1. The aim

People who were physically active before the COVID-19 pandemic and maintained physical activity (PA) during the pandemic are less likely to become infected with SARS-CoV-2 infection, they also have lower risk of severe COVID-19 or COVID-19-related death (Lee et al., 2021). Nationwide cohort research conducted "during" the COVID-19 pandemic suggests that PA levels decreased in >50% of the population, whereas sedentary time has increased (Tanguy et al., 2021). The links between the trajectory of the COVID-19 pandemic (e.g., fluctuations in public policies restricting movement; fluctuations in in COVID-19 morbidity and mortality) and changes in PA or the proportion of time spent on sedentary behavior (SB) and PA remain unknown. It is also unclear how/if the public policies restricting movement during the COVID-19 pandemic are associated with people's ability to self-regulate (e.g., by means of forming plans or self-monitoring). We will investigate how psychosocial and policy-related predictors operate together in explaining objectively assessed time spent on **physical activity and the proportion of sedentary behavior to physical activity,** calculated for the waking time (henceforth called: SB/PA).

The proposed research will provide insights into the association between four sets of predictors:
(1) the ways people perceive their physical environment (defined as built environment in the community, supporting active lifestyle, i.e. pedestrian and cycling facilities, but also home design and equipment promoting PA or SB) or the objective characteristics of the physical environment, such as presence of public gyms, swimming pools, the length of cycling paths, etc.
(2) beliefs about ability to exercise in spite of barriers, self-monitoring one's own PA and SB levels, and planning when, where, and how to exercise;
(3) habits, defined as automaticity in PA and a lack of awareness of engaging in PA or SB
(4) containment policies introduced during the COVID-19 pandemic (including restriction of movements, closure of exercise facilities) enforced in the country in the week of data collection.

2. Research Plan and Methods

The research questions will be investigated using a longitudinal design, accounting for 6 measurement points within a span of 8 months (Figure 1), with data collection between September 2019 and spring 2024 to capture the pre-COVID-19 period and the period of pandemic (and, potentially, post-pandemic period?). The time span of 8 months and the time gaps between the measurement points were chosen to capture very short effects (weekly changes between T0 and T2), short-term changes (2 months between T0 and T4), and mid-term changes (8 months between T2 and T6). We will combine currently collected data (600 participants aged 12-95 years old) with newly collected data (200 additional participants). The indicators of 8 containment policies (e.g., , limits on gatherings, cancelling public events, schools and universities closed) will be applied to test the role of COVID-19 containment policies. This containment index is calculated for each country for each week since the beginning of the COVID-19 pandemic (the Oxford COVID-19 Government Response Tracker; Hale e al., 2021). The values will be matched with the exact date when each individual's data were collected. The role of the fluctuations of the COVID-19 morbidity and mortality will be controlled, accounting for daily morbidity and mortality rates.

Figure 1: The study design. PA–physical activity; SB–sedentary behavior; SB/PA–the proportion of time spent on SB and PA
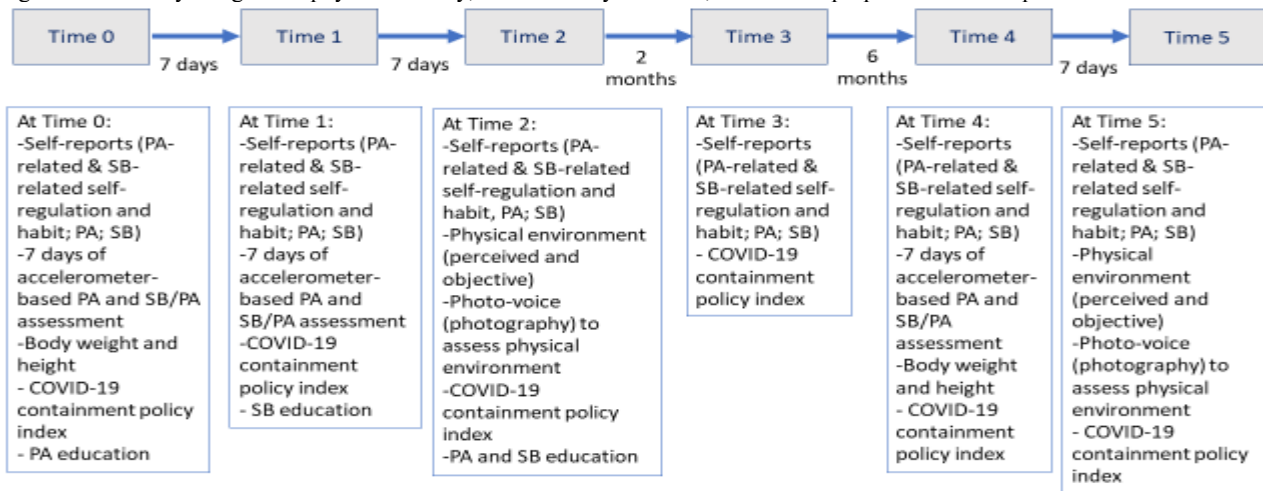
3. Results Expected

The results will be presented in a PhD thesis, based on a line of 3 publications (outlets: recognized international journals). The conducted studies will provide a novel insight into the associations between policies and health behaviors (mediated by the physical environment and self-regulatory beliefs). Although effects of policies on behavior have been investigated, it is unclear how/if policies operate via people's beliefs about themselves and their perceptions of the environment. We hope to bridge this knowledge gap.