



**TURUN
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Going Green without a Silver Spoon:

How social processes within families influence
proenvironmental behaviors in China

Meiting Liu



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Meiting Liu

University of Turku

Faculty of Social Sciences
Department of Social Research
Economic Sociology
Doctoral Programme of Social and Behavioural Sciences

Supervised by

Docent Aki Koivula
INVEST Research Flagship Centre
University of Turku
Turku, Finland

Professor Pekka Räsänen
Department of Social Research
University of Turku
Turku, Finland

Reviewed by

Professor Harri Luomala
University of Vaasa
Vaasa, Finland

Assistant Professor Walaa Elsayed
Ajman University
Ajman, United Arab Emirates

Opponent

Associate Professor Markus Kaakinen
University of Helsinki
Helsinki, Finland

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ABSTRACT

According to the Global Waste Management Outlook 2024, householders across the world generate over two billion tons of municipal solid waste every year. One of the most immediate negative consequences of human activities is the rise in global surface temperatures, which increased by 1.1 degree Celsius from 2011 to 2020 compared with the recorded temperatures from 1850 to 1900. The rise in temperature has led to major repercussions to the environment and everyday human life, including extreme weather events worldwide. Despite the global environmental crisis, China—like many developing countries—still faces a trade-off between economic growth and environmental preservation. Socioeconomic barriers, such as poverty, social inequality, and political corruption, remain significant obstacles in these countries, complicating efforts to prioritize sustainability. Against this backdrop, even when environmental policies are promulgated, their execution is often ineffective, hindering the establishment of proenvironmental practices as social norms. The urgency of the current environmental crisis pressures researchers to ponder on the following question: Is there a possibility for people to contribute something beneficial to the environment without normalized proenvironmental social practice?

In this dissertation, I focus on adolescents' proenvironmental behaviors (PEBs) in China, aiming to identify the motivators and barriers to PEBs during adolescence. Theoretically, this dissertation draws on post-materialist theory to explore the concept and moralization of PEBs as well as the sociocultural determinants of PEBs, including childhood socioeconomic status, intentions for social mobility, values, and consumer patterns. Empirically, the current studies include one set of national data from the Chinese General Social Survey, along with one set of self-collected cross-sectional data and one set of self-collected longitudinal data, all sampled from adolescents aged 11–17 in Central China. Various statistical methods were employed, including correlational analysis, confirmatory factor analysis (CFA), structural equation modeling, ordinary least squares (OLS) regression, mediation analysis, moderation analysis, conditional process analysis, fixed-effects modeling, and mixed-effects modeling.

The results revealed that PEBs were positively associated with intentions for social mobility, as well as both reciprocal and authoritarian filial piety. Conversely, PEBs were negatively associated with factors such as childhood socioeconomic

status, the purchase of commercial insurance, materialism, and psychological entitlement. In closing, all the articles demonstrated that individuals can contribute to the environment even in the absence of normalized proenvironmental practices. More specifically, this dissertation offers new insights into PEBs within a non-Western context. It demonstrates that a more sustainable lifestyle can be achieved if individuals transform their consumption patterns, appreciate traditional values, and pursue meaningful life goals.

KEYWORDS: proenvironmental behaviors, socioeconomic status, materialism, psychological entitlement, intention for social mobility, filial piety

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TIIVISTELMÄ

Global Waste Management Outlook 2024 -raportin mukaan kotitaloudet ympäri maailmaa tuottavat yli kaksi miljardia tonnia yhdyskuntajätettä vuodessa. Yksi näkyvimmistä ihmisen toiminnan kielteisistä seurauksista on maapallon keskilämpötilan nousu: vuosien 2011–2020 aikana lämpötila oli keskimäärin 1,1 celsiusastetta korkeampi kuin vuosina 1850–1900. Tämä lämpeneminen on jo aiheuttanut vakavia ympäristö- ja arkipäivän vaikutuksia, kuten lisääntyneitä äärimmäisiä sääilmiöitä eri puolilla maailmaa.

Vaikka globaali ympäristökriisi on pahenemassa, Kiina — kuten monet muut kehittyvät maat — kamppailee edelleen talouskasvun ja ympäristönsuojelun yhteensovittamisen kanssa. Sosiaaliset ja poliittiset tekijät, kuten köyhyys, sosiaalinen eriarvoisuus ja poliittinen korruptio, vaikeuttavat kestävyuden asettamista etusijalle useissa maissa. Ympäristöpoliittisten toimien täytäntöönpano on usein tehotonta, mikä estää ympäristöä edistävien käytäntöjen vakiinnuttamisen sosiaalisiksi normeiksi. Nykyisen ympäristökriisin kiireellisyys herättää tärkeän kysymyksen: voivatko ihmiset edistää ympäristön hyvinvointia, vaikka vakiintuneita ympäristömyönteisiä käytäntöjä ei olisi?

Tässä väitöskirjassa tarkastellaan kiinalaisnuorten ympäristönsuojeluun tähtävästä käyttäytymisestä (pro-environmental behavior, PEB). Nuoruusiässä ilmenevien PEB-motivaattorien ja -esteiden tunnistaminen voi auttaa kehittämään strategioita, joilla nuorten ympäristömyönteistä toimintaa vahvistetaan. Teoreettisesti tutkimus nojaa postmaterialistiseen teoriaan tutkiakseen PEB:n käsitettä, sen moralisaatiota sekä sosiokulttuurisia tekijöitä, kuten lapsuuden sosioekonomista asemaa, sosiaalisen liikkuvuuden tavoitteita, arvoja ja kulutustottumuksia. Empiirinen aineisto koostuu Kiinan yleisen sosiaalitutkimuksen (Chinese General Social Survey) kansallisesta aineistosta sekä kahdesta itse kerätystä aineistosta: poikittaistutkimuksesta ja pitkittäistutkimuksesta, jotka molemmat on kerätty 11–17-vuotiailta nuorilta Keski-Kiinassa. Analyyseissä hyödynnettiin useita tilastollisia menetelmiä, kuten korrelaatioanalyysiä, konfirmatorista faktorianalyysiä (CFA), rakenneyhtälömallinnusta, OLS-regressiota, mediaatio- ja moderaatioanalyysijä, ehdollista sessianalyysiä sekä kiinteiden ja sekavaikutteiden mallinnusta.

Tutkimuksen tulokset osoittivat, että PEB oli positiivisesti yhteydessä sosiaalisen liikkuvuuden tavoitteluun sekä vastavuoroiseen ja auktoriteettipohjaiseen perheen kunnioitukseen. Toisaalta PEB:llä oli negatiivinen yhteys lapsuuden

sosioekonomiseen asemaan, kaupallisen vakuutuksen hankintaan, materialismiin ja psykologiseen erityisoikeuden tunteeseen.

ASIASANAT: Ympäristön suojeluun tähtäävään käyttäytymiseen, sosioekonominen asema, materialismi, psykologinen erityisoikeuden tunne, sosiaalisen liikkuvuuden tavoittelu, perhehurskaus

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7.2.2025
Meiting Liu

Table of Contents

Acknowledgements	7
Table of Contents	8
List of Original Publications	11
1 Introduction	12
1.1 The aim of the study.....	14
2 Theoretical Background	17
2.1 Proenvironmental behaviors.....	17
2.1.1 The concept of proenvironmental behaviors.....	17
2.1.2 Moralization of proenvironmental behaviors	18
2.1.3 Attitudes and consumer behavior	20
2.2 Sociocultural determinants of proenvironmental behaviors.....	21
2.2.1 Childhood socioeconomic status	21
2.2.2 Intention for social mobility	23
2.2.3 Contextualizing values	25
3 Empirical Background	27
3.1 A general literature review of proenvironmental behaviors: a post-materialist perspective.....	27
3.2 Childhood socioeconomic status and proenvironmental behaviors	28
3.3 Intention for social mobility and proenvironmental behaviors..	30
3.4 Materialism and proenvironmental behaviors	31
3.5 Filial piety and proenvironmental behaviors.....	32
4 Research Design	34
4.1 Research questions	34
4.2 Data	35
4.3 Measures	37
4.4 Statistical techniques	40
4.5 Ethical considerations	42
5 Results	43
5.1 Article I.....	44
5.2 Article II.....	45
5.3 Article III.....	47

5.4	Article IV.....	48
6	Discussion and Conclusions	50
6.1	Theoretical implications.....	51
6.2	Practical implications.....	52
6.3	Limitations and future directions	55
	List of References.....	59
	Original Publications.....	69

Tables

Table 1.	Key literature review.....	33
Table 2.	Research design.....	35
Table 3.	Key findings.....	50

Figures

Figure 1.	Three approaches to increase proenvironmental behavior.	16
Figure 2.	The results of Article I.....	45
Figure 3.	The interaction plot of Article II.	46
Figure 4.	The results of Article III.....	47
Figure 5.	The interaction plot of Article III.	48
Figure 6.	The interaction plot of Article IV.....	49

List of Original Publications

This dissertation is based on the following original publications, which are referred to in the text by their Roman numerals:

- I Liu, M., & Koivula, A. (2021). Silver Spoon and Green Lifestyle: A National Study of the Association between Childhood Subjective Socioeconomic Status and Adulthood Pro-Environmental Behavior in China. *Sustainability*, 13(14), 7661.
- II Liu, M. (2024). Social climbing has a green lining: a two-wave longitudinal study on whether adolescents' intention for social mobility predicts proenvironmental behaviours (submitted to *Journal of Youth and Adolescence*)
- III Liu, M., & Koivula, A. (2023). Greed doesn't grow on trees: the indirect association between proenvironmental behaviour and materialism through adolescents' psychological entitlement. *Young Consumers*, 24(1), 1-17.
- IV Liu, M. (2025). Love, authority and green lifestyle: a longitudinal study on how filial piety beliefs influence adolescents' proenvironmental behaviors (submitted to *Personality and Individual Differences* for peer-review).

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1 Introduction

“I didn’t think it was fair for anyone to tell Indians that their children couldn’t have lights to study by, or that thousands of Indians should die in heat waves because installing air conditioners is bad for the environment.”

*— Bill Gates, How to Avoid a Climate Disaster:
The Solutions We Have and the Breakthroughs We Need*

As the epigraph suggests, despite the global environmental crisis, most developing countries still face the dilemma of prioritizing either economic growth or environmental protection. This dilemma is largely due to the historical reality that economic growth, especially during the early stages of industrialization, has often come at the expense of the environment. Additionally, any modern lifestyle will produce no small amount of carbon footprints, even including behaviors that are widely considered to be proenvironmental—for example, driving recyclable waste to a recycling service point (Peattie, 2010).

The inevitable trade-off between economic development and environmental preservation becomes more pronounced in societies where socioeconomic obstacles, such as poverty, social inequality, and political corruption, still loom large for residents. In such contexts, even when environmental policies and regulations are introduced, their implementation is often unsatisfactory. As a result, proenvironmental practices are not normalized, meaning that people do not view actions such as recycling plastics or reducing plastic use as moral behaviors encouraged by the community. Looking at the recycling history of an industrialized country, it becomes clear that achieving green normalization is a long journey (Thomas & Sharp, 2013). However, the urgency of the current environmental crisis pressures researchers to ponder on the following question: Is there a possibility for people to contribute something beneficial to the environment without normalized proenvironmental social practice?

This practical conundrum reflects a theoretical gap in the current literature on proenvironmental behaviors (PEBs) that most of them based on the WEIRD (Western, Educated, Industrialized, Rich, and Democratic; Henrich et al., 2010)

population, where proenvironmental practice has long been normalized. Although there are likely satisfactory quantities of non-WEIRD samples, very few of them have focused on those factors reflecting their specific sociocultural conditions.

As China has become one of the major developing economies, sustainable consumption and PEBs have become increasingly relevant topics. What are the potential consequences if a large portion of the population—who currently consume little and appear sustainable only because of limited income—begins to gain greater purchasing power? Given that China has the world's second-largest population, the answer to this question may determine whether we face climate catastrophe or move toward a cleaner planet in the future. In this respect, it is important to examine what factors motivate and hinder people from engaging in more PEBs in China.

As shown through data from China Urban Construction Statistical Yearbook, the volume of wastes in 2019 has almost quadrupled from that in 2003, and the collected and transported wastes per year have increased by nearly 10,000 tons (Bai & Lin, 2022). Additionally, rapid industrialization, urbanization, and increasing consumption of fossil fuels in recent decades have brought about serious air pollution, triggering multiple public health crises (Wang, 2021). According to the research of The State of Global Air report, up to 2016, China had the highest death rate attributable to Particulate Matter 2.5 (Health Effects Institute, 2018). These alarming repercussions from environmental degradation have prompted the government to implement new policies to ameliorate the situation.

For instance, since July 1, 2019, the municipal government of Shanghai has launched regulations to implement mandatory garbage sorting (Chinadaily, 2019). To tackle the air pollution, since the initiation of the 11th Five-Year Plan in 2005, Chinese national targets for total SO₂ and NO_x emissions have been quantitatively defined and made mandatory (Wang, 2021). As an example, mandated by the 13th Five-Year Plan spanning 2015 to 2020, the total emissions of SO₂ and NO_x should decrease by 15% each (Wang, 2021). In addition to an authoritarian environmental agenda, a market-based green finance instrument, initiated through the green credit policy, was introduced to incentivize companies in low-carbon, ecological fields by prioritizing them as customers for bank loans (Su et al., 2022).

Although government schemes worldwide have raised consumer awareness about environmental issues (Awewomom et al., 2024), this awareness has not translated into a strong commitment to eco-friendly purchasing (Gleim et al., 2013). Similarly, although the subsequent years after the launch of the above policies in China have seen some achievements, the status quo shows they were inadequate, especially considering the increasingly growing needs for a cleaner industry and greener household lifestyle (Wang, 2021; Bai & Lin, 2022). Specifically, a recent survey conducted among higher educational institutions in Beijing—China's capital and one of the first-tier cities—has shown that over 50% of students have limited

knowledge and lack a clear concept of waste sorting (Liu et al., 2024). The findings imply that even highly educated Chinese residents lack sufficient environmental knowledge, especially considering that their counterparts in Western society are typically more aware of social welfare and gravitate toward greener lifestyles than people without higher educational experience (Meyer, 2015). Moreover, another study indicated that although residents in first-tier Chinese cities are highly willing to engage in waste sorting, they often lack the financial commitment to support it (Bai & Lin, 2022), suggesting a reluctance to sacrifice self-interests for environmental preservation.

Another important factor that shapes today's green status quo in China is the unique contemporary history of economic development. Over the past 40 years, China's transformation from a planned to a market economy has led to significant economic growth. As a result, many individuals who grew up during this period have experienced substantial improvements in their socioeconomic status (SES), achieving much greater affluence and social prestige compared to their childhood. Such social mobility has led to a phenomenon where some people enjoy much more financial freedom compared to their childhood but still retain mindsets that are rooted in times of resource scarcity. They may prioritize short-term gains over long-term interests. For instance, their consumption habits and lifestyles may favor luxury purchases that significantly exceed their current income levels (Zhang et al., 2022). Additionally, their values and attitudes may reflect a general indifference toward broader public issues, such as sustainability (Harris, 2006).

On another note, older Chinese residents have developed habits of frugality during periods of extreme material scarcity, such as reusing plastic bags and conserving water and electricity. These habits persist even during times of material sufficiency and are often passed down to the next generations through family socialization. As a result, although many Chinese residents lack environmental awareness, quite a few engage in environmentally friendly behaviors unconsciously. In short, this historical shift in SES fosters a lifestyle where frugality coexists with overconsumption among Chinese individuals, thereby raising specific research questions in studies on motivating PEBs.

1.1 The aim of the study

This dissertation focuses on the microlevel motivators and obstacles influencing individual PEBs. This approach aligns with China's ongoing transition toward a post-materialist phase, in which individuals are increasingly shifting their values from materialist concerns—such as physical comfort and economic security—toward post-materialist values that emphasize social connectedness, personal identity, and life fulfilment (Inglehart, 1981). Post-materialist theory is grounded in

two core hypotheses. The first is the socialization hypothesis, which posits that values formed during early life stages tend to persist into adulthood, continuing to shape individuals' attitudes and behaviors throughout their lives. This perspective has inspired the present focus on adolescents' PEBs. The second is the scarcity hypothesis, which suggests that individuals prioritize goals and values that address what they perceive to be lacking in their environment. This perspective has led me to focus this dissertation on the conditions of economic restriction.

As adolescence is a dynamic period of ongoing development in the formation of prosocial values and behaviors (Eisenberg et al., 2002), their thoughts and actions tend to be more malleable than those of adults. Therefore, this take on PEBs can be viewed as a practical consideration. Specifically, identifying motivators and barriers to PEBs during adolescence can provide educators guidance in developing strategies to boost young people's willingness and actions toward PEBs. Thus, I believe that nudging or intervention strategies aimed at adolescents would be more effective than efforts to influence adult groups. Moreover, in this doctoral project, I pay special attention to the social processes within families. Given that the family is a major site of moral socialization and plays a more significant role in adolescents' lives than in those of adults, the focus on adolescents would also be theoretically justified.

The novelty of this dissertation lies in its examination of PEBs through the lens of early family SES and adolescents' values and life goals—perspectives that, at the time of publishing the individual articles, had received little scholarly attention. For example, to the best of my knowledge, the positive effect of intentions for social mobility on PEBs has not been previously explored and appears counterintuitive. Moreover, although the influence of individuals' current SES on PEBs has been extensively studied (Chen et al., 2011), the potential association between childhood SES and adulthood PEBs has remained largely unexplored. Although the association between materialistic value and PEBs has been examined, relatively few studies have explored the complex dynamics between materialism and SES among adolescent groups. Finally, the distinct impacts of two dimensions of filial piety on PEBs, previously unexamined, were investigated.

According to the main question in this dissertation project, I proposed three approaches to increase PEB that are tailored to the Chinese context but can also be applied to other developing countries (Fig. 1). The first approach, supported by Article I, is *reflection on the effects of SES on PEBs*. Does coming from a disadvantaged background solely hinder individuals' PEBs? Alternatively, does SES influence PEBs in part through a constrained mindset and the corresponding consumption patterns? The results of Article I put forward a reply to the first strand that the transformation of consumption types may remedy the downsides of lowered SES. People from lower-income backgrounds often experience instability and insecurity. Instead of spending money on conspicuous products, investing in

insurance to protect against uncertainty may alleviate daily anxieties, allowing individuals to shift their attention to broader public interests.

Article II provided the second approach, suggesting that *search for other meaning in life*, other than hedonistic goals, helps promote PEB. In the Chinese sociocultural setting, elevating individual social status is not only regarded as a positive, self-realization course but also serves as a meaningful effort to achieve one's family happiness and honor. In that sense, this goal-directed take on life can distract consumers from their instant material desires and adopt a long-term perspective.

The third approach, demonstrated by Articles III and IV, proposed that *improvement of the value system* may strengthen engagement in PEBs. On the one hand, Article III argues that reducing materialistic value can increase PEBs. If consumers do not view money and material products as the ultimate indicators of success and happiness, they may buy less and turn to more transcendental values that guide behaviors such as PEBs (Schwartz et al., 2012). On the other hand, as proposed in Article IV, instilling values that encourage children to love and respect their parents helps build a general moral identity, which in turn fosters PEBs.

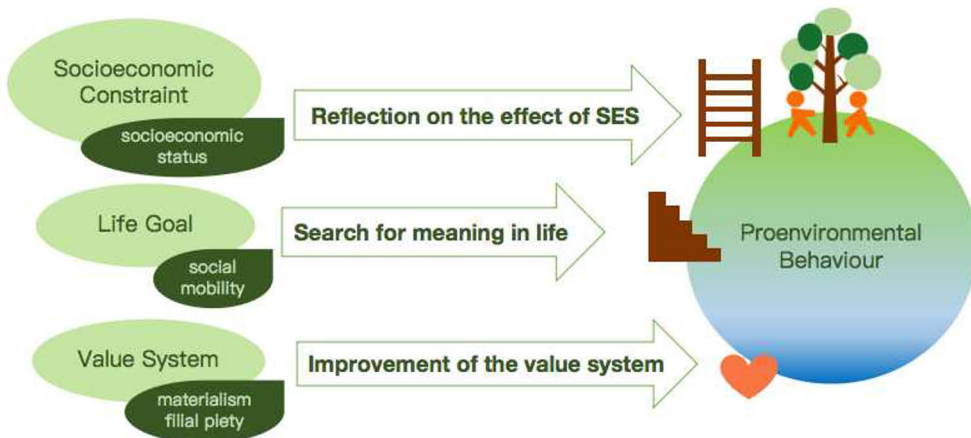


Figure 1. Three approaches to increase proenvironmental behavior

2 Theoretical Background

2.1 Proenvironmental behaviors

2.1.1 The concept of proenvironmental behaviors

We understand PEBs on an individual level and define them as actions that contribute to environmental well-being, including recycling, thrifting, or, in general, reducing daily consumption of natural resources (Krettenauer, 2017). PEBs are commonly categorized as a specific type of prosocial behavior because the actors usually exhibit prosocial tendencies, and instead of merely deriving personal benefits from such actions, they also intend for other people, animals, or the ecological system itself to benefit (Nolan & Schultz, 2015). To note, although proenvironmental motivations often result in PEBs, not all PEBs result from these motivations. For example, some individuals reuse plastic bags and save energy out of frugality rather than environmental concern.

Although individuals do benefit from these actions (Mazar & Zhong, 2010; Tezer & Bodur, 2020), motivating people—who are evolutionarily inclined toward self-interest—to engage in PEBs is generally difficult (Griskevicius et al., 2012). Consequently, extensive research has been done on the factors contributing to PEB or the intention to engage in PEB. In terms of individual-level factors, people must first care about the environment (Pagiaslis & Krontalis, 2014), which then influences their environmental beliefs, attitudes, value, motivation, behavioral intention, and even behaviors. For example, residents may be more willing to recycle electronic waste if they feel a moral responsibility to do so or they believe in the necessity of nudging daily life in the proenvironmental direction (Saphores et al., 2012). Former researchers have summarized these internalized beliefs and attitudes as environmental awareness. The concept comprises eight components: the intention to take proenvironmental actions, the belief that those actions aid in solving the environmental issues, a sense of responsibility, the perceived burden resulting from those actions, the perceived agency to act proenvironmentally, the perceived threat of environmental issues, the awareness of personal connection to these issues, and the demand for proenvironmentally related information (Kikuchi-Uehara et al., 2016).

Similarly, a study on employee PEBs in Russian corporations showed that employees have more PEBs at work if they have stronger intrinsic motivation for those behaviors; in contrast, surprisingly, the association between external motivation and PEBs is negative (Graves et al., 2019). Simply speaking, employees show more PEBs when those actions fit their value or part of their self-identity, rather than when they are paid to do so. Other factors cover individuals' perceived convenience of recycling and their environmental knowledge, such as the awareness of potential toxicity of e-waste and the familiarity with recycling location and instructions (Saphores et al., 2012).

Although proenvironmental intention has been closely linked with PEBs empirically (Yuriev et al., 2020) and theoretically (Ajzen, 1991; Peattie, 2010), the reaction from the market has shown consumers' low commitment to green options, suggesting a potential barrier between intention and behavior (Gleim et al., 2013). Scholars, correspondingly, have proposed that a low level of actual PEBs results from the following factors: the economic sacrifice of green products and practices, the cognitive exhaustion of searching for green information, the lack of influence from intimate others, perceived efficacy of green purchases (Gleim et al., 2013), and the intention to implement specific actions rather than a general intention (Wang & Mangmeechai, 2021).

Researchers have also found various mechanisms influencing different types of proenvironmental strategies; that is, recycling behavior is mostly linked with individuals' recycling attitudes wherein they regard recycling as good, useful, rewarding, responsible, sensible, and hygienic (Tonglet et al., 2004). In comparison, buying durable products or products with minimal packaging and repairing or reusing products are significantly associated with people's concern for the well-being of their community, suggesting a consideration for neighboring others (Tonglet et al., 2004). This study inspires us to consider that, even without a mature recycling system, it is encouraging that PEBs are achievable through the promotion of frugal practices, such as energy-saving and reuse behaviors.

2.1.2 Moralization of proenvironmental behaviors

I illustrated above that there is an academic consensus that PEBs are a subtype of prosocial behavior because PEBs reflect actors' consideration of public interests. However, this argument has a precondition that proenvironmental value has been properly moralized within a given society or cultural community. In other words, people regard those who practice PEBs as moral actors who definitely enjoy a widespread positive moral reputation. Treating PEBs as moral actions seems to be a widespread consensus in Western societies, but in many countries around the world, a moralized PEB has not yet become common. In certain contexts, PEBs can even be deemed "immoral" when environmental topics become politicized.

For example, when acclaimed Chinese journalist Chai Jing released her documentary “Under the Dome,” which exposed severe air pollution and ineffective environmental policies in China, extreme patriotism led some members of the public to view her advocacy as unpatriotic due to her reference to American experiences of environmental cleanups (Powers, 2016). Chai Jing’s downfall epitomizes the prevailing notion in contemporary Chinese society that environmental campaigns are an “infiltration of Western ideology.” Interestingly, this take on environmentalists is the exact opposite of that in Western societies, where environmentalists are often associated with left wings and even labeled as “Communist watermelons” (green on the outside, red on the inside; Hoffarth & Hodson, 2016).

According to the push–pull model of moralization, moral emotions and moral cognitions function to “push” individuals to adopt moral convictions (Feinberg et al., 2019). In line with this model, some people view PEB as moral because they analyze this argument based on their environmental knowledge, often acquired through environmental education and media exposure. This line of reasoning leads them to conclude that PEB is the right course of action. Such moral cognition about the environment would barely exist if an individual lives in a country where environmental education is insufficient and environmental protection has not been a talking point in the media.

Another base is their strong dislike for pollution or love for nature. However, human beings are inherently indifferent to the consequences of their behaviors if the consequences are hidden from them (Griskevicius et al., 2012). This is precisely the situation for those of us living in a modern city. On the one hand, one dislike for pollution is not easily triggered due to a specific city cleaning system and management. Tons of plastic garbage are stored invisibly and transferred regularly on a daily basis.

On the other hand, due to market or administrative forces, people from different socioeconomic backgrounds often live segregated lives from each other within a city or within a country. Residents in affluent, middle-class districts would not be constantly reminded of the hunger struggles that occur in the other parts of a city or the world. City residents, therefore, may readily free themselves from the guilt of producing nondegradable trash or wasting food. From another perspective, however, the innate human preference for a clean environment presents an opportunity to influence people to behave more proenvironmentally even in the absence of moralized PEBs. In line with this argument, a previous literature review indicates that emotions can be effective drivers in shifting consumer behavior toward greater sustainability (White et al., 2019). For example, in the context of the present dissertation, adolescents’ feelings of guilt about their materialism or their affection for their parents may be associated with their PEBs.

2.1.3 Attitudes and consumer behavior

Although theories (e.g., the theory of planned behavior; Ajzen, 1991, 2020) have asserted that proenvironmental attitudes and values strongly predict behaviors, extant empirical studies have highlighted a notable gap between them (Peattie, 2010). Some scholars have suggested that this gap may be due to inaccuracies in self-reported PEBs, as an observational study found that many questionnaire respondents who claimed they often recycle actually do not (Davies et al., 2002). Moreover, this gap has also been revealed in marketing behavior, where consumers are not consistently buying eco-friendly products (Gleim et al., 2013). In practical terms, previous studies have focused more on attitudes than behaviors, likely because attitudes are easier to measure through questionnaires.

Gilovich et al. (2015) reasoned that the amount of happiness a purchase brings consumers depends on how much satisfaction it provides. However, people do not totally understand what kinds of consumption bring them more happiness than others and whether the happiness is temporal or enduring. Researchers, however, have revealed that consuming physical products brings less enduring satisfaction (Van Boven & Gilovich, 2003; Van Boven, 2005), generates more regret after the purchases (Rosenzweig & Gilovich, 2012), and provokes less conversation about the consumption (Nicolao et al., 2009) than consuming experiences—for instance, going to the theatre with friends or traveling on the seaside with families. Theoretically, experiential consumption provides greater satisfaction than material consumption because the former is more effective in strengthening social relations and building personal identity, and it awakens less comparisons between the self and others (Gilovich et al., 2015).

However, the prevalence of social media in our times seems to have propagated the materialization of experiential consumption. People are now able to post photos or stories online, enabling them to compare the prices of their hotels or the uniqueness of their travel destinations. These digital trends are turning traveling experiences that were traditionally considered to be mainly experiential and incomparable into something that can be quantitatively compared and even ranked.

Moreover, consumption can be either hedonic or utilitarian—namely consumption motivated by seeking for aesthetics, sensual pleasure, physical enjoyment, and so on—or driven by instrumental or functional goals (Dhar & Wertenbroch, 2000). We generally consume hedonic products to satisfy our “wants” and utilitarian products to fulfill our “needs,” which usually indicate basic requirements for human surviving and thriving regardless of cultural difference (Royo, 2007). According to Doyal and Gough’s (1984) theory of human needs, needs are goals in life that must be reached by all individuals in the world, encompassing goals for survival and autonomy. In an article that summarizes research on green consumption, Peattie (2010) called for more academic attention to the discrimination

between wants and needs. He also advocated for shifting the attention from reevaluating the excessive wants of affluent consumers to the needs of those who barely meet their basic needs (Peattie, 2010).

Why is this academic shift that important? Indeed, excessive wants result in a lifestyle or values that evoke personal difficulties in life (Kasser, 2016) and might be one of the culprits for environmental crises (Shirvanimoghaddam et al., 2020). However, more crucially, needs are more fundamental and vital to our general well-being (Hsee et al., 2009). Even for those who can fully manage basic needs, they tend to ignore basic needs. They may engage in less functional but more hedonic products, such as luxuries, to satisfy their wants (Wang et al., 2020), but they will probably remain ignorant about how easily people adapt to hedonic consumption (Brickman & Campbell, 1971) and how much absolute happiness (vs. relative happiness, which relies more on social comparison) basic comforts can bring (Hsee et al., 2009).

Health or age commercial insurance is a unique form of consumption that aligns with the concepts of experiential and utilitarian products. It is experiential because no tangible item is acquired upon payment, and it is utilitarian because it satisfies basic needs such as security and risk aversion. However, research shows that many people's reluctance to purchase insurance is not simply due to budget constraints. In fact, some lower-income consumers even prefer spending more on luxury items than health and medical services, even though those services are typically more affordable and more essential (Charles et al., 2009).

2.2 Sociocultural determinants of proenvironmental behaviors

2.2.1 Childhood socioeconomic status

SES, or social class, is a concept that virtually allocates individuals to various levels of positions in a society. This definition is based on a metaphor where individuals' socioeconomic capacities are depicted as being arranged vertically like the rungs of a ladder or the tiers of a pyramid. By comparing people's tangible goods and intangible social resources (Kraus et al., 2013), the idea of social class places those who own the least at the bottom of the ladder, with each successive rung comprising those who own more than the previous rung until the top of the ladder. Notably, SES and social class are commonly used interchangeably, although social class is often understood as a more abstract depiction of social experiences regarding "power, prestige, and control over resources," and SES is a means of measurement to concretize social class (Diemer et al., 2013).

Researchers can measure individuals' objective SES, which directly questions respondents' or their parents' educational background (e.g., Stephens et al., 2007), occupations, which are ranked usually based on income and social prestige within a particular society (e.g., Mueller & Parcel, 1981; Lundberg, 1940), or respondents' material possessions (e.g., Currie et al., 2008). Alternatively, SES can be measured subjectively—for example, in the way that respondents evaluate their own social positions by choosing a class label (e.g., middle class) or giving an answer on where they rank on a ladder if social class works as a ladder. Some researchers have found that respondents often answer this simple question by contemplating on the aforementioned objective personal situations, such as education, income, and financial possessions. A recent study classified the sources for evaluating subjective SES into two aspects: current rank—in relation to wealth and living easiness—and cultural privilege—in relation to elite heritage, elite education, and refined taste (Laurin et al., 2024). In fact, some scholars consider subjective SES, or self-perceived social class, a more accurate measurement that encapsulates individual SES than objective SES (Kraus et al. 2011; Van Doesum et al. 2017).

Childhood SES simply indicates individuals' socioeconomic conditions during their childhood or adolescence, usually operationalized as their family's SES (Currie et al., 2008). Scholars pay specific attention to the SES during these life stages because events before adulthood influence a wide range of outcomes during adulthood, and, more importantly, some influences can be tenacious (Mittal & Griskevicius, 2016). For example, generally, childhood family SES is a strong predictor for mental and physical health in adulthood (Repetti et al., 2002). Further, financial constraints during adolescence were found to be even more damaging than those during childhood to individuals' mental well-being (Sobolewski & Amato, 2005).

With regard to more specific domains, especially socioeconomic ones, family SES may influence what life decisions are made later in adulthood. People of different family backgrounds during childhood choose differently when to have children (Griskevicius et al., 2011), have different levels of tolerance for economic unpredictability (Griskevicius et al., 2013), participate differently in health insurance (Mittal & Griskevicius, 2016), and vary in their willingness to consume green products (Sun & Kong, 2020). In short, individuals lower in family SES are probably forced into a mental state where they constantly handle issues of their own, thus lacking the psychological resources to consider matters beyond their personal life or adopt a long-term perspective.

Social class has not always been an established fact in contemporary political discourse (Kraus et al., 2013), although it has long been recognized and researched within academia (Bourdieu, 1979). Scholars most likely lay SES on the table rather than ignore or deny it as some politicians did (Kraus et al., 2013) because the abstract

concept of SES manifests concretely as persistent social issues, such as social inequality, social injustice, and low rate of social mobility.

2.2.2 Intention for social mobility

In previous literature, the terms “social mobility,” “social fluidity,” and “class mobility” are equivalent and can be used interchangeably (Goldthorpe & Mills, 2008; Hertel & Groh-Samberg, 2019; Bukodi & Goldthorpe, 2021). All of the abovementioned terms measure the changes of individuals’ occupation types on the 7- or 12-category class schema (Erikson & Goldthorpe, 1992). In other words, social mobility measures how much social prestige or, specifically, career prestige an individual receives in comparison to how much their family did (Erikson & Goldthorpe, 1992).

The term “economic mobility” is slightly different from the former mentioned terms in the way that it merely measures the changes of income (Sabol et al., 2021). This emphasis probably results from the situation wherein economists tend to directly use income to examine social stratification and relevant social topics (Barone et al., 2022). However, as social class is generally defined as a social category that divides a certain population into various levels of groups primarily based on the individual’s or their family’s economic capacity, income is definitely a powerful indicator of occupational hierarchy (Krieger et al., 1997).

Although social mobility can be realized both upwards and downwards, the bulk of the research has revolved around upward social mobility. This scholarly focus is undoubtedly reasonable because to which extent an individual is able to move up on the social ladder indicates the elasticity of the social class structure and, thus, a function of still-pending social issues, such as social inequality (Hertel & Groh-Samberg, 2019). If an individual in a society considers it difficult to change their current socioeconomic situation or achieve their goals in life, it somehow suggests that the social structure is static and, thus, unhealthy. Therefore, upward social mobility is a barometer of the economic, social, and political dynamics in a society (Friedman, 2014).

However significant social mobility is, individuals usually face structural and personal barriers (Piff et al., 2018), which result in a situation wherein only a small group of people within a population are able to realize upward mobility, which is, therefore, naturally contingent on a multitude of factors (Sabol et al., 2021). According to the theory of planned behavior (Ajzen, 1991; Ajzen, 2020), the most proximal factor that leads to an actual behavior is its intention, and the intention is predicted by the attitudes toward the behavior, subjective norm, and perceived behavioral control. Therefore, a certain number of studies have also focused on the

perception of social mobility (e.g., Fehr et al., 2024; Leung & Koh, 2019; Park et al., 2024) and the intention for social mobility (Tausch et al., 2015).

We define the intention for social mobility as individuals' inclination to pursue a higher social status than where they come from, usually by executing personal strengths and working hard toward material or prestige goals (Tausch et al., 2015; Hogg & Abrams, 1988). Apart from the strong prediction of intention on behavior (Ajzen, 1991; Ajzen, 2020), we concentrated on the intention for social mobility partly because we meant to study this topic within adolescent age groups, where participants usually have not yet been given the opportunity for mobility. However, studying their intention for social mobility in the future is not only meaningful to their potential mobility in adulthood but also motivates students' academic pursuits (Browman et al., 2022), thus shaping the values that will guide their future lives (Sieben, 2017).

With regard to the present research, it would be incomplete to study social mobility in China without accounting for its historical context. Indeed, it is precisely this historical complexity that makes the topic interesting, even though social mobility has been extensively examined across various disciplines in social sciences. Over thousands of years, Confucianism developed and gradually transformed into an autocratic force in the sociocultural realm of presocialist Chinese society (Yao, 2000). Therefore, Confucianism has never been merely a philosophical or religious ideology but more a sociopolitical tool for governing the entire social system. The blueprint of Confucian society was a stable entity managed by scholar-officials directly responsible for the only legitimate authority: the emperor (Phillips, 2005). Within this Confucian hierarchy, each individual has their own superior to answer to, which could be the emperor, a father, or a husband. Such a social structure, therefore, has naturally developed an aversion to between-class mobility.¹

During the period of planned socialism and before the reform of the 1980s, administrative forces distinctly divided Chinese society into rural and urban sections. Urban residents with an urban hukou (population registration) enjoyed extensive political, social, and economic benefits, which were inaccessible to their rural counterparts (Chan & Zhang, 1999; Chan, 2009). Cadres, typically leaders or professionals within institutions, enjoyed even greater privileges within the communist sociopolitical system (Bian, 2002).

The 1980s, nonetheless, witnessed a historical transformation from a planned economy to a market one. The artificially imposed social stratification began to break

¹ I used "between-class" because intraclass mobility was actually encouraged in ancient China. As an example, the imperial examination was designed to strengthen mobility within meritocratic classes so as to limit the power of dominating aristocratic families (Ko, 2017).

down in the new market economic environment, as the private sector created new middle classes primarily from the formerly privileged proletariat (e.g., cadres; Rona-Tas, 1994) and new working classes from former rural residents. The social and economic development brought about by this transformation provided opportunities for ambitious citizens to realize their “Chinese dream,” enabling them to alter their own or their family’s SES.

Whereas the reform activated the dynamics of social stratification to a certain extent, it ushered in new issues that coexisted with the remains of the problematic social structure during the planned times. For example, the unfair hukou policy and hierarchy within government institutions and state-owned enterprises persist, continuing to perpetuate regional and sociopolitical inequality (Nee, 1991; Nee & Cao, 2002). Even now, masses of Chinese citizens who live, work, and pay taxes in Beijing are still unable to obtain a Beijing hukou, thereby lacking the access to its social and economic privileges, including (Liu & Shi, 2020).

Although educational reforms have enabled young people to change their lives by excelling in the college entrance exam (gaokao; Wu & Zhang, 2010), students’ socioeconomic backgrounds continue to play a crucial role in university enrollment, especially when they desire a place in elite institutions (Wu et al., 2019). Consequently, the prevailing unfairness in education has crept in to restructure the social stratification. Urban students benefit more than rural students from the expansion of higher education (Tam & Jiang, 2015). Children of managers or professionals have an increased likelihood of securing university admission compared to previous periods (Yeung, 2013).

2.2.3 Contextualizing values

According to the post-materialistic theory, as values in a society transition from materialistic to post-materialistic, individuals start to pay attention to more transcendental dimensions in life (Inglehart, 1981). To be more specific, beyond material ease, in a post-materialistic society, individuals increasingly seek a life with a deeper understanding of themselves and their relationships with others and nature. In a similar vein, the theory of basic human values organized almost all basic human ethics into a circular continuum (Schwartz, 1992). According to Schwartz, values act as guiding principles in life that are applicable to everyone regardless of cultural background or circumstances (Schwartz et al., 2012). Differences in individuals’ values may reflect varying opinions on what they consider important in life (Schwartz et al., 2012). However, within a cultural group, where members have a shared knowledge about themselves and their surrounding social world, some values can become mainstream whereas others remain peripheral (Hong, 2013). Individuals

may develop more positive self-regard if their morals are consistent with those prevalent within their cultural setting (Becker et al., 2014).

For example, in the Chinese context, where Confucius' canon of filial piety is embedded, standards that cherish traditions and family harmony are probably among the most prevalent across society (Bedford & Yeh, 2021). Chinese people who hold those values may have a higher self-esteem or better self-evaluation than others. Because a higher level of self-esteem helps to diminish anxiety and anxiety-associated defensive behavior (Pyszczynski et al., 2004), individuals higher in self-esteem are more disposed than those lower in self-esteem to adopt anxiety-free values (e.g., universalism; Schwartz et al., 2012). Theories and empirical studies both point to the fact that people who do better in their personal domains have more physical and mental resources to be interested in others' or public matters (Maslow, 1943; Putnam, 2000; Thoits & Hewitt, 2001). In relation to this conjecture, previous empirical evidence reveals a strong prediction of personal well-being on prosocial behavior, and its assessment includes mental health (Diener & Seligman, 2004).

In addition, cultural differences lead to different takes on proenvironmental values. In an analysis of environmental attitudes and behaviors, researchers have highlighted several aspects that suggest an instrumental take on proenvironmental standards among the Chinese (Peattie, 2010). First and foremost, economic growth is consistently prioritized over environmental concerns (Harris, 2006). Additionally, for the Chinese, the significance of a clean environment tends to extend outward from the individual to their family and neighbors but rarely any farther (Harris, 2006). This observation suggests that the Chinese have less concern for environmental issues that do not have a direct impact on their immediate surroundings. Moreover, the Chinese tend to prefer that other people or the government, rather than individuals, shoulder the responsibility for environmental protection (Harris, 2006).

Although some values may be more appropriate in certain cultural settings than others—indicating that values are not inherently “good” or “bad”—some can still be detrimental to individuals' well-being across nearly all cultures and societies. Materialism is one such example. People who hold a materialistic value view wealth and possessions as the fundamental composition of happiness and success (Richins & Dawson, 1992; Kasser, 2016). Throughout history, philosophers and sociologists have widely disapproved of pursuing money as life's ultimate goal (Belk, 1983), and modern empirical studies also demonstrate that living by this value diminishes adolescents' various prosocial behaviors, including helping behaviors (Briggs et al., 2007), backing of egalitarian (Flanagan et al., 2005), and PEBs (Brown & Kasser, 2005; Kilbourne & Pickett, 2008; Alzubaidi et al., 2021; Helm et al., 2019).

3 Empirical Background

3.1 A general literature review of proenvironmental behaviors: a post-materialist perspective

Post-materialist theory argues that as societies achieve material security, individuals increasingly shift their priorities from materialist goals, such as access to water, food, clothing, to post-materialist ones, including self-expression, quality of life, and environmental protection (Inglehart, 1981). Materialist goals, focused on acquiring tangible goods and attaining financial security, often impede the adoption of green consumption practices. This proposition was partially demonstrated by an analysis of the World Values Survey (2017–2021), which covered 66 countries and 85,000 participants (Bano et al., 2024). Further evidence suggests that consumers are frequently unwilling to pay higher prices or lack the time and effort required to search for information and compare the prices and benefits of green versus non-green products (Gleim et al., 2013).

Furthermore, within the post-materialist framework, two hypotheses are proposed: the scarcity hypothesis, which suggests that people prioritize what is in short supply, and the socialization hypothesis, which argues that values formed in early years continue to influence individuals throughout life (Inglehart, 1981). In line with the scarcity hypothesis, numerous studies have demonstrated that a lower level of SES often hinders green consumption (Yan et al., 2021). In conjunction with the socialization hypothesis, it follows an assumption that a lower level of childhood SES may impede PEB. In fact, previous studies have revealed that a more deprived childhood background is associated with more precarious consumption behavior, such as impulsive spending (Griskevicius, et al., 2011), stronger materialistic tendencies (Li et al., 2014), and lower investment in financial security measures such as insurance (Mittal & Griskevicius, 2016).

Post-materialist goals, which often include environmental concerns, tend to encourage values, norms, and practices that motivate PEB. For example, White, Habib, and Hardisty (2019) synthesized over 300 studies to explain how consumer behaviors can be shifted toward sustainability. Their SHIFT (social influence, habitual routines, identity alignment, emotional engagement, and tangible outcomes) suggests that social norms, habitual routines, and identity alignment encourage

individuals to act in ways that feel socially approved, automatic, and consistent with their values. Emotional engagement and tangible outcomes further strengthen proenvironmental choices by making sustainability personally resonant and its benefits concrete (White et al., 2019). Table 1 summarizes the key literature.

3.2 Childhood socioeconomic status and proenvironmental behaviors

As mentioned before, PEB is generally considered a subtype of prosocial behavior, so the two concepts share certain properties. For example, actors of both are hardly self-centered, or at least they both hold motivations or identities for universalism, tradition, or collectivism (Piff & Robinson, 2017; Peattie, 2010). If following the general results about social class differences in prosocial behavior (Piff & Robinson, 2017), we may accordingly infer that lower classes also exhibit more PEBs, which, however, is contradictory to most of the current conclusions (Yan et al., 2021). Most of this research agrees that lower classes have more prosocial motivations, or at least internal motivations (Kraus & Callaghan, 2016), than higher classes because the former lives a more contextual social life, displaying more attention to others' well-being (Piff & Robinson, 2017). However, lower classes tend to have less PEB than their higher-class counterparts or, according to a recent finding, their middle-class counterparts (Yan et al., 2021).

Here I provide two potential explanations. First, lower classes may not have fully moralized PEBs as they perceive other forms of prosocial behavior. The moralization of PEBs features two processes: the simulation of moral emotions and moral piggybacking, specifically linking environmental issues with one's existing ethical framework (Feinberg et al., 2019). The conditions for these two processes may both differ for people from various levels of SES. Compared to higher-class individuals, lower-class ones might be less susceptible to pollution-related reports, images, or videos. This is probably because they often feel powerless in controlling even their own life, rendering environmental issues to seem like a distant topic from their daily responsibilities (Kennedy & Givens, 2019). On the other hand, lower-class individuals have less access to environmental education, which is typically provided only or mostly by elite educational institutions in most countries. This situation may, therefore, lead to their lack of environmental knowledge and analytical ability to be aware of environmental issues.

Second, lower classes have fewer resources to consider costlier, longer-term benefits of prosocial behaviors or PEBs compared to other less costly, shorter-term types (Grandin et al., 2022), such as helping close others or making donations. Previous research has revealed that consumers of different SES even have different patterns of PEBs. Higher-class consumers engage in costlier PEBs than lower-class

ones, including activities such as sustainable consumption, recycling, signing petitions, and being members of environmental organizations (Kennedy & Givens, 2019). In contrast, lower-class individuals tend to adopt more economical PEBs, such as saving energy and using public transport (Grandin et al., 2022; Trotta, 2018).

Additionally, higher classes enjoy more financial advantage in signaling status through PEBs compared to lower ones. This signaling function in PEBs may be more convenient than that in other types of prosocial behaviors, as this goal can be achieved simply through consumption—for example, buying an eco-friendly car (Griskevicius et al., 2010). Consumers who shop at a higher-end sustainable chain are also more likely to intentionally display the shopping bags with their logos compared to those who shop at a lower-end sustainable chain (Van der Wal et al., 2016).

In terms of time preference, lower-class individuals tend to prioritize present-oriented decisions over future-oriented ones (Reimer et al., 2009). PEBs do not provide instant or definite feedback from the parties—all mankind or the natural world—that benefit from this behavior. As a result, people cannot instantly or definitely pinpoint the potential positive consequences of their behaviors, whether in terms of social respect brought to the providers or the help brought to the receivers.

The current set of studies pays specific attention to SES before adulthood, which reflects how many resources individuals have access to during childhood and adolescence. A wide range of studies have demonstrated that resource constraints impede children's development in multiple areas, including physical health, cognition, socioemotion, methods for coping with stress, and lifestyle; more seriously, this negative influence can persist as far as into adulthood (Bradley & Corwyn, 2002). In the area of social processes, participants who expect resource scarcity in the near future are found to be reluctant to adopt innovative problem-solving strategies, instead conforming to traditions and authority (Booth, 1984). In an experimental study, prompts of scarcity activate participants' motivation for seeking their own benefits (Roux et al., 2015). In the long run, economic scarcity leads to a reduction in mental bandwidth, forcing people to participate in activities that provide long-term benefits (Mullainathan & Shafir, 2013). Therefore, those practices and mindsets may restrain individuals from engaging in PEB.

In another vein, PEB-related values, lifestyles, and methods of consumption tend to persist across generations (Pelikán et al., 2020; Katz-Gerro et al., 2020). Through socialization, parents pass on their values toward nature, experience in nature, and knowledge of environment to their children (Brannen, 2006). Empirical and theoretical studies have shown that concern for nature in adulthood is significantly predicted by the quality time that parents spend with their children in nature before adulthood, as well as by parents acting as proenvironmental role models (Chawla, 2007). Presumably, compared to advantaged families, disadvantaged families are so

constrained by their financial difficulties that they are unable to provide their children with time spent together in nature. Consequently, when they grow into adulthood, people from disadvantaged family backgrounds may feel unfamiliar or indifferent about environmental topics granted that these topics prevail today.

3.3 Intention for social mobility and proenvironmental behaviors

It seems contradictory to think that people who desire social elevation will engage in actions beneficial to the environment. Indeed, people who aim to achieve social status are mostly assumed to hold self-enhancement values, acting primarily in their own financial and social interest, whereas PEBs reflect self-transcendence values that guide individuals to consider others' or public interest (Becker et al., 2014). However, if positioning that individual within a Chinese cultural field, social mobility may not necessarily be driven solely by self-interest.

First, the fruits of one individual's social mobility are not wholly enjoyed by oneself but shared with their family or even kinfolks in general, namely "upholding the family name" (Hao, 2021). That is to say, in the Chinese cultural setting, a desire for social mobility may not be necessarily equivalent to a search for self-interest. On the other hand, secular success, including career, material, and societal achievements, is an important element forming the Chinese interpretation of a meaningful life (Zhang et al., 2015). An empirical research even revealed that life meaningfulness is predicted by a clear idea about who and what one aspires to become in the future work life (Zhang et al., 2016), suggesting the weight of career prestige in conceptualizing a Chinese version of a meaningful life.

In a similar vein, PEBs can be propelled by considerations beyond just public interest and do not necessarily require an absolute sacrifice of personal well-being. Individuals can turn PEBs to their own advantage, rather than merely considering PEBs as a way of serving public fears. For example, when someone aims to move socially upward, they are likely to adopt the practices and lifestyle of a higher class. To acquire the membership of the fields of their desired class, they may deliberately engage in the accordant practices. This is because each social class is assumed to have their own specific habitus shared by all the members. By common consent, members adhere to the agreed social standards that provide instructions on how they should act and think within a social community they believe they belong to (Bourdieu, 1984).

Because PEBs are often seen as exclusive to affluent classes due to its potential inconvenience and added costs (Gleim et al., 2013), lower classes might perceive PEBs as part of the moral identity associated with higher classes. Therefore, by going green, consumers are likely to obtain the credentials necessary for entering the middle-class club, which can be a self-driven motivation. In fact, previous research

has found that consumers sometimes utilize green consumption as a means of status signaling (Griskevicius et al., 2010).

We have not found an exact examination on the intention for social mobility as an antecedent to PEBs, but similar studies have touched on this topic. In an experimental study, when lower-class participants perceived a higher possibility of realizing social mobility, their prosocial behavior increased; this association was explained by a higher belief that the social system where they reside upholds fairness, legitimacy, and reason (Rao et al., 2022). Although intention and perception are different aspects, they are by any means correlated. The intention to move socially upward requires a consideration of its feasibility. This study is interesting as it suggests that individual perceptions of their life opportunities, such as the chance of social mobility, can affect their attitudes toward broader societal topics.

Another study provided more direct proof for our current one. Researchers found in a sample of Singaporean college students that participants high in perceived social mobility tend to score higher in cosmopolitan orientation, showing positive attitudes toward cultural openness, global prosociality, and cultural diversity, thus exhibiting more proenvironmental intentions (Leung & Koh, 2019). The findings are not difficult to digest if considering the circular spectrum of basic individual values where the pursuit of achievement or the freedom to determine one's own actions and the concern for nature are all under the growth sectors, implying that the holders could all be open to change and novelty (Schwartz et al., 2012).

3.4 Materialism and proenvironmental behaviors

Materialism is a value system where the ultimate goals in life revolve around acquiring money and materials, as achieving those goals are equivalent to obtaining happiness and success (Richins & Dawson, 1992; Kasser, 2016). On the circular motivational continuum of values, materialism falls within the opposite clusters of self-transcendent values such as family, universalism, and conformity (Schwartz et al., 2012; Kasser, 2016).

Scholars generally consider proenvironmental values a stronger predictor for PEBs, which implies that opposing values such as materialism are major obstacles to PEBs. Materialism in adolescents decreases their likelihood of helping others (Briggs et al., 2007), egalitarian advocacy (Flanagan et al., 2005), and ecologically responsible behavior (Brown & Kasser, 2005). Most studies claim that an increased level of materialism is associated with a decreased level of PEB (Kilbourne & Pickett, 2008; Alzubaidi et al., 2021; Helm et al., 2019). Contrary to most other findings, Evers et al. (2018) discovered that materialistic consumers in a U.S. sample have more sustainable consumption behaviors, as they tend to seek alternative uses and ends for products.

Further, PEBs can be an antecedent of materialism. Considering that green consumption enhances consumers' sense of self-worth (Tezer & Bodur, 2020), PEBs may activate self-transcendent values, potentially reducing materialism (Kasser, 2016). Alternatively, PEBs are a strong predictor of proenvironmental values (Hurst et al., 2013), which are positioned opposite to materialistic values on the circular model of the value system (Maio et al., 2009; Schwartz et al., 2012), suggesting that an increase in PEB may lead to a decrease in materialistic values.

3.5 Filial piety and proenvironmental behaviors

Filial piety is basically a set of moral canons believed and practiced within families where family as an important social relation is esteemed (Bedford & Yeh, 2021). People who believe and practice filial piety tend to respect their parents and act in ways that align with their expectations. The concept itself is rooted in Confucius traditions, although people who live outside the influence of Confucianism may have similar beliefs or practices (Wei & Liu, 2022). They may interact with their parents in accordance with certain implicit principles similar to those of filial piety or, as parents, require their children to behave in similar ways (Wei & Liu, 2022). Nevertheless, we stick to the concept that derives directly from Confucianism, a dominant doctrine in ancient China (Bedford & Yeh, 2021), which primarily influences the population in East and Southeastern Asia, as well as their descendants, to spread out across the world.

Many studies have demonstrated that parents' PEBs significantly influence their children's PEBs through various ways. For example, children emulate their parents' compliance with environmental norms and actions (Collado et al., 2019). Parents discuss environmental topics with their children, and both engage in proenvironmental activities together (Jia & Yu, 2021). Nonetheless, some children are more willing than others to imitate their parents, depending most likely on the extent to which they approve of their parents' attitudes and behaviors. It is reasonable to hypothesize that a child may behave more like their parents if they believe that they should unconditionally obey their parents or care for their parents to reciprocate their love (i.e., filial piety; Yeh & Bedford, 2003).

Alternatively, children who hold filial piety beliefs are likely to hold values that emphasize tradition and conformity or care and benevolence (Schwartz et al., 2012; Wei & Liu, 2022). These values focus on the social aspects, as opposed to personal aspects (Schwartz et al., 2012), indicating that individuals who hold these values are generally concerned with the interest of others or authorities (Schwartz et al., 2012). On the other hand, people who frequently engage in PEBs are inclined to hold proenvironmental values, classified as standards with a social focus, namely caring about other people or the interest of a group (Schwartz et al., 2012).

Table 1. Key literature review.

	Determinants	References	Findings
Post-materialist theory	Childhood socioeconomic status	Griskevicius, et al., 2011; Li et al., 2014; Mittal & Griskevicius, 2016	A more deprived childhood background is associated with more precarious consumption behavior, such as impulsive spending, stronger materialistic tendencies, and lower investment in financial security measures such as insurance.
	Socioeconomic status	Bano et al., 2024; Yan et al., 2021	Materialists show a lower tendency to prioritize the environment over economic growth; a lower level of SES hinders green consumption
	Unwillingness to pay green premium	Gleim et al., 2013	Consumers are frequently unwilling to pay higher prices or lack the time and effort required to search for information and compare the prices and benefits of green versus non-green products
	Intention for social mobility	Rao et al., 2022 Leung & Koh, 2019	When lower-class participants perceived greater social mobility, their prosocial behavior increased, driven by stronger beliefs in the fairness and legitimacy of the social system. Higher perceived social mobility predicts a stronger cosmopolitan orientation—characterized by openness to cultures, global prosociality, and appreciation of diversity—which in turn fosters greater pro-environmental intentions.
Materialist goals	Materialism	Briggs et al., 2007, Flanagan et al., 2005, Brown & Kasser, 2005 Kilbourne & Pickett, 2008; Alzubaidi et al., 2021; Helm et al., 2019	Materialism in adolescents decreases their likelihood of helping others, egalitarian advocacy, and ecologically responsible behavior. An increased level of materialism is associated with a decreased level of PEB.
	Values	Kasser, 2016 Schwartz et al., 2012	Self-transcendent values reduce materialism. The circular motivational continuum of values
Post-materialist goals	Filial piety	Bedford & Yeh, 2021 Collado et al., 2019 Jia & Yu, 2021	Filial piety is basically a set of moral canons believed and practiced within families where family as an important social relation is esteemed. Children emulate their parents' compliance with environmental norms and actions. Parents discuss environmental topics with their children, and both engage in proenvironmental activities together

4 Research Design

The current group of studies included one set of open national data (Chinese General Social Survey [CGSS], 2013), one set of self-collected cross-sectional data, and one set of self-collected longitudinal data. Various statistical methods were employed, including correlational analysis, confirmatory factor analysis (CFA), structural equation modeling, ordinary least square (OLS) regression, mediation analysis, moderation analysis, conditional process analysis, fixed-effects modeling, and mixed-effects modeling.

4.1 Research questions

RQ1: How does SES before adulthood influence PEBs?

RQ2: How does the intention for social mobility influence PEBs?

RQ3: How do values, such as materialism, and beliefs, such as filial piety, influence PEBs?

Table 2. Research design.

	Article I	Article II	Article III	Article IV
Independent variables	childhood subjective SES, commercial insurance purchase	intention for social mobility	materialism, psychological entitlement	reciprocal filial piety, authoritarian filial piety, moral identity
Dependent variables	commercial insurance purchase, PEBs	PEBs	psychological entitlement, PEBs	moral identity, PEBs
Moderating variables	age	family SES	family SES	gender
Controlled variables	current SES, recent health conditions		urban or countryside, only child, grade, gender	
Data	2013 Chinese General Social Survey (CGSS, 2013)	self-collected longitudinal data	self-collected cross-sectional data	self-collected cross-sectional and longitudinal data
Sample sizes	11,172	1,526	784	791 (1 st data), 1510 (2 nd data)
Populations	18- to 97-year-old (M = 48.49, SD = 16.38) Chinese citizens from all provinces, excluding Xinjiang and Hainan	11- to 16-year-old (M = 13.29, SD = 0.76) adolescents from Henan province, Central China	12- to 17-year-old (M = 13.73, SD = 1.06) adolescents from Henan province, Central China	11- to 16-year-old (M = 13.72, SD = 1.15) adolescents (1 st) and 11- to 16-year-old (M = 13.29, SD = 0.76) adolescents (2 nd) from Henan province, Central China

4.2 Data

I utilized data from the 2013 CGSS. The CGSS, initiated in 2003 and ongoing, is a national, comprehensive, and continuous social investigation. It is designed to systematically track social transitions since the beginning of 2000 and to examine the potential associations between social structures and citizens' quality of life in China. The survey employed multistage stratified sampling and involved door-to-door interviews with over 10,000 Chinese citizens from all provinces except Xinjiang and Hainan. Respondents ranged in age from 18 to 95 years.

According to our theoretical design, we selected questionnaires addressing demographics, health conditions, childhood subjective SES, current SES, commercial insurance purchases, and PEBs. We obtained a final sample of 11,172 respondents, aged 18 to 97 (M = 48.49, SD = 16.38), after excluding responses with

missing information, invalid answers, and data irrelevant to our research design. Of these respondents, 5,546 (49.6%) were female and 5,626 (50.4%) were male.

The longitudinal data of Articles II and IV came from the same project, where respondents who participated in the first survey were followed up with in a second survey. Data were collected from two randomly selected secondary schools in Henan province, Central China. In the first school, our participants included nine eighth-grade classes and seven ninth-grade classes. In the second school, six seventh-grade classes and six eighth-grade classes participated in the survey. We used convenience sampling to gather data from adolescent students.

The first wave of data collection took place in September 2022, with a total of 1,727 participants. The second wave was conducted in February 2023, yielding 1,681 responses. Our final dataset comprised only those participants who took part in both waves, totaling 1,627 individuals.

For Article II, we incorporated 1,526 participants after addressing missing data and invalid responses and including only items relevant to our current study. The sample consisted of 773 girls (50.7%) and 753 boys (49.3%). Additionally, 473 students (31%) came from rural areas, whereas 1,053 (69%) were from urban areas. Only 147 students (9.6%) were the only child in their families, meaning that 1,379 (90.4%) had siblings. The age range was 11 to 16 years ($M = 13.29$, $SD = 0.76$).

Article III and one sample in Article IV employed convenience sampling to gather data from two randomly selected secondary schools in Central China. In Study III, after we removed incomplete data and invalid responses, the final sample included 784 participants, comprising 379 girls (48%) and 405 boys (52%). The participants were distributed across grades as follows: 59% from seventh grade, 16% from eighth grade, and 25% from ninth grade. Their ages ranged from 12 to 17 years ($M = 13.73$, $SD = 1.06$), with only 10% being the only child in their family.

In Article IV, the first dataset, which included 791 student participants (M age = 13.72, SD age = 1.15), was included in this study after we removed missing data and clerical errors. The sample comprised 378 (47.8%) girls and 413 (52%) boys, 456 (57.6%) seventh graders, 131 (16.6%) eighth graders, and 197 (24.9%) ninth graders. Most respondents were from the seventh grade because the higher grades must prepare for the high school entrance exam, and most of them were not willing to take part in the survey.

The second dataset came from the same survey conducted in Article II. We focused solely on the items required in Article IV. After we addressed the missing data and typographical errors, the sample comprised 1,510 participants. In this sample, 767 (50.7%) students were girls and 743 (49.3%) were boys. Most students were either 13 (727) or 14 years old (507). The age range was 11–16 years old (M age = 13.29, SD age = 0.76).

4.3 Measures

In Article I, variables of interest, including participants' childhood subjective SES (family SES at 14 years old), commercial insurance purchase, and PEBs were measured. Other controlled variables were current subjective SES and health conditions.

Childhood subjective SES and *current subjective SES* were assessed using the MacArthur ladder. Respondents were shown two images of ladders, each with numbered rungs, and given the following instructions: "In our society, some people occupy higher positions, while others are in lower positions. The ladder represents social class, with 10 indicating the highest social class and 1 indicating the lowest." They were then asked to rate their perceived social class at age 14 for childhood subjective SES and their current social class for current SES. Responses were recorded on a scale from 1 (lowest) to 10 (highest).

The variable of *commercial insurance purchase* comprises two items: one addressing the purchase of medical insurance and the other addressing the purchase of life insurance. Respondents were asked, "Have you joined the following insurance programs?" For each type of insurance, the response options were "yes," "no," and "not applicable." "Yes" responses were coded as 1, and other responses were coded as 0.

In line with previous studies, 10 items were selected to measure PEBs (Wang & Cheng, 2017). Respondents were asked whether they had engaged in certain activities or behaviors in the past year. The items are listed below:

- Garbage sorting
- Discussing environmental issues with family and friends
- Taking reusable bags when shopping for daily products
- Recycling plastic bags
- Following environmental issues on broadcasts, TV, and newspapers
- Donating to environmental protection causes
- Actively participating in environmental publicity and education organized by the government and other organizations
- Actively participating in activities organized by nongovernmental organizations
- Conserving forests at their own expense
- Making complaints and appeals against environmental damage

All responses were recorded on a 3-point Likert scale, with 1 indicating “never,” 2 “sometimes,” and 3 “often.” The Cronbach’s alpha coefficient for these items was 0.75, indicating good internal consistency.

To measure health condition as a controlled variable, we used the mean score of two survey items. First, respondents were asked, “What do you think of your current physical health?” Responses were recorded on a 5-point Likert scale ranging from “Not healthy at all” (1) to “Very healthy” (5). The second question was “In the past four weeks, how often have your work or other daily activities been affected by health issues?” This was also rated on a 5-point Likert scale, ranging from “Always” (1) to “Never” (5). By averaging the scores of these two items, we obtained an overall measure of respondents’ health condition.

Article II measured variables, including the intention for social mobility, family SES, and PEBs.

Intention for social mobility. We translated the measurement of individual mobility intentions by Tausch et al. (2015). Participants answered questions regarding the extent to which they are inclined to partake in the following actions to enhance their societal standing: “create connections with people who hold power in society,” “move to a neighborhood where there are more job opportunities,” and “work hard to be able to advance myself.” The answers were rated on a Likert scale ranging from 1 (not at all likely) to 5 (extremely likely).

Proenvironmental behaviors. We employed a localized and translated edition of the PEB measurement (Krettenauer, 2017; Wang et al., 2019). Participants read the Chinese version of questionnaires. The original items are in English, which included “I turn off TV and computer screens when they are not in use,” “I conserve energy and water by taking shorter showers,” “I collect and recycle used papers and plastic containers,” “I properly treat the dead batteries to avoid polluting the environment,” “I reuse plastic bags,” and “I prefer buying products made from recyclables (e.g., notebooks made of used papers).” Participants were asked to rate the frequency of the above actions in the previous year (0 = never do this, 5 = always do this).

Family SES. We used the Family Affluence Scale (Currie et al., 2008; Zou et al., 2020), which is widely used to assess younger people’s family SES by asking about their family possessions and consumption, considering that adolescents often have insufficient knowledge of their family income or inaccurate judgement about their family SES. In this scale, participating adolescents were asked to indicate the number of family cars, vans, or trucks (1 = none, 2 = one, 3 = two or more), whether they have their own bedroom (1 = no, 2 = yes), how many times their family traveled over the past year (1 = none, 2 = one, 3 = two, 4 = more than two times), and how many family computer(s) are in their home (1 = none, 2 = one, 3 = two, 4 = more than two). Participants’ family SES was evaluated by summing four scores; higher scores

indicate a higher family SES. The range in this study was from 4 to 13, the mean score was 8.31, the median score was 8, and the standard deviation was 1.84.

In Article III, we measured variables of interest, including materialism, psychological entitlement, family SES, and PEBs. We controlled for demographic factors, such as urban or countryside residence, only-child status, grade, and gender. We employed a modified version of the PEB assessment, drawing from Krettenauer (2017) and a localized study examining a Chinese adolescent sample (Wang et al., 2019). The items are “I turn off TV and computer screens when they are not in use,” “I conserve energy and water by taking shorter showers,” “I collect and recycle used papers and plastic containers,” “I properly treat the dead batteries to avoid polluting the environment,” “I reuse plastic bags,” and “I prefer buying products made from recyclables (e.g., notebooks made of used papers).” For each item, participants were asked to rate how often they engaged in the behavior in the last year (from 0 = never do this to 5 = always do this).

To assess *psychological entitlement*, we utilized a Chinese version of the Psychological Entitlement Scale (Ding et al., 2019b; Campbell et al., 2004). This scale comprises nine items that reflect an individual’s sense of entitlement. Sample items include “I honestly feel I’m just more deserving than others,” “Great things should come to me,” “If I were on the Titanic, I would deserve to be on the first lifeboat,” “I demand the best because I’m worth it,” and “People like me deserve an extra break now and then.” Participants responded on a 7-point scale ranging from 1 (completely disagree) to 7 (completely agree).

We employed the Youth Materialism Scale (Goldberg et al., 2003) to measure materialism. This scale has demonstrated good reliability in a Chinese sample (Ding et al., 2019a). Participants rated their agreement with 10 statements, such as “I’d rather spend time buying things than doing almost anything else,” “I would be happier if I had more money to buy more things for myself,” “I have fun just thinking of all the things I own,” “I really enjoy going shopping,” “I like to buy things my friends have,” and “I really like the kids that have very special games or clothes.” Responses were given on a 4-point scale ranging from 1 (disagree a lot) to 4 (agree a lot).

Given adolescents’ limited awareness of their actual family economic situation, we measured the family SES using the Family Affluence Scale (Currie et al., 2008; Zou et al., 2020). This scale directly gathers information about respondents’ family possessions and life experiences. Respondents responded to four questions about their family’s economic situation, such as the number of family cars, vans, or trucks (1 = none, 2 = one, 3 = two or more), whether they have their own bedroom (1 = no, 2 = yes), how often their family traveled in the past 12 months (1 = none, 2 = once, 3 = twice, 4 = more than twice), and the number of family computers (1 = none, 2 =

one, 3 = two, 4 = more than two). We evaluated participants' family SES by averaging the summed four scores.

In Article IV, we chose the variables PEB and filial piety beliefs.

Filial piety beliefs. We evaluated participants' levels of filial piety belief using the Filial Piety Belief Scale, which consists of two dimensions: reciprocal filial piety and authoritarian filial piety (Yeh & Bedford, 2003). Each dimension includes five items. For instance, reciprocal filial piety is assessed with statements such as "I take care of my parents when they are ill," whereas authoritarian filial piety includes items such as "I give up my interests and hobbies to meet my parents' aspirations." Responses were measured on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Studies have demonstrated good reliability of this scale among East Asian samples (Jin et al., 2019; Leung, 2020; Tan et al., 2018; Yeh, 2006; Yeh & Bedford, 2003). In Dataset I, the Cronbach's alpha coefficients were .89 for reciprocal filial piety and .76 for authoritarian filial piety. In Dataset II, the first wave yielded Cronbach's alpha coefficients of .82 for reciprocal filial piety and .74 for authoritarian filial piety, and the second wave showed coefficients of .88 for reciprocal filial piety and .78 for authoritarian filial piety. All coefficients indicated strong internal consistency.

Proenvironmental behaviors. An adapted measurement of PEB was utilized, drawing from Krettenauer's (2017) questionnaire and a study involving a Chinese adolescent sample (Wang et al., 2020). Participants were presented with six items, including statements such as "I conserve energy and water by taking shorter showers" and "I prefer buying products made from recyclables (e.g., notebooks made of used papers)." They were then asked to evaluate the frequency of these actions over the past year using a 6-point Likert scale, ranging from 0 (never do this) to 5 (always do this). In Dataset I, the Cronbach's alpha coefficient was .83, indicating good reliability. In Dataset II, the first wave yielded a Cronbach's alpha coefficient of .84, and the second wave showed a coefficient of .87. All coefficients demonstrated strong internal consistency.

4.4 Statistical techniques

A range of statistical techniques were employed across the research articles, incorporating mainly predictive methods as well as factor analysis for testing the research questions. The selection of statistical techniques was guided by the specific objectives of each study and the nature of the data. For example, we used fixed- and mixed-effects models to handle the panel data of the longitudinal studies in Articles II and IV. We conducted most of the analyses using R 4.0.4 for Mac OS X GUI and RStudio Version 1.4.1106, except that in the first study, we analyzed the data using

IBM SPSS Statistics Subscription. The original codes in R are available from the author upon request for peer researchers who may require them.

In Article I, we wanted to test whether childhood SES is positively associated with adulthood PEBs, whether commercial insurance purchase acts as a mediator of the association between childhood SES and adulthood PEBs, and whether age moderated the mediation model. Given the model's complexity, which involved multiple variables and associations, we utilized PROCESS_v3.5 (Hayes, 2017), a macro designed for IBM SPSS Statistics Subscription. This macro simplifies the statistical process by providing a user-friendly tool for building regression models with multiple pathways. In this study, we chose Model 4 for the mediation model and Model 8 for conditional mediation analyses. This macro calculates indirect effects by generating 95% bias-corrected accelerated confidence intervals (CIs) based on 5,000 bootstrap samples, with statistical significance indicated by a 95% CI that does not include zero. If the effect of an independent variable on a dependent variable is significant, it indicates there is a 95% probability that the effect is true, which suggests that the result is due to a certain cause rather than random chance.

Bootstrapping is a statistical technique that repeatedly resamples a single dataset to generate multiple simulated samples so that the results can approximate those of the total population. We utilized the bootstrapping method for mediation and conditional process analyses, as previous methodological scholars (MacKinnon et al., 2004; Zhao et al., 2010) have recommended. Notably, we converted all original variable scores to Z-scores beforehand because Z-scores provide a standardized scale for measuring how far a data point deviates from the mean. This procedure is convenient in identifying outliers and comparing data across distributions.

Because we were working with panel data in Articles II and IV, the data had a hierarchical structure, with observations from two time points nested within individuals. We analyzed the data employing fixed-effects models, which controlled for all time invariant factors at the within-individual level. Furthermore, we hypothesized that factors at the between-individual level might moderate the main effect. To explore these between-individual differences, we employed mixed-effects models. This approach involved relaxing some of the fixed-effects assumptions, treating part of the intercepts as distributions with a mean of zero and specific variances rather than as fixed constants. Regarding the statistical software, we conducted all analyses using R 4.0.4 for Mac OS X GUI and RStudio Version 1.4.1106. We employed the `plm` function from the `plm` package to analyze the fixed-effects model and used the `lmer` function from the `lme4` package for the mixed-effects model. In addition, we conducted simple slope analysis using the `simple_slopes` function from the `reghelper` package in R.

In Article III, we analyzed the data using R 4.0.4 for Mac OS X GUI and RStudio Version 1.4.1106. We conducted CFA using the `lavaan` and `semPlot` packages. Next,

we tested the hypothetical model and a competing model using the processR package (Moon, 2021), which is based on the PROCESS macro for SPSS and SAS (Hayes & Rockwood, 2020). We ran 95% bias-corrected accelerated CIs based on 5,000 bootstrap samples, with statistical significance indicated by a 95% CI that does not include zero. Then, we used standardized scores to calculate the hypothetical models.

4.5 Ethical considerations

In Article I, we used secondary data from the CGSS, a national dataset collected by leading institutions. The dataset is publicly available, allowing everyone to access the data archive and obtain detailed information about the data collection process from the CGSS website. This choice relieved us of the need to collect data and provided access to high-quality national data. However, there were still ethical considerations to mention here. First, personal privacy was safeguarded through the anonymization of the data, ensuring that respondents could not be identified. Second, we ensured that the data were merely used for research purposes per the original consent the respondents provided. Third, our use of the data conformed with the General Data Protection Regulation (EPCEU, 2016).

Articles II, III, and IV employed self-collected data, so consent and permissions were required to conduct the data collecting. The data collection process has been thoroughly documented, and all versions of the data are accessible upon request from the author of this dissertation. In Articles III and Article IV, the Ethics Committee for Scientific Research of Xinyang Normal University Permissions authorized us to conduct this survey. Consent was also obtained from the students and their parents. Before writing on the questionnaires, students were informed about the entire procedure, the scientific and confidential use of their responses, and their right to withdraw at any time. Participants were given a short time to review and confirm their responses' completeness at the end of each survey. The survey included questions on demographics, family SES, PEBs, psychological entitlement, materialism, filial piety, and so on. Each study included only the variables relevant to its research questions.

Approval to conduct the survey for Articles II and IV was obtained from the same institution as above and from the adolescent students and their parents. A fellow researcher, along with school teachers, led the survey. Student participants completed paper questionnaires in their classrooms. Prior to the formal survey, students were thoroughly briefed on the entire procedure. It was emphasized that the survey results would be used solely for scientific purposes, and participants were assured of their responses' confidentiality. They were also informed of their right to withdraw at any point during the survey. Finally, students were given time to verify their answers' completeness.

5 Results

Article I concerned RQs 1 and 2 and answered how childhood SES influences PEB. Participants' subjective SES at 14 is positively associated with their current purchase of commercial insurance and positively associated with current PEBs, even controlling for their current SES; the purchase of commercial insurance is positively associated with PEBs. That is, the purchase of commercial insurance plays a mediating role in the association between childhood SES and PEBs.

Moreover, age is a moderator of two associations of the mediation model. The interaction between childhood SES and age is negatively associated with the purchase of commercial insurance and positively associated with PEBs. In other words, the positive effect of childhood SES on the purchase of commercial insurance is higher for younger respondents than for older respondents, and the positive effect of childhood SES on PEBs is lower for younger respondents than for older respondents.

In Article II, we answered RQ 2 by examining the effect of intention for social mobility on PEBs. The fixed-effects model revealed that within individuals, variations in the intention for social mobility positively predicted variations in PEBs. The mixed-effects model indicated that across individuals, family SES positively influenced the relationship between the intention for social mobility and PEBs. However, the interaction between family SES and the intention for social mobility showed a negative effect on PEBs. This implies that when family SES increases, the positive impact of social mobility intentions on PEBs diminishes. In summary, the intention for social mobility has a stronger positive effect on PEBs among adolescents from less economically advantaged families than among their more advantaged counterparts.

Article III concerned RQ 4, revealing the effect of a certain value, materialism, on PEBs. PEBs are negatively associated with materialism and psychological entitlement. Psychological entitlement is positively associated with materialism, and it serves as a mediator in the association between PEBs and materialism.

In addition, adolescents' family SES acts as a moderator on the association between PEBs and psychological entitlement. For adolescents from families with higher SES, higher engagement in PEBs is significantly associated with lower

psychological entitlement. This effect, however, does not exist among adolescents from families with lower SES.

In Article IV, we presented how filial piety influenced PEBs, which provided responses to RQ 4. The regression results from Data I indicated a positive association between filial piety, calculated by adding together RFP and AFP items, and PEBs. More specifically, both RFP and AFP were positively correlated with PEBs. The findings from the fixed-effects model demonstrated that within individuals, both RFP and AFP positively predicted PEBs. Additionally, a mixed-effects model showed that when gender was included as a moderator, the effect of RFP on PEBs was significantly positive, and the interaction between gender and RFP significantly predicted PEBs. Notably, the positive influence of RFP on PEBs was stronger among male students than among female ones. In contrast, the interaction between gender and AFP did not significantly predict PEBs.

5.1 Article I

In Article I, we examined the association between childhood SES and adulthood PEBs. The results indicated that childhood SES was positively correlated with adulthood PEBs, regardless of current SES. Studies have been conducted to examine how childhood SES can influence adult decision-making across various areas (e.g., Mittal & Griskevicius, 2016); however, the impact on PEBs had not been addressed until Article I was published. We analyzed the potential association mainly based on the concept of resource scarcity. An economically deprived childhood may signal chronic resource scarcity. The studies on scarcity showed that a person with limited financial means is often less open to new ideas and finds developing open-minded values difficult, leading to short-sighted actions as opposed to pursuing long-term goals (Mullainathan & Shafir, 2013).

We also examined the purchase of commercial insurance as a mediator of the said association. This assumption is grounded in life history theory, which argues that individuals with limited resources are less inclined to invest in risk reduction. Instead, they adopt a fast strategy aimed at maximizing current survival prospects within a shorter time frame (Griskevicius et al., 2013). Furthermore, we considered age a moderator in the model. We speculated that age positively moderates the direct path and the first half path of the mediation model (see Fig. 2). For the direct path, one explanation could be that older people tend to have higher ethical standards than younger individuals, which leads to more PEBs. However, young people often have more opportunities to acquire environmental knowledge through school, a factor that positively influences PEBs. For the first half path of the mediation model, as individuals age, their perception of risk tends to change because older adults face a higher likelihood of disease diagnosis. Consequently, for older individuals, potential

health threats may weaken the association between childhood SES and the purchase of commercial insurance.

In terms of the empirical results, the mediation model revealed that both the direct and indirect effects between childhood SES and adulthood PEBs were significant, even controlling for the current SES and current health condition. Moreover, commercial-insurance purchase partially mediated the association between childhood SES and adulthood PEBs. According to the results of the conditional process analysis, age positively moderated the association between childhood SES and adulthood PEBs. This result aligns more closely with the reasoning that older people tend to be inherently more proenvironmental than younger ones. Age also moderated the association between childhood SES and commercial insurance purchase. The conditional process model with coefficients and a clear presentation of the interaction can be seen in Fig. 2.

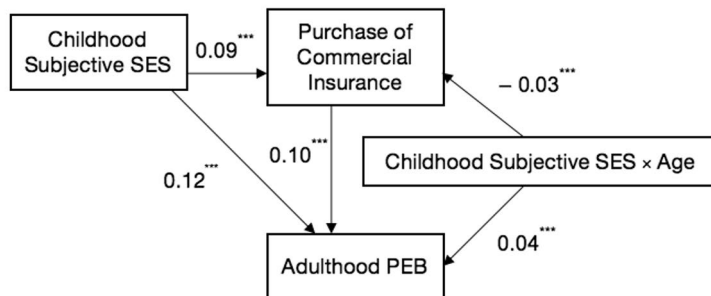


Figure 2. The results of Article I.

5.2 Article II

In Article II, we examined whether having an intention to improve social status leads adolescents to commit more PEBs. We theorized that individuals aiming to elevate their social status are likely to adopt higher-class habits (Bourdieu, 1984), which often involve increased awareness of public issues and the need to maintain morality. Several studies in the existing literature support this idea up to a point. For example, Yoon and Kim (2016) found that materialism does not make consumers spend impulsively when they feel a strong likelihood of realizing economic mobility. In such circumstances, consumers are more likely to adopt a farsighted approach to achieving financial success. Moreover, people who perceived more class mobility have more charitable emotions and charitable concepts and subsequently online giving intention (Li et al., 2023). People from disadvantaged backgrounds display

greater prosocial behavior when they perceive a high possibility of class mobility than when their perception of class mobility is low (Rao et al., 2022).

Empirically, intention for social mobility positively predicted PEBs. When family affluence is included as a moderator, the main effect becomes stronger and the interaction between family affluence and intention for social mobility negatively predicted PEBs. In other words, the positive effect of intention for social mobility on PEBs was stronger among adolescents from less financially secure families than among those from more financially secure families. The interaction plot is shown in Fig. 3.

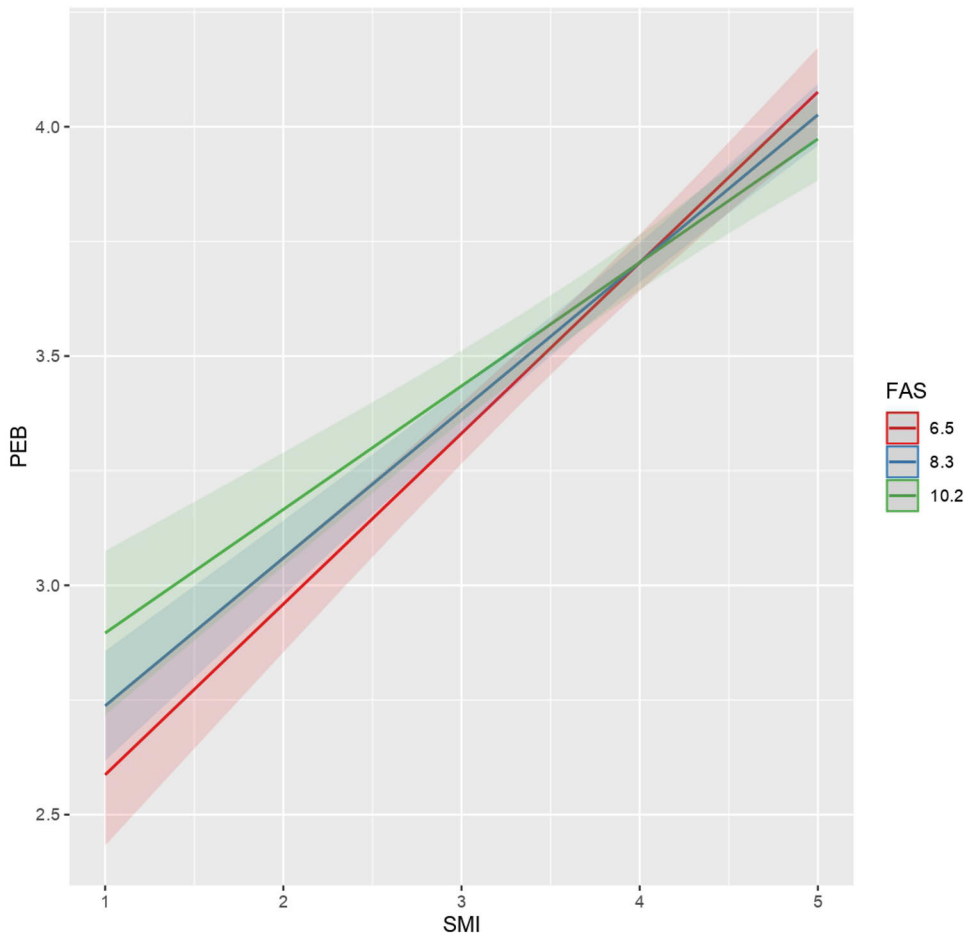


Figure 3. The interaction plot of Article II. Note: SMI = intention for social mobility, PEB = proenvironmental behaviors, FAS = family affluence (family socioeconomic status).

5.3 Article III

Article III concerned how materialistic value was associated with PEBs. We employed the theory of basic individual values (Schwartz et al., 2012) to interpret the associations among materialism, psychological entitlement, and PEBs. Specifically, proenvironmental values have a place in the self-transcendence dimension, standing in direct opposition to materialism and psychological entitlement, which belong to the self-enhancement dimension on the circular value spectrum. As predicted, PEBs influenced materialism both directly and indirectly, with psychological entitlement serving as a mediator. The model can be seen in Fig. 4.

Moreover, we tested the moderation of family affluence on the association between PEBs and psychological entitlement. Adolescents from lower social classes are likely to experience greater social injustice than their higher-class peers, leading them to feel they deserve better treatment than they actually receive. Consequently, their psychological entitlement may remain consistently high, leaving it less influenced by other factors. Correspondingly, the empirical results supported this reasoning. In the interaction plot, the line representing adolescents with low family affluence remains nearly horizontal, suggesting that their psychological entitlement is minimally influenced by PEBs, and it consistently remains higher than the other line (see Fig. 5).

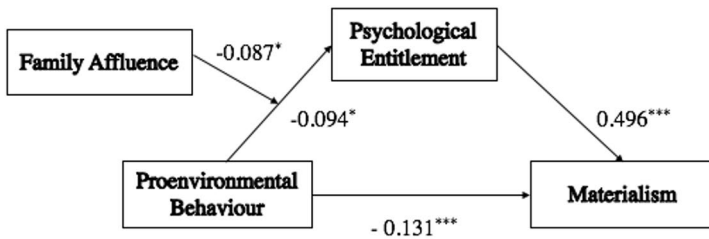


Figure 4. The results of Article III.

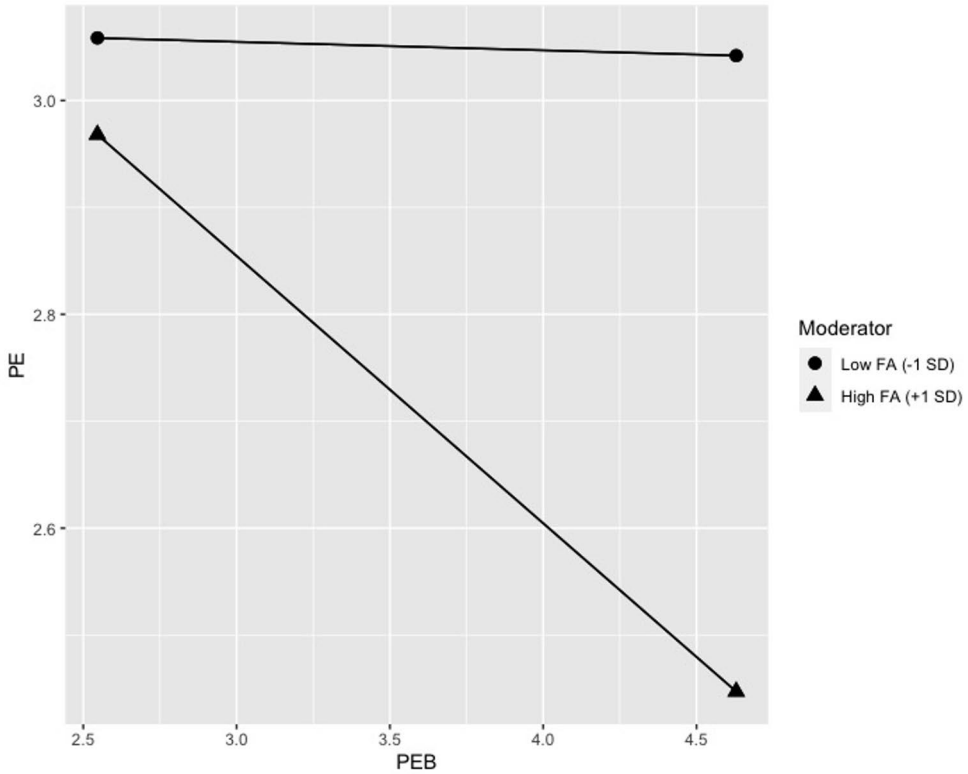


Figure 5. The interaction plot of Article III. *Note:* PEB = proenvironmental behaviors, PE = psychological entitlement, FA = family affluence.

5.4 Article IV

Article IV concerned how two types of filial piety were associated with PEBs. This article therefore provided additional empirical evidence that value influences PEBs. As in Article III, we based our assumption on the theory of basic individual values (Schwartz et al., 2012). Individuals who embrace reciprocal filial piety are likely to value care and benevolence, whereas those who adhere to authoritarian filial piety tend to prioritize tradition and conformity (Wei & Liu, 2022). However, both are classified under social focus, which also includes PEBs, indicating that individuals who adhere to these values are more likely to prioritize others or groups (Schwartz et al., 2012).

In the empirical section, we initially conducted a preliminary analysis using cross-sectional data and later reassessed the association using two-wave longitudinal panel data. In the first dataset, which included 791 adolescent students, the regression model results revealed that filial piety, calculated as the average score of all 10 items, was positively associated with PEBs. Regressions conducted separately also showed

that both RFP and AFP were positively associated with PEBs. In the second dataset, which comprised 1,510 adolescents measured at two time points, the results of fixed-effects model showed that both RFP and AFP positively predicted PEBs. The results of the mixed-effects model indicated that the positive influence of RFP on PEBs was still significant but was stronger among male adolescents than among female ones. Differently, no interaction effect of gender and AFP on PEBs was observed. The interaction plot is shown in Fig. 6.

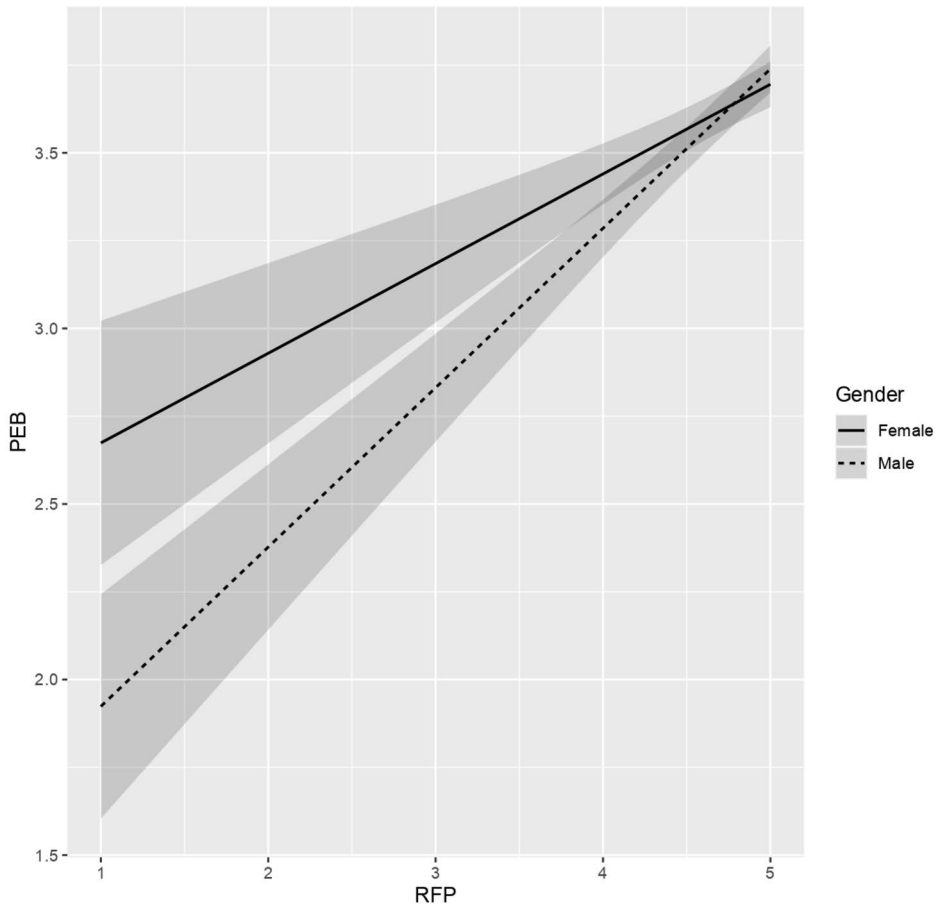


Figure 6. The interaction plot of Article IV. Note: PEB = proenvironmental behaviors, RFP = reciprocal filial piety.

6 Discussion and Conclusions

Table 3. Key findings.

Article	Key findings
I	People who have a lower childhood SES are less likely to buy commercial insurance and subsequently commit fewer PEBs during adulthood than those who have a higher childhood SES, regardless of current SES. However, the purchase of commercial insurance by older people is less influenced by their childhood SES compared to younger people. In contrast, younger people's PEBs are less affected by their childhood SES than those of older people.
II	Adolescents who intend to elevate their social status have more PEBs. The increased PEBs were less affected by the intention for social mobility among adolescents who have higher family SES than among those who have lower family SES.
III	Adolescents who engage more often in PEBs tend to feel less psychologically entitled to privileged treatment and place less value on materialism. This reduction in psychological entitlement and materialism is more pronounced among adolescents from lower family SES than among those from higher family SES.
IV	Adolescents who hold more RFP and AFP are more likely to engage in PEBs. The heightened PEB due to RFP was stronger among male adolescents than among female ones.

In closing, all of the articles addressed the question posed in the Introduction and demonstrated that individuals can contribute to the environment even in the absence of normalized proenvironmental practices. More specifically, this dissertation offers new insights into PEBs within a non-Western context. It demonstrates that a more sustainable lifestyle can be achieved if individuals transform their consumption patterns, appreciate traditional values, and pursue meaningful life goals. Table 2 presents the key findings from the four articles. In the sections that follow, I present the results' implications in the context of prior research, dividing the discussion into theoretical and practical perspectives. In the final subsection, I address the study's limitations and propose future research directions regarding the social determinants influencing PEBs.

6.1 Theoretical implications

The results of the present articles are generally consistent with previous mainstream theoretical frameworks, such as the theory of planned behavior (Ajzen, 1991). However, our results provide additional elaborations on this theory. The theory of planned behavior posits that the intention behind an action—shaped by factors such as attitude, social norms, and perceived behavioral control—ultimately determines whether the action is carried out (Ajzen, 1991). Ajzen (1991) also highlighted that this theory is to explain a specific intention of a behavior, predicting the specific behavior. That is to say, it is proenvironmental intention that strongly predicts PEBs. However, human behavior is embedded within a complex and dynamic social environment, where multiple factors across time and space may interact with each other (Granovetter, 1985). Therefore, the formation of the intention of a specific behavior can be associated with a wide range of social conditions, behavioral patterns, intentions, and values. In a more practical sense, these factors are worth examining as well. For example, in examination of PEBs, the practical implications may be limited for individuals in contexts where proenvironmental practices have not been normalized if the focus is solely on the effect of proenvironmental intention on PEBs.

To be more specific, the four articles provided alternative sociocultural determinants of PEBs within a specific cultural context. Below, I present the theoretical contribution of each factor examined.

Article I was among the few that explore PEBs through an evolutionary lens. Previously, limited research offered an evolutionary explanation for sustainability issues. However, in a theoretical article, Griskevicius et al. (2012) argued that a shortsighted mindset is deeply ingrained in human nature due to the highly uncertain environments our ancestors faced. Our findings, which showed that individuals who experience adverse childhood environments are less likely to engage in far-sighted activities during adulthood, such as the purchase of commercial insurance and PEBs, provide empirical support for the theoretical hypotheses Griskevicius et al. (2012) formulated.

Article I also showed that consumer choices regarding insurance are linked to PEBs or a green lifestyle in general. This finding expanded the scope of the study of insurance given that previous research on commercial insurance has primarily focused on expanding coverage for health-related reasons (e.g., Li et al., 2021). However, our findings suggest that commercial insurance coverage may benefit not only individual health and life expectancy but also their commitment to protecting nature.

Article II highlights the exploration of a factor of PEBs that initially seems contradictory because the intention for social mobility is self-focused, whereas PEB is essentially social focused. Prior to this article, little research has been conducted

to examine the potential positive impact of pursuing social status on the environment. Nonetheless, several studies conceptually align with our current findings (Yoon & Kim, 2016; Li et al., 2023; Rao et al., 2022). The results indicate that even actions motivated by monetary gain, such as social mobility, can have positive impacts on the environment.

In Article III, we focus on psychological entitlement, a belief that reflects the darker side of individual perceptions, to explain why greater PEBs are associated with lower materialism. Research has largely overlooked the individual beliefs or perceptions that explain the negative link between PEBs and materialism (Gu et al., 2020). The results provide a concrete understanding of how PEBs and materialism are associated.

Article IV connected two types of filial piety with PEBs through a congruent theoretical framework. We argue, based on the theory of basic individual values (Schwartz et al., 2012), that both types of filial piety reflect social-focused values, which align with the proenvironmental values typically held by individuals who engage in PEBs. The positive impact of RFP on adolescent PEBs supports previous findings that an individual's treatment of their parents is linked to how they treat others (Wei & Liu, 2022). The positive impact of AFP on adolescent PEBs is also consistent with previous studies suggesting that authoritarian regulations can be effective in promoting sustainable practices (Gonzalez-Arcos et al., 2021).

The gender difference in Article IV is also in tune with a bulk of research records, showing that male participants engage in fewer PEBs than female ones (Brough et al., 2016). Moreover, the weaker effect of RFP on PEBs among adolescent girls than among boys can be attributed to the fact that girls generally exhibit higher levels of PEB than boys.

6.2 Practical implications

The results of the current set of studies answered all four research questions, offering recommendations for resolving the practical and empirical dilemma presented in the introduction: how individuals can lead a proenvironmental lifestyle in a society where PEBs are not yet normalized. Four recommendations were proposed based on the results of the four empirical studies.

Reflecting on the effects of childhood SES on PEBs and transforming consumption types. Although underprivileged circumstances are associated with reduced PEBs, the effect was mediated by a specific consumer activity, the purchase of commercial insurance. Lack of resources during childhood is likely to foster a fast life strategy, focusing on immediate gains and showing little interest in mitigating potential risks (Griskevicius et al., 2011). The lack of an effective buffer, such as insurance against future risks, subsequently confines individuals to their own

struggles and restrains them from engaging in actions beneficial to the broader domain. In other words, being born without a silver spoon might be a barrier to PEBs. However, this effect can be diminished by transforming mindsets and adopting alternative consumption habits.

Despite multiple reforms by the Chinese government over the past decades to expand the social welfare system, institutionalized disparities and inequality have increased between rural and urban areas, inside and outside the labor market, and among state-owned and private companies (Huang, 2014). For rural residents and workers in private companies or self-employment, commercial insurance can therefore serve as a potential supplement to lower their living risk when they encounter major life events or illness.

The exclusion of rural residents has long been a problem in China's social welfare system, indicating a promising market for the commercial insurance industry in rural areas. In fact, a survey study based on the national longitudinal dataset, CFPS, showed that development of the commercial insurance industry has indeed boosted rural residents' purchase of commercial insurance (Li et al., 2021). Another study based on the national cross-sectional dataset, CGSS 2015, revealed that the purchase of commercial insurance significantly predicts better health conditions (Xu et al., 2021). However, the coverage of commercial insurance is still insufficient (Choi et al., 2018). The lack of insurance poses a threat to residents' safety and life stability, especially for lower-income families encountering critical illness or accidents.

Improvement of value system. According to the circular value spectrum, materialistic value stands in opposition to transcendental values (Schwartz et al., 2012). These values, as Schwartz et al. (2012) suggested, can guide individuals toward transcendental behaviors, such as PEBs. Consistent with our results, reducing materialistic value can promote PEBs. Moreover, our results also suggest that instilling values that encourage children to love and respect their parents helps foster PEBs. In terms of value-based education, integrating PEBs with filial piety can be particularly effective in cultures where filial piety holds significant social and moral influence.

Researchers in education and school educators can work toward this goal by identifying shared altruistic values between PEBs and filial piety and designing activities that highlight these connections. Teachers can encourage students to explore the relationship between filial piety and PEBs through class discussions or reflective essays. For instance, they can guide students to recognize how PEBs benefit not only their own families but also society at large. This approach helps students understand that actions such as conserving water and electricity not only protect the environment but also reduce household expenses, thereby alleviating their parents' financial burden, which is a meaningful expression of filial piety.

As a result, students can be guided to see how small acts, such as turning off unused lights and sorting waste, embody the shared value of altruism both PEBs and filial piety emphasize. In China, environmental policies often face low social acceptance, so PEB lacks strong social recognition. However, filial piety holds significant cultural importance. By embedding environmental activities within the framework of filial piety, acceptance of proenvironmental policies and recognition of proenvironmental identities can be effectively enhanced.

More importantly, the findings suggest an alternative means to encourage boys to engage in PEBs by strengthening their belief in filial piety, a family value that Chinese children widely accept. Studies have demonstrated that both male consumers and consumers in general often perceive people who engage in PEBs as feminine (Brough et al., 2016). Accordingly, one possible interpretation for why boys are generally less concerned about PEBs than girls is that boys may not want to be seen as feminine. Promoting PEBs by cultivating filial piety, however, evades the green-feminine stereotype.

Search for other meaning in life. Considering the high priority Chinese society places on achieving financial freedom and social status (Harris, 2006; Doepke & Zilibotti, 2019), the finding that longing for elevating social status can help promote PEBs sheds light on potential approaches to resolving the environment-versus-economy dilemma. It is also worth noting that in the Chinese sociocultural setting, elevating one's social status is not only seen as a positive, self-realizing pursuit but also as a meaningful effort to achieve family happiness and honor. This goal-oriented approach to life can distract consumers from their immediate material desires and encourage them to adopt a long-term perspective.

Practically, showcasing the fact that proenvironmental identities and lifestyles are integral to the lives of people from higher social classes may motivate those aspiring for social mobility to engage in PEBs. Building on Bandura's social learning theory (1971), which posits that individuals' cognition and behavior are shaped by observing and emulating role models, it can be argued that prominent figures or individuals of higher social status may play a pivotal role in influencing proenvironmental attitudes and actions. By modeling PEBs, these role models can inspire others to adopt similar practices, particularly when such behaviors are associated with success, respect, or social advancement. Therefore, for adolescents with a strong intention for social mobility, increased exposure to individuals from a higher social class serving as role models could significantly influence their proenvironmental attitudes and behaviors. For example, when celebrities advocate for thrift shopping (Oscario, 2023), they convey to their audience that engaging in PEBs is both fashionable and socially appealing.

Amid the growing popularity of social media and short video platforms in China, individuals from higher social classes can easily share their proenvironmental values

and sustainable lifestyles with a broader audience than before. By doing so, adolescents who hold a strong intention for social mobility are more likely to identify with and emulate the proenvironmental values and behaviors these role models demonstrate.

The moderation of family SES on the association between the intention for social mobility and PBE offers potential insights for addressing the increasingly deteriorating environmental conditions in rural areas of China. As socioeconomic disparities between urban and rural areas persist (Bian, 2002), rural areas are home to more economically disadvantaged residents. On the other hand, these areas receive less governmental investment in green initiatives, resulting in the neglect of their deteriorating environmental conditions (Zhang & Guo, 2023). The results of the moderation suggest that the effect of social mobility as a personal pursuit on PEBs is more significant for adolescents from rural areas than for those from urban areas.

6.3 Limitations and future directions

Although the current set of studies gives insights into motivating PEBs, it has several limitations. The first is that three of our projects employed convenience sampling among adolescents, which limits the samples' representativeness and the results' generalizability (Etikan et al., 2016), particularly in China, where southeastern regions are notably more economically developed than other districts. However, in Article I, we adopted a dataset obtained through multistage stratified sampling, partly resolving this limitation.

Secondly, although we aimed to theorize on the current topic by generalizing the results to other developing countries, the samples were limited to Mainland China, restricting generalization. In China, attitudes toward money, social status, and family values can be distinct from those in other cultural settings. For example, social mobility is not merely perceived as an individual accomplishment but as a means to elevate a whole family, even including extended relatives. Successful individuals can provide their relatives with more career or financial opportunities through *guanxi*, namely utilitarian social networks (Luo, 1997). In this context, individuals who intend for social mobility in China may bear more prosocial tendencies than their counterparts in other countries. Therefore, similar results may not be replicated with samples from other countries.

Indeed, there are more questions that deserve exploration in future research, the first being how the various sociocultural factors in the current studies interact with each other and subsequently influence PEBs. For example, childhood SES may be associated with adolescent materialism, which in turn may impact adulthood PEBs. Second, some factors have been further divided into more specific subdimensions in

recent studies, meaning that measuring them using these alternative frameworks could yield different results.

For instance, Csikszentmihalyi and Rochberg-Halton (1978) distinguished between two forms of materialism based on the purpose and motivation of consumption: instrumental materialism, where material wealth is viewed as a means to achieve personal values and life goals, essential for meeting basic needs, and terminal materialism, where acquiring material wealth is the ultimate goal, used to gain social status and the admiration of others. Recent empirical evidence has also shown that instrumental materialism does not lead to negative outcomes (Kristin, 2009). In line with this theoretical framework, the impact of these two types of materialism on PEBs may also differ. Instrumental materialism may discourage excessive consumption, reduce waste, and promote PEBs, whereas terminal materialism may drive conspicuous and symbolic consumption, thereby reducing PEBs.

Third, some influential mechanisms between the examined associations deserve further testing. For example, we merely provided a theoretical explanation of the association between social mobility intention and PEBs, without empirical testing. However, the mediating roles of generosity and frugality values between social mobility intentions and PEBs can be examined in the future. I present briefly the reasoning below.

Generosity is widely desirable in most societies. In a group of South American forager-horticulturists, individuals who are generous with food are often rewarded with more food when they encounter hardships later on (Gurven et al., 2000). Experimental evidence also revealed that sacrificing self-interests for others' interests can enhance an individual's status within a group, leading to increased income and selection as a political representative (Milinski et al., 2002). Therefore, people who desire social mobility must make extra efforts to acquire more social capital because, according to Bourdieu (1986, 2001), the entrance into any level of higher social groups requires a certain "credential" and people who are not born privileged have to show their social value in the potential marketplace. Therefore, it is reasonable for individuals to win the trust of others from the desired social class through acts of generosity, thereby holding a value of generosity.

Regarding the mediation of frugality, Sieben (2017) observed that individuals who experience upward mobility by two or more social classes tend to favor values such as determination and thrift, which have historically been associated with the Protestant work ethic (Weber, 2002). Achieving higher social status is a common life goal that often involves a trade-off between present gratification and future success. Specifically, when deciding whether to spend or save money, individuals with aspirations for upward mobility are more likely to choose saving, as they are likely aware of the opportunity costs of immediate indulgence (Frederick et al.,

2009). In other words, these goal-oriented individuals tend to prioritize utilitarian values over hedonistic ones, evaluating alternative uses of their resources before making spending decisions.

Fourth, because the current studies mainly focused on social processes centered on children within families, researchers could further explore the interaction patterns among family members and their influence on PEBs. On one hand, existing research on how environmentally-related interactions among family members influence PEBs is still insufficient. Recent studies have shown that parent–child environmental interactions, such as sorting trash together and discussing environmental issues, can increase both parents’ and children’s PEBs through the mediating effects of family well-being (Ding et al., 2024) and connection to nature (Cheng & Monroe, 2012).

On the other hand, interactions among family members that are not directly related to environmental concerns deserve particular attention. The current studies’ results suggest that filial piety, as a value within family interactions and seemingly unrelated to environmental concerns, can also influence PEBs. We speculate that positive family interactions, such as communication and support, may enhance PEBs whereas negative interactions, such as conflict, can reduce children’s engagement in PEBs, possibly because positive family interactions cultivate altruistic values in young people (Elsayed, 2024), which in turn foster PEBs.

Specifically, the influence of parenting style or specifically Chinese parenting style on PEBs can be examined. Research has shown that parental autonomy support enhances adolescents’ environmental motivation and increases their PEBs (Grønhøj & Thøgersen, 2017). However, studies on the impact of parenting style on PEBs are still limited, especially research examining the effect of Chinese parenting style on PEBs. As one study highlighted (Wu & Chao, 2011), parental warmth differs from the traditional Chinese concept of parental love, which is typically expressed in three ways: devotion and sacrifice, thoughtfulness in predicting and fulfilling the child’s needs, and *guan* (discipline and guidance). This *guan* dimension shares some similarities with AFP, a concept in one of our current studies. Therefore, this culturally specific parenting style may be associated with PEBs in distinctive ways.

In addition, negative parenting styles, such as harsh parenting (Zhang et al., 2024) and parenting by lying (Liu & Wei, 2020), may undermine children’s trust in authority figures. This could lead to aversion to any environmental education provided by authoritative sources, such as schools or government institutions. Notably, in Chinese families, grandparents often assume the role of primary caretakers rather than parents. In future studies, it would be interesting to examine whether and how grandparents’ attitudes, intentions, values, and behaviors were associated with grandchildren’s PEBs.

Finally, there are cultural-specific factors other than filial piety. For example, it would be intriguing to explore how PEBs are associated with “mianzi” (face), the

self-image that publicizes one's social status, reputation, or the respect or esteem one requires to thrive in society (Hwang, 1987; Zhou & Zhang, 2024). In Chinese society, individuals strive to maintain or enhance their mianzi through social behaviors. The desire to maintain one's face can drive individuals to adopt PEBs if they are perceived as beneficial for their social standing; it probably hinders PEBs, as they often involve consuming fewer resources, whereas mianzi typically encourages conspicuous consumption and displays of wealth (Hu, 1944; Hwang, 1987).

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Original Publications

Liu, M., Koivula, A. (2021)
Silver Spoon and Green Lifestyle: A National Study of the Association
between Childhood Subjective Socioeconomic Status and Adulthood
Pro-Environmental Behavior in China
Sustainability

Article

Silver Spoon and Green Lifestyle: A National Study of the Association between Childhood Subjective Socioeconomic Status and Adulthood Pro-Environmental Behavior in China

Meiting Liu ^{1,2,*}  and Aki Koivula ¹ ¹ Department of Social Research, University of Turku, 20014 Turku, Finland; akjeko@utu.fi² School of Law and Sociology, Xinyang Normal University, Xinyang 464000, China

* Correspondence: meiliu@utu.fi

Abstract: Based on the life history theory, this study is aimed at examining the associations among childhood subjective socioeconomic status, adulthood pro-environmental behavior, and commercial insurance purchase. We used the data from the 2013 Chinese General Social Survey (CGSS2013) and obtained a sample of 11,172 respondents, with ages ranging from 18 to 97 years old. The respondents were selected using multistage stratified sampling. Correlational, mediational and moderational analyses were conducted using SPSS. The results show that the childhood subjective socioeconomic status is positively associated with adulthood pro-environmental behavior, independent of the current subjective socioeconomic status. In addition, commercial insurance purchase acts as a mediator of the association between childhood subjective socioeconomic status and adulthood pro-environmental behavior. Using conditional process analysis, we demonstrated that age moderated both the path where childhood subjective socioeconomic status influenced adulthood pro-environmental behavior and the path where childhood subjective socioeconomic status influenced commercial insurance purchase. Theoretically, the results provide empirical support for evolutionary perspective on sustainable behavior and demonstrate that childhood environment can constrain individual consumer choices and lifestyle. Practically, positioning target customers to commercial insurance clients may be an effective marketing strategy to increase consumers' actual purchase of ethical products. Moreover, to realize environmental goals, social policy makers can make efforts to publicize the importance of insurance and expand the coverage of insurance by increasing the corresponding financial subsidies for low socioeconomic status families.

Keywords: childhood subjective socioeconomic status; adulthood pro-environmental behavior; commercial insurance purchase; 2013CGSS



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1. Introduction

There is a consensus that our daily behavior largely shapes our planet's future fate. With such awareness, many developing countries tend to prioritize environmental conservation measures on the national agendas. For example, on 1 July 2019, Shanghai's municipal government, China, declared to execute compulsory garbage sorting regulations [1]. Although the ideal plan is that individuals voluntarily engage in environmental protection practice, fulfilling green responsibilities in daily life is demonstrated to be difficult [2,3]. Therefore, understanding the influential factors of individual pro-environmental behavior (PEB) is particularly relevant in countries where governments actively implement environmental policies and public environmental concerns are burgeoning.

Extant literature looked at variables that influence PEB regarding internal factors, including environmental knowledge [4], environmental consciousness [5], environmental attitude [6], values [7], internet use [8], habits [9] and political preference [10], and external factors, including social capital [11], collective efficacy [12], accessibility of recycling facilities [13], current socioeconomic status [14] and so forth. However, little research considered

the external factors that occurred in individuals’ early life as contributing factors to PEB. There are some examples. A recent study found a positive link between childhood exposure to nature and children’s PEB [15]. Moreover, children’s PEB and attitude at six years old have little relevance to their subsequent PEB in early adulthood [16]. Given the consequence of childhood experience on individual moral development [17], it is unexpected that we, until now, know so little about the potential impact of early life experience on PEB.

Social scientists have a decent understanding of the association between individuals’ current socioeconomic status (SES) and PEB, concluding that the typical environmentalists are middle-classed or the upper-classed [14,18–21]. Furthermore, a recent study has elaborated on the relationship between SES and green consumption and revealed that the middle classes are more inclined to green consumption than both the lower and upper classes [22]. However, whether childhood subjective SES is associated with adulthood PEB is open to question. In fact, researchers have found empirical evidence that childhood subjective SES may influence adulthood decision-making, apropos of the timing for bearing children, the willingness to take risks, the desire for health insurance and green consumption [23–26]. In the present study, we assume that childhood subjective SES is positively associated with adulthood PEB. In addition, we explore the influential mechanism underlying this association by looking at a common type of economic decision-making in consumers’ daily consumption and life planning, namely, commercial insurance purchase.

As shown in the statistics of World Population Ageing 2013, China is increasingly becoming a member of the ageing countries, with an estimated 90 million people aged 80 years or over in 2050 [27]. Furthermore, the Chinese government’s implementation of the newly declared two-child policy forecasts a new round of baby boom in the near future [28]. Considering the two factors, China is likely to see a growing demand for healthcare service, following considerable healthcare expenditure in many households. Given that the Chinese social insurance system is still not adequate, commercial insurance can serve as a good supplement for the whole healthcare system. Individually, commercial insurance can improve citizens’ risk resistance capacity, which is crucial for those disadvantaged households with children and older adults [29]. Therefore, we test whether commercial insurance purchase mediates childhood subjective SES and PEB in the present study. Moreover, we will also examine whether there are potential moderating effects of the association.

Given that little research in extant literature has studied early life experience associated with PEB, we will fill this gap by examining the association between childhood SES and adulthood PEB as well as testing commercial insurance purchase as an influential mechanism underlying this association. Different from most previous environmental studies, we understand individual PEB with an evolutionary perspective. Additionally, we will also analyze the age difference of the main effect and the mediation (see Figure 1).

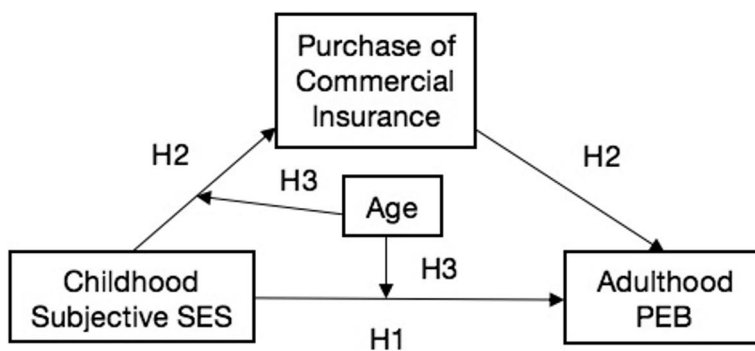


Figure 1. The hypothetical model.

2. Theoretical Framework and Hypothesis

2.1. Childhood Subjective Socioeconomic Status and Pro-Environmental Behaviors in Adulthood

Developmental psychologists have maintained that childhood experience paves the way for adulthood well-being [30–32]. What a child comes across in early years exerts great influence on their attitudes and behaviors in later years throughout one's life. As adults, is it possible that our current PEB holds some cues from our childhood social environment? Given the typical, if not stereotypical, portrait of middle-classed environmentalists, a further question is: does a person who grows up affluently will have more PEB?

Childhood subjective SES indicates how much resource children have access to in childhood [33]. Low childhood subjective SES, as reflected by insufficient economic resource, possibly signifies chronic resource scarcity. The disadvantages resulting from scarcity have been extensively demonstrated. For example, a person who lacks financial resource is hard to accept new practices and values and becomes antagonistic towards socially distant others [34]. Psychological scarcity may lead to small-minded values and short-sighted actions in goal attainment [35].

Moreover, given that social structures, which built upon the socioeconomic hierarchies, form a base for environmental value, lifestyles and consumption patterns [36], these values potentially flow inter-generationally. Children born in higher socioeconomic positions might have more interest in performing green behavior [37], more participation with nature [38] and positive environmental value [39]. Therefore, it is reasonable to assume that individuals with lower childhood subjective SES may have fewer PEB than those with higher childhood subjective SES because the economic scarcity people experienced in childhood might narrow their mindset within the private domain. Struggling with insecurity and unstable living conditions, individuals with lower childhood subjective SES are more likely to regard public welfare as a matter of indifference than their counterparts. It is difficult for them to develop collective altruism concerning personal insecurity. There is also a fair amount of empirical evidence showing that resource scarcity may foster egocentric behavior [40,41]. Therefore, we propose:

Hypothesis 1 (H1). *The childhood subjective SES is positively associated with adulthood PEB, independent of the current SES.*

2.2. Commercial Insurance Purchase as a Mediator

Uncertainties, instabilities or dangers pervade human life that our ancestors and we per se seek strategies to avoid risks and procure security. Difference from our ancestral cavemen who had been struggling to maximise their chances of survival, we modern people have a wide range of choices to handle potential accidents, for example, buying insurance. Despite the widely known benefit [42], not everyone is willing to adopt insurance to defend against risks, considering the certain cost and uncertain "benefit" (especially sometimes the benefit will be accompanied by fatal disasters) of insurance. Why some people buy it while others do not? A lay explanation is that rich people buy insurance because they have additional money to pay for the non-essential product. However, studies indicate that masses of the uninsured could afford health insurance [43,44], and people from low-status groups are also enthusiastic about buying luxury goods [45], which are expensive and more non-essential than insurance. These two reasons suggest that the disparity of purchasing insurance between different SES may be alternatively explained.

The life history theory is one component of the evolutionary framework regarding human behavior, on the basis of observations and investigations of human life in evolutionary history, mostly hunter-gathering societies [46]. It mainly attempts to explain why some people prefer risks and instant gratification whereas others not by linking the preferences for risk and gratification with mortality and resource scarcity [23]. According to the life-history theory, individuals take two strategies, slow and fast, when dealing with environments regarding different levels of resource access. In response to abundant resources, individuals are inclined to make decisions guided by a slow strategy, characterised

by valuing long-term interests more than short-term interests and a larger likelihood of avoiding risks rather than taking risks [24].

In contrast, people who choose a fast strategy prefer short-term interests and are less likely to consider avoiding risks. During evolutionary history, both strategies are adaptive. Abundant resource usually forebodes a life with fewer dangers, less unpredictability, and a longer life expectancy, so that individuals can think about a future and lower risks in order to reach the future [23]. However, people with limited resource will be constantly concerned about immediate dangers and fail to expect a future. In that case, adopting measures to avoid future, impalpable risks would not be a rational choice.

Therefore, based on the life-history theory, we assume that people who have a lower childhood subjective SES may adopt a fast strategy, indicating few personal plans for commercial insurance. While their counterparts who grow up in a higher childhood subjective SES are more likely to adopt a slow strategy, in other words, purchasing commercial insurance as a strategy to avoid risks. Thus, we assume that childhood subjective SES is positively correlated with commercial insurance purchase.

Moreover, we assume that individuals who have bought commercial insurances are likely to have a higher sense of security than those who have not. With a higher sense of security, people can free themselves from individual survival threats and engage in altruistic behaviors in the broader spectrum [47], for example, behaviors that benefit the planet. The attachment theory maintains that each individual is physically and psychologically attached to one or more caregivers at the beginning of a lifetime. This attachment is vitally important because it creates a caregiving behavioral system through which individuals develop different behavioral orientations later in life [48]. Well-developed attachment patterns with caregivers prepare an “internal working model” for individuals to explore and function in the external world [49]. In line with this theory, a secure person whose early social environment is supportive may show compassion for other people and cares for the landscapes we and our next generation live on [47]. Conversely, an unsecured person is less likely to be concerned about environmental issues because of lacking personal security. Therefore, we propose:

Hypothesis 2 (H2). *Commercial insurance purchase acts as a mediator of the association between childhood subjective SES and adulthood PEB.*

2.3. Age as a Moderator

To further understand the associations, we introduce age as a potential moderator of the association between childhood subjective SES and adulthood PEB and the association between childhood subjective SES and commercial insurance purchase. We can make two assumptions regarding how age affects the association between childhood subjective SES and adulthood PEB. Some scholars of consumer studies found that age is associated with individual belief and action in ethics [50] and that older people have higher ethical standards than younger people do, which lead to them behave more ethically [51]. Therefore, the interaction of age and childhood subjective SES might be associated with adulthood PEB, suggesting that the PEB of older people are less affected by childhood subjective SES than the PEB of younger people are. Another assumption is because young people tend to have more environmental knowledge or more ethical education [52], which is a factor that positively predicts PEB. This factor of younger people may weaken the association between their childhood subjective SES and adulthood PEB.

In addition, we assume that the interaction of age and childhood subjective SES may be associated with commercial insurance purchase, suggesting that the association between childhood subjective SES and commercial insurance purchase may be more robust for younger people than for older people. Risk perception indicates people’s estimate of how likely an adverse event will occur to them [53]. As people grow older, their risk perception is likely to transform because older people tend to have a higher risk of disease diagnosis [54]. In that case, for older people, a potential health threat may weaken the

association between childhood subjective SES and commercial insurance purchase. Thus, we propose the following hypothesis. Please see Figure 1 for the theoretical model.

Hypothesis 3 (H3). *Age simultaneously moderates the association between childhood subjective SES and adulthood PEB and the association between childhood subjective SES and commercial insurance purchase.*

3. Data and Methods

3.1. The Research Population and Sample

We used the data from the 2013 Chinese General Social Survey (CGSS2013). First started in 2003, this survey is a national, comprehensive and continuous social investigation aimed at systematically tracking the social transition since the turn of the millennium and examining the interconnection between social structure and citizens' quality of life in China. In this survey, multistage stratified sampling was adopted, and respondents were interviewed door-to-door—more than 10,000 Chinese citizens from all provinces except those from Xinjiang and Hainan. The respondents' ages span from 18 to 95 years old. After deleting missing information, invalid answers and the data, which is irrelevant to our research design, we obtained a sample of 11,172 respondents, with age ranging from 18 to 97 ($M_{\text{age}} = 48.49$, $SD_{\text{age}} = 16.38$). Of the respondents, 5546 (49.6%) were female, and 5626 (50.4%) were male. Guided by the theoretical framework, we elicited the questionnaires regarding demographics, health condition, childhood subjective SES, current SES, commercial insurance purchase, and PEB.

3.2. Measures

3.2.1. Childhood Subjective SES and Current SES

Childhood subjective SES was assessed using the "MacArthur ladder" [55–57]. Respondents were shown two pictures of ladders with corresponding numbers (1 to 10). Simultaneously, they were instructed, "In our society, some people are upper positioned, and some people are lower positioned. The ladder from up to down indicates the higher social class to lower social class, with 10 the highest social class and 1 the lowest social class." Then they were asked, "What do you think of your social class in your fourteenth?" for childhood subjective SES and "What do you think of your current social class?" for current SES. Responses were rated on a scale ranging from 1 (lowest) to 10 (highest).

3.2.2. Commercial Insurance Purchase

Both the purchases of medical insurance and life insurance were assessed by asking, "Have you joined the following insurance programs?". For each sort of insurance, respondents were given response options of "yes," "no," or "not applicable." "Yes" responses were coded as 1, and other responses were coded as 0. A higher score suggests more purchase of commercial insurance.

3.2.3. Proenvironmental Behaviors

According to previous research [58], ten items in this survey were chosen to measure respondents' pro-environmental behaviors. Respondents were asked whether they have certain activities or behaviors in the recent year. The items are "garbage sorting", "discussing environmental issues with families and friends", "taking your own bags when buying daily products", "recycling plastics bags", "concerning about environmental issues on broadcast, TV and newspaper", "donating for the protection of the environment", "actively participating in environmental publicity and education organised by government and organisations", "actively participating in activities organised by non-governmental organisations", "conserving the forests at your own expense", and "actively participating in making complaints and appealing against environmental damages". A 3-point Likert scale was used with 1 indicating "never", 2 "sometimes", and 3 "often". In this study, Cronbach's α coefficient was 0.75, indicating good internal consistency [59].

3.2.4. Controlled Variables

Previous studies have shown that current SES may influence individual PEB [60], and short-term health condition significantly influence commercial insurance purchase [61]. Therefore, we control for the current SES and recent health condition. We measure health condition using the mean score of the two items in this survey. Respondents were first asked, “What do you think of your current physical health”. Answers were given on a 5-point Likert scale from “Not healthy at all = 1” to “Very healthy = 5”, which indicates that the higher score, the better their health condition is. Another question is, “In the past four weeks, how often did your work or other daily activities have been affected by health issues”. Answers were given on a 5-point Likert scale from “Always = 1” to “Never = 5”; that is, a higher score indicates better health condition.

3.3. Statistical Procedures

We first used IBM SPSS Statistics Subscription to analyze descriptive statistics and correlations. Then, we used PROCESS_v3.5 [62], a macro for IBM SPSS Statistics Subscription, to analyze the mediation (model 4) and the conditional mediation (model 8) in the present study. The PROCESS_v3.5 calculate the indirect effect by generating 95% bias-corrected accelerated confidence intervals (CI) based on 5000 bootstrap samples. Statistical significance is acquired by a 95% CI that excludes zero. Since the PROCESS_v3.5 cannot standardise data, we had all the original scores of the variables standardised to z-scores before the mediation and conditional mediation analyses. Following the recommendations of many methodological researchers [63,64] and empirical researchers [8], we used bootstrapping method to test mediation analyses.

4. Results

4.1. Descriptive Statistics and Correlation Analysis

The descriptive statistics, including gender, age and all the variables of interest, were shown in Table 1. Pearson’s correlations were calculated to examine the associations among the variables of interest, including childhood subjective SES, commercial insurance purchase, and PEB and the controlled variables, including health condition and current SES. Table 1 shows the detailed results of the correlation analyses. As predicted, childhood subjective SES was positively correlated with commercial insurance purchase ($r = 0.15, p < 0.01$), and PEB ($r = 0.20, p < 0.01$).

Table 1. Correlation Coefficients, Means, and Standard Deviations of Variables.

Variable	M	SD	1	2	3	4	5
1. PEB	1.52	0.33	1				
2. Childhood SES	3.08	1.80	0.20 **	1			
3. Current SES	4.32	1.68	0.17 **	0.43 **	1		
4. PCI	0.08	0.23	0.14 **	0.15 **	0.12 **	1	
5. Health	3.84	0.98	0.17 **	0.19 **	0.20 **	0.11 **	1

Note. ** $p < 0.01$; PEB = proenvironmental behavior, PCI = purchase of commercial insurance.

4.2. Mediation Analyses

Model 4 of PROCESS_v3.5 [62] was used to examine the possible association between childhood subjective SES, commercial insurance purchase, and adulthood PEB. The results of the mediation analysis were presented in Table 2. The total effect of childhood subjective SES on adulthood PEB was significant ($B = 0.15, p < 0.001$). After controlling for the current SES and current health condition, we found that the process of childhood subjective SES predicting PEB through the mediation of commercial insurances’ purchase was significant, $a^*b = 0.01, SE = 0.0016, 95\% CI = [0.0080, 0.0141]$. The mediation effect is represented by a^*b , with a represents the path from Childhood SES on purchase of commercial insurance ($B = 0.11, p < 0.001$) and b represents the path from purchase of commercial insurance on

PEB ($B = 0.10, p < 0.001$). Commercial insurance purchase partially mediated the association between childhood subjective SES and PEB.

Table 2. Mediation Analysis.

Predictors	Equation (1) (Criterion = PEB)		Equation (2) (Criterion = PCI)		Equation (3) (Criterion = PEB)	
	B	SE	B	SE	B	SE
Childhood SES	0.15 ***	0.01	0.11 ***	0.01	0.14 ***	0.01
PCI					0.10 ***	0.01
* Current SES	0.08 ***	0.01	0.06 ***	0.01	0.07 ***	0.01
* Health	0.12 ***	0.01	0.07 ***	0.01	0.11 ***	0.01
R2	0.06		0.03		0.07	
F	247.04 ***		118.49 ***		221.36 ***	

Note. *** $p < 0.001$; PEB = proenvironmental behaviors, PCI = purchase of commercial insurance. Predictors with an * on upper left side are controlled variables.

4.3. Conditional Process Analysis

Following prior literature [65], after testing the mediation, we added a moderator to test the conditional process analysis by running model 8 in PROCESS_v3.5 [62]. A conditional process model can test the moderation and mediation effects simultaneously, namely, test the interaction of an independent variable and a moderator on a dependent variable through a mediator [66]. The regression results (Table 3) indicated that childhood subjective SES positively predicted commercial insurance purchase ($B = 0.09, p < 0.001$), age negatively predicted commercial insurance purchase ($B = -0.09, p < 0.001$), and the interaction of childhood subjective SES and age was significant ($B = -0.03, p < 0.01$) (Equation (1)). Simple slope analyses revealed that, for younger people, the positive prediction of childhood subjective SES on commercial insurance purchase ($B_{\text{simple}} = 0.13, p < 0.001$) was stronger than for older people ($B_{\text{simple}} = 0.06, p < 0.001$) (Figure 2). In addition, childhood subjective SES positively predicted adulthood PEB ($B = 0.12, p < 0.001$), age negatively predicted adulthood PEB ($B = -0.09, p < 0.001$), and the interaction of childhood subjective SES and age was significant ($B = 0.04, p < 0.001$) (Equation (2)). Simple slope analyses revealed that, for younger people, the positive prediction of childhood subjective SES on adulthood PEB ($B_{\text{simple}} = 0.08, p < 0.001$) was weaker than for older people ($B_{\text{simple}} = 0.16, p < 0.001$) (Figure 3). Figure 4 showed an integrated model of the conditional process analysis.

Table 3. Moderation Analysis.

Predictors	Equation (4) (Criterion = PIC)		Equation (5) (Criterion = PEB)	
	B	SE	B	SE
Childhood SES	0.09 ***	0.01	0.12 ***	0.01
Age	-0.09 ***	0.01	-0.09 ***	0.01
Childhood SES × Age	-0.03 **	0.01	0.04 ***	0.01
PIC			0.10 ***	0.01
R2	0.04		0.08	
F	86.49 ***		163.71 ***	

Note. ** $p < 0.01$, *** $p < 0.001$; PEB = proenvironmental behavior, PCI = purchase of commercial insurance.

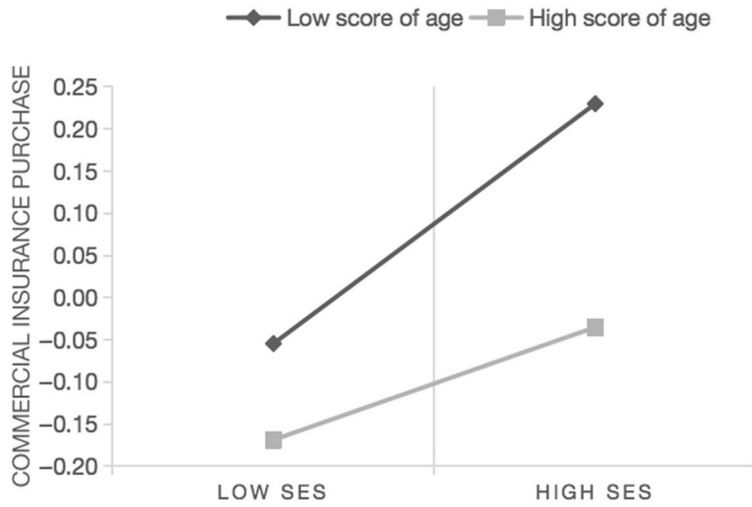


Figure 2. The interaction of childhood subjective SES and age on the purchase of commercial insurance.

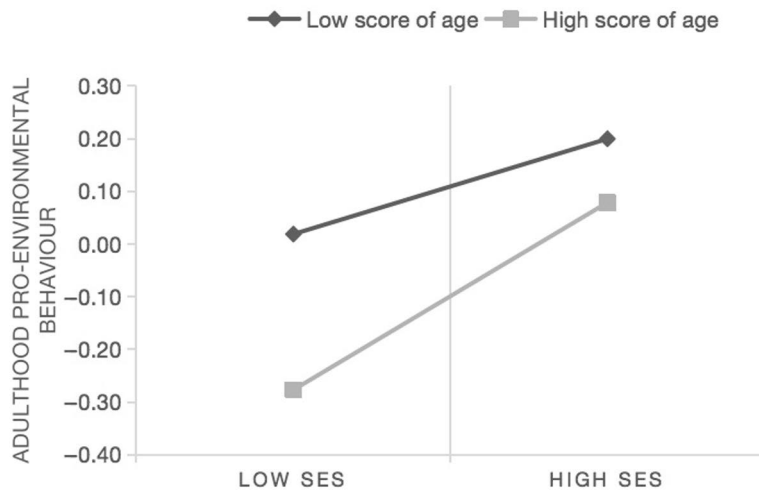


Figure 3. The interaction of childhood subjective SES and age on the PEB.

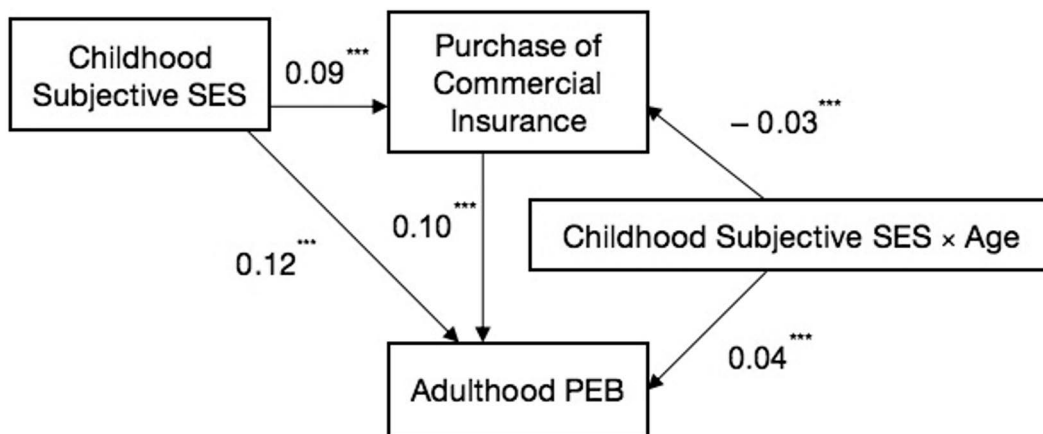


Figure 4. The conditional process model. Note. *** $p < 0.001$.

5. Discussion

Using a sample from a national survey, we examined the association between childhood subjective SES and adulthood PEB, and we tested the purchase of commercial insurance as a mediator of the association. As predicted, the results show a significantly positive association between childhood subjective SES and adulthood PEB, even when controlling for the current SES and health condition. Compared to a higher childhood subjective SES, a lower childhood subjective SES is associated with less engagement in PEB during adulthood. We explained the association using the concept of resource scarcity, arguing that the resource scarcity individuals experienced in childhood might limit their mindset from entering into the public domain and bearing collective altruism. We also demonstrated that commercial insurance purchase acts as a mediating role in the association between childhood subjective SES and adulthood PEB. Based on the life history theory [25], we reasoned that childhood subjective SES affects consumers' choice for commercial insurance, and subsequently commercial insurance purchase, which ensures individual security, influences PEB. In addition, we found that for younger people, the positive association between childhood subjective SES and commercial insurance purchase was stronger than for older people; the positive association between childhood subjective SES and adulthood PEB was weaker for younger people than for older people. This result demonstrated our assumption that the former effect is stronger and the latter is weaker for younger people than older people. In the following text, we discuss the theoretical implications and practical implication.

First, the present study is one of the few studies to investigate PEB from an evolutionary perspective. Several perspectives have been applied in the extant literature to study PEB, for example, the simulation theories, control theories, ecological psychology, and integral approaches [67]. However, little research proposes an evolutionary explanation for sustainable issues. Griskevicius et al. [68] maintained that a shortsighted mindset was deeply rooted in human nature because a highly uncertain environment must constantly confront our ancestors. By demonstrating that individuals who grow up in an adverse childhood environment are likely to act less pro-environmentally in adulthood, our results provide empirical support for Griskevicius et al.'s [68] theoretical framework.

Second, the present study expands our knowledge of childhood social environment's influence on adulthood daily life. Previous research has demonstrated that economic disadvantages in childhood could affect adulthood life in several aspects, including adulthood physical health [69,70], adulthood SES [71], adulthood unhealthy habit [72], desire for health insurance [25], the timing for bearing children [23], economic risk-taking [24] and buying green products [26]. Although previous research has touched upon green

issues [26], their sample is relatively less generalised than a national survey. Moreover, we introduced childhood subjective SES as an antecedent variable for PEB and explored the mechanism by testing a type of consumer behavior as a mediator.

Third, the present study found that consumer choices of insurance can be associated with a green lifestyle. Existing studies on commercial insurance mainly resort to increasing the insurance coverage in the population for health reasons [61,73]. Our results suggest that the benefits of commercial insurance coverage on a national or transnational level may go far beyond individual health and life expectancy and reach the realm of resource sustainability. Future studies can further explore other impacts within the public domain that commercial insurance may lead.

Fourth, the conditional process analysis results expanded our understanding of the age variance of the associations between childhood subjective SES, the purchase of insurance and adulthood PEB. The results showed that the interaction of age and childhood subjective SES on commercial insurance purchase and adulthood PEB were significant. That is, the positive prediction of childhood subjective SES on commercial insurance purchase was stronger for younger people than for older people. We guess that the potential health threat and risk perception in older people may be attributed to the weakened association. This result suggests that the promotion of insurance coverage should be paid more attention to younger people with a lower level of social background. In addition, the positive prediction of childhood subjective SES on adulthood PEB was stronger for older people than for young people. We speculate that this may result from young people in China having better environmental education, making the influence of childhood subjective SES less prominent. Therefore, environmental educational programs that target on older adults can be designed and promoted.

On an applied level, the present studies contribute to environmental conservation by introducing an association between childhood socioeconomic environment and PEB. Although previous studies have considered the influence of childhood experience on PEB, they have centred on children's physical exposure to nature [37,74]. To our knowledge, little research examined the influence of adverse factors in childhood on adulthood PEB. Our results show that the influence of a scarcity mindset in childhood goes far beyond economic restriction. Specifically, a low childhood subjective SES is associated with less engagement in activities that benefit the environment.

Although improving SES is difficult, children can be protected from having "the feeling of scarcity" [35]. They can be taught to remain alert to the habits of thought that constrain their consumer choices and lifestyle. Moreover, in particular cultural contexts, family members may distort children's perception of SES. For example, hiding financial affluence from children is a prevalent practice among Chinese families. Parents tend to lie to their children about their family economic condition to regulate children's money spending by claiming "we are too poor to afford that" [75,76]. Therefore, this practice is empirically opposed because our results show that childhood SES may lead to low adulthood engagement in PEB.

In addition, our results provide practical implications for marketers of ethical products and commercial insurance. Ethical products are a growing industry that orients consumers who care for ethical concerns such as fair trade, animal experiments, and environmental sustainability [77,78]. Although consumers are increasingly aware of the ethical issues throughout product manufacturing and retailing, a gap still exists between consumers' ethical intention and their consumptive action [79]. Our results suggest that positioning target customers to commercial insurance clients may be an effective marketing strategy to increase consumers' actual purchase of ethical products. Moreover, to realize environmental goals, social policy makers can make efforts to publicize the importance of insurance and expand the coverage of insurance by increasing the corresponding financial subsidies for low SES families.

6. Limitations

The first limitation of the present research was that it relied on a sample of citizens in mainland China, and whether the results can be generalised to other regions is unknown. For example, in countries where social insurance is relatively comprehensive, commercial insurance might be primarily purchased by high-income populations [80], rendering commercial insurance purchase not a persuasive indicator for PEB. Therefore, we suggest future studies to explore other consumption phenomena according to the specific public policy and service in different countries.

The second limitation of the present research was the cross-sectional study design, which does not allow a cause-and-effect conclusion to be drawn. However, considering both sufficient and comprehensive sample size and a time variable is practically difficult. Nevertheless, theoretically, a longitudinal approach would help build a causality relationship between childhood subjective SES, commercial insurance purchase, and adulthood PEB.

The third limitation of the present research was that our research design is a retrospective survey. On the one hand, the measurement of childhood SES may not be accurate because memories can be distorted, especially when it comes to childhood experience [81]. However, as we examined the subjective perception of the childhood experience on adulthood behaviors, this problem might be partly addressed. Granted that childhood SES might be either inflated or underrated, the perception of their SES on adulthood PEB is still valid. On the other hand, some may argue that a retrospective survey on childhood may suggest little to the present generation, but it sheds light on how we educate our children to sustain the environment for many centuries to come.

The fourth limitation was that the mediation held a small proportion of the total effect. The small effect size suggests that other mediators, such as a sense of insecurity, resource scarcity or altruism, can be examined in future research. However, we still consider the present study meaningful. Methodological researchers have argued that small effect size can be meaningful when it is of long-term consequences [82]. Despite the importance of environmental issues, the evolutionary preference for seeking present interest blinkers people to the long-term consequences of environmental pollution [68]. Perhaps it is due to the above reason that the effect sizes are generally humble in many environmental studies [2,8].

In addition, one small effect might be trivial, but multiple small effects can accumulate to more significant effects [82]. Although the present study merely tested a type of consumer behavior in discussing PEB, it inspires future consumer studies to ascertain more types of consumption in relation to PEB. Moreover, small sizes can be acceptable if the hypothetical model tests a theoretical framework [82]. Given that we examined PEB from an evolutionary perspective, we considered it acceptable the statistically significant mediation model with a small effect size.

7. Conclusions

The present research indicates that childhood subjective SES is positively associated with adulthood PEB, independent of the current subjective SES. In addition, commercial insurance purchase acts as a mediator of the association between childhood subjective SES and adulthood PEB. Moreover, age moderates both the path where childhood subjective SES influences adulthood PEB and the path where childhood subjective SES influences commercial insurance purchase. In accordance with our hypotheses, the results suggest that early environment can be an influence on adulthood lifestyle and consumer choices. Additionally, this influential strength differs for difference age groups.

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Liu, M.
**Social climbing has a green lining: a two-wave longitudinal study on
whether adolescents' intention for social mobility predicts
proenvironmental behaviors**
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Social climbing has a green lining: a two-wave longitudinal study on whether adolescents' intention for social mobility predicts proenvironmental behaviors

Meiting Liu ¹

(1. Faculty of Social Sciences, University of Turku)

Author Note

Corresponding author: Meiting Liu

E-mail addresses for all authors:

Meiting Liu: meiliu@utu.fi

Permanent address: Assistentinkatu 7, 20500, Turku, Finland

ABSTRACT

Giving priority to self-interest often sacrifices the interest of the nature. However, we speculate that having an intention to improve social status may lead individuals to adopt higher class habitus, and thus surprisingly motivate them to practice more proenvironmental behaviors. We conducted a two-wave longitudinal study on a sample of 1526 adolescent participants with an age range from 11 to 16 years old. The results of fixed effects model indicated that within individuals, intention for social mobility positively predicted proenvironmental behaviors. Furthermore, in a mixed effects model including family socioeconomic status as a moderator, the main effect become stronger and the interaction of family socioeconomic status and intention for social mobility negatively predicted proenvironmental behaviors. That is, this effect was stronger among adolescents from a less well-off family compared to their counterparts from a more well-off family.

Keywords: intention for social mobility; proenvironmental behaviors; adolescents; socioeconomic status

1. Introduction

People generally pursue socioeconomic goals in almost every society (Goldthorpe, 2007; Hertel & Groh-Samberg, 2019), while giving priority to self-interest often sacrifices the interest of the nature (Griskevicius et al., 2012). However, is there a possibility that the ambition of climbing the social ladder drives people to be more environmentally friendly?

We speculate that having an intention to improve social status may lead individuals to adopt habitus (Bourdieu, 1984; Halewood, 2023) of a higher social class, where more proenvironmental behaviors (PEB) are usually assumed to be practiced than in a lower social class (Skogen, 1996; Kennedy & Givens, 2019). Habitus is a sociological concept which elaborates on how people think and do within a certain social context, particularly within a social class (Bourdieu, 1984). Halewood (2023) has recently underlined the kernal role of morality absent of Bourdieu's original theoretical framework, arguing that habitus makes people intentionally act in line with the norms of the social class with which they identify. Accordingly, we presume that holding a stronger

intention for social mobility leads individuals to more PEB, a habitus shared within people from the individual's target social class.

This topic is particularly significant for adolescents in that adolescence is highly malleable in moralization and building healthy social mindsets. We also believe that adolescents, at least in a society as competitive as contemporary China, understand the importance of social mobility for their future career and well-being.

Quite different from the typical, and maybe sometimes stereotypical, western teenagers with justified emotional turmoils, contemporary Chinese adolescents are likely to make early decisions about whether to lead a more prosperous life in the future than their families' current socioeconomic situations. The reason may lie in cultural difference of the concept of adolescence such that, for example, Chinese adolescents perceive more family responsibilities than do American adolescents (Qu, et al., 2016). Or because social elevation is more valued in unequal society, where one step further on the social ladder improves more well-being than in relatively equal society (Doepke & Zilibotti, 2019). As adolescents often identify, sometimes unconsciously, with their parents, they are easily to internalize their parents' attitudes, intentions or values, and thus, share their parents' life goals of winning the rat race (Killen & Smetana, 2005; Doepke & Zilibotti, 2019).

2. Intention for social mobility and proenvironmental behaviors

2.1. Concepts and backgrounds

In the current research, we define the intention for social mobility as the personal intention for elevating their social status by means of, for example, building relationship with people who are highly placed in society, moving to a better neighbourhood with better job opportunities and striving for advancement in career (Tausch et al., 2015). Young people's intention for social mobility is important in creating the motivation for their academic journey (Browman et al., 2022) and constructing the value guiding their future life (Sieben, 2017). In the macro level, the social mobility rate is a significant indicator of equality and dynamics of a society (Hertel & Groh-Samberg, 2019).

If you ask a Chinese citizen how likely would you elevate your social status, a respondent from the 1960s China may straightly give a low score on the scale, whereas for a respondent from the present Chinese society, the answer would be more complicated. The onset of the economic marketization in the 1980s marked a threshold in Chinese economy. This transformation gave rise to complicated situations concerning social mobility, many of which continue to resonate in contemporary society.

Before the reform, the planned socialist society was clearly separated into two sections: rural and urban. Because of the high regard for the industrial proletariat, urban residents with an urban *hukou* (population registration), enjoy a wide range of political, social and economic benefits to which their rural counterparts did not have access (Chan & Zhang, 1999; Chan, 2009). Cadres, usually leaders or professionals in an institution, even enjoy more privileges in the communist sociopolitical system (Bian, 2002). This artificially imposed social stratification partly collapsed after the marketization, when the private sectors produced new middle-classes primarily from the former privileged proletariat (e.g.,

cadres, Rona-Tas, 1994) and new working-classes from former rural residents. This shift made it possible for citizens to change their own or their family's socioeconomic fate.

The social progress has undoubtedly activated the dynamics of the social stratification, but there are still obstacles in front of an ambitious young person. Although weakened under the market economy, the unfair *hukou* policy and hierarchy in state-owned institutions still linger on and continue to create regional and sociopolitical inequality in contemporary Chinese society (Nee, 1991; Nee & Cao, 2002). For instance, even today, there are a large number of Chinese citizens who live, work and pay taxes in Beijing but have no right to receive a Beijing *hukou*, suggesting that they have no access to the social and economic privileges of being a Beijing resident (Liu & Shi, 2020).

More relevantly, the widespread educational reforms made it possible for young people, especially female students, to change their life through outperforming in the *gaokao*, the college matriculation test (Wu & Zhang, 2010). However, socioeconomic backgrounds of students still play a vital role in university enrolment, especially when it comes to elite institutions (Wu et al., 2019). In specific, urban students benefit more than rural students from the higher educational expansion (Tam & Jiang 2015). Nowadays children with parents who are managers or professionals have an increased probability of securing university admission compared to previous periods (Yeung 2013).

2.2. Theoretical framework

When an individual aims to climb up on the social ladder, they are likely to engage in its social practices of a certain higher class and identity with its lifestyle. This inclination arises from the shared habitus within each social class, a concept describes how an individual acts and thinks in accordance with the social world they identify (Bourdieu, 1984). Therefore, when adolescents intend to elevate their social position on the hierarchy, they may deliberately immerse themselves in the social practices of their desired class, gradually embodying the quintessential characteristics associated with that class.

Green lifestyle, including PEB, is generally considered as social practices that prevail among people without socioeconomic struggle. This assumption is not necessarily biased, because embracing environmental practice often requires a certain level of privilege. Going green can be more inconvenient and expensive (Gleim et al., 2013). In fact, the real world demographics also support the argument that people from more affluent socioeconomic backgrounds are more likely to engage in PEB (Gifford & Nilsson, 2014) and there is no exception in the Chinese context (Chen et al., 2011).

In that case, it is not hard to infer that adolescents may assume that people from a higher social status lead a more environmental friendly life, or at least more aware of the public morality – they care more about public issues, such as environmental protection. This assumption, moreover, is supported by empirical results demonstrating that compared with people from their original social position, people who have achieved educational and occupational elevation tend to engage in activities which are more of a habitus shared among their current social peers, for example, a preference for plant-based diets (Kallunki, 2023).

Thus, adolescents who have stronger intention for social mobility may build their moral identity through engaging in PEB. The above mentioning class identity may act as the packages of

both *symbolization*, public actions that show a personal commitment to a public issue and *internalization*, a private acknowledge that suggests the incorporation of the idea into one's self-concept (Aquino & Reed II, 2002).

Although previous studies have not directly examined the effect of the intention for social mobility on PEB, some related findings potentially argue a significantly positive association between the two constructs. For example, Yoon & Kim (2016) found that materialism would not lead consumers to impulsive spending when they perceive high economic mobility, because in this situation, consumers tend to be more farsighted to achieve a financial success. This long-term mindset may also transcend beyond economic domain.

In a more recent study, researchers has demonstrated that perceived class mobility positively predicts online giving intention and through the mediating roles of charitable emotions and charitable concepts (Li et al., 2023). Another study has revealed that lower-class individuals engage in more prosocial behavior when their perception of class mobility was high than when they perceived lower level of class mobility (Rao et al., 2022).

The reconstructions of class and cultural habitus might also explain why a stronger intention for social mobility can predict more PEB. For instance, buying products that take care of the environment has even transformed into a form of status consumption, signifying the buyers' social position (Griskevicius et al., 2010). Similarly, compared with traditional conspicuous consumption, contemporary luxury consumption has developed new signals of status, taking sustainability into consideration (Bellezza, 2023).

Today's adolescents may also find consuming green products to be a fashionable trend, symbolizing their individual uniqueness (Fu & Kim, 2019). Consumers who have changed their residential locations prefer unique shapes and purchasing unique products as opposed to those with stable residence (Koo et al., 2016). Given that consumers express their uniqueness by buying green products (Afshar Jahanshahi & Jia, 2018), residential mobility may be associated with PEB.

3. Family socioeconomic status as a moderator

Although previous studies have abundantly examined the relationship between socioeconomic status and PEB (Gifford & Nilsson, 2014; Yan et al., 2021), hardly any research, to our knowledge, has considered the effect of the interaction of socioeconomic status and intention for social mobility on PEB.

The results of a previous study argue that individuals from different social classes hold varying attitudes regarding the means to achieve social mobility. Whereas higher-ranking individuals often feel comfortable practising social manipulation to achieve advancement in their careers, those in lower ranks tend to use prosocial ways to move upward, valuing the prosperity of their organization (Belmi & Laurin, 2016). Thus we speculate that the effect of the intention for social mobility on green behavior may vary differently for adolescents depending on their families' socioeconomic status. The effect that more intention for social mobility leading to more green behaviors holds stronger among adolescents brought up in less affluent families, in contrast with those raised in more affluent families.

Previous studies have uncovered that people of different socioeconomic statuses hold opposing lay theories regarding the tactics of attaining status (Belmi & Laurin, 2016). Compared with higher-

classed individuals, lower- classed individuals often prefer prosocial strategies to gain social prestige (Belmi & Laurin, 2016). In accordance with this argument, compared to adolescents hailing from a more advantaged background, disadvantaged adolescents who tend to move socially upward may exhibit more engagement in green behaviour. This behavioral inclination could stem from their preference for developing habitus by means of moral identity, aiming to secure more opportunities, either in their careers or in daily lives.

4. This study

Given the context of prior theories and research, we posit the following hypothesis:

H1: Adolescents' intention for social mobility positively predicts their PEB.

H2: Adolescents' family socioeconomic status moderates the effect of their intention for social mobility on PEB.

5. Data

5.1. Participants

The data was collected from two randomly selected secondary schools in central China, Henan province. In the first school, our participants consist of nine classes from the eighth grade and seven classes from the ninth grade. In the second school, six classes of seventh-grade students and six classes of eighth-grade students participated in the survey. We adopted convenience sampling to collect data from adolescent students. The first wave was collected in September, 2022, receiving data from a total of 1727 participants. The second wave was collected in February, 2023 in which 1681 questionnaires in total were received. We obtained the final data only from participants who participated in both waves, which was 1627 in total.

We incorporated a total of 1526 participants in the study by including only items of our current study of interest while also addressing the missing data and wrongly written responses. In this sample, 773 (50.7%) students are girls and 405 (49.3%) are boys; 473 (31%) students come from the rural areas and 1053 (69%) from urban areas; merely 147 (9.6%) students are the only child in their family, that is, 1379 (90.4%) students have siblings. Students have very little age variance, showing a range from 11 to 16 years old (M age = 13.29, SD age = 0.76). Merely 10% of the students are the only child in their family.

Approval to conduct this survey was obtained from the ethics committee for scientific research at Department of Educational Sciences, Xinyang Normal University, as well as from the adolescent students and their parents. The survey was conducted by a fellow researcher along with the teachers from schools. Student participants were given paper questionnaires in the classrooms. Before the formal survey, students were briefed on the entire procedure, the scientific and confidential handling of their responses, and their right to withdraw at any point. Finally, students were provided with a few minutes to verify the completeness of their answers.

5.1. Measures

Intention for social mobility. We translated Tausch et al. (2015)'s measurement of individual mobility intentions. Participants answer the questions regarding the extent to which they are inclined to partake in the following actions to enhance their societal standing. The action items are "create connections with people who hold power in society", "move to a neighborhood where there are more job opportunities", and "work hard to be able to advance myself". The answers were presented on a Likert scale ranging from 1 (not at all likely) to 5 (extremely likely).

Proenvironmental behaviors. We employed a localized and translated edition of the PEB measurement (Krettenauer, 2017; Wang et al., 2019). Participants read the Chinese version of questionnaires. The original items are in English, which include "I turn off TV and computer screens when they are not in use", "I conserve energy and water by taking shorter showers", "I collect and recycle used papers and plastic containers", "I properly treat the dead batteries to avoid polluting the environment", "I reuse plastic bags" and "I prefer buying products made from recyclables (e.g. notebooks made of used papers)". Participants were asked to rate the frequency of the above actions in the previous year (from 0 = never do this to 5 = always do this).

Family socioeconomic status. We used the Family Affluence Scale (Currie et al., 2008; Zou et al., 2020), which is widely used to assess younger people's family socioeconomic status by asking about their family possessions and consumption, considering that adolescents often have insufficient knowledge of their family income or inaccurate judgement about their family socioeconomic status. In this scale, participating adolescents were asked what is the number of family cars, vans or trucks (1 = none, 2 = one, 3 = two or more), whether they have their own bedroom (1 = no, 2 = yes), how many times their family travel over the past year (1 = none, 2 = one, 3 = two, 4 = more than two times) and how many family computer(s) (1 = none, 2 = one, 3 = two, 4 = more than two). Participants' family socioeconomic status was evaluated by summing four scores, thus higher scores indicating a higher family socioeconomic status. The range in this study was from 4 to 13, the mean score was 8.31, the median score is 8 and the standard deviation was 1.84.

According to formerly methodological literature (Rossiter, 2002; Diamantopoulos, 2005), the Cronbach's α is not suitable to assess reliability of the family affluence scale, a formative scale, where items are different aspects of the construct. Rossiter (2002) argued that when the items of a scale indicate concrete attributes, the scale is inherently reliable and therefore unnecessary to test reliability. For items, for instance, give the number of cars their family owns, respondents are entirely able to provide accurate answers.

We still followed Diamantopoulos (2005)'s recommendation, adopting estimates of the test-retest reliability, based upon the generalizability theory, a theory that specifically includes time variance (Brennan, 2010). We run the multilevel generalizability analysis in R using *mlr* function from *psychTools* package. Allowing time effects to be random, we generated the generalizability of average time points across all items ($R_{KR} = 0.83$), showing excellent test-retest reliability. Moreover, this scale is widely used across the world (e.g., Boyce et al., 2006; Liu et al., 2012), thus we consider it a reliable measurement for capturing young people's family socioeconomic status.

6. Statistical Analysis

6.1. Intention for social mobility predicting pro-environmental behaviors

We examined the main effect of this study using fixed effects model, exploring within-individual differences between intention for social mobility and PEB. Then the model's equation is:

$$y_{it} = b_{0i} + b_1 x_{it} + u_{it} \quad (1)$$

where x is the predictor variable, intention for social mobility, and y is the outcome variable PEB, i refers to each individual and t refers to each time point. For each individual, b_0 represents the intercept, indicating the initial level of PEB without considering the predictor, intention for social mobility; b_1 represents the slope, a growth rate determining how much PEB changes as intention for social mobility changes; u_{it} is the error term. When predicting a fixed effects model, we let intercept b_0 to be constant but different for each individual and we assume the slope b_1 do not vary across individual and time. We calculated the results of the model using `plm` function in the `plm` package from R.

6.2. Family socioeconomic status as a moderator

We followed Bliese et al. (2018)'s recommendation for the interaction test using mixed-effects model, because multilevel models allow individual properties to be used to explain both slope and intercept differences in the first level. Our hypothesis is that the effect of adolescents' intention for social mobility on their green behaviors is moderated by their family socioeconomic status. More specifically, having higher intention for social mobility in an less affluent family is more likely to have more green behaviors.

Firstly, we tested whether the within-individual variability of slopes in the model that intention for social mobility predicting PEB signifies differences related to between-individual effects, family socioeconomic status in this study, rather than being attributed solely to random error. In R, adopting `nlme` package, we assess the significance of slope variation by comparing $-2\log$ likelihood value of a model with only a random intercept to that of a model with a random intercept and random slope (for the justification of including a random slope, also see Bell et al., 2019). The results show that the model with both a random slope and a random intercept yields a better fit (L.Ratio = 36.37, $p < 0.00$), thus we have evidence to be convinced that at least part of the slope differences are likely to be explained by family socioeconomic status.

The mixed-effects regression model consists of a level-1 model, examining within-individual differences, and a level-2 model, exploring between-individual differences (Laird & Ware, 1982). Level-1 model was represented as the equation:

$$y_{it} = b_{0i} + b_{1i} x_{it} + u_{it} \quad (2)$$

As we let the intercepts random, level-2 models are:

$$b_{0i} = \beta_{00} + \beta_{01} m_i + \varepsilon_{0i} \quad (3)$$

$$b_{1i} = \beta_{10} + \beta_{11} m_i \quad (4)$$

where m_i is the level-2 moderator, which suggests that the change in slope of y on x_{it} , given a unit change in m_i , is represented by b_{1i} .

Substituting equation (3) and (4) into equation (2), we obtained,

$$y_{it} = \beta_{00} + \beta_{01}m_i + \varepsilon_{0i} + (\beta_{10} + \beta_{11}m_i)x_{it} + u_{it} \quad (5)$$

Rearranging equation (5), we obtained,

$$y_{it} = \beta_{00} + \beta_{01}m_i + \beta_{10}x_{it} + \beta_{11}m_ix_{it} + (\varepsilon_{0i} + u_{it}) \quad (6)$$

where the outside-brackets part is fixed effects and the inside-brackets part is random effects. The random error terms are distributions with a mean of zero and variances of $\sigma_{\varepsilon_{0i}}^2$ and $\sigma_{u_{it}}^2$, and follow the assumption that they are not correlated with each other.

To conduct a simple slope test (Aiken et al., 1991), we then transform equation (6) to the expected regression equation by taking away the error terms and then rearranged the terms into the following equation:

$$\hat{y}_{it} = (\beta_{00} + \beta_{01}m_i) + (\beta_{10} + \beta_{11}m_i)x_{it} \quad (7)$$

Different values for m_i can be substituted into the equation to estimate certain simple slopes for \hat{y}_{it} regressed on x_{it} at those particular values of m_i . It is often common to define a higher level of m_i as one standard deviation above the mean ($m_i = +1 SD$) and a lower level of m_i as one standard deviation below the mean ($m_i = -1 SD$). The simple slope analysis was conducted in R using the function `simple_slope` from the package `reghelper`.

Following the common practice in moderation analysis (Hayes, 2017), the independent variables should be centralized or standardized so that the coefficient of x_{it} or m_i can be interpreted as the effect of that variable on y at the mean level of the other independent variable. We calculated the moderation results by employing `lmer` function in the `lme4` package and conducted simple slope analysis by using `simple_slopes` function in the `reghelper` package from R.

7. Results

The results of descriptive statistics and correlations between all the constructs are shown in Table 1. As was shown in the table, all the variables of interest were significantly correlated with each other, suggesting the potential of conducting further regression analysis.

Table 1

Means, standard deviations, and correlations with confidence intervals

Variable	M	SD	1	2	3	4	5	6	7	8
1. Gender										
2. Age	13.29	0.76	.01							
3. Onlychild			.06*	.05*						
4. Residence			-.08**	.10**	.06*					
5. FAS	8.31	1.84	-.01	.08**	-.03	.19**				
6. SMI_T1	3.71	0.82	.02	.01	.01	.11**	.16**			
7. SMI_T2	3.70	0.82	.05	.03	.01	.06*	.15**	.32**		
8. PEB_T1	3.64	0.98	.02	.00	-.02	.05	.03	.26**	.15**	
9. PEB_T2	3.57	1.01	.00	.04	-.01	.02	.06*	.15**	.32**	.43**

Note. Onlychild = whether you are an only child of your family (1= yes, 0 = no), Residence = live in a city (= 1) or in a countryside (= 0), FAS = family affluence/family socioeconomic status, SMI_T1 = intention for social mobility at Time 1, SMI_T2 = intention for social mobility at Time 2, PEB_T1 = proenvironmental behavior at Time 1, PEB_T2 = proenvironmental behavior at Time 2, * indicates $p < .05$, ** indicates $p < .01$.

Table 2 showed the results of the regression models. The results of the fixed effects model indicated that, within individuals, the variance of intention for social mobility positively predicted the variance of PEB (estimate = 0.257, CI[.202, .311], $t = 9.232$, $p < 0.001$). The results of the mixed effects model indicated that, when considering the between individual variable, family socioeconomic status, intention for social mobility positively predicted PEB (estimate = 0.531, CI[.352, .710], $t = 5.81$, $p < 0.001$). Additionally, the interaction of family socioeconomic status and intention for social mobility negatively predicted PEB (estimate = -0.025, CI[-.047, -.004], $t = -2.340$, $p = 0.019$), that is, as participants' family socioeconomic status increases, the effect of intention for social mobility on PEB become smaller.

Table 2

Predictors	PEB(fixed effects model)				PEB(mixed effects model)			
	Estimates	CI	Statistic	p	Estimates	CI	Statistic	p
SMI	0.257 ***	0.202 – 0.311	9.232	<0.001	0.531 ***	0.352 – 0.710	5.813	<0.001
(Intercept)					1.622 ***	0.938 – 2.307	4.646	<0.001
FAS					0.096 *	0.014 – 0.179	2.299	0.022
FAS × SMI					-0.025 *	-0.047 – -0.004	-2.340	0.019
Random Effects								
σ^2					0.54			
τ_{00}					0.37 _{ID}			
ICC					0.40			
N					1526 _{ID}			
Observations	3052				3052			
R ² / R ² adjusted	0.053 / -0.895				0.074 / 0.449			
* p<0.05 ** p<0.01 *** p<0.001								

Note. FAS = family affluence/family socioeconomic status, SMI = intention for social mobility, PEB = proenvironmental behaviors, * indicates p < .05. ** indicates p < .01.

Moreover, the results of the simple slope test (Aiken et al., 1991) was presented in Table 3, demonstrating that the effect of intention for social mobility on PEB is stronger among adolescents with less economically advantaged family background (estimate = 0.37, CI[.315, .428], t = 13.16) than their counterparts with more economically advantaged family background (estimate = 0.37, CI[.212, .329], t = 9.12). The interaction plot was also provided in figure 1.

Thus, we demonstrated that the difference of level-1 slopes differ for each individual can be explained by a between individual difference, i.e., some of the adolescents have more affluent family background and the effect of intention for social mobility on PEB hold smaller among them.

Table 3

FAS	SMI	Test Estimate	Std.Error	t value	2.5%	97.5%
6.5(-1SD)	<u>sstest</u>	0.37	0.03	13.16	0.3150	0.4280
8.3(Mean)	<u>sstest</u>	0.32	0.02	15.45	0.2767	0.3584
10.2(+1SD)	<u>sstest</u>	0.27	0.03	9.12	0.2118	0.3288

Note. FAS = family affluence/family socioeconomic status, SMI = intention for social mobility.

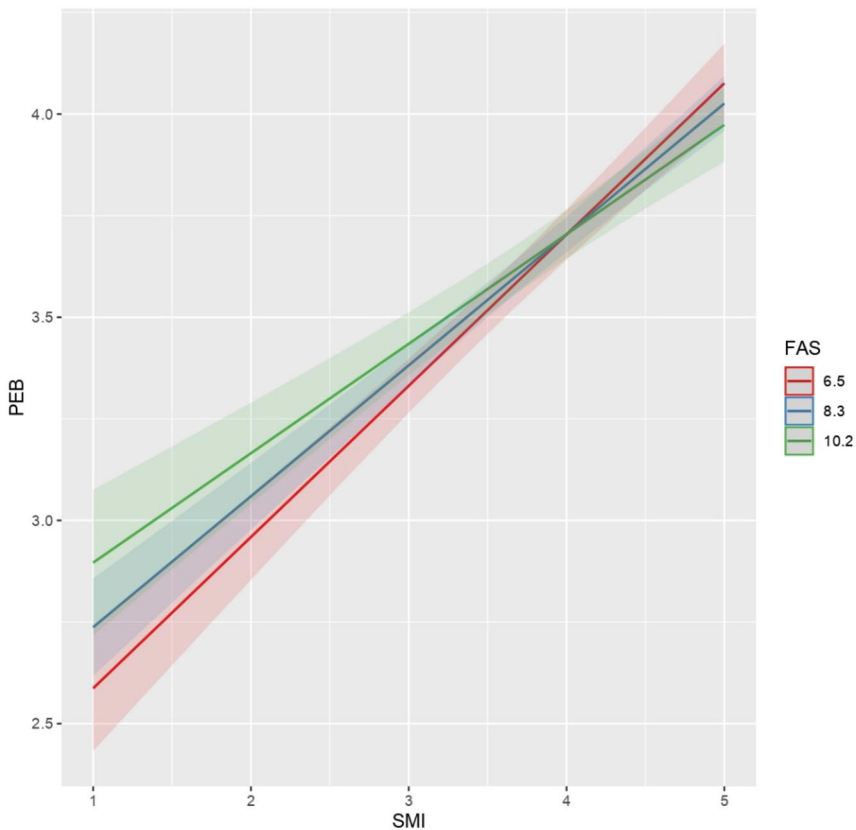


fig.1.

8. Discussion

8.1. General discussion

While intuition may lead us to believe that people who have intention for social mobility could not care less about public issues such as environmental crisis, the current studies demonstrated the opposite on a Chinese adolescent sample. Through analyzing a two-wave longitudinal data, we concluded that adolescents' higher level of the intention for social mobility positively predict PEB. Additionally, moderation analysis indicated that this effect was stronger among adolescents from a less well-off family compared to their counterparts from a more well-off family.

8.2. Intention for social mobility predicts pro-environmental behaviors

Theoretically, to our knowledge, there is a lack of research exploring the potential positive impact that the pursuit of social status could have on the environment. However, several studies were conceptually in line with our current results (Yoon & Kim, 2016; Li et al., 2023; Rao et al., 2022). One study has demonstrated that in situations where there is a low perception of class mobility, individuals from lower classes exhibited lower levels of prosocial behavior compared to their higher-class counterparts; the prosocial behavior of lower-class individuals increased when the

perception of class mobility was elevated, resulting in no significant difference between lower and higher-class individuals (Rao et al., 2022).

This research (Rao et al., 2022) also provides an alternative explaining why intention for social mobility predicts pro-environmental behaviors. Similarly in our current study, adolescents who have higher intention for social mobility may perceive themselves to be able to move upward, so they believe that the social system where they inhabit is of sufficiently justice (Rao et al., 2022). This heightened belief in system-justification motivates them to be more environmental friendly.

8.3. Family socioeconomic status as a moderator

Due to a complex interplay of social, political and historical factors, the socioeconomic disparities between urban and rural areas remain to be salient social issues in contemporary Chinese society (Bian, 2002). The correlational results shown in Table 1 are in accordance with this poignant reality. Compared with adolescents from rural areas, adolescents from urban areas still have significantly higher family socioeconomic status ($r = .19, p < .01$) and higher intention for social mobility ($r = .11, p < .01$ for T1, $r = .06, p < .05$ for T2). This is definitely not surprising because intention for social mobility is closely associated with how likely people perceive that they could move upward, often based on weighing on their current socioeconomic situations (Clark & Lisowski, 2017).

However, regarding our results that intention for social mobility more strongly predict pro-environmental behaviors among adolescents with a less advantaged family background, elevating young people's intention for social mobility can be more than an socioeconomic consideration. It also bears the potential to save the increasingly deteriorating environment in Chinese rural areas.

8.4. Implications

Social mobility is probably one of the foremost life goals for individuals or their families from a hierarchical society. The attainment of a higher social position is often considered an insurance for individual and family happiness and the potential to receive respect from fellow social members. How to incorporate the increasingly urgent global environmental concern into existing prevailing topics is practical for countries and regions where longstanding social issues—such as poverty, socioeconomic inequality, or gender inequality— still remain developmental priorities. The findings of the current research, accordingly, provide a perspective wherein even a monetary-driven action, such as the pursuit of social status, can result in benefits for the environments.

When this concept is effectively communicated by policy makers or educators to the young consumers, there is a higher likelihood that young people will be motivated to embrace pro-environmental attitudes and behaviors. Moreover, environmental activities could be designed and organized for adolescents who show wishes to move socially upward. Educators do not need to rely solely on standardized scores to identify students with a higher intention for social mobility. Instead, they can discern such intention by paying attention to students expressing their desire to go to university in a big city, pursue a professional career or start a business in the future.

The stereotypical portrayal of environmentalists as over-moralistically ascetic monks often gives an impression that going green suffers and must sacrifice people's own well-being. On the contrary, some recent studies have shown that green lifestyle benefit people in the personal level (Tezer & Bodur, 2020; Liu & Koivula, 2023) and, not to say that, it will in the end benefit everyone

in the long-term (Bamberg et al., 2007). By effectively communicating and ensuring young people the potential personal benefits, environmental policy makers can provide sustainable and enduring motivation for people to persist on the road to green lifestyle, leading to more effective policy implementation.

In fact, the “zero waste movement”, which advocates using zero plastic products and only eating organic vegetable foods, has received criticisms from a sociopolitical perspective (Müller & Schönbauer, 2020). These researchers argued that people who advocate “zero waste lifestyle” online are often white middle-class women from North America and Europe, who have enjoyed a privileged level of living condition and utilize zero waste concept as a tool for reevaluating their previously shopaholic behavior. If we look at our results in this respect, a combination of economic pursuit with environmental concern may be a more effective environmental campaign in developing countries and regions, because extreme environmental campaign may overlook the reality of economic disadvantage faced by most people in the world, potentially denying their rights to pursue an affluent life (Gates, 2021).

Additionally, the results can serve to debunk the stigma of “social climbers” by encouraging an updated view of people who pursue their own socioeconomic interest. The public, particularly of a collectivistic cultural setting, often has a negative bias towards people who are enthusiastic about elevating their social status. For example, in China, the men who desire social elevation are derogatorily called “phoenix men” (Zhang, 2019), embodying the traits such as selfishness, ambitiousness and a willingness to do whatever it takes to reach their monetary goals. Contrary to the stigma, the current study showed that desiring social elevation can result in behaviors that benefit the environment.

8.5. Limitations and future directions

The major limitation for this research lies in the lack of generalization of our sample, as it is confined to a specific cultural setting and age group. The cultural context is narrowed to mainland China where the attainment of upward mobility worth more than that in a less competitive society (Doepke & Zilibotti, 2019). Data with different cultural contexts may yield different results and this assumption can be tested in future studies.

The age range is limited within from 11 to 16 years old. However, we particularly limit the research objects as adolescents for two reasons. On the one hand, when researching on the intention for social mobility, it is more realistic to focus on individuals who has not faced the decision of mobility but for whom the intention holds significance in shaping their future. On the other hand, adolescence is a pivotal phase for moral development during which external influences, such as school education, family routines and media coverage, can bring profound changes or even transformations. Nonetheless, future studies could investigate the perceive social mobility or the actual mobility among adult samples.

In addition, although we adopted longitudinal design in this study, the interval between the time points are only 6 months, resulting in little variance for analysis. Future studies could consider testing the hypotheses with more waves and longer intervals.

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Greed doesn't grow on trees: the indirect association between
proenvironmental behaviour and materialism through adolescents'
psychological entitlement
Young Consumers



Greed doesn't grow on trees: the indirect association between proenvironmental behaviour and materialism through adolescents' psychological entitlement

Meiting Liu and Aki Koivula

Abstract

Purpose – This study aims to explore the potential that acting proenvironmentally protects adolescents from developing materialistic value.

Design/methodology/approach – Convenience sampling was adopted to collect data from two randomly selected secondary schools in central China. A total of 784 participants were included in the survey.

Findings – The mediation analysis revealed that adolescent proenvironmental behaviour was negatively associated with materialism. The results of the moderated mediation model showed that psychological entitlement mediates the association between adolescent proenvironmental behaviour and materialism, and that family socioeconomic status acts as a moderator in the association between proenvironmental behaviour and psychological entitlement.

Practical implications – The current results advise educational practitioners on alleviating adolescent materialism. Policy makers and schools can add more environmental practice to the curriculum and extracurricular activities. Moreover, identifying the personal benefits of proenvironmental behaviour can motivate young people to act proenvironmentally, which not only factually reduces over-consumption but also attracts more attention from young people to the environment.

Originality/value – Previous studies rarely explored the individual belief or perception accounting for the negative association between proenvironmental behaviour and materialism. Therefore, the authors adopt psychological entitlement, a belief reflecting the dark side of individual perception, to explain why proenvironmental behaviour reduces materialism.

Keywords Adolescence, Materialism, Proenvironmental behaviour, Psychological entitlement, Family socioeconomic status

Paper type Research paper

Meiting Liu and Aki Koivula both are based at the Faculty of Social Sciences, University of Turku, Turku, Finland.

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1. Introduction

A majority of studies have paid attention to factors and strategies that drive people to live and consume products environmentally friendly (Goldstein *et al.*, 2008; Gleim *et al.*, 2013; Gupta *et al.*, 2022). Scholars and policy makers have also convinced people that going green will guide us all in tandem to a clean, wholesome and sustainable planet (Griskevicius *et al.*, 2012; York *et al.*, 2018). However, within a large body of green-related research, there is a relative lack of academic interest in topics regarding how one can personally benefit from practising proenvironmental behaviour. Only until more recently, studies have revealed that consumers can gain personal benefits from proenvironmental behaviour (Tezer and Bodur, 2020; Kasser, 2017; Kang *et al.*, 2021).

Adolescence has been regarded as a key period of developing prosocial values and tendencies, which will be constantly relevant for adulthood (Eisenberg *et al.*, 2002). However, one of the most poignant and surprising contemporary observations about adolescent life is the increasing trend where adolescents mindlessly justify materialism (Chaplin and John, 2007; de Rezende Pinto *et al.*, 2017), a value that features an emphasis on acquiring money and items, the mere possession of material goods and an insurance for happiness if one eventually acquires those goods (Belk, 1985; Richins and Dawson, 1992). Shrewd marketers have peddled consumerism through social media by encouraging and building a dream for young people that money and materials are the shortcut, if not the only way, to happiness (Lewallen *et al.*, 2016).

Research has demonstrated that materialism is associated with negative outcomes in adolescence – e.g. decreased school performance (Goldberg *et al.*, 2003), mental issues among 18-year-olds (Kasser and Ryan, 1993), social comparison with media figures (Chan and Prendergast, 2007), strong interest in fashion and clothing (Kamal *et al.*, 2013), high intention to get plastic surgery (Henderson-King and Brooks, 2009), and low life satisfaction (Ku, 2015). In terms of prosocial attitudes, adolescents who hold materialistic value are less likely than non-materialists to help others (Briggs *et al.*, 2007), advocate for egalitarian (Flanagan *et al.*, 2005) and have less ecologically responsible behaviour (Brown and Kasser, 2005).

Moreover, exposure to material parenting in adolescence increases the likelihood of developing adulthood materialism (Richins and Chaplin, 2015), which subsequently engenders risky health behaviours (e.g. tobacco, alcohol or drugs) and compulsive buying (Ding *et al.*, 2019a; Dittmar *et al.*, 2014), and develops negative self-evaluation (Dittmar *et al.*, 2014), problematic interpersonal relationships (Norris *et al.*, 2012), recurrent loneliness (Pieters, 2013) and dark personality traits (Kasser and Ryan, 1993; McHoskey, 1999). In the Chinese context, exploring adolescent materialism is particularly important because development of the Chinese economy brings about an increasing desire for material hedonism among young people in modern Chinese society (Chan *et al.*, 2006; Chan and Prendergast, 2008; Durvasula and Lysonski, 2010; Gu and Hung, 2009; Podoshen *et al.*, 2011).

Kasser (2016) proposed three approaches to reducing materialism: activating self-transcendent values, removing materialistic cues in the social environment and improving one's sense of security. In principle to the approaches, previous studies have reported successful interventions (Stillman *et al.*, 2012; Brown *et al.*, 2009; Buijzen, 2007; Chaplin and John, 2007; Clark *et al.*, 2011; Lasaleta *et al.*, 2014), while few studies have explored whether proenvironmental behaviour can decrease materialism. Given that green consumption provides a sense of self-worth among consumers (Tezer and Bodur, 2020), we believe that proenvironmental behaviour may activate self-transcendent values, which is a possible way to reduce materialism (Kasser, 2016). Moreover, materialism-related values lie opposite to proenvironmental value on the circular model of the value system (Maio *et al.*, 2009; Schwartz *et al.*, 2012), which suggests that increasing one means decreasing the other. Therefore, we assume that acting proenvironmentally may protect adolescents from developing materialistic value.

Although previous studies have copiously revealed the link between proenvironmental behaviour and materialism (Kilbourne and Pickett, 2008; Bergman *et al.*, 2014; Alzubaidi *et al.*, 2021; for negative association, Helm *et al.*, 2019; for positive association, Evers *et al.*, 2018), the influential mechanism and demographical difference have been inadequately explored. Extant literature has indicated that environmental beliefs (Kilbourne and Pickett, 2008), proenvironmental attitudes (Gu *et al.*, 2020) and the social approval and behavioural control of green behaviour (Sreen *et al.*, 2020) act as the mediators between proenvironmental behaviour and materialism. However, these studies do not specify why people who take actions that benefit the environment can affect their immoderate search for

materialist goals. Drawing from Bergman *et al.*'s (2014) study showing that materialism explains why narcissist business students have lower levels of environmental ethics than their non-narcissist counterparts, we assume that dark beliefs may serve to interpret the negative association between proenvironmental behaviour and materialism.

In addition, from the late 20th to the early 21st century, American college students have become increasingly psychologically entitled (ego inflated) over time (Twenge and Foster, 2010). Although psychological entitlement has been consistently identified as the problem of the privileged in the western context (Kraus *et al.*, 2012), some researchers have found that Chinese college students from a lower social class exhibit psychological entitlement when they attribute their economic disadvantage to external factors and perceive a sense of relative deprivation (Ding *et al.*, 2019b). Accordingly, we speculate that psychological entitlement, a sub-dimension of narcissism, might be associated with proenvironmental behaviour and materialism. Therefore, we aim to examine the influential mechanism by testing psychological entitlement as a mediator in the association between proenvironmental behaviour and materialism. Furthermore, given that materialism is closely linked to money and material acquisition, we attempt to explore how adolescent family socioeconomic status moderates this hypothetical model.

1.1 Proenvironmental behaviour and materialism

As proenvironmental value and behaviour are significantly associated (Hurst *et al.*, 2013), people who engage in proenvironmental behaviour are likely to have proenvironmental value. According to the theory of basic individual values, proenvironmental value falls within the self-transcendence dimension and the universalism–nature sub-dimension of the circular value spectrum (Schwartz *et al.*, 2012). That is, self-interest is dwarfed in proenvironmental behaviour and inflated in materialism. People who practise proenvironmental behaviour have less motivation for boosting self-interest than improving the welfare of the entire population or nature (Schwartz *et al.*, 2012). By contrast, materialism highlights the tendencies that one fixes on personal goals directed by hedonic or instrumental motives (Richins and Dawson, 1992; Shrum *et al.*, 2013) or social fantasies (Solomon, 1983). These tendencies are in accordance with self-enhancement goals, which stand on the very opposite of self-transcendence, where proenvironmental value is located, in the circular values model (Schwartz *et al.*, 2012; Burroughs and Rindfleisch, 2002). Furthermore, we can draw from the social learning theory (Bandura, 1971) and the social cognitive theory (Bandura, 2018) to illustrate how behaviour shapes value. As shown in the flow diagram of social learning (Bandura, 1971), the core practice for individuals to internalise a moral thought is to form a symbolic conclusion according to the feedback of their multiple behavioural trials. This is a process where behavioural factors contribute to the construction of personal values or moral thoughts. Bandura's (2014) emphasis of "learn by modelling" has a subtext of "learn by doing". In accordance with the interactionist perspective of social learning (Bandura, 2014; Bandura, 2018), repeated proenvironmental behaviour provides adolescents with social worth and warm-glow feelings (Tezer and Bodur, 2020), which are positive feedback that restrains self-centred attitudes and values, e.g. materialism. Thereby, we propose:

H1. Proenvironmental behaviour will have a negatively significant impact on materialism.

1.2 Psychological entitlement as a mediator

Psychological entitlement is a self-centred belief where one experiences exaggerated deservingness, distinctiveness and expectations (Grubbs and Exline, 2016). Psychologically entitled individuals usually consider themselves to have more privilege than other people in various aspects of social life (Campbell *et al.*, 2004; Barton and Hirsch, 2016; Boyd and Helms, 2005). Feeling entitled is negatively associated with myriads of negative outcomes that decrease well-being (Grubbs and Exline, 2016).

First, proenvironmental behaviour has a negative impact on psychological entitlement. Drawing on the circular model of basic individual values (Schwartz *et al.*, 2012), adolescents who practise proenvironmental behaviour are likely to appreciate self-transcendent values that counter to the self-enhancement values where people of high psychological entitlement usually hold (Schwartz *et al.*, 2012). In a previous study, psychological entitlement was found to be negatively associated with environmental ethics among business students (Bergman *et al.*, 2014), which substantiated the potential negative impact of proenvironmental behaviour on psychological entitlement.

Second, psychological entitlement has a positive impact on materialism. Adolescents who are less psychologically entitled tend to have more self-transcendent values and less likely to value self-interests than those who are more psychologically entitled (Schwartz *et al.*, 2012). As pursuing self-interests is a dominant feature of materialism, we believe that less psychological entitlement can lead to less materialism. In addition, given that psychologically entitled adolescents usually consider themselves to have more privilege than other people (Campbell *et al.*, 2004), it is likely that this sense of privilege blinds adolescents so that they see the world only in terms of their hedonic or instrumental goals and realise the goals by pursuing material goods. Moreover, there is empirical evidence in previous literature supporting the given relationship (Lee *et al.*, 2022; Oprea and Kühne, 2016).

Third, psychological entitlement serves as a mediator to the relationship between proenvironmental behaviour and materialism. The associations between proenvironmental behaviour, psychological entitlement and materialism can be explained through how important people evaluate the self in comparison with the larger social domains – e.g. the natural environment. Thus, we propose:

H2. Psychological entitlement will significantly mediate the causal relationship between proenvironmental behaviour and materialism.

1.3 Family socioeconomic status as a moderator

People from lower class are more likely to have more context-dependent cognitive styles through which they are more concerned about people around them rather than their own behaviour (Kraus *et al.*, 2012). Therefore, this behavioural tendency may weaken the association between proenvironmental behaviour and psychological entitlement. Moreover, adolescents from lower class may experience more social injustice than their higher class peers, and they will feel that they deserve better treatment than what they really experience. Therefore, their psychological entitlement may maintain a high level so that other factors have little effect on it. A recent study revealed that lower classed college students in China feel psychologically entitled when they attribute the rich–poor gap to external factors and feel a sense of relative deprivation (Ding *et al.*, 2019b).

Moreover, some scholars have distinguished between “vulnerable-based” and “grandiose-based” forms of psychological entitlement (Hart *et al.*, 2019). Research has revealed that people who are treated unjustly in adverse childhood may be more psychologically entitled because their vulnerability triggers demand for special consideration (Bishop and Lane, 2000). Therefore, factors that would have decreased psychological entitlement (proenvironmental behaviour) may be invalidated due to the vulnerable social conditions confronted by lower classed adolescents. Thus, we propose:

H3. Family socioeconomic status moderates the causal relationship between proenvironmental behaviour and psychological entitlement.

2. Data and methods

2.1 Participants

We adopted convenience sampling to collect data from two randomly selected secondary schools in central China. The purpose of the current study is to explore the potential that

acting proenvironmentally protects Chinese adolescents from developing materialistic value. Given that the ages of secondary school students meet the general criteria of the adolescence stage (Kim and Kim, 2009), we consider it appropriate to recruit adolescents from secondary schools in central China by means of convenience sampling.

However, convenience sampling has several limitations. For example, the research results may not be generalised to a larger population because we merely examined students from two schools in a particular district (Etikan *et al.*, 2016), particularly in China where the economic level in the south-eastern area is higher than other districts. In addition, the homogeneity may inflate the research validity because students tend to have homogeneous demographics such as age and education (Peterson and Merunka, 2014). Still, we assume that the sample is of certain representativeness because most adolescents in China are in school at this stage of life due to the nine- or 12-year compulsory education programmes launched by the government.

After deleting missing data and wrongly written answers, we included a total of 784 participants in the study. A total of 379 (48%) girls and 405 (52%) boys made up the sample. Of the participants, 59% are from the seventh grade, 16% are from the eighth grade and 25% are from the ninth grade. Their age ranges from 12 to 17 years old ($M_{age} = 13.73$, $SD_{age} = 1.06$). Merely 10% of the participants are the only child in their family.

Permissions to conduct this survey were sought from the Ethics Committee for Scientific Research of our institution, the adolescent students and the adolescents' parents.

Prior to the formal survey, students were informed about the entire procedure, the scientific and confidential use of their responses, and their right to quit at any time. The formal questionnaires covered participants' demographics, family wealth, proenvironmental behaviour, psychological entitlement and adolescent materialism. Lastly, the participants were given a few minutes to confirm the completeness of their answers.

2.2 Measures

2.2.1 Proenvironmental behaviour. We used an adapted version of proenvironmental behaviour assessment based on Krettenauer (2017) and a localised research with a Chinese adolescent sample (Wang *et al.*, 2019). The items are "I turn off TV and computer screens when they are not in use", "I conserve energy and water by taking shorter showers", "I collect and recycle used papers and plastic containers", "I properly treat the dead batteries to avoid polluting the environment", "I reuse plastic bags" and "I prefer buying products made from recyclables (e.g. notebooks made of used papers)". For each item, participants were asked to rate how often they engaged in the behaviour in the last year (from 0 = *never do this* to 5 = *always do this*).

2.2.2 Psychological entitlement. Participants filled in a Chinese version of the PE scale (Ding *et al.*, 2019b; Campbell *et al.*, 2004). The PE scale consists of nine items that describe an individual sense of entitlement. Examples of items are "I honestly feel I'm just more deserving than others", "Great things should come to me", "If I were on the Titanic, I would deserve to be on the *first* lifeboat", "I demand the best because I'm worth it" and "People like me deserve an extra break now and then". Participants' answers were given on a seven-point scale ranging from 1 (*completely disagree*) to 7 (*completely agree*).

2.2.3 Materialism. We also adopted the Youth Materialism Scale (Goldberg *et al.*, 2003) to measure adolescent materialism in the current study. The scale also showed good reliability on a Chinese sample (Ding *et al.*, 2019a). Participants rated to what degree they agreed across ten items – for example, "I'd rather spend time buying things than doing almost anything else", "I would be happier if I had more money to buy more things for myself", "I have fun just thinking of all the things I own", "I really enjoy going shopping", "I like to buy things my friends have" and "I really like the kids that have very special games or clothes".

For all items, participants answer using a four-point scale from 1 (*disagree a lot*) to 2 (*disagree a little*) to 3 (*agree a little*) to 4 (*agree a lot*).

2.2.4 The family affluence scale. Given that adolescents were usually unaware of their family socioeconomic status, we measured the family socioeconomic status using the Family Affluence Scale (Currie *et al.*, 2008; Zou *et al.*, 2020), which is a scale that directly obtains information about participants' family possessions and life experience. In this scale, adolescents were asked four questions regarding their family economic condition – e.g. the number of family cars, vans or trucks (1 = *none*, 2 = *one*, 3 = *two or more*), whether participants have their own bedroom (1 = *no*, 2 = *yes*), family travel times over the past 12 months (1 = *none*, 2 = *one*, 3 = *two*, 4 = *more than two times*) and the number of family computer(s) (1 = *none*, 2 = *one*, 3 = *two*, 4 = *more than two*). We evaluated participants' family socioeconomic status by averaging the summed four scores, with lower scores indicating a low level of family affluence, and higher scores indicating a high level of family affluence. The range of the answers was from 1 to 3.25, the mean score was 1.93 and the standard deviation was 0.61.

2.3 Statistical procedures

We analysed the data with R 4.0.4 for Mac OS X GUI and RStudio Version 1.4.1106. To begin with, *lavaan* and *semPlot* packages were used to conduct confirmatory factor analysis (CFA). Following this, we tested the hypothetical model and competing model using the package *processR* (Moon, 2021), which was created based on PROCESS macro for SPSS and SAS (Hayes and Rockwood, 2020). In this study, we ran 95% bias-corrected accelerated confidence intervals (CIs) based on 5,000 bootstrap samples. Statistical significance is represented by a 95% CI that does not include zero. We used standardised scores to calculate the hypothetical models.

3. Results

3.1 Confirmatory factor analysis

We adopted Cronbach's α to test the reliability of the constructs. As was shown in Table 1, the value of Cronbach's α for each constructs is above 0.6, indicating either acceptable or good reliability (Taber, 2018). The composite reliability (CR) of each construct is greater than 0.70 (Table 1), showing acceptable internal consistency of items in each scale.

We used average variance extracted (AVE) to assess convergent validity. According to Fornell and Larcker (1981), 0.4 of AVE is acceptable if the CR is higher than 0.6. As was indicated in Table 2, the AVE of all constructs is either approximately 0.4 or above 0.5, indicating not good but acceptable convergent validity.

For discriminant validity, we followed Fornell and Larcker's (1981) criteria that the maximum shared variance (MSV) should be lower than AVE, and AVE should be higher than the average shared variance (ASV). As was shown in Table 3, all constructs showed good discriminant validity.

Table 1 Factor loading and Cronbach's α

Constructs	Factor loading	Cronbach's α	CR
Proenvironmental behaviour	0.53/0.73/0.77/0.63/0.58/0.43	0.74	0.79
Psychological entitlement	0.70/0.57/0.76/0.81/0.72/0.65/0.85/0.75/0.66	0.90	0.91
Materialism	0.63/0.77/0.51/0.63/0.60/0.67/0.55/0.63/0.66/0.47	0.85	0.86
Family affluence	0.79/0.38/0.57/0.66	0.66	0.70

	PrB	PsE	Mtr	FmA	CR	AVE	MSV	ASV
PrB	1				0.79	0.38	0.07	0.04
PsE	-0.09	1			0.91	0.52	0.34	0.12
Mtr	-0.24	0.58	1		0.86	0.37	0.34	0.13
FmA	-0.26	-0.13	0.03	1	0.70	0.38	0.07	0.03

Model	NPAR	CMIN	DF	p	CMIN/DF
Default model	64	1,100.961	371	0.000	2.968

Notes: NPAR: Number of distinct parameters; DF: Degree of freedom; p: Significance value; CMIN/DF: Minimum discrepancy divided by degree of freedom

The results of the CFA were shown in Figure 1 and Table 2, indicating acceptable validity. Moreover, the fit indices of the measurement model are either acceptable or good, as was shown in Tables 3 and 4 (Hooper *et al.*, 2008; Arya *et al.*, 2019).

3.2 Theorised mediation model

Based on our theoretical framework, we tested the association between proenvironmental behaviour, psychological entitlement and materialism through Model 4 from *processR* package. Controlling for the correlated demographics, the results showed that proenvironmental behaviour was negatively associated with PE ($B = -0.08, p < 0.05$), psychological entitlement was positively associated with materialism ($B = 0.50, p < 0.001$) and proenvironmental behaviour was negatively associated with materialism ($B = -0.13, p < 0.001$). Psychological

Figure 1 CFA model

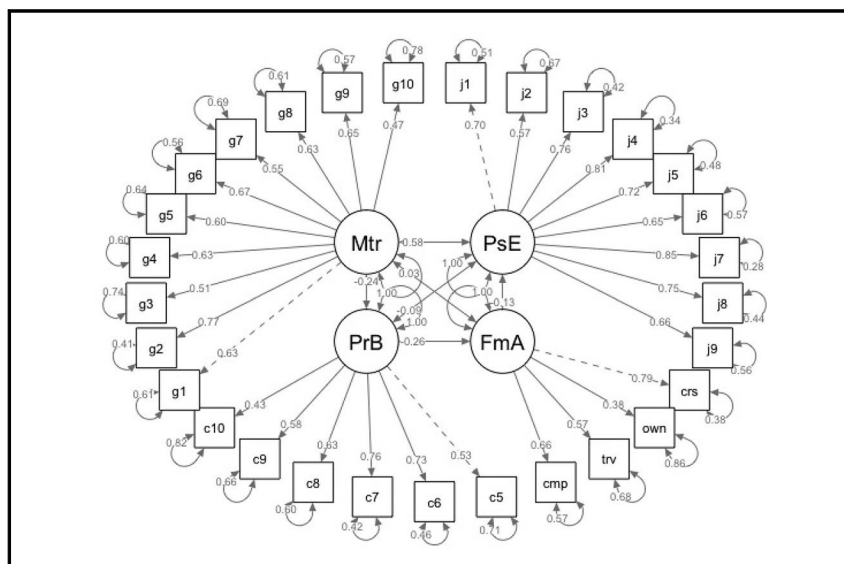


Table 4 Model fit analysis (CFI, GFI, NFI, TLI, RMSEA)

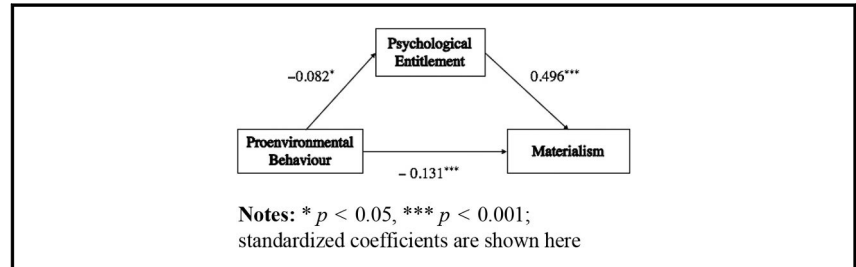
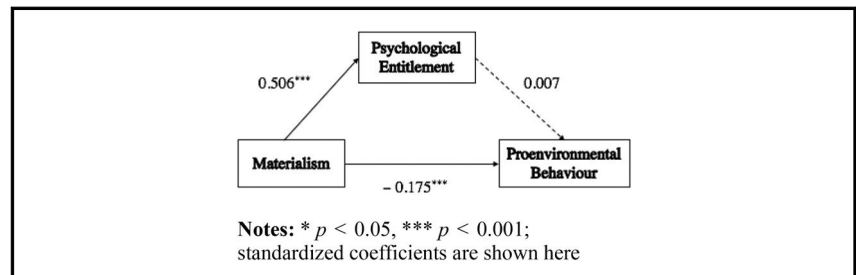
Model	CFI	GFI	NFI	TLI	RMSEA
Default model	0.913	0.906	0.875	0.905	0.050

Notes: CFI: Comparative fit index; GFI: Goodness of fit index; NFI: Normed fit index; TLI: Tucker–Lewis coefficient; RMSEA: Root mean square error of approximation

entitlement significantly mediated the association between proenvironmental behaviour and materialism ($ab = -0.04$, 95% CI = $[-0.02, -0.06]$, $p < 0.05$). The mediation effect accounted for 31.0% of the total effect ($b = -0.13$, 95% CI = $[-0.08, -0.21]$, $p < 0.001$). Given that the indirect and direct effects point to the same direction, the mediation type is complementary mediation. Figure 2 shows the statistical diagram.

3.3 Alternative mediation models

Following the practice recommended by previous methodological literature (Lawrence *et al.*, 2006) and adopted by previous empirical research (Orkibi and Ronen, 2017), we attempted an alternative model, with the dependent and independent variables reversed, to find the appropriate directions. The results show that the path between psychological entitlement and proenvironmental behaviour was not significant in the alternative model, where materialism was the predictor and proenvironmental behaviour was the outcome variable ($B = 0.007$, $p = 0.86$, Figure 3).

Figure 2 The theorized Model 4**Figure 3** The alternative Model 4

3.4 The moderated mediation model

We adopted Model 7 from *processR* package to test the moderated mediation model. Figure 4 displays the results. The results showed that the interaction between proenvironmental behaviour and family socioeconomic status was associated with psychological entitlement ($B = -0.09$, $p < 0.05$). The mediating role of psychological entitlement on the association between proenvironmental behaviour and materialism was significant ($ab = -0.05$, $p < 0.05$). The mediation effect accounted for 35.0% of the total effect ($b = -0.13$, $p < 0.001$).

In addition, a simple slope test (Aiken *et al.*, 1991) revealed there was no significant association between proenvironmental behaviour and psychological entitlement ($B_{\text{simple}} = 0.08$, $p = 0.92$) for adolescents with lower family socioeconomic status (-1 SD). By contrast, for adolescents with higher family socioeconomic status ($+1$ SD), higher engagement in proenvironmental behaviour significantly predicted lower psychological entitlement ($B_{\text{simple}} = -0.25$, $p < 0.001$). Figure 5 shows the interaction plot.

4. Discussion

The mediation analysis revealed that adolescent proenvironmental behaviour was negatively associated with materialism, and that psychological entitlement significantly mediated the association between adolescent proenvironmental behaviour and materialism. Based on the theory of basic individual values (Schwartz *et al.*, 2012), we explained that adolescents who engaged in proenvironmental behaviour were likely to have self-transcendental values, which decreased materialism, a self-enhancement value. In addition, according to the social learning (Bandura, 1971) and social cognitive theories (Bandura, 2018), repeated proenvironmental behaviour can provide adolescents positive experience (Tezer and Bodur, 2020), which helps them to develop self-transcendence and restrain materialism.

The moderated mediation model showed that the negative association between proenvironmental behaviour and psychological entitlement was only significant for adolescents from higher family socioeconomic status. The reason for the results could be that the effect of proenvironmental behaviour on psychological entitlement weakened because stronger factors, such as social class, affected lower class adolescents' psychological entitlement.

4.1 Theoretical implications

First, previous studies rarely explored the individual belief or perception accounting for the negative association between proenvironmental behaviour and materialism (Gu *et al.*, 2020),

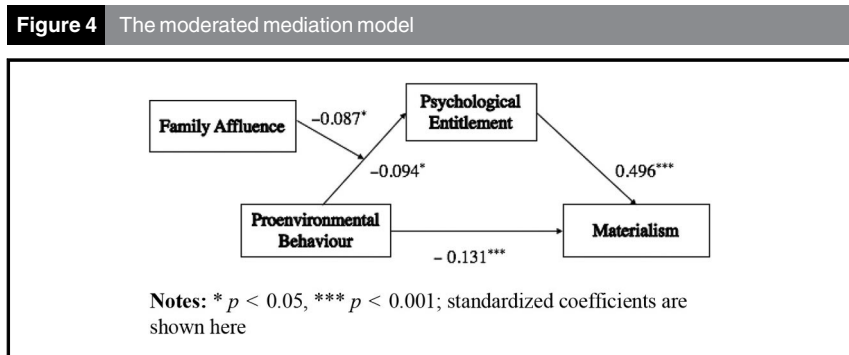
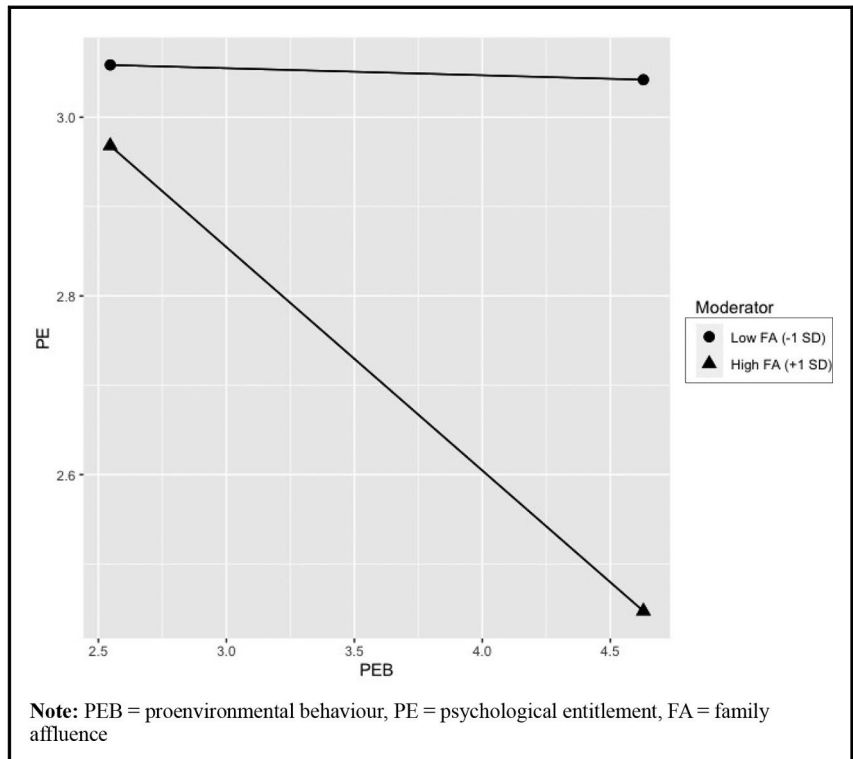


Figure 5 The interaction plot



and therefore, they were inadequate to explain why more proenvironmental behaviour could lead to less materialistic value. To fill this gap, we draw on the circular model of basic individual values (Schwartz *et al.*, 2012), social learning theory (Bandura, 1971) and the social cognitive theory (Bandura, 2018), adopting psychological entitlement, a belief reflecting the dark side of individual perception, to illustrate the negative relationship between proenvironmental behaviour and materialism.

Additionally, previous studies paid little attention to economic constraints in a family when examining antecedents of adolescent materialism (Felix and Almaguer, 2019; Zawadzka *et al.*, 2021), while materialism is a value closely related to money acquisition. Therefore, testing family socioeconomic status as a moderator to the current model helps to illustrate how economic factors influence adolescent materialism.

4.2 Practical implications

Practically, identifying the personal benefits of proenvironmental behaviour can motivate young people to act proenvironmentally by conveying that they may not always have to sacrifice self-interests (Griskevicius *et al.*, 2012), which not only factually reduces over-consumption but also attracts attention from young people towards the environment. At present, environmental education has laid too much emphasis on how much we can give rather than how much we can receive (Gleim *et al.*, 2013). Drawing from the previous (Kasser, 2017; Tezer and Bodur, 2020; Kang *et al.*, 2021) and current results, we conclude that adolescents can benefit from proenvironmental behaviour.

The current study is also significant for the environment because a reduction of adolescent materialism can decrease the increasing amount of products that young people consume (Buijzen, 2007), which factually alleviates the environmental burden. Moreover, as sustainable lifestyle is becoming a new trend that stimulates reputation and self-identification among young people (Griskevicius *et al.*, 2010; Fjeldstad, 2017; McNeill and Venter, 2019; Legere and Kang, 2020), encouraging young people into proenvironmental behaviour in the context of the trend creates a niche for environmental protection.

In addition, the current study can advise educational practitioners on alleviating adolescent materialism. Policy makers and schools can add more environmental practice to the curriculum and extracurricular activities to intervene adolescent materialism. For example, schools and organisations can encourage and organise students to collect their own products for charity, pick up trash in tourist sites, plant trees in urban areas or join a forest management game (Fritsche *et al.*, 2010). Proenvironmental behaviour as a strategy to shape adolescents' values and reduce materialism is financially viable in both economically advantaged and disadvantaged countries and areas. The specific activities can be created according to the economic and social conditions in various countries and cultures.

Lastly, the result that proenvironmental behaviour is negatively associated with psychological entitlement merely for adolescents with higher family affluence provides schools and health practitioners with practical suggestion. Psychological entitlement is a problematic belief that perplexes contemporary young people and brings about social problems to society (Grubbs and Exline, 2016). However, interventions to perception and belief have been challenging to practice. The current study suggests that encouraging adolescents from affluent family to engage in proenvironmental behaviour may help to decrease their psychological entitlement. This suggestion is particularly actionable because higher classed people are more likely than their lower classed counterparts to receive better environmental education, accept proenvironmental value and have more proenvironmental behaviour (Yan *et al.*, 2021).

4.3 Future directions

The current study provides insights into the study of eco-friendly luxury fashion trends in the context of the green campaign of luxury brands. From a traditional view, luxury brands encapsulate and advocate a materialistic lifestyle and are one of the culprits for materialism in the consumerist society. Eco-friendly luxury fashion seems to be a contradictory notion and luxury brands that promote green values have been suspicious of "greenwashing" (Du, 2015). However, luxury and fashion trends are socially constructed so that the definition and connotation of luxury are developing across time (Hemetsberger *et al.*, 2012). In the past centuries, owning more means more freedom (Veblen, 1912), whereas owning less releases modern consumers from emotional impediment (Kang *et al.*, 2021).

On the one hand, as the functions of luxury are changing from status manifestation to self-representation (Carrigan *et al.*, 2013), consumers become increasingly interested in what values the brands hold and promote. On the other hand, the fashion industry has become ever more concerned with consumers' demand for more sustainable consumption and has created new concepts, such as "buy less, buy better" and "slow fashion", in contrast with the "fast fashion" promoted by high-street retailers (Sun *et al.*, 2021). Therefore, luxury brands that are eco-friendly may no longer be a symbol of materialism and may appeal to consumers who are concerned with social topics.

Nevertheless, buying and owning any commercial products involve the possession and consumption of materials and resources. Research has found that even just living in wealthy neighbourhoods generates cravings for material consumption (Zhang *et al.*, 2016), indicating that materialist or consumerist reminders exist in the social surroundings; for example, the prevailing commercial campaign of luxury products can easily trigger material desires.

Therefore, although some luxury purchases are manufactured and sold as eco-friendly, owning too much of them could still become psychologically entitled and materialistic.

In addition, research has revealed that consumers tend to adopt green consumption as a strategy to exhibit high status and good reputation (Griskevicius *et al.*, 2010). This study suggests that luxury brands can provide consumers with a sense of luxury through promoting green lifestyle. In conclusion, future studies can illustrate whether psychological entitlement and materialism are associated with green luxury consumption.

5. Limitations

Although the current study provides implications, two limitations must be raised. Firstly, it is of remote likelihood to draw causal conclusions with regard to the cross-sectional nature of the current design. To remedy this limitation, we have run a competing model in the statistical analysis and found that the model with reversed dependent and independent variables is not significant. Still, a cross-lagged analysis on a longitudinal data would be more reliable to draw certain conclusions.

Secondly, as all the participants are from mainland China, the results could be different on samples from other cultural contexts. Given that the association between proenvironmental behaviour and materialism is not consistently negative (Evers *et al.*, 2018), we suggest that results may vary regarding different culture backgrounds. Specifically, the items of proenvironmental behaviour may reflect green lifestyle and green commitment in the western culture, whereas some items could merely show adolescents' frugal values that comply to the traditional Chinese admonition (Cheung *et al.*, 2003) – e.g. "I turn off TV and computer screens when they are not in use" and "I conserve energy and water by taking shorter showers". In that case, the negative association between proenvironmental behaviour and materialism may be better explained by the attitude towards saving money.

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Further reading

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Corresponding author

Meiting Liu can be contacted at: meiliu@utu.fi

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Love, authority and green lifestyle:
how filial piety beliefs influence adolescents' proenvironmental
behaviors.
Personality of Individual Differences

Love, authority and green lifestyle: a longitudinal study on how filial piety beliefs influence adolescents' proenvironmental behaviors

Liu Meiting¹

(1.Faculty of Social Sciences, University of Turku)

Author Note

Corresponding author: Liu Meiting

E-mail addresses for all authors:

Liu Meiting: meiliu@utu.fi

Permanent address: Assistentinkatu 7, 20500, Turku, Finland

ABSTRACT

Background and objectives: There is a lack of research on culturally specific family factors relating to adolescents' pro-environmental behaviors. Therefore, we aim to explore the potential relationships between adolescents' filial piety beliefs, a cultural factor distinctively existed in East Asian family, and their pro-environmental behaviors.

Procedures: We first made a preliminary analysis on a cross-sectional designed data and later tested the association again on a two wave longitudinal panel data. In the first data, a total of 791 student participants (M age = 13.72, SD age = 1.15) was included in this study after removing missing data and clerical errors. In the second data, a total of 1510 participants (M age = 13.29, SD age = 0.76) were taken in in the final analyses.

Results: The regression results revealed that filial piety, as a whole concept, was positively associated with PEB ($B = .37, p < .01$), which verified H1a. Separately, RFP was positively associated with PEB ($B = .22, p < .01$) and AFP was also positively associated with PEB ($B = .47, p < .01$).

The results of fixed effects model indicated that within individuals, both reciprocal ($B_{rfp} = 0.303^{***}, p < 0.001$) and authoritarian filial piety ($B_{afp} = 0.167^{***}, p < 0.001$) positively predicted proenvironmental behaviors. Moreover, a mixed-effects model revealed that, when gender was included as a moderator, the effect of reciprocal filial piety on proenvironmental behaviors was significantly positive ($B_{main_rfp} = 0.255^{***}, p < 0.001$), and the interaction of gender and reciprocal filial piety significantly predicted proenvironmental behaviors ($B_{interaction_rfp} = 0.199^{**}, p < 0.01$). Specifically, the positive impact of reciprocal filial piety on proenvironmental behaviors was stronger among male students ($B_{male} = 0.454^{***}, p < 0.001$) than female students ($B_{female} = 0.256^{***}, p < 0.001$). However, the interaction of gender and authoritarian filial piety did not predict proenvironmental behaviors ($B_{interaction_afp} = -0.020, p > 0.05$).

Implications: The current results offer insights into promoting sustainable lifestyles by examining the interplay between parents and children from a culturally specific perspective. This perspective particularly suggests strategies to encourage male adolescents to engage in more proenvironmental behaviors, given that they are generally less interested in a green lifestyle compared to their female counterparts.

Keywords: filial piety beliefs, pro-environmental behaviors, adolescents, family, gender.

1. Introduction

Research is increasing recently regarding adolescent pro-environmental behaviors, which include daily activities such as recycling home waste and saving energy resources. Given that adolescents realize these behaviors mostly in the family domain and that family influence is essential to adolescent life, many studies have examined family factors associated with adolescent pro-environmental behaviors, for example, parents' pro-environmental behaviors, proenvironmental attitudes and proenvironmental communication with their children (Casaló & Escario, 2016; Collado et al., 2019; Evans et al., 2018; Grønhøj & Thøgersen, 2009, 2012, 2017; Jia & Yu, 2021). Although existing studies have explored family influences on children's pro-environmental behaviors, the majority of them were sampled on WEIRD (Western, Educated, Industrialized, Rich, and Democratic, Henrich et al., 2010), where environmental education is advanced and everyday green actions are part of their local social norms. Furthermore, there is evidence supporting that findings regarding pro-environmental behaviors in WEIRD and non-WEIRD cultures are different. For example, a cultural comparison study has revealed that older Chinese people, who are more aware of social norms, have less pro-environmental behaviors than younger people, while the same association is not significant in a Canadian sample (Krettenauer et al., 2020).

On the other hand, although some environmental studies have touched on the cultural differences, most of the studies did cultural comparison and tested the different influence of general factors in different cultures (e.g., Krettenauer et al., 2020). There is still a lack of research in culturally different factors relating to pro-environmental behaviors. Therefore, in this study, we aim to explore the potential relationships between adolescents' pro-environmental behaviors and their filial piety, which is a cultural factor distinctively existed in East Asian family.

1.1. Filial Piety and Proenvironmental Behaviors

Parents are regarded as primary agents of children's socialization (Bronfenbrenner et al., 2000; Maccoby & Eleanor, 1992). Specifically, parents' green concern and normative practices may directly affect those of adolescents (Collado et al., 2019; Jia & Yu, 2021), suggesting parents' vital influence on children's proenvironmental behaviors. However, how much children internalize parents' influence may depend on how much importance they attach to parents' views, which may be linked to how children perceive their roles in the family. Cultural studies reveal that children from different cultural contexts may hold different opinions of their roles in the family (Smetana, 2000). For instance, children from East Asian societies tend to recognize their subordinate roles in the family because they generally hold filial piety belief, which prompts them to care for and obey their parents (Yeh & Bedford, 2003).

Deriving from Confucius scriptures, filial piety originally serves to be a regulatory doctrine for children to behave properly towards their parents in ancient China (Yeh & Bedford, 2003). As the dominating and enduring Confucianism extend its influence to the modern Chinese society, filial piety still counts for many Chinese people. Individuals who hold filial piety beliefs are likely to hold values that either acknowledge tradition and conformity or upholds care and benevolence (Wei & Liu, 2022). Around the circular motivational continuum of the theory of basic individual values (Schwartz et al., 2012), both tradition and conformity and care and benevolence are

arranged under social focus, which contrasts personal focus. This positioning suggests that individuals who hold those values are generally concerned with interests of other people or established institutions (Schwartz et al., 2012).

People who frequently engage in pro-environmental behaviors are inclined to hold values featuring a concern with the nature, which is also classified as social focus values in the circular model (Schwartz et al., 2012). Furthermore, literature indirectly support the argument that environmentalists generally care about other-focused or group interests. For instance, Griskevicius et al. (2012) argue that an impediment to a sustainable planet is human beings' evolutionary propensity for individual interest, because the self-serving grab for limited natural resources by excessive population is considered to be the culprit of environmental deterioration. Thereby, we propose,

H1a: Filial piety as a whole concept is positively associated with pro-environmental behaviors.

H1b: Reciprocal filial piety is positively associated with pro-environmental behaviors.

H1c: Authoritarian filial piety is positively associated with pro-environmental behaviors.

1.2. Gender difference

We assume that the association between RFP and PEB is moderated by gender. That is, the effect is stronger among male participants than among female participants. Participants score higher in RFP often emphasize values such as care and benevolence. These attributes overlap with female gender roles (Wood & Eagly, 2012). Due to those socially constructed roles, female students tend to care and love their parents than their male peers. However, this gender difference might not exist in the association between AFP and PEB, as obeying authority is not consistent with either masculine or feminine social roles.

2. Methods

2.1. Participants and Procedures

2.1.1. Data I

We first made a preliminary analysis on a cross-sectional designed data and later tested the association again on a two wave longitudinal panel data.

For the first data, we recruited secondary school students from three schools using convenience sampling. Two schools are from the city, Xinyang and one school is from the city, Zhengzhou. A total of 791 student participants ($M_{age} = 13.72$, $SD_{age} = 1.15$) was included in this study after removing missing data and clerical errors. The sample comprises 378 (47.8%) girls and 413 (52%) boys, and 456 (57.6%) 7th graders, 131(16.6%) 8th graders, and 197 (24.9%) 9th graders. Most respondents are from the 7th grade because the higher graders must prepare for the high school entrance exam and most of them were not willing to take part in the survey.

We obtained permissions to conduct this survey from the ethics committee in Xinyang Normal University, the student respondents, and the students' parents. The study was conducted in

respondents' classroom and instructed by two undergraduates who are studying psychological and educational sciences. At the beginning of the survey, the students were instructed to understand the survey procedure, the scientific and confidential use of their answers, and their right to discontinue during the survey. The study is part of a project aiming at examining adolescents' green attitudes and behaviors and their interpersonal relationships with others. The selected variables included participants' demographic variables, filial piety beliefs, and proenvironmental behaviors. In the end, the participants were left a few minutes to confirm no blanks.

2.1.2. Data II

The data was collected from two randomly selected secondary schools in central China, Henan province. In the first school, our participants consist of nine classes from the eighth grade and seven classes from the ninth grade. In the second school, six classes of seventh-grade students and six classes of eighth-grade students participated in the survey. We adopted convenience sampling to collect data from adolescent students. The first wave was collected in September, 2022, receiving data from a total of 1727 participants. The second wave was collected in February, 2023 in which 1681 questionnaires in total were received. We obtained the final data only from participants who participated in both waves, which was 1627 in total.

We incorporated a total of 1510 participants, focusing solely on the items we needed while addressing the missing data and typographical errors. In this sample, 767 (50.7%) students are girls and 743 (49.3%) are boys. Most students are around 13 years old (727) or 14 years old (507). The age was in the range of 11 -16 years old (M age = 13.29, SD age = 0.76).

2.2. Measures

Filial piety beliefs. We assess participants' level of filial piety belief with the Filial Piety Belief Scale, which encompasses two dimensions—reciprocal and authoritarian filial piety (Yeh & Bedford, 2003). Each dimension has five items. Correspondingly, the reciprocal filial piety was rated by items such as “Take care of my parents when they are ill”. The authoritarian filial piety includes items such as “Give up my interests and hobbies to meet my parents' aspirations”. A 5-point Likert scale (1 = totally not agree, 5 = totally agree) was used to calculate the answers. In previous studies, the scale showed good reliability on East Asian samples (Jin et al., 2019; Leung, 2020; Tan et al., 2018; Yeh, 2006; Yeh & Bedford, 2003). In Data I, the Cronbach α coefficients were .89 for reciprocal and .76 for authoritarian filial piety. In Data II, for the first wave, the Cronbach α coefficients were .82 for RFP and .74 for AFP; for the second wave, the Cronbach α coefficients were .88 for RFP and .78 for AFP. All of the coefficients showed great internal consistency.

Proenvironmental behaviors. An adapted measurement of proenvironmental behaviors was adopted based on Krettenauer (2017)'s questionnaire and the questionnaire from a study with a Chinese adolescent sample (Wang et al., 2020). Participants read six items that includes, for example, “I conserve energy and water by taking shorter showers” and “I prefer buying products made from recyclables (e.g., notebooks made of used papers).” Then participants were instructed to evaluate their frequency of these actions in the last year on a 5-point Likert scale ranging from 0 (never do this) to 5 (always do this). In Data I, the Cronbach's α coefficient was .83, indicating

good reliability. In Data II, for the first wave, the Cronbach α coefficients was .84; for the second wave, the Cronbach α coefficient was .87. All of the coefficients demonstrated great internal consistency.

2.3. Statistical procedures

We conducted the statistical analyses using RStudio (Version 1.4.1106). The reliability check, descriptive statistics and correlations were output by running the function `alpha()` from `psych` package and `apa.cor.table()` from `apaTables` package. To analyze Data I, we conducted regression models by running `lm()` from basic R and we used `apa.reg.table()` to output a regression table. In the analyses of Data II, building fixed effects model required function `plm()` from the package `plm`. Constructing random effects model required function `lmer()` from the package `lme4`. The table of the results was output by calling the package `sjPlot` and using the function `tab_model()`. To visualize the interaction effect, we adopted the function `plot_model()` from the package `sjPlot`.

3. Statistical analysis and results

3.1. Data I

3.1.1. Descriptive and Correlational Analyses

Table 1 presents the means, standard deviations, correlation coefficients and statistical significance for all variables of interest. As predicted, reciprocal filial piety belief, authoritarian filial piety belief, proenvironmental behaviors were significantly correlated, which implied potential tests on regression models.

3.1.2. Regression Analyses

The regression results revealed that filial piety, as a whole concept, was positively associated with PEB ($B = .37, p < .01$), which verified H1a. Separately, RFP was positively associated with PEB ($B = .22, p < .01$) and AFP was also positively associated with PEB ($B = .47, p < .01$). The detailed results were illustrated in Table 2. However, the expected interaction between gender and RFP was not found.

Table 1

Means, standard deviations, and correlations with confidence intervals

Variable	<i>M</i>	<i>SD</i>	1	2	3	4
1. Gender	1.49	0.50				
2. FP	21.49	4.27	-.02 [-.09, .05]			
3. RFP	21.49	4.27	-.02 [-.09, .05]	1.00** [1.00, 1.00]		
4. AFP	12.27	4.80	-.13** [-.20, -.06]	.24** [.17, .30]	.24** [.17, .30]	
5. PEB	21.38	5.81	-.06 [-.13, .01]	.27** [.21, .34]	.27** [.21, .34]	.34** [.28, .40]

Note. FP = filial piety, RFP = reciprocal filial piety, AFP = authoritarian filial piety, * indicates $p < .05$. ** indicates $p < .01$.

Table 2

Predictor	<i>b</i>	<i>b</i> 95% CI [LL, UL]	<i>beta</i>	<i>beta</i> 95% CI [LL, UL]	<i>sr</i> ²	<i>sr</i> ² 95% CI [LL, UL]	<i>r</i>	Fit	Difference
(Intercept)	13.40**	[11.38, 15.43]							
FP	0.37**	[0.28, 0.46]	0.27	[0.20, 0.34]	.07	[.04, .11]	.27**		
								<i>R</i> ² = .074**	
								95% CI [.04, .11]	
(Intercept)	11.10**	[9.09, 13.11]							
RFP	0.22*	[0.05, 0.39]	0.16	[0.04, 0.29]	.01	[-.00, .02]	.27**		
AFP	0.47**	[0.22, 0.72]	0.39	[0.18, 0.59]	.02	[-.00, .03]	.34**		
I(RFP * Gender)	0.04	[-0.06, 0.13]	0.08	[-0.12, 0.28]	.00	[-.00, .00]			
I(AFP * Gender)	-0.08	[-0.24, 0.08]	-0.12	[-0.37, 0.12]	.00	[-.00, .01]			
								<i>R</i> ² = .156**	ΔR^2 = .082**
								95% CI [.11, .20]	95% CI [.05, .12]

Note. FP = filial piety, RFP = reciprocal filial piety, AFP = authoritarian filial piety, * indicates $p < .05$. ** indicates $p < .01$.

3.2. Data II

3.2.1. Fixed effects models

We conducted two separate fixed effect models to understand the effects of RFP and AFP on PEB. Fixed effects models could estimate within-individual differences between the predictors and the outcome variable. Here we take the first fixed effects model, RFP on PEB, as an example and elaborate on the model building process. The regression equation can be written as:

$$y_{it} = b_{0i} + b_1 x_{it} + u_{it} \quad (1)$$

where x is the predictor variable, RFP, and y is the outcome variable PEB, i refers to each individual and t refers to each time point. For each individual, b_0 serves as the intercept, representing the baseline of PEB when the predictor, RFP, is not taken into account; b_1 represents the slope, a growth rate determining how much PEB changes as RFP changes; u_{it} is the error term. In a fixed effects model, we allow intercepts b_{0i} to be constants yet unique for each individual while assuming that the slope b_1 remains consistent across individual and time.

The results of the fixed effects model indicated that, within individuals, the variance of RFP positively predicted the variance of PEB ($B = 0.303$, CI [.215, .392], $t = 6.733$, $p < 0.001$). Additionally, the change of AFP positively predicted the change of PEB ($B = 0.167$, CI [.106, .227], $t = 5.415$, $p < 0.001$). More specific information can be found in Table 3.

3.2.2. Mixed effects model

The fixed effects model focuses on examining within-individual differences through a procedure that ignores any between-individual differences. However, to explore whether there are individual differences on the association between RFP and PEB, we need to relax some of the fixed effects and allow the intercepts and slopes to vary randomly. This approach, which accounts for both fixed and random effects, is known as the mixed-effects model (Bliese et al., 2018). To justify a mixed effects modelling, we must have reasons to believe that the observed differences are due to between-individual variances, rather than merely random errors. Correspondingly, we compared the $-2\log$ likelihood values of a model with only a random intercept and a model with a random intercept and random slope (Bell et al., 2019). The results indicated that the model with

both a random slope and a random intercept resulted in a better fit (L.Ratio = 14.68, $p < 0.00$). The results call for a further exploration of potential between-individual factors.

Following this, we developed a mixed-effects regression model. The level-1 model examined within-individual variations in the relationship between RFP and PEB, while the level-2 model explored between-individual differences, which included the interaction effect of gender and RFP on PEB (Laird & Ware, 1982). Level-1 model can be represented as the equation:

$$y_{it} = b_{0i} + b_{1i}x_{it} + u_{it} \quad (2)$$

When we let the intercepts random, level-2 models are:

$$b_{0i} = \beta_{00} + \beta_{01}m_i + \varepsilon_{0i} \quad (3)$$

$$b_{1i} = \beta_{10} + \beta_{11}m_i \quad (4)$$

where m_i is the level-2 moderator, gender, which indicates that the change in slope of y (PEB) on x_{it} (RFP), given a unit change in m_i , is represented by b_{1i} .

By substituting equations (3) and (4) into equation (2), we gain:

$$y_{it} = \beta_{00} + \beta_{01}m_i + \varepsilon_{0i} + (\beta_{10} + \beta_{11}m_i)x_{it} + u_{it} \quad (5)$$

By rearranging equation (5), the equation becomes:

$$y_{it} = \beta_{00} + \beta_{01}m_i + \beta_{10}x_{it} + \beta_{11}m_ix_{it} + (\varepsilon_{0i} + u_{it}) \quad (6)$$

The terms outside the brackets represent the fixed effects, while those inside the brackets denote the random effects. The random error terms are distributions with a mean of zero and variances of $\sigma_{\varepsilon_{0i}}^2$ and $\sigma_{u_{it}}^2$, following the assumption that they are uncorrelated with each other.

To perform a simple slope test (Aiken et al., 1991), we first transform equation (6) into the expected regression equation by removing the error terms, then rearrange the terms into the following formation:

$$\hat{y}_{it} = (\beta_{00} + \beta_{01}m_i) + (\beta_{10} + \beta_{11}m_i)x_{it} \quad (7)$$

Different values of m_i can be substituted into the equation (7) to estimate specific simple slopes for \hat{y}_{it} regressed on x_{it} . It is common practice to define a higher level of m_i as one standard deviation above the mean ($m_i = +1 SD$) and a lower level of m_i as one standard deviation below the mean ($m_i = -1 SD$). Following the common practice in moderation analysis (Hayes, 2017), the independent variables should be centralized or standardized so that the coefficient of x_{it} or m_i can be interpreted as the effect of that variable on y at the mean level of the other independent variable.

The results of the mixed effects model indicated that, when considering the between individual variable, gender, RFP positively predicted PEB ($B = 0.255$, CI[.162, .348], $t = 5.39$, $p < 0.001$). Additionally, the interaction of gender and RFP positively predicted PEB ($B = 0.199$, CI[.072, .325], $t = 3.076$, $p < 0.01$). The results indicate that the effect of RFP on PEB is stronger among male participants than female participants. More specific information can be found in Table 3.

Moreover, the results of the simple slope test (Aiken et al., 1991) showed that the effect of RFP on PEB is stronger among male adolescents (estimate = 0.45, CI[.375, .541], $t = 10.35$) than female adolescents (estimate = 0.26, CI[.166, .348], $t = 5.39$). The results indicate that the variation in level-1 slopes across individuals can be explained by gender differences. For visual comparison, the interaction effects was illustrated in fig.1.

Table 3

Predictors	PEB(fixed effects model I)				PEB(fixed effects model II)				PEB(mixed effects model)			
	Estimates	CI	Statistic	p	Estimates	CI	Statistic	p	Estimates	CI	Statistic	p
RFP	0.303 ***	0.215 - 0.392	6.733	<0.001					0.255 ***	0.162 - 0.348	5.390	<0.001
AFP					0.167 ***	0.106 - 0.227	5.415	<0.001	0.099 **	0.034 - 0.164	2.964	0.003
(Intercept)									2.164 ***	1.730 - 2.598	9.777	<0.001
Gender [Male]									-1.000 ***	-1.588 - -0.412	-3.334	0.001
Gender [Male] × RFP									0.199 **	0.072 - 0.325	3.076	0.002
Gender [Male] × AFP									0.020	-0.066 - 0.105	0.453	0.651
Random Effects												
σ^2									0.55			
τ_0									0.37 _{ID}			
ICC									0.40			
N									1453 _{ID}			
Observations	2906				2906				2906			
R ² / R ² adjusted	0.030 / -0.940				0.020 / -0.961				0.067 / 0.440			

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

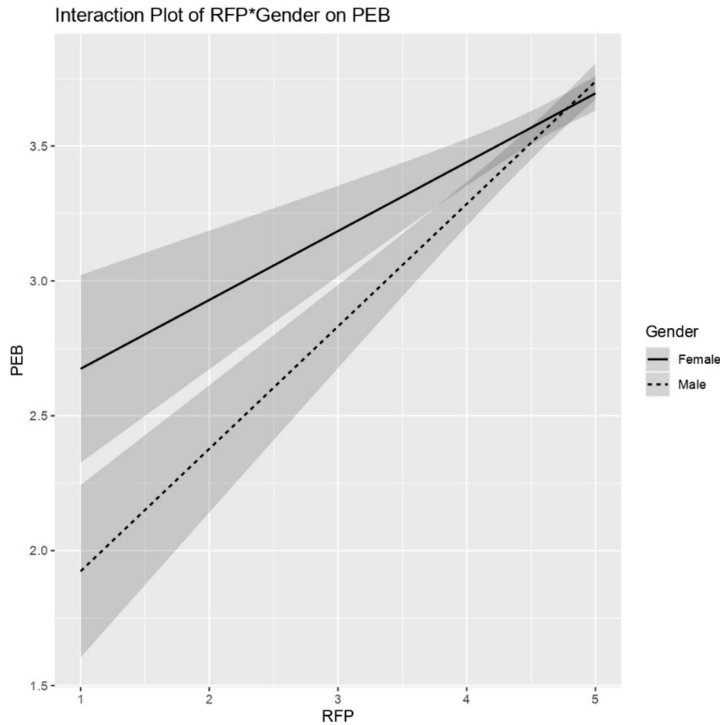


fig.1

4. Discussion

Family influence is commonly considered a vital component in developing healthy lifestyle and appropriate consumer behaviors during adolescence (e.g., Chaplin & John,

2010; Richins & Chaplin, 2015). Despite a rich body of adolescent consumer studies in relation to family factors, an attention to those who live outside western and wealthy countries is much needed (Henrich et al., 2010). Family interactions in East Asia are dissimilar to those in western countries in view of how important the role each member plays in a family. Compared to children-centered educational culture prevalent in western society, parents-centered culture is widely shared among East Asian society, conveying the belief that children take up as junior roles in a family (Yeh & Bedford, 2003). As this belief, known as filial piety, deeply affects how Chinese people think and make decisions, we presume that filial piety belief may be associated with adolescent pro-environmental behaviors, which was substantiated by the current statistical results. The following text will give more specific discussions about the implications of the current study.

4.1. Two types of filial piety and their relationships with pro-environmental behaviors

Yeh and Bedford (2003) identified two types of filial piety with different connotations. Reciprocal filial piety is a belief that better adapts to modern society, advocating children's love and care for parents. Authoritarian filial piety, however, is more of a remnant of traditional disciplines, regulating children's behaviors to conform to parents' will. Interestingly, our results revealed that both two types of filial piety directly and positively predicted adolescent pro-environmental behaviors.

In line with the theory of basic individual values (Schwartz et al., 2012), the two types of filial piety reflect social-focused values, which agree with proenvironmental values, the values that environmentalists usually hold. The positive impact of reciprocal filial piety on adolescent pro-environmental behaviors supports a previous finding that how individuals treat their parents is significantly associated with how they treat others (Wei & Liu, 2022). Nevertheless, the positive association between authoritarian filial piety and pro-environmental behaviors is less intuitively explainable than the former. In fact, many previous studies have shown that authoritarian control and regulations are more effective than moral encouragement in promoting green practice. For example, many governments have to start environmental reformation with plastic bags banning orders after long years of inconsequential oral advocacy (Gonzalez-Arcos et al., 2021). This situation may result from human beings' evolutionary-based resistance to sustainable lifestyle, largely due to a focus on self-interests, shortsightedness, following the crowd, etc. (Griskevicius et al., 2012). Thus, the current result provides insights to promoting sustainable lifestyle by confirming that authoritarian measures are still practical.

4.2. Gender difference

The findings on the interaction effects of gender provide a potential strategy to motivate men and boys to engage more in PEB. Although boys may engage in less PEB than girls due to perceiving it as feminine, they are unlikely to reject practicing filial piety, as it is a core principle in Chinese

families. Since the positive effect of RFP on PEB is stronger among boys than girls, fostering boys' RFP may be a more effective approach than directly encouraging them to engage in PEB.

A bulk of research records have showed that men are more reluctant than women to adopt PEB (see a short literature review in Brough et al., 2016). Researchers have attributed the gender differences of PEB to women's preference for altruistic values (Dietz et al., 2002), stronger sense of social responsibility and moral orientation towards caring for other people (Zelezny et al., 2000), inclination to sacrifice present gratification for future rewards and more conscientiousness (Zimbardo & Boyd, 1999), more concern for environmental safety (Davidson et al., 1996) and the green-feminine stereotype that discourage men from adopting values and behaviors towards PEB (Brough et al., 2016).

Deeply influenced by Confucianism, the typical family structure in traditional Chinese society was characterized by the central role of absolute male authority. This served as a cultural foundation for hegemonic masculinity, which continues to hold significant influence in modern society (Ma et al., 2021). Although the Chinese concept of masculinity might seem somewhat softer than its Western definition, both of the two aspects (Louie, 2014)— *Wen* (cultural attainment) and *Wu* (physical prowess)— emphasize men's personal achievement.

According to the stereotype content model, traditional or stereotypical feminine traits—such as love, benevolence, and care for others—are categorized under the dimension of warmth, while traditional masculine traits—such as assertiveness, perseverance, and physical strength—fall under the dimension of competence (Fiske, 2010). Therefore, during boys' gender socialization, there is a tendency to encourage male children and adolescents to prioritize developing competence, sometimes even at the expense of suppressing altruistic motivations that generally reflect warmth — just because these are often considered feminine traits. Specifically, the stereotype that associates altruism towards nature with femininity may hinder boys' PEB (Brough et al., 2016). However, our study proposes a more gender-neutral approach for boys to develop their relationship with a greener lifestyle.

4.3. Future directions

Although filial piety is a distinct cultural phenomenon in East Asian societies, there are some similar concepts in other cultural setting that illustrate how children perceive their roles in the families. For example, RFP shares similarities with love for parents and AFP overlaps with adolescents' beliefs about the legitimacy of parental authority to some extent (Cumsille et al., 2009). Researchers can explore how these variables are associated with PEB. Moreover, researchers today have extended the concept of filial piety to samples in cultural contexts beyond East Asia, including countries like Poland and the United States (Różycka-Tran et al., 2021; Lim et al., 2022). This also suggests that our current research can be applied to and tested with individuals from other cultural backgrounds.

Researchers can also examine influential mechanisms to explain why filial piety beliefs affect PEB. For example, moral identity can be an explanation. Children who unconditionally obey their parents may strictly follow parents' moral discipline such as frugality, honesty and kindness (Aquino & Reed II, 2002). Those who have benevolent moral identity may participate in more PEB.

5. Limitations

Despite the above implications, the current study still has limitations that should be presented. First, we failed to construct causal relationships between the studied variables due to the cross-sectional design. It is possible that adolescents who habitually engage in proenvironmental behaviors have more affection for parents or are keen to follow parents' orders. However, given that filial piety is a deep-rooted belief originating from traditional Chinese culture, most children are indoctrinated with this belief from an early age, possibly younger than they receive proenvironmental attitudes. Therefore, the influencing direction is more likely to be the one in the current study than the alternative one. Nonetheless, longitudinal design will add more reliability to the results.

Second, the sample was limited because of the single cultural background. Although filial piety belief is prevailing among many East Asian regions, the impact degree and the detailed content of the belief may differ. Additionally, adolescent materialism and proenvironmental behaviors are heavily influenced by the economic, educational and social conditions, these factors definitely vary across East Asia.

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