

**Designing Campus Green Spaces for Students' Mental Health and Well-being:  
A User-Centered and Evidence-Based Design Approach**

**Bachelor Thesis**

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### **Abstract**

Amid the global rise in student mental health challenges, campus green spaces hold potential to support well-being, yet they remain an underutilized resource for health promotion. This study investigates how the design of two campus green spaces at the University of Fribourg (Regina Mundi and Pérolles 21) support students' mental well-being. Using a mixed-methods approach, it combines an evidence-based framework CLM (Contemplative Landscape Model) to assess the quality of urban green spaces for mental health with a user-centered survey of students' experiences. Data was collected through a survey (subjective CLM, quantitative and qualitative measures) and an expert CLM evaluation of both green spaces. The findings show that Regina Mundi offers moderate contemplative quality but is limited by privacy, comfort, amenities, and spatial diversity, while Pérolles 21 has a low contemplative quality due to a lack of natural elements and these same shortcomings. Across both sites, well-being is linked to rest, privacy regulation, spatial diversity and personal control of the space. The results indicate that the CLM, while valuable, does not fully capture key user-centered factors such as personal control, comfort, spatial and activity diversity. The study highlights the importance of integrating evidence-based and user-centered approaches to inform the design of campus green spaces to effectively support student's mental well-being.

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## 1 Introduction

Campus green spaces hold significant potential to support students' mental health and well-being, yet they represent a largely underutilized preventative and health supporting resource (Windhorst & Williams, 2015). This is particularly striking given the growing prevalence of poor mental well-being among university students (Cui et al., 2025; Lu & Fu, 2019). Indeed, between 2020 and 2024 an increase of 6% of symptoms of depression has been reported, reaching a proportion 29% of students in Switzerland (Bundesamt für Statistik, 2025). Moreover, approximately 22% reported elevated levels of loneliness (Bundesamt für Statistik, 2025). These findings highlight an urgent need for preventative and health-promoting approaches to students' mental health (Aghabozorgi et al., 2025; Deng & Lee, 2025; Windhorst & Williams, 2015).

Research has shown that the built and natural environment influence mental health and well-being (Hartig et al., 2003; Kaplan & Kaplan, 1989; Olszewska-Guizzo, 2023a). Even the World Health Organization (WHO) recognizes that mental health and well-being are shaped not only by individual factors but also by environmental conditions (World Health Organization, 2022). They advocate for transformative measures that include reshaping schools, workplaces, and natural environments in ways that support mental well-being (World Health Organization, 2022). Universities therefore carry a responsibility not only to provide academic education but also to foster environments that promote students' mental health and well-being (Li et al., 2025). In this context, campus green spaces are particularly relevant, because they combine qualities of the built and natural environment. Further, research has shown that there are positive associations between university campus green spaces and students' mental well-being (Foellmer et al., 2021).

However, the mental health and well-being benefits of green spaces are not automatically guaranteed as their restorative potential depends on specific environmental qualities and design characteristics rather than on the mere presence of greenery alone (Olszewska et al., 2016; Olszewska et al., 2023a; Olszewska-Guizzo et al., 2022). These qualities can be operationalised through evidence-based design frameworks such as the Contemplative Landscape Model (CLM), a neuroscience- and psychology-informed framework for assessing and designing landscapes that support mental health and well-being (Olszewska et al., 2016; Olszewska et al., 2023a; Olszewska-Guizzo et al., 2022). The CLM evaluates urban green spaces by identifying spatial attributes associated with mental health and well-being benefits (Olszewska-Guizzo, 2023a).

While evidence-based design approaches such as the CLM offer valuable design guidance, their effectiveness to support mental health and well-being may remain limited if they do not sufficiently consider users' experiences, needs, and preferences. Research suggests that campus green spaces can only function as truly restorative settings when they respond to students' needs (Lu & Fu, 2019; Owens et al., 2023). For this reason, user-centered design (UCD), which focuses on users' experiences, needs and preferences throughout the planning process (Xavier, 2022), is highly relevant.

Unfortunately, mental health and well-being are still rarely considered within landscape architecture design processes (Olszewska et al., 2023a). Moreover, user-centered and evidence-based design approaches largely remain separate, if they are applied at all. As a result, limited knowledge exists on how evidence-based design qualities for green spaces align with students' actual needs, use and experiences in regards to mental health and well-being.

To address this gap, the present study evaluates how the design of campus green spaces at the University of Fribourg supports students' mental health and wellbeing. Specifically, it combines an evidence-based expert assessment of contemplative landscape qualities (CLM) with a user-centered investigation of students' perceptions and needs, including a subjective CLM assessment, open questions on space use, perceived positive and negative aspects in relation to well-being, and closed questions examining factors influencing mental health and well-being. In doing so, the study not only applies the CLM framework but also examines the extent to which it captures students' lived experiences and identifies aspects of well-being that may not be sufficiently addressed by the model. This enables to derive design recommendations for university campus green spaces that more effectively promote students' mental health and well-being.

The study is guided by the following research questions:

RQ1: How do students perceive and experience the University of Fribourg's campus green spaces in relation to their mental well-being and mental health?

RQ2: To what extent do the University of Fribourg's campus green spaces exhibit contemplative landscape qualities as defined by the Contemplative Landscape Model (CLM)?

RQ3: In what ways does the current design of the University of Fribourg's campus green spaces differ from students' needs and perceptions of mental well-being, and from expert-based contemplative landscape assessment?

RQ4: What design recommendations can be formulated for the University of Fribourg's campus green spaces, based on the user-centered survey, CLM assessment, and literature, to better support student's mental well-being?

## 2 Theoretical Background

### 2.1 Mental Health and Well-being

#### 2.1.1 Definition "Mental Health and Well-being"

In this study, mental well-being and mental health are defined according to WHO: "Mental health is a state of well-being in which an individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and is able to make a contribution to his or her community" (World Health Organization, n.d.). Mental and psychosocial disorders are therefore only considered part of mental (World Health Organization, n.d.). Further, Mental Health is shaped by social, environmental and individual determinants (Roe & McCay, 2021; World Health Organization, n.d.).

#### 2.1.2 Students' Mental Health

University students are particularly vulnerable to mental health challenges (Asim et al., 2023; Guo et al., 2023). Academic pressure, social adjustment, professional uncertainty, and economic stress can all increase this vulnerability (Cui et al., 2025; Lau & Yang, 2009; Li et al., 2025). The transition to university may be especially difficult for students with a history of mental disorders, as new environments and demands can worsen existing symptoms or contribute to the onset of further difficulties (Asim et al., 2023; Li et al., 2025).

Mental health problems can, in turn, affect students' academic performance, daily life, and continuation of studies (Li et al., 2025). In Switzerland, the second biggest reason to drop out is due to stress, with 53 % of students suffering from depression (VSS Verband der Schweizer Studierendenschaften, 2023, according to BfS 2021). These challenges may also extend beyond university, as approximately 14% of graduates enter employment with moderate to severe depression, with higher numbers when other mental health conditions are considered (VSS Verband der Schweizer Studierendenschaften, 2023, according to BfS, 2021). Supporting student well-being is therefore important not only for students themselves, but also for their academic trajectories and future working lives.

### 2.2 Environment and Mental Health

#### 2.2.1 The Built and Natural Environment

The relationship between humans and their environment is inherently bidirectional:

environmental conditions shape human behaviour, social dynamics and emotional reactions, simultaneously people directly influence their surroundings (Owens et al., 2023, S. 7). This interaction is significant as people spend the majority of their time in built environments (Kals et al., 2023). The built environment refers to those aspects of the physical world that are constructed by humans, as opposed to occurring naturally (Cambridge University Press & Assessment, n.d.).

Generally, the built environment shapes health outcomes through its spatial structure, design and how it is resourced (Donald, 2022). Further, it's influence on mental health and well-being are influenced through direct and indirect effects (Evans, 2003). Direct effects include exposure to environmental stressors such as crowding, noise, and air pollution. Indirect effects operate through psychosocial processes, including social interaction, perceived safety, sense of control, and opportunities for psychological restoration (Evans, 2003). When adverse environmental conditions persist over time, they can activate physiological stress systems and thereby contribute to long-term negative health outcomes (Steg et al., 2018). ~~Our environments have the potential to restore our well-being. Restoration refers to the positive impact an environment can have on recovering both our physiological and psychological states, ultimately contributing to our overall well-being (Donald, 2022). Specifically, being in a restorative environment helps us recover from stress, mental fatigue, and daily challenges (Roe & McCay, 2021). Nature is considered one of the most restorative elements, greatly benefiting mental health (Flade, 2020a).~~

In contrast, research in environmental psychology has shown that exposure to nature has a health promoting effect, particularly on mental health and well-being (Berg et al., 2003; Hartig et al., 2003; Kaplan & Kaplan, 1989; Lau & Yang, 2009; Ulrich et al., 1991). Contact with nature has been shown to reduce stress, improve mood and attention, and support cognitive restoration (Berg et al., 2003; Hartig et al., 2003; Kaplan & Kaplan, 1989; Lu & Fu, 2019; Ulrich et al., 1991). Moreover, individuals experiencing higher levels of stress tend to show a stronger preference for natural environments (Berg et al., 2003).

Beyond these general effects, certain landscape characteristics have been associated with measurable relaxation patterns in the brain, further highlighting the restorative potential of well-designed environments (Olszewska-Guizzo et al., 2022). In the urban context, green spaces therefore represent a valuable restorative source (Hartig et al., 2003), capable of mitigating the negative influence of built environments on mental health and help improve the well-being Olszewska et al., 2023a).

Overall, well-being within a given space is closely associated with both its physical structure and its aesthetic qualities (Owens et al., 2023). In summary, exposure to specific types of environments can help restore individuals to a calmer, less stressed state of mind (Donald, 2022).

### **2.2.2 Safety and Maintenance**

Neighborhoods and their environmental attributes play an important role in shaping safety, which in turn influences mental health and well-being (Infantino et al., 2024; Putrik et al., 2019). A lack of safety may contribute to chronic stress, a major pathway through which environmental conditions can affect disease risk (Brosschot et al., 2017). Conversely, a sense of safety enables individuals to relax and recharge (Reichl, 2018), which ~~therefore in turn~~ allows for restoration and well-being ~~to occur~~.

There are two dimensions of safety, actual and perceived, which together shape how comfortable individuals feel in a space and how they engage with it (Owens et al., 2023). Actual safety refers to objective conditions that may expose individuals to harm or danger, such as obstructed visibility or unsafe pedestrian infrastructure (Owens et al., 2023). In contrast, perceived safety reflects individuals' subjective sense of security, which is influenced by a range of factors including physical features, social context, and personal characteristics such as past experiences or gender (Owens et al., 2023; Ross & Mirowsky, 2009). Importantly, when green spaces are perceived as unsafe, they are less likely to be used (Olszewska et al., 2023a).

### **2.2.3 Privacy, Crowding and Social interaction**

Altman (1976) defines privacy as “a dialectic process involving both a closing off of the self and an opening of the self to others” (p. 27), emphasizing that it is not a fixed state but a dynamic, continuously adjusted process (Donald, 2022). In this sense, privacy enables individuals to control access to themselves and manage social interaction, including how visible or exposed they feel within a given environment (Altman, 1976; Donald, 2022). Importantly, privacy does not imply solitude, but rather the ability to choose whether to engage with others or withdraw when needed (Olszewska et al., 2023a).

When this regulatory capacity is compromised, individuals may experience crowding. Crowding refers to a negative psychological experience that arises when the number of people in a space exceeds an individual's preferred level or when the environment fails to support their needs (Donald, 2022). It is important to distinguish crowding from social density, which refers to the objective number of people per unit of space (Donald, 2022). The same level of

density may be perceived differently depending on context, expectations, and the intended use of the space (Donald, 2022). Crowding poses an issue as it can impair the regulation of social interaction, increasing stress due to personal space invasion, and lead to social withdrawal (Steg et al., 2018).

This is particularly relevant given that social relationships and interaction are a key determinant of health and well-being (Owens et al., 2023; Steg et al., 2018). While social stressors represent some of the most significant challenges individuals face (Wood & Bhatnagar, 2015), strong social connections have been linked to lower mortality rates (Holt-Lunstad et al., 2010). The built environment therefore plays a crucial role in shaping how social interaction is experienced. Well-designed spaces can support both social engagement and withdrawal, enabling individuals to regulate their level of interaction according to their needs (Owens et al., 2023). Thus, when spaces are appropriately sized and structured in relation to their intended use, they can reduce experiences of crowding and enhance perceived privacy (Owens et al., 2023).

#### ***2.2.4 Personal Control & Appropriation***

According to Hong et al. (2021), a sense of control is a key factor in supporting overall health. It is associated with healthier behaviors, including increased physical activity and improved sleep, as well as higher psychological well-being, greater life satisfaction, and more positive affect. Furthermore, it is linked to lower psychological distress, fewer depressive symptoms, reduced loneliness, and increased social interaction. In environmental contexts, the design of space can play a crucial role in facilitating this sense of control. Well-designed environments can support individuals in regulating their interactions with the surroundings, thereby enhancing perceived control and even reducing negative social behaviors (Liu et al., 2024).

A key concept in this regard is place appropriation, which goes beyond mere use of space, as it describes the process through which individuals actively adapt, modify, or “claim” an environment to better fit their needs (Sant’Anna et al., 2024). Finally, the concept of psychological ownership further reinforces the importance of control and appropriation. When individuals feel a sense of ownership over a space, they are more likely to care for and protect it, as well as engage more actively with it (Preston & Gelman, 2020).

#### ***2.2.5 Inclusive and Accessible Design,***

Inclusive and accessible design within the architectural domain is defined as follows (Mulligan et al., 2018, S. 237): “Inclusive design, also referred to as universal design,

accessible design, and barrier free design is an international concept that is intended to allow environments to be inclusive of all people.”. More specifically, urban and landscape design needs to consider people of all genders, ages, all sorts of abilities and needs (eg. Cognitive, physical and sensory), all well as diverse social and cultural backgrounds (Roe & McCay, 2021). Accessible and inclusive spaces are crucial, as they ensure that everyone can access and benefit from spaces that support mental health and well-being, while reducing social isolation (Roe & McCay, 2021).

### **2.2.6 *Physical Activity***

Physical activity provides substantial mental health and well-being benefits (Roe & McCay, 2021; von Stammoggy et al., 2020). For instance, according to Roe & McCay (2021), it supports cognitive health, such as memory and attention, and improves the ability to deal with stress and regulate mood through the release of endorphins. In addition, physical activity benefits sleep quality, which is highly conducive to good mental health and well-being as sleep is considered a protective factor. Furthermore, being physically active increases the likelihood of spending time in environments that positively influence mental well-being. When physical activity takes place in these restorative settings, it can also facilitate social interaction and foster a sense of inclusion, which further supports mental health and well-being.

## **2.3 The Contemplative Landscape Model (CLM)**

The Contemplative Landscape Model (CLM) was developed by Olszewska-Guizzo (2023) as an evidence-based design framework grounded in empirical neuroscientific research (see Appendix A). It is primarily intended for professionals such as landscape architects, architects, and planners, as well as students and trainees in these fields (Olszewska-Guizzo, 2023a; Olszewska-Guizzo et al., 2022).

The model functions as an analytical tool to evaluate the quality of urban green spaces in relation to mental health and well-being by identifying spatial attributes that benefit mental health and well-being (Olszewska-Guizzo, 2023a). These attributes define so-called contemplative landscapes, which have been shown to reduce stress and mental fatigue, support mood regulation, and evoke positive emotions (Olszewska et al., 2016; Olszewska-Guizzo, 2023a). In this context, contemplation is understood as passive recreation, meaning that passive exposure to contemplative spaces benefit mental health and well-being (Olszewska et al., 2016; Olszewska et al., 2023a; Olszewska-Guizzo et al., 2022).

Importantly, different levels of contemplative quality are associated with distinct neural responses. Higher CLM scores are linked to increased frontal alpha and theta brainwave activity, which are associated with relaxation and mindfulness (Olszewska et al., 2023a; Olszewska-Guizzo et al., 2022). This indicates that not all green spaces have the same effects on mental health, and that specific spatial qualities play a key role (Olszewska-Guizzo, 2023).

The CLM evaluates landscapes through seven key qualities (Olszewska et al., 2023a; Olszewska-Guizzo et al., 2023b). These include “Layers of Landscape”, which describe whether foreground, middle ground, and background can be distinguished, as well as whether distant views are possible. “Landform” assesses how natural the topography appears and whether the space invites an upward orientation, such as looking towards the sky. “Biodiversity” captures whether vegetation appears natural and native, as well as whether a high diversity of plant and animal species is present. “Color and Light” refer to the perception of natural variations in light and shade across the day and seasons, as well as natural colors present. “Compatibility” describes the visual harmony and spatial order of a landscape, including the balance between natural and artificial elements and the level of maintenance. “Archetypal Elements” refer to features that can evoke a contemplative experience, such as old trees, water bodies, or clearings. Finally, “Character of Peace and Silence” captures the extent to which a space contrasts with the surrounding urban environment and provides a sense of calmness, solitude, and comfort, including whether the space feels safe and invites to rest and relax.

Furthermore, individual CLM categories are associated with different patterns of brain activity. In particular, Layers of Landscape, Archetypal Elements, Character of Peace and Silence, and Biodiversity have been linked to increased frontal alpha and theta activity (Olszewska-Guizzo et al., 2022). These findings inform a prioritization of design elements that are especially beneficial for mental health and well-being (Olszewska-Guizzo et al., 2023b).

## **2.4 User-Centered Design in Landscape Architecture**

User-centered design (UCD) is a design approach that focuses on the needs, experiences, and preferences of end users throughout the planning process (Xavier, 2022). In architectural contexts, UCD involves systematic user research and testing to ensure that built environments are functional, and supportive for their intended users (Xavier, 2022). Although UCD has become more popular within architectural design (Xavier, 2022), its systematic application remains limited (Mantaib et al., 2025).

Research suggests that incorporating users' needs and preferences enhances user satisfaction, frequency of use, and the overall effectiveness of designed spaces (Xavier, 2022). In the university context specifically, Arafat et al. (2024) demonstrate that applying user-centered principles in campus building design allows to meet students' needs and preferences without sacrificing professional work practice. Owens et al. (2023) argue that landscape architects should consider users' needs, the existing spatial conditions, the site's design potential, and possible uses that are not yet supported by the current design. The planner itself places certain expectations on the space through the design, which may contradict what the users value and need from the space. It happens frequently that there is a mismatch between what the users want and what the actual outdoor space offers. Especially since design is not aimed at only one user, but there are multiple different types of users and it is not always possible to meet all needs (Lanter & Essinger, 2017). In this context, the concept of affordance is useful, as it helps to understand how a space or its elements are actually used in practice, the range of possible uses, and how these may differ from designers' expectations (Owens et al., 2023). This illustrates the need to integrate user' needs and experiences throughout the design process rather than relying solely on assumptions (Owens et al., 2023).

By responding to diverse user needs and anticipating varying patterns of use, designers can foster inclusive environments that support social integration and well-being (Owens et al., 2023). This perspective is particularly relevant in campus settings, where green spaces must accommodate diverse activities, ranging from social interaction to solitude and restoration.

## **2.5 Campus Green Spaces**

University Campus Green spaces are defined as university outdoor spaces with natural, greenery elements which can positively influence student's mental health and well-being (Malekinezhad et al., 2020).

They are considered a crucial part of students' daily lives (Foellmer et al., 2021), as they are not only a place of study and work but are also used as a place of restoration and stress reduction (Foellmer et al., 2021; Lu & Fu, 2019; Pullman, 2025).

Indeed, research consistently highlights the importance of campus green spaces in regards to promoting students' well-being and health (Cui et al., 2025; Holt et al., 2019; Pullman, 2025). However, according to Holt et al. (2019), these benefits depend on active engagement with a space, especially when it is well-maintained.

Foellmer et al. (2021) proposed the concept of "Healthy Academic Greenspace" as a form of therapeutic environment, encompassing all campus green spaces that improve students' physical, mental, and social well-being. This effect is not only shaped by their

physical and material characteristics, but more importantly by personal experiences, identity-forming elements, emotional attachments, subjective meanings, and social connection.

Subsequently, it is paramount to have optimally designed campus green spaces as they are a resource for improving mental well-being as well as restoration (Aghabozorgi et al., 2025; Cui et al., 2025; Guo et al., 2023).

## **2.6 The Present Study**

This study adopts a user-centered, mixed-methods design approach by integrating evidence-based expert assessments, Contemplative Landscape Model (CLM), with students' subjective perceptions of two campus green spaces of the University of Fribourg (Regina Mundi and Pérolles 21). Data were collected through a survey consisting of closed-ended as well as open-ended questions and an adapted version of CLM (Olszewska et al., 2023a). No formal hypotheses were formulated, as the study follows an exploratory and design-oriented approach. Rather than testing causal relationships through independent and dependent variables, the research focuses on key constructs such as students' perceived well-being, their needs and experiences for campus green spaces and contemplative landscape qualities. These dimensions are analyzed descriptively and comparatively to inform evidence-based design recommendations.

The study is guided by the following research questions:

RQ1: How do students perceive and experience the University of Fribourg's campus green spaces in relation to their mental well-being and mental health?

RQ2: To what extent do the University of Fribourg's campus green spaces exhibit contemplative landscape qualities as defined by the Contemplative Landscape Model (CLM)?

RQ3: In what ways does the current design of the University of Fribourg's campus green spaces differ from students' needs and perceptions of mental well-being, and from expert-based contemplative landscape assessment?

RQ4: What design recommendations can be formulated for the University of Fribourg's campus green spaces, based on the user-centered survey, CLM assessment, and literature, to better support student's mental well-being?

## **3 Methods**

### **3.1 Participants**

The expert CLM assessment was conducted with a total of four participants, including the author. The sample consisted of one trained architect, one trained landscape architect, and

two landscape architecture students in training, one of whom was the author. All participants were female.

The user-centered survey included 96 participants in total; 56 evaluated the Regina Mundi campus, 92 evaluated Pérolles 21, and 55 evaluated both sites. Detailed sample characteristics are presented in Table 1. Participants were eligible if they were enrolled at the University of Fribourg at Bachelor, Master, or PhD level, had previously used the Regina Mundi and/or Pérolles 21 campus green spaces, and were fluent in English, German, or French. Recruitment primarily targeted psychology students, as the study was conducted within the psychology faculty. Accordingly, participants were recruited via digital flyers (see Appendix B) distributed through a psychology students' WhatsApp group used for study participation opportunities, with participation contributing to required experimental hours within the psychology program.

**Table 1:**

*Sample User-Centered Survey*

| Campus             |                   | Total Sample             | Regina Mundi<br>Sample | Pérolles 21 Sample |
|--------------------|-------------------|--------------------------|------------------------|--------------------|
| <b>Sample Size</b> |                   | 96<br>(55 answered both) | 56                     | 92                 |
| <b>Gender</b>      | diverse           | 1                        | 1                      | 1                  |
|                    | men               | 9                        | 4                      | 8                  |
|                    | women             | 86                       | 51                     | 83                 |
| <b>Age</b>         | <i>M</i>          | 21.61                    | 21.93                  | 21.66              |
|                    | <i>SD</i>         | 2.03                     | 2.22                   | 2.04               |
| <b>Native</b>      | French            | 57                       | 29                     | 54                 |
| <b>Language</b>    |                   |                          |                        |                    |
|                    | German            | 19                       | 17                     | 19                 |
|                    | Italian           | 15                       | 8                      | 24                 |
|                    | Other             | 5                        | 2                      | 5                  |
| <b>Degree</b>      | Bachelor          | 94                       | 54                     | 90                 |
|                    | Master            | 2                        | 2                      | 2                  |
| <b>Subject</b>     | Psychology        | 94                       | 54                     | 90                 |
|                    | Education Science | 1                        | 1                      | 1                  |

The larger sample size for P  rolles 21 can be explained by the higher number of students attending courses on this campus.

## **3.2 Measures & Instruments**

### **3.2.1 CLM**

For an in-depth description of the CLM and its categories, see Chapter 2.3. The assessment consists of seven categories rated on a 1–6 scale, with scores grouped into three ranges (1–2, 3–4, 5–6), each associated with a shared descriptor (see Appendix A). Experts evaluate each category individually, either through on-site assessment or based on photographs. Each category encompasses multiple underlying themes, which are aggregated into a single score. As a result, the score reflects the overall best fit, even if individual subcategories do not fully align with it.

The assessment yields both category-specific scores and an overall contemplative score of the landscape. Scores above 4.33 indicate highly contemplative environments, which are associated with beneficial effects on mental health and well-being. Scores between 3.83 and 4.33 are considered average, suggesting limited positive effects, while scores below 3.83 indicate low contemplative quality and are associated with increased stress or cognitive load. (Olszewska et al., 2016; Olszewska et al., 2023a).

### **3.2.2 User-Centered Student survey**

The user-centered survey (see Appendix C) was developed by the author and structured into multiple parts to distinguish between students' experiences of campus green spaces and their perceived support for mental health & well-being.

The first block collected demographic information and how often students use the green space, followed by questions on participants' ideal campus green space design and their familiarity with Regina Mundi and/or P  rolles 21. This was followed by three blocks. It began with the subjective CLM assessment, in which students were presented with the same photographic material used in the expert assessment (see Appendix D).

The original CLM was slightly adapted by adding brief descriptions where necessary to enhance comprehension (see Appendix C). Additional questions were then included to address factors identified in the literature as relevant to mental health and well-being (see Chapters 2.1–2.5) that are not, or only indirectly, captured by the CLM. This was necessary because the CLM aggregates multiple experiential dimensions into broader categories,

limiting the clarity of individual perceptions. For instance, safety, rest and relaxation, and crowding are partly reflected within “Character of Peace and Silence”, while maintenance is included under “Compatibility”. Solitude-related experiences also extend beyond the CLM, as they involve privacy regulation, social interaction, and perceived connectedness or isolation. Therefore, additional dimensions were assessed separately, including physical activity, inclusive and accessible design, personal control, privacy regulation, feeling observed, usability under different weather and seasonal conditions, perceived air quality, and overall well-being.

The seven Likert items assessed how inclusive and accessible the space is perceived to be (“This space feels welcoming to people from diverse backgrounds”; “This space is accessible to people with different abilities (e.g. social, cognitive, physical).”). Further items addressed personal control (“I can use the space in different ways depending on my needs.”), the ability to regulate privacy (“This space allows me to choose how private or social I want to be.”), the influence of weather (“Weather (rain, heat, cold, sun etc.) conditions limit how I use this space.”), feeling observed (“When spending time in this space, I feel observed by others.”), and overall well-being (“Spending time in this space supports my general well-being.”). Likert scales were used because these items represent evaluative statements rather than bipolar dimensions, with response options ranging from 1 (totally disagree) to 6 (totally agree).

In addition, a semantic differential scale with nine bipolar items was included. These assessed environmental stressors such as air quality (“The air quality in the space is poor. – The air quality in the space is good.”) and crowding (“The number of people in the space feels uncomfortable. – The number of people in the space feels comfortable.”), as well as social interaction (“The space discourages social interaction. – The space encourages social interaction.”), solitude (“It's hard to find solitude in this space. – I can easily be in solitude in this space.”), social isolation or connection (“I feel isolated from others in this space. – I feel connected to others in this space.”), physical activity (“The space encourages me to move. – The space encourages me to linger and stay.”), maintenance (“The space appears neglected. – The space appears well maintained and taken care of.”), safety (“The space makes me feel unsafe. – The space makes me feel safe.”), and restoration (“The space does not encourage me to rest and relax. – The space encourages me to rest and relax.”).

The final block included three open-ended questions on how students use the space, as well as its positive and negative influences on their well-being. As two campuses were

evaluated, this structure was repeated for each campus. For participants familiar with both campuses, the order of presentation was randomized.

The survey was developed in English and translated into French and German. As the author's native language is German and the author is proficient in English, the German version was translated directly and back-translated to verify accuracy. The French version was translated using DeepL SE (2026) and back-translated into English. All versions were reviewed by a trilingual speaker to ensure clarity and semantic equivalence.

### **3.2.3 Pretest**

A total of nine participants took part in the pretest survey (see Appendix E); however, two submitted empty surveys. Consequently, data from seven completed pretest surveys were included in the analysis. Participants were instructed to answer the closed-ended questions, while the open-ended questions were optional and intended to assess the comprehensibility of the survey. At the end, participants were given the opportunity to provide general comments on difficulties encountered and suggestions for improvement.

As this is a user-centered design research project, the pretest and its quantitative analysis were not intended to draw psychometric conclusions. Due to the small sample size, this analysis was purely descriptive. Response patterns were visually examined at the individual level to identify potential inconsistencies (See Appendix F). Based on this, some semantic differential items were adjusted, as opposing response anchors were too similar and may have led to unintentional errors.

The open-ended responses did not require a formal thematic analysis due to the limited number of comments. Nevertheless, several changes were implemented based on participant feedback. First, French and German were added as survey languages to broaden the target audience. Second, the order of campus evaluation was randomized to reduce potential fatigue effects. Third, the introductory text was shortened, and information on required experimental hours was added once confirmed. Fourth, photographs were included alongside maps to clarify questions about prior use of Pérolles 21 and Regina Mundi. To reduce survey fatigue, the subjective CLM questions were returned to their original format, with added explanations to support comprehension. This reduced the number of items and enabled comparison with the expert CLM assessment. Some items from the first version were retained to capture more specific perceptions, such as perceived safety, rather than addressing them only within broader CLM categories.

### 3.3 Material

#### 3.3.1 Study Sites

The study sites selected for this research are campus green spaces part of the University of Fribourg (1700 Fribourg, Switzerland): Regina Mundi (Rue P.-A. Faucigny 2) and Pérolles 21 (Bd de Pérolles 90). Photographs and maps can be found in Appendix D.

Regina Mundi is a courtyard-like campus space enclosed by buildings on three sides. It is located adjacent to a main road, with residential houses situated along one side of the site. It consists of mature trees, shrubs, a pond-like fountain, as well as an access road leading into the campus. It is part of an older church building, which contributes to its overall character.

**Figure 1:**

*Regina Mundi Campus Green Space*



Pérolles 21, in contrast, is a long, linear urban courtyard surrounded by university buildings. On two sides, the space is bordered by extended building façades with large window fronts. A main road directly borders the site and is clearly visible from within the campus area. A wooded area is located nearby. The space is characterized by solitary trees and a dominance of gravel, concrete, and asphalt surfaces.

**Figure 2:**

*Pérolles 21 Campus Green Space*



The sites were selected due to their relevance for the target group of this study. As the research was conducted within the psychology faculty, and psychology students attend the majority of their classes at Regina Mundi and Pérolles 21, both locations represent frequently used campus environments for the participants.

### **3.3.2 Photographs**

The photographs (see Appendix D) used in the study were taken by the author during the fall of 2025. Images were captured using a wide-angle lens as suggested to document the campus spaces from multiple perspectives (Olszewska et al., 2023a; Olszewska-Guizzo et al., 2023b). The photographs were taken on an overcast day, without direct sunlight, when the trees still retained their foliage.

## **3.4 Procedure**

### **3.4.1 Expert CLM Assessment**

The evaluation followed the photo-based methodology proposed by Olszewska-Guizzo et al. (2023) (see Chapter 4.4.2). Experts received a PDF file containing photographs of the campus green spaces and maps indicating the corresponding locations (see Appendix G). Using the CLM assessment sheet, they evaluated each space according to the seven CLM categories and assigned a score from 1 to 6 for each category. As two numerical scores corresponded to one description, experts were required to decide which score best reflected their expert evaluation of the scene. Explanatory comments were added to the assessment sheet to support comprehension, as the model can be challenging to interpret for first-time users. Any questions during the assessment process could be addressed directly to the author.

### **3.4.2 Student survey**

Data were collected between 20<sup>th</sup> February 2026 and 19<sup>th</sup> March 2026. Participants accessed the survey via QR code or link provided on the distributed flyer using a mobile device or computer on a website called “unipark.de” (Tivian XI GmbH, n.d.). Participation was voluntary, and participants could withdraw at any time without negative consequences. To begin the survey, they had to accept the participation conditions, followed by demographic questions and an open-ended. Participants were then asked whether they had previously used the Pérolles 21 and/or Regina Mundi campus green spaces. If they indicated familiarity with a site, they proceeded to complete the corresponding survey section. For participants familiar with both campuses, the survey for the second campus was presented subsequently.

Participants were instructed to rate their perception of the P  rolles 21 or Regina Mundi campus green space on a 1–6 scale, considering their own experiences across different weather and seasonal conditions rather than relying solely on the provided photos.

The duration of the survey ranged between approximately 15 and 40 minutes, depending on whether participants completed the survey for one or both campus green spaces, as well as on the level of detail provided in the open-ended responses.

### **3.5 Data Analysis**

#### **3.5.1 *Qualitative Analysis***

The coding process was conducted using the open-source qualitative analysis software Taguette (Taguette Project, 2023). The qualitative analysis followed a six-step approach (Ahmed et al., 2025), combining both inductive (data-driven) and deductive (concept-driven) strategies. First, the responses to each open-ended question (ideal design, positive aspects, negative aspects, and usage) were reviewed for each campus to ensure familiarity with the responses. A first coding frame was then developed based on categories from the Contemplative Landscape Model (CLM), including layers of landscape, landform, biodiversity, color and light, compatibility, archetypal elements, and character of peace and silence, with corresponding subcategories. In parallel, an inductive approach was applied to identify themes not captured by the CLM framework. Initially, all responses were coded openly, generating a large number of preliminary codes (e.g. trees, shade, eating, meeting friends), which were then grouped into broader categories. The framework was revised multiple times to avoid overlaps and develop coherent themes and subthemes. A single statement could receive multiple codes; however, repeated instances of the same code within one participant’s response were counted only once. Once the final coding framework was established, the frequency of each code was quantified.

Only themes mentioned by at least two participants were included in the final coding framework to focus on recurring patterns and maintain analytical clarity. However, less frequent responses were still considered during interpretation when relevant.

#### **3.5.2 *Quantitative Analysis***

Quantitative data were analyzed using RStudio (Posit Software, 2026). Descriptive statistical analyses were conducted to summarize participants’ evaluations of the campus green spaces. For each variable, including CLM dimensions, semantic differential items, and Likert-scale measures, means and standard deviations were calculated. To examine relationships between variables, Pearson’s correlation coefficients were computed for selected

theoretically relevant factors. These included subjective CLM dimensions, semantic differential items and Likert-scale measures. The analyses focused in particular on relationships associated with overall well-being and with rest and relaxation. Statistical significance was assessed at the  $p < .05$  level. No weighting procedures were applied, as the analyses were conducted separately for Regina Mundi and P  rolles 21 rather than for direct comparison.

Expert-based CLM assessment scores were analyzed separately and descriptively compared with students' subjective evaluations to identify similarities and differences in perceived landscape qualities.

## 4 Results

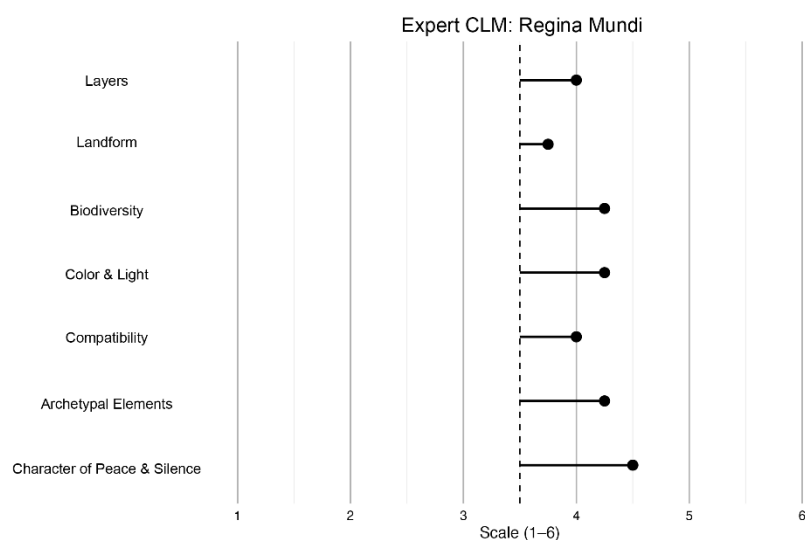
### 4.1 Quantitative Analysis

#### 4.1.1 Expert CLM Assessment

For Regina Mundi, the overall expert CLM score indicated an average contemplative level ( $M = 4.14$ ,  $SD = 0.89$ ). Most CLM dimensions fell within the average range, including "Layers of Landscape" ( $M = 4.00$ ,  $SD = 0.82$ ), "Biodiversity" ( $M = 4.25$ ,  $SD = 0.50$ ), "Color and Light" ( $M = 4.25$ ,  $SD = 1.50$ ), "Compatibility" ( $M = 4.00$ ,  $SD = 0.82$ ), and "Archetypal Elements" ( $M = 4.25$ ,  $SD = 1.26$ ). "Character of Peace and Silence" showed the highest mean score ( $M = 4.50$ ,  $SD = 0.58$ ). In contrast, "Landform" presented a lower score compared to the other dimensions ( $M = 3.75$ ,  $SD = 0.96$ ).

**Figure 3:**

*Expert CLM Scores for Regina Mundi*

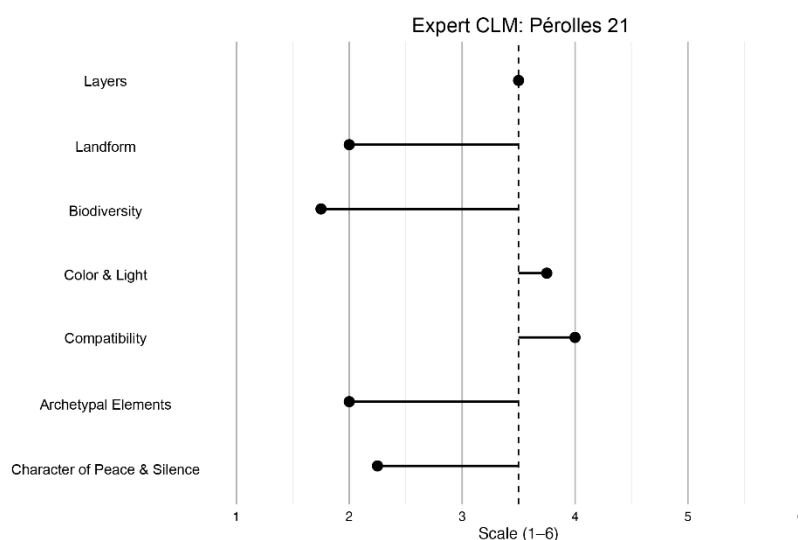


*Note.* The dashed vertical line represents the midpoint of the 1–6 scale (3.5) and is included as a visual reference for interpreting whether ratings fall toward the lower or higher end of the scale.

The expert-based CLM assessment indicated that the Pérolles 21 campus green space exhibits low levels of contemplative landscape qualities, with an overall mean score of 2.75 ( $SD = 1.29$ ). Most CLM dimensions fell within the low range, including “Layers of Landscape” ( $M = 3.50$ ,  $SD = 1.29$ ), “Landform” ( $M = 2.00$ ,  $SD = 0.00$ ), “Biodiversity” ( $M = 2.00$ ,  $SD = 0.50$ ), “Color and Light” ( $M = 3.75$ ,  $SD = 0.96$ ), “Archetypal Elements” ( $M = 2.00$ ,  $SD = 1.41$ ), and “Character of Peace and Silence” ( $M = 2.00$ ,  $SD = 1.26$ ). “Compatibility” was the only dimension reaching an average level ( $M = 4.00$ ,  $SD = 1.15$ ).

**Figure 4:**

*Expert CLM Scores for Pérolles 21*



*Note.* The dashed vertical line represents the midpoint of the 1–6 scale (3.5) and is included as a visual reference for interpreting whether ratings fall toward the lower or higher end of the scale.

#### 4.1.2 *Regina Mundi*

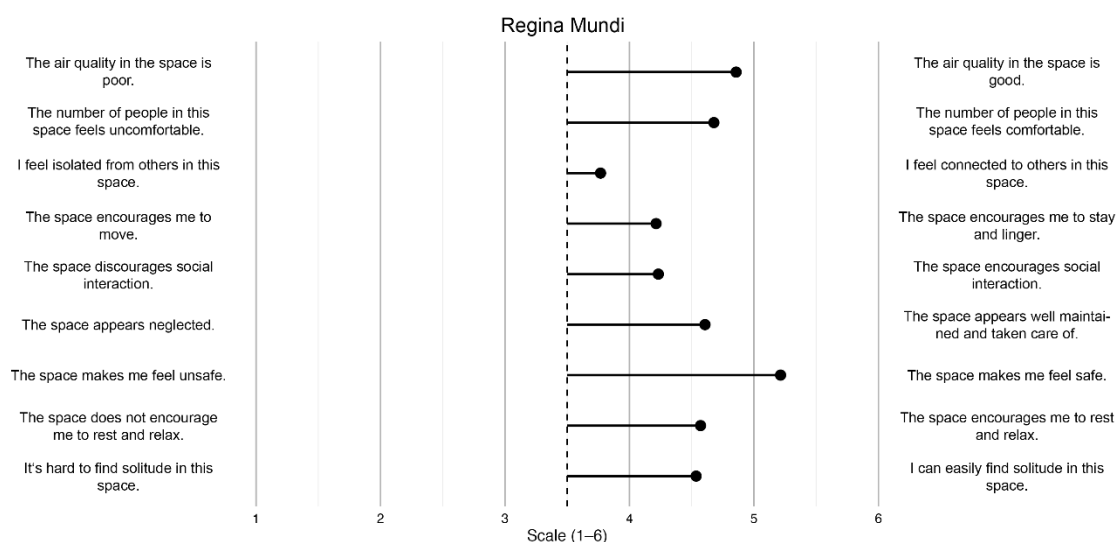
The subjective CLM results for Regina Mundi indicated generally high ratings across all dimensions (see Appendix H). Specifically, “Layers of Landscape” ( $M = 4.23$ ,  $SD = 1.11$ ) and “Biodiversity” ( $M = 4.27$ ,  $SD = 0.26$ ) fell within the average range, while “Landform” ( $M = 4.45$ ,  $SD = 1.04$ ), “Color and Light” ( $M = 4.79$ ,  $SD = 1.06$ ), “Compatibility” ( $M = 4.68$ ,  $SD = 0.99$ ), “Archetypal Elements” ( $M = 4.48$ ,  $SD = 1.01$ ), and “Character of Peace and Silence” ( $M = 4.82$ ,  $SD = 0.94$ ) show high scores. The overall subjective CLM score was average ( $M = 4.53$ ,  $SD = 0.89$ ).

The analysis of the semantic questions for Regina Mundi showed generally positive evaluations of several environmental and social factors (see Figure 5). Perceived air quality was rated highly ( $M = 4.86$ ,  $SD = 1.20$ ), and the space was considered well maintained ( $M = 4.61$ ,  $SD = 1.50$ ). In addition, students reported feeling safe within the space ( $M = 5.21$ ,  $SD = 1.12$ ), representing one of the highest-rated dimensions. With regard to social and behavioral aspects, the space was perceived as moderately encouraging social interaction ( $M = 4.23$ ,  $SD = 1.26$ ) and allowing a moderate sense of connection to others ( $M = 3.77$ ,  $SD = 1.19$ ). Similarly, the space was rated as moderately supportive of passive use and lingering ( $M = 4.21$ ,  $SD = 1.34$ ), as well as rest and relaxation more generally ( $M = 4.57$ ,  $SD = 1.25$ ). The ability to find solitude when desired was also rated at a moderate level ( $M = 4.54$ ,  $SD = 1.33$ ). Interestingly, perceived crowding received a relatively high mean score ( $M = 4.68$ ,  $SD = 1.21$ ), suggesting that students do not generally experience the space as overly crowded.

Descriptive analyses indicated generally moderate to positive evaluations across the assessed dimensions (see Figure 6). Perceived accessibility was relatively high ( $M = 4.70$ ,  $SD = 1.23$ ), and the environment was rated as welcoming ( $M = 5.07$ ,  $SD = 1.04$ ). Appropriation of the space showed a mean of  $M = 4.41$  ( $SD = 1.28$ ), while perceived limitations due to weather were comparable ( $M = 4.38$ ,  $SD = 1.24$ ). Participants reported lower levels of feeling observed ( $M = 2.95$ ,  $SD = 1.23$ ) relative to the other dimensions. The perception that the environment supports general well-being was moderate ( $M = 4.04$ ,  $SD = 1.17$ ), and the extent to which the space was experienced as private versus social was also moderate ( $M = 4.18$ ,  $SD = 1.28$ ).

**Figure 5:**

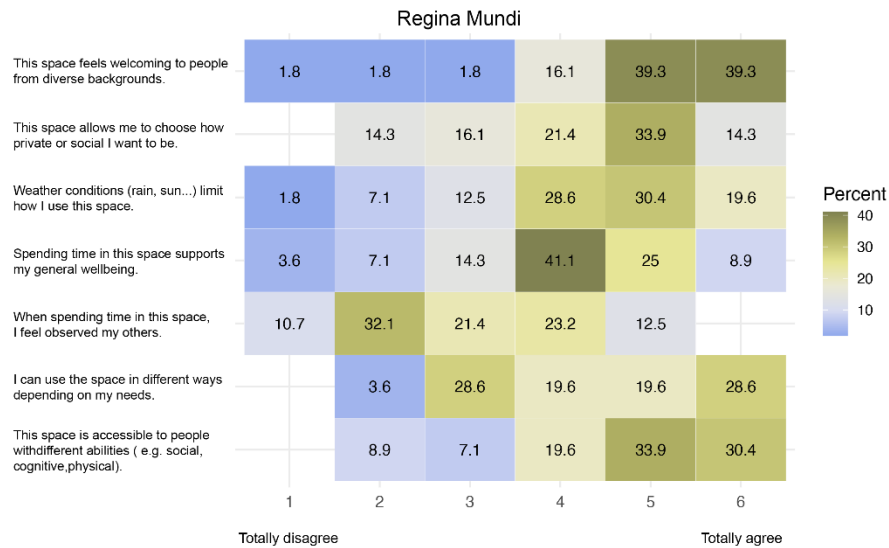
*Semantic Questions Scores for Regina Mundi*



*Note.* The dashed vertical line represents the midpoint of the 1–6 scale (3.5) and is included as a visual reference for interpreting whether ratings fall toward the lower or higher end of the scale.

**Figure 6:**

*Likert Questions Scores for Regina Mundi*



Perceived general well-being was positively associated with safety,  $r(54) = .34, p = .011$ ; rest and relaxation,  $r(54) = .58, p < .001$ ; ability to find solitude,  $r(54) = .57, p < .001$ ; lower crowding,  $r(54) = .29, p = .030$ ; regulation of privacy and social interaction,  $r(54) = .55, p < .001$ ; social connection,  $r(54) = .38, p = .004$ ; and personal control over the space,  $r(54) = .55, p < .001$ . No significant association was found with encouragement of social interaction,  $r(54) = .19, p = .161$ . General well-being was strongly positively associated with movement,  $r(54) = .67, p < .001$ , but not with weather-related limitations,  $r(54) = -.12, p = .373$ , or feeling observed,  $r(54) = -.23, p = .095$ . Pearson correlation analyses revealed several relationships between environmental perceptions and spatial experience. Rest and relaxation were positively associated with character of peace and silence,  $r(54) = .43, p < .001$ ; lower crowding,  $r(54) = .34, p = .010$ ; ability to find solitude,  $r(54) = .59, p < .001$ ; personal control,  $r(54) = .44, p < .001$ ; regulation of privacy,  $r(54) = .44, p < .001$ ; and feeling connected to others,  $r(54) = .47, p < .001$ . Rest and relaxation were further positively associated with perceived safety,  $r(54) = .53, p < .001$ , and perceived inclusive, welcoming design,  $r(54) = .29, p = .030$ , but not with accessibility,  $r(54) = .15, p = .270$ , or weather-related limitations,  $r(54) = .02, p = .864$ . Perceived safety was positively associated with general well-being,  $r(54) = .34, p = .011$ , and perceived maintenance,  $r(54) = .41, p = .002$ . No significant associations were found between safety and inclusive, welcoming design,  $r(54)$

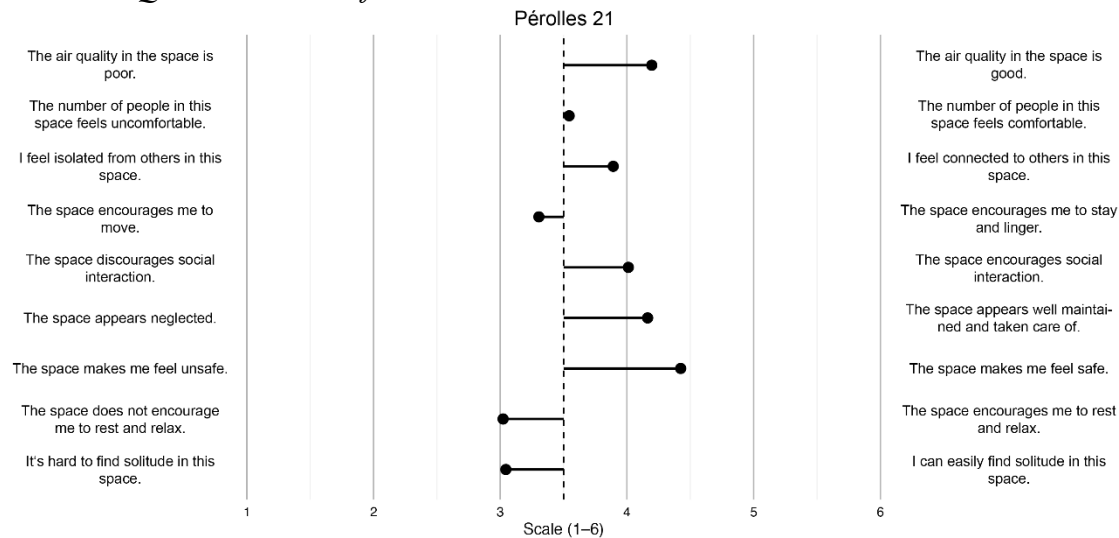
$= .00, p = .987$ ; accessibility,  $r(54) = -.11, p = .422$ ; feeling observed,  $r(54) = -.12, p = .365$ ; or character of peace and silence,  $r(54) = .24, p = .069$ .

#### 4.1.3 Pérolles 21

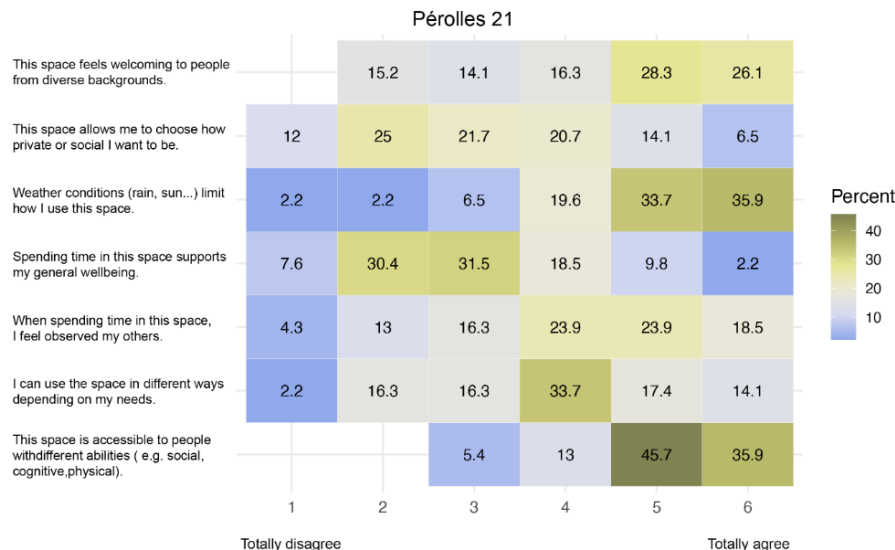
Subjective CLM results for Pérolles 21 showed predominantly low ratings across all dimensions (see Appendix H). Specifically, “Layers of Landscape” ( $M = 3.03, SD = 1.19$ ), “Landform” ( $M = 2.28, SD = 1.06$ ), “Biodiversity” ( $M = 2.00, SD = 0.86$ ), “Color and Light” ( $M = 3.20, SD = 1.19$ ), “Compatibility” ( $M = 3.54, SD = 1.24$ ), “Archetypal Elements” ( $M = 2.09, SD = 0.99$ ), and “Character of Peace and Silence” ( $M = 2.71, SD = 1.16$ ) were within the low range. The overall subjective CLM score was also low ( $M = 2.69, SD = 1.29$ ). See Appendix H.

Semantic differential results for Pérolles 21 indicated predominantly moderate evaluations across most dimensions (see Figure 8). Perceived air quality was rated as moderately good ( $M = 4.20, SD = 1.28$ ), while crowding was near the midpoint ( $M = 3.54, SD = 1.26$ ). Participants reported moderate social connection ( $M = 3.89, SD = 1.29$ ) and perceived the space as moderately supportive of social interaction ( $M = 4.01, SD = 1.31$ ). The space was also rated as moderately well maintained ( $M = 4.16, SD = 1.51$ ) and relatively safe ( $M = 4.42, SD = 1.40$ ). In contrast, activity- and restoration-related aspects received lower ratings: the space was perceived as only slightly encouraging physical activity ( $M = 3.30, SD = 1.45$ ) and as offering limited support for rest and relaxation ( $M = 3.02, SD = 1.42$ ). Similarly, the ability to find solitude was rated relatively low ( $M = 3.04, SD = 1.47$ ).

Descriptive analyses of the Likert items indicated mixed evaluations (see Figure 9). Perceived accessibility was rated relatively high ( $M = 5.12, SD = 0.84$ ), whereas the environment was considered moderately welcoming ( $M = 4.36, SD = 1.40$ ). Personal control over the space was moderate ( $M = 3.90, SD = 1.33$ ), and limitations due to weather were comparatively high ( $M = 4.88, SD = 1.17$ ). The extent to which the space supported privacy regulation was rated lower ( $M = 3.20, SD = 1.44$ ). Participants reported moderate levels of feeling observed ( $M = 4.05, SD = 1.44$ ), while perceived support for general well-being was comparatively low ( $M = 2.99, SD = 1.18$ ).

**Figure 8:***Semantic Questions Scores for Pérolles 21*

*Note.* The dashed vertical line represents the midpoint of the 1–6 scale (3.5) and is included as a visual reference for interpreting whether ratings fall toward the lower or higher end of the scale.

**Figure 9:***Likert Questions Scores for Pérolles 21*

Perceived general well-being was positively associated with rest and relaxation,  $r(90) = .58, p < .001$ ; solitude,  $r(90) = .43, p < .001$ ; personal control,  $r(90) = .37, p < .001$ ; privacy regulation,  $r(90) = .36, p < .001$ ; lower crowding,  $r(90) = .32, p = .002$ ; perceived isolation,  $r(90) = .23, p = .027$ ; social interaction,  $r(90) = .23, p = .029$ ; and encouragement to move,  $r(90) = .51, p < .001$ . It was negatively associated with feeling observed,  $r(90) = -.29, p = .005$ . No significant association was found with weather-related limitations,  $r(90) =$

.02,  $p = .828$ . Perceived rest and relaxation were positively associated with character of peace and silence,  $r(90) = .54, p < .001$ ; solitude,  $r(90) = .53, p < .001$ ; appropriation,  $r(90) = .49, p < .001$ ; lower crowding,  $r(90) = .34, p = .001$ ; and privacy regulation,  $r(90) = .25, p = .016$ . No significant association was found with perceived social connection,  $r(90) = .09, p = .419$ . Further they were positively associated with perceived safety,  $r(90) = .31, p = .003$ , and inclusive, welcoming design,  $r(90) = .33, p = .001$ , but not with accessible design,  $r(90) = .09, p = .393$ , or weather-related limitations,  $r(90) = .02, p = .839$ . Feeling observed was negatively associated with perceived safety,  $r(90) = -.38, p < .001$ , whereas perceived maintenance was positively associated with safety,  $r(90) = .36, p < .001$ .

## 4.2 Qualitative Analysis

### 4.2.1 *Regina Mundi*

With regard to how students use the Regina Mundi campus green space two categories of use were identified (see Appendix I). First, transitory use primarily consisted of passing through the space ( $n = 31$ ), as well as occasional waiting ( $n = 3$ ). In contrast, stationary use reflected a range of activities. These included academic uses such as studying or working ( $n = 10$ ), as well as various forms of restorative use. The latter encompasses consuming food and drinks ( $n = 13$ ), taking breaks between classes ( $n = 11$ ), and resting or relaxing ( $n = 22$ ). Additional restorative activities included enjoying sunlight ( $n = 3$ ) and engaging with nature ( $n = 2$ ). The space was also used for social interaction ( $n = 20$ ) and, to a lesser extent, for other activities ( $n = 5$ ).

The qualitative analysis of negative aspects revealed several issues related to students' mental health and well-being, spanning both CLM-related and non-CLM categories. Within the CLM dimension of "compatibility" ( $n = 6$ ), participants noted a lack of balance between natural and built elements ( $n = 2$ ), as well as a generally unattractive overall design ( $n = 4$ ). Concerns related to the "character of peace and silence" ( $n = 32$ ) were more prominent. Students reported a lack of contrast to the surrounding urban environment ( $n = 9$ ), and some indicated that the space does not strongly invite rest or relaxation ( $n = 2$ ) or provide a clear sense of peace and calmness ( $n = 2$ ). A particularly salient issue was the lack of solitude ( $n = 19$ ), which was often associated with perceptions of crowding ( $n = 7$ ), feelings of being exposed or observed ( $n = 7$ ), and, in some cases, feelings of isolation ( $n = 5$ ). In addition to CLM-related aspects, several non-CLM themes emerged. A major concern was the lack of amenities and physical comfort ( $n = 24$ ), including limited seating ( $n = 8$ ), insufficient shelter from weather conditions ( $n = 4$ ), and the inability to use the grass areas ( $n = 3$ ). The presence of smoking ( $n = 3$ ) was also mentioned as a negative factor. Furthermore, the space was

perceived as relatively small ( $n = 3$ ), and certain areas, such as the terrace, were described as not sufficiently inviting ( $n = 3$ ). A lack of spatial diversity ( $n = 2$ ) was also noted, alongside a more general perception of an insufficient social and psychological experience ( $n = 19$ ), reflected in themes such as crowding, exposure, and limited privacy.

Despite these limitations, the survey also revealed a range of positive aspects related to students' mental health and well-being. Within the CLM category of "layers of landscape" ( $n = 2$ ), the openness of the space was positively perceived. The category of "biodiversity" ( $n = 65$ ) was mentioned frequently, with students highlighting the abundance of greenery ( $n = 35$ ), the presence of animals such as fish and birds ( $n = 5$ ), visible seasonal changes on the vegetation ( $n = 10$ ), and the availability of grass ( $n = 15$ ). Positive perceptions were also reported for "color and light" ( $n = 21$ ), particularly in relation to natural colors ( $n = 16$ ), especially the colors of the trees (id 67, 94) and the presence of shade ( $n = 5$ ). In terms of "compatibility" ( $n = 8$ ), some participants noted a balance between natural and built elements ( $n = 4$ ), as well as an overall attractive design ( $n = 4$ ). The presence of a water element, specifically the pond, was highlighted as an important and appreciated feature within the category of "archetypal elements" ( $n = 17$ ). Within the dimension of "character of peace and silence" ( $n = 34$ ), students reported that the space can support rest and relaxation ( $n = 10$ ), provide a sense of peace and calmness ( $n = 18$ ), and offer some contrast to the surrounding urban environment ( $n = 6$ ). It was described as being in a forest in the middle of a city and feeling safe (id 7, 2). Regarding amenities and comfort ( $n = 21$ ), seating areas such as benches and the terrace were appreciated ( $n = 10$ ), along with shaded areas ( $n = 5$ ) and the possibility to use the space more freely, for example by sitting on the grass ( $n = 6$ ). Finally, in terms of social and psychological experience, some participants reported feeling connected to others within the space ( $n = 4$ ).

#### **4.2.2 *Pérolles 21***

Students use Pérolles 21 campus green space for transitory use ( $n = 61$ ), which mainly consists of passing through the space ( $n = 59$ ), meaning getting to class, with only occasional instances of waiting ( $n = 2$ ) (see Appendix I). In contrast, stationary use ( $n = 149$ ) encompassed a broader range of activities. These included academic uses such as studying and working ( $n = 19$ ), as well as various forms of restorative use ( $n = 92$ ). Students used it to eat and drink ( $n = 37$ ), more specifically to take their lunch break or to drink a coffee. Other restorative uses included enjoying the sunlight ( $n = 10$ ) as well as resting and relaxing ( $n = 19$ ). Lastly, restorative uses included taking breaks between classes or studying sessions ( $n =$

26). In addition, the space was used for social interaction ( $n = 38$ ) such as chatting with people (id 26) or spending time with friends (id 92).

In terms of negative aspects of student's mental health and well-being revealed several recurring themes. Some of them were captured by the CLM and some of them weren't.

Within CLM-related category "landform" ( $n = 7$ ), the space was described as an unnatural design, more specifically as very artificially looking (id 84). For "biodiversity" ( $n = 47$ ), students emphasized a pronounced lack of greenery, including few trees, no flowers or shrubs ( $n = 35$ ), the absence of grass areas ( $n = 8$ ), and low diversity of plant and animal species ( $n = 4$ ). Regarding color and light ( $n = 25$ ), participants frequently highlighted a lack of color ( $n = 20$ ), largely attributed to the dominance of grey tones ( $n = 15$ ) in the space in form of concrete and gravel and a general absence of natural colors ( $n = 5$ ). The dimension of "compatibility" ( $n = 49$ ) was also negatively evaluated, particularly due to an imbalance between natural and built elements ( $n = 43$ ), reflected in the excessive presence of concrete ( $n = 28$ ) and cobblestone surfaces ( $n = 15$ ). The red columns ( $n = 3$ ) were perceived as visually distracting, and the space was occasionally described as empty or underused ( $n = 3$ ). For "character of peace and silence" ( $n = 47$ ), several participants noted that the space does not provide sufficient contrast to the surrounding urban environment ( $n = 11$ ), for instance "pretty grey and urban" (id 86) and "proximity to the hustle and bustle of the city (both visually and audibly) (id 48)", nor does it strongly invite rest or relaxation ( $n = 2$ ). Reports of a lack of peace and calmness ( $n = 5$ ) and, more prominently, a lack of solitude ( $n = 29$ ) were common. These perceptions were closely associated with crowding ( $n = 17$ ), as well as feelings of exposure ( $n = 7$ ) and limited privacy ( $n = 5$ ). A dominant concern was the lack of amenities and physical comfort ( $n = 45$ ). Students frequently referred to uncomfortable surfaces such as concrete and gravel ( $n = 10$ ), also in terms of the benches (id ), the absence of grass areas suitable for sitting or doing activities on ( $n = 8$ ), generally a insufficient seating options ( $n = 17$ ), as well as not enough shade ( $n = 5$ ) and shelter ( $n = 3$ ). Someone described the space as difficult to use and not comfortable (id 8). In addition, students reported negative social and psychological experiences ( $n = 29$ ). These included perceptions of the space as crowded ( $n = 17$ ), as well as feelings of being observed and exposed to other students ( $n = 7$ ). Also a lack of privacy ( $n = 5$ ) is a concern. The space was described as underused ( $n = 8$ ), suggesting that its potential remains largely unrealised; as one participant put it, it is an "empty space for nothing" (id 3). Further, participants highlighted a lack of spatial diversity ( $n = 8$ ), describing as lacking clearly defined areas for different activities such as studying relaxing, or being able to be alone (id 49).

Only a few positive qualities were mentioned. Within the CLM category of “layers of landscape” (n = 11), the openness of the space was positively perceived. For “biodiversity” (n = 50), students appreciated the presence of trees (n = 45) and seasonal changes (n = 5). These aspects are closely linked to the category of “color and light” (n = 15), where natural colors (n = 2) and sunlight (n = 13) were highlighted. In terms of “compatibility”, few participants (n = 3) mentioned the spatial order of the space as positive. Within “character of peace and silence” (n = 14), some students reported that the space invites rest and relaxation (n = 10) and offers a sense of calmness (n = 4). For amenities and comfort (n = 54), seating areas such as benches and tables were appreciated (n = 36), along with the shade provided by trees (n = 5) and the availability of sunlight (n = 13). Finally, in terms of social and psychological experience (n = 5), some participants reported feeling connected to others within the space.

#### **4.2.3 *Ideal Design***

Students’ ideal design for campus green spaces at the University of Fribourg reflects several themes across CLM and additional categories. Students strongly highlight the need for an abundance of greenery and natural elements (n = 49). They mentioned a grass lawn (n = 34), flower gardens (n = 24), a high diversity plant species (e.g., different trees, bushes, flowers) (n = 7), and a visible change of seasons (n = 2). For “color and light” (n = 33), participants expressed a preference for natural colors (n = 4), as well as sunlight exposure (n = 7) and the presence of shade (n = 22). In the category of “compatibility” (n = 10), participants highlighted the importance of a balance between natural and built elements (n = 8), as well as a clear spatial structure (n = 2). Water features, as part of “archetypal elements”, were also desired (n = 10). Within “character of peace and silence” (n = 29), participants emphasized that the space should encourage to rest and relax (n = 17), provide a sense of peace and calmness (n = 8), and offer a contrast to the surrounding urban environment (n = 4).

For additional categories not covered by the CLM, “amenities and comfort” (n = 125) emerged as particularly important. This includes the availability of both shaded areas (n = 22) and shelter (n = 3) from weather conditions, as well as zones with sunlight exposure (n = 7). Students also emphasize the need for a sufficient number of seating options (n = 55), which should be comfortable (n = 8), such as “comfortable lounge chairs” (id 96). A variety of seating types is preferred, including picnic tables (id 6), tables for studying, benches, and potentially hammocks (id 81) or flexible seating options (id 75). Also the desire for “usable green space” (n = 30) became apparent. This included aspects such as accessible and inclusive design (n = 5) and the possibility to sit directly on grass lawns (n = 25).

Finally, the category of “spatial diversity” (n = 83) reflected a desire for both active and passive zones. Active areas included spaces for sports (n = 16), for instance a volley ball field (id 70). Also more different kinds of activities including play (n = 14) or organized events such as concerts (id 49), for instance «board games» (id 19). Areas dedicated for eating (n = 9), zones for social interaction (n = 6), and community gardening (n = 4). Passive zones were described as spaces for studying (n = 7), calm zones for relaxation (n = 1) like meditation areas (id 71) or “quiet spaces to relax (silent zones)” (id 43). Also zones for privacy (n = 9), for instance secluded areas (id 85).

## 5 Discussion

### 5.1 How do students perceive and experience the campus green spaces in relation to their mental well-being and mental health?

#### 5.1.1 *Regina Mundi*

Overall, Regina Mundi was perceived as a moderately supportive environment for students’ mental health and well-being. The findings suggest that its positive effect is linked not only to its natural and contemplative qualities, but also to students’ ability to rest, feel safe, regulate privacy, experience solitude, and appropriate the space for different everyday activities. At the same time, several limitations indicate that the space does not fully realise its restorative potential.

A major strength of Regina Mundi is its greenery, water and animals which students value, all of which contribute to its restorative and contemplative potential (Olszewska et al., 2023a). The qualitative responses further suggest that these elements help create a sense of calmness and partial contrast with the surrounding urban environment. However, this contrast was not experienced equally by all students. While some described the space as peaceful and removed from the city, others still perceived it as insufficiently separated from the university and urban context. This supports the idea that adjacent buildings or urban surroundings do not automatically reduce restorative quality in the same way for all users (Asim et al., 2023), but that their effect depends on how the space is structured and experienced.

Regina Mundi moderately supports rest and relaxation, but not consistently for all users. While some described Regina Mundi as peaceful and inviting, others felt it did not sufficiently support calmness or relaxation. Although students use the space for restorative activities, its design does not fully enable this function. This is particularly relevant because rest and relaxation were positively associated with general well-being, suggesting that students who experienced the space as relaxing also evaluated it as more supportive of well-

being. Thus, Regina Mundi shows clear restorative potential, but its benefits depend on users' specific needs and conditions.

Well-being was associated with lower crowding, stronger privacy regulation, greater personal control, and opportunities for solitude. This suggests that social interaction supports well-being only when students can regulate it (Steg et al., 2018) and when spatial design prevents overcrowding (Owens et al., 2023). While Regina Mundi facilitates social interaction, its current design also risks crowding and offers limited opportunities for retreat and solitude, which students experienced negatively. Further, some students also report feeling disconnected from the broader university context. This is important because solitude represents a positive, restorative state, whereas isolation is associated with negative psychological outcomes (Luymes & Tamminga, 1995). This partly contradicts Windhorst & Williams (2015) stating students prefer that the campus green spaces are not in proximity to the social space.

Perceived safety is generally high and contributes positively to the experience of the space, likely related to its well-maintained condition of the space (Owens et al., 2023). Although students report feeling exposed, this does not directly translate into lower perceived safety, even though literature suggests that constant visibility can reduce restorative quality (Lu & Fu, 2019). This may be because visibility has a double function: it can undermine privacy and psychological comfort, but also enhance perceived safety by allowing visual control and informal social surveillance.

Students' well-being also appears to be shaped by comfort and amenities. Although these aspects were not strongly associated with overall well-being, they may function as enabling conditions for restorative use by determining whether students can comfortably stay, appropriate the space, and benefit from it. Although students value the grass lawn, its use seems constrained, possibly because the design does not clearly communicate whether informal activities such as sitting, resting, or gathering are permitted (von Sommoggy et al., 2020). Since personal control was positively associated with well-being, improving opportunities for appropriation, comfort, and flexible use could strengthen Regina Mundi's health-supportive potential.

Students expressed a clear preference for a broader range of activities that respond to different needs. This suggests that limited opportunities for diverse or active engagement may reduce the space's well-being-supportive potential, aligning with research that highlights the importance of varied activity settings for well-being (Holt et al., 2019)

In summary, even though Regina Mundi supports student mental health and well-being, its potential remains limited. As a result, students largely adapt to the existing conditions rather than fully benefiting from the space.

### 5.1.2 *Pérolles*

Overall, students experience Pérolles 21 as poorly supportive of their mental health and wellbeing. Well-being appears to be mainly associated with rest and relaxation, solitude, privacy regulation, appropriation, low crowding, physical activity, social interaction, spatial diversity, and adequate comfort and amenities.

Students' well-being also appears to be negatively affected by the weak presence of greenery and natural elements. The very low biodiversity and artificial character of the space limit opportunities for restorative experiences, which is important given that natural environments are strongly linked to psychological well-being (Hartig et al., 2003; Kaplan & Kaplan, 1989; Olszewska et al., 2023a).

Pérolles 21 supports rest and relaxation only weakly to moderately, and not consistently across users. Although students use the space for resting, taking breaks, and socialising, this appears to reflect limited compensatory use rather than effective restorative potential. This is particularly relevant because rest and relaxation were positively associated with general well-being.

Students generally reported a relatively high sense of safety, which was associated with their well-being. This may be explained by the space's openness, visibility, and good maintenance, which have been linked to perceived safety in previous research (Hur & Nasar, 2014; Lu & Fu, 2019; Owens et al., 2023). The prospect-refuge theory states that open space with long-distance views and visual control, enables users to detect potential threats more easily, which increases perceived safety (Appleton, 1975; Fisher & Nasar, 1992; Gatersleben & Andrews, 2013). However, this sense of safety is partly offset by being constantly visible to others, which reduces psychological comfort and limits restorative quality (Lu & Fu, 2019). This highlights the importance of balancing prospect with refuge in supporting well-being (Appleton, 1975). Further, the open layout seems to facilitate encounters between students, but the lack of private or calm areas restricts opportunities for withdrawal and limits control over social interaction. As a result, crowding and a lack of privacy regulation can lead to discomfort and feeling isolated (Donald, 2022; Steg et al., 2018).

Students' well-being also appears to be shaped by comfort and amenities. Comfort is a fundamental aspect of physiological needs in urban design (Mehan & Soflaei, 2017) and is necessary for rest and relaxation (Olszewska et al., 2023a). Although sunlight and tree shade

are appreciated (Akhir et al., 2018), these qualities alone do not guarantee a restorative experience. The findings suggest that amenities, usability, and comfort function as enabling conditions: they determine whether students can remain in the space, appropriate it for their needs, and benefit from its restorative potential.

Students' well-being appears to be negatively affected by the limited spatial and activity diversity. The survey showed that students have varied needs such as studying, eating, socialising, and being more physically active, yet the space offers only a narrow range of settings and activities to support these uses. As a result, it may not fully accommodate the diversity of students' everyday needs, which limits its restorative potential. This aligns with research emphasizing the importance of varied spatial settings to support well-being and healthy behaviors (Antonova et al., 2021; Ward Thompson, 2013). Although the space shows some potential to support movement, the absence of clear cues and facilities may limit active engagement (Holt et al., 2019).

Ultimately, Pérolles 21 does not effectively support students' mental health and well-being. As a result, students adapt their behavior to a constrained environment rather than genuinely benefiting from the space.

## **5.2 To what extent do green spaces exhibit contemplative landscape qualities as defined by the Contemplative Landscape Model (CLM)?**

### **5.2.1 *Regina Mundi***

Based on both expert-based and subjective CLM assessments, Regina Mundi exhibits a moderate level of contemplative landscape quality (Olszewska et al., 2023a). Both expert and student ratings consistently fall within the average range, with students generally evaluating the space slightly more positively.

Across most dimensions, contemplative qualities are present but not strongly developed. For example, the layers of landscape are perceptible but do not significantly enhance the overall spatial experience. Similarly, landform shows some variation and natural features, although these are not dominant and are partly offset by more artificial elements. Biodiversity is also rated as moderate by both groups, indicating that while vegetation and seasonal changes are present, ecological diversity remains limited. In contrast, the dimension of color and light is perceived somewhat more positively by students, due to the presence of natural colors and the visibility of light and shade throughout the day. The category of compatibility suggests a general but not optimal balance between natural and built elements. Archetypal elements are moderately present, including features such as a water body and individual trees, which contribute to the contemplative potential of the space. Finally, the

character of peace and silence is rated within the average range, indicating that the space offers some contrast to the surrounding urban environment and supports rest and relaxation to a certain extent, but does not strongly facilitate solitude or psychological withdrawal.

Overall, both expert and subjective assessments converge in indicating that Regina Mundi possesses several key contemplative features, but that these remain moderately expressed rather than fully developed.

### **5.2.2 *Pérolles 21***

The CLM assessment for Pérolles 21 indicates a low to moderate level of contemplative landscape quality, with only minor differences between expert and subjective evaluations. Overall, both assessments converge in showing that key contemplative qualities are either weakly expressed or largely absent.

Across most dimensions, the space shows only weakly developed contemplative qualities. Layers of landscape are present but do not meaningfully enhance the spatial experience. In contrast, landform is rated low, reflecting the predominantly flat, geometrically structured topography and the absence of natural variation. Biodiversity receives consistently very low scores, indicating a lack of ecological diversity and limited presence of vegetation or natural changes. Similarly, the category of color and light is only moderately developed, suggesting that while some natural light and color variation exist, they are not sufficiently pronounced to contribute strongly to the overall atmosphere. Compatibility is rated within the average range, indicating a basic level of spatial order, but also suggesting an incomplete balance between natural and built elements. Archetypal elements are absent, reflecting the lack of natural features such as solitary trees or clearings that typically support contemplative experience. Finally, the character of peace and silence is rated low, indicating that the space provides only limited contrast to the surrounding urban environment and does not effectively support calmness, restoration, or psychological withdrawal.

Overall, the CLM results suggest that Pérolles 21 lacks several key components of a contemplative landscape, particularly in terms of biodiversity, spatial variation, and character of peace and silence, resulting in a space with limited restorative ability.

### **5.3 In what ways does the current design of campus green spaces differ from students' needs and perceptions of mental well-being, and from expert-based contemplative landscape assessment?**

#### **5.3.1 *Regina Mundi***

A comparison between the current design of Regina Mundi, student needs and perceptions as well as both expert-based and subjective CLM assessments reveals several important mismatches.

Although Regina Mundi shows moderate contemplative landscape qualities, these remain insufficiently developed, revealing unused design potential and preventing the space from becoming a strongly contemplative environment. In particular, biodiversity remains limited, suggesting that greater plant diversity and vegetation structure are needed to strengthen its restorative character. Although the space offers some contrast to its urban surroundings, its design does not fully create a clear sense of retreat. Students still reported feeling somewhat disconnected from the university setting, suggesting that Regina Mundi is neither fully integrated into campus life nor clearly experienced as a restorative refuge.

Second, the design falls short in addressing key psychosocial needs. While the space enables social interaction, it provides insufficient opportunities for solitude. This leads to crowding, partly also because seating areas concentrate users in limited locations. The design lacks sufficient visual barriers and semi-enclosed spaces to balance privacy and exposure to the surrounding buildings. Overall, this limits the ability to regulate social interaction and privacy, which ultimately constrains restorative potential.

Third, comfort and amenities represent major limitations. Seating provision is insufficient, and existing options are not designed for flexible or comfortable use. Shelter is limited, reducing usability across different weather conditions. The placement of certain elements, such as the smoking area, further detracts from the overall experience. Although a grass lawn is present, it doesn't support active use. Similarly, the terrace, where most seating is concentrated, lacks a welcoming design. Together, these factors restrict appropriation and usability, leading to a reduced restorative potential.

Finally, the space lacks sufficient spatial diversity to support a broad range of activities and user needs. Although students use it in different ways, the design does not provide clearly differentiated zones for physical activity, playful social interaction, calm retreat, and privacy remain limited. As a result, everyday activities such as studying, eating, socializing, and relaxing are only partially accommodated and may interfere with one another. This highlights a mismatch between the current design and expectations for a multifunctional campus green space.

In summary, although Regina Mundi exhibits several positive contemplative qualities, it does not yet fully support students' mental health and well-being. However, targeted design interventions could substantially strengthen its restorative and well-being-supportive potential.

### **5.3.2 *Pérolles 21***

The current design of the Pérolles 21 campus green spaces differs substantially from both students' needs and perceptions of mental health and well-being as well as from expert-based and subjective CLM assessments.

First, the space lacks fundamental contemplative landscape qualities. Both expert and subjective CLM assessments indicate very low scores for biodiversity, archetypal elements, and character of peace and silence. This is reflected in the limited quantity and diversity of vegetation, the absence of archetypal features such as water, and the lack of meaningful contrast with the surrounding urban environment. In addition, there is little buffering from the urban world. The dominance of concrete, gravel, and geometric structures, along with trees that appear artificially arranged rather than naturally integrated, and visually distracting elements such as the red columns, reinforces the urban, artificial character of the space and limits its restorative potential.

Second, the design fails to support essential psychosocial needs. Although the open layout enables social interaction, it provides almost no opportunities for solitude or calmness, as there are no enclosed spaces where students can withdraw. Seating areas concentrate users in limited locations, increasing the risk of crowding while offering few alternatives for those seeking privacy. In addition, constant visibility from surrounding buildings creates a sense of exposure. This indicates limited privacy regulation and personal control within the space.

Third, amenities and comfort represent major limitations. There is a lack of sufficient seating, and the available options are not designed for comfortable or flexible use. In addition, insufficient shade and shelter, the predominance of hard materials, the absence of usable grass areas, and the unideal placement of smoking areas further reduce the usability of the space across different seasons and discourage prolonged stay.

Fourth, the space lacks spatial diversity and does not support a variety of activities for different users. There are no dedicated areas for exercise, play, or social engagement, and no clearly defined calm zones for rest or solitude. Everyday student needs such as studying, eating, and relaxing are therefore inadequately supported. Although the space shows some potential to encourage movement, the absence of clear spatial cues and facilities limits active engagement (Holt et al., 2019).

Overall, Pérolles 21 lacks both the theoretical qualities of a contemplative landscape and the practical conditions required for positive student experience. However, with strategic redesign, it has strong potential to become a space that actively supports students' mental health and well-being.

#### **5.4 What design recommendations can be formulated for campus green spaces, based on the user-centered survey, CLM assessment, and literature, to better support student's mental well-being?**

Based on the identified mismatches between CLM assessments, current design, and student experience, several design recommendations can be formulated to better support students' mental health and well-being at Regina Mundi and Pérolles 21. See Appendix J for design maps and visualizations.

First, existing contemplative qualities should be strengthened and further developed. For Regina mundi in particular, vegetation diversity should be increased, for example by introducing flowering plants with varied colors and seasonal dynamics or more native vegetation to support local biodiversity. Also creating more openings and closings within the vegetation, strengthening archetypal elements, such as small clearings or more meandering pathways to further improve the contemplative character of the space (Olszewska-Guizzo et al., 2023a; Olszewska et al., 2023b).

For Pérolles 21, this includes the substantial increase of greenery and vegetation, alongside a reduction of dominant urban elements. The prevalence of concrete, and gravel should be replaced with grass and vegetation. The introduction of archetypal elements like water features and dense vegetation can also contribute to mitigating urban noise, for instance by masking traffic sounds (Fang & Ling, 2005; Roe & McCay, 2021). In addition, tree canopies may also be used to partially screen the surrounding urban environment (Lau & Yang, 2009). To further create a strong contrast with the built environment, asymmetry and organic design elements should be introduced, for instance through mounds and curved pathways (Olszewska et al., 2023a). Vegetation should not only be increased in quantity but also introduced strategically. A diverse range of plant species with varying shapes, colors, and seasonal characteristics should be incorporated, moving away from rigid, geometric tree rows toward more naturalistic compositions. This may include shrubs and flowering plants that support biodiversity and attract pollinators (Olszewska et al., 2023a; Olszewska et al., 2023b). Visually distracting elements, such as the prominent red columns, should either be removed or more carefully integrated into the overall design.

Second, both Regina Mundi and P  rolles 21 should better address psychosocial needs by supporting both social interaction and withdrawal. This requires spaces whose size and structure match their intended use (Olszewska et al., 2023a). A key priority is improving privacy regulation. This could be achieved through smaller, clearly defined calm areas and semi-enclosed spaces that support retreat and solitude (Olszewska et al., 2023a; Olszewska et al., 2023b). Strategic planting, visual barriers, and spatial subdivisions could reduce feelings of exposure while maintaining visibility along main routes and near buildings to preserve safety (Lu & Fu, 2019; Owens et al., 2023). Deciduous trees are useful, as they can reduce the feeling of being observed without fully blocking views (Lu & Fu, 2019).

Third, improvements in comfort and amenities are essential as it directly influences the usability and restorative potential of the space (Olszewska et al., 2023a). Additional seating should be provided and diversified, including more flexible and comfortable options such as movable chairs, lounge chairs, hammocks, or wooden platforms, while ensuring proper maintenance (Olszewska et al., 2023a). This will help the user feel part of the design and the space (Olszewska et al., 2023a). In addition, sufficient shade and shelter must be ensured to increase usability across different weather conditions. Shade is especially important for P  rolles 21. In addition, reconsidering the placement of elements such as the smoking area and beautifying the current seating terraces to create a more welcoming atmosphere would enhance overall comfort. For P  rolles 21, a grass lawn should be provided which can serve multiple purposes, accommodating both active uses such as exercise, playing games and passive uses like laying on the grass or studying. For Regina Mundi, clear cues should also be provided to signal that grass areas can be used, enabling more active and informal engagement (von Sommoggy et al., 2020).

Fourth, both Regina Mundi and P  rolles 21 should offer greater spatial diversity by incorporating clearly defined zones for different activities. A range of spatial settings enables the environment to accommodate diverse user needs and support both active and passive forms of engagement, which is essential for promoting well-being (Antonova et al., 2021; Brito et al., 2022). This includes spaces for social interaction, quiet retreat, studying, play and physical activity. These zones should be designed with multifunctionality in mind to accommodate diverse and changing user needs, while also ensuring inclusive and accessible design (Owens et al., 2023; Roe & McCay, 2021).

To support active, playful, and social engagement, appropriate features and infrastructure should be integrated into the design (Brito et al., 2022; Roe & McCay, 2021; Ward Thompson, 2013). Examples include sports areas (e.g., basketball court), outdoor games

such as chess or table tennis, community gardening spaces, and open lawn areas suitable for activities like yoga. Further, environments can support different types and intensities of activity by providing a variety of options, such as multiple pathways with varying levels of challenge, allowing users of different ages, abilities, and needs to engage with the space (Brito et al., 2022). Movable and adaptable elements can support playful and flexible use (Loo & Zhang, 2024), while dedicated facilities such as water fountains, recreational spaces, and community areas support more sustained engagement (Ryan, 2012, as cited in Owens, 2023). Reducing barriers between activity zones and integrating clear spatial cues can further encourage continuous movement and more intuitive use of the space (Holt et al., 2019; Roe & McCay, 2021).

Overall, these recommendations highlight the importance of complementing CLM-based design principles with user-centered considerations, particularly regarding comfort, usability, privacy regulation, spatial and activity diversity, as well as personal control. By strengthening existing qualities while addressing identified gaps, Regina Mundi and Pérolles 21 has strong potential to evolve into a more effective and supportive environments for students mental health and well-being.

## 5.5 CLM Framework

The Contemplative Landscape Model (CLM) provides a valuable evidence-based foundation for identifying environmental qualities that support mental health and well-being. This is reflected in the general alignment between CLM assessments and student perceptions: spaces with higher contemplative quality, such as Regina Mundi, were associated with more positive well-being evaluations, whereas Pérolles 21, characterized by low CLM scores, was perceived as less supportive. This indicates that the CLM successfully captures important spatial features of health-promoting environments.

However, the findings also reveal a fundamental limitation: the CLM does not sufficiently account for how spaces are experienced and used. Students' well-being was strongly associated with personal control, including the ability to regulate privacy and social interaction, choose between activities, and adapt space to different needs. These aspects are only indirectly addressed within the CLM.

This limitation is partly rooted in the model's structure. By aggregating multiple experiential dimensions within broad CLM categories. Factors such as crowding, solitude, and maintenance are embedded within dimensions like "character of peace and silence" or "compatibility," making it difficult to interpret specific psychological experiences and their association with students' mental health and well-being. As a result, determinants of students'

well-being, particularly spatial and activity diversity, comfort, usability, and personal control, remain insufficiently captured. This helps explain why designing solely for contemplative qualities is not sufficient in regards to campus green spaces. For instance, while calmness and solitude are important, they do not automatically translate into positive well-being outcomes. Instead, supportive environments must enable users to actively shape their experience by choosing between different social contexts.

Overall, the results point to a gap between evidence-based environmental frameworks and actual user experience. They demonstrate that effective design requires integrating contemplative landscape qualities with user-centered factors such as personal control, comfort, and diverse patterns of use.

## **5.6 Limitations**

Several limitations should be considered when interpreting the results of this study. First, the use of photographic material in the user-centered survey may have influenced participants' perceptions and subsequently their answers. Images were taken in fall under non-sunny conditions, which may have negatively affected the visual impression of the spaces and biased evaluations toward less favorable assessments. In addition, the applicability of the Contemplative Landscape Model (CLM) may be seasonally sensitive, as reduced vegetation during this period could have influenced both subjective and expert ratings.

Second, the sample consisted predominantly of female psychology students of a similar age group. This limits the generalizability of the findings, as other user groups may have different needs and preferences. However, it can be argued that the results are largely consistent with other studies that have researched students' needs for campus green spaces (Akhir et al., 2018; Foellmer et al., 2021; Lu & Fu, 2019), suggesting that similar patterns may emerge even in more diverse samples. Nonetheless, including a broader demographic range in future research would provide a more comprehensive understanding of user needs.

Third, the quantitative analysis relied primarily on Pearson correlation coefficients, which identify associations but do not allow for causal conclusions. In addition, no direct statistical comparison between the two campuses was conducted, limiting the ability to draw comparative inferences.

Finally, the study is based on self-reported data, which may be subject to response biases such as social desirability or individual interpretation of survey items.

Despite these limitations, the study provides valuable insights into the relationship between campus green space design and student well-being, particularly by highlighting the importance of integrating user-centered perspectives with evidence-based frameworks.

## 5.7 Conclusion

These findings underscore the need to complement expert-based frameworks with user-centered approaches. Across both Regina Mundi and Pérolles 21, students did not passively experience the spaces; rather, they adapted their behavior to existing spatial limitations. This suggests that use alone should not be interpreted as evidence that green space design successfully supports student's mental health and well-being. A campus green space may be used for resting, studying or socialising while still failing to accommodate these activities in ways that benefit them. Only by aligning contemplative qualities with students' actual experiences, needs, and patterns of use can campus green spaces become genuinely health-supportive environments.

The results show that contemplative landscape qualities are important, but not sufficient on their own. Regina Mundi demonstrates that natural elements, water, shade, seasonal change, and calmness can support positive experience, but that comfort, privacy regulation, personal control, and flexible use remain necessary for the space to fully function as a restorative environment. Pérolles 21 shows that a centrally located and frequently used campus space can still lack restorative quality when it does not provide sufficient greenery, comfort, solitude, spatial diversity, or opportunities for appropriation.

Future research should therefore not only refine evidence-based frameworks, but also critically examine how such frameworks correspond to users' lived experiences. As this study shows, the CLM captures several important contemplative qualities, yet may overlook practical and psychosocial dimensions such as personal control, privacy regulation, flexible use, comfort, amenities, spatial and activity diversity. These factors may determine whether students can genuinely benefit from a space rather than merely adjust to its limitations.

These insights also need to be translated more effectively into design practice. This includes developing tools, guidelines, and participatory methods that make user-centered knowledge accessible and applicable within landscape architecture offices. Integrating environmental design principles with a deeper understanding of users' everyday experiences would support more effective design outcomes. Ultimately, bridging evidence-based frameworks with user-centered design can help create campus green spaces that are not only visually or theoretically restorative, but practically, socially, and psychologically supportive in everyday student life.

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## 7 Appendix

### 7.1 Appendix A

#### Contemplative Landscape Model CLM

**Figure A**

#### *Contemplative Landscape Model Assessment Sheet*

| The Contemplative Landscape Model (CLM) |                                                                                                                                                                                                       |                                                                                                                                    |                                                                                                                                                                                                     |                                                                                                                                                    |                                                                                                                                                                                                      |                                                                                                            |                                                                                                                                                                                                                             |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                         | Layers of the Landscape                                                                                                                                                                               | Landform                                                                                                                           | Biodiversity                                                                                                                                                                                        | Colour & Light                                                                                                                                     | Compatibility                                                                                                                                                                                        | Archetypal Elements <sup>4</sup>                                                                           | Character of Peace & Silence                                                                                                                                                                                                |
|                                         |                                                                                                                      |                                                   |                                                                                                                    |                                                                   |                                                                                                                    |                         |                                                                                                                                          |
| 6<br><br>5                              | <ul style="list-style-type: none"> <li>Far-distance view (<math>\geq 400\text{m}</math>)</li> <li>Fore, middle &amp; background visible</li> <li>Layers greatly enhance the visual quality</li> </ul> | <ul style="list-style-type: none"> <li>Undulating</li> <li>Natural lines</li> <li>Stimulation to look up to the sky</li> </ul>     | <ul style="list-style-type: none"> <li>High diversity of plant &amp; animal species</li> <li>Vegetation seems native &amp; spontaneous</li> <li>Visible changes &amp; motion<sup>1</sup></li> </ul> | <ul style="list-style-type: none"> <li>Harmonious, natural, broken or warm colours</li> <li>Visibility of light &amp; shade<sup>3</sup></li> </ul> | <ul style="list-style-type: none"> <li>Physical &amp; visual relations between elements are worked out</li> <li>Explicit spatial order, simplicity, harmony between natural &amp; created</li> </ul> | <ul style="list-style-type: none"> <li>Strongly influence overall perception</li> </ul>                    | <ul style="list-style-type: none"> <li>Explicit</li> <li>Contrast to urban environment</li> <li>Accessible &amp; safe</li> <li>No technology</li> <li>Invites to rest and relax</li> <li>Gives sense of solitude</li> </ul> |
| 4<br><br>3                              | <ul style="list-style-type: none"> <li>Layers moderately enhance the overall visual quality</li> </ul>                                                                                                | <ul style="list-style-type: none"> <li>Landform is not very significant to the setting</li> <li>OR</li> <li>Hard to say</li> </ul> | <ul style="list-style-type: none"> <li>Moderate diversity of species</li> <li>Moderate changes &amp; motion</li> </ul>                                                                              | <ul style="list-style-type: none"> <li>Moderate amount of contrasting colours</li> <li>Moderate amount of light &amp; shade</li> </ul>             | <ul style="list-style-type: none"> <li>Physical &amp; visual relations are unclear</li> <li>OR</li> <li>Some elements disturbing the harmony &amp; balance</li> </ul>                                | <ul style="list-style-type: none"> <li>Are present but not important for the overall perception</li> </ul> | <ul style="list-style-type: none"> <li>Moderate</li> <li>AND/OR</li> <li>Moderate sense of solitude</li> <li>AND/OR</li> <li>Less contrast with urban environment</li> </ul>                                                |
| 2<br><br>1                              | <ul style="list-style-type: none"> <li>Layers are not visible</li> <li>OR</li> <li>Layers do not enhance the overall visual quality</li> </ul>                                                        | <ul style="list-style-type: none"> <li>Flat</li> <li>OR</li> <li>Rugged</li> </ul>                                                 | <ul style="list-style-type: none"> <li>Low diversity of species</li> <li>No visible changes or motions</li> <li>OR</li> <li>Presence of bio-phobic phenomena<sup>2</sup></li> </ul>                 | <ul style="list-style-type: none"> <li>Lots of vivid contrasting colours</li> <li>Light &amp; shade not visible</li> </ul>                         | <ul style="list-style-type: none"> <li>Physical &amp; visual relations not worked out well or not at all</li> <li>OR</li> <li>Chaos, clutter, lack of harmony</li> </ul>                             | <ul style="list-style-type: none"> <li>No archetypal elements</li> </ul>                                   | <ul style="list-style-type: none"> <li>No character of peace &amp; silence</li> <li>Busy</li> <li>No contrast with urban environment</li> </ul>                                                                             |

<sup>1</sup>Dynamic natural phenomena, e.g., seasonal diurnal changes of vegetation, flying birds, bees, etc. Ignore this point for photo evaluation.

<sup>2</sup>Biophobic phenomena include, but are not limited to, snakes, spiders, darkness, etc.

<sup>3</sup>In case of overcast weather, imagine the sunny conditions.

<sup>4</sup>Archetypal elements include water (still or running water body, waterfall, sea), path, clearing, mountain/hill, single old tree, stone, forest, desert, grave, circle, dome, arc.

(Olszewska et al., 2023b)

## 7.2 Appendix B

### Flyers

**Figure B1**

#### *English Flyer*

**DESIGNING CAMPUS GREEN SPACES FOR MENTAL HEALTH AND WELLBEING**  
valeria.heini@unifr.ch

**Search for participants**  
The study examines the design of campus green spaces in relation to mental wellbeing and health.

- Online questionnaire (20-40 minutes)
- available in English, French and German

*1h of Experimental Hours*

**Participation criteria**

- Bachelor, Master or Phd Student at University of Fribourg
- Familiar with either Regina Mundi and/or Pérolles 21 campus
- Fluent in English, French or German

Deutsch English Français

ENG: [https://www2.unipark.de/uc/bachelor\\_master\\_2026/cd5c/](https://www2.unipark.de/uc/bachelor_master_2026/cd5c/)  
DE: [https://www2.unipark.de/uc/bachelor\\_master\\_2026/0835/](https://www2.unipark.de/uc/bachelor_master_2026/0835/)  
FR: [https://www2.unipark.de/uc/bachelor\\_master\\_2026/d047/](https://www2.unipark.de/uc/bachelor_master_2026/d047/)

**Figure B2**

#### *German Flyer*

**DESIGNING CAMPUS GREEN SPACES FOR MENTAL HEALTH AND WELLBEING**  
valeria.heini@unifr.ch

**Teilnehmer\*innen gesucht**  
Die Studie untersucht, wie sich die Gestaltung von Campus-Grünflächen auf psychische Gesundheit und Wohlbefinden auswirken.

- Online Fragebogen (20-40 Minuten)
- verfügbar in Englisch, Französisch und Deutsch

*1h Versuchspersonenstunde*

**Teilnahmekriterien**

- Bachelor, Master oder Phd Student\*in an der Universität Fribourg
- Vertraut mit Regina Mundi and/or Pérolles 21 campus
- Spricht fließend Deutsch, Englisch oder Französisch

Deutsch English Français

ENG: [https://www2.unipark.de/uc/bachelor\\_master\\_2026/cd5c/](https://www2.unipark.de/uc/bachelor_master_2026/cd5c/)  
DE: [https://www2.unipark.de/uc/bachelor\\_master\\_2026/0835/](https://www2.unipark.de/uc/bachelor_master_2026/0835/)  
FR: [https://www2.unipark.de/uc/bachelor\\_master\\_2026/d047/](https://www2.unipark.de/uc/bachelor_master_2026/d047/)

Figure B3

*French Flyer*


**DESIGNING CAMPUS GREEN SPACES FOR MENTAL HEALTH AND WELLBEING**  
valeria.heini@unifr.ch

**Recherche de participants**

L'étude examine la conception des espaces verts du campus en relation avec le bien-être mental et la santé.

- Questionnaire en ligne (20 à 40 minutes)
- Disponible en anglais, français et allemand

**1h Heures**

**Critères de participation d'expérimentation**

- Étudiant·e en Bachelor, Master ou Doctorat à l'Université de Fribourg
- Connaissance du campus Regina Mundi et/ou du campus Pérolles 21
- Maîtrise de l'anglais, du français ou de l'allemand

Deutsch English Français

ENQ: [https://ww2.unipark.de/uc/bachelor\\_master\\_2026/cd5c/](https://ww2.unipark.de/uc/bachelor_master_2026/cd5c/)  
DE: [https://ww2.unipark.de/uc/bachelor\\_master\\_2026/0835/](https://ww2.unipark.de/uc/bachelor_master_2026/0835/)  
FR: [https://ww2.unipark.de/uc/bachelor\\_master\\_2026/d047/](https://ww2.unipark.de/uc/bachelor_master_2026/d047/)

### 7.3 Appendix C

#### User-centered survey

#### English Version

##### *Introduction page*

**Study Purpose:** You are invited to participate in a user-centered research study examining students' well-being in regards to the design of campus green spaces. Your participation supports a Bachelor's thesis at the University of Fribourg. If you are a psychology student at the University of Fribourg, you will receive one hour of participation hours for completing the survey.

**Voluntary Participation & Right to Withdraw:** Your participation is entirely voluntary. You may withdraw from the study at any time without any negative consequences and without giving a reason.

**Risks:** There are no risks associated with participating in this study. If any of the questions make you uncomfortable, you may discontinue your participation at any time without negative consequences.

**Data Anonymity & Confidentiality:** All data collected in this study will be treated confidentially and used solely as well as in anonymous form for research purposes. No personally identifiable information will be collected. Data will be stored securely and analyzed in anonymized form. Survey data are collected via the Unipark online survey platform.

**Expected Duration:** The questionnaire takes approximately 20 - 40 minutes to complete.

**Contact:** Please contact the following people if you have any questions: Researcher (Bachelor Student): Valeria Heini, Email: [valeria.heini@unifr.ch](mailto:valeria.heini@unifr.ch) Supervised by Prof. Dr. Andreas Sonderegger, University of Fribourg - Cognitive Ergonomics and Work Psychology, [andreas.sonderegger@unifr.ch](mailto:andreas.sonderegger@unifr.ch)

By clicking "Accept", you confirm that: You have read and understood the information provided. You voluntarily agree to participate in this study. You understand that your answers are collected anonymously

##### *Demographics*

Gender

- female
- male
- others

Age (Please answer using numbers):

Native Language

- German
- French
- Italian
- Other:

Your study subject:

- Psychology
- Education Sciences
- Teacher Education
- Other

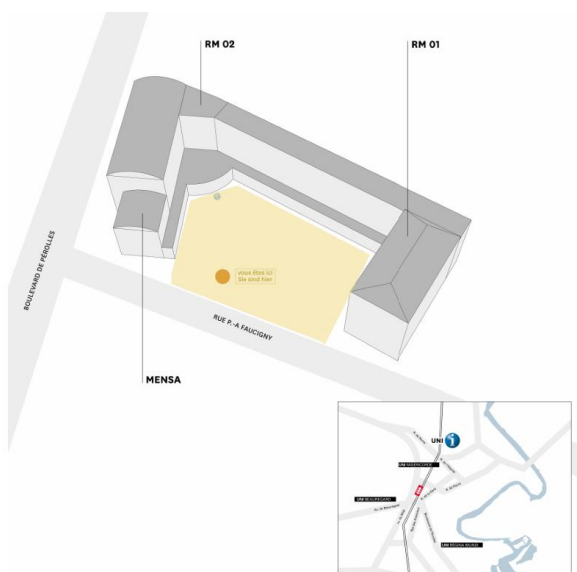
Your degree:

- Bachelor
- Master
- PhD

***General open question***

In your opinion, what would the ideal design of university campus green spaces look like in order to best support student well-being? (For example: specific features, activities, spatial layouts, amenities.) You may answer using bullet points.

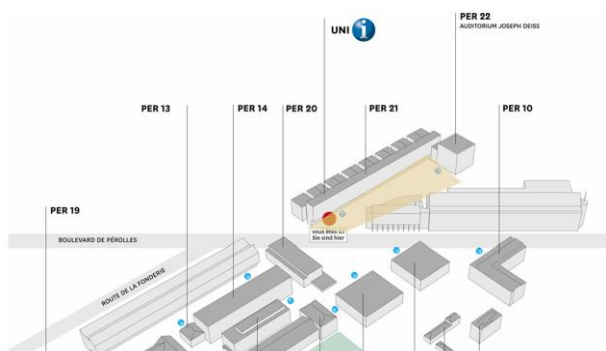
### *Question prior usage*



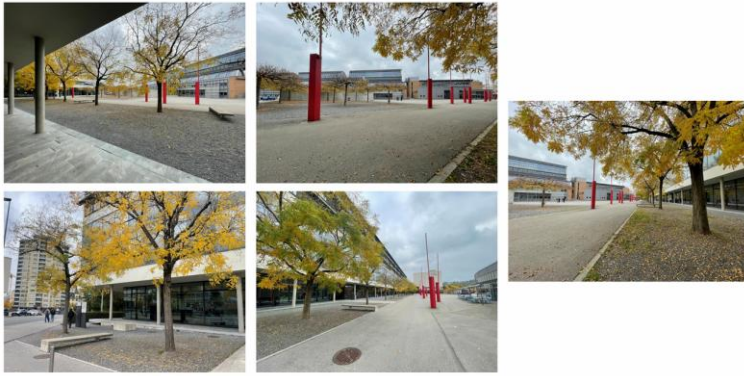
(Université de Fribourg, n.d.)



Photos taken by the author



(Université de Fribourg, n.d.)



Photos taken by the author

Have you used Regina Mundi/Pérolles 21 campus green space before?

- Yes
- No

### ***Frequency***

How often do you use Pérolles 21/Regina Mundi campus green space during an average semester?

- Daily
- Several times a week
- Several times a month
- Occasionally
- Rarely

### ***General instructions***

On the following pages, you will see photos of the campus green space along with several closed and open questions about the space. For closed questions, you can choose only one answer. For open-ended questions you are welcome to respond using bullet points.

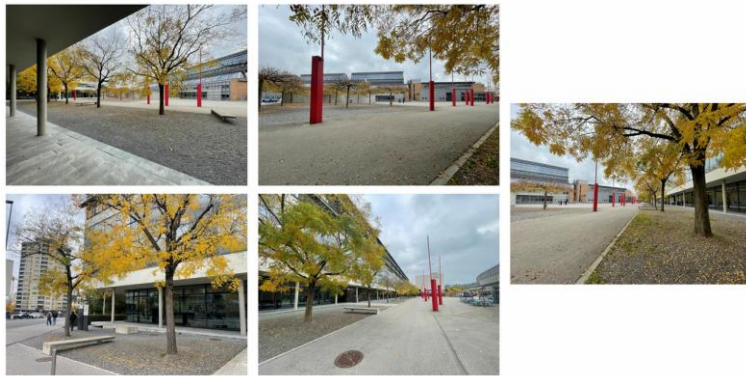
### ***Subjective CLM***

Below is a collection of statements about your perception of Regina Mundi campus green space. Using the 1-6 scale below, please indicate what describes the space best. The photos provided are meant to support your reflection, but they show the space as it appeared on one specific fall day. Please imagine the space in different weather conditions (sunny day, leaves moving etc.). However, when answering, (during spring, summer, on a please mainly

think about your own experiences and perception of the space. Do not rely on the photos alone



Photos taken by the author



Photos taken by the author

**Table C**

*Subjective CLM*

|                     | 1                                                                                                                         | 2 | 3                                                                    | 4 | 5                                                                                                                             | 6 |
|---------------------|---------------------------------------------------------------------------------------------------------------------------|---|----------------------------------------------------------------------|---|-------------------------------------------------------------------------------------------------------------------------------|---|
|                     | <i>Fore-, Middle- and Background = 3 layers</i>                                                                           |   |                                                                      |   |                                                                                                                               |   |
| Layers of Landscape | Layers are not visible<br>OR<br>Layers do not enhance the overall visual quality                                          |   | Layers moderately enhance the overall visual quality                 |   | ·Far-distance view ( $\geq 400\text{m}$ )<br>·Fore, middle & background visible<br>·Layers greatly enhance the visual quality |   |
| Landform            | <i>Landform and topography appear unnatural:</i><br>Flat<br>OR<br>Rugged<br><i>Sharp edges</i><br><i>Geometric shapes</i> |   | Landform is not very significant to the setting<br>OR<br>Hard to say |   | <i>Landform and topography appear natural: wavy and natural lines, hills, slopes</i><br>·Stimulation to look up to the sky    |   |

|                                                                                                      |                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                       |                                                                                                                                                                                                                                                               |
|------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Biodiversity                                                                                         | <ul style="list-style-type: none"> <li>·Low diversity of species</li> <li>·No visible changes or motions <i>along days and seasons</i></li> <li>·<i>Vegetation seems artificial and planted by humans</i></li> </ul> OR <ul style="list-style-type: none"> <li>·Presence of bio-phobic phenomena (<i>snakes, spiders, darkness...</i>)</li> </ul> | <ul style="list-style-type: none"> <li>·Moderate diversity of species</li> <li>·Moderate changes &amp; motion</li> </ul>                                                                              | <ul style="list-style-type: none"> <li>·High diversity of plant &amp; animal species</li> <li>·Vegetation seems native &amp; spontaneous</li> <li>·Visible changes &amp; motion <i>along days and seasons</i></li> </ul>                                      |
| Color & Light                                                                                        | <ul style="list-style-type: none"> <li>·Lots of vivid contrasting colours</li> <li>·Light &amp; shade not visible (<i>throughout the days and seasons</i>)</li> </ul>                                                                                                                                                                             | <ul style="list-style-type: none"> <li>·Moderate amount of contrasting colours</li> <li>·Moderate amount of light &amp; shade</li> </ul>                                                              | <ul style="list-style-type: none"> <li>·Harmonious, natural, broken or warm colours</li> <li>·light &amp; shade visible (<i>throughout the days and seasons</i>)</li> </ul>                                                                                   |
| Combability                                                                                          | <ul style="list-style-type: none"> <li>·Physical &amp; visual relations not worked out well or not at all</li> </ul> OR <ul style="list-style-type: none"> <li>·<i>Space appears</i> chaotic and cluttered</li> <li>·Lack of harmony between <i>natural and created</i></li> </ul>                                                                | <ul style="list-style-type: none"> <li>Physical &amp; visual relations are unclear</li> </ul> OR <ul style="list-style-type: none"> <li>Some elements disturbing the harmony &amp; balance</li> </ul> | <ul style="list-style-type: none"> <li>·Physical &amp; visual relations between elements are worked out</li> <li>·Explicit spatial order, simplicity,</li> <li>·<i>Space feels harmonious</i></li> <li>·Harmony between <i>natural and created</i></li> </ul> |
| <i>Archetypal elements = water (waterfall, sea, running water), rocks, old trees, path, clearing</i> |                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                       |                                                                                                                                                                                                                                                               |
| Archetypal Elements                                                                                  | No archetypal elements                                                                                                                                                                                                                                                                                                                            | Are present but not important for the overall perception                                                                                                                                              | Strongly influence overall perception                                                                                                                                                                                                                         |
| Character of Peace & Silence                                                                         | <ul style="list-style-type: none"> <li>·No character of peace &amp; silence</li> <li>·Busy</li> <li>·No contrast with urban environment</li> </ul>                                                                                                                                                                                                | <ul style="list-style-type: none"> <li>Moderate AND/OR Moderate sense of solitude AND/OR Less contrast with urban environment</li> </ul>                                                              | <ul style="list-style-type: none"> <li>·Explicit</li> <li>·Contrast to urban environment</li> <li>·Accessible &amp; safe</li> <li>·No technology</li> <li>·Invites to rest and relax</li> <li>·Gives sense of solitude</li> </ul>                             |

Everything written in italic letters has been added to increase comprehension.

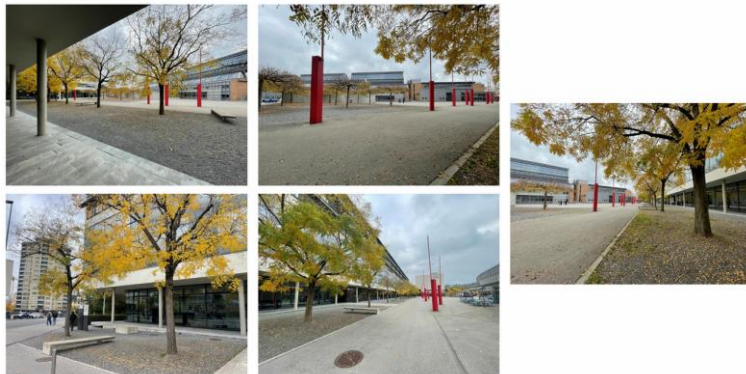
### ***Additional Questions***

Below is a collection of statements about your perception of Regina Mundi campus green space. Using the 1-6 scale below, please indicate what describes the space best. The photos provided are meant to support your reflection, but they show the space as it appeared on one specific fall day. Please imagine the space in different weather conditions sunny day, leaves moving etc.). However, when answering, (during spring, summer, on a please mainly

think about your own experiences and perception of the space. Do not rely on the photos alone



Photos taken by the author



Photos taken by the author

Please indicate how much you disagree or agree with the following statements: These statements are in regards to P  rolles 21/Regina Mundi campus green space. (1 Totally disagree - 6 totally agree)

- This space is accessible to people with different abilities (e.g. social, cognitive, physical).
- This space feels welcoming to people from diverse backgrounds.
- I can use the space in different ways depending on my needs.
- Weather (rain, heat, cold, sun etc.) conditions limit how I use this space.
- This space allows me to choose how private or social I want to be.
- When spending time in this space, I feel observed by others.
- Spending time in this space supports my general well-being.

Please complete the questionnaire below. These statements are in regards to P  rolles 21/Regina Mundi campus green space.

- The air quality in the space is poor. (1) - The air quality in the space is good. (6)
- The number of people in the space feels uncomfortable. (1) - The number of people in the space feels comfortable. (6)
- I feel isolated from others in this space. (1) - I feel connected to others in this space. (6)
- The space encourages me to move. (1) - The space encourages me to linger. (6)
- The space discourages social interaction. (1) - The space encourages social interaction. (6)
- The space appears neglected. (1) - The space appears well maintained and taken care of. (6)
- The space makes me feel unsafe. (1) - The space makes me feel safe. (6)
- The space does not encourage me to rest and relax. (1) - The space encourages me to rest and relax. (6)
- It's hard to find solitude in this space. (1) - I can easily be in solitude in this space. (6)

### **Open Questions**

- What aspects of the Pérolles 21/Regina Mundi campus green space have a positive effect on your well-being? (For example: places, features, or experiences that help you relax, focus, or feel good.)
- What aspects of the Pérolles 21/Regina Mundi campus green space have a negative effect on your well-being? (For example: things that cause stress, discomfort, or make it hard to enjoy the space.)
- How do you usually use the Pérolles 21/Regina mundi campus green space? (e.g. walking through, resting, studying, socializing)

### ***Final page***

Thank you for taking part in this survey! Use the following information to receive your experimental hours: Hours = 1h, Type of Task = Online Survey, Project = UX x Architecture, Researchers = Andreas Sonderegger, Valeria Hein

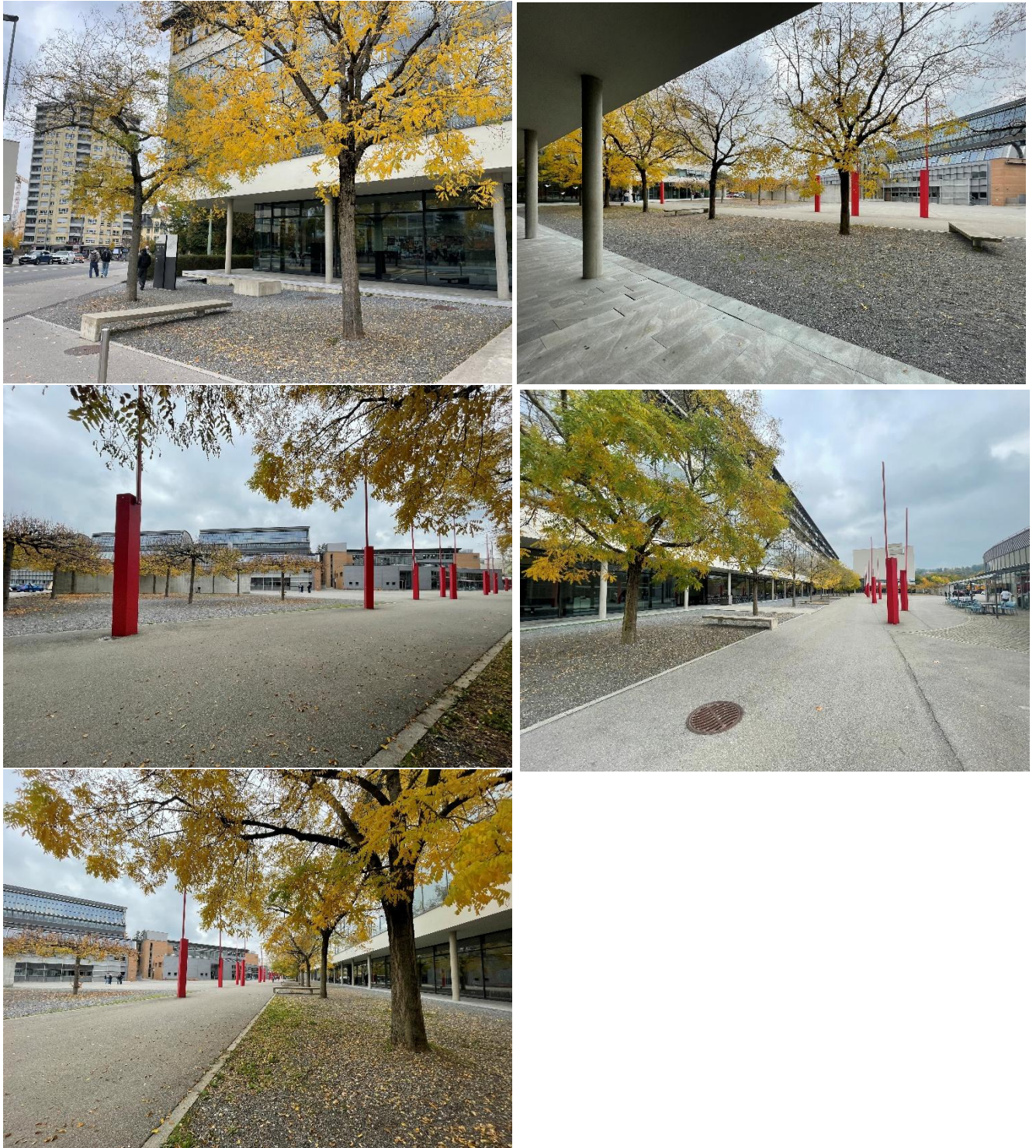
Note: To receive the German and French version, the author can be contacted.

## 7.4 Appendix D

### Photos of Campus Green Spaces

**Figure D1**

*Photos of Pérolles 21 Campus Green Space*



Photos taken by the author

## Figure D2

### *Map of Pérolles 21 Campus Green Space*



(Staat Freiburg, n.d.)

## Figure D3

### *Photos of Regina Mundi Campus Green Space*





Photos taken by the author

## Figure D4

### *Map of Regina Mundi Campus Green Space*



(Staat Freiburg, n.d.)

## 7.5 Appendix E

### Pretest Survey

#### Introduction page

**Study Purpose:** You are invited to participate in a user-centered research study examining students' needs for campus green spaces and how the design of these spaces influences their well-being. Your participation supports a Bachelor's thesis at the University of Fribourg. If you are a psychology student at the University of Fribourg, you will receive participation hours for completing the survey.

**Voluntary Participation & Right to Withdraw:** Your participation is entirely voluntary. You may withdraw from the study at any time without any negative consequences and without giving a reason.

**Risks:** There are no risks associated with participating in this study. If any of the questions make you uncomfortable, you may discontinue your participation at any time without negative consequences.

**Data Anonymity & Confidentiality:** All data collected in this study will be treated confidentially and used solely for research purposes. No personally identifiable information will be collected. Data will be stored securely and analyzed in anonymized form. Survey data are collected via the Unipark online survey platform.

**Expected Duration:** The questionnaire takes approximately 20 - 40 minutes to complete.

**Contact:** Please contact the following people if you have any questions: Researcher (Bachelor Student): Valeria Heini, Email: [valeria.heini@unifr.ch](mailto:valeria.heini@unifr.ch) Supervised by Prof. Dr. Andreas Sonderegger, University of Fribourg - Cognitive Ergonomics and Work Psychology, [andreas.sonderegger@unifr.ch](mailto:andreas.sonderegger@unifr.ch)

By clicking "Accept", you confirm that: You have read and understood the information provided. You voluntarily agree to participate in this study. You understand that your answers are collected anonymously

#### *Demographics*

Gender

- female
- male

- others

Age (Please answer using numbers):

Native Language

- German
- French
- Italian
- Other:

Your study subject:

- Psychology
- Education Sciences
- Teacher Education
- Other

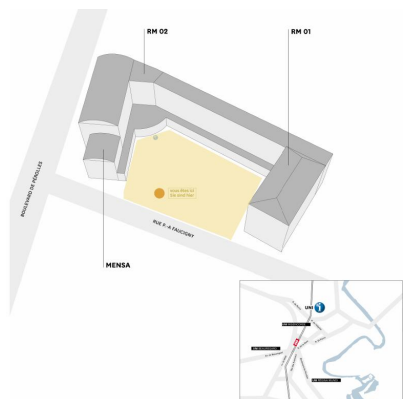
Your degree:

- Bachelor
- Master
- PhD

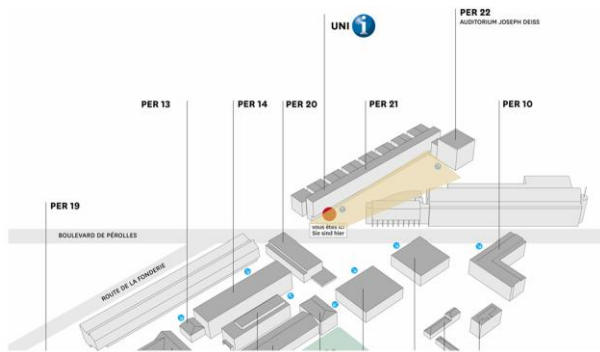
### ***General open question***

In your opinion, what would the ideal design of university campus green spaces look like in order to best support student well-being? (For example: specific features, activities, spatial layouts, amenities.) You may answer using bullet points.

### ***Question prior usage***



(Université de Fribourg, n.d.)



(Université de Fribourg, n.d.)

Have you used Regina Mundi/Pérolles 21 campus green space before?

- Yes
- No

### ***Frequency***

How often do you use Pérolles 21/Regina Mundi campus green space during an average semester?

- Daily
- Several times a week
- Several times a month
- Occasionally
- Rarely

### **Instructions**

On the following pages, you will see photos of the campus green space along with several questions about the space. The photos are provided as a reference, but they show the space on only one fall day. Please imagine the space in different weather conditions (during spring, summer, on a sunny day, leaves moving etc.). However, when answering, please mainly think about your own experiences and perception of the space. Do not rely on the photos alone. For open-ended questions, you are welcome to respond using bullet points.

### **CLM**

- There is no far distance view. (1) - There is a far distance view (400 meter or more). (6)
- Fore-, middle-, and background are not distinguishable. (1) - Fore-, middle-, and background are clearly distinguishable. (6)

- Fore-, middle-, and background do not enhance the visual quality. (1) - Fore-, middle-, and background strongly enhance the visual quality. (6)
- The landform and topography appear unnatural (geometric, straight lines, sharp edges, overly flat). (1) - The landform and topography appear natural (hills, slopes, wavy and natural lines). (6)
- The space doesn't make me want to look up towards the sky. (1) - The space makes me want to look up towards the sky. (6)
- Vegetation seems unnatural and planted by humans. (1) - Vegetation seems natural and spontaneous. (6)
- There is little diversity of plants and animals. (1) - There is a big diversity of plants and animals. (6)
- Plants do not move and change along days and seasons. (1) - Plants move and change along days and seasons. (6)
- There are elements that cause discomfort (e.g., snakes, spiders, darkness, etc.). (1) - There are no elements that cause discomfort (e.g., snakes, spiders, darkness, etc.). (6)
- Light and shade movement (throughout the day and the seasons) are not visible. (1) - Light and shade movement (throughout the day and the seasons) are visible. (6)
- The colors feel unnatural, vivid and contrasting. (1) - The colors feel natural and harmonious. (6)
- The space appears chaotic and cluttered. (1) - The space appears chaotic and cluttered. (6)
- The space does not feel harmonious. (1) - The space feels harmonious. (6)
- No balance between natural and human made elements. (1) - Balance between natural and human made elements. (6)
- There are distracting elements all over the space. (1) - There is one element that dominates and is in the centre of my attention. (6)
- Archetypal elements (water, rocks, old trees, etc.) are absent. (1) - The archetypal elements (water, rocks, old trees etc.) strongly influence my overall perception. (6)
- There is no contrast with the urban environment. (1) - There is a clear contrast to urban environment. (6)
- The space makes me feel unsafe. (1) - The space makes me feel safe. (6)
- The space feels noisy and busy. (1) - The space feels peaceful. (6)

- The space does not encourage me to rest and relax. (1) - The space encourages me to rest and relax. (6)
- The space inhibits solitude. (1) - The space enables solitude. (6)

### **Additional questions**

Please indicate how much you disagree or agree with the following statements: These statements are in regards to Pérolles 21/Regina Mundi campus green space. (1 Totally disagree - 6 totally agree)

- This space is accessible to people with different abilities (e.g. social, cognitive, physical).
- This space feels welcoming to people from diverse backgrounds.
- I can use the space in different ways depending on my needs.
- Weather (rain, heat, cold, sun etc.) conditions limit how I use this space.
- This space allows me to choose how private or social I want to be.
- When spending time in this space, I feel observed by others.
- Spending time in this space supports my general well-being.

Please complete the questionnaire below. These statements are in regards to Pérolles 21/Regina Mundi campus green space.

- The air quality in the space is poor. (1) - The air quality in the space is good. (6)
- The number of people in the space feels uncomfortable. (1) - The number of people in the space feels comfortable. (6)
- I feel isolated from others in this space. (1) - I feel connected to others in this space. (6)
- The space encourages me to move. (1) - The space encourages me to linger. (6)
- The space discourages social interaction. (1) - The space encourages social interaction. (6)

### **Open Questions**

- What aspects of the Pérolles 21/Regina Mundi campus green space have a positive effect on your well-being? (For example: places, features, or experiences that help you relax, focus, or feel good.)

- What aspects of the Pérolles 21/Regina Mundi campus green space have a negative effect on your well-being? (For example: things that cause stress, discomfort, or make it hard to enjoy the space.)
- How do you usually use the Pérolles 21/Regina mundi campus green space? (e.g. walking through, resting, studying, socializing)

***Final page***

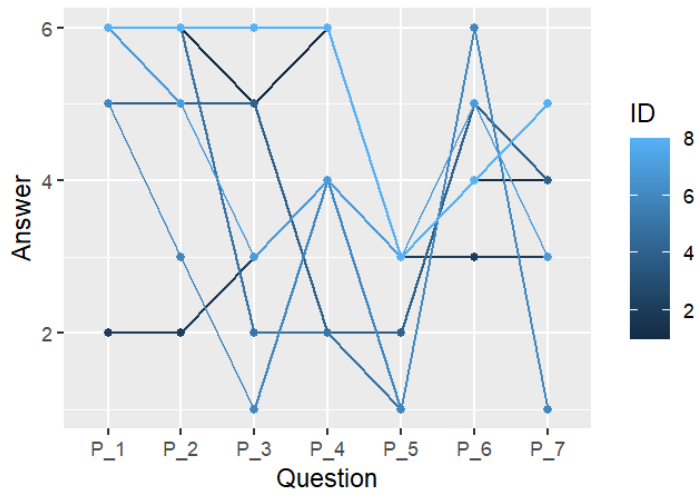
Thank you for taking part in this survey!

## 7.6 Appendix F

### Pretest Results

**Figure F**

*Answering pattern per person*



## 7.7 Appendix G

## Expert CLM Assessment

Figure G1

## Expert CLM Assessment Sheet

## CONTEMPLATIVE LANDSCAPE MODEL

ver.2.0

An expert-based, validated tool for visual quality assessment of urban green spaces. For an on-site use or photo representations (for the photos: to imagine as if you were there). Do NOT rate the quality of photography, weather conditions or personal preference.

Evaluate given landscape scene according to seven categories described in columns below, by scoring them from 1 to 6 points. Note, that two scores correspond to one description, which means you will need to decide which score fits better based on your expert's evaluation of the scene.

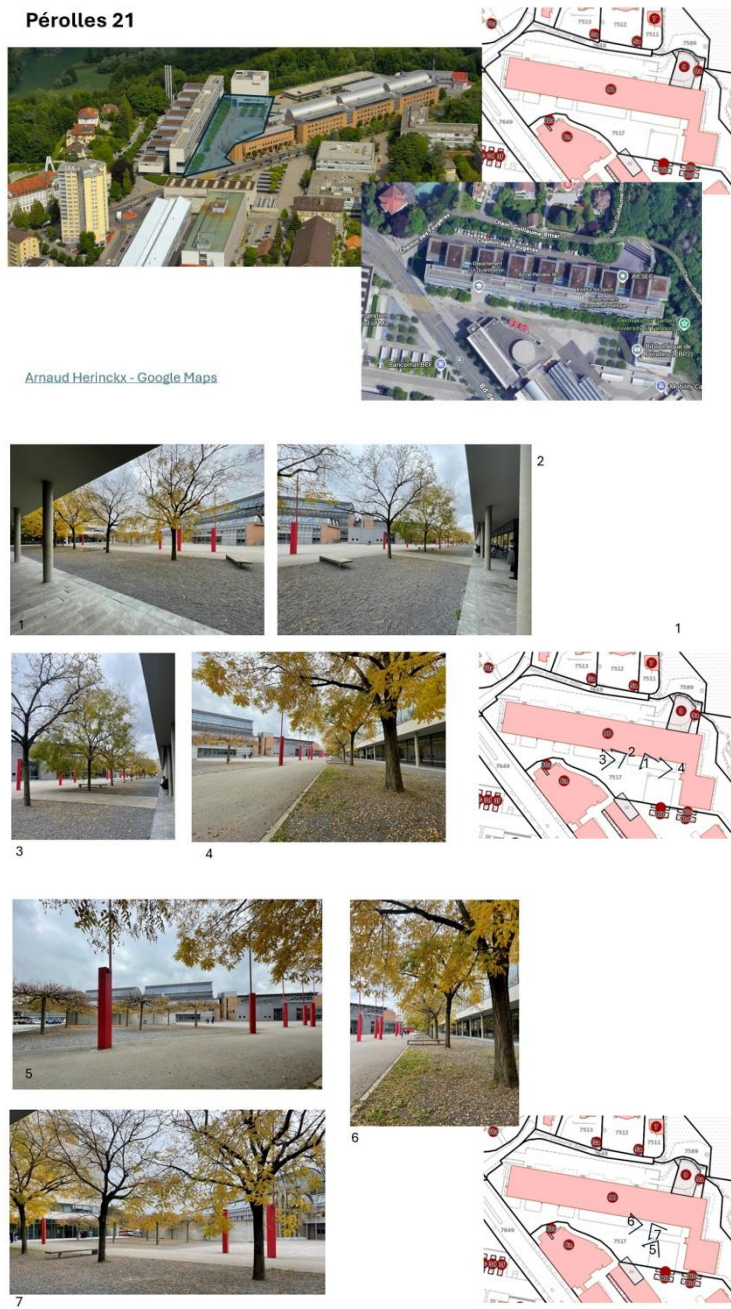
|          |                                                                                                 |                                                                                         |                                                                                                            |                                                                                                                           |                                                                                                                |                                                                                                                                                                    |                                                                                                                                              |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>6</b> | <ul style="list-style-type: none"> <li>Far-distance view (400m or more)</li> <li>Fore, middle and background visible</li> <li>Layers greatly enhance the visual quality</li> </ul> | <ul style="list-style-type: none"> <li>Undulating</li> <li>Natural lines</li> <li>Stimulation to look up to the sky through diversified skyline or water mirror</li> </ul> | <ul style="list-style-type: none"> <li>High diversity of plant and animal species</li> <li>Vegetation seems native and spontaneous</li> <li>Visible changes and motion<sup>1</sup></li> </ul> | <ul style="list-style-type: none"> <li>Viewpoints situated away from direct sun exposure</li> <li>Harmonious, natural, broken or warm colors</li> <li>Visibility of light and shade<sup>3</sup></li> </ul>   | <ul style="list-style-type: none"> <li>Physical and visual relations between elements are worked out</li> <li>Explicit spatial order, simplicity, harmony between natural and created</li> </ul> | <ul style="list-style-type: none"> <li>A number of these archetypal elements (path or running body of water, waterfall, old tree, a stone, and forest, etc.) are present in the scene</li> <li>Strongly influence the overall perception</li> </ul> | <ul style="list-style-type: none"> <li>Explicit</li> <li>Contrast to the urban environment</li> <li>Accessible and safe</li> <li>No technology</li> <li>Invites to rest and relax</li> <li>Gives sense of solitude</li> </ul> |
| <b>5</b> |                                                                                                                                                                                    |                                                                                                                                                                            | <ul style="list-style-type: none"> <li>plants that move and change with seasons and day natural cycles</li> </ul>                                                                             | <ul style="list-style-type: none"> <li>view of light and shade makes the landscape more animated and alive</li> <li>Colors that are neither overexposed nor overdarkened are ideal for relaxation</li> </ul> | <ul style="list-style-type: none"> <li>Physical and visual relations are unclear</li> <li>OR</li> <li>Some elements disturbing the harmony and balance</li> </ul>                                | <ul style="list-style-type: none"> <li>Are present but not important for the overall perception</li> </ul>                                                                                                                                          | <ul style="list-style-type: none"> <li>Moderate</li> <li>AND/OR</li> <li>Moderate sense of solitude</li> <li>AND/OR</li> <li>Less contrast with urban environment</li> </ul>                                                  |
| <b>4</b> | <ul style="list-style-type: none"> <li>Layers moderately enhance the overall visual quality</li> </ul>                                                                             | <ul style="list-style-type: none"> <li>Landform is not very significant to the setting</li> <li>OR</li> <li>Hard to say</li> </ul>                                         | <ul style="list-style-type: none"> <li>Moderate diversity of species</li> <li>Moderate changes and motion</li> </ul>                                                                          | <ul style="list-style-type: none"> <li>Moderate amount of contrasting colors</li> <li>Moderate amount of light and shade</li> </ul>                                                                          |                                                                                                                                                                                                  |                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                               |
| <b>3</b> |                                                                                                                                                                                    |                                                                                                                                                                            |                                                                                                                                                                                               |                                                                                                                                                                                                              |                                                                                                                                                                                                  |                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                               |
| <b>2</b> | <ul style="list-style-type: none"> <li>Layers are not visible</li> <li>OR</li> <li>Layers do not enhance the overall visual quality</li> </ul>                                     | <ul style="list-style-type: none"> <li>Flat (divided by straight lines &amp; geometric shapes)</li> <li>OR</li> <li>Rugged (sharp and unwelcoming to visitors)</li> </ul>  | <ul style="list-style-type: none"> <li>Low diversity of species</li> <li>No visible changes or motion</li> <li>OR</li> <li>Presence of biophobic phenomena<sup>2</sup></li> </ul>             | <ul style="list-style-type: none"> <li>Lots of vivid, contrasting colors</li> <li>Light and shade not visible</li> </ul>                                                                                     | <ul style="list-style-type: none"> <li>Physical and visual relations are not worked out well or not at all</li> <li>OR</li> <li>Chaos, clutter, lack of harmony</li> </ul>                       | <ul style="list-style-type: none"> <li>No archetypal elements</li> </ul>                                                                                                                                                                            | <ul style="list-style-type: none"> <li>No character of peace and silence</li> <li>Busy</li> <li>No contrast with the urban environment</li> </ul>                                                                             |
| <b>1</b> |                                                                                                                                                                                    |                                                                                                                                                                            |                                                                                                                                                                                               |                                                                                                                                                                                                              |                                                                                                                                                                                                  |                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                               |

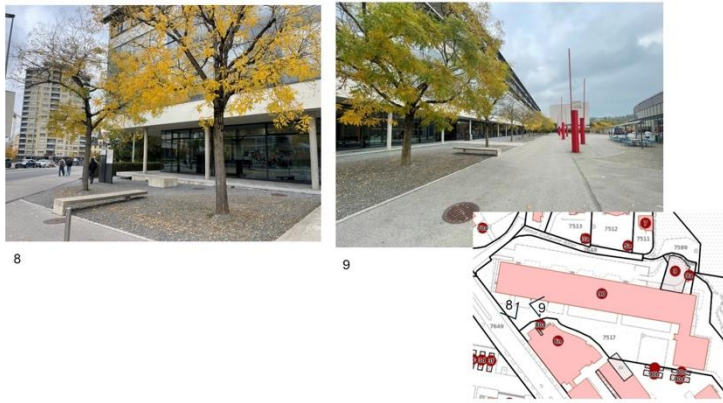
<sup>1</sup> Dynamic natural phenomena, e.g., seasonal, diurnal changes of vegetation, flying birds, bees etc. Ignore this for photo evaluation.

<sup>2</sup> Biophobic phenomena include, but are not limited to: snakes, spiders, darkness etc.

<sup>3</sup> In case of overcast weather, imagine the sunny conditions.

<sup>4</sup> Archetypal elements include: water (still or running body of water, waterfall, sea), path, clearing, mountain/hill, single old tree, stone, forest, desert (space of absence), grave, circle, dome, arc.

**Figure G2***Map of Pérolles 21 with corresponding photos*



**Figure G3**

*Map of Regina Mundi with corresponding photos*





5



6



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8



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10



11

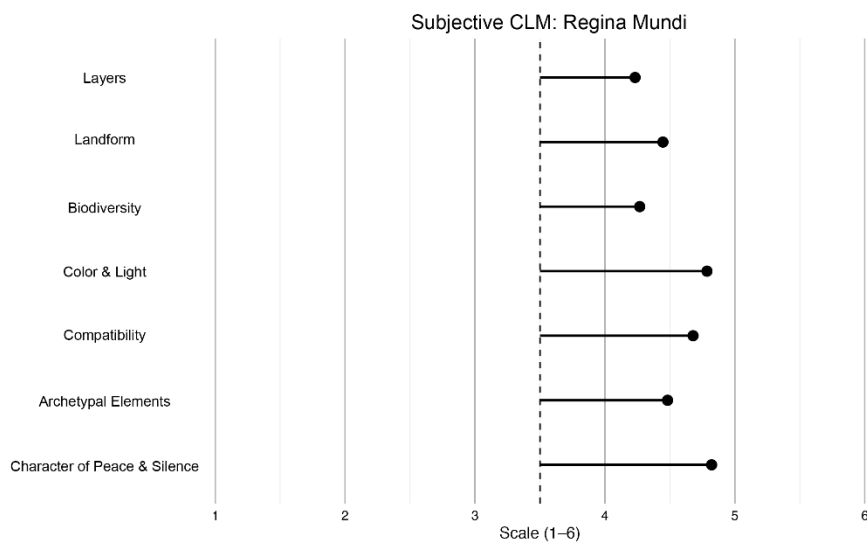


## 7.8 Appendix H

### Subjective CLM Results

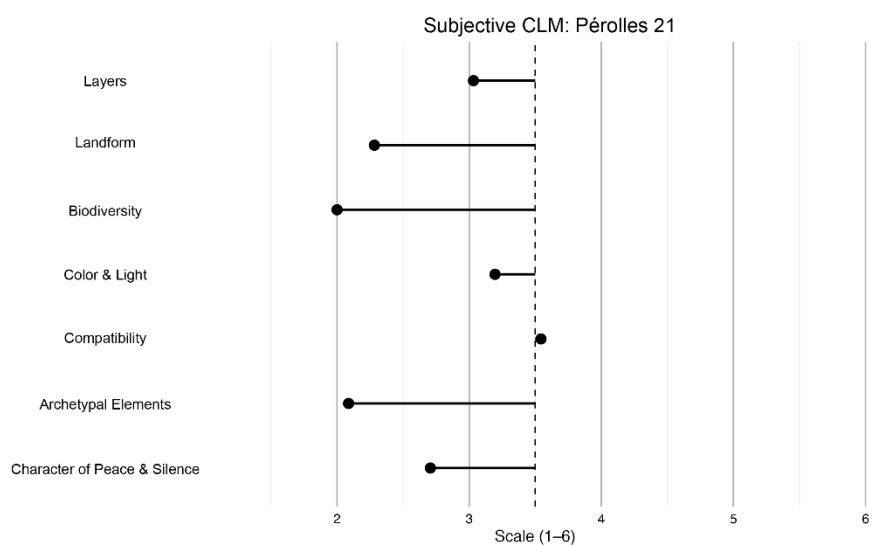
**Figure H1**

*Subjective CLM Results for Regina Mundi*



**Figure H2**

*Subjective CLM Results for Pérolles 21*



## 7.9 Appendix I

### Results qualitative analysis

Table I1

*Pérolles 21 qualitative analysis results*

| Pérolles 21             |                              |                                          |                     |
|-------------------------|------------------------------|------------------------------------------|---------------------|
| Question                | Theme                        | Subthemes                                | Quantity of Answers |
| <b>Usage</b>            |                              |                                          |                     |
|                         | Transitory Use               |                                          | 61                  |
|                         |                              | Passage                                  | 59                  |
|                         |                              | Waiting                                  | 2                   |
|                         | Stationary Use               |                                          | 149                 |
|                         |                              | Study & Working                          | 19                  |
|                         |                              | Restoration                              | 92                  |
|                         |                              | Consuming food and drinks                | 37                  |
|                         |                              | Taking breaks                            | 26                  |
|                         |                              | Rest & relax                             | 19                  |
|                         |                              | Enjoying sunlight                        | 10                  |
|                         |                              | Socialising                              | 38                  |
| <b>Negative Aspects</b> |                              |                                          |                     |
|                         | Landform                     |                                          | 7                   |
|                         |                              | Artificial Design                        | 7                   |
|                         | Biodiversity                 |                                          | 47                  |
|                         |                              | Lack of greenery                         | 35                  |
|                         |                              | No grass lawn                            | 8                   |
|                         |                              | Low diversity in species                 | 4                   |
|                         | Color & Light                |                                          | 25                  |
|                         |                              | Lack of color                            | 20                  |
|                         |                              | Too much grey                            | 15                  |
|                         |                              | Lack of natural color                    | 5                   |
|                         |                              | Lack of shade                            | 5                   |
|                         | Compatibility                |                                          | 49                  |
|                         |                              | No balance between the natural & created | 43                  |
|                         |                              | Too much concrete                        | 28                  |
|                         |                              | Too much cobble                          | 15                  |
|                         |                              | Red columns                              | 3                   |
|                         |                              | Empty space                              | 3                   |
|                         | Character of Peace & Silence |                                          | 47                  |
|                         |                              | No contrast to the urban environment     | 11                  |
|                         |                              | Does not invite to rest & relax          | 2                   |
|                         |                              | No sense of peace & calmness             | 5                   |
|                         |                              | No sense of solitude                     | 29                  |
|                         |                              | Crowded                                  | 17                  |

|                         |                                   |                             |    |
|-------------------------|-----------------------------------|-----------------------------|----|
|                         |                                   | Feeling exposed & observed  | 7  |
|                         |                                   | Lack of privacy             | 5  |
|                         | Amenities & Comfort               |                             | 45 |
|                         |                                   | Uncomfortable surfaces      | 10 |
|                         |                                   | No grass lawn               | 8  |
|                         |                                   | Lack of shade               | 5  |
|                         |                                   | Lack of shelter             | 3  |
|                         |                                   | Lack of seating             | 17 |
|                         |                                   | People smoking              | 2  |
|                         | Lack of spatial diversity         |                             | 8  |
|                         | Underused space                   |                             | 3  |
|                         | Social & psychological experience |                             | 29 |
|                         |                                   | Feeling exposed & observed  | 7  |
|                         |                                   | Crowded                     | 17 |
|                         |                                   | Lack of privacy             | 5  |
| <b>Positive Aspects</b> |                                   |                             |    |
|                         | Layers of Landscape               |                             | 11 |
|                         |                                   | Open Space                  | 11 |
|                         | Biodiversity                      |                             | 50 |
|                         |                                   | Trees                       | 45 |
|                         |                                   | Change of season            | 5  |
|                         | Color & Light                     |                             | 15 |
|                         |                                   | Neutral Colors              | 2  |
|                         |                                   | Sunlight                    | 13 |
|                         | Compatibility                     |                             |    |
|                         |                                   | Spatial Order               | 3  |
|                         | Character of Peace & Silence      |                             | 14 |
|                         |                                   | Invites to rest & relax     | 10 |
|                         |                                   | Sense of peace & calmness   | 4  |
|                         | Amenities & Comfort               |                             | 54 |
|                         |                                   | Seating areas               | 36 |
|                         |                                   | Shade of trees              | 5  |
|                         |                                   | Sunlight                    | 13 |
|                         | Social & Psychological Experience |                             | 5  |
|                         |                                   | Feeling connected to others | 5  |

**Table I2***Regina Mundi qualitative analysis results*

| Regina Mundi |                |                 |                     |
|--------------|----------------|-----------------|---------------------|
| Question     | Theme          | Subthemes       | Quantity of Answers |
| Usage        |                |                 |                     |
|              | Transitory Use |                 | 34                  |
|              |                | Passage         | 31                  |
|              |                | Waiting         | 3                   |
|              | Stationary Use |                 |                     |
|              |                | Study & Working | 10                  |

|                         |                                   |                                          |    |
|-------------------------|-----------------------------------|------------------------------------------|----|
|                         |                                   | Restoration                              | 51 |
|                         |                                   | Consuming food and drinks                | 13 |
|                         |                                   | Taking breaks                            | 11 |
|                         |                                   | Rest & relax                             | 22 |
|                         |                                   | Enjoying sunlight                        | 3  |
|                         |                                   | Enjoying nature                          | 2  |
|                         |                                   | Socialising                              | 20 |
|                         |                                   | Participating in activities              | 5  |
| <b>Negative Aspects</b> |                                   |                                          |    |
|                         | Compatibility                     |                                          | 6  |
|                         |                                   | No balance between the natural & created | 2  |
|                         |                                   | Unattractive design                      | 4  |
|                         | Character of Peace & Silence      |                                          | 32 |
|                         |                                   | No contrast to the urban environment     | 9  |
|                         |                                   | Does not invite to rest & relax          | 2  |
|                         |                                   | No sense of peace & calmness             | 2  |
|                         |                                   | No sense of solitude                     | 19 |
|                         |                                   | Crowded                                  | 7  |
|                         |                                   | Feeling exposed & observed               | 7  |
|                         |                                   | Feeling isolated                         | 5  |
|                         | Lack of Amenities & Comfort       |                                          | 24 |
|                         |                                   | Too small                                | 3  |
|                         |                                   | Lack of shelter                          | 4  |
|                         |                                   | Lack of seating                          | 8  |
|                         |                                   | People smoking                           | 3  |
|                         |                                   | No seating on grass lawn                 | 3  |
|                         |                                   | Terrace not inviting                     | 3  |
|                         | Lack of spatial diversity         |                                          | 2  |
|                         | Social & Psychological Experience |                                          | 19 |
|                         |                                   | Feeling exposed & observed               | 7  |
|                         |                                   | Crowded                                  | 7  |
|                         |                                   | Feeling isolated                         | 5  |
| <b>Positive Aspects</b> |                                   |                                          |    |
|                         | Layers of Landscape               |                                          | 2  |
|                         |                                   | Open space                               | 2  |
|                         | Biodiversity                      |                                          | 65 |
|                         |                                   | Abundance of greenery                    | 35 |
|                         |                                   | Presence of animals                      | 5  |
|                         |                                   | Change of Season                         | 10 |
|                         |                                   | Grass lawn                               | 15 |
|                         | Color & Light                     |                                          | 21 |
|                         |                                   | Natural colors                           | 16 |
|                         |                                   | Shade                                    | 5  |
|                         | Compatibility                     |                                          | 8  |

|  |                              |                                       |    |
|--|------------------------------|---------------------------------------|----|
|  |                              | Balance between the natural & created | 4  |
|  |                              | Attractive design                     | 4  |
|  | Archetypal Elements          |                                       | 17 |
|  |                              | Body of Water                         | 17 |
|  | Character of Peace & Silence |                                       | 34 |
|  |                              | Invites to rest & relax               | 10 |
|  |                              | Sense of peace & calmness             | 18 |
|  |                              | Contrast to the urban environment     | 6  |
|  | Amenities & Comfort          |                                       | 21 |
|  |                              | Seating areas                         | 10 |
|  |                              | Shade                                 | 5  |
|  |                              | Usable green space                    | 6  |
|  |                              | Seating on grass lawn                 | 6  |
|  |                              | social & psychological experience     | 4  |
|  |                              | Feeling connected to others           | 4  |

**Table I3**

*Overview Ideal Campus Green Space Design*

| Ideal Campus Green Space Design |                                       |                     |
|---------------------------------|---------------------------------------|---------------------|
| Theme                           | Subthemes                             | Quantity of Answers |
| Biodiversity                    |                                       | 116                 |
|                                 | Abundance of greenery                 | 49                  |
|                                 | Flower garden                         | 24                  |
|                                 | Grass lawn                            | 34                  |
|                                 | High diversity of species             | 7                   |
|                                 | Change of season                      | 2                   |
| Color & Light                   |                                       | 33                  |
|                                 | More (natural) color                  | 4                   |
|                                 | Sunlight                              | 7                   |
|                                 | Shade                                 | 22                  |
| Compatibility                   |                                       | 10                  |
|                                 | Balance between the natural & created | 8                   |
|                                 | clear structure                       | 2                   |
| Archetypal Elements             |                                       | 10                  |
|                                 | Body of water                         | 10                  |
| Character of Peace & Silence    |                                       | 29                  |
|                                 | Invites to rest & relax               | 17                  |
|                                 | Sense of peace & calmness             | 8                   |
|                                 | Contrast to the urban environment     | 4                   |
| Amenities & Comfort             |                                       | 125                 |
|                                 | Zones with shade                      | 22                  |
|                                 | Zones with shelter                    | 3                   |
|                                 | Zones with sunlight                   | 7                   |

|                   |                               |    |
|-------------------|-------------------------------|----|
|                   | Sufficient seating            | 55 |
|                   | Comfortable seating           | 8  |
|                   | Usable green space            | 30 |
|                   | Accessible & inclusive design | 5  |
|                   | Seating on grass lawn         | 25 |
| Spatial Diversity |                               | 83 |
|                   | Active Zones                  | 49 |
|                   | Sport                         | 16 |
|                   | Play & activities             | 14 |
|                   | Social interaction            | 6  |
|                   | Community gardening           | 4  |
|                   | Eating                        | 9  |
|                   | Passive Zones                 | 34 |
|                   | Study                         | 7  |
|                   | Calm & relaxation             | 18 |
|                   | Private                       | 9  |

## 7.10 Appendix J

### Redesign

**Figure J1**

*Design Plan Regina Mundi*



**Figure J2**

*Visualization Regina Mundi*



**Figure J3***Design Plan Pérolles 21***Figure J4***Visualization Pérolles 21*

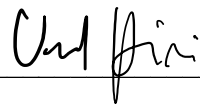
## 7.11 Appendix K

### Statement of independence

Hereby I assure to have written this paper on my own and I have used no unauthorized means to do so. I have declared as such and marked citations to the best of my ability, according to the standard scientific practices, all sections that are taken word for word or paraphrased from other sources (e.g., books, journals, newspapers, encyclopaedias, internet etc.). This is also true for tables, sketches, pictorial presentations etc. I have used no aids other than those mentioned.

### The use of AI

Artificial Intelligence (OpenAI, 2026) was used as a supportive tool in this thesis. It assisted in refining the English language, improving clarity and conciseness, and enhancing the overall academic tone and flow of the text. In addition, it supported aspects of the qualitative and quantitative analysis, including checking the plausibility and limitations of statistical interpretations, assisting with RStudio (Posit Software, 2026) coding issues, and suggesting labels for qualitative coding categories. All analytical decisions and interpretations were critically evaluated and finalized by the author.

\_\_\_\_\_ Cazaux, 08.05.26\_ Place, Date \_\_\_\_\_  \_\_\_\_\_ Signature