

## Attitudes matter

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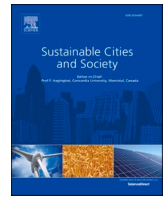
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# Attitudes matter: Measuring the intention-behaviour gap in built heritage conservation

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## ABSTRACT

This research applies the theory of planned behaviour (TPB) to measure the gap between designers' intentions towards heritage conservation and the actual design decisions. It aims at contributing to identify which psychological constructs (attitude, norm, perception of control) are hindering the implementation of sustainable conservation approaches in practice. The results suggest that attitudes have a significant correlation with performed behaviour, and that norms, despite impacting intentions, do not necessarily correlate with the performed actions. Using the TPB to analyse designers' behaviours is an innovative methodological approach that opens new possibilities for the design of interventions targeting behavioural change towards the implementation of sustainable conservation practices in built heritage.

## 1. Introduction

The Sustainable Development Goals (SDG) defined on the global agenda for sustainable development (United Nations, 2015) endorses for the first time at the international policy level the role of heritage and its conservation to achieve sustainable development. Despite being often approached as opposite or incompatible concepts in the last decades (Dornelles, Gandolfi, Mercader-Moyano, & Mosquera-Adell, 2020; Lidelöw, Örn, Luciani, & Rizzo, 2019), sustainability and heritage conservation can today be understood in their shared goal of conserving valuable resources for future generations (Gonçalves, Mateus, Silvestre, & Roders, 2019).

According to (Dornelles et al. (2020)), a coherent and legible urban landscape depends on urban and architectural interventions that are sensitive to social memory and heritage values since these interventions can have potential harmful effects on the ways of life and community welfare. The importance of heritage for sustainability surpasses the social dimension. As a driver of sustainable development (Janssen, Luiten, Renes, & Stegmeijer, 2017) heritage benefits range from the contribution to local economies and economic growth (Icomos, 2011) to the knowledge capital on the environmental dimension (Unesco, 2013). The research of Vardopoulos (Vardopoulos, 2019) identifies and prioritises

critical sustainable development factors affected by the adaptive reuse of buildings: improvement of quality of life; community empowerment; environmental management; land conservation; local culture and identity conservation; public awareness and education; and cultural heritage protection.

Despite the generalised perception of the positive contributions of heritage to sustainable conservation, the literature points to a lack of information on the nature of these contributions (Lidelöw et al., 2019). In a systematic literature review, (Lidelöw et al., 2019) show that approaches that consider the conservation of built heritage is, in itself, an energy efficiency measure (by saving embodied energy, reducing waste, and taking advantage of passive systems), are still scarce. It also identified that the assessment of cultural values is rarely explicit, referring to generic conservation principles, without a clear and transparent assessment method that supports practitioners' decisions towards sustainable conservation (Lidelöw et al., 2019).

Current literature on the challenges of heritage conservation (Ashley, Osmani, Emmitt, Mallinson, & Mallinson, 2014; Gonçalves, Mateus, & Silvestre, 2019; Perovic, Coffey, Kajewski, & Madan, 2016; Roy & Kalidindi, 2017) identifies a performance gap between conservation intentions and its actual implementation in the design and construction stages. In common, these studies point to the behaviour of the different

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stakeholders in the process – from decision-makers to occupants – as the leading cause for the performance gap. Notwithstanding, a behavioural approach in the sustainable heritage field is a very recent topic (Gonçalves, Mateus, Silvestre, & Roders, 2020). In specific for built heritage, behaviour is frequently mentioned as a synonym of "performance", referring to physical characteristics of the building. While in the construction sector, in general, there is raising awareness of the role of occupants' behaviour for sustainability and energy efficiency (Caro & Sendra, 2020; Chen, Ding, Bai, & Sun, 2020; Gianfrate, Piccardo, Longo, & Giachetta, 2017; Laaroussi, Bahrar, El Mankibi, Draoui, & Si-Larbi, 2020), in the specific field of built heritage, occupants' behaviour is only mentioned as a factor that affects performance, without a more in-depth analysis of the underlying socio-psychological factors (Ajzen, 1985; Berg & Donarelli, 2019; Galiano-Garrigós, González-Avilés, Rizo-Maestre, & Andújar-Montoya, 2019; Mutani, Todeschi, Kämpf, Coors, & Fitzky, 2018). A systematic literature review on behaviour and heritage conservation found no results targeting practitioners' behaviour towards the implementation of sustainable conservation practices (Gonçalves et al., 2020).

This research applies the Theory of Planned Behaviour (TPB) (Ajzen & Fishbein, 1974; Ajzen, 1991) to measure the gap between designers' intentions towards heritage conservation and the actual design decisions, and to identify which psychological constructs (attitudes, subjective norms, perception of control) are hindering the implementation of sustainable conservation approaches in practice. The unveiling of the latent psychological factors affecting the decision process will contribute to future research on policies and design tools targeting effective behavioural change for sustainability.

## 2. Background

Social psychological models can be used to predict human behaviour and to understand its relationship with other psychological constructs, such attitudes, or intentions. The TPB (Ajzen & Fishbein, 1974; Ajzen, 1991) is based on the premise that the intention to perform a behaviour is the immediate antecedent of the behaviour itself (Sheeran, 2002; Triandis, 1980). According to this theory, three main factors affect the formation of intentions, and thus, behaviour: attitudes, subjective norms, and Perceptions of Behavioral Control (PBC). According to Sheeran (Triandis, 1980), the gap between intention and behaviour is mainly caused by those that having an intention to act, fail to implement their intentions (inclined abstainers). While intentions are a reliable predictor of behaviours, the consistency between intention and behaviour is not always absolute, due to low facilitating conditions and intervening events (Ajzen & Fishbein, 2010; Yung & Chan, 2012) that affect the actual behavioural control.

Sheeran (Triandis, 1980) classifies the factors affecting behavioural control in two main categories: 1) factors related to self-efficacy (knowledge, ability), and 2) factors related to controllability

(resources, availability, opportunity, and cooperation). These factors, presented in Fig. 1, can be defined as follows:

- Knowledge: be aware of the information
- Ability: have the necessary skills to use that information
- Resources: the existence of the resources required to implement the intention
- Availability: have access to the necessary resources
- Opportunity: have the chance to act
- Cooperation: be able to negotiate with different actors
- Unexpected situations: factors related to controllability

Several studies analyse the challenges in the conservation of built heritage, showing that despite the good intentions in the field, inclined abstainers fail to implement their intentions. The research of Yung & Chan (Ajzen, 2002a) interviews practitioners about the main challenges of applying sustainability goals in the adaptive reuse of built heritage in Hong Kong. While demonstrating that practitioners are aware of the importance of heritage for sustainable development in the social, economic, and environmental dimensions, this study also states that the challenges of incorporating sustainability in practice "are still unresolved" (Ajzen, 2002a). (Ashley et al. (2014) interviewed representatives of the different stakeholders involved in the conservation of built heritage in Sudan, from governments to major investors, such as UNESCO, but also local investors, architects, engineers, and end-users. The findings show financial restrictions, stakeholder collaboration, and knowledge and awareness as primary problems.

Further, the research of Ashley et al. (Ashley et al., 2014) identifies a dissociation between stakeholder groups, which attribute responsibility to each other. In Australia, Perovic, Coffey & Kajewski (Perovic et al., 2016) used interviews in real practice case studies to research the repeating issues affecting heritage-listed conservation projects. It points the difficulty to reach a clear assessment of the significance of the place as one of the main problems, together with the reliability of documentation, unexpected situations, and the necessary qualified knowledge. The research of Roy & Kalidindi (Roy & Kalidindi, 2017) interviewed conservation professionals in India to investigate the reasons for project failure in terms of time, cost, and quality. As (Ashley et al., 2014), it identifies, resource constraints, lack of know-how, and stakeholders' cooperation among the main issues. An earlier research used a focus group with different stakeholders to identify the main challenges in professional practice (Gonçalves et al., 2019). Accordingly, in that study, the authors concluded that the knowledge and qualification gap among all the stakeholders in the process leads to decisions based solely on the initial investment, disregarding heritage values and sustainability principles.

These studies allow identifying modal accessible beliefs, common amongst practitioners working in heritage conservation processes around the world. As theorised by Sheeran (Triandis, 1980), challenges

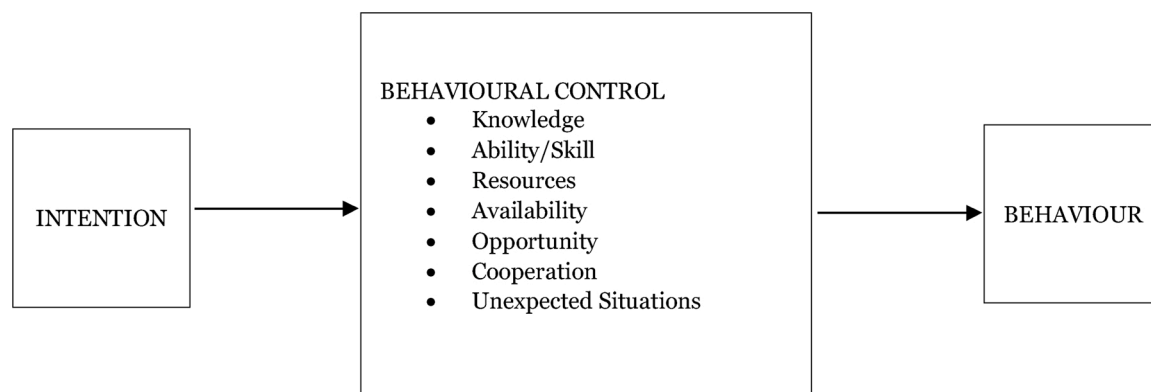


Fig. 1. Factors affecting behavioural control according to Sheeran (2002).

in the implementation can be related to the low perception of behavioural control, also in the field of heritage conservation. All the factors defined by Sheeran (Triandis, 1980) were identified in practitioners' discourse about challenges in conservation, with knowledge, ability, resources, and cooperation as the most outstanding, as shown in Table 1. Recurrently, the challenges identified in the literature are associated with an external locus of control: practitioners tend to externalise responsibility of the failure to other stakeholders in the process, from policy-makers to clients.

In the present study, the research population were architecture students of the Heritage and Design studios, at the TU Delft, Netherlands.

**Table 1**  
Challenges pointed out by professionals hindering implementation.

| Category              | Factors                                                                                | Literature                                                                                             |
|-----------------------|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| Knowledge             | A gap in conservation knowledge and awareness of all the stakeholders                  | (Ashley et al., 2014; Gonçalves et al., 2019)                                                          |
|                       | Lack of technical information                                                          | (Gonçalves et al., 2019)                                                                               |
|                       | Knowledge gap on traditional know-how                                                  | (Gonçalves et al., 2019; Perovic et al., 2016)                                                         |
|                       | Low awareness of private owners                                                        | (Gonçalves et al., 2019; Perovic et al., 2016)                                                         |
| Ability               | Procedures and methodologies are too complex                                           | (Gonçalves et al., 2019; Perovic et al., 2016)                                                         |
|                       | Technical capacity of all actors                                                       | (Ashley et al., 2014; Roy & Kalidindi, 2017)                                                           |
|                       | Contractors without experience in conservation                                         | (Perovic et al., 2016; Roy & Kalidindi, 2017)                                                          |
|                       | Insufficient training of technicians                                                   | (Gonçalves et al., 2019)                                                                               |
| Resources             | Unsuitable deadlines                                                                   | (Gonçalves et al., 2019; Perovic et al., 2016; Roy & Kalidindi, 2017)                                  |
|                       | Conservation practices are too time-consuming                                          | (Gonçalves et al., 2019; Perovic et al., 2016)                                                         |
|                       | Limited financial availability                                                         | (Ashley et al., 2014; Gonçalves et al., 2019; Roy & Kalidindi, 2017)                                   |
|                       | Conservation is unprofitable                                                           | (Yung, 2012; Gonçalves et al., 2019)                                                                   |
|                       | Decisions only consider economic criteria                                              | (Gonçalves et al., 2019; Perovic et al., 2016)                                                         |
|                       | Existing information is difficult to access                                            | (Gonçalves et al., 2019)                                                                               |
| Availability          | Insufficient tools to support decision-making                                          | (Gonçalves et al., 2019)                                                                               |
|                       | Technical specifications are not available for traditional technologies                | (Roy & Kalidindi, 2017)                                                                                |
|                       | Lack of documentation on the original building, local history and community narratives | (Roy & Kalidindi, 2017; Yung, 2012)                                                                    |
|                       | Limited sourcing of compatible materials                                               | (Perovic et al., 2016; Roy & Kalidindi, 2017)                                                          |
| Opportunity           | Regulations limit innovative design                                                    | (Yung, 2012; Ashley et al., 2014; Gonçalves et al., 2019; Perovic et al., 2016; Roy & Kalidindi, 2017) |
|                       | Building codes not compatible with heritage conservation                               | (Yung, 2012; Perovic et al., 2016)                                                                     |
|                       | Lack of coordination between stakeholders                                              | (Roy & Kalidindi, 2017)                                                                                |
| Cooperation           | Segregation between different expertise or project disciplines                         | (Gonçalves et al., 2019; Roy & Kalidindi, 2017)                                                        |
|                       | Competing priorities of different stakeholders                                         | (Ajzen, 2002a; Ashley et al., 2014; Perovic et al., 2016)                                              |
|                       | Lack of consultation of different stakeholders                                         | (Perovic et al., 2016)                                                                                 |
|                       | Private ownership                                                                      | (Ashley et al., 2014; Roy & Kalidindi, 2017)                                                           |
| Unexpected situations | Changes in the client brief                                                            | (Perovic et al., 2016)                                                                                 |
|                       | Unpredictable works due to building decay and latent conditions                        | (Ashley et al., 2014; Perovic et al., 2016; Roy & Kalidindi, 2017)                                     |

The aim was to clearly isolate the factors affecting the gap between intention and implementation. By researching in a controlled environment where designers are free to explore their own limits, without dealing with clients and regulations, will allow understanding if the cooperation between multiple stakeholders, and the normative regulations, pointed by the literature, are the most determinant factors affecting the implementation of conservation intentions.

### 3. Materials and methods

This study adapted and applied techniques used in social psychology to understand and measure the intention-behaviour gap. The objective of these techniques is to bypass conscious defences and gather the tacit knowledge. Therefore, the participants can provide unchanged views of their feelings and attitudes, which is not possible with more direct questioning.

This study was thus divided in a sequence of three research steps: intention questionnaire, generative artefacts, and self-assessment of behaviour. Initially, a TPB questionnaire (Galema & Hooimeijer, 2008) was distributed amongst the participants, to identify their intentions for the design phase. Then students developed their design process, for eight weeks. It was considered that the design process is a generative technique that allows participants to express visually and spatially their priorities and attitudes towards valuable attributes of the building. After the submission of the final design projects, the same group of students answered a questionnaire with the aim of self-assessing their actual design decisions towards the building attributes defined in the intention questionnaire.

The study took place between September 2019 and February 2020, within the scope of the Heritage & Architecture master studios, offered by the faculty of Architecture and the Built Environment, at the Delft University of Technology, the Netherlands. The students were asked to give informed consent to start the survey. The questionnaire was distributed among 63 students. A return rate of 62 % was achieved (see Table 2). The questionnaire was distributed by two groups of students: group 1 working on the American Embassy building, in Den Haag, and group 2 working on the Huys te Warmond estate, both in the Netherlands. The American Embassy is an exemplar of the 20th-century heritage, designed by Marcel Breuer in 1959, and declared as a national monument in 2017 (Riepema, 2020). The Huys te Warmond is a historic estate and country house, listed as a national monument since the year 2000 (Kuipers & De Jonge, 2017).

#### 3.1. TACT: target, action, context, and time

To develop the intention survey, the behaviour of interest was defined in its Target, Action, Context and Time (TACT) elements (Galema & Hooimeijer, 2008; Yung & Chan, 2012). Context and time are common to all groups of questions, referring to the specific buildings used as case studies in the design studios. Target and Action refer to the conservation actions towards the valuable attributes of a building. In the context of this research, the list of attributes was defined according to the seven building layers (Fig. 2) adapted by Kuipers and de Jonge (2017) from Brand (1995). Accordingly, these seven layers are defined as follows:

**Table 2**  
Response rate.

|                     | Students on list | Responses Phase 1 | Responses Phase 2 | Response rate |
|---------------------|------------------|-------------------|-------------------|---------------|
| 1) American Embassy | 25               | 20                | 15                | 60 %          |
| 2) Huys te Warmond  | 38               | 28                | 24                | 63 %          |
| <b>Total</b>        | <b>63</b>        | <b>48</b>         | <b>39</b>         | <b>62 %</b>   |

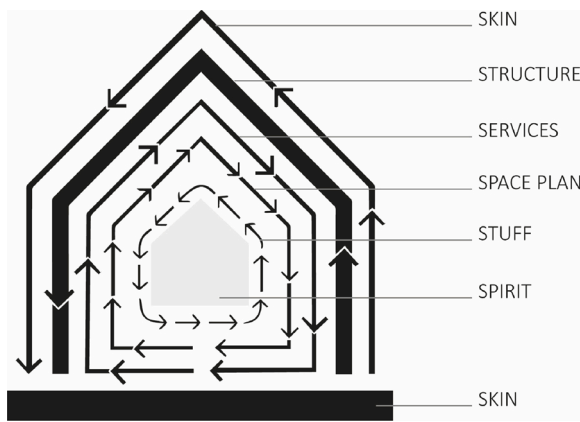


Fig. 2. Seven building layers adapted by Kuipers and de Jonge (2017) from Brand (1995).

- Site: relation of the building with the surrounding urban landscape;
- Skin: the building envelope and interface with the exterior;
- Structure: the support construction systems;
- Services: the infrastructures, such as plumbing, electrical systems, heating and ventilation;
- Space Plan: the interior layout and distribution of spaces;
- Stuff: furnishings and furniture;
- Spirit of the Place: intangible aspects related to building's meanings over time.

This conceptual framework used by the master students as a guideline for the analysis and design process was also used as the theoretical framework of this research, since it allows a gradual approximation to the building, from site to spirit, ensuring that the questions are easily understandable by the research population.

### 3.2. Development of the questionnaire

According to the theoretical model (Fig. 3), the intention survey was developed with four groups of questions: attitudes ("I consider it to be"), subjective norms ("is expected of me that"), perception of control ("it is easy for me to") and intention ("I intend to"). All the questions use a 5-point Likert scale.

The first group of questions aims at identifying the attitudes of the participants towards the attributes of the building. This group allows collecting data about the participant's value assessment of the building. The second group aims to identify the presence of social pressure over the performance of the action, namely the opinion of colleagues and tutors. It allows identifying on which building attributes the formation of intentions is affected by the opinions of significant others. This data is essential to further understand, in the analysis of results, which intentions may not have been applied due to the tutor intervention. The third group of questions intended to measure perceptions of behavioural control. For reasons of feasibility, not all the factors identified by Sheeran (reference) were considered, focusing only on self-efficacy (knowledge /skill). Finally, in the fourth group, standard direct

measures of intention were collected for each attribute of the building, to establish a baseline for comparison with the final design interventions.

In the follow-up questionnaire, students were asked to self-assess their designs ("in my design I decided to"), reporting on the level of conservation of the same list of attributes, in a similar 5-point Likert scale. The questionnaire was tested and reviewed by a selected group of tutors and master students to ensure its simplicity and clarity.

### 3.3. Data analysis

Data were analysed using SPSS Version 26.0 (SPSS Inc., Chicago, IL, USA). Descriptive statistics, including percentages, arithmetic means, and standard deviation were used to summarize the choices of the students towards conservation, in the different groups of questions and for each building attribute.

This questionnaire was validated for reliability and internal consistency, measuring the Cronbach alpha for each variable group (attitude, subjective norms, perception of control, intention, and behaviour), with alpha being higher than 0,6 in all cases (Table 3), as recommended by the literature (Ajzen, 2002b; Nunnally & Bernstein, 1994). Considering that the questionnaire proved to be internally consistent, data was merged into the main variable groups, to run the bivariate correlation analysis with a sufficient sample.

The relation between behaviour and the other variables was analysed using linear regression modelling, followed by multiple regression with backwards elimination (Fisher, 1993). The final model was obtained by eliminating variables associated with a P-value greater than 0.20, with low statistical significance. Collinearity among variables in the model was measured by the variance inflation factor (VIF). No multicollinearity was detected ( $VIF < 2$ ). Results are expressed as the Beta coefficient with their confidence intervals at 95 % (95 % CIs).

In the last question of the self-assessment questionnaire, respondents were asked to identify the main reason that led them not to conserve the attributes that they previously expressed intention to. The results of this question were analysed qualitatively, using content and thematic analysis.

## 4. Results

### 4.1. Descriptive statistics

In the first part of the questionnaire, respondents were given the option to choose the parts of the building they consider more relevant for their case study. Respondents prioritize the site, the structure, the

Table 3

Internal consistency and reliability of the measuring scales.

|                  | Cronbach's alpha | N. of items |
|------------------|------------------|-------------|
| Attitudes        | 0,803            | 26          |
| Subjective norms | 0,955            | 30          |
| PBC              | 0,651            | 20          |
| Intention        | 0,736            | 26          |
| Behaviour        | 0,688            | 23          |

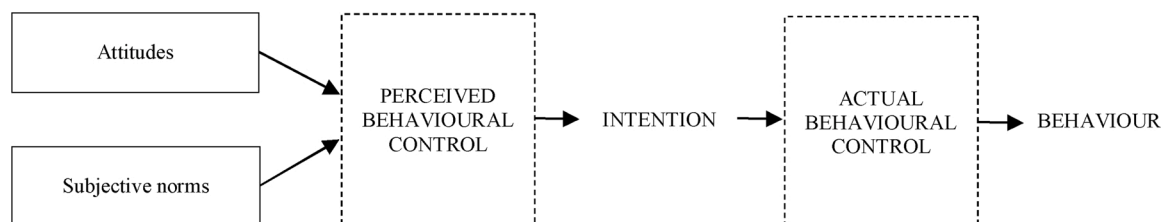


Fig. 3. Theoretical model based on the TPB.



“skin” and the “spirit of the place”. The layers services (related to infrastructures), space plan, and stuff (related to movable objects and fixed furniture) are considered less important in the context of heritage conservation by more than half of the respondents (Table 4).

Some differences emerge when analysing the two groups separately, that may be related to the specific features of the case studies. For instance, focusing on the attitudes towards the conservation of building attributes, the relation with street seems to be much more relevant in the American Embassy (76,5 % “very valuable” responses) than in the Huys te Warmond (18,2 % “very valuable” responses). Contrarily, the roof is considered more important in the Huys te Warmond (considered “very valuable” or “valuable” for 86 % of responders) than in the American Embassy, where all the respondents show a neutral (30 %) or even negative attitude (70 %).

In the American Embassy group, results show strong positive attitudes (around 53 % of the responses) and high levels of perception of control (pointed out by about 61 % of the respondents). The layer “skin” consistently presents average positive replies, with positive attitudes and perception of high expectations, but also good levels of control (for 80 % of respondents). In the other extreme, “spirit of the place” has the lowest values. Even if there is a positive attitude towards the conservation of the spirit of the place, it presents the lower value on the positive attitudes in the analysed building layers (Table 5). The “spirit of the place” is also highlighted by respondents as not particularly subject to social pressure and, at the same time, the one where levels of control are lower (on average for 43 % of respondents).

At the indicator level, the results allow identifying priorities on the decision-making process. The conservation of the facade, for instance, is seen for 100 % of the respondents as valuable; 90 % feel social pressure to conserve this element, and 84 % show high levels of perceived behavioural control. As a result, 84 % of the respondents indicate the intention to conserve the facade, and all the respondents (100 %) self-report high percentages of conservation of the building attributes. Other indicators with similar positive reactions are the “skin” materials and the relation with the street. Contrarily, the indicators that concentrate more negative reactions are the conservation of the roof, the relation with topography, and religious expressions. The respondents do not feel social pressure for the conservation of these aspects, but recognise low perception of control, not having enough knowledge to support the conservation of these elements (Table 6).

In the Huys te Warmond group, respondents show, in general, more positive attitudes towards conservation than in the American Embassy (65 % instead of 53 %). They also point out higher social pressure (60 % instead of 46 %). However, on average, levels of perceived behavioural control, intention, and behaviour do not vary significantly in the two groups. As in the first group, the layer “skin” consistently presents positive replies but is surpassed in the second group by the layer structure, with 90 % positive attitudes, 88 % high perceived norms, and 85 % of perceived control, also converting it in the layer with highest levels of intention and behaviour (Table 7). Once again, “spirit of the place” is the building layer with more negative replies, being considered less valuable for more than one-third of the respondents (38 %), and with lower perceived control (for 42 % of respondents) (Table 8).

At the indicator level, results are very similar in the American Embassy and the Huys te Warmond groups, with the conservation of the facade as one of the main priorities, and the conservation of religious expressions as the least important indicator. Nevertheless, also some differences emerge, e.g. the relation with the surroundings being more important than the relationship with the street, or the roof being considered valuable for the majority of the respondents.

#### 4.2. Intention-behavior gap

The bivariate correlation analysis confirms the correlations predicted by the theoretical model (Ajzen, Sheeran, etc.). Intention has a moderately positive correlation with behaviour, with the correlation coefficient ( $r = 0.366$ ) evidencing a statistically significant ( $p = 0.036$ ) effect of the increase of positive intentions in the increase of positive behaviours. Attitudes, however, present a stronger correlation with behaviour than with intentions ( $r = 0.580$ ;  $p = 0.000$ ), suggesting that, in the scope of this study, attitudes are a more reliable predictor of behaviour, than the expressed intentions. Subjective norms – the expectations of tutors and peers – seem to affect the formation of attitudes on the students, and to mediate expressed intentions. Nevertheless, no correlation was found between subjective norm and actual behaviour. In the scope of this research, perceived behavioural control does not appear to have a significant correlation with any of the analysed psychological construct (Table 9).

Simple linear regression was carried out to investigate further which layers of the building have a stronger relationship with conservation behaviours. The results showed a significant relationship between the attitudes towards the “skin” of the building and the conservation behaviour ( $p = 0.001$ ). The  $R^2$  value was 0.333, meaning that 33 % of the variation in conservation behaviours can be explained by the model containing only attitudes towards the skin. Structure and skin are the building layers where the relationship with conservation behaviour was proven to be more significant ( $p < 0.1$ ), predicting the self-reported behaviours (Table 10). In the opposite direction, the layer “spirit of the place” presents less significant results in predicting conservation behaviour.

Considering the results of the single linear regression, multiple regression with backwards elimination was performed to find out the model that better explains the reported behaviours towards conservation of built heritage. The final model indicates that 38 % of the variance on behaviour ( $R^2 = 0.376$ ) can be explained by one single variable: attitudes towards the skin ( $B = 0.538$ ;  $p = 0.005$ ). The final predictive model was:

$$\text{Conservation Behaviour} = 0.780 + (0.538 * \text{Attitudes-Skin})$$

Given the relevance of the attitudes towards the skin for conservation behaviours, another multiple regression was carried out, to identify which indicators within this building layer have a more substantial impact in the formation of the attitudes. The final predictive model includes six indicators (Table 11), that explain 88 % of the variance on the attitudes ( $R^2 = .877$ ). While the conservation of the materials ( $B = 0.310$ ;  $p = 0.000$ ) and the detailing ( $B = 0.277$ ;  $p = 0.000$ )

**Table 4**  
Relevance of building attributes according to respondents.

| Layer               | 1) American Embassy |            | 2) Huys te Warmond |            | Total     |            |
|---------------------|---------------------|------------|--------------------|------------|-----------|------------|
|                     | Frequency           | Percentage | Frequency          | Percentage | Frequency | Percentage |
| Site                | 17                  | 77,3 %     | 22                 | 73,7 %     | 39        | 81,3 %     |
| Structure           | 16                  | 72,7 %     | 24                 | 80 %       | 40        | 83,3 %     |
| Skin                | 20                  | 90,9 %     | 21                 | 70 %       | 41        | 85,4 %     |
| Services            | 3                   | 13,6 %     | 4                  | 13,3 %     | 7         | 14,6 %     |
| Space Plan          | 4                   | 18,2 %     | 19                 | 63,3 %     | 23        | 47,9 %     |
| Stuff               | 2                   | 9,1 %      | 6                  | 20 %       | 8         | 16,7 %     |
| Spirit of the Place | 14                  | 63,6 %     | 24                 | 80 %       | 38        | 79,2 %     |

**Table 5**

Average values according to the building layer in the American Embassy group.

| Layer           | Attitudes <sup>1</sup> |           | Subj. Norms <sup>2</sup> |           | PBC <sup>3</sup> |           | Intention <sup>4</sup> |           | Behaviour <sup>5</sup> |           |
|-----------------|------------------------|-----------|--------------------------|-----------|------------------|-----------|------------------------|-----------|------------------------|-----------|
|                 | Pos.                   | Mean (SD) | High                     | Mean (SD) | High             | Mean (SD) | Pos.                   | Mean (SD) | Pos.                   | Mean (SD) |
| Site            | 51 %                   | 2.4 (0.8) | 44 %                     | 2.5 (1.0) | 70 %             | 2.1 (0.7) | 64 %                   | 2.3 (1.2) | 75 %                   | 2 (1.1)   |
| Structure       | 69 %                   | 2.1 (1.0) | 67 %                     | 2.1 (1.0) | 71 %             | 1.9 (0.9) | 78 %                   | 2.1 (1.2) | 67 %                   | 1.9 (0.9) |
| Skin            | 66 %                   | 2.2 (0.8) | 59 %                     | 2.4 (1.0) | 80 %             | 1.9 (0.8) | 67 %                   | 2.4 (1.2) | 67 %                   | 2.2 (0.9) |
| Spirit of Place | 57 %                   | 2.4 (1.1) | 44 %                     | 2.6 (1.2) | 57 %             | 2.2 (1.0) | 45 %                   | 2.7 (1.1) | 57 %                   | 2.5 (1.3) |
| Average         | 53 %                   | 2.3 (0.9) | 46 %                     | 2.4 (1.0) | 61 %             | 2 (0.9)   | 54 %                   | 2.4 (1.2) | 57 %                   | 2.2 (1.0) |

<sup>1</sup>On a scale from 1:5 where 1 is "very valuable" and 5 is "worthless"; <sup>2,4</sup> on a scale from 1:5 where 1 is "extremely likely" and 5 is "extremely unlikely"; <sup>3</sup> on a scale from 1:5 where 1 is "strongly agree" and 5 is "strongly disagree"; <sup>5</sup> on a scale from 1:5 where 1 is "100 %" and 5 is "0 %".

**Table 6**

Main positive and negative indicators in the American Embassy group.

| Indicator                | Attitudes <sup>1</sup> |           | Subj. Norms <sup>2</sup> |           | PBC <sup>3</sup> |           | Intention <sup>4</sup> |           | Behaviour <sup>5</sup> |           |
|--------------------------|------------------------|-----------|--------------------------|-----------|------------------|-----------|------------------------|-----------|------------------------|-----------|
|                          | Freq.                  | Mean (SD) | Freq.                    | Mean (SD) | Freq.            | Mean (SD) | Freq.                  | Mean (SD) | Freq.                  | Mean (SD) |
| positive                 |                        |           |                          |           |                  |           |                        |           |                        |           |
| Facade                   | 100 %                  | 1.2 (0.4) | 90 %                     | 1.4 (0.8) | 84 %             | 1.7 (0.7) | 85 %                   | 1.6 (1.2) | 100 %                  | 1.4 (0.5) |
| Skin materials           | 90 %                   | 1.6 (0.7) | 80 %                     | 1.8 (0.8) | 84 %             | 1.8 (0.8) | 90 %                   | 1.8 (1.0) | 79 %                   | 1.9 (0.9) |
| Relation with street     | 88 %                   | 1.4(0.7)  | 71 %                     | 1.8 (0.9) | 94 %             | 1.6 (0.6) | 88 %                   | 1.6 (1.1) | 78 %                   | 1.7 (1.0) |
| Roof                     | 100 %                  | 4.3 (0.9) | 90 %                     | 3.9 (1.1) | 21 %             | 2.3 (0.9) | 90 %                   | 4.1 (1.3) | 71 %                   | 3.2 (1.4) |
| negative                 |                        |           |                          |           |                  |           |                        |           |                        |           |
| Relation with topography | 94 %                   | 3.8 (0.8) | 82 %                     | 3.4 (1.3) | 75 %             | 2.9 (0.7) | 82 %                   | 3.7 (1.3) | 33 %                   | 2.2 (1.2) |
| Religious expressions    | 64 %                   | 3.4 (1.6) | 79 %                     | 3.6 (1.3) | 62 %             | 2.7 (1.3) | 85 %                   | 3.6 (1.2) | 72 %                   | 3.4 (1.6) |

<sup>1</sup>On a scale from 1:5 where 1 is "very valuable" and 5 is "worthless"; <sup>2,4</sup> on a scale from 1:5 where 1 is "extremely likely" and 5 is "extremely unlikely"; <sup>3</sup> on a scale from 1:5 where 1 is "strongly agree" and 5 is "strongly disagree"; <sup>5</sup> on a scale from 1:5 where 1 is "100 %" and 5 is "0 %".

**Table 7**

Average values according to building layer in the Huys te Warmond group.

| Layer               | Attitudes <sup>1</sup> |           | Subj. Norms <sup>2</sup> |           | PBC <sup>3</sup> |           | Intention <sup>4</sup> |           | Behaviour <sup>5</sup> |           |
|---------------------|------------------------|-----------|--------------------------|-----------|------------------|-----------|------------------------|-----------|------------------------|-----------|
|                     | Pos.                   | Mean (SD) | High                     | Mean (SD) | High             | Mean (SD) | Pos.                   | Mean (SD) | Pos.                   | Mean (SD) |
| Site                | 65 %                   | 1.9 (0.9) | 69 %                     | 1.9 (0.9) | 80 %             | 2.0 (0.9) | 79 %                   | 1.8 (0.9) | 55 %                   | 2.2 (1.2) |
| Structure           | 90 %                   | 1.0 (0.7) | 88 %                     | 1.7 (0.7) | 85 %             | 1.7 (0.7) | 88 %                   | 1.0 (0.8) | 77 %                   | 1.2 (0.9) |
| Skin                | 85 %                   | 1.9 (0.7) | 78 %                     | 1.9 (0.9) | 79 %             | 2.0 (0.7) | 79 %                   | 1.6 (0.9) | 73 %                   | 1.6 (0.9) |
| Spirit of the Place | 62 %                   | 2.1 (1.0) | 48 %                     | 3 (1.2)   | 58 %             | 2.4 (1.2) | 44 %                   | 2.8 (1.2) | 56 %                   | 2.2 (1.2) |
| Average             | 65 %                   | 1.8 (0.8) | 60 %                     | 2.1 (0.9) | 64 %             | 2 (0.9)   | 61 %                   | 1.8 (1.0) | 56 %                   | 1.8 (1.0) |

<sup>1</sup>On a scale from 1:5 where 1 is "very valuable" and 5 is "worthless"; <sup>2,4</sup> on a scale from 1:5 where 1 is "extremely likely" and 5 is "extremely unlikely"; <sup>3</sup> on a scale from 1:5 where 1 is "strongly agree" and 5 is "strongly disagree"; <sup>5</sup> on a scale from 1:5 where 1 is "100 %" and 5 is "0 %".

**Table 8**

Main positive and negative indicators in the Huys te Warmond group.

| Indicator                | Attitudes <sup>1</sup> |           | Subj. Norms <sup>2</sup> |           | PBC <sup>3</sup> |           | Intention <sup>4</sup> |           | Behaviour <sup>5</sup> |           |
|--------------------------|------------------------|-----------|--------------------------|-----------|------------------|-----------|------------------------|-----------|------------------------|-----------|
|                          | Freq.                  | Mean (SD) | Freq.                    | Mean (SD) | Freq.            | Mean (SD) | Freq.                  | Mean (SD) | Freq.                  | Mean (SD) |
| positive                 |                        |           |                          |           |                  |           |                        |           |                        |           |
| Façade                   | 100 %                  | 1.2 (0.4) | 100 %                    | 1.4 (0.8) | 95 %             | 1.7 (0.7) | 86 %                   | 1.6 (1.2) | 88 %                   | 1.4 (0.5) |
| Surroundings and context | 100 %                  | 1.6 (0.7) | 95 %                     | 1.8 (0.8) | 100 %            | 1.8 (0.8) | 95 %                   | 1.8 (1.0) | 86 %                   | 1.9 (0.9) |
| Shape                    | 100 %                  | 1.4(0.7)  | 86 %                     | 1.8 (0.9) | 90 %             | 1.6 (0.6) | 81 %                   | 1.6 (1.1) | 82 %                   | 1.7 (1.0) |
| Religious expressions    | 58 %                   | 4.3 (0.9) | 75 %                     | 3.9 (1.1) | 62 %             | 2.3 (0.9) | 88 %                   | 4.1 (1.3) | 74 %                   | 3.2 (1.4) |
| negative                 |                        |           |                          |           |                  |           |                        |           |                        |           |
| Relation with topography | 50 %                   | 3.8 (0.8) | 50 %                     | 3.4 (1.3) | 50 %             | 2.9 (0.7) | 45 %                   | 3.7 (1.3) | 60 %                   | 2.2 (1.2) |
| Local traditions         | 46 %                   | 3.4 (1.6) | 54 %                     | 3.6 (1.3) | 54 %             | 2.7 (1.3) | 50 %                   | 3.6 (1.2) | 63 %                   | 3.4 (1.6) |

<sup>1</sup>On a scale from 1:5 where 1 is "very valuable" and 5 is "worthless"; <sup>2,4</sup> on a scale from 1:5 where 1 is "extremely likely" and 5 is "extremely unlikely"; <sup>3</sup> on a scale from 1:5 where 1 is "strongly agree" and 5 is "strongly disagree"; <sup>5</sup> on a scale from 1:5 where 1 is "100 %" and 5 is "0 %".

contributed significantly to the model, the conservation of the roof does not ( $B = 0.057$ ;  $p = 0.072$ ). The final predictive model for the attitudes towards the skin was:

$$\text{Attitudes towards Skin} = -0.612 + (0.057 \cdot \text{Roof}) + (0.310 \cdot \text{Materials}) + (0.134 \cdot \text{Colours}) + (0.183 \cdot \text{Openings}) + (0.258 \cdot \text{Shape}) + (0.277 \cdot \text{Detail})$$

#### 4.3. Reasons for the intention-behaviour gap

The analysis of the reasons pointed out by respondents for the gap between expressed intentions and self-reported behaviours towards conservation of building elements, results in 3 main groups of reasons: program requirements and adaptation to new functions; sustainability

and performance standards; and aesthetics and design concepts. Some respondents also found out during the design process that the previous value assessment was inaccurate, with building elements found "not as special" as previously stated. Only one respondent identifies "lack of time and skill" as the main reason behind the performance gap. While the response "program requirements and new functions" suggests an external locus of control, with a situation not directly manageable by the respondent, the responses under "design concept" evidence higher levels of personal control and responsibility for the decision. On several occasions, the expression "old" is used with a pejorative meaning, as opposed to "modern" or "innovative". After program requirements, the compatibility with sustainability standards is the most common reason identified by respondents to not perform conservation intentions.



**Table 9**

Pearson correlations among analysed psychological constructs.

|             |                         | Intention | Behaviour | Attitudes | Subj. norms | PBC   |
|-------------|-------------------------|-----------|-----------|-----------|-------------|-------|
| Intention   | Pearson Correlation (r) | 1         | .366*     | .351*     | .337*       | .131  |
|             | Sig. (2-tailed) (p)     |           | .036      | .017      | .022        | .387  |
|             | N                       | 46        | 33        | 46        | 46          | 46    |
| Behaviour   | Pearson Correlation (r) | .366*     | 1         | .580**    | .335        | .182  |
|             | Sig. (2-tailed) (p)     | .036      |           | .000      | .057        | .310  |
|             | N                       | 33        | 36        | 33        | 33          | 33    |
| Attitudes   | Pearson Correlation (r) | .351*     | .580**    | 1         | .407**      | .009  |
|             | Sig. (2-tailed) (p)     | .017      | .000      |           | .004        | .955  |
|             | N                       | 46        | 33        | 47        | 47          | 46    |
| Subj. norms | Pearson Correlation (r) | .337*     | .335      | 0.407**   | 1           | -.045 |
|             | Sig. (2-tailed) (p)     | .022      | .057      | 0.004     |             | .765  |
|             | N                       | 46        | 33        | 47        | 47          | 46    |
| PBC         | Pearson Correlation (r) | .131      | .182      | .009      | -.045       | 1     |
|             | Sig. (2-tailed) (p)     | .387      | .310      | .955      | .765        |       |
|             | N                       | 46        | 33        | 46        | 46          | 46    |

\* Correlation is significant at the 0.05 level (2-tailed).

\*\* Correlation is significant at the 0.01 level (2-tailed).

**Table 10**

Single linear regression between independent variables and "conservation behaviour".

|           |             | Beta coefficient | Sig. (p)      | R <sup>2</sup> |
|-----------|-------------|------------------|---------------|----------------|
| Site      | Attitudes   | 0.221            | 0.246         | 0.053          |
|           | Subj. Norms | 0.216            | 0.212         | 0.062          |
|           | Intentions  | 0.223            | 0.08          | 0.118          |
| Structure | Attitudes   | 0.366            | 0.076         | 0.121          |
|           | Subj. Norms | 0.363            | 0.064         | 0.131          |
|           | Intentions  | 0.31             | <b>0.034*</b> | <b>0.167</b>   |
| Skin      | Attitudes   | 0.542            | <b>0.001*</b> | <b>0.333</b>   |
|           | Subj. Norms | 0.312            | 0.057         | 0.128          |
|           | Intentions  | 0.148            | 0.298         | 0.04           |
| Spirit    | Attitudes   | 0.103            | 0.617         | 0.01           |
|           | Subj. Norms | -0.047           | 0.737         | 0.004          |
|           | Intentions  | -0.117           | 0.409         | 0.026          |

\* Significant at level  $p < 0.05$ .**Table 11**

Multiple linear regression model explaining "attitudes towards skin".

| Indicators                    | Beta coefficient | Sig. (p) |
|-------------------------------|------------------|----------|
| Conservation of the roof      | 0.057            | 0.072    |
| Conservation of the materials | 0.310            | 0.000    |
| Conservation of the colours   | 0.134            | 0.008    |
| Conservation of the openings  | 0.183            | 0.004    |
| Conservation of the shape     | 0.258            | 0.004    |
| Conservation of the detailing | 0.277            | 0.000    |

## 5. Discussion

The main aim of this research was to reveal and discuss the factors behind the intention-behaviour gap in the conservation of built heritage. While existing literature focusing on practitioners pointing out controllability as the main factor, this study hypothesised that in an environment with more creative freedom and less involved stakeholders, the PBC levels should be higher. Thus, the intention-behaviour gap should tend to zero. The results confirm the first premise of the hypotheses: PBC levels are high and do not correlate with the self-reported behaviours. However, even with high levels of PBC, the results show that there is no perfect fit between intention and behaviour, with a correlation coefficient around 0.3 instead of 1 (Fisher, 1993). This suggests that, despite practitioners' perception of their low control on

built heritage conservation, other psychological constructs can be behind the intention-behaviour gap.

The results of this research show that attitudes matter for built heritage conservation, presenting a stronger correlation to behaviour than to intentions. One of the possible reasons for this, is that expressed intentions are mediated by a social desirability bias (Grimm, 2010; Ross & Angel, 2019) – as demonstrated by the fact that a correlation was found between subjective norms and intentions, but not between subjective norms and behaviours. These findings corroborate the theoretical model defined by Sheeran (Triandis, 1980), that states that attitudinal controlled intentions have a greater likelihood of performance than normative controlled intentions, that result from external pressures and have poorer motivation impact. This suggests that policies, norms, and new building codes for conservation, even if necessary, may not be sufficient to ensure the implementation of sustainable conservation practices. The qualitative analysis also corroborates attitudes as strong determinants of behaviours. Whereas the literature focusing on practitioners tends to evidence low perceived behavioural control and an external locus of control (Ajzen, 2002a; Ashley et al., 2014; Gonçalves et al., 2019; Perovic et al., 2016; Roy & Kalidindi, 2017), the design students in the present research point more often to self-chosen and autonomous decisions, derived from personal beliefs, such as the design concept. +Even if heritage conservation and sustainability share the common goal of preserving valuable resources for future generations, sustainability is frequently pointed out by participants as one of the main reasons why intentions were not implemented, evidencing respondent's personal "evaluative dispositions" (Yung & Chan, 2012). This result demonstrates the importance of developing tools and educational mechanisms aimed at tackle knowledge gaps and increase the awareness of the role of heritage conservation for sustainability – not only in the social dimension, but also in the aspects related to the material conservation of resources (Wells, Manika, Gregory-Smith, Taheri, & McCowlen, 2015).

The descriptive statistics indicate a predominant interest in the conservation of physical, tangible attributes, such as the structure or the building envelope ("skin"). The building's façade is also considered valuable for all the respondents. However, the results show that this particular positive attitude is not statistically significant to represent the general attitude towards the "skin". This suggests that a protective attitude of the façade does not necessarily convert into positive conservation behaviours of other building attributes and values. Targeting other indicators related to the "skin" of the building, such as materials

and detailing, raising awareness to its value, seems to be more likely to convert in positive conservation attitudes and, thus, positive conservation behaviours. "Spirit of the place" is the layer on which respondents state to have less perceived control, and, in specific, less knowledge. This building layer, as the perceived behavioural construct, does not present any correlation with behaviour, suggesting that the low perceived behavioural control makes the behaviour towards the "spirit of the place" particularly unpredictable, according to the developed model. This corroborates the research of Lidelow (Lidelow et al., 2019) that found that existing literature on the assessment values is unclear and insufficient to guide the practitioner's decision-making.

While interventions to change behaviour can be directed to one or more of its determinants, according to Ajzen (Fisher, 1993) "it may be safer to target predictors that account for significant variance in intention and behaviour". The results of the present study suggest that, in the case of built heritage conservation, behaviours are deeply rooted in the personal set of values of the designer, and behavioural change interventions need to target attitudes, strengthening existing positive beliefs and creating new ones. As a result of different learning experiences, beliefs can be formed by observation (direct experiences); information (learned from outside sources); or inferred (from other beliefs) (Yung & Chan, 2012). This means that knowledge and information do not only affect perceived control but also have a role in the formation of attitudes. This explains why persuasive communication is considered by several authors (Fisher, 1993; Gregory-Smith, Wells, Manika, & McElroy, 2017; Weiler, Moyle, Wolf, D.; de Bie, & Torland, 2017; Yung & Chan, 2012) as one of the most effective intervention methods for behavioural change. In the specific scope of heritage conservation, the researches of Wells et al. (Weiler et al., 2017), Gregory-Smith et al. (Salvatierra & Walters, 2015), Salvatierra (Lwoga, 2016), and Lwoga (Soliman & Abou-Shouk, 2017) suggest the importance of the availability of information, knowledge, and awareness to increase positive attitudes and the performance of pro-environmental and pro-heritage behaviours.

### 5.1. Limitations and future research

The presented results should be interpreted within the scope of the defined TACT and are not intended to be generalised. The descriptive statistics results show that the case study affects the priorities of the respondents. While in a modern building from the 20th century in an urban context, the roof is not a design priority, the same does not happen when dealing with a historic neoclassic house in the countryside. In the same way, the lack of interest concerning "religious expressions" does not necessarily mean a general indifference to this indicator, but may be related to the fact that religion is not a central topic given the functions of the case studies. Behavioural beliefs are not innate but instead acquired through subjective experiences (Yung & Chan, 2012), and the presented results reflect a pilot study with a small sample in a particular cultural context. This study, as recommended by Ajzen (Fisher, 1993) "provides a snapshot of the behaviour's cognitive foundation in a given population at a given point in time". Despite its limitations, it allows for gaining insight on the determinant factors behind the gap in the implementation of sustainable conservation behaviours in built heritage.

In this research, the generative artefacts created by the participants (the design results of the students) were not evaluated, and the analysis relies on participants self-reports. The risk of social desirability bias was reduced by ensuring confidentiality and anonymity of the responses, to maximize accuracy. While the literature points out that self-reports can be as reliable and valid as direct observations (Yung & Chan, 2012), future research could monitor decisions during the design process and consider the actual conservation actions expressed in the design. For that, a cross-sectional study (compare different students over the years) or even a longitudinal study (comparing the same students while they progress over the years), would allow to increase the level of detail and the statistical significance of the results. A more significant sample of

respondents would also allow for further statistical analysis, such as Structural Equation Modelling (SEM) to explore with more accuracy the relationship between the different variables affecting conservation behaviours (Soliman & Abou-Shouk, 2017; Unesco, 2011; Zhang, Lee, & Xiong, 2019).

This study presents the analysis of the correlation between intention and implementation in design decisions related to built heritage conservation. It represents a steppingstone for future research aiming at behavioural change, since it will allow to compare the effects of different interventions (such as sustainability, significance, and state of conservation assessments) with the baseline situation. It would also be essential to apply the developed methodology in professional practice, measuring how real conditions affect perceived behavioural control and if attitudes maintain their relevant correlation with behaviour.

The most recent guidelines and international recommendations for heritage conservation, such as the UNESCO Recommendation on Historic Urban Landscape [47], highlight the importance of participatory processes and community engagement, opening the decision-making processes to a broader range of stakeholders. In this setting, the use of mixed-methods with the insights of behavioural sciences have a growing potential as a field of research in the heritage context, not only for a better understanding of decision-making processes at the design level, but also to understand the background factors affecting communities values and attitudes towards heritage conservation. To that end, segmentation studies aimed at profiling different stakeholders, would have much to gain by applying the theoretical framework proposed in the present research, to achieve more effective behavioural change towards sustainable conservation.

## 6. Conclusion

This paper presents the results of the exploratory application of the Theory of Planned Behaviour (TPB) to measure the intention-behaviour gap in built heritage conservation. Although the literature focusing on practitioners is pointing out for low behavioural control challenges, the application of this theoretical model in a controlled environment shows that the dissonance between conservation intentions and self-reported conservation actions persists, even with high levels of perceived behavioural control. The results suggest that conservation behaviour is attitudinally controlled: norms have a role in the formation of intentions, but self-reported behaviours present a stronger correlation with the personal attitudes of the respondents. This means that despite the importance of policies and international regulations on sustainability and heritage conservation, deeper change is more likely to be achieved by targeting practitioners' internal set of values, through engagement in persuasive learning experiences about the value of heritage for a sustainable future. Using the TPB to analyse designers' behaviours is an innovative methodological approach to understand the performance gap in built heritage conservation. The identification of the most determinant psychological constructs, and the most significant indicators at the building scale, opens new possibilities for the design of interventions targeting behavioural change towards a more significant role of the cultural heritage and its conservation in the sustainable development of cities and buildings.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## Further reading

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