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Challenges to sustainable ageing: the role of the generational digital divide in Budapest's participatory budgeting

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Abstract

The inclusion of older adults in civic and political life is an important dimension of sustainable ageing, yet digitalisation increasingly shapes how such engagement is organised and accessed. This article examines the participation of adults aged 65 and over in Budapest's participatory budgeting (PB) during the 2020/21 and 2021/22 cycles. In these two rounds, administrative participation data with age information were available, and participation was organised predominantly online. The descriptive analysis shows that older adults were underrepresented in both idea submission and voting relative to their share of Budapest's population, and that their representation was even lower in the voting phase than in the idea-submission phase. To contextualise these results, the article also draws on survey-based data on parliamentary election turnout from an earlier period. These data provide limited and indirect contextual evidence on age-differentiated civic engagement in selected electoral districts, indicating that older adults' participation was higher than that of younger adults. Taken together, the findings are consistent with the interpretation that digitally mediated participation requirements, in a context of age-related digital inequalities, may have contributed to age-differentiated patterns of inclusion in a formally open civic process. As a descriptive case study based on limited administrative participation data, the article contributes to debates on sustainable ageing by highlighting that digital institutional design may affect inclusion in later life. It concludes with policy implications for making participatory budgeting more accessible through more inclusive and hybrid forms of participation.

Keywords: Participatory budgeting, online participation, digital divide, civic engagement of older adults, sustainable ageing, Budapest

Introduction

Participatory budgeting (PB) is a distinctive form of democratic decision-making through which residents help determine how a portion of public resources is allocated to local priorities. In practice, PB typically involves two main stages: citizens first submit proposals for local improvements, and then vote on those proposals that remain after feasibility screening. Since its emergence in Porto Alegre, Brazil, in 1989, PB has spread across a wide range of institutional and regional contexts, including Latin America, Central and Eastern Europe, and other regions (Abers, 2000; Gherghina et al., 2023; Sintomer et al., 2008; Taylor et al., 2025). This article examines PB in Hungary's capital, Budapest, during the 2020/21 and 2021/22 cycles, focusing on age-differentiated participation in a process that was organised predominantly online.

Participatory budgeting in Budapest has a relatively short history. The first city-level pilot programme was launched in 2020 (Kiss et al., 2023). Although some district-level PB initiatives had already existed in the city (Sipos & Reszkető,

2019), our analysis focuses exclusively on the metropolitan programme. In the two cycles examined here, both idea submission and voting were organised primarily through digital channels, while offline participation opportunities remained limited and were available only in the voting phase. This makes the Budapest case especially relevant for examining whether formally open participatory institutions are equally accessible across age groups when participation is mediated largely through digital tools.

This question is important not only for the study of PB, but also for debates on sustainable ageing. As Arpino et al. (2026) argue, sustainable ageing is a multidimensional and forward-looking framework that links older adults' well-being, autonomy, and inclusion to the broader social, economic, political, technological, and ecological conditions that must also be sustained across generations. In this context, the inclusion of older adults in civic and political life becomes increasingly consequential for social inclusion and for the long-term inclusiveness of participatory institutions. Our contribution is primarily concerned with the technological and civic inclusion dimensions of sustainable ageing. More specifically, the article contributes to this perspective not through direct measurement of ageing outcomes or individual-level digital inequalities, but by examining how the digital design of participatory institutions may shape older adults' effective opportunities for civic inclusion. In this sense, the paper highlights a forward-looking policy challenge in ageing societies: if democratic participation is increasingly organised through digital channels, sustainable ageing also depends on whether older adults can participate in these institutions on substantively equal terms.

To address this question, we draw on administrative data on PB participants provided by the Municipality of Budapest for the 2020/21 and 2021/22 cycles. These two rounds are analytically important because registration data including age information were collected only during this period and not in subsequent cycles. The dataset is nevertheless limited: it contains participation outcomes and age information, but it does not include information on gender or other socioeconomic characteristics, nor direct measures of digital skills, digital access, technology use, or motivations. Accordingly, the article should be understood as a descriptive case study rather than as a direct individual-level test of the generational digital divide. Its contribution lies in documenting age-differentiated participation patterns in a predominantly digital PB process and interpreting them cautiously in light of the literature on digital inequality in later life.

In this article, the term digital divide is used mainly in relation to inequalities associated with the digital skills required to participate in digitally mediated environments (Büchi et al., 2016). The article therefore focuses on inequalities most closely associated with the second-level digital divide, while also acknowledging that these may have downstream consequences associated with the third-level digital divide in terms of who is better positioned to benefit from digitally mediated participation (Scheerder et al., 2017; Van Deursen & Helsper, 2015). In the case of participatory budgeting, these consequences may extend beyond access to the process itself and may also affect whose voices are more likely to be reflected in collective decisions.

Like other European countries, Hungary is also experiencing population ageing. On average, the old-age dependency ratio in the EU (population aged 65+ relative to population aged 20-64) is projected to increase from 36 per cent in 2022 to 55 per cent in 2050, and further to 65.3 per cent in 2100 (Eurostat, 2023). Although Hungary's figures are slightly lower (34.3 per cent in 2022, 49.6 per cent in 2050, and 60.4 per cent in 2100; Eurostat, 2023), it remains important to examine how actively older adults are currently engaged in public affairs and what this may imply for sustainable ageing in the future. The analysis of participatory budgeting data offers one way of approaching this question in an urban setting.

The remainder of the article is structured as follows. The next section reviews the literature on digital inequality and participatory budgeting. This is followed by a section on the institutional design of PB in Budapest, then by the empirical analysis of age-differentiated participation in the 2020/21 and 2021/22 cycles. The final sections discuss the implications of the findings for sustainable ageing and inclusive participatory design.

Literature review

Participatory budgeting (PB) was historically organised primarily through in-person engagement, which was a natural feature of the model in its early decades. Over time, however, an increasing number of municipalities began to introduce online or hybrid formats (Sampaio, 2016), and the Covid-19 pandemic further accelerated this trend (Annunziata, 2024). The digitalisation of PB has often been associated with the promise of broader inclusion, lower participation costs, and more flexible forms of engagement. In this context, online PB has frequently been linked to the broader aspiration of combining digital tools with participatory democracy (Peixoto, 2009). Some of these expectations have been partly confirmed, as digital formats may facilitate participation for people with limited mobility or for those living farther from deliberative venues. At the same time, however, the spread of digitally mediated participation has also raised concerns about whether the move online reproduces or reshapes existing inequalities in civic engagement.

Existing research suggests that digital PB does not automatically broaden inclusion. In New York City, for example, online voting was associated with higher overall participation but also with greater participation by wealthier and more educated groups (Saad, 2020). Mellon et al. (2017) likewise show that mode of participation matters, with older adults and people with lower levels of education more likely to prefer offline formats when such options are available. Research on Brazil points in a similar direction. Touchton et al. (2019) show that poorer municipalities often struggled with digital PB because of limited internet access and weaker local resources, while Wampler et al. (2018) argue that digital PB may expand participation primarily by involving the middle class more extensively. Annunziata (2024), writing in the context of pandemic-era digitalisation, similarly highlights how rapid shifts to online participation can intensify exclusion when institutional adaptation is limited.

The literature also highlights that existing digital habits shape continued engagement in online PB. In Lisbon, Zolotov et al. (2018) found that continued use of online PB was most common among participants who already had strong digital habits. At the same time, because their study was based on respondents who had already used the online PB platform, it offered only limited leverage for assessing broader inequalities in access or for capturing those excluded before participation even began. More broadly, scholarship on digital inequality has long shown that disparities in access, digital skills, and patterns of internet use shape who is able to participate in digitally mediated forms of civic and political engagement (Büchi et al., 2016; Norris, 2001). These inequalities often disadvantage older adults and people with lower levels of education (Melenchuk, 2021).

These concerns are especially relevant in relation to age. Research on digital participation has repeatedly shown that older adults are less likely to benefit from digitalised participation formats when meaningful participation depends not only on access, but also on the digital skills required to register, navigate interfaces, evaluate information, and complete multi-step procedures. Dajer (2024) shows that PB participants in Medellín expressed concerns that digital tools might marginalise older adults and other groups with weaker digital access. Mellon et al. (2017) similarly suggest that older adults are more likely to prefer offline participation when different modes are available.

Annunziata (2024) provides particularly relevant evidence from Vicente López, where the rapid digitalisation of PB during the pandemic coincided with a sharp drop in participation and a shift in the age profile of participants, which in turn prompted targeted outreach efforts towards older adults. Research beyond PB points in a similar direction. Junqueira et al. (2023), studying older adults' interaction with legislative e-participation platforms in Brazil, show how interface complexity, difficult language, and usability problems can reinforce distrust and discourage participation. Likewise, Jurišić and Bogataj (2024) emphasise that technology anxiety, preference for face-to-face interaction, and limited digital skills continue to constrain older adults' engagement with digital government even where formal access is available.

At the same time, some municipalities have experimented with ways of mitigating these barriers. Klimovský et al. (2024) discuss low-cost alternative channels such as SMS and ATM voting, while Sintomer et al. (2013) describe how

Belo Horizonte addressed territorial inequalities through mobile computer units in poorer areas. Sedmihradská et al. (2021), examining the Czech case, show that although many municipalities rely on online-only or hybrid formats, some also provide assistance for citizens who are less familiar with internet-based tools. Such measures are particularly relevant because the direct intersection of older adults and PB remains thinly researched. One recent study of Wrocław's 2023 PB process found very low participation among older adults and identified reluctance, lack of trust, digital exclusion, and lack of knowledge as key barriers (Olejniczak & Bednarska-Olejniczak, 2025). More broadly, Falanga et al. (2021) show that older adults often participate more through stable and institutionalised consultative bodies than through more episodic and competitive participatory formats, which suggests that the standard design of PB may be less closely aligned with their preferred modes of engagement.

An important empirical gap nevertheless remains. While the literature increasingly recognises that digital participatory institutions may reproduce age-related inequalities, relatively few studies provide stage-specific descriptive evidence on age-differentiated participation in predominantly digital PB processes. The Budapest case offers a descriptive case-study contribution to this literature by examining two consecutive PB cycles in which limited administrative participation data with age information were available for both idea submitters and voters. Because the available data do not directly measure individual digital skills, the analysis cannot identify the precise mechanisms linking age and PB involvement.

Participatory budgeting in Budapest: Institutional design and case background

Participatory budgeting at the city level in Budapest has a relatively short history. Although some district-level initiatives had appeared earlier, the metropolitan programme was launched only after the 2019 municipal election, with the first city-level pilot introduced in 2020 (Kiss et al., 2023; Sipos & Reszkető, 2019). The Budapest process followed the standard two-stage structure of participatory budgeting. In the first stage, residents submitted proposals for local improvements. These proposals were then reviewed by the Municipality for feasibility and compliance with financial and practical criteria, and only those that met the published requirements proceeded to the voting stage. In the second stage, residents voted on the shortlisted proposals.

For the purposes of this article, the institutional design of participation is especially important. In both analysed cycles, idea submission was available only online. Voting also remained predominantly digital, although limited offline options were provided. In 2020/21, offline voting was initially available at one temporary public voting station and was later extended to one designated library branch in each district. In 2021/22, offline voting was available in 23 district library branches as well as at a small number of additional municipal service points and temporary public voting locations. Even so, participation remained overwhelmingly digital: approximately 92 per cent of all votes were cast online in 2020/21, and this share rose to 98 per cent in 2021/22 despite the broader range of in-person voting opportunities (Municipality of Budapest, 2021, 2022). Thus, although offline access existed in both years, it functioned primarily as a supplementary channel rather than as a fully equivalent alternative to online participation, since idea submission remained entirely digital and offline voting was available only at selected locations rather than through a broadly integrated parallel system.

The structure of the process also matters for understanding participation barriers. In both cycles, idea submitters had to place their proposals into one of three thematic categories with differentiated budget allocations and project-size limits. Participation was open to adults aged 18 and over who lived, worked, or studied in Budapest. Proposals were expected to fit the published thematic structure and to concern projects that could legally and financially be implemented by the metropolitan municipality. The category structure was revised in 2021/22, and where proposals could plausibly fit more than one category, the Mayor's Office made the final classification decision. Proposals then underwent an administrative screening process in which the Municipality assessed whether they met the published criteria in terms of feasibility, budget compatibility, and institutional competence. Voting was also structured by category, and participants were required to cast one vote in each category, meaning that valid participation involved completing the full category-based ballot.

These institutional features are analytically important because the 2020/21 and 2021/22 cycles are the only rounds for which administrative participation data with age information were collected. The demographic information used in the analysis is based on self-declared data provided during registration in these two early cycles. These data are limited in scope: they record participation outcomes, birth year, postal code, and district, but not participants' gender or other demographic variables usable in the present analysis. They also do not include direct measures of digital skills, digital access, technology use, or participants' motivations. The present analysis focuses on age because the article is concerned specifically with age-differentiated participation and the role of the generational digital divide. Age was calculated from self-reported year of birth using the relevant year of participation. Two cases with missing year-of-birth information were excluded from the analysis. We did not identify implausible or extreme values in the year-of-birth variable. The analysis is descriptive and interpretive rather than causal: it identifies age-differentiated participation patterns in a predominantly digital participatory setting and interprets them in light of the literature on digital inequality. While the dataset does not permit independent verification of the reported year-of-birth entries, it remains suitable for descriptive age-group comparisons within the observed participant population. In subsequent cycles, demographic data collection was discontinued in order to reduce participation barriers, so comparable age-based analysis is no longer possible. Later rounds are therefore used here only as contextual background.

The 2020/21 PB round was framed by the Municipality as a pilot intended to strengthen trust in local government, encourage civic innovation, and support democratic decision-making (Oross & Kiss, 2023). The digital platform was developed using the open-source Lutece system in consultation with experts from Paris (Lutece Team, 2020). During the 2020/21 cycle, 687 ideas were submitted and approximately 12,000 people voted; in 2021/22, the number of submitted ideas declined to 440, while the number of voters increased to approximately 21,000. In each cycle, residents could decide on the allocation of approximately one billion HUF (about €2.8 million), although this amount declined in real terms over time because it was not adjusted upwards in nominal terms (Municipality of Budapest, 2024a).

Older adults in Budapest's participatory budgeting

This section examines the participation of older adults in Budapest's participatory budgeting in three steps. It first presents descriptive age patterns in idea submission and voting, then uses survey-based evidence on age-differentiated participation in parliamentary elections as limited contextual background, and finally considers how the more pronounced underrepresentation of older adults in the voting stage can be interpreted.

Participation patterns in idea submission and voting

This subsection presents descriptive age patterns in the 2020/21 and 2021/22 participatory budgeting cycles, the only two rounds for which limited administrative participation data with age information were available for both idea submitters and voters. Throughout the analysis, we use the conventional threshold of 65 years to identify older adults, in line with a widely used convention in ageing-related research (e.g., Lovarini et al., 2019), while those under the age of 65 are treated as younger adults. Where relevant, we also report more fine-grained age breakdowns within later life. To assess underrepresentation, the participation shares observed in the PB process are compared with the age distribution of Budapest's adult population based on the 2022 census.

The descriptive data show that older adults were underrepresented in idea submission in both analysed cycles. Table 1 presents the age distribution of idea submitters in 2020/21 (N = 685) and 2021/22 (N = 440), alongside the age distribution of Budapest's adult population in 2022. In both years, idea submitters were heavily concentrated in the 18–64 age group, which accounted for 89 per cent of submitters in 2020/21 and 88 per cent in 2021/22, compared with 75 per cent in Budapest's adult population. Underrepresentation was visible across all older age groups, and was especially pronounced in the 75–84 and 85+ categories.

Table 1. Age distribution of idea submitters and Budapest's adult population (%)

Age group	Idea submitters 2020/21 (%)	Idea submitters 2021/22 (%)	Budapest adult population 2022 (%)
18–64	89%	88%	75%
65–74	10%	10%	13%
75–84	1%	2%	9%
85+	0%	0.2%	3%
Total	100%	100%	100%

N (idea submitters 2020/21) = 685
N (idea submitters 2021/22) = 440
N (Budapest adult population reference 2022) = 1 432 306

Note: The difference between the 687 ideas recorded in the institutional data and the N = 685 used in this table reflects two cases excluded because of missing year-of-birth information.
Source: Authors' calculations based on Municipality of Budapest data and the 2022 Census database of the Hungarian Central Statistical Office.

The same pattern appears even more strongly in the voting phase. Table 2 presents the age distribution of voters in 2021 (N = 12 279) and 2022 (N = 21 076), again compared with the age distribution of Budapest's adult population in 2022. In both years, the overwhelming majority of voters were aged 18–64: 92 per cent in 2021 and 93 per cent in 2022, compared with 75 per cent in Budapest's adult population. The shares of all older age groups were lower than their population weight, indicating that underrepresentation persisted across the full later-life age range.

Table 2. Age distribution of voters and Budapest's adult population (%)

Age group	Voters 2021 (%)	Voters 2022 (%)	Budapest adult population 2022 (%)
18–64	92%	93%	75%
65–74	6%	5%	13%
75–84	1%	1%	9%
85+	0.4%	0%	3%
Total	100%	100%	100%

N (voters 2021) = 12 279
N (voters 2022) = 21 076
N (Budapest 18+ population reference) = 1 432 306

Source: Authors' calculations based on Municipality of Budapest data and the 2022 Census database of the Hungarian Central Statistical Office.

Comparing the two stages of the process, the underrepresentation of older adults appears more pronounced in voting than in idea submission. The next subsection places this pattern in limited context by drawing on survey-based evidence on age-differentiated participation in another form of civic engagement.

Election participation as a limited contextual comparison

The descriptive patterns reported above raise the question of how older adults' lower involvement in participatory budgeting relates to age differences in other forms of civic engagement. This question is relevant because lower participation by older adults in PB should not automatically be interpreted as evidence of lower civic engagement more generally. In the electoral participation literature, older adults are often found to vote at higher rates than younger adults, although this pattern depends on institutional and contextual conditions and does not necessarily extend to other forms of participation. Goerres (2007), analysing European survey data, shows that previous voting experience increases the likelihood of continued electoral participation later in life. The lower participation of younger adults has also been documented by Highton and Wolfinger (2001). More recently, Barilari et al. (2025), using European Social Survey data, show that the lower turnout of younger cohorts partly catches up as they age, although this catch-up is not always complete.

This broader literature provides background for interpreting the Budapest PB pattern, but it does not provide direct evidence about PB or the reasons for lower participation among older adults. This comparison is not treated as directly equivalent to PB or as a gold standard for civic engagement. Parliamentary elections differ from participatory budgeting in their institutional setting, salience, frequency, and mode of participation. Nevertheless, because they also involve voluntary participation in a collective decision-making process, they can provide a limited contextual reference point for considering whether older adults appear less likely to participate in another civic decision-making context.

To provide such local contextual evidence, we use data from constituency-level public opinion surveys commissioned by the Közös Ország Mozgalom (Common Country Movement) ahead of the 2018 parliamentary elections. Because official election turnout data in Hungary do not provide sufficiently detailed demographic information, this comparison relies on survey-based evidence. The present analysis uses the eight Budapest electoral districts included in Table 3. These electoral districts were selected because the surveys were designed to examine electorally competitive constituencies in which opposition coordination was considered politically relevant. The surveys were conducted between 31 January and 29 March 2018 using random sampling in these eight constituencies and yielded a combined total of 7,998 responses, of which 7,848 were retained after data cleaning. From these responses, we drew on information about respondents' ages and their participation in the 2014 parliamentary elections. We applied the survey weights provided by the Közös Ország Mozgalom to the data analysed.

Table 3. Reported and official voter participation rates in the 2014 parliamentary elections in selected electoral districts in Budapest

Electoral district	Reported participation, 65+ (survey, %)	Reported participation, 18–64 (survey, %)	Age-group gap (percentage points)	Reported participation, total (survey, %)	Official turnout, total (%)	Survey–official gap (percentage points)
1	85.0	72.7	12.2	75.7	71.5	4.2
4	92.5	81.5	11.0	84.3	76.8	7.5
6	80.9	65.6	15.3	68.5	56.9	11.6
10	93.7	76.5	17.2	80.8	70.0	10.8
13	92.7	88.8	3.9	89.9	74.5	15.4
15	96.3	75.1	21.2	79.3	68.8	10.5
17	89.7	73.7	16.1	76.9	65.0	11.9
18	92.0	78.7	13.3	81.8	71.8	10.0
Mean	90.4	76.6	13.8	79.6	69.4	10.2

Note: 'Age-group gap' refers to the difference between the reported participation rates of the 65+ and 18–64 groups in each electoral district. Survey-based percentages were calculated using the survey weights described in the text. N = 7,848. Percentage-point gaps and means were calculated from unrounded estimates, displayed values may therefore not add or subtract exactly because of rounding.
Source: Authors' calculations based on data from the Közös Ország Mozgalom survey and official election results from the National Election Office of Hungary.

Table 3 reports the relevant survey-based participation rates for the selected Budapest electoral districts, alongside official total turnout in those districts. To make the within-sample age comparison more transparent, the table also reports the gap between the 65+ and 18–64 groups in each district. The survey-based total participation figures are higher than the official turnout rates in all selected districts. The survey–official gaps have a mean of 10.2 percentage points, reinforcing the point that the survey-based figures should not be interpreted as accurate estimates of actual turnout levels. One plausible reason for the generally higher survey-based participation figures is that individuals who are least interested in politics may also be less likely to participate in a political survey, thereby raising reported participation within the achieved sample. For the purposes of the present analysis, however, the key point is not the absolute level of reported turnout, but the within-sample comparison between age groups in the selected districts.

Within the survey data, reported participation among respondents aged 65 and over is, on average, 13.8 percentage points higher than among younger respondents across the electoral districts included in the comparison. Older respondents also reported higher participation than younger respondents in each of the eight selected districts. In this limited and indirect sense, the comparison provides suggestive contextual evidence that older respondents in the selected districts were not less likely than younger respondents to report participation in another form of civic decision-making distinct from PB.

This comparison should nevertheless be interpreted with caution. It relies on retrospective survey reporting, covers only selected electoral districts, and refers to elections held before the pandemic, whereas the PB cycles analysed here unfolded in a pandemic-era context. This temporal gap matters because the pandemic appears to have increased digital service use among older adults in Hungary (Zsuffa et al., 2022), even if such change does not in itself eliminate age-related inequalities in digitally mediated participation. The comparison therefore cannot establish why older adults participated less in participatory budgeting. It provides only limited contextual evidence that, within the selected and temporally earlier survey comparison, older respondents did not report lower participation in another civic decision-making context. It cannot distinguish between civic willingness, digital barriers, the perceived importance of participatory budgeting, proposal content, or other possible explanations for lower participation among older adults. The next subsection considers how these age-related participation gaps may be interpreted in light of the institutional design of the PB process.

Interpreting age-related participation gaps in participatory budgeting

A further question arises from the comparison of the two stages of the participatory budgeting process: how should we interpret the fact that the underrepresentation of older adults was more pronounced in voting than in idea submission? Table 4 provides an additional descriptive perspective on this difference by reporting the ratio of voters to idea submitters within the younger (18–64) and older (65+) groups.

Table 4. Ratio of voters to idea submitters in Budapest participatory budgeting

Year of idea submission	Ratio of younger voters to younger idea submitters	Ratio of older voters to older idea submitters
2020/21	18.6	12.7
2021/22	52.2	24.9

Note: Each cell reports the number of voters in the relevant age group divided by the number of idea submitters in the same age group. The ratio does not track the same individuals across stages; it is a descriptive indicator of how much larger the voting pool was than the idea-submission pool within each age group.

As Table 4 shows, in the two years for which data on both idea submitters and voters are available, the ratio of voters to idea submitters was substantially higher among younger adults than among older adults. In descriptive terms, this means that the expansion from idea submission to voting was markedly more pronounced in the younger population. While both age groups were more numerous in the voting stage than in the idea-submission stage, the increase was considerably stronger among younger adults. One plausible interpretation is that the voting stage may have been more effective at expanding participation among groups for whom digitally mediated forms of engagement were less burdensome. In the Budapest process, voting remained overwhelmingly online, and required registration. Participants also had to choose from proposals organised into different categories. These features did not prevent participation altogether, but they may have limited the extent to which older adults beyond those already highly motivated to participate could be drawn into the process. By contrast, participation among younger adults appears to have expanded more strongly once the process moved from a smaller pool of idea submitters to a much broader pool of voters.

This reading is also compatible with a broader distinction between the two stages of participatory budgeting. Generating and submitting an idea usually requires more initiative and effort than voting on existing proposals, while voting can be more easily scaled up once awareness of the process has spread. A relevant strand of the literature suggests that younger people are often less likely to participate in community and political activities under ordinary circumstances, but that their participation can increase more quickly when the costs of action are lower and the mode of participation is accessible and familiar (Arceneaux & Nickerson, 2009; Nickerson, 2006; Panagopoulos & Abrajano, 2014). Relatedly, research on youth participation suggests that lower-cost and more direct forms of engagement can be easier to expand among younger cohorts, especially when digital tools are involved (Boulianne & Theocharis, 2020; Green & Gerber, 2001; Holbein & Hillygus, 2016). Ferrali et al. (2023) likewise show that younger people can be recruited relatively easily to low-cost forms of online voting, which fits the broader expectation that participation expands more readily when the time and effort costs of engagement decline. Thijssen and Van Dooren (2016) also highlight two widely discussed hypotheses that are relevant here: the Differential Skill Hypothesis, according to which younger cohorts are more likely to engage through online tools than through offline means, and the Differential Gratification Hypothesis, according to which younger people are more inclined to participate in activities that allow them to express their views directly rather than merely perform instrumental tasks. In this sense, the stronger expansion of younger participation at the voting stage can be read as compatible with existing literature, although the present data do not allow these mechanisms to be tested directly.

At the same time, the older age group may have faced a different configuration of constraints. This is not to suggest that younger people are inherently more capable participants, but rather that digitally mediated participation may be more routine for younger cohorts in everyday life, whereas older adults may be more likely to face uneven access, weaker digital confidence, or greater difficulty with platform-based procedures (Bennett et al., 2008). In the context of the Budapest PB process, this distinction may matter especially at the voting stage, where participation was scaled up through an overwhelmingly online system. The interpretation proposed here is also consistent with Kovács's (2024) findings on strong civic involvement in local public affairs in two Budapest districts with participatory budgeting, which suggest that lower participation by older adults in the present case should not be read simply as evidence of civic disengagement. Taken together, the descriptive evidence is consistent with the possibility that broader participation among younger adults may have been easier to expand through mobilisation into a low-cost voting stage, whereas participation among older adults may have been more sensitive to the accessibility of digitally mediated participation. This distinction may also be read in light of Motivation Intensity Theory (Brehm & Self, 1989), which suggests that willingness to invest effort depends on whether a task is seen as manageable and worthwhile. In the context of participatory budgeting, generating and submitting an idea demands more initiative than voting on existing proposals, whereas voting may appear to younger adults as a lower-cost, more easily manageable form of participation.

This offers one possible interpretation of why the age gap appears more pronounced at the voting stage as participation expands.

This interpretation should nevertheless be treated cautiously. The administrative PB data capture participation outcomes, but not the underlying motivations, competences, or constraints that may have shaped them. The available data do not directly measure digital skills, confidence, or platform-specific barriers. Accordingly, the ratio should be read as descriptive evidence of age-differentiated involvement, rather than as a direct test of the mechanisms underlying this difference. We also cannot rule out that differences in proposal themes, policy salience, and the substantive attractiveness of the issues on offer shaped age-differentiated participation patterns alongside barriers associated with digitally mediated participation. Future research could strengthen this interpretation by examining more directly how older non-participants experience registration, navigation, and other platform-specific barriers. Even so, the pattern remains compatible with the article's central interpretation: in a predominantly digital participatory process, digitally mediated participation requirements may contribute to a sharper age gap when participation scales up from idea submission to voting. From a practical perspective, this suggests that formal online availability alone is unlikely to ensure inclusive participation across generations. If participatory budgeting is intended to broaden involvement, then participatory design may need to combine general mobilisation efforts with more targeted measures to reduce potential digital barriers among older adults. This may include simpler procedures, assisted participation, and genuinely accessible offline or hybrid channels. More broadly, the generational digital divide should be understood not only as a background inequality, but also as a practical design challenge for inclusive democratic participation, with implications for the longer-term civic inclusion of older adults and, more broadly, for sustainable ageing.

Conclusions

This article has examined the participation of older adults in Budapest's participatory budgeting during the 2020/21 and 2021/22 cycles. The descriptive analysis has shown that older adults were underrepresented in both the idea-submission phase and, even more strongly, in the voting phase. Taken together, the descriptive patterns presented in the article are consistent with the interpretation that digitally mediated participation requirements may have contributed to age-differentiated participation patterns in this predominantly online participatory process.

When read alongside the limited election comparison presented above, these findings provide suggestive contextual evidence that lower participation by older adults in participatory budgeting should not automatically be interpreted as lower civic willingness. The comparison cannot establish whether civic willingness, digital barriers, the perceived importance of participatory budgeting, proposal content, or other factors explain the lower participation of older adults in PB. Rather, the findings raise broader concerns about the inclusiveness of digitally organised democratic participation, since inequalities in access to and use of digital technologies may systematically shape patterns of civic engagement (Norris, 2001). From this perspective, meaningful participation depends not only on formal rights, but also on whether citizens have an effective opportunity to take part in collective decision-making (Dahl, 1971; Sen, 1999). More specifically, the article is primarily concerned with the civic and technological inclusion dimensions of sustainable ageing by examining how digitally organised participation may shape older adults' effective opportunities for public involvement. In this sense, the study also highlights digital capability as an important link between technological change, democratic participation, and later-life inclusion.

The findings also have practical implications for the design of participatory institutions. If participatory budgeting is intended to broaden involvement across generations, formal online availability alone is unlikely to ensure inclusive participation. More inclusive participatory design may require a combination of broader mobilisation efforts and more targeted measures to reduce potential digital barriers among older adults, including simpler procedures, assisted participation, and genuinely accessible offline or hybrid channels. Even where offline options are available, however, not all of them are equally likely to reduce age-related barriers, since some in-person channels may themselves be more accessible to certain demographic groups than to others. Lower participation by older adults may also mean that

forms of experience and local knowledge available in later life are less likely to be reflected in participatory agenda-setting and voting outcomes.

Subsequent changes in Budapest's PB process point partly in this direction. In the 2023/24 PB round, additional offline voting opportunities were introduced. At the same time, idea submission remained entirely online and 98 per cent of votes continued to be cast digitally (Municipality of Budapest, 2024b). The registration process was also simplified, which may have reduced some participation barriers. However, this simplification also meant that age data were no longer collected, making analyses of the kind presented in this article difficult to reproduce in future cycles.

From a sustainable ageing perspective, participatory budgeting can therefore be understood not merely as a digital service, but as a form of capability-sensitive civic infrastructure that shapes older adults' effective opportunities to remain active participants in public life. This also helps clarify the relationship between active ageing and sustainable ageing in the present study: civic participation is treated here not as an abstract normative ideal, but as one concrete dimension through which later-life inclusion can be observed empirically. On this basis, interventions aimed at reducing technical barriers and strengthening assisted or hybrid forms of participation become relevant not only for improving access to participatory budgeting, but also for supporting older adults' continued civic inclusion more broadly.

In practical terms, involving older adults more effectively in participatory budgeting may require not only more offline opportunities, but also support in using online tools. One possible approach would be to provide assisted participation in institutions such as libraries, health-related service points, or other easily accessible municipal venues. Peer-to-peer support may also be relevant here, especially where older adults who are already confident users of digital tools can help others navigate the process. Existing research suggests that such forms of support can be effective in strengthening digital participation and confidence among older adults (e.g., Korpela et al., 2023; Mateos-González et al., 2025; Peng et al., 2026).

Looking ahead, narrowing the generational digital divide is unlikely to occur automatically. Technological change in democratic participation will continue, and inclusion in such processes cannot be assumed simply because digital tools become more widespread. Policies concerned with sustainable ageing should therefore treat digital civic participation as an important component of later-life inclusion, and should ensure that innovation in democratic participation is accompanied by inclusive design and targeted support for older adults.

Statements and declarations

Competing interests

The authors declare no competing interests.

Role of the authors

É.B. established the concept of the paper and wrote the main manuscript text. J.G. contributed to and revised the text. M.R. obtained the data. É.B. and J.G. conducted the statistical calculations. J.G., M.K., J.K., and M.R. provided background information on participatory budgeting. M.K. contributed to the literature review. M.R. organised discussions with experts from the Municipality of Budapest. É.B. and J. G. revised the paper. All authors read and approved the final version of the manuscript and provided comments on earlier drafts.

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