instance, an opposite pattern emerges for mobility-related behaviors: the 18–24 group is more likely than the 35–44 and 45–54 groups to reduce driving and instead walk, cycle, or use public transportation.

Therefore, H10a is partially supported (gender), while H10b shows mixed results (age).

To summarize, Table 3 presents the results of hypothesis testing across consumers' demographic characteristics (gender and age) in relation to: (i) perceived knowledge of health, economic, geopolitical, and environmental issues; (ii) concerns about health, economic, geopolitical, and environmental issues; and (iii) the adoption of sustainable consumer behaviors (sustainable product purchases and other pro-environmental behaviors).

5 | Implications

5.1 | Theoretical Implications

This study provides several relevant theoretical contributions, particularly in the current context of uncertainty and poly-crisis (World Economic Forum 2024, 2026). It examines how different demographic groups differ in perceived knowledge, concerns, and sustainable behaviors, thereby extending the debate within the frameworks of Gender Socialization theory and the Life Course perspective. Unlike most previous studies, that tend to focus exclusively on single areas of perceived knowledge—such as health (Al-Mohrej et al. 2016), economic (Walstad and Rebeck 2002; Wobker et al. 2014), or environmental topics (Mostafa 2007), as well as concern, such as health (e.g., Huang and Zhao 2020; Makhshvili et al. 2020; Bruine de Bruin 2021; Wilson et al. 2021), economic (e.g., Bou-Hamad et al. 2022; Hoven et al. 2025; Zhong and Huo 2024), or environmental (e.g., Saari et al. 2021; Orkut and Perrin 2026), coherently with a very recent research stream (Barchielli et al. 2022;

Lass-Hennemann et al. 2024; Yousef et al. 2025)—this research adopts a holistic approach, analyzing these aspects collectively to provide a more comprehensive understanding. In addition, this study contributes to the emerging literature on consumers' perceptions during conflicts in countries not directly involved (Barchielli et al. 2022; Regnoli et al. 2023; Lass-Hennemann et al. 2024; Liobikienė and Liobikas 2025). To the best of our knowledge, this is the first study to investigate demographic differences in perceived knowledge of geopolitical conflicts among consumers indirectly affected by the broader consequences of war. Furthermore, while previous studies on sustainable consumer behavior have mainly focused on specific behaviors, such as recycling (e.g., Babaei et al. 2015), organic food consumption (e.g., Cavite 2025), buying sustainable fashion goods (Jeong and Seock 2026), and purchasing energy-saving products (Azar and Al Ansari 2017), only a few exceptions have examined a broader range of behaviors (e.g., Dangelico et al. 2022). By considering and analyzing a much broader range of sustainable behaviors (28 different types), this research contributes to the sustainable consumer behavior literature (e.g., Lauri Korajlija and Jokic-Begic 2020; Mainardes et al. 2021; Rausch et al. 2021; Rodgers et al. 2021; Bender et al. 2022; Dangelico et al. 2022; Grunert et al. 2023; Hwang et al. 2025; Trinh et al. 2025) by highlighting significant heterogeneity in both the frequency of sustainable product purchases across different product categories and the adoption of other pro-environmental behaviors. Theoretically, this finding suggests that pro-environmental behaviors should not be treated as a single overall construct. Instead, a more detailed approach is needed, focusing on specific behaviors to better understand the factors driving their variability. Furthermore, the differences among demographic groups are highly relevant and suggest that gender and age should always be included as determinants in studies on sustainable consumer behavior.

This study contributes to advancing knowledge in Gender Socialization theory and the Life Course perspective by applying the Knowledge-Attitude-Behavior framework to define the dimensions under analysis.

From the perspective of Gender Socialization theory, this study contributes to gender studies (e.g., Mendez and Osborn 2010; Sandlin and Maudlin 2012; Wobker et al. 2014; Al-Mohrej et al. 2016; Jüttler and Schumann 2019) by analyzing gender differences in both perceived knowledge and levels of concern across multiple domains, and in pro-environmental behaviors. The findings show that women perceive themselves as less knowledgeable than men in economic, geopolitical, and environmental domains, while no differences emerge in health-related knowledge. This apparent contradiction can be explained by gender stereotypes, widely documented in the literature (e.g., Sandlin and Maudlin 2012; Reinking and Martin 2018; Bordalo et al. 2019; Jüttler and Schumann 2019), which originate in early socialization processes and are reinforced during adolescence through social and cultural pressures (Reinking and Martin 2018). These mechanisms tend to discourage women from engaging in STEM-related fields, reinforcing lower self-perceived competence in technical-scientific (Bordalo et al. 2019) and economic domains (Jüttler and Schumann 2019). Moreover, Mendez and Osborn (2010) highlight how similar dynamics affect political knowledge, contributing to women's underrepresentation in

TABLE 3 | Hypothesis testing results.

Dimension	Demographic variables			
	Gender		Age	
	Hypothesis	Result	Hypothesis	Result
Perceived knowledge of uncertainty related to current problems	H1a: Women exhibit higher levels of perceived health knowledge than men in times of uncertainty	Not supported (not statistically significant)	H1b: Older consumers exhibit higher levels of perceived health knowledge than younger consumers in times of uncertainty	Fully supported
	H2a: Men exhibit higher levels of perceived economic knowledge than women in times of uncertainty	Fully supported	H2b: Older consumers exhibit higher levels of perceived economic knowledge than younger consumers in times of uncertainty	Fully supported
	H3a: Men exhibit higher levels of perceived geopolitical knowledge than women in times of uncertainty	Fully supported	H3b: Older consumers exhibit higher levels of perceived geopolitical knowledge than younger consumers in times of uncertainty	Fully supported
	H4a: Men exhibit higher levels of perceived environmental knowledge than women in times of uncertainty	Partially supported	H4b: Older consumers exhibit higher levels of perceived environmental knowledge than younger consumers in times of uncertainty	Fully supported
Concerns for uncertainty related to current problems	H5a: Women exhibit higher levels of health concern than men in times of uncertainty	Partially supported	H5b: Younger consumers exhibit higher levels of health concern than older consumers in times of uncertainty	Mixed results
	H6a: Mex exhibit higher levels of economic concern than women in times of uncertainty	Not supported (opposite results)	H6b: Older consumers exhibit higher levels of economic concern than younger consumers in times of uncertainty	Mixed results
	H7a: Women exhibit higher levels of geopolitical conflicts concern than men in times of uncertainty	Fully supported	H7b: Older consumers exhibit higher levels of geopolitical concern than younger consumers in times of uncertainty	Mixed results
	H8a: Women exhibit higher levels of environmental concern than men in times of uncertainty	Fully supported	H8b: Younger consumers exhibit higher levels of environmental concern than older consumers in times of uncertainty	Not supported (not statistically significant and opposite results)
Sustainable consumer behavior	H9a: Women exhibit higher levels of sustainable consumption than men in times of uncertainty	Partially supported	H9b: Younger consumers exhibit higher sustainable consumption than older consumers in times of uncertainty	Mixed results
	H10a: Women exhibit higher levels other pro-environmental behaviors than men in times of uncertainty	Partially supported	H10b: Younger consumers exhibit higher levels other pro-environmental behaviors than older consumers in times of uncertainty	Mixed results

politics. At the same time, stereotypes also permeate consumption and media discourses, shaping women's identities as consumers through historically embedded sexist, racist, and classist assumptions (Sandlin and Maudlin 2012). Conversely, women report higher levels of concern than men across all items considered. This finding is consistent with previous research showing that women are more likely to develop stress-related conditions such as anxiety, depression, and panic disorders (e.g., Kudielka and Kirschbaum 2005; Altemus et al. 2014). Theoretically, these findings suggest that gender stereotypes influence perceived knowledge in technical, economic and political

domains. This leads to discrepancies between factual and perceived knowledge, potentially resulting in biased results. Therefore, it would be better to measure factual knowledge when assessing knowledge. Furthermore, given that gender differences also emerge in pro-environmental behaviors, gender should be systematically controlled for when analyzing sustainable consumption patterns.

From the Life Course perspective, the results reveal significant differences across age groups. For instance, respondents aged over 55 report higher levels of concern about the Covid-19

pandemic, likely due to their higher mortality risk (Amore et al. 2021). However, prior studies suggest that older individuals tend to manage concern differently, reporting lower levels of anxiety and panic compared to younger individuals (Huang and Zhao 2020; Bruine de Bruin 2021; Wilson et al. 2021). These findings highlight the importance of considering age-related differences in how individuals respond to uncertain and stressful events. In relation to environmental issues, younger individuals perceive themselves as less knowledgeable than older groups, while reporting similar levels of concern, except for specific issues such as undifferentiated waste disposal and natural habitat destruction, where older individuals (over 65) report higher concern. This pattern may reflect more critical self-assessment among younger individuals or greater awareness of the complexity of environmental challenges, whereas older individuals may rely on accumulated experience and repeated exposure to environmental discourse. With regard to sustainable consumption, younger consumers report lower purchasing frequencies for products such as those sold by neighborhood stores, made in Italy products, local products, and energy-efficient products compared to older groups. However, they report higher engagement in the purchase of refurbished and second-hand products. In terms of other pro-environmental behaviors, younger individuals report lower levels of driving but are less likely to read product labels to assess health risks, harmful substances, recyclability, or packaging sustainability. In contrast, efficient routine domestic behaviors, such as turning off lights when leaving a room or reducing air conditioning use, do not show significant differences across age groups. These findings contribute to the ongoing debate on the role of younger generations in addressing sustainability challenges (Gray et al. 2019; Dwidienawati et al. 2021). Specifically, the lower engagement of younger individuals in certain sustainable consumption and pro-environmental behaviors can be explained by a lower willingness to sustain higher levels of compromise. Results indicate that younger consumers tend to prioritize more affordable sustainable choices (e.g., second-hand products), over higher-cost alternatives (e.g., made in Italy, energy-efficient products), and are less inclined to invest time or attention in cognitively demanding behaviors (e.g., reading product labels).

5.2 | Managerial Implications

In terms of managerial implications, this study offers valuable insights for companies.

First, this study highlights differences in purchasing frequency and related purchasing habits across different demographic groups. For example, women tend to purchase healthy, organic, local, and made in Italy products more often than men. They are also more likely to read product labels, looking for information on recyclability, environmental impact, and health effects. Regarding age, older people are less likely to buy refurbished or second-hand products, while lower-income groups are more likely to do so. These findings have important implications for marketing strategies, suggesting a differentiated approach to targeting. Companies should offer specific products and personalized communication strategies to each targeted group.

Second, it identifies the most commonly purchased sustainable products among Italian consumers. These include made in Italy

items, local products, energy-efficient goods, and healthy food. Conversely, the least frequently purchased products are vegan items, draft products (e.g., laundry detergent), and refurbished or remanufactured goods (e.g., smartphones, PCs). These findings provide useful guidance for defining a sustainable product portfolio with higher chances of success in the Italian market, as they highlight which product categories have greater market potential. Moreover, for under-purchased items identified in this study (such as refurbished products or draft products) companies can design targeted promotional campaigns to encourage trial and adoption to better communicate their advantages such as reduced material usage or lower costs.

Third, this study reveals interesting insights on consumer habits during the purchase of products. Results show that reading label information about environmentally harmful substances, product recyclability, and packaging recyclability is among the least common consumer behaviors. To encourage consumers to read labels, companies should improve the clarity and appeal of product labels, making them more engaging for their target audience, possibly through more attractive and eye-catching design.

Fourth, given the observed age-related differences and the lower willingness of younger consumers to sustain higher levels of compromise, companies targeting young consumers should design campaigns that are simple, attractive, and easily understandable. Marketing strategies should avoid promoting products or activities that are costly or require extensive time and effort. Options include using smart labels that communicate key product information clearly through design, reducing the price of sustainable products for younger consumers, or transparently explaining why sustainable products may cost more than conventional alternatives, thereby fostering trust and informed decision-making.

Fifth, environmental concern emerged as being highly perceived by Italian consumers. Therefore, companies should continue to invest in research and development to create new products that help reduce environmental problems and at the same time satisfy consumer needs as well as in communicating their benefits for the natural environment and the consumers themselves.

5.3 | Policy-Related Implications

This study provides valuable insights for policymakers, offering essential guidance for the development of data-driven and effective policies.

First, the observed gender gap in perceived knowledge and concerns highlights the need for gender-sensitive educational programs. According to the results of this study, women exhibit higher concern levels across most domains but consistently report lower perceived knowledge in economic, geopolitical, and environmental issues compared to men. Such gaps may reflect early emerging gender stereotypes that discourage girls from associating high intellectual ability with themselves (Bian et al. 2017), as well as persistent implicit biases in academic settings that favor male students in STEM fields (Moss-Racusin et al. 2012). Policymakers should encourage female participation

in STEM fields and promote inclusive educational initiatives that empower women with technical, economic, and geopolitical literacy from an early stage.

Second, significant differences in concerns and behaviors across age groups suggest that age-tailored communication strategies are needed. For instance, since young people give less attention to labels and packaging information when buying products, educational interventions targeting younger generations should be conducted (Rugbani et al. 2026), leveraging digital platforms, social media, gamification, and interactive tools, which have been shown to enhance engagement, knowledge acquisition, and pro-environmental behaviors among youth (e.g., Lim et al. 2024). At the same time, education plays a key role in shaping consumption behavior (Rugbani et al. 2026), and therefore should be actively promoted to foster sustainable practices.

Third, the study highlights high difficulties and concerns regarding the Italian healthcare system. Public decision-makers should address this by enhancing the system's efficiency, accessibility, and long-term sustainability.

Fourth, regarding mobility patterns, older groups are more reluctant to reduce private car usage in favor of shared mobility solutions. Policymakers should investigate the causes of this phenomenon, develop targeted communication campaigns on the benefits of the use of public transport, implement disincentives for the use of private cars (e.g., parking fees, traffic restrictions), while simultaneously providing improvements to the public transportation system.

Fifth, given the generally high engagement of Italian consumers in sustainable consumption and other pro-environmental behaviors (such as purchasing made in Italy, local, and healthy food products, turning off lights when leaving rooms, or waiting until appliances are full before use), policymakers should leverage these tendencies to enhance societal resilience in the face of recent and ongoing crises. Sustainability-oriented behaviors can be framed not only as environmentally beneficial, but also as practical strategies to mitigate the impact of economic, energy, and geopolitical shocks. For instance, in response to rising fuel and energy costs, policies that incentivize energy reduction at home and the consumption of local products could simultaneously reduce individual expenses, support environmental goals, and strengthen collective resilience. By positioning sustainability as a tool for coping with uncertainty, public initiatives can both encourage pro-environmental behavior and enhance adaptive capacity across the population.

6 | Limitations, Future Research Directions, and Conclusion

This study has several limitations that must be acknowledged.

First, the sample is not representative of the Italian population, as it is based on a convenience sample, with more than 60% of respondents being women. Although the relatively large sample size mitigates some risks associated with sampling bias (Atkinson and Flint 2001), this issue may affect the generalizability of the results.

Second, the use of snowball sampling may introduce several sources of bias, including limited representativeness, the over-representation of individuals with similar demographic characteristics due to network homophily, and the potential exclusion of less connected or more isolated individuals. Additionally, highly connected participants may be disproportionately included, further affecting the sample composition (Faugier and Sargeant 1997). To mitigate these limitations, multiple initial seeds with heterogeneous characteristics were selected, and efforts were made to diversify recruitment paths. In particular, the questionnaires were distributed across different geographical areas of Italy, including Central and Southern regions, in order to improve sample heterogeneity.

Third, data were collected through an online questionnaire administered via Qualtrics. This may have limited the accessibility of the survey to individuals without internet access or with low digital literacy, particularly older populations (which represent 8.23% of the sample).

Fourth, the sample is composed exclusively of individuals living in Italy; therefore, caution should be exercised when generalizing the results to other national contexts.

Several avenues for future research emerge from this study.

First, the present analysis focuses on perceived knowledge. Future studies could integrate objective measures of knowledge to compare perceived and factual knowledge across demographic groups. While some studies have explored this gap in single-crisis contexts (e.g., Granderath et al. 2021, in relation to Covid-19), evidence remains limited in multi-crisis scenarios involving health, economic, geopolitical, and environmental risks.

Second, longitudinal research designs would be valuable to examine how concerns and sustainable consumption behaviors evolve over time, particularly in response to emerging global crises such as pandemics, energy shortages, or geopolitical conflicts. Such approaches would provide insights into the stability and adaptability of sustainable behaviors under conditions of prolonged uncertainty.

Third, in line with the Knowledge-Attitude-Behavior framework, future research should investigate the causal relationships between perceived knowledge, concern, and sustainable behaviors in order to better understand the mechanisms linking these dimensions.

Fourth, cross-cultural and cross-country studies should explore how contextual factors, such as religion, cultural values, and traditions (Mi et al. 2020; Khan et al. 2024), influence the relationship between perceived knowledge, concerns, and sustainable behaviors.

Fifth, this study highlights gender- and age-based differences. Future research should further investigate the psychological, cultural, and social mechanisms underlying these differences, and how they shape both individuals' knowledge acquisition and concern perceptions.

By analyzing key Italian consumers' perceived knowledge and concerns, along with diverse pro-environmental behaviors, in a time characterized by multiple uncertainties, and investigating differences among demographic groups, this study leads to a deeper understanding of sustainable consumer behavior. As such, it contributes to the UN Sustainable Development Goal (SDG) 12, which promotes responsible consumption and production patterns. By investigating gender-based differences in perceived knowledge, concerns, and sustainable behaviors, this study also leads to a better understanding of gender differences. In doing so, it is relevant to the UN SDG 5, which promotes gender equality. Thus, we hope that this research will contribute to accelerate a transition toward a more sustainable society.

Author Contributions

Rosa Maria Dangelico: conceptualization, methodology, writing – review and editing, project administration, supervision. **Serena Filippelli:** conceptualization, methodology, writing – review and editing. **Luca Fraccascia:** conceptualization, methodology, writing – original draft, project administration, supervision. **Andrea Viggiani:** data curation, formal analysis, writing – original draft, writing – review and editing, investigation, visualization.

Acknowledgments

Open access publishing facilitated by Politecnico di Bari, as part of the Wiley – CRUI-CARE agreement.

Conflicts of Interest

The authors declare no conflicts of interest.

Endnotes

¹The term “recent” refers to the time at which this paper was written.

²Please notice that this review is not intended to be exhaustive but rather to overall present the state-of-the-art.

References

- Aguilar-Gomez, S., J. C. Cardenas, C. Galindo, J. Rodriguez-Arenas, and D. Vlasak-Gonzalez. 2025. “Gender Gaps in Knowledge, Attitudes, and Practices Related to Environmental Degradation in Colombia.” *Environmental Research: Climate* 4, no. 2: 025004. <https://doi.org/10.1088/2752-5295/adcb62>.
- Ahmed, N., C. Li, A. Khan, S. A. Qalati, S. Naz, and F. Rana. 2021. “Purchase Intention Toward Organic Food Among Young Consumers Using Theory of Planned Behavior: Role of Environmental Concerns and Environmental Awareness.” *Journal of Environmental Planning and Management* 64, no. 5: 796–822. <https://doi.org/10.1080/09640568.2020.1785404>.
- Airlangga, A. R., W. A. Saputri, and P. R. Nurhakim. 2024. “Socio-Religious Behavior on Consumption Pattern During Israel and Palestine Conflict in Muslim Society.” *IAS Journal of Localities* 1, no. 2: 138–152. <https://doi.org/10.62033/iasjol.v1i2.22>.
- Almansour, M. 2025. “Understanding the Associations Between Social Media Marketing and Green Outcomes: A Study of Employee Green Behavior.” *Technology in Society* 82: 102938. <https://doi.org/10.1016/j.techsoc.2025.102938>.
- Al-Mohrej, O. A., S. D. Al-Shirian, S. K. Al-Otaibi, H. M. Tamim, E. M. Masuadi, and H. M. Fakhoury. 2016. “Is the Saudi Public Aware of Middle East Respiratory Syndrome?” *Journal of Infection and Public Health* 9, no. 3: 259–266. <https://doi.org/10.1016/j.jiph.2015.10.003>.

- Altemus, M., N. Sarvaiya, and C. Neill Epperson. 2014. “Sex Differences in Anxiety and Depression Clinical Perspectives.” *Frontiers in Neuroendocrinology* 35, no. 3: 320–330. <https://doi.org/10.1016/j.yfrne.2014.05.004>.
- Amore, S., E. Puppo, J. Melara, E. Terracciano, S. Gentili, and G. Liotta. 2021. “Impact of COVID-19 on Older Adults and Role of Long-Term Care Facilities During Early Stages of Epidemic in Italy.” *Scientific Reports* 11, no. 1: 12530. <https://doi.org/10.1038/s41598-021-91992-9>.
- Arbuckle, M., and M. Mercer. 2020. “Economic Outlook and the Gender Gap in Attitudes About Climate Change.” *Population and Environment* 41, no. 4: 422–451. <https://doi.org/10.1007/s11111-020-00343-9>.
- Atkinson, R., and J. Flint. 2001. “Accessing Hidden and Hard-to-Reach Populations: Snowball Research Strategies.” *Social Research Update* 33, no. 1: 1–4. <https://sru.soc.surrey.ac.uk/SRU33.html>.
- Azar, E., and H. Al Ansari. 2017. “Framework to Investigate Energy Conservation Motivation and Actions of Building Occupants: The Case of a Green Campus in Abu Dhabi, UAE.” *Applied Energy* 190: 563–573. <https://doi.org/10.1016/j.apenergy.2016.12.128>.
- Babaei, A. A., N. Alavi, G. Goudarzi, P. Teymouri, K. Ahmadi, and M. Rafiee. 2015. “Household Recycling Knowledge, Attitudes and Practices Towards Solid Waste Management.” *Resources, Conservation and Recycling* 102: 94–100. <https://doi.org/10.1016/j.resconrec.2015.06.014>.
- Bacchetta, R., C. Vacchelli, A. Pica, et al. 2026. “Effects of Polypropylene Micro and Nanoplastics From Surgical Masks in Amphibian and Echinoderm Models.” *Ecotoxicology* 35, no. 5: 93. <https://doi.org/10.1007/s10646-026-03077-w>.
- Balsalobre-Lorente, D., A. Sinha, and M. Murshed. 2023. “Russia-Ukraine Conflict Sentiments and Energy Market Returns in G7 Countries: Discovering the Unexplored Dynamics.” *Energy Economics* 125: 106847. <https://doi.org/10.1016/j.eneco.2023.106847>.
- Barchielli, B., C. Cricenti, F. Gallè, et al. 2022. “Climate Changes, Natural Resources Depletion, COVID-19 Pandemic, and Russian-Ukrainian War: What Is the Impact on Habits Change and Mental Health?” *International Journal of Environmental Research and Public Health* 19, no. 19: 11929. <https://doi.org/10.3390/ijerph191911929>.
- Baumert, T., M. M. de Obesso, and E. Valbuena. 2020. “How Does the Terrorist Experience Alter Consumer Behaviour? An Analysis of the Spanish Case.” *Journal of Business Research* 115: 357–364. <https://doi.org/10.1016/j.jbusres.2019.11.085>.
- Ben Hassen, T., H. El Bilali, M. S. Allahyari, and R. Morrar. 2022. “Food Attitudes and Consumer Behavior Towards Food in Conflict-Affected Zones During the COVID-19 Pandemic: Case of the Palestinian Territories.” *British Food Journal* 124, no. 9: 2921–2936. <https://doi.org/10.1108/BFJ-05-2021-0590>.
- Bender, K. E., A. Badiger, B. E. Roe, Y. Shu, and D. Qi. 2022. “Consumer Behavior During the COVID-19 Pandemic: An Analysis of Food Purchasing and Management Behaviors in U.S. Households Through the Lens of Food System Resilience.” *Socio-Economic Planning Sciences* 82: 101107. <https://doi.org/10.1016/j.seps.2021.101107>.
- Bian, L., S.-J. Leslie, and A. Cimpian. 2017. “Gender Stereotypes About Intellectual Ability Emerge Early and Influence Children’s Interests.” *Science* 355, no. 6323: 389–391. <https://doi.org/10.1126/science.aah6524>.
- Bordalo, P., K. Coffman, N. Gennaioli, and A. Shleifer. 2019. “Beliefs About Gender.” *American Economic Review* 109, no. 3: 739–773. <https://doi.org/10.1257/aer.20170007>.
- Bos, A. L., J. S. Greenlee, M. R. Holman, Z. M. Oxley, and J. C. Lay. 2022. “This One’s for the Boys: How Gendered Political Socialization Limits Girls’ Political Ambition and Interest.” *American Political Science Review* 116, no. 2: 484–501. <https://doi.org/10.1017/S0003055421001027>.
- Bou-Hamad, I., R. Hoteit, D. Harajli, and D. Reykowska. 2022. “Personal Economic Worries in Response to COVID-19 Pandemic: A Cross Sectional

- Study." *Frontiers in Psychology* 13: 871209. <https://doi.org/10.3389/fpsyg.2022.871209>.
- Broche-Pérez, Y., Z. Fernández-Fleites, E. Fernández-Castillo, et al. 2021. "Anxiety, Health Self-Perception, and Worry About the Resurgence of COVID-19 Predict Fear Reactions Among Genders in the Cuban Population." *Frontiers in Global Women's Health* 2: 634088. <https://doi.org/10.3389/fgwh.2021.634088>.
- Bruine de Bruin, W. 2021. "Age Differences in COVID-19 Risk Perceptions and Mental Health: Evidence From a National U.S. Survey Conducted in March 2020." *Journals of Gerontology: Series B, Psychological Sciences and Social Sciences* 76, no. 2: e24–e29. <https://doi.org/10.1093/geronb/gbaa074>.
- Bulut, Z. A., F. Kökalan Çımrın, and O. Doğan. 2017. "Gender, Generation and Sustainable Consumption: Exploring the Behaviour of Consumers From Izmir, Turkey." *International Journal of Consumer Studies* 41, no. 6: 597–604. <https://doi.org/10.1111/ijcs.12371>.
- Casey, P. J., and K. Scott. 2006. "Environmental Concern and Behaviour in an Australian Sample Within an Ecocentric – Anthropocentric Framework." *Australian Journal of Psychology* 58, no. 2: 57–67. <https://doi.org/10.1080/00049530600730419>.
- Cavite, H. J. M. 2025. "Millennial Consumers' Intention to Purchase Organic Food: Do Environmental Concerns Matter?" *Business Strategy and the Environment* 34: 3940–3956. <https://doi.org/10.1002/bse.4162>.
- Chetty, R., J. N. Friedman, M. Stepner, and Team, O. I. 2024. "The Economic Impacts of COVID-19: Evidence From a New Public Database Built Using Private Sector Data." *Quarterly Journal of Economics* 139, no. 2: 829–889. <https://doi.org/10.1093/qje/qjad048>.
- Climate Council. 2024. "2024's Climate Crisis: Extreme Weather Around the Globe Signals the Urgent Need for Action." <https://www.climatecouncil.org.au/2024s-climate-crisis-extreme-weather-around-the-globe/>.
- Dangelico, R. M., L. Fraccascia, and S. Strazzullo. 2024. "Determinants of the Intention to Purchase Sustainable Beer: Do Gender and Type of Sustainable Solution Matter?" *Business Strategy and the Environment* 33, no. 7: 6748–6772. <https://doi.org/10.1002/bse.3841>.
- Dangelico, R. M., V. Schiaroli, and L. Fraccascia. 2022. "Is Covid-19 Changing Sustainable Consumer Behavior? A Survey of Italian Consumers." *Sustainable Development* 30, no. 6: 1477–1496. <https://doi.org/10.1002/sd.2322>.
- De Canio, F., E. Martinelli, and E. Endrighi. 2021. "Enhancing Consumers' Pro-Environmental Purchase Intentions: The Moderating Role of Environmental Concern." *International Journal of Retail & Distribution Management* 49, no. 9: 1312–1329. <https://doi.org/10.1108/IJRDM-08-2020-0301>.
- Dhir, A., M. Sadiq, S. Talwar, M. Sakashita, and P. Kaur. 2021. "Why Do Retail Consumers Buy Green Apparel? A Knowledge-Attitude-Behaviour-Context Perspective." *Journal of Retailing and Consumer Services* 59: 102398. <https://doi.org/10.1016/j.jretconser.2020.102398>.
- Di Renzo, L., P. Gualtieri, F. Pivari, et al. 2020. "Eating Habits and Lifestyle Changes During COVID-19 Lockdown: An Italian Survey." *Journal of Translational Medicine* 18, no. 1: 229. <https://doi.org/10.1186/s12967-020-02399-5>.
- Diamantopoulos, A., B. B. Schlegelmilch, R. R. Sinkovics, and G. M. Bohlen. 2003. "Can Socio-Demographics Still Play a Role in Profiling Green Consumers? A Review of the Evidence and an Empirical Investigation." *Journal of Business Research* 56, no. 6: 465–480. [https://doi.org/10.1016/S0148-2963\(01\)00241-7](https://doi.org/10.1016/S0148-2963(01)00241-7).
- Dwidienawati, D., S. B. Abdinagoro, D. Gandasari, and D. Tjahjana. 2021. "Do Generation Y and Z Really Concern About Environmental Issues?" *IOP Conference Series: Earth and Environmental Science* 729, no. 1: 012137. <https://doi.org/10.1088/1755-1315/729/1/012137>.
- Ek, S. 2015. "Gender Differences in Health Information Behaviour: A Finnish Population-Based Survey." *Health Promotion International* 30, no. 3: 736–745. <https://doi.org/10.1093/heapro/dat063>.
- Elder, G. H., Jr. 1994. "Time, Human Agency, and Social Change: Perspectives on the Life Course." *Social Psychology Quarterly* 57, no. 1: 4–15.
- European Commission. 2026. "Commission Calls on EU Countries to Coordinate Measures to Ensure Oil Security of Supply Amid Middle East Energy Disruption." https://energy.ec.europa.eu/news/commission-calls-eu-countries-coordinate-measures-ensure-oil-security-supply-amid-middle-east-energy-2026-03-31_en.
- Eurostat. 2024. "Eurostat News." <https://ec.europa.eu/eurostat/web/products-eurostat-news>.
- Fabbrizzi, S., F. Maggino, N. Marinelli, S. Menghini, and C. Ricci. 2016. "Sustainability and Well-Being: The Perception of Younger Generations and Their Expectations." *Agriculture and Agricultural Science Procedia* 8: 592–601. <https://doi.org/10.1016/j.aaspro.2016.02.081>.
- Faugier, J., and M. Sargeant. 1997. "Sampling Hard to Reach Populations." *Journal of Advanced Nursing* 26, no. 4: 790–797.
- Fortin-Rittberger, J. 2016. "Cross-National Gender Gaps in Political Knowledge: How Much Is due to Context?" *Political Research Quarterly* 69, no. 3: 391–402. <https://doi.org/10.1177/1065912916642867>.
- Franzen, A., and R. Meyer. 2010. "Environmental Attitudes in Cross-National Perspective: A Multilevel Analysis of the ISSP 1993 and 2000." *European Sociological Review* 26, no. 2: 219–234. <https://doi.org/10.1093/esr/jcp018>.
- Fryxell, G. E., and C. W. H. Lo. 2003. "The Influence of Environmental Knowledge and Values on Managerial Behaviours on Behalf of the Environment: An Empirical Examination of Managers in China." *Journal of Business Ethics* 46, no. 1: 45–69. <https://doi.org/10.1023/A:1024773012398>.
- Georgouli Loupi, M., D. Guizzo, and S. Smith. 2025. *Tackling the Gender Gap in Who Studies Economics in the UK*. Royal Economic Society. <https://res.org.uk/wp-content/uploads/2025/04/Tackling-the-Gender-Gap-full-report.pdf>.
- Gilg, A., S. Barr, and N. Ford. 2005. "Green Consumption or Sustainable Lifestyles? Identifying the Sustainable Consumer." *Futures* 37, no. 6: 481–504. <https://doi.org/10.1016/j.futures.2004.10.016>.
- Granderath, J. S., C. Sondermann, A. Martin, and M. Merkt. 2021. "Actual and Perceived Knowledge About COVID-19: The Role of Information Behavior in Media." *Frontiers in Psychology* 12: 778886. <https://doi.org/10.3389/fpsyg.2021.778886>.
- Gray, S. G., K. T. Raimi, R. Wilson, and J. Árvai. 2019. "Will Millennials Save the World? The Effect of Age and Generational Differences on Environmental Concern." *Journal of Environmental Management* 242: 394–402. <https://doi.org/10.1016/j.jenvman.2019.04.071>.
- Grunert, K. G., C. Chimisso, L. Lähteenmäki, et al. 2023. "Food-Related Consumer Behaviours in Times of Crisis: Changes in the Wake of the Ukraine War, Rising Prices and the Aftermath of the COVID-19 Pandemic." *Food Research International* 173: 113451. <https://doi.org/10.1016/j.foodres.2023.113451>.
- Hamilton, S. B., S. van Mouwerik, E. R. Oetting, F. Beauvais, and W. G. Keilin. 1988. "Nuclear War as a Source of Adolescent Worry: Relationships With Age, Gender, Trait Emotionality, and Drug Use." *Journal of Social Psychology* 128, no. 6: 745–763. <https://doi.org/10.1080/00224545.1988.9924554>.
- Herzenstein, M., S. Horsky, and S. S. Posavac. 2015. "Living With Terrorism or Withdrawing in Terror: Perceived Control and Consumer Avoidance." *Journal of Consumer Behaviour* 14, no. 4: 228–236. <https://doi.org/10.1002/cb.1511>.

- Ho, C. M., K.-C. Ko, S. Liu, and C.-C. Wu. 2024. "Stormy Sales: The Influence of Weather Expectations on FMCG Consumption." *Journal of Product and Brand Management* 33, no. 7: 801–814. <https://doi.org/10.1108/JPBOM-07-2023-4611>.
- Hoven, C. W., A. Krasnova, M. Bresnahan, et al. 2025. "Racial, Ethnic, and Socioeconomic Disparities in COVID-19 Pandemic Worries." *Journal of Racial and Ethnic Health Disparities* 12: 2853–2861. <https://doi.org/10.1007/s40615-024-02093-y>.
- Huang, H. 2016. "Media Use, Environmental Beliefs, Self-Efficacy, and Pro-Environmental Behavior." *Journal of Business Research* 69, no. 6: 2206–2212. <https://doi.org/10.1016/j.jbusres.2015.12.031>.
- Huang, Y., and N. Zhao. 2020. "Generalized Anxiety Disorder, Depressive Symptoms and Sleep Quality During COVID-19 Outbreak in China: A Web-Based Cross-Sectional Survey." *Psychiatry Research* 288: 112954. <https://doi.org/10.1016/j.psychres.2020.112954>.
- Hwang, H., S. J. Nam, and Y. L. Lee. 2025. "Reducing Food Waste Behavior for Sustainable Consumption: The Effect of Food Consumption Values on Food Waste." *Journal of Consumer Affairs* 59, no. 1: e70001. <https://doi.org/10.1111/joca.70001>.
- Jánská, M., M. Zambochová, and P. Kita. 2023. "The Influence of Slovak Consumer Lifestyle on Purchasing Behaviour in the Consumption of Organic Food." *British Food Journal* 125, no. 13: 3028–3049. <https://doi.org/10.1108/BFJ-07-2022-0618>.
- Jeong, H. S., and Y. K. Seock. 2026. "Decoding Sustainable Development in Fashion: Abductive Insights From Meta-Analysis." *Sustainable Development* 34, no. 1: 951–967. <https://doi.org/10.1002/sd.70299>.
- Jian, Y., I. Y. Yu, M. X. Yang, and K. J. Zeng. 2020. "The Impacts of Fear and Uncertainty of Covid-19 on Environmental Concerns, Brand Trust, and Behavioral Intentions Toward Green Hotels." *Sustainability* 12, no. 20: 1–14. <https://doi.org/10.3390/su12208688>.
- Josiassen, A., E. Lang, A. Nørfelt, F. Kock, and A. G. Assaf. 2024. "Investigating Place Solidarity and Consumer Boycotting in Threatening Times: A Study on the Ukraine-Russia Conflict." *Journal of Business Research* 182: 114796. <https://doi.org/10.1016/j.jbusres.2024.114796>.
- Jüttler, M., and S. Schumann. 2019. "Is Economics a Man's Business? Exploring the Long-Term Effects of the Gender Gap in Economic Competencies at the Upper Secondary Level on Students' Choice to Study Economics at University." *Citizenship, Social and Economics Education* 18, no. 3: 177–197. <https://doi.org/10.1177/2047173419885628>.
- Kaiser, F. G., and M. Wilson. 2004. "Goal-Directed Conservation Behavior: The Specific Composition of a General Performance." *Personality and Individual Differences* 36, no. 7: 1531–1544. <https://doi.org/10.1016/j.paid.2003.06.003>.
- Kallgren, C. A., and W. Wood. 1986. "Access to Attitude-Relevant Information in Memory as a Determinant of Attitude-Behavior Consistency." *Journal of Experimental Social Psychology* 22, no. 4: 328–338.
- Keeling, S. 2023. "A Matter of Content: Overcoming the Gender Gap in Political Knowledge, Expression of Knowledge, and Interest." *Italian Political Science Review* 53, no. 3: 384–398. <https://doi.org/10.1017/ipo.2023.15>.
- Khan, O., N. Varaksina, and A. Hinterhuber. 2024. "The Influence of Cultural Differences on Consumers' Willingness to Pay More for Sustainable Fashion." *Journal of Cleaner Production* 442: 141024. <https://doi.org/10.1016/j.jclepro.2024.141024>.
- Kitz, R., T. Walker, S. Charlebois, and J. Music. 2022. "Food Packaging During the COVID-19 Pandemic: Consumer Perceptions." *International Journal of Consumer Studies* 46, no. 2: 434–448. <https://doi.org/10.1111/ijcs.12691>.
- Kong, Z. H., M. Stangl, R. Oester, et al. 2026. "Medical Facemask Waste Alters Detritus Decomposition and Fungal Communities in a Freshwater Pond." *Scientific Reports* 16: 10597. <https://doi.org/10.1038/s41598-026-45795-5>.
- Krishen, A. S., J. L. Barnes, and H. F. Hu. 2025. "Consumer Knowledge and Sustainable Decision-Making: A Mixed-Method Inquiry and Proposed Model." *Technological Forecasting and Social Change* 210: 123848. <https://doi.org/10.1016/j.techfore.2024.123848>.
- Kudielka, B. M., and C. Kirschbaum. 2005. "Sex Differences in HPA Axis Responses to Stress: A Review." *Biological Psychology* 69, no. 1: 113–132. <https://doi.org/10.1016/j.biopsycho.2004.11.009>.
- Lass-Hennemann, J., M. R. Sopp, N. Ruf, et al. 2024. "Generation Climate Crisis, COVID-19, and Russia–Ukraine-War: Global Crises and Mental Health in Adolescents." *European Child and Adolescent Psychiatry* 33, no. 7: 2203–2216. <https://doi.org/10.1007/s00787-023-02300-x>.
- Lauri Korajlija, A., and N. Jokic-Begic. 2020. "COVID-19: Concerns and Behaviours in Croatia." *British Journal of Health Psychology* 25, no. 4: 849–855. <https://doi.org/10.1111/bjhp.12425>.
- Lee, K. 2008. "Opportunities for Green Marketing: Young Consumers." *Marketing Intelligence & Planning* 26, no. 6: 573–586. <https://doi.org/10.1108/02634500810902839>.
- Lim, W. M., M. Das, W. Sharma, A. Verma, and R. Kumra. 2024. "Gamification for Sustainable Consumption: A State-of-the-Art Overview and Future Agenda." *Business Strategy and the Environment* 34, no. 1: 1510–1549. <https://doi.org/10.1002/bse.4021>.
- Lin, F., X. Li, N. Jia, et al. 2023. "The Impact of Russia-Ukraine Conflict on Global Food Security." *Global Food Security* 36: 100661. <https://doi.org/10.1016/j.gfs.2022.100661>.
- Liobikienė, G., and J. Liobikas. 2025. "How the War in Ukraine and Attitudes Towards It Influenced Electricity Saving Behaviour and Electricity Consumption?" *Cleaner and Responsible Consumption* 16: 100261. <https://doi.org/10.1016/j.clrc.2025.100261>.
- Liu, C., S. Xia, and C. Lang. 2023. "Consumer Coping With Covid-19: An Exploratory Study of Clothing Consumption Shifts and the Effect of Consumer Resilience." *Journal of Fashion Marketing and Management: An International Journal* 27, no. 5: 810–825. <https://doi.org/10.1108/JFMM-10-2022-0221>.
- Luchs, M. G., and T. A. Mooradian. 2012. "Sex, Personality, and Sustainable Consumer Behaviour: Elucidating the Gender Effect." *Journal of Consumer Policy* 35, no. 1: 127–144. <https://doi.org/10.1007/s10603-011-9179-0>.
- Mahlstein, K., C. McDaniel, S. Schropp, and M. Tsigas. 2022. "Estimating the Economic Effects of Sanctions on Russia: An Allied Trade Embargo." *World Economy* 45, no. 11: 3344–3383. <https://doi.org/10.1111/twec.13311>.
- Mainardes, E. W., C. A. Espanhol, and P. B. da Cruz. 2021. "Green Consumption: Consumer Behavior After an Environmental Tragedy." *Journal of Environmental Planning and Management* 64, no. 7: 1156–1183. <https://doi.org/10.1080/09640568.2020.1812546>.
- Makhashvili, N., J. D. Javakhishvili, L. Sturua, K. Pilauri, D. C. Fuhr, and B. Roberts. 2020. "The Influence of Concern About COVID-19 on Mental Health in the Republic of Georgia: A Cross-Sectional Study." *Globalization and Health* 16: 1–10. <https://doi.org/10.1186/s12992-020-00641-9>.
- Mannoni, E. 2025. "'I'm Worried, but': Unpacking the Gap Between Environmental Concern and Pro-Environmental Behavior." *Swiss Political Science Review* 31, no. 4: 644–665. <https://doi.org/10.1111/spsr.12660>.
- Martin-Valmayor, M. A., L. A. Gil-Alana, and J. Infante. 2023. "Energy Prices in Europe. Evidence of Persistence Across Markets." *Resources Policy* 82: 103546. <https://doi.org/10.1016/j.resourpol.2023.103546>.
- McKinsey & Company. 2020. "How Covid-19 Is Changing Consumer Behavior-Now and Forever." <https://www.mckinsey.com/~media/mckinsey/industries/retail/our%20insights/how%20covid%2019%20is%20changing%20consumer%20behavior%20now%20and%20forever/how-covid-19-is-changing-consumer-behaviornow-and-forever.pdf>.

- Mendez, J. M., and T. Osborn. 2010. "Gender and the Perception of Knowledge in Political Discussion." *Political Research Quarterly* 63, no. 2: 269–279. <https://doi.org/10.1177/1065912908328860>.
- Mertens, G., L. Gerritsen, S. Duijndam, E. Salemink, and I. M. Engelhard. 2020. "Fear of the Coronavirus (COVID-19): Predictors in an Online Study Conducted in March 2020." *Journal of Anxiety Disorders* 74: 102258. <https://doi.org/10.1016/j.janxdis.2020.102258>.
- Mi, L., L. Qiao, T. Xu, et al. 2020. "Promoting Sustainable Development: The Impact of Differences in Cultural Values on Residents' Pro-Environmental Behaviors." *Sustainable Development* 28, no. 6: 1539–1553. <https://doi.org/10.1002/sd.2103>.
- Migheli, M. 2021. "Green Purchasing: The Effect of Parenthood and Gender." *Environment, Development and Sustainability* 23, no. 7: 10576–10600. <https://doi.org/10.1007/s10668-020-01073-6>.
- Moss-Racusin, C. A., J. F. Dovidio, V. L. Brescoll, M. J. Graham, and J. Handelsman. 2012. "Science Faculty's Subtle Gender Biases Favor Male Students." *Proceedings of the National Academy of Sciences* 109, no. 41: 16474–16479. <https://doi.org/10.1073/pnas.1211286109>.
- Mostafa, M. M. 2006. "Antecedents of Egyptian Consumers' Green Purchase Intentions." *Journal of International Consumer Marketing* 19, no. 2: 97–126. https://doi.org/10.1300/J046v19n02_06.
- Mostafa, M. M. 2007. "Gender Differences in Egyptian Consumers' Green Purchase Behaviour: The Effects of Environmental Knowledge, Concern and Attitude." *International Journal of Consumer Studies* 31, no. 3: 220–229. <https://doi.org/10.1111/j.1470-6431.2006.00523.x>.
- Ngo, C. N., and H. Dang. 2023. "Covid-19 in America: Global Supply Chain Reconsidered." *World Economy* 46, no. 1: 256–275. <https://doi.org/10.1111/twec.13317>.
- Noy, C. 2008. "Sampling Knowledge: The Hermeneutics of Snowball Sampling in Qualitative Research." *International Journal of Social Research Methodology* 11, no. 4: 327–344. <https://doi.org/10.1080/13645570701401305>.
- Orkut, H., and C. Perrin. 2026. "Two Shades of Green? Gender Differences in Environmental Concern and Activism." *International Journal of Finance and Economics*: 1–25. <https://doi.org/10.1002/ijfe.70172>.
- Peluso, A. M., M. Pichierri, and G. Pino. 2021. "Age-Related Effects on Environmentally Sustainable Purchases at the Time of COVID-19: Evidence From Italy." *Journal of Retailing and Consumer Services* 60: 102443. <https://doi.org/10.1016/j.jretconser.2021.102443>.
- Polonsky, M. J., A. Vocino, S. L. Grau, R. Garma, and A. S. Ferdous. 2012. "The Impact of General and Carbon-Related Environmental Knowledge on Attitudes and Behaviour of US Consumers." *Journal of Marketing Management* 28, no. 3–4: 238–263. <https://doi.org/10.1080/0267257X.2012.659279>.
- Rausch, T. M., D. Baier, and S. Wening. 2021. "Does Sustainability Really Matter to Consumers? Assessing the Importance of Online Shop and Apparel Product Attributes." *Journal of Retailing and Consumer Services* 63: 102681. <https://doi.org/10.1016/j.jretconser.2021.102681>.
- Rausch, T. M., and C. S. Kopplin. 2021. "Bridge the Gap: Consumers' Purchase Intention and Behavior Regarding Sustainable Clothing." *Journal of Cleaner Production* 278: 123882. <https://doi.org/10.1016/j.jclepro.2020.123882>.
- Ravaldi, C., V. Ricca, A. Wilson, C. Homer, and A. Vannacci. 2020. "Previous Psychopathology Predicted Severe COVID-19 Concern, Anxiety, and PTSD Symptoms in Pregnant Women During "Lockdown" in Italy." *Archives of Women's Mental Health* 23, no. 6: 783–786. <https://doi.org/10.1007/s00737-020-01086-0>.
- Regnoli, G. M., G. Tiano, and B. De Rosa. 2023. "Italian Adaptation and Validation of the Fear of War Scale and the Impact of the Fear of War on Young Italian Adults' Mental Health." *Social Sciences* 12, no. 12: 643. <https://doi.org/10.3390/socsci12120643>.
- Reinking, A., and B. Martin. 2018. "The Gender Gap in STEM Fields: Theories, Movements, and Ideas to Engage Girls in STEM." *Journal of New Approaches in Educational Research* 7, no. 2: 148–153. <https://doi.org/10.7821/naer.2018.7.271>.
- Riad, A., A. Drobov, M. A. Alkasaby, A. Peřina, and M. Kořčík. 2023. "Nuclear Anxiety Amid the Russian-Ukrainian War 2022 (RUW-22): Descriptive Cross-Sectional Study." *International Journal of Environmental Research and Public Health* 20, no. 4: 3551. <https://doi.org/10.3390/ijerph20043551>.
- Rice, G. 2006. "Pro-Environmental Behavior in Egypt: Is There a Role for Islamic Environmental Ethics?" *Journal of Business Ethics* 65, no. 4: 373–390. <https://doi.org/10.1007/s10551-006-0010-9>.
- Robelia, B., and T. Murphy. 2012. "What Do People Know About Key Environmental Issues? A Review of Environmental Knowledge Surveys." *Environmental Education Research* 18, no. 3: 299–321. <https://doi.org/10.1080/13504622.2011.618288>.
- Rodgers, R. F., C. Lombardo, S. Cerolini, et al. 2021. "Waste Not and Stay at Home Evidence of Decreased Food Waste During the COVID-19 Pandemic From the U.S. and Italy." *Appetite* 160: 105110. <https://doi.org/10.1016/j.appet.2021.105110>.
- Rugbani, A., M. B. Hkoma, A. Almaktoof, and T. Galouz. 2026. "Evaluating the Role of Higher Education Institutions in Fostering Environmental Awareness, Behaviour and Sustainable Development." *Sustainable Development* 1–17. <https://doi.org/10.1002/sd.70915>.
- Saari, U. A., S. Damberg, L. Frömling, and C. M. Ringle. 2021. "Sustainable Consumption Behavior of Europeans: The Influence of Environmental Knowledge and Risk Perception on Environmental Concern and Behavioral Intention." *Ecological Economics* 189: 107155. <https://doi.org/10.1016/j.ecolecon.2021.107155>.
- Sandlin, J. A., and J. G. Maudlin. 2012. "Consuming Pedagogies: Controlling Images of Women as Consumers in Popular Culture." *Journal of Consumer Culture* 12, no. 2: 175–194.
- Schahn, J., and E. Holzer. 1990. "Studies of Individual Environmental Concern." *Environment and Behavior* 22, no. 6: 767–786. <https://doi.org/10.1177/0013916590226003>.
- Seifian, A., S. Shokouhyar, and M. Bahrami. 2023. "Exploring Customers' Purchasing Behavior Toward Refurbished Mobile Phones: A Cross-Cultural Opinion Mining of Amazon Reviews." *Environment, Development and Sustainability* 26, no. 11: 28131–28159. <https://doi.org/10.1007/s10668-023-03804-x>.
- Setiawan, H., K. Kusnadi, H. K. Surtikanti, and R. Riandi. 2023. "Gender Differences and the Correlation of Environmental Knowledge With Sustainability Awareness After ESD-PjBL Implementation." *Jurnal Pendidikan Biologi Indonesia* 9, no. 3: 371–386. <https://doi.org/10.22219/jpbi.v9i3.26049>.
- Sharkasi, N., P. De Maeyer, H. c. Lababdi, S. AlMansoori, and G. Agag. 2025. "A Sustainable Step Forward: Exploring Factors Influencing the Purchase Intentions Towards Remanufactured Products Using fsQCA." *Journal of Retailing and Consumer Services* 82: 104115. <https://doi.org/10.1016/j.jretconser.2024.104115>.
- Spagnolo, P. A., J. A. E. Manson, and H. Joffe. 2020. "Sex and Gender Differences in Health: What the COVID-19 Pandemic Can Teach Us." In *Annals of Internal Medicine*, vol. 73, 385–386. American College of Physicians. <https://doi.org/10.7326/M20-1941>.
- Tan, B. C., T.-C. Lau, T. B. Chen, and L. T. Chai. 2010. "Attitude Towards the Environment and Green Products: Consumers' Perspective." *Management Science and Engineering* 4, no. 2: 27–39.
- Taufique, K. M. R., A. Vocino, and M. J. Polonsky. 2017. "The Influence of Eco-Label Knowledge and Trust on Pro-Environmental Consumer Behaviour in an Emerging Market." *Journal of Strategic Marketing* 25, no. 7: 511–529. <https://doi.org/10.1080/0965254X.2016.1240219>.

- Trepte, S., and J. B. Schmitt. 2017. "The Effects of Age on the Interplay Between News Exposure, Political Discussion, and Political Knowledge." *Journal of Individual Differences* 38, no. 1: 21–28. <https://doi.org/10.1027/1614-0001/a000218>.
- Trinh, A. K., M. D. Tran, and S. Adomako. 2025. "Environmental Knowledge and Sustainable Consumption Behavior: Evidence From Vietnam." *Sustainable Development* 33: 577–593. <https://doi.org/10.1002/sd.70013>.
- Trudel, R. 2019. "Sustainable Consumer Behavior." *Consumer Psychology Review* 2, no. 1: 85–96. <https://doi.org/10.1002/arcp.1045>.
- Tzavaras, M., I. Tzimitra-Kalogianni, and M. Bourlakis. 2010. "Consumer Behaviour in the Greek Floral Market: Comparative Insights for the Food Industry." *British Food Journal* 112, no. 4: 403–415. <https://doi.org/10.1108/00070701011034411>.
- United Nations. 2024. "Greenhouse Gases Surged to New Highs in 2023, Warns UN Weather Agency." <https://news.un.org/en/story/2024/10/1156186>.
- Vargová, L., B. Jozefiaková, M. Lačný, and M. Adamkovič. 2024. "War-Related Stress Scale." *BMC Psychology* 12, no. 1: 208. <https://doi.org/10.1186/s40359-024-01687-9>.
- Veloso, S., C. Tam, and T. Oliveira. 2024. "Effects of Extreme Drought and Water Scarcity on Consumer Behaviour – The Impact of Water Consumption Awareness and Consumers' Choices." *Journal of Hydrology* 639: 131574. <https://doi.org/10.1016/j.jhydrol.2024.131574>.
- Verba, S., N. Burns, and K. L. Schlozman. 1997. "Knowing and Caring About Politics: Gender and Political Engagement." *Journal of Politics* 59, no. 4: 1051–1072. <https://doi.org/10.2307/2998592>.
- Villa-Castaño, L. E. 2025. "An Analysis of the Influence of Gender and Generational Factors on Sustainable Consumption Patterns in the Urban Environment of Colombia." *Sustainability* 18, no. 1: 85. <https://doi.org/10.3390/su18010085>.
- Walstad, W. B. 1997. "The Effect of Economic Knowledge on Public Opinion of Economic Issues." *Journal of Economic Education* 28, no. 3: 195–205. <https://doi.org/10.1080/00220489709596744>.
- Walstad, W. B., and K. Rebeck. 2002. "Assessing the Economic Knowledge and Economic Opinions of Adults." *Quarterly Review of Economics and Finance* 42, no. 5: 921–935.
- Wilson, J. M., J. Lee, and N. J. Shook. 2021. "COVID-19 Worries and Mental Health: The Moderating Effect of Age." *Aging and Mental Health* 25, no. 7: 1289–1296. <https://doi.org/10.1080/13607863.2020.1856778>.
- Wobker, I., P. Kenning, M. Lehmann-Waffenschmidt, and G. Gigerenzer. 2014. "What Do Consumers Know About the Economy?: A Test of Minimal Economic Knowledge in Germany." *Journal für Verbraucherschutz und Lebensmittelsicherheit* 9, no. 3: 231–242. <https://doi.org/10.1007/s00003-014-0869-9>.
- World Economic Forum. 2024. "The Global Risk Report 2024 (19th Edition)." https://www.weforum.org/docs/WEF_The_Global_Risks_Report_2024.pdf.
- World Economic Forum. 2026. "The Global Risk Report 2026 (21st Edition)." <https://www.weforum.org/publications/global-risks-report-2026>.
- World Health Organization. 2025. "Who Covid-19 Dashboard." <https://data.who.int/dashboards/covid19/cases>.
- Xu, Y., W. Li, and S. Chi. 2021. "Altruism, Environmental Concerns, and Pro-Environmental Behaviors of Urban Residents: A Case Study in a Typical Chinese City." *Frontiers in Psychology* 12: 643759. <https://doi.org/10.3389/fpsyg.2021.643759>.
- Yemeke, T., H. H. Chen, and S. Ozawa. 2023. "Economic and Cost-Effectiveness Aspects of Vaccines in Combating Antibiotic Resistance." *Human Vaccines & Immunotherapeutics* 19, no. 1: 2215149. <https://doi.org/10.1080/21645515.2023.2215149>.
- Yousef, H., D. Yousri, and N. El-Bassiouny. 2025. "Seeing the Threat: A Study on Climate Change Risk Perceptions and Pro-Environmental Behaviour." *Sustainable Development* 34: 1808–1826. <https://doi.org/10.1002/sd.70425>.
- Zhang, J. Z., and C.-W. Chang. 2021. "Consumer Dynamics: Theories, Methods, and Emerging Directions." *Journal of the Academy of Marketing Science* 49, no. 1: 166–196. <https://doi.org/10.1007/s11747-020-00720-8>.
- Zhang, Q., K. Yang, Y. Hu, J. Jiao, and S. Wang. 2023. "Unveiling the Impact of Geopolitical Conflict on Oil Prices: A Case Study of the Russia-Ukraine War and Its Channels." *Energy Economics* 126: 106956. <https://doi.org/10.1016/j.eneco.2023.106956>.
- Zhong, B. L., W. Luo, H. M. Li, et al. 2020. "Knowledge, Attitudes, and Practices Towards COVID-19 Among Chinese Residents During the Rapid Rise Period of the COVID-19 Outbreak: A Quick Online Cross-Sectional Survey." *International Journal of Biological Sciences* 16, no. 10: 1745–1752. <https://doi.org/10.7150/ijbs.45221>.
- Zhong, C., and J. Huo. 2024. "Does Age Matter in Inflation Uncertainty?" *Economics Letters* 242: 111834. <https://doi.org/10.1016/j.econlet.2024.111834>.
- Zimand-Sheiner, D., and S. Lissitsa. 2024. "Generation Z - Factors Predicting Decline in Purchase Intentions After Receiving Negative Environmental Information: Fast Fashion Brand SHEIN as a Case Study." *Journal of Retailing and Consumer Services* 81: 103999. <https://doi.org/10.1016/j.jretconser.2024.103999>.

Appendix A

TABLE A1 | Scales with sources and descriptive statistics.

Question	Statement	References	Mean	Standard deviation
Q1	Please indicate to what extent you agree or disagree with the following statements:			
	A. I feel well informed about public health issues (e.g., Covid-19 pandemic, epidemics, vaccines)	Adapted from Mostafa (2006)	3.59	0.90
	B. I know more about public health issues (e.g., Covid-19 pandemic, epidemics, vaccines), than the average person	Adapted from Mostafa (2006)	3.41	0.94
	C. I know quite a lot about public health issues (e.g., Covid-19 pandemic, epidemics, vaccines)	Adapted from Mostafa (2006)	3.44	0.92
	D. I feel well informed about economic trends (e.g., trends of prices and interest rate)	Adapted from Mostafa (2006)	2.94	1.02
	E. I know more about economic trends than the average person (e.g., the trends of prices and interest rate)	Adapted from Mostafa (2006)	2.88	1.01
	F. I know quite a lot about economic trends (e.g., the trends of prices and interest rate)	Adapted from Mostafa (2006)	2.82	1.00
	G. I feel well informed about current geopolitical conflicts (e.g., war in Ukraine, conflicts in the Middle East)	Adapted from Mostafa (2006)	3.21	1.02
	H. I know more about current geopolitical conflicts (e.g., war in Ukraine, conflicts in the Middle East) than the average person	Adapted from Mostafa (2006)	3.08	1.01
	I. I know quite a lot about current geopolitical conflicts (e.g., war in Ukraine, conflicts in the Middle East)	Adapted from Mostafa (2006)	3.11	1.00
	J. I feel well informed about environmental issues (e.g., pollution, global warming and climate change)	Adapted from Mostafa (2006)	3.63	0.90
	K. I know more about environmental issues (e.g., pollution, global warming and climate change) than the average person	Adapted from Mostafa (2006)	3.39	0.92
	L. I know quite a lot about environmental issues (e.g., pollution, global warming and climate change)	Adapted from Mostafa (2006)	3.45	0.94
Q2	Please indicate to what extent you experience difficulties or concerns in the following areas			
	A. Covid-19 pandemic	New item	2.39	1.18
	B. Future epidemics and diseases	New item	3.01	1.09
	C. My health condition	New item	2.93	1.15
	D. Health conditions of my loved ones (family, friends)	New item	3.72	1.08
	E. Functioning of the Italian healthcare system	Adapted from Vargová et al. (2024)	3.83	1.15
	F. Economic crisis in Italy	Adapted from Vargová et al. (2024)	3.63	1.04
	G. Rising prices of essential items (e.g., food, medicine)	Adapted from Vargová et al. (2024)	4.02	0.96
	H. Rising prices of electricity, gas and fuels	Adapted from Vargová et al. (2024)	4.09	0.93
	I. Rising of interest rates	New item	3.73	1.12
	J. My economic condition	New item	3.40	1.18
	K. Potential political crisis in Italy	Adapted from Vargová et al. (2024)	3.03	1.30
	L. Potential political crisis in other countries	Adapted from Vargová et al. (2024)	2.87	1.24
	M. International critical events (e.g., attacks on merchant ships, closure of the Suez Canal)	New item	3.31	1.15
	N. Concern about the war moving to the EU or the world	Vargová et al. (2024)	4.00	1.03
	O. Nuclear threat related to conflicts	Adapted from Vargová et al. (2024)	3.78	1.14
	P. Global warming and climate change	Dangelico et al. (2022)	4.09	1.07
	Q. Pollution (air, soil, and water)	Dangelico et al. (2022)	4.18	0.96
	R. Biodiversity loss	Dangelico et al. (2022)	3.90	1.05
	S. Disposal of undifferentiated waste	Dangelico et al. (2022)	3.87	1.05
	T. Natural habitat destruction	Dangelico et al. (2022)	4.04	0.99
	U. Unsustainable management of natural resources	Dangelico et al. (2022)	3.96	0.97

(Continues)

TABLE A1 | (Continued)

Question	Statement	References	Mean	Standard deviation
Q3	Please indicate how frequently did you buy each of the following products during the last 2 years			
	A. Products sold by neighborhood stores	Dangelico et al. (2022)	3.57	0.94
	B. Made in Italy products	Dangelico et al. (2022)	3.68	0.75
	C. Local Products	Dangelico et al. (2022); Huang (2016)	3.59	0.79
	D. Fair Trade products	Dangelico et al. (2022)	2.71	0.84
	E. Organic product	Dangelico et al. (2022)	2.96	0.87
	F. Eco-sustainable products	Dangelico et al. (2022)	3.06	0.79
	G. Products with recycled materials	New item	3.01	0.71
	H. Second-hand products	New item	2.30	0.98
	I. Refurbished or remanufactured products (e.g., smartphone, PC)	New item	1.95	0.99
	J. Energy efficient products (e.g., LED light bulbs, energy efficient home appliances)	Adapted from Huang (2016)	3.84	1.01
	K. Healthy food products	New item	3.94	0.76
	L. Vegan products	New item	2.07	1.03
	M. Draft products, bringing your own bottle (e.g., laundry detergent) or versions that do not require plastic packaging (e.g., solid soaps, detergents, shampoo)	New item	2.07	1.06
	N. Products with eco-friendly packaging	New item	3.08	0.86
Q4	Please indicate how frequently did you perform each of the following actions during the past 2 years			
	A. Turn off or unplug electronic devices when not needed	Huang (2016)	3.57	1.19
	B. Reduce air conditioning	Huang (2016)	3.92	1.03
	C. Reduce driving, and walk, cycle or use public transportation or mobility sharing (e.g., bike or car sharing)	Adapted from Huang (2016)	3.35	1.10
	D. Lower the thermostat of domestic heating	Adapted from Kaiser and Wilson (2004)	3.73	1.05
	E. Turn off lights when leaving rooms	New item	4.65	0.66
	F. Prefer low temperature washing programs (for washing machine and/or dishwasher)	New item	4.05	0.94
	G. Cook more efficiently (e.g., cooking multiple foods simultaneously in the oven)	New item	3.74	1.03
	H. Recycling	Adapted from Kaiser and Wilson (2004)	4.67	0.75
	I. Use own bag when shopping	Adapted from Kaiser and Wilson (2004)	4.16	1.01
	J. Wait until appliances (dishwasher or washing machine) is full to run	Adapted from Kaiser and Wilson (2004)	4.52	0.72
	K. Look at the label/package information, when buying a product, to see if it contains substances that are environmentally damaging	Adapted from Lee (2008)	3.27	1.26
	L. Look at the label/package information, when buying a product, to see if it contains substances that are damaging for health	Adapted from Lee (2008)	3.61	1.21
	M. Look at the label/package information, when buying a product, to see if the product can be recycled	Adapted from Lee (2008)	3.14	1.18
	N. Look at the label/package information, when buying a product, to see if the packaging can be recycled	Adapted from Lee (2008)	3.15	1.19

TABLE A2 | Gender comparison: Results of the Kruskal–Wallis test.

Question	Means			Sign Kruskal – Wallis test statistic			
	Item	Man	Woman	χ^2 (1)	p		
Q1	Q1-A	3.56	<	3.61	1.536	0.215	
	Q1-B	3.44	<	3.39	0.639	0.424	
	Q1-C	3.44	<	3.45	0.123	0.752	
	Q1-D	3.25	>	2.75	75.590	< 0.001	
	Q1-E	3.25	>	2.66	103.632	< 0.001	
	Q1-F	3.14	>	2.63	80.219	< 0.001	
	Q1-G	3.50	>	3.03	61.765	< 0.001	
	Q1-H	3.44	>	2.87	95.896	< 0.001	
	Q1-I	3.39	>	2.95	58.183	< 0.001	
	Q1-J	3.65	>	3.62	1.116	0.291	
	Q1-K	3.57	>	3.28	31.056	< 0.001	
	Q1-L	3.57	>	3.38	13.611	< 0.001	
Q2	Q2-A	2.19	<	2.52	25.278	< 0.001	
	Q2-B	2.85	<	3.11	18.145	< 0.001	
	Q2-C	2.77	<	3.02	16.277	< 0.001	
	Q2-D	3.52	<	3.84	28.821	< 0.001	
	Q2-E	3.77	<	3.87	3.257	0.071	
	Q2-F	3.48	<	3.73	18.223	< 0.001	
	Q2-G	3.84	<	4.13	27.279	< 0.001	
	Q2-H	3.95	<	4.17	15.189	< 0.001	
	Q2-I	3.52	<	3.86	28.658	< 0.001	
	Q2-J	3.28	<	3.48	9.323	0.002	
	Q2-K	2.69	<	3.24	51.866	< 0.001	
	Q2-L	2.59	<	3.03	40.974	< 0.001	
	Q2-M	3.16	<	3.41	14.298	< 0.001	
	Q2-N	3.75	<	4.16	42.729	< 0.001	
	Q2-O	3.45	<	3.99	66.029	< 0.001	
	Q2-P	3.80	<	4.26	42.834	< 0.001	
	Q2-Q	3.97	<	4.32	31.529	< 0.001	
	Q2-R	3.70	<	4.03	25.931	< 0.001	
	Q2-S	3.63	<	4.02	37.191	< 0.001	
	Q2-T	3.88	<	4.14	21.958	< 0.001	
	Q2-U	3.81	<	4.05	18.143	< 0.001	
	Q3	Q3-A	3.40	<	3.68	25.977	< 0.001
		Q3-B	3.59	<	3.74	11.706	< 0.001
		Q3-C	3.49	<	3.65	14.741	< 0.001
Q3-D		2.63	<	2.76	8.156	0.004	
Q3-E		2.81	<	3.06	27.770	< 0.001	
Q3-F		2.96	<	3.11	13.066	< 0.001	
Q3-G		2.98	<	3.02	2.281	0.131	
Q3-H		2.26	<	2.32	1.354	0.245	
Q3-I		1.88	<	2.00	2.664	0.103	
Q3-J		3.78	<	3.87	3.369	0.066	
Q3-K		3.76	<	4.05	39.240	< 0.001	
Q3-L		1.85	<	2.21	41.628	< 0.001	
Q3-M		2.00	<	2.11	4.008	0.045	
Q3-N		2.97	<	3.14	14.205	< 0.001	
Q4	Q4-A	3.43	<	3.65	8.767	0.003	
	Q4-B	3.79	<	4.00	12.324	< 0.001	
	Q4-C	3.24	<	3.43	10.311	0.001	
	Q4-D	3.71	>	3.74	0.600	0.439	
	Q4-E	4.63	<	4.66	0.303	0.582	
	Q4-F	3.90	<	4.14	21.205	< 0.001	
	Q4-G	3.43	<	3.93	70.314	< 0.001	
	Q4-H	4.62	<	4.70	7.241	0.007	
	Q4-I	4.02	<	4.24	15.317	< 0.001	
	Q4-J	4.35	<	4.62	39.290	< 0.001	
	Q4-K	3.13	<	3.36	10.231	0.001	
	Q4-L	3.47	<	3.70	10.629	0.001	
	Q4-M	3.04	<	3.20	5.816	0.016	
	Q4-N	3.02	<	3.24	10.568	0.001	

TABLE A3 | Age comparison: Results of the Kruskal–Wallis test and Dunn–Bonferroni Post hoc test.

		Means						Sign		
Question		Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Kruskal–Wallis test statistic		Dunn–Bonferroni post hoc test differences
	Item	18–24	25–34	35–44	45–54	55–65	> 65	χ^2 (5)	<i>p</i>	(<i>p</i>)
Q1	Q1-A	3.60	3.45	3.49	3.55	3.67	3.91	27.68	< 0.001	2–5 (0.004); 2–6 (< 0.001); 3–5 (0.017); 3–6 (< 0.001); 4–6 (< 0.001); 1–4 (< 0.001); 5–6 (0.016)
	Q1-B	3.35	3.26	3.34	3.43	3.47	3.79	28.596	< 0.001	2–5 (0.013); 2–6 (< 0.001); 3–6 (< 0.001); 1–6 (< 0.001); 4–6 (< 0.001); 5–6 (0.002)
	Q1-C	3.42	3.32	3.38	3.43	3.50	3.79	21.336	< 0.001	2–5 (0.030); 2–6 (< 0.001); 3–6 (< 0.001); 1–6 (< 0.001); 4–6 (< 0.001); 5–6 (0.006)
	Q1-D	2.85	2.76	2.84	2.99	3.12	3.23	29.874	< 0.001	2–4 (0.012); 2–5 (< 0.001); 2–6 (< 0.001); 3–5 (0.006); 3–6 (< 0.001); 1–5 (0.002); 1–6 (< 0.001); 4–6 (0.030)
	Q1-E	2.76	2.74	2.74	2.93	3.10	3.15	34.218	< 0.001	3–4 (0.043); 3–5 (< 0.001); 3–6 (< 0.001); 2–4 (0.050); 2–5 (< 0.001); 2–6 (< 0.001); 1–5 (< 0.001); 1–6 (< 0.001); 4–6 (0.046)
	Q1-F	2.74	2.63	2.67	2.88	3.05	3.06	37.359	< 0.001	2–4 (0.006); 2–5 (< 0.001); 2–6 (< 0.001); 3–4 (0.032); 3–5 (< 0.001); 3–6 (0.001); 1–5 (< 0.001); 1–6 (0.003); 4–5 (0.047)
	Q1-G	3.15	3.01	2.98	3.24	3.40	3.62	50.489	< 0.001	3–4 (0.006); 3–5 (< 0.001); 3–6 (< 0.001); 2–4 (0.017); 2–5 (< 0.001); 2–6 (< 0.001); 1–5 (0.001); 1–6 (< 0.001); 4–6 (< 0.001); 5–6 (0.024)
	Q1-H	2.99	2.89	2.88	3.08	3.37	3.40	51.076	< 0.001	3–4 (0.041); 3–5 (< 0.001); 3–6 (< 0.001); 2–5 (< 0.001); 2–6 (< 0.001); 1–5 (< 0.001); 1–6 (< 0.001); 4–5 (0.002); 4–6 (0.003)
	Q1-I	3.01	2.88	2.93	3.17	3.33	3.53	55.248	< 0.001	2–4 (0.003); 2–5 (< 0.001); 2–6 (< 0.001); 3–4 (0.016); 3–5 (< 0.001); 3–6 (< 0.001); 1–4 (0.043); 1–5 (< 0.001); 1–6 (< 0.001); 4–6 (< 0.001)
	Q1-J	3.60	3.47	3.51	3.73	3.69	3.90	23.859	< 0.001	2–5 (0.017); 2–4 (0.007); 2–6 (< 0.001); 3–5 (0.050); 3–4 (0.024); 3–6 (< 0.001); 1–6 (< 0.001); 5–6 (0.025)
	Q1-K	3.32	3.27	3.24	3.43	3.51	3.69	25.485	< 0.001	3–4 (0.037); 3–5 (0.003); 3–6 (< 0.001); 2–5 (0.006); 2–6 (< 0.001); 1–5 (0.009); 1–6 (< 0.001); 4–6 (0.025)
	Q1-L	3.38	3.34	3.29	3.49	3.56	3.81	27.671	< 0.001	3–5 (0.006); 3–6 (< 0.001); 2–5 (0.025); 2–6 (< 0.001); 1–5 (0.024); 1–6 (< 0.001); 4–6 (0.002)

(Continues)

TABLE A3 | (Continued)

		Means						Sign		
Question		Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Kruskal–Wallis test statistic		Dunn–Bonferroni post hoc test differences
Item		18–24	25–34	35–44	45–54	55–65	> 65	χ^2 (5)	p	(p)
Q2	Q2-A	2.36	2.20	2.22	2.38	2.58	2.72	22.945	< 0.001	2–5 (< 0.001); 2–6 (< 0.001); 3–5 (0.005); 3–6 (< 0.001); 1–5 (0.040); 1–6 (0.006); 4–6 (0.009)
	Q2-B	2.97	3.02	2.86	3.00	3.15	3.07	8.634	0.125	
	Q2-C	3.00	2.92	2.80	2.97	2.91	2.86	3.518	0.621	
	Q2-D	3.91	3.80	3.74	3.72	3.48	3.48	28.35	< 0.001	6–4 (< 0.042); 6–3 (0.031); 6–2 (0.006); 6–1 (< 0.001); 5–4 (0.033); 5–3 (0.025); 5–2 (0.002); 5–1 (< 0.001); 4–1 (0.033)
	Q2-E	3.77	3.78	3.98	3.86	3.90	3.73	11.881	0.036	1–4 (0.046); 1–5 (0.012); 1–3 (0.009); 2–3 (0.035)
	Q2-F	3.65	3.77	3.50	3.53	3.58	3.83	12.048	0.034	3–2 (0.024); 3–6 (0.015); 4–2 (0.020); 4–6 (0.014); 5–6 (0.035)
	Q2-G	4.04	4.13	3.9	4.00	4.03	3.95	6.179	0.289	
	Q2-H	4.00	4.20	4.00	4.03	4.20	4.09	14.003	0.016	1–2 (0.007); 1–5 (0.001); 3–5 (0.033)
	Q2-I	3.68	3.82	3.77	3.79	3.77	3.40	14.622	0.012	6–3 (0.014); 6–4 (0.005); 6–5 (0.003); 6–2 (0.002); 1–2 (0.035)
	Q2-J	3.54	3.75	3.46	3.35	3.18	2.81	59.748	< 0.001	6–5 (0.010); 6–4 (< 0.001); 6–3 (< 0.001); 6–2 (< 0.001); 6–1 (< 0.001); 5–3 (0.015); 5–1 (< 0.001); 5–2 (< 0.001); 4–2 (< 0.001); 3–2 (0.019); 1–2 (0.037)
	Q2-K	3.24	3.06	3.01	2.89	2.85	3.08	15.726	0.008	5–1 (< 0.001); 4–1 (0.002)
	Q2-L	2.79	2.76	2.83	2.88	2.99	3.04	7.662	0.176	
	Q2-M	3.30	3.16	3.03	3.29	3.5	3.72	33.611	< 0.001	3–1 (0.035); 3–4 (0.035); 3–5 (< 0.001); 3–6 (< 0.001); 2–5 (0.001); 2–6 (< 0.001); 1–5 (0.010); 1–6 (< 0.001); 4–5 (0.027); 4–6 (0.002)
	Q2-N	3.97	3.98	3.79	4.00	4.1	4.27	20.465	0.001	3–5 (0.001); 3–6 (< 0.001); 1–5 (0.014); 1–6 (0.001); 4–6 (0.013) 2–6 (0.016)
	Q2-O	3.69	3.70	3.75	3.72	3.95	4.03	15.460	0.009	1–5 (0.003); 1–6 (0.010); 2–5 (0.009); 2–6 (0.017); 4–5 (0.023); 4–6 (0.034)
	Q2-P	4.17	4.12	4.05	3.97	4.03	4.22	4.625	0.463	
	Q2-Q	4.18	4.18	4.08	4.17	4.23	4.28	6.803	0.236	
	Q2-R	3.89	3.83	3.89	3.93	3.94	4.00	3.798	0.579	
	Q2-S	3.73	3.78	3.88	3.97	3.91	4.19	23.337	< 0.001	1–5 (0.020); 1–4 (0.002); 1–6 (< 0.001); 2–4 (0.032); 2–6 (< 0.001); 3–6 (0.005); 5–6 (0.019)
	Q2-T	3.89	3.95	4.04	4.11	4.18	4.21	21.095	< 0.001	1–4 (0.006); 1–5 (< 0.001); 1–6 (0.002); 2–5 (0.008); 2–6 (0.014)
	Q2-U	3.87	3.91	3.94	4.03	4.03	4.04	8.889	0.114	

(Continues)

TABLE A3 | (Continued)

		Means						Sign		
Question		Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Kruskal–Wallis test statistic		Dunn–Bonferroni post hoc test differences
	Item	18–24	25–34	35–44	45–54	55–65	> 65	χ^2 (5)	p	(p)
Q3	Q3-A	3.37	3.34	3.73	3.72	3.73	3.76	56.328	< 0.001	2–3 (< 0.001); 2–4 (< 0.001); 2–5 (< 0.001); 2–6 (< 0.001); 1–3 (< 0.001); 1–4 (< 0.001); 1–5 (< 0.001); 1–6 (< 0.001)
	Q3-B	3.41	3.41	3.68	3.84	3.92	4.14	154.423	< 0.001	1–3 (< 0.001); 1–4 (< 0.001); 1–5 (< 0.001); 1–6 (< 0.001); 2–3 (0.001); 2–4 (< 0.001); 2–5 (< 0.001); 2–6 (< 0.001); 3–4 (0.023); 3–5 (< 0.001); 3–6 (< 0.001); 4–6 (< 0.001); 5–6 (0.008)
	Q3-C	3.41	3.48	3.66	3.65	3.72	3.88	47.644	< 0.001	1–3 (0.002); 1–4 (< 0.001); 1–5 (< 0.001); 1–6 (< 0.001); 2–3 (0.033); 2–4 (0.019); 2–5 (< 0.001); 2–6 (< 0.001); 3–6 (0.015); 4–6 (0.009)
	Q3-D	2.80	2.66	2.65	2.66	2.70	2.76	5.326	0.377	
	Q3-E	2.94	3.00	3.02	2.98	2.95	2.91	3.278	0.657	
	Q3-F	3.07	3.05	3.04	2.97	3.09	3.13	3.716	0.591	
	Q3-G	3.05	3.10	2.93	2.92	2.98	3.02	11.037	0.051	
	Q3-H	2.52	2.46	2.24	2.16	2.23	1.84	49.701	< 0.001	6–4 (0.004); 6–5 (< 0.001); 6–3 (< 0.001); 6–2 (< 0.001); 6–1 (< 0.001); 4–2 (0.002); 4–1 (< 0.001); 5–2 (0.021); 5–1 (< 0.001); 3–1 (0.006)
	Q3-I	1.97	1.90	1.92	1.99	2.08	1.66	17.492	0.004	6–1 (0.021); 6–3 (0.039); 6–4 (0.005); 6–5 (< 0.001); 2–5 (0.012); 1–5 (0.019)
	Q3-J	3.45	3.56	3.85	4.10	4.17	4.21	122.121	< 0.001	1–3 (< 0.001); 1–4 (< 0.001); 1–5 (< 0.001); 1–6 (< 0.001); 2–3 (0.005); 2–4 (< 0.001); 2–5 (< 0.001); 2–6 (< 0.001); 3–4 (0.016); 3–5 (0.003)
	Q3-K	3.90	3.95	3.88	3.91	4.01	4.02	8.377	0.137	
	Q3-L	2.11	2.38	2.07	2.02	2.00	1.61	45.330	< 0.001	6–4 (< 0.001); 6–5 (< 0.001); 6–3 (< 0.001); 6–1 (< 0.001); 6–2 (< 0.001); 4–2 (< 0.001); 5–2 (< 0.001); 3–2 (0.010); 1–2 (0.010)
	Q3-M	2.11	2.24	1.88	2.01	2.10	1.93	14.748	0.011	3–1 (0.024); 3–5 (0.017); 3–2 (0.002); 6–5 (0.041); 6–2 (0.008); 4–2 (0.045)
	Q3-N	3.20	3.17	2.97	2.93	3.06	3.04	15.582	0.008	4–2 (0.006); 4–1 (< 0.001); 3–2 (0.045); 3–1 (0.015)

(Continues)

TABLE A3 | (Continued)

		Means						Sign		
Question		Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Kruskal–Wallis test statistic		Dunn–Bonferroni post hoc test differences
	Item	18–24	25–34	35–44	45–54	55–65	> 65	χ^2 (5)	<i>p</i>	(<i>p</i>)
Q4	Q4-A	3.60	3.52	3.31	3.62	3.66	3.62	9.854	0.079	
	Q4-B	3.89	3.86	3.82	3.95	3.99	4.10	7.388	0.193	
	Q4-C	3.51	3.34	3.20	3.25	3.37	3.35	12.172	0.033	3–1 (0.002); 4–1 (0.007)
	Q4-D	3.50	3.54	3.72	3.86	3.95	4.03	46.309	< 0.001	1–3 (0.028); 1–4 (< 0.001); 1–5 (< 0.001); 1–6 (< 0.001); 2–4 (0.004); 2–5 (< 0.001); 2–6 (< 0.001); 3–5 (0.025); 3–5 (0.011)
	Q4-E	4.68	4.64	4.55	4.59	4.73	4.65	10.876	0.054	
	Q4-F	3.77	3.95	4.09	4.15	4.25	4.36	51.234	< 0.001	1–2 (0.030); 1–3 (< 0.001); 1–4 (< 0.001); 1–5 (< 0.001); 1–6 (< 0.001); 2–4 (0.036); 2–5 (0.002); 2–6 (< 0.001); 3–6 (0.019)
	Q4-G	3.74	3.83	3.76	3.81	3.69	3.51	7.571	0.182	
	Q4-H	4.59	4.59	4.63	4.72	4.75	4.82	18.441	0.002	1–5 (0.010); 1–4 (0.003); 1–6 (0.002); 2–5 (0.049); 2–4 (0.018); 2–6 (0.007)
	Q4-I	4.08	4.05	4.14	4.20	4.32	4.19	15.645	0.008	2–5 (0.002); 1–5 (< 0.001); 3–5 (0.041)
	Q4-J	4.43	4.45	4.53	4.63	4.56	4.58	10.915	0.053	
	Q4-K	2.75	2.96	3.26	3.60	3.70	3.79	136.414	< 0.001	1–2 (0.049); 1–3 (< 0.001); 1–4 (< 0.001); 1–5 (< 0.001); 1–6 (< 0.001); 2–3 (0.019); 2–4 (< 0.001); 2–5 (< 0.001); 2–6 (< 0.001); 3–4 (0.007); 3–5 (< 0.001); 3–6 (< 0.001)
	Q4-L	3.17	3.34	3.55	3.97	3.98	3.94	110.128	< 0.001	1–3 (0.001); 1–5 (< 0.001); 1–6 (< 0.001); 1–4 (< 0.001); 2–5 (< 0.001); 2–4 (< 0.001); 2–6 (< 0.001); 3–5 (< 0.001); 3–6 (0.005); 3–4 (< 0.001)
	Q4-M	2.84	2.98	3.09	3.35	3.40	3.36	47.499	< 0.001	1–3 (0.037); 1–5 (< 0.001); 1–6 (< 0.001); 1–4 (< 0.001); 2–5 (< 0.001); 2–4 (0.002); 2–6 (0.007); 3–5 (< 0.007); 3–4 (< 0.033)
	Q4-N	2.91	3.02	3.07	3.37	3.33	3.42	36.713	< 0.001	1–5 (< 0.001); 1–4 (< 0.001); 1–6 (< 0.001); 2–5 (0.006); 2–4 (0.003); 2–6 (0.004); 3–5 (0.026); 3–4 (0.014); 3–6 (0.014)