

Article

Bridging the Intention–Behavior Gap in Green Housing Purchasing Evidence from China: The Moderating Effect of Environmental Concerns and Green Trust

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Abstract

Promoting green housing (GH) on a large scale is essential for advancing urban sustainability and improving quality of life. However, prior research often equates purchasing intentions with actual behavior, overlooking the intention–behavior gap, which limits the effectiveness of market strategies and policies aimed at stimulating GH consumption. This study investigates whether such a gap exists in GH purchasing and explores ways to narrow it. Grounded in the Theory of Planned Behavior and extended with environmental concern and green trust, the research model was tested using survey data from 450 potential homebuyers in Shandong Province, China. Results confirm a significant intention–behavior gap in GH consumption. Notably, green trust positively moderates this gap, whereas environmental concern shows no significant moderating effect. These findings underscore that, from a sustainable urban development perspective, enhancing consumer trust in green housing can effectively promote actual purchasing behavior and support wider adoption of green buildings. The study offers valuable insights for policymakers designing interventions to bridge the intention–behavior gap and further environmental sustainability in cities.

Keywords: green housing; sustainable cities; theory of planned behavior; intention–behavior gap

1. Introduction

The Architecture Engineering and Construction (AEC) industry in China has experienced rapid expansion over the past few decades, accompanied by significant resource consumption [1–3]. This growth has also resulted in substantial carbon emissions, contributing to an intensified greenhouse effect [4]. According to the United Nations Environment Programme report [5], energy-related CO₂ emissions from buildings accounted for 37% of the global total in 2020. China's building sector contributed 50.9% of the national carbon emissions in 2020. Within this, building operational emissions accounted for 21.7% of the national total. Residential buildings were responsible for nearly 60% of these operational emissions, representing approximately 13.4% of China's total carbon output. This makes the residential sector a significant and distinct contributor to the national carbon footprint [6]. Within the framework of sustainable urban development, green building (GB) is regarded as an innovative approach to mitigate the greenhouse effect within the AEC industry [7], aiming to reduce carbon dioxide emissions by approximately 20.0% throughout its lifecycle [8]. Therefore, the widespread promotion of GB is crucial not only



Academic Editor: Mark Gillott

Received: 31 December 2025

Revised: 6 February 2026

Accepted: 12 February 2026

Published: 19 February 2026

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for achieving ambitious targets related to global carbon neutrality and peak emission levels, but also for advancing the goals of sustainable cities and communities.

The Chinese government has actively promoted green buildings (GB) [9]. It has established relevant standard systems. Key standards include the Green Building Evaluation Standard (GB/T 50378-2019) [10], the Assessment Standard for Healthy Building (T/ASC 02-2021) [11], and the Technical Standard for Nearly Zero Energy Buildings (GB/T 51350-2019) [12]. The government has also implemented administrative regulations and incentive policies to encourage GB practices [13]. Despite these efforts, the overall market penetration of GB remains limited [14]. China's Green Building (GB) Label is a four-tier certification system (Basic, One-Star, Two-Star, Three-Star). Star ratings are determined by a comprehensive scoring system across multiple performance categories. The Three-Star level requires the highest score and most stringent criteria, representing the top performance tier. Notably, green housing (GH), as the largest GB market segment [13,15], sees only about 14.9% of its products achieving this Three-Star designation [16]. Recent studies on China's housing market further indicate that the economic value of "greenness" in second-hand housing transactions is becoming increasingly significant, suggesting a growing market recognition of GH benefits [17]. In the long-term, fostering a mature GH market becomes crucial in attracting both demand-side and supply-side participants voluntarily [18]. Concerning the demand side of GH, consumer purchasing behavior plays an essential role in stimulating market activities [7], and has garnered considerable interest from domestic and international scholars. From an urban sustainability perspective, promoting green housing uptake is directly linked to realizing low-carbon, resource-efficient, and healthy living environments in cities.

Previous research has examined the public's attitude and intention to purchase GH in relation to socio-demographic characteristics [19] and individual psychological factors [1], as well as environmental knowledge and its influence through constructs like moral obligation [20], as well as product characteristics [19]. However, most of these studies primarily focused on purchasing intention or equated it with purchase behavior without considering the disparity between them. Although intention serves as a valuable reference point for predicting an individual's actual behavior [21], consumers' actual green purchasing behavior does not always align with their intentions [22,23]. For instance, one study found that only 30% of UK consumers translated their concerns into purchasing intentions and merely 3% made ethical product purchases [24]. In other words, the effective transformation of purchasing intention into actual behaviors may be limited [25]. The existence of an intention-behavior gap has been confirmed in various domains such as green consumption [22], new energy vehicle purchasing [26], e-waste recycling [27], energy-saving refrigeration appliances [28], and household-waste classification [29]. Similarly, GH is also considered as one of the typical environmentally friendly products. If a discrepancy exists between purchasing intention and behavior, it is imperative to adapt the corresponding guiding policies in order to facilitate widespread adoption of GH [30] and accelerate the transition toward sustainable urban habitats. However, there is currently a dearth of research addressing the gap between purchasing intention and behavior specifically in relation to GH within the context of sustainable urban development.

The Theory of Planned Behavior (TPB) is widely recognized as a robust model for elucidating consumers' purchase intentions and behavior within the domain of consumer behavior [31]. Research in sustainable tourism has successfully extended TPB by incorporating green marketing tools and motives to explain purchase intention, demonstrating the framework's adaptability across contexts [32]. However, the traditional TPB theoretical framework, in which behavioral intentions are affected by subjective norms, attitude, and perceived behavioral control, falls short in explaining the transformation from behavioral

intentions to actual behavior [28,33]. To bridge this intention–behavior gap, several moderators have been proposed by scholars [7,34,35]. For instance, Hua and Dong [33] suggested that a heightened sense of environmental responsibility can facilitate the translation of individuals’ intentions to recycle courier packaging into concrete actions. Recent work focusing on Generation Z also highlights the critical role of environmental responsibility in translating sustainable attitudes into action [36]. Similarly, Sultan et al. [37] found that satisfaction and trust play a pivotal role in bridging the intention–behavior gap among Australian consumers when purchasing organic food.

In the context of GH and its role in sustainable cities, it is crucial to consider environmental concern and green trust when explaining the intention–behavior gap. Green trust, defined as a consumer’s willingness to rely on a product or brand based on its perceived environmental credibility and performance, serves as a critical psychological mechanism that reduces uncertainty in high-involvement sustainable purchases [38]. Empirical research demonstrates that green trust significantly mediates the relationship between environmental attitudes and pro-environmental behavior [39], while also directly enhancing green purchase intention in the housing sector [40]. The absence of such trust, particularly when eroded by greenwashing practices, can substantially weaken consumers’ motivation to act upon their positive intentions [41,42].

Concurrently, environmental concern represents an individual’s cognitive and affective engagement with ecological issues. This psychological construct functions as another pivotal moderator in the intention–behavior relationship. Consumers with heightened environmental concern tend to attribute greater value to the pro-environmental attributes of GH [7], thereby amplifying the motivational force behind their purchase intentions. This increased valuation can strengthen how attitudes translate into behavioral intentions [43,44] and enhance persistence in overcoming practical barriers [45]. External factors such as perceptions of environmental uncertainty may further intensify this concern, adding complexity to the decision-making process [46].

These moderators were selected based on their theoretical relevance in explaining the psychological transition from intention to action, unlike demographic variables that primarily influence access rather than motivation. Environmental concern provides the foundational motivation for considering GH, while green trust determines whether this motivation evolves into confident action [39,43]. Their inclusion is substantiated by the extensive literature examining sustainable consumption patterns [47,48], green marketing effectiveness [49,50], and the attitude–behavior gap [51,52]. Together, they offer a coherent framework for understanding the conditions under which green-housing purchase intentions are more likely to convert into actual behavior.

As mentioned above, there are several research gaps that need to be addressed in the context of GH consumption and sustainable urban development: (1) Is there an intention–behavior gap in GH consumption? (2) If such a gap exists, how can it be effectively bridged between purchase intention and behavior? To address these questions, we establish a theoretical framework based on the TPB model, using potential residential purchasers in Shandong Province as an example. We introduce two moderating factors—green trust and environmental concern—to empirically test the intention–behavior gap. It is expected to make three contributions to theory and practice. Firstly, it fills the research gap regarding the intention–behavior disparity in GH consumption by effectively converting purchase intentions into actual behaviors and promoting widespread adoption of GH practices. This is essential for scaling up green housing as a key component of sustainable urban infrastructure. Secondly, within the context of GH consumption, our extended TPB model incorporates additional constructs between intention and behavior to enhance its explanatory power. This can provide new insights into bridging the intention–behavior gap

in GH consumption. Finally, this research not only expands our understanding of the influencing mechanisms behind GH purchase decisions but also offers practical guidance for governments and urban planners seeking to promote sustainable consumer behavior and foster green, livable cities. This provides new insights into bridging the intention–behavior gap in GH consumption in support of sustainable urban transitions.

2. Theoretical Framework and Hypotheses

2.1. Extending the Theory of Planned Behavior

In 1991, Ajzen [53] formally proposed TPB (theory of planned behavior, TPB) which integrates the variable of perceived behavioral control into rational behavior theory. This theoretical model is widely recognized for explaining individuals' decision-making process regarding their behaviors. According to this theory, attitudes, subjective norms, and perceived behavioral control serve as antecedents to intentions, subsequently influencing actual behavior [27]. The theory of planned behavior was employed in various domains such as elucidating consumers' green-consumption intention and behavior [54], exploring green-consumption practices [22], understanding new energy vehicle purchases [26], investigating e-waste recycling behaviors [27], examining the adoption of energy-saving electrical appliances [28] as well as studying household garbage classification practices [29]. TPB is particularly suited for explaining complex, high-involvement decisions such as housing purchases, due to the significant financial commitment, long-term implications, and emotional attachment involved. Its applicability in the green-housing context has been demonstrated in empirical studies conducted in both China [55] and other international markets [56]. These studies have consistently demonstrated its robust explanatory power. Further extensions in the marketing literature explore how specific tools like brand anthropomorphism and advertising appeals interact with consumer traits to influence green intentions, showcasing the model's continued relevance and adaptability [57].

However, the applicability of the TPB in explaining the discrepancy between intention and behavior in green consumption has been questioned over the past decades [35,58]. Some scholars have expanded upon the traditional TPB model by introducing additional constructs to bridge this intention–behavior gap [7,34,35]. In the context of GH, particular attention should be given to green trust and environmental concern as explanatory factors for GH consumption behavior. When consumers possess a high level of trust in GHs, they are more inclined to choose them due to their perceived superior environmental performance, quality, and health benefits [7]. Furthermore, heightened environmental concerns among consumers lead to a greater preference for green products including GHs since they offer environmentally friendly design features and energy-efficient building materials [26,59]. The stronger their environmental concern is, the higher their willingness and behavioral inclination towards purchasing GHs become. Consequently, this study proposes a conceptual model based on an extended TPB framework that aims at addressing the behavioral gap in GH purchase intentions while exploring how environmental concerns and green trust moderate this intention–behavior relationship. Figure 1 presents the research model.

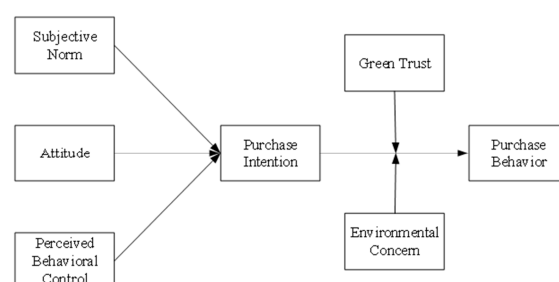


Figure 1. GH purchasing intention–behavior gap theory model.

2.2. Research Hypothesis

2.2.1. Subjective Norms for Purchasing GH

According to Ajzen [53], subjective norms pertain to the social pressures experienced by individuals when engaging in a specific behavior. When influential individuals believe that something should be done, individuals feel compelled by normative beliefs and motivated to comply, thus fulfilling the expectations of others and society [60]. Individuals with strong subjective norms are more susceptible to social pressures and inclined to modify their behavioral choices based on the advice of their surroundings [61]. Consequently, the greater the subjective norm is, the more profound its impact on the decision-making. Previous studies examining individual green environmental behaviors such as waste separation [61], sustainable clothing [21], and electric vehicles [62] have found that subjective norms significantly contribute to individual behavioral intentions. Similarly, subjective norms positively influence consumers' intentions to purchase green homes among Chinese consumers who also consider the thoughts and suggestions of trusted family members, relatives friends and social groups when making such decisions [13]. Therefore, we hypothesize the following:

H1. *Subjective norm has a positive impact on purchase intention for GH.*

2.2.2. Attitude Toward Purchasing GH

Purchasing attitude as a psychological disposition reflects an individual's preference for a particular object, issue, or entity [63]. Attitudes have been identified as indicators of consumers' psychological evaluations towards products and exert a significant influence on their behavioral intentions [28,64]. Judge et al. [56] confirmed that positive attitudes toward purchasing sustainable housing are a strong positive predictor of purchase intentions. Guo et al. [65] demonstrated the substantial impact of attitudes on consumers' intention to invest in healthy housing during the COVID-19 pandemic. Optimistic expectations regarding the benefits associated with purchasing GH facilitate decision-making in favor of such purchases. Conversely, negative attitudes toward GH discourage potential buyers from purchasing GH due to limited knowledge and high acquisition costs. Based on these observations, we propose the following hypothesis:

H2. *Attitude towards GH has a positive impact on purchase intention.*

2.2.3. Perceived Behavior Control of Purchasing GH

According to Ajzen [52], perceived behavioral control refers to an individual's perception of the ease or difficulty associated with engaging in a particular behavior. The behavior of individuals is influenced by their access to relevant resources (e.g., time, money, etc.) and opportunities. When consumers perceive a lack of resources and abilities, it becomes challenging for them to perform the desired behavior even if they are positively motivated. Perceived behavioral control was employed as a parameter for measuring consumer intention in various contexts, including e-waste recycling [27], garbage sorting [61], and new energy vehicles [66]. Given that the price of GH generally exceeds that of conventional housing, consumers are inevitably constrained by their consumption ability (including time, money, and skills) when making purchases [67]. Therefore, we propose the following:

H3. *Perceived behavioral control can promote the intention to purchase GH.*

2.2.4. Purchase Intention of GH

Behavioral intention refers to an individual's inclination towards engaging in a specific behavior, bridging the gap between cognitive processes and outward actions [61]. Typically preceding actual behavior, purchasing intention represents the likelihood of a consumer

making a purchase. Rausch and Kopplin [21] have established that individuals' behavioral intentions can exert a positive and significant influence on their ultimate behavioral implementation within the realm of sustainable clothing consumption. Generally speaking, stronger behavioral intentions are associated with higher probabilities of corresponding behaviors occurring. Consequently, we posit that individuals exhibiting strong intentions towards GH will actively strive to make GH purchases, thereby significantly enhancing the likelihood of completing such transactions. Based on this rationale, our hypothesis is as follows:

H4. *Purchase intention positively influences GH purchasing behavior.*

2.2.5. The Moderating Effect of Green Trust and Environmental Concern

Trust has garnered significant attention in the field of social science. Sirdeshmukh et al. [68] define trust as consumers' perception of a service provider's reliability and ability to deliver promised product attributes. Chen [69] introduced the concept of "green trust", which refers to consumers' willingness to rely on a product or service based on confidence in its credibility, benevolence, and environmental performance capabilities. Referring to Sirdeshmukh et al. [68] and Chen [69], this study posits that green trust reflects consumer confidence in the environmental and economic benefits offered by GH products, as well as their belief in developers' provision of reliable attributes associated with these products. However, consumer trust in GH is undermined by developers engaging in greenwashing and false advertising due to opportunistic behavior. Thus, GH consumption behavior is significantly influenced by green trust. Liu et al.'s [7] argument emphasizes the crucial role played by trust when individuals lack sufficient knowledge or resources for making informed decisions regarding GH purchases. Furthermore, Sultan et al.'s [37] research established the moderating effect of perceived trust in organic food products on the relationship between consumer behavior and intention. The effectiveness of green marketing communications, including advertisements, in shaping intention is also moderated by the consumer's existing level of environmental knowledge [70]. Based on these findings, we hypothesize the following:

H5. *Green trust positively moderates the relationship between GH purchase intention and behavior.*

Environmental concern refers to individuals' awareness of environmental problems and their intention to address these issues [21]. Consumers who possess environmental concerns are likely to consider the impact of their actions on the environment, which influences their decision-making behavior [71]. Previous research has highlighted the significance of environmental concern in explaining individuals' pro-environmental behaviors [26,59]. As mentioned by Pagiaslis and Krontalis [72], individuals with high levels of environmental concerns demonstrate a greater willingness to pay extra for environmentally friendly products. Moreover, Molinillo et al. [73] discovered that environmental concern positively affects consumers' health consciousness, thereby increasing their intention to purchase organic food. Concerning water-conservation behavior, individuals who exhibit higher levels of care towards environmental issues and limited water resources are more inclined to engage in water-conservation practices [74]. Therefore, individual environmental concerns may have an impact on the translation of intentions into actual behaviors related to purchasing GH. We thus hypothesize the following:

H6. *Environmental concern positively moderates the gap between the intention to purchase and the behavior of GH.*

3. Methodology

3.1. Questionnaire Design

To ensure the scientific validity of the questionnaire design, we made the following efforts. Given the limited research on GH purchasing behavior, we drew inspiration from the established structure of green purchasing behavior research. All items in the questionnaire were derived from previously validated scales and modified to suit the specific context of GH purchasing. The variables of environmental concern and green trust were measured using relevant scales with well-established applicability in similar contexts. Additionally, a preliminary survey was conducted prior to formal research to assess item completeness, clarity of wording, and structural appropriateness. Firstly, we provided an explanation of the study's content and purpose to respondents while defining GH; secondly, constructs were measured through proposed items; finally, participants were asked about their demographics. A five-point Likert scale was used for all variables except demographic ones (strongly disagree = 1; disagree = 2; neutral/undecided = 3; agree = 4; strongly agree = 5). Measures for green trust and environmental concern were based on previous exploratory findings with minor modifications made before finalizing the questionnaire. Table 1 presents the measurement items for each variable along with their reference scales.

Table 1. Variable measurement item.

Constructs	Item	Reference(s)
Attitude (ATT)	ATT1 I think it is a wise choice to purchase GH. ATT2 I support the purchase of GH. ATT3 I think GH is good for my health and my family's health.	[27,60,75]
Subjective Norm (SN)	SN1 My friends expect me to purchase GH. SN2 My family expects me to purchase GH. SN3 People who are important to me expect me to purchase GH.	[21,60,66,76]
Perceived Behavioral Control (PBC)	PBC1 Whether I purchase GH depends entirely on me. PBC2 If I want, I can purchase GH. PBC3 I have the resources, time, and opportunity to purchase GH.	[66,75–77]
Green Trust (GT)	GT1 I believe in the quality of the official GB assessment criteria. GT2 I trust expert evaluation in the process of GB certification. GT3 I believe in the authenticity of the assessment materials provided by developers, investors, and consultants. GT4 I think the environmental performance of GH is generally trustworthy.	[7,76,78]
Environmental Concern (EC)	EC1 I am concerned about environmental development. EC2 I am concerned about the long-term consequences of unsustainable behavior. EC3 I often think about the potential negative development of the environmental situation. EC4 I am concerned that humanity will cause lasting damage to the environment.	[21]
Purchasing Intention (PI)	PI1 I intend to purchase GH in the future. PI2 I am considering purchasing GH. PI3 I will try to purchase GH in the future.	[21,66]
Purchasing Behavior (PB)	PB1 When purchasing a house, I value it as sustainable. PB2 I purchase GH, even if they are more expensive than traditional houses. PB3 I would be happy to recommend purchasing GH to others.	[21]

3.2. Data Collection

A survey was conducted in Shandong Province, located in eastern China. In the field of green building, Shandong Province stands out as highly representative due to its substantial number of green building projects and extensive green floor area. Firstly, it is worth noting that Shandong Province ranked third in China in terms of green building area (<https://igreen.org/>, accessed on 31 December 2025), which added to its significance as a representative province. During the “13th Five-Year Plan (2016–2020)” period, remarkable achievements were made by our province in terms of green building and building energy efficiency. Specifically, Shandong Province accumulated a total of 443 million square meters

of completed and certified green building area during the 13th Five-Year Plan period (2016–2020), with an additional 813 million square meters dedicated to new construction and renovation of energy-saving building. Furthermore, renewable energy applications have been promoted across an area totaling 308 million square meters [79]. Additionally, during the same period, Shandong Province secured two-star and above green building labels for projects totaling 97.65 million square meters. It also established 59 provincial-level ultra-low-energy building demonstration projects [79]. These achievements placed the province among the national leaders. These achievements placed the province among the national leaders. For China, which is now in the rapid development stage of green building, it is crucial to initially explore the leading role played by representative sample provinces (specifically residential areas) and conduct comprehensive research on how trust in environmentally friendly practices influences purchasing intentions and behaviors. This will enable us to draw valuable insights from prior experiences which can be practically applied towards bridging the gap between residents' willingness to purchase GH and their actual behavior throughout the country.

The survey was conducted from August to November 2023 using a mixed-mode approach. A team of 18 trained investigators was organized into three groups, with each group responsible for data collection within assigned areas of Shandong Province. The questionnaire was developed and distributed through a professional online survey platform. We employed a multi-channel recruitment strategy: online distribution primarily via social media platforms such as WeChat and QQ; offline recruitment involved visits to real estate sales centers and residential communities across multiple cities in Shandong Province. Investigators first explained the study's purpose and introduced the concept of green housing (GH) to potential respondents. Those who agreed to participate were provided with either a QR code to access the online survey or a paper questionnaire. To supplement this approach, we also employed snowball sampling, where initial respondents could refer friends, relatives, or colleagues who expressed interest in purchasing GH. This combination of online and offline channels, coupled with snowball sampling, enhanced the diversity and representativeness of our sample.

To ensure statistical adequacy, we performed an a priori sample size calculation using the standard formula for infinite populations [80]:

$$n = \frac{Z^2 \times p \times (1 - p)}{d^2} \quad (1)$$

With $Z = 1.96$ (95% confidence level), $p = 0.5$ (maximum variance), and $d = 0.05$ (margin of error), the minimum required sample size was 385. In total, 974 residents interested in purchasing GHs received these questionnaires through various channels mentioned above. A total of 482 questionnaires were subsequently recovered (recovery rate is 46.2%). During the data screening process, any questionnaires exhibiting zero standard deviation or incomplete data were excluded from analysis; thus leaving us with a final dataset comprising 450 coded questionnaires for further analysis purposes. The validity rate of our questionnaire reached an impressive level at 93.3%, ensuring that all collected data met our research requirements.

3.3. Sample Characteristics

Based on statistical analysis of the individual variations across formal samples, the sex ratio was found to be essentially balanced. The age group of respondents falls within the 25–35 range, constituting 73.3% of the total sample population. In China's housing market, younger adults (aged 25–35) represent the primary demographic for first-time home purchases, driven by factors such as marriage, family formation, and urbanization.

This group faces acute housing needs and is actively engaged in housing market decisions. While the financial resources of younger adults are typically more limited compared to older cohorts, their decision-making patterns regarding housing purchases are particularly valuable for understanding evolving trends in green housing adoption. In terms of income distribution, a majority of households (36.9%) report a monthly income between ¥5000 and ¥10,000 RMB, and 81.6% earn below ¥20,000 monthly. This suggests the sample largely represents urban middle-class consumers for whom the cost premium of green housing is a significant consideration. Educationally, the sample is highly advanced, with 79.6% holding a bachelor's degree or higher. This high education level likely correlates with greater environmental awareness and comprehension of green housing benefits [81], which should be considered when generalizing the results. In terms of housing demand, the sample is split between “Rigid Demand” (53.8%) and “Improvement Demand” (46.2%), covering both first-time buyers and those seeking upgraded living standards.

Therefore, this sample is suitable for testing the theoretical model, as it comprises young, educated consumers with moderate incomes and established housing needs—a profile that represents the key target demographic for urban green housing. Detailed demographics are provided in Table 2.

Table 2. Demographic characteristics of the sample. (Sample size = 450).

Respondents' Characteristics	Specifications	Frequency	Percentage (in %)
Gender	Male	182	40.4
	Female	268	59.6
Age	25 and lower	173	38.4
	25–35	157	34.9
	35–45	81	18
	45–55	36	8
	55 and over	3	0.7
Education level	Junior high school and below	7	1.6
	High school	35	7.8
	Junior college	50	11.1
	Undergraduate course	234	52
	Master and above	124	27.6
Family monthly income	¥5000 and below	76	16.9
	¥5000–10,000	166	36.9
	¥10,001–20,000	125	27.8
	¥20,001–30,000	62	13.8
	¥30,000 and above	21	4.7
Housing purchase demand	Rigid demand	242	53.8
	Improve housing	208	46.2

4. Results

Structural equation modeling (SEM) is widely used in consumer psychology and behavior research, particularly when analyzing questionnaire data [26,82]. Substantial evidence supports the suitability of SEM methods for multivariate regression analysis in both exploratory and validation research contexts. Two primary approaches exist for solving structural equations: covariance-based structural equation modeling using maximum likelihood estimation (CB-SEM), and partial least squares structural equation modeling (PLS-SEM). PLS-SEM is considered a more appropriate method for exploratory or comprehensive research models compared to CB-SEM [83]. Thus, this study employs PLS-SEM to examine the research model. To validate the research hypotheses, we first

evaluated the reliability and validity of the measurement model and then assessed the structural model.

4.1. Measurement Model Evaluation

The reliability and validity of the measurement models were first assessed using the Smart-PLS software (4.1.0.9). Outer loadings were examined, employing a threshold of 0.708 [84], which ranged from 0.794 to 0.914 for all items. The result indicates that all indicators meet the required criteria for survive. Construct reliability is assessed based on composite reliability (CR) and Cronbach's α . Table 3 demonstrates that all constructs' Cronbach's α values and CR values exceeded the acceptable threshold of 0.70, indicating a satisfactory level of reliability. Convergent validity was tested by calculating the average variance extracted (AVE) for each construct. Whereas, the average variance extracted (AVE) value was greater than the threshold value of 0.5, further confirming adequate convergent validity.

Table 3. Construct validity and reliability.

Constructs	Item	Outer Loading	Cronbach's α	CR	AVE	VIF
Subjective Norm	SN1	0.889	0.837	0.838	0.755	2.253
	SN2	0.872				2.015
	SN3	0.845				1.782
Attitude	ATT1	0.85	0.782	0.784	0.697	1.756
	ATT2	0.862				1.848
	ATT4	0.791				1.449
Perceived Behavioral Control	PBC1	0.862	0.842	0.847	0.759	2.039
	PBC2	0.884				2.045
	PBC3	0.867				1.919
Green Trust	GT1	0.892	0.899	0.902	0.767	2.648
	GT2	0.874				2.554
	GT3	0.858				2.289
	GT4	0.879				2.637
Environmental Concern	EC1	0.889	0.902	0.903	0.773	2.758
	EC2	0.887				2.737
	EC3	0.875				2.588
	EC4	0.866				2.324
Purchasing Intention	PI1	0.845	0.757	0.759	0.673	1.633
	PI2	0.794				1.451
	PI3	0.821				1.534
Purchasing Behavior	PB1	0.914	0.892	0.892	0.822	2.775
	PB2	0.901				2.5
	PB3	0.905				2.665

The discriminant validity can be evaluated by two approaches: the Fornell–Larcker criterion (FLC) [85], as expressed in Table 4, and the HTMT criterion [86], which is employed for further analysis. The upper off-diagonal values in the table indicate the correlation between the constructs. Each value falls below the minimum threshold of 0.9. In addition, the square root of the AVE (diagonal values) for each construct in the HTMT matrix exceeds the squared correlation between the constructs (values indicated within parentheses on the off-diagonal line), thereby confirming adequate discriminant validity. These two tests indicate sufficient evidence supporting discriminant validity. In conclusion, this study has established reliability, validity, and discriminant validity of all constructs.

Table 4. Fornell–Larcker criterion analysis and HTMT ratios.

	SN	ATT	PBC	GT	EC	PI	PB
SN	0.869						
ATT	0.595 (0.481)	0.835					
PBC	0.502 (0.424)	0.385 (0.312)	0.871				
GT	0.167 (0.146)	0.229 (0.193)	0.14 (0.123)	0.879			
EC	0.291 (0.254)	0.307 (0.258)	0.325 (0.284)	0.774 (0.697)	0.879		
PI	0.834 (0.664)	0.825 (0.635)	0.706 (0.567)	0.337 (0.279)	0.152 (0.128)	0.821	
PB	0.501 (0.434)	0.514 (0.429)	0.419 (0.365)	0.807 (0.726)	0.752 (0.675)	0.721 (0.593)	0.907

4.2. Structural Model Evaluation

The structural model is then evaluated, encompassing an examination of the goodness of fit indices and proposed hypotheses. Multicollinearity between variables is assessed using the variance inflation factors (VIFs), while the values of VIF, ranging from 1.449 to 2.775, are rather low. Consequently, VIFs meet the conservative threshold of three for the absence of collinearity issues [87]. Next, R² values are examined with PI showing a value of 0.642, and PB showing a value of 0.784 (R²-adjusted PI of 0.639 and PB of 0.782). Overall, the R² values indicate that the structural model has a good degree of explanation. Since one of our main goals is to test the intention–behavior gap and the moderating influences of green trust and environmental concerns, R² is preferred to Q² as a measure of “explanatory modeling effort”. By employing blindfolding procedure to derive the Q² value of the endogenous structure evaluation purposes, we obtain Q² values equal to 0.425 for PI and 0.638 for PB, respectively. The value of Q² is greater than 0.35, suggesting strong predictive relevance between exogenous and endogenous variables in our model, i.e., the stronger the predictive relevance of the model. Having ensured appropriate measures were taken into account, a bootstrapping technique was employed with 5000 re-samples in order to evaluate coefficient significance for each path proposed in our research model.

The SEM path diagram is shown in Figure 2. As presented in Table 5, all hypotheses were supported except for H6. Specifically, subjective norms ($\beta = 0.359$, $p < 0.001$), attitude ($\beta = 0.368$, $p < 0.001$) and perceived behavioral control ($\beta = 0.299$, $p < 0.001$) were found to have significant positive effects on purchase intention (PI), respectively, thus supporting H1, H2, and H3, respectively. Furthermore, the analysis revealed a significant positive impact of purchase intention on purchase behavior ($\beta = 0.463$, $p < 0.001$), confirming hypothesis H4 and suggesting that strong purchase intentions can significantly enhance actual purchasing behavior. Moreover, the findings demonstrate that green trust moderates the relationship between consumers’ purchase intention and their subsequent purchase behavior ($\beta = 0.125$, $p < 0.001$). This indicates that green trust plays a crucial role in bridging the gap between intention and behavior. However, the moderating effect of environmental concern on consumers’ purchase intention and purchase behavior is not significant ($\beta = -0.006$, $p > 0.05$), which does not provide support for hypothesis H6.

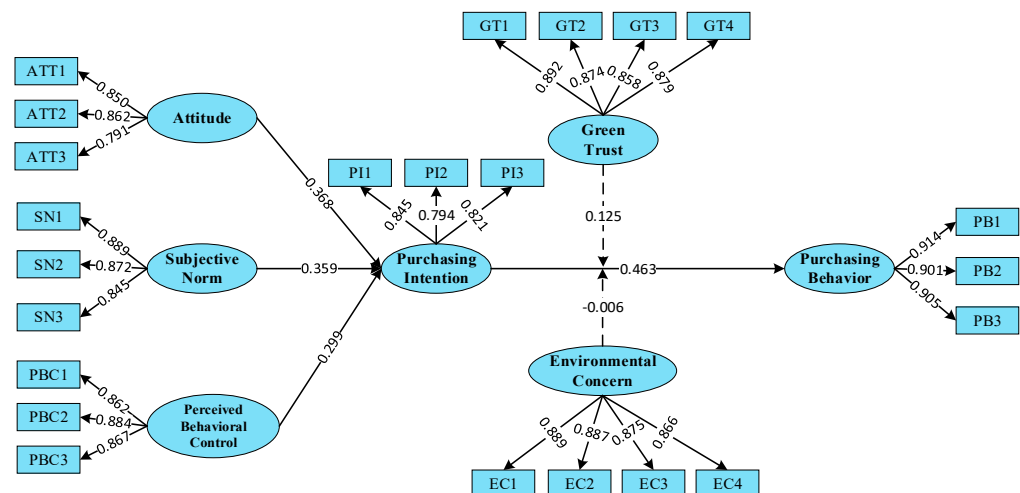


Figure 2. GH purchase intention-behavior gap SEM path analysis.

Table 5. Hypotheses testing.

	Path Coefficients (Effect Size f ²)	Confidence Intervals (Bias-Corrected, 97.5%)	T-Statistics (<i>p</i> -Value)
SN → PI	0.359 (0.247)	[0.282, 0.434]	9.239 (<0.001)
ATT → PI	0.368 (0.285)	[0.294, 0.442]	9.757 (<0.001)
PBC → PI	0.299 (0.201)	[0.228, 0.368]	8.382 (<0.001)
PI → PB	0.463 (0.857)	[0.403, 0.525]	14.887 (<0.001)
GT* → PI → PB	0.125 (0.048)	[0.054, 0.193]	3.501 (<0.001)
EC* → PI → PB	−0.006 (<0.001)	[−0.086, 0.069]	0.144 (0.885)

Note: Asterisk (*) indicates moderating effect.

4.3. Moderating Effect Analysis

The moderating effect was examined using Smart-PLS3.0 through simple slope tests to elucidate the relationship between green trust and the interaction of purchase intention and purchase behavior. Green trust was employed as a moderator variable, with high-score ($M + 1SD$) and low-score ($M - 1SD$) groups created by adding or subtracting a standard deviation from the average score. Since no significant moderating effect of environmental concern on the relationship between purchase intention and purchase behavior was observed, a simple slope test was not conducted. A schematic diagram illustrating the regulatory effects is presented in Figure 3. When consumers exhibit higher levels of green trust towards GH, their purchase intention exerts a stronger influence on their actual purchasing behavior. Conversely, when consumers possess lower levels of trust in GH, the impact of their purchase intention on purchasing behavior weakens accordingly. Therefore, it can be concluded that green trust plays a significant moderated role in shaping the “purchase intention–purchase behavior” relationship.

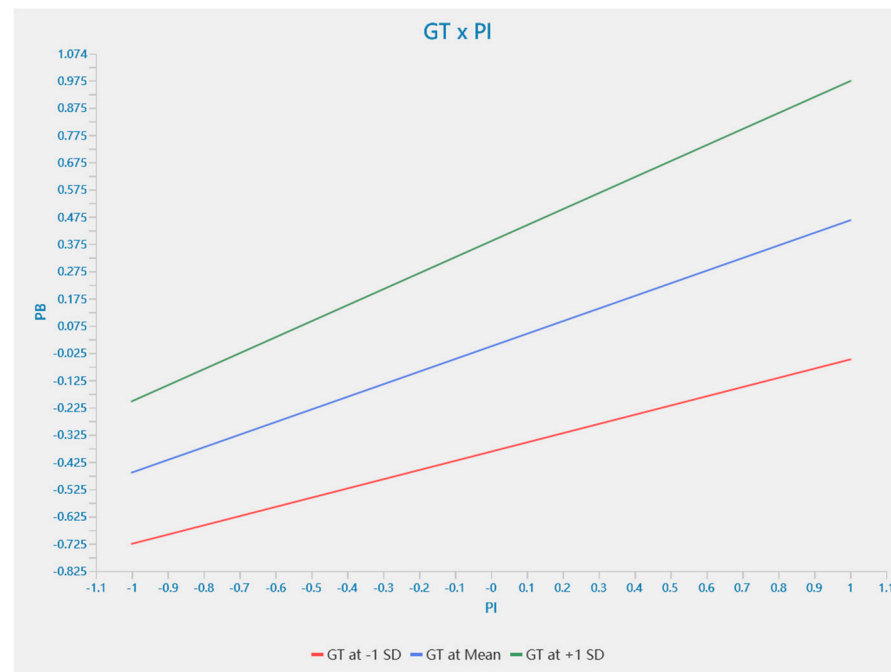


Figure 3. Moderating effect of green trust.

4.4. Intention–Behavior Gap

This study explores the “intention–behavior” gap, which pertains to the relationship between consumers’ intention to purchase GH and their actual purchasing behavior. A comparative analysis was conducted to examine the mean differences between individual intention variables and behavioral variables within the research sample. The validation results reveal a significant gap between consumers’ GH purchase intention and their subsequent behavior. Specifically, the mean value (3.89) of purchase intention exceeds that of purchase behavior (3.11). To test the statistical significance, a paired-sample *t*-test was performed on these two variables. The results indicate that the mean difference value between intention and behavior was 0.7878 below zero, with a 95% confidence interval ranging from 0.716 below zero to 0.860. Furthermore, the two-tailed *t*-value was 21.472 ($p \leq 0.01$), highlighting a substantial disparity between behavioral intention and behavior in relation to GH purchase during decision process. This finding is consistent with other research situations [88]. That implies that consumers with high GH purchase intention, may not purchase GH in the end, and “intention–behavior gap” of GH existing.

5. Discussion and Practical Implications

5.1. Discussion

Promoting GH on a large scale is crucial for achieving environmental sustainability and enhancing global well-being. Previous research has predominantly focused on investigating the purchase intentions and behaviors of potential consumers towards GH [6]. Nevertheless, empirical studies addressing the gap between GH purchase intention and behavior are scarce. This study aims to explain the relationship between purchase intention and actual purchase behavior in the GH context, thereby addressing pressing concerns regarding prioritizing actual behavior over mere intentions [27,75,89].

The findings suggest that the extended theory of planned behavior (TPB) is suitable for investigating consumers’ GH purchasing behavior. We found that positive behavioral attitudes, subjective norms and perceived behavioral control can reasonably account for behavioral intention. Moreover, our findings echoed with the recent study in green consumerism, which have demonstrated a significant positive correlation between attitudes,

subjective norms, and perceived behavioral control with intention across various contexts such as new energy vehicles [26] and e-waste recycling [27].

Moreover, the findings of this study provide further empirical evidence supporting the existence of an intention–behavior gap in the context of GH consumption process. A paired-sample *t*-test revealed a significant disparity between consumers' GH purchase intention and actual purchasing behavior ($p < 0.001$). Specifically, the mean purchase intention (3.89) was found to be significantly higher than the mean purchase behavior (3.11), indicating that individuals with stronger intentions to engage in green housing consumption were not effectively translating their intentions into actual purchasing actions. This finding aligns with previous research on various domains of green consumerism, such as new energy vehicles [26] and energy-saving refrigeration appliances [28].

The results also indicate a significant and positive moderation effect of green trust on the conversion of purchase intention to purchase behavior ($\beta = 0.125$, $T = 3.501$, $p < 0.01$). This implies that the current augmentation of consumers' green trust positively influences the transformation from their purchase intention to actual purchasing behavior. These findings are generally consistent with the previous literature on green consumerism. For instance, Tandon et al. [89] concluded that trust in organic food positively increased purchasing behavior and narrowed the gap between intention and behavior. Similarly, Liu et al. [6] identified a lack of social trust in organizations responsible for green-labeled residential buildings was identified as a potential psychological barrier to the GB movement in China. Given the information asymmetry prevalent in the GH market, establishing justified trust becomes even more crucial.

Surprisingly, the study provides evidence supporting the hypothesis that consumers' environmental concerns significantly influence the gap between purchasing intentions and behaviors. Consumers' environmental concerns are predominantly influenced by cost, quality, and green-product performance [90]. The high acquisition cost of GH, a product, may diminish individuals' concern for environmental issues, hindering the translation of their purchase intentions into behavior. The purchase of GH entails both altruism and self-interest on the part of consumers as it promotes environmentally friendly practices. However, consumers primarily prioritize their own interests rather than considering the environmental impact of their actions, displaying less inclination towards reducing carbon emissions or making eco-friendly choices. Hu et al. [91] emphasize that improved health is the most appealing factor for homebuyers. The healthier living environment of GH serves as a significant selling point of a GH site [18]. Another possible reason could be attributed to limited understanding and awareness among most people regarding the environmental benefits associated with purchasing GHs. He et al. [13] argue that despite being environmentally friendly in nature, many customers lack knowledge about these benefits and thus refrain from buying GH.

5.2. Practical Implications

Our study takes a novel perspective in examining the relationship between consumers' intentions to purchase green products and their actual purchasing behavior, confirming the existence of an intention–behavior gap. However, empirical research on how to effectively bridge this gap is insufficient, particularly when it comes to investigating GH consumption. These findings shed light on the potential influence of environmental concerns and trust in promoting a stronger link between intentions and behaviors related to GH purchases, providing valuable insights for policymakers seeking to address this issue.

Environmental concerns have been overlooked in the GH consumer sector, potentially leading to a weakening of individuals' environmental consciousness due to the higher premium price associated with GH. Government subsidies or tax reductions for GH purchases

are not a bad strategy to reduce consumer acquisition costs. In addition to providing direct support at the sales stage, the government can also reduce or waive electricity bills for GH consumers at the utilization stage. Developers can implement various promotional tools during the pre-sale of properties, such as choosing appropriate concessions to increase the sales of GH and create certain economies of scale. From the consumer perspective, willingness to pay more for GH is contingent upon perceived advantages [92]. When consumers do not understand the quality and functions of GH, they are easily disturbed by loss aversion and are naturally unwilling to pay extra for them. Therefore, when publicizing and promoting GH, the focus should be on the benefits of GH to the homebuyers themselves. The government can make public the information on the assessment of the living comfort and health improvement (especially the improvement of indoor air quality) of GH to consumers, so that they will realize that GH is value for money. At the same time, through the statistics and analysis of the whole process of GH projects, it can show consumers the benefits of building energy saving and emission reduction, and enhance consumers' confidence in the upfront investment in GH. Finally, raising consumers' awareness of the environmental benefits of GH may yield more promising results. Therefore, the government could increase consumers' knowledge and awareness of GH through green education and awareness campaigns. Public-service advertising, community advocacy, and demonstration projects are considered effective means to disseminate information about the environmental benefits of GH. Success in urban green development, such as the green renovation of old communities, often hinges on fostering social capital and community participation [93], a principle that can be applied to promoting GH at the neighborhood level. Apart from improving consumers' knowledge of GH, it is also important to raise their awareness of energy conservation and sustainable development issues [6].

Further, we find that consumer green trust positively affects the intention–behavior relationship. Prioritizing increasing consumer trust in the GH may therefore be more effective in closing the purchase intention–behavior gap. Notably, the current GH market is characterized by a high level of “greenwashing” [40], which may reduce consumer trust in GH with labeled certification. GH environmental claims are not always beneficial, and consumers are also affected by the reliability of information. Even if consumers' environmental concern is high, it negatively affects their willingness to pay for GH because they doubt the authority and reliability of the organization's disclosure of GH information. From both managerial and policy perspectives, concrete actions are needed. First, regulatory frameworks must be strengthened. This includes mandating independent third-party verification and post-occupancy audits to ensure performance matches claims, alongside establishing clear anti-greenwashing regulations with meaningful penalties for misleading information. Second, market incentives should be introduced. Financial mechanisms such as green mortgage discounts or tax rebates for certified green housing can effectively offset cost barriers. Third, transparency and consumer education must be enhanced. Standardized disclosure of all certification data and public campaigns to educate consumers on evaluating green claims will empower informed decisions. Ultimately, by strengthening certification integrity through rigorous oversight, stimulating demand through targeted incentives, and fostering transparency through information disclosure, consumer trust in green housing can be substantively increased. This multi-pronged approach will help translate environmental concern and purchase intention into actual green-housing adoption.

6. Conclusions

To facilitate the actual purchase of GH within the framework of sustainable urban development, we conducted a survey in Shandong Province, China, aiming to investigate

the moderating effects of green trust and environmental concerns on the intention–behavior gap regarding GH purchases. The key research findings are as follows:

First, we extend the theory of planned behavior to identify the intention–behavior gap in the process of purchasing GH. Through mean comparison analysis, we observe a significant intention–behavior gap specifically related to GH consumption. In general, consumers holding positive attitudes, stronger social norms, and higher perceived behavioral control exhibit greater explanatory power for purchase intentions. Among these factors, attitudes toward GH exert the most substantial influence on subsequent purchase intentions, while perceived behavioral control has a comparatively weaker impact. Second, by conducting simple slope tests, we provide evidence that consumers' trust in environmentally friendly practices positively influences the relationship between intention and behavior. However, our findings indicate that environmental concerns do not significantly moderate this relationship. These results underscore that, in the context of promoting green housing within sustainable cities, enhancing consumers' trust in the credibility and performance of green housing may be more effective than relying solely on raising environmental awareness to drive actual purchase behavior.

From the perspective of sustainable urban planning and policy, our study highlights several actionable pathways. Policymakers and urban developers should recognize that closing the intention–behavior gap in green housing is not only a matter of individual consumer psychology but also a key mechanism for advancing urban sustainability goals, such as reducing carbon footprints, improving resource efficiency, and enhancing public health. Building consumer trust through transparent certification systems, reliable performance disclosures, and stringent oversight can help align individual purchasing decisions with broader urban sustainability objectives. Meanwhile, although environmental concern alone did not show a significant moderating effect in this study, it remains a foundational element of green consumption values and should be nurtured through long-term education and communication campaigns as part of a holistic urban sustainability strategy. This aligns with the broader understanding that enterprise-led green innovations are a key driver of smart and sustainable city development [94].

Furthermore, it is imperative to acknowledge the limitations of this study. Firstly, this study only selects environmental concern and green trust to bridge the gap between intentions and behavior, without considering other potential variables that may contribute to bridging the intention–behavior gap, such as financial incentives, policy interventions, or social influence mechanisms that are particularly relevant in urban governance contexts. Future research could also investigate how perceptions of natural environmental uncertainty shape GH demand [43], or how marketing communication strategies can be optimized for different consumer segments [56]. Future research should explore additional factors that could potentially bridge this gap. Secondly, it is important to note that the data for this study was collected exclusively from consumers in Shandong Province, China; therefore, caution must be exercised when generalizing these findings to the entire Chinese population, especially across diverse urban and regional contexts with varying levels of economic development, policy enforcement, and environmental awareness. Consequently, future studies should aim to include a more representative sample of the national population and conduct comparative analyses across different city types to validate and extend our conclusions. Third, the sample in this study was predominantly composed of younger adults aged 25–35. This demographic is more likely to be in the first-time homebuyer stage, where purchasing decisions may be shaped by different financial constraints, life priorities, and long-term planning considerations compared to older, more experienced buyers. Therefore, while the findings provide valuable insights into the intention–behavior gap among a key emerging consumer group, they may not fully represent the behavioral patterns of

repeat buyers or older segments of the housing market. Future research would benefit from including participants across a wider age range to obtain a more comprehensive understanding of green-housing consumption dynamics.

Overall, this study contributes to the growing literature on green consumption and sustainable urban development by empirically validating the intention–behavior gap in green housing and identifying trust as a critical moderator. By fostering credible, trustworthy green housing markets, cities can better harness consumer demand to accelerate the transition toward sustainable, low-carbon, and healthy urban living environments.

Author Contributions: Conceptualization, L.Z., Y.Z. (Yanna Zhang) and Y.Z. (Youquan Zhang); methodology, Y.Z. (Youquan Zhang) and Y.Z. (Yanna Zhang); software, Y.Z. (Yanna Zhang); validation, L.Z., Y.Z. (Youquan Zhang) and Z.B.; resources, L.Z. and Y.Z. (Yanna Zhang); writing—original draft preparation, L.Z., Y.Z. (Yanna Zhang) and Y.Z. (Youquan Zhang); writing—review and editing, Y.Z. (Youquan Zhang) and Z.B. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Ethical review and approval were waived for this study. This exemption is in compliance with China’s “Ethical Review Measures for Life Science and Medical Research Involving Humans” and the institutional policies of Shandong Jianzhu University, which do not mandate ethical review for this specific type of anonymous survey-based research.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The original contributions presented in this study are included in the article. Further inquiries can be directed to the corresponding authors.

Acknowledgments: The authors thank the experts and respondents who participated in the questionnaire surveys. The authors also thank the editors and the anonymous reviewers for their valuable and constructive suggestions for improving this study.

Conflicts of Interest: The authors declare no conflicts of interest.

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